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FINAL REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT OPERABLE UNIT 8 (OU 8) NSY PORTSMOUTH ME

7/1/2016

TETRA TECH

Final
Remedial Investigation/Feasibility Study Report
for
Operable Unit 8

Portsmouth Naval Shipyard

Kittery, Maine

Naval Facilities Engineering Command
Mid-Atlantic

Contract Number N62470-08-D-1001
Contract Task Order WE32

July 2016

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FINAL
REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 8

PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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CERTIFIED MAINE GEOLOGIST CERTIFICATION

By affixing my seal to this report, I certify that the geologic data and interpretations stated in this *Remedial Investigation/Feasibility Study Report for Operable Unit 8 Portsmouth Naval Shipyard, Kittery, Maine,* prepared by Tetra Tech, Inc., and dated July 2016, are true and accurate to the best of my knowledge. I further certify that I am certified to practice geology in the State of Maine and that it is within my professional expertise to verify the correctness of this information.

STATE OF MAINE
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7/7/16

Timothy S. Evans, C.G. Date

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MAINE PROFESSIONAL ENGINEER CERTIFICATION PAGE

I hereby acknowledge that Sections 7.0 through 10.0 and associated appendices of this Remedial Investigation/Feasibility Study Report for Operable Unit 8 at Portsmouth Naval Shipyard, Kittery, Maine, dated July 2016, were prepared with my consultation and review.

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ACRONYMS AND ABBREVIATIONS

ALM	Adult Lead Model
ABS	Absorption efficiency
ADAF	Age dependent adjustment factor
ARAR	Applicable or Relevant and Appropriate Requirement
ATSDR	Agency for Toxic Substances and Disease Registry
BAP	Benzo(a)pyrene
bgs	Below ground surface
CD	Compact disc
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIA	Controlled Industrial Area
CLEAN	Comprehensive Long-Term Environmental Action Navy
CNS	Central nervous system
COC	Chemical of concern
COPC	Chemical of potential concern
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
CSF	Cancer slope factor
CSM	Conceptual Site Model
CTE	Central tendency exposure
CTO	Contract Task Order
DMR	Department of Marine Resources
DQR	Data quality review
EPC	Exposure point concentration
EPH	Extractable petroleum hydrocarbon
EU	Exposure unit
°F	Degrees Fahrenheit
FFA	Federal Facility Agreement
FS	Feasibility Study
FY	Fiscal Year
GHG	Greenhouse gas
GRA	General response action
GS	Gastrointestinal system
HEAST	Health Effects Assessment Summary Table
HHRA	Human Health Risk Assessment
HI	Hazard index

HQ	Hazard quotient
HSWA	Hazardous and Solid Waste Amendments
IAS	Initial Assessment Study
IEUBK	Integrated Exposure Uptake Biokinetic
ILCR	Incremental lifetime cancer risk
IRIS	Integrated Risk Information System
IRP	Installation Restoration Program
IUR	Inhalation unit risk
LUC	Land use control
MEDEP	Maine Department of Environmental Protection
mg/kg	Milligram per kilogram
MLW	Mean Low Water
NA	Not applicable
NAD	North American Datum
NAVD	North American Vertical Datum
NAVFAC	Naval Facilities Engineering Command
NCEA	National Center for Environmental Assessment
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NERP	Navy Environmental Restoration Program
NHDES	New Hampshire Department of Environmental Services
NPL	National Priorities List
NPW	Net present worth
NOAA	National Oceanic and Atmospheric Administration
O&M	Operations and maintenance
OSHA	Occupational Safety and Health Act
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
PAH	Polycyclic aromatic hydrocarbon
PCB	Polycholorinated biphenyl
PEF	Particulate emission factor
PNS	Portsmouth Naval Shipyard
PPE	Personal protective equipment
PPRTV	Provisional Peer Reviewed Toxicity Value
ppt	Part per thousand
PRAP	Proposed Remedial Action Plan
PRG	Preliminary remediation goal
RAB	Restoration Advisory Board

RAG	Remedial Action Guideline
RAGS	Risk Assessment Guidance for Superfund
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RfC	Reference concentration
RfD	Reference dose
RFI	RCRA Facility Investigation
RI	Remedial Investigation
RME	Reasonable maximum exposure
ROD	Record of Decision
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SMP	Site Management Plan
SSI	Site Screening Investigation
SVOC	Semivolatile organic compound
SWMU	Solid Waste Management Unit
TAL	Target Analyte List
TBC	To be considered
TCL	Target Compound List
TEQ	Toxicity equivalency quotient
TEF	Toxicity equivalence factor
TOC	Total organic carbon
TSD	Treatment, storage, and disposal
UCL	Upper confidence limit
USEPA	United States Environmental Protection Agency
VDEQ	Virginia Department of Environmental Quality
VISL	Vapor Intrusion Screening Level
VOC	Volatile organic compound
µg/dL	Microgram per deciliter
µg/kg	Microgram per kilogram
µg/L	Microgram per liter

EXECUTIVE SUMMARY

This Remedial Investigation(RI)/Feasibility Study (FS) Report for Operable Unit (OU) 8 at Portsmouth Naval Shipyard (PNS), Kittery, Maine, was prepared by Tetra Tech for the United States Department of the Navy, Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic, under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Program, Contract Number N62470-08-D-1001, Contract Task Order (CTO) WE32. OU8 consists of Site 31 – Former West Timber Basin. This RI/FS Report was prepared to fulfill the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by Superfund Amendments and Reauthorization Act (SARA).

The purpose of the RI/FS Report for OU8 is to: (1) characterize the nature and extent of contamination; (2) evaluate potential risks to human receptors; and (3) prepare and evaluate remedial alternatives for OU8 contamination. OU8 is in an area that is currently and has historically been an industrial area with no onshore ecological habitats; therefore, potential onshore ecological risks were not evaluated. Current and future potential for unacceptable risks from offshore migration of contaminants from the site via groundwater discharge to the offshore are considered to be unlikely because the majority of site soil is in the tidally saturated and saturated zones, and because historical offshore impacts from potential past releases from OU8 were considered in the evaluation of OU4. No adverse impacts associated with OU8 activities were identified in the offshore area.

The operations that resulted in the release of contamination at OU8 were related to the filling of the former timber basin and past industrial uses of the site, including a metal washing plant and plate yard. The majority of filling of the former timber basin was completed by 1925, when only a small area in the southwestern corner had not been filled. By 1940, filling of the former timber basin was complete. Fill material included rocks, soil, bricks, metal debris, cinders, wood, gravel, and other waste materials. Industrial activities at OU8 included metal washing and pickling, a plate yard, potassium nitrate storage, equipment storage, and office building and trailer use. Some of the by-products of operations in the metal washing plant, which operated for approximately 3 years, may have been discarded into the former West Timber Basin, including metals, ash, and skimmings.

The boundary of the site was considered upon review of historical maps and documents. The eastern and western quay walls have been used to define the eastern and western boundaries, in conjunction with the sampling results east and west of the quay walls. The northern boundary was based on the extent of OU8 operations, as defined by the former location of Building 53. The approximate location of the southern quay wall was used as the southern boundary of OU8, but the southern quay wall has not been able to be confirmed. Because the southern quay wall has not been field located and there are no

other borings south of the quay wall, it is possible that the actual location of the quay wall may be shifted south. Therefore, extending the southern boundary of OU8 10 to 20 feet to the south is recommended to account for the uncertainty in the southern extent of the site.

For the RI, soil and groundwater data were evaluated, the nature and extent of contamination were defined, and risks associated with the site were determined. Debris materials within the fill material include slag, ash, metal, cinders, coal, wood, and brick. Metals and polycyclic aromatic hydrocarbons (PAHs) were detected in surface and subsurface soil samples. Based on evaluation of the data, there is not a clear relationship between the presence or absence of debris and the detected analytical results. Based on the risk evaluation, there are potentially unacceptable risks for hypothetical future residential receptors exposed to surface soil and to subsurface soil and for hypothetical future recreational users exposed to subsurface soil. There are potentially unacceptable risks for construction and occupational workers (referred collectively to as industrial workers) exposed to subsurface soil. Based on the risk conclusions, groundwater is not a medium of concern for OU8.

For remedial evaluations, the carcinogenic PAHs (cPAHs) are evaluated in terms of equivalency of toxicity to benzo(a)pyrene (BAP) expressed as a single concentration called the BAP toxicity equivalency quotient (TEQ). The main chemicals contributing to unacceptable residential exposure are cPAHs in surface soil and antimony, arsenic, cobalt, copper, iron, lead, manganese, and mercury in subsurface soil. Only antimony and lead in subsurface soil were found to present a risk to current receptors (industrial workers) and to hypothetical future recreational users.

Remedial Action Objectives (RAOs) are medium-specific goals for protecting human health and the environment. RAOs are required to specify the chemicals of concern (COCs), exposure routes and receptors of concern, and an acceptable contaminant level or range of levels for each exposure route. Acceptable contaminant levels are based on site-specific preliminary remediation goals (PRGs) as a starting point, after which final remediation goals (cleanup goals) are determined when a remedy is selected. The following RAOs have been developed for OU8:

- Prevent residential exposure through ingestion of, inhalation of dust from, and dermal contact with surface soil containing cPAHs concentrations exceeding residential PRG, and subsurface soil containing antimony, arsenic, cobalt, copper, iron, lead, manganese, mercury, and cPAHs concentrations exceeding residential PRGs.

- Prevent recreational exposure through ingestion of, inhalation of dust from, and dermal contact with subsurface soil containing antimony and lead concentrations exceeding recreational PRGs.

- Prevent industrial worker exposure through ingestion of, inhalation of dust from, and dermal contact with subsurface soil with antimony, and lead concentrations exceeding industrial PRGs.

PRGs have been developed on a receptor-specific basis for protection of human health from exposure to soil contaminants. The PRGs were used to determine the remediation areas and volumes to be addressed by alternatives in this FS. The hypothetical future residential and recreational use scenarios were combined for consideration of remediation areas for hypothetical future users and current construction and occupational worker use scenarios were combined for consideration of remediation areas for industrial use.

Remedial alternatives were prepared from applicable technology types and process options considering the RAOs. The No Action alternative is included, as required under CERCLA, to establish a basis for comparison with other alternatives. Two alternatives were developed for OU8 in addition to No Action (Alternative 1); Land Use Controls (LUCs) (Alternative 2), and Limited Excavation and LUCs (Alternative 3). An alternative for excavation of contaminated material across the entire site to achieve unlimited use and unrestricted exposure was not fully developed because of high costs (excavation and disposal alone, without costs for site preparation or support, decontamination, post-construction tasks, etc., would be approximately $12.6 million) and the disruption that construction would cause to day-to-day Shipyard operations (e.g. potential utility interferences and parking restrictions).

In the detailed analysis section of this RI/FS Report, each alternative is evaluated against seven of the nine CERCLA criteria. In selecting a remedy, in accordance with CERCLA, overall protectiveness of human health and the environment and compliance with Applicable or Relevant and Appropriate Requirements (ARARs) are “threshold criteria” that *must* be satisfied for an alternative to be eligible for selection. Reduction of toxicity, mobility, or volume through treatment, short-term effectiveness, long-term effectiveness and permanence, implementability, and cost are “balancing criteria” that are used to weigh trade-offs among alternatives. Two of the nine CERCLA criteria (state and community acceptance), not evaluated as part of this FS, are “modifying criteria.” After a preferred alternative has been identified and submitted for public comment via the Proposed Remedial Action Plan (PRAP), the modifying criteria are taken into account during preparation of the Record of Decision (ROD). Table ES-1 provides a summary of the comparative analysis.

TABLE ES-1: SUMMARY OF COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES			
ALTERNATIVE	**ALTERNATIVE 1**	**ALTERNATIVE 2**	**ALTERNATIVE 3**
Estimated Time Frame (months)			
Designing and Constructing the Alternative	N/A	12	22
Achieving the Cleanup Objectives	N/A	12	22
Criteria Analysis			
Threshold Criteria			
Protects Human Health and the Environment Ø Will it protect you and plant and animal life on and near the site?	¡	l	l
Meets federal and state regulations Ø Does the alternative meet federal and state environmental statutes, regulations and requirements?	N/A	l	l
Primary Balancing Criteria			
Provides long-term effectiveness and is permanent Ø Will the effects of the cleanup last?	¡	£	l
Reduces mobility, toxicity, and volume of contaminants through treatment Ø Are the harmful effects of the contaminants, their ability to spread, and the amount of contaminated material present reduced?	¡	¡	¡
Provides short-term protection Ø How soon will the site risks be reduced? Ø Are there hazards to workers, residents, or the environment that could occur during cleanup?	N/A	l	£
Can it be implemented Ø Is the alternative technically feasible? Ø Are the goods and services necessary to implement the alternative readily available?	N/A	l	¡
Cost ($) Ø Upfront costs to design and construct the alternative (capital costs) Ø Operating and maintaining any system associated with the alternative (O&M costs) Ø Periodic costs associated with the alternative (periodic costs) Ø Total cost in today's dollars (30-year NPW cost)	$0	$15,000 capital 30-year NPW: $197,000	$13,702,000 capital 30-year NPW: $13,884,000
Modifying Criteria			
State Agency Acceptance Ø Does MEDEP agree with the Navy's recommendation?	To be determined after the public comment period on the Proposed Remedial Action Plan.		
Community Acceptance Ø What objections, suggestions, or modifications does the public offer during the comment period?	To be determined after the public comment period on the Proposed Remedial Action Plan.		
Relative comparison of the nine balancing criteria and each alternative: l – Good , £ – Average, ¡ – Poor; N/A – not applicable O&M – Operation and Maintenance N/A – Not Applicable NPW – Net Present Worth			

1.0 INTRODUCTION

This Remedial Investigation (RI)/Feasibility Study (FS) Report for Operable Unit (OU) 8 at Portsmouth Naval Shipyard (PNS), Kittery, Maine, was prepared by Tetra Tech for the United States Department of the Navy, Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Program, Contract Number N62470-08-D-1001, Contract Task Order (CTO) WE32. The OU8 RI/FS Report was prepared to fulfill the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA) and is consistent with United States Environmental Protection Agency (USEPA) Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (October 1988) and the Navy Environmental Restoration Program (NERP) Manual, Chapter 8, Remedial Investigation/Feasibility Study (August 2006).

1.1 PURPOSE AND SCOPE OF REPORT

The purpose of the RI/FS for OU8 is to: (1) characterize the nature and extent of contamination in soil and groundwater; (2) evaluate current and future potential risks to human receptors; and (3) prepare and evaluate remedial alternatives to address unacceptable risks at OU8. OU8 is in an area that is currently and has historically been used for industrial purposes and has no onshore ecological habitat. Also, the offshore area associated with OU8 has been investigated as part of OU4, and no further action was selected as the remedy for this area in the OU4 Record of Decision (ROD) (Navy, August 2013). Therefore, potential ecological risks were not evaluated. Current and future potential offshore migration of contaminants from the site via groundwater discharge to the offshore was also not evaluated as part of the RI for OU8 because migration of groundwater to the offshore has been investigated as part of OU4 investigations, and no contamination was found to be present in the offshore area associated with OU8.

This RI/FS Report is a culmination of the evaluation of data collected under various investigations, as discussed in Section 1.4. The investigations included sampling of soil and groundwater at OU8, sampling of groundwater upgradient and downgradient of OU8, and a tidal study of the groundwater at OU8. This report describes the data collected and the formulation and evaluation of remedial alternatives to address the potentially unacceptable risks to human health at OU8.

1.2 REPORT ORGANIZATION

This report has been organized into the following 10 sections:

- Section 1.0 – Introduction: This section provides a description of the purpose and scope of the RI/FS Report; facility and site descriptions and histories; and summaries of previous OU8 environmental investigations.

- Section 2.0 – Study Area Investigation: This section describes the RI sampling activities and includes a discussion of data usability.

- Section 3.0 – Site Characterization: This section describes demography, land use, surface features, soils, geology, hydrogeology, surface water use, hydrogeology, ecology, and climatology for the site area.

- Section 4.0 – Nature and Extent of Contamination: This section discusses the types, magnitudes, and spatial distribution of contaminants present in soil and groundwater at OU8.

- Section 5.0 – Contaminant Fate and Transport Analysis: This section discusses the chemical and physical properties of the chemicals detected at levels exceeding screening criteria at OU8, and also discusses the Conceptual Site Model (CSM), which addresses contaminant migration pathways, exposure routes, and potential receptors.

- Section 6.0 – Human Health Risk Assessment: This section presents the Human Health Risk Assessment (HHRA) for OU8.

- Section 7.0 – Remedial Action Objectives: This section presents Applicable or Relevant and Appropriate Requirements (ARARs), the media of concern, Remedial Action Objectives (RAOs), preliminary remediation goals (PRGs), and areas and volumes of soil to be addressed by the remedial alternatives developed for OU8.

- Section 8.0 – Identification and Screening of Technologies and Development of Alternatives: This section discusses the general response actions (GRAs) identified to attain the RAOs, discusses the screening of technology types and process options, provides descriptions and evaluations of technologies, and summarizes the development of alternatives.

- Section 9.0 – Description and Detailed Analysis of Remedial Alternatives: This section describes the conceptual design of the alternatives and discusses the detailed analysis of alternatives using seven of the nine criteria of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

- Section 10.0 – Comparative Analysis of Alternatives: This section provides a comparison of the alternatives using the detailed analysis information in Section 9.0.

Appendix A contains supporting information for the RI including a discussion of historical uses, figures displaying historical shorelines, and site boundary evaluation, soil boring and monitoring well construction logs for OU8 and adjacent areas, results of the 2015 tidal lag study and the slug tests, OU8 sample list, 2015 sampling, field, and survey information and construction worker screening level development for groundwater. Appendix B contains analytical results, including the complete OU8 database printout for soil and groundwater samples and upgradient and downgradient groundwater samples, background evaluations, and 2015 data validation reports and data quality review (DQR). Appendix C contains details supporting the HHRA. Appendix D provides supporting information including a discussion of PRG development. Appendix E provides alternative-specific ARARs tables. Appendix F provides cost estimates for the alternatives and area and quantity calculations for the alternatives evaluated. Appendix G provides an environmental footprint evaluation of the remedial alternatives evaluated in this RI/FS. Appendix H provides responses to regulatory comments on the draft version of this RI/FS Report.

1.3 FACILITY AND OU8 DESCRIPTION AND HISTORY

This section provides descriptions and histories for PNS and OU8.

1.3.1 Facility Description and History

PNS is a military facility with restricted access located on an island located in the Piscataqua River, as shown on Figure 1-1. PNS is referred to on National Oceanic and Atmospheric Administration (NOAA) nautical charts as Seavey Island, with the eastern tip given the name Jamica Island. Clark's Island is to the east, attached by a rock causeway to Seavey Island. The Piscataqua River is a tidal estuary that forms the southern boundary between Maine and New Hampshire. PNS is located in Kittery, Maine, north of Portsmouth, New Hampshire, at the mouth of the Great Bay Estuary (commonly referred to as Portsmouth Harbor).

PNS is engaged in the conversion, overhaul, and repair of submarines for the Navy. The long history of shipbuilding in Portsmouth Harbor dates back to 1690, when the first warship launched in North America, the Falkland, was built. The first government-built submarine was designed and constructed at PNS during World War I. A large number of submarines have been designed, constructed, and repaired at this facility since 1917. PNS continues to service submarines as its primary military focus.

Prior to enactment of CERCLA and Resource Conservation and Recovery Act (RCRA) regulation, years of shipbuilding and submarine repair work resulted in hazardous substances being released into soil,

groundwater, surface water, and sediment on and around PNS. As a result, investigation and remediation activities were performed under the Department of Navy Installation Restoration Program (IRP). Paralleling CERCLA, the IRP focuses on the cleanup of contamination from past hazardous waste operations and past hazardous material spills as is further discussed in the Fiscal Year (FY) 2016 Amended Site Management Plan (SMP) for PNS (Navy, November 2015).

Investigations of hazardous substance releases at PNS began in 1983 with the Initial Assessment Study (IAS) (Weston, June 1983). USEPA became involved with PNS in 1985 when the agency requested information on PNS' hazardous wastes and conducted a visual site inspection under RCRA authority. Since 1988, the Maine Department of Environmental Protection (MEDEP) has also provided oversight of investigation and remediation of PNS. In March 1989, USEPA issued a Corrective Action Permit under the RCRA Hazardous and Solid Waste Amendments (HSWA) of 1984 (March 1989) that required PNS to investigate 13 Solid Waste Management Units (SWMUs) and take appropriate corrective action. Until the mid-1990s, investigations at PNS were conducted under RCRA authority. Effective May 31, 1994, PNS was included on the National Priorities List (NPL), and subsequent studies have been conducted under the authority of CERCLA, commonly known as Superfund. Consistent with the transition from RCRA to CERCLA, the SWMUs were renamed as "sites". Ongoing studies to develop and evaluate remedial alternatives are conducted as part of FSs (CERCLA terminology).

The Federal Facility Agreement (FFA) for PNS was signed by USEPA and the Navy in September 1999, became effective February 2000, and supersedes the HSWA Permit. The State of Maine has elected not to be a party to the FFA at this time; however, the state is afforded a participatory role in the site remediation process in accordance with CERCLA. Among other things, the FFA outlines roles and responsibilities, establishes deadlines/schedules, outlines work to be performed, and provides a dispute resolution process for primary documents. The FFA ensures that CERCLA decisions will be consistent with RCRA and other federal and state hazardous waste statutes and regulations, as appropriate for the sites at PNS.

1.3.2 OU8 Description and History

OU8 consists of Site 31 – Former West Timber Basin, which is located in the Controlled Industrial Area (CIA) in the western portion of PNS, as shown on Figure 1-1. Site 31 is an industrial area that was previously filled with various materials and is bounded on the east, west, and south by historical quay walls, as shown on Figure 1-2. There are two main buildings bordering and partially contained within OU8, Building 92 on the east and Building 174 on the west. An addition to Building 174 was completed in 2013, and intrusive activities underneath and within the building for environmental activities are prohibited. Additional utility corridors were also installed during new building construction, and utility corridors also existed previously on site. The abundance of utilities on site may present obstacles to future construction, potential sampling, and site use. Previous investigations at OU4 (offshore) monitoring stations MS-13 and

MS-14 (shown on Figure 1-1) have shown that contaminants are not migrating to the offshore areas of OU8 at unacceptable levels (Navy, August 2013).

The known OU8 site history information is based on the Industrial History of the West Timber Basin (Dolph and Bolger, May 1996) and review of historical maps of the OU8 area. Naval warships built at PNS throughout the 19th Century were constructed with wood, and the wet storage and seasoning (drying) of the wood was conducted in the West Timber Basin. A new timber basin was constructed beginning in 1910 on the eastern side of the Shipyard, and by 1913, wet storage of timber in the West Timber Basin had ceased and was conducted in the new timber basin. Around 1917, the former West Timber Basin's granite block quay wall was enclosed, the northern portion of the former timber basin was partially filled, and a metal washing plant, Building 110, was constructed to further extract essential scrap. Between 1920 and 1940, cleaning of steel plates and pickling continued in the area of Building 110. Based on excavations and borings advanced at the site during various investigations, the fill material appears to consist of rocks, soil, bricks, metal debris, cinders, wood, gravel, and other waste materials. Some of the by-products of operations in the metal washing plant, which operated for approximately 3 years, may have been discarded into the former West Timber Basin, including metals, ash, and skimmings (Dolph and Bolger, May 1996).

The majority of filling of the former timber basin was completed by 1925, when only a small area in the southwestern corner had not been filled. By 1940, filling of the former timber basin was complete. Fill apparently included soil, rock, cinders, and other industrial debris. By 1940, Building 92 had been extended into the former West Timber Basin fill area. Around 1940, a metal plate yard was also constructed that included a traveling crane, four pickling tanks, two washing aprons, and a potassium nitrate storage building (Building 157). There is no evidence to date of plating operations taking place at the site. Also in 1940, Building 110, the metal washing plant was razed. The pickling tanks at the plate yard appear to have been active for approximately 20 years and the plate yard was the primary steel storage and pickling location at the Shipyard. The pickling tanks for the plate yard were removed from the site at an unknown time. Filling west of the former timber basin began sometime after 1941, and by 1947, the fill area west of OU8 extended to the current shoreline, and Buildings 174 and 175 had been built.

Based on review of maps from the 1960s to present and site historical information (included in Appendix A.1), the plate yard was in use until the late 1990s. Storage of potassium nitrate in Building 157 ended in the 1990s, and the building was subsequently used as an office. The former plate yard was used for equipment storage and temporary facilities until 2006 when Building 157 and associated surface features were removed. The area is now used for office trailers, temporary buildings, and equipment storage. The area was defined as a potential IRP site in the 1990s, and environmental investigations began as discussed further in Section 1.4. Additional information on the site history and historical maps are included in Appendix A.1.

The boundary of the site was determined based on review of historical maps and documents as discussed in Appendix A. The eastern and western quay walls are used to define the eastern and western boundaries, in conjunction with soil sampling results east and west of the quay walls. The northern boundary is based on the approximate extent of OU8 operations, as defined by the location of former Building 53. The approximate location of the southern quay wall is used as the southern boundary of OU8; however, the location of the southern quay wall has not been confirmed in the field. One geotechnical boring (TB-117) collected by the Shipyard as part of construction activities for Building 92 was located south of the approximate location of the quay wall. Soil boring TB-117 was found to contain cinders and rock fragments at multiple depths, suggesting that the boring location contained fill material. Because the southern quay wall has not been field located, it is possible that the actual location of the quay wall may be several feet further south. Therefore, extending the southern boundary of OU8 20 feet to the south (to include boring TB-117) is recommended to account for the uncertainty in the southern extent of the site. Because this historical review was conducted as part of the RI, the boundary has not been changed on the RI figures; however, the change is reflected on the figures associated with the alternatives presented in the FS sections.

1.4 SUMMARY OF ENVIRONMENTAL REPORTS AND ACTIONS AT OU8

This section provides summaries of previous reports that included investigation of onshore areas of OU8. Figure 1-3 presents previous and RI soil and groundwater sample locations for the onshore area. A list of samples collected and associated analyses by investigation that were included in the RI are presented in Table A.1 in Appendix A.5.

Environmental sampling at OU8 was conducted as part of the Site Screening Investigation (SSI) in 1998 (Tetra Tech, May 2000), the objectives of which were to determine the presence or absence of contamination remaining from past industrial operations and to determine whether further investigation was needed to assess the extent and potential hazards associated with contamination. Surface soil, subsurface soil, and groundwater samples were collected in areas with past industrial activities that may have resulted in potential contamination of soil. Soil samples collected during the SSI were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides and polychlorinated biphenyls (PCBs); Target Analyte List (TAL) metals and cyanide; hexavalent chromium; sulfate; total organic carbon (TOC); petroleum hydrocarbons (diesel and gasoline range); and pH. Analytical results for SSI surface soil and subsurface soil samples are shown on the database printouts in Appendix B. Consistent with the presence of debris-like materials in the subsurface, maximum concentrations of PAHs and metals were detected in subsurface soil. Only metals (iron, lead, manganese, and mercury) and PAHs were detected in site soils at concentrations exceeding USEPA industrial risk-based screening levels and PNS-specific background concentrations. Risk-based screening levels

represent concentrations above which chemical concentrations potentially pose a risk to human health, and concentrations exceeding background levels indicate potential site-related contamination.

There was one mercury exceedance in soil detected during the 1998 SSI sampling, at WTB-SB05. The mercury exceedance was unexpected considering that the site history did not indicate any reason for elevated mercury concentrations in soil, and the concentration detected at location WTB-SB05/WTB-MW05 was significantly greater than the range of other mercury concentrations detected at OU8 and other PNS sites. Low levels of PAHs detected sporadically throughout the site suggest that these levels may be attributable to ongoing industrial activities at the site. Hexavalent chromium was not detected in soil; therefore, chromium at OU8 can be assumed to be in the trivalent oxidation state. The site history did not indicate a reason to suspect VOC, SVOC, pesticide or PCB contamination, and this was confirmed because there were no risk-based screening level exceedances for these compounds during the SSI.

Groundwater samples collected during the SSI were analyzed for TCL VOCs, SVOCs, and pesticides/PCBs; total TAL metals and cyanide; hexavalent chromium; TOC; petroleum hydrocarbons (diesel and gasoline range); alkalinity; chloride; bromide; sulfate; nitrate; pH, and salinity. Table C.6.1 in Appendix C presents analytical results for SSI groundwater samples. Several metals (aluminum, arsenic, iron, manganese, mercury, and potassium) were detected at concentration in excess of residential screening levels (based on drinking water standards) and site-specific background concentrations in groundwater. No chemicals were detected at concentrations exceeding industrial screening levels and site-specific background concentrations. No correlation was made between concentrations of metals in soil that exceeded soil screening criteria and those that exceeded groundwater criteria. The site history did not indicate a reason to suspect the presence of VOC, SVOC, pesticide or PCB contamination, and this was confirmed because there were no risk-based criteria exceedances of these compounds during the SSI. Although PAHs and some metals were not detected in groundwater during the SSI, they remained contaminants of interest after the SSI based on soil concentrations detected and known previous activities conducted on site. In addition, detection limits for the SSI groundwater data for many PAHs and some metals were greater than residential screening levels.

Petroleum hydrocarbons (particularly diesel range) were detected in SSI soil and groundwater samples. Although there were no known fuel oil tanks at OU8, there were fuel oil tanks in areas adjacent to OU8. In comments on the draft Sampling and Analysis Plan (SAP) for Remedial Investigation at OU8 (Tetra Tech, May 2015), MEDEP requested extractable petroleum hydrocarbon (EPH) analysis because of potential petroleum hydrocarbon contamination. Based on resolution of MEDEP's comments, the Navy agreed to include EPH in the list of analytes for OU8 for informational purposes to provide data to MEDEP to confirm that petroleum hydrocarbon contamination is not present. Because petroleum hydrocarbons are not CERCLA contaminants and the data were collected for informational purposes, the data are discussed in

the nature and extent of contamination section (Section 4.0) and only discussed qualitatively in the uncertainty section of the risk assessment (Section 6.0), but were not used to make remedial action decisions for OU8.

Additional samples collected by the Shipyard as part of Shipyard construction projects for Buildings 92 and 174. These samples were not considered in environmental evaluations of OU8, but the geophysical data were considered in determining the extent of cinders, slag, ash, and coal in the fill material. The geophysical data are discussed in the following reports which are included in Appendix A.2: Report of Geotechnical Evaluation for Waterfront Support Facility – Portsmouth Naval Shipyard (R.W. Gillespie & Associates, Inc., January 2010) and Geotechnical Engineering Services, Structural Shops Addition – Portsmouth Naval Shipyard (Pennoni Associates, Inc., May, 2011).

Based on the results of the SSI and site history, operations that resulted in the release of contamination at OU8 were related to the filling the historical West Timber Basin, including filling with material from site operations (e.g., the metal washing plant) and past industrial uses of the site. Based on previous investigations, a potential risk to current and future receptors from exposure to PAHs and metals in soil and groundwater was identified at OU8, and further investigation was recommended, which led the OU8 RI.

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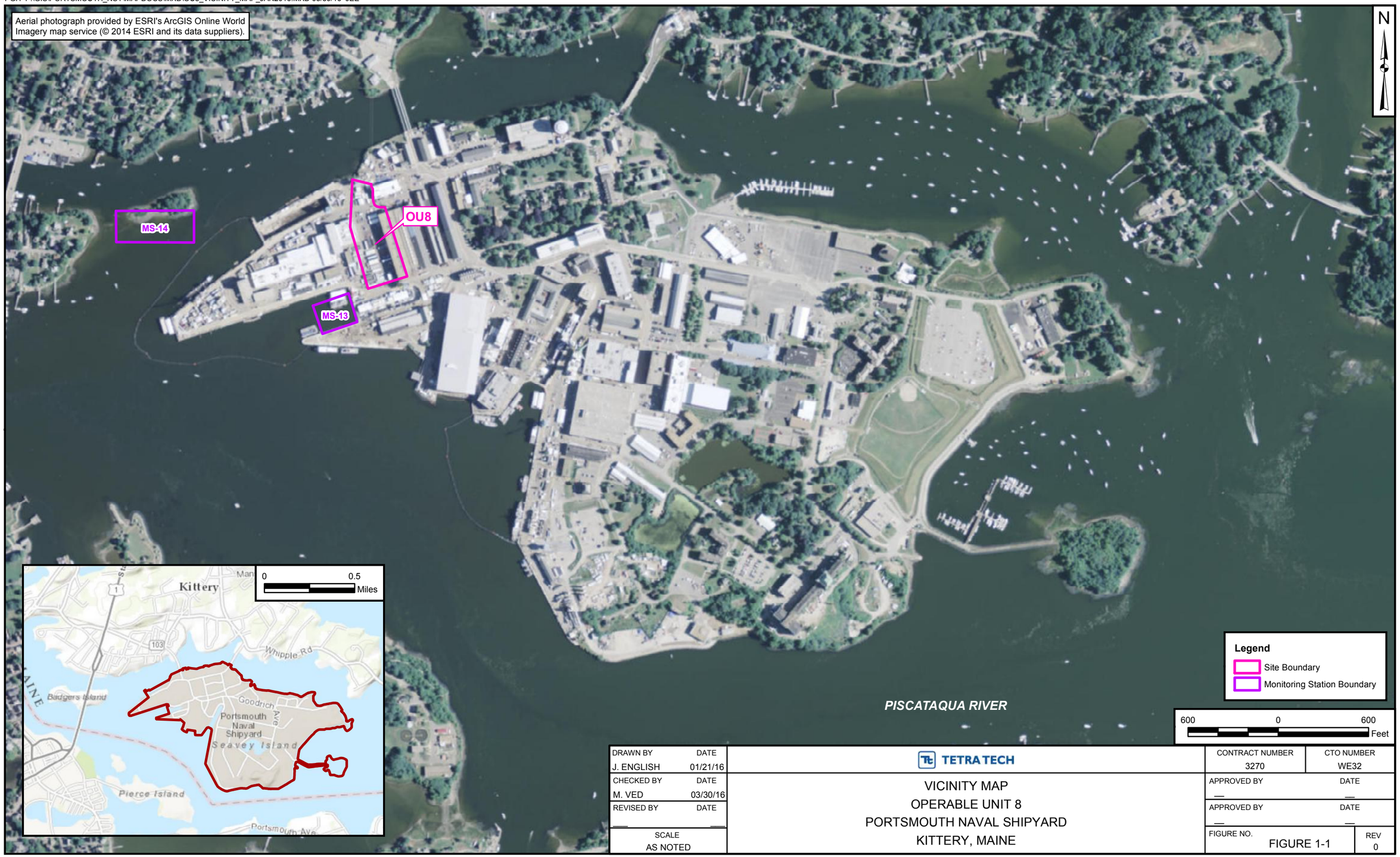

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CHECKED BY	DATE	VICINITY MAP OPERABLE UNIT 8 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY	DATE
M. VED	03/30/16		—	—
REVISED BY	DATE		APPROVED BY	DATE
—	—		—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 1-1	0

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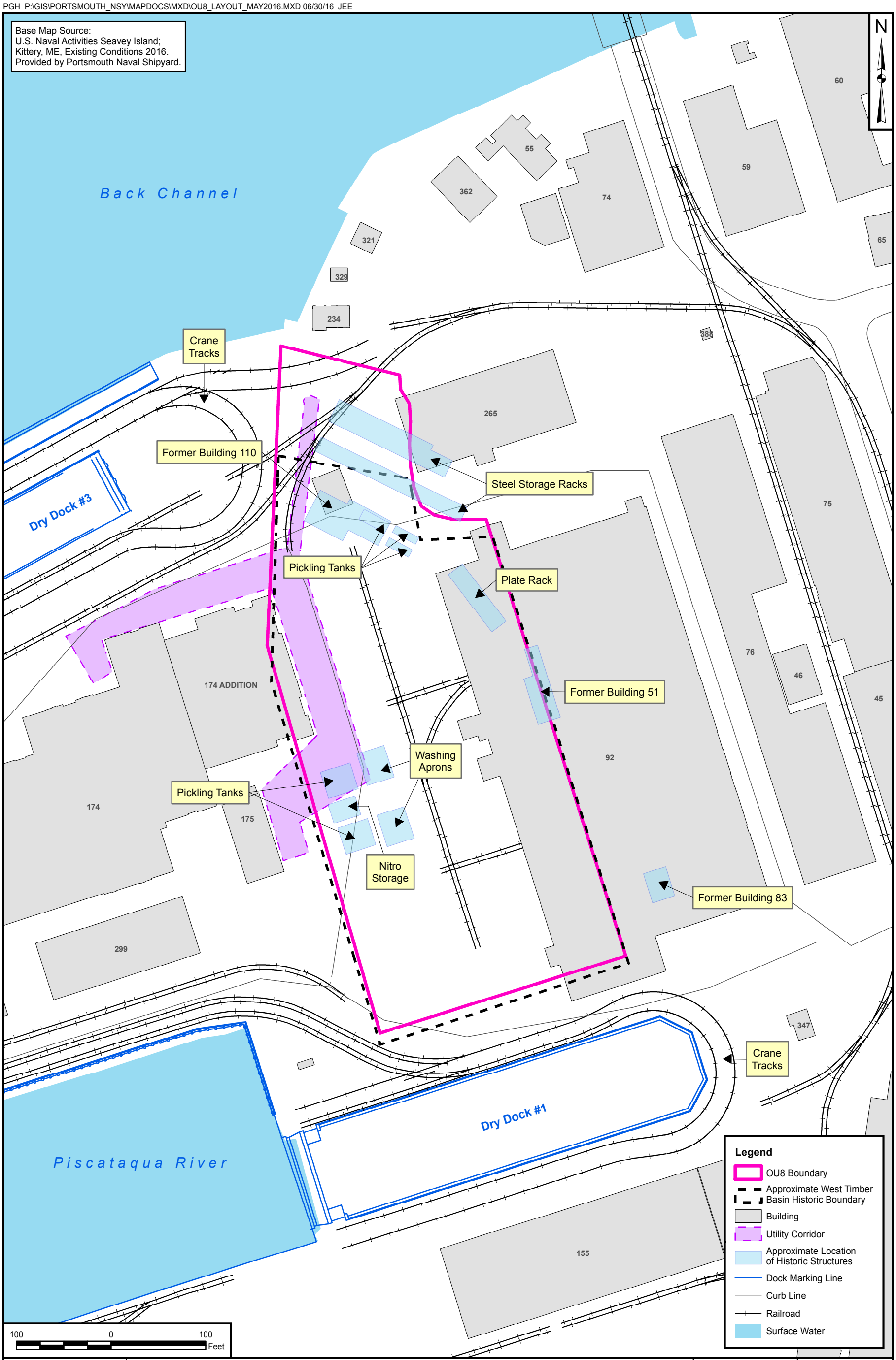

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M. VED	06/30/16	OPERABLE UNIT 8	—	—
REVISED BY	DATE	PORTSMOUTH NAVAL SHIPYARD	APPROVED BY	DATE
—	—	KITTERY, MAINE	—	—
SCALE			FIGURE NO.	REV
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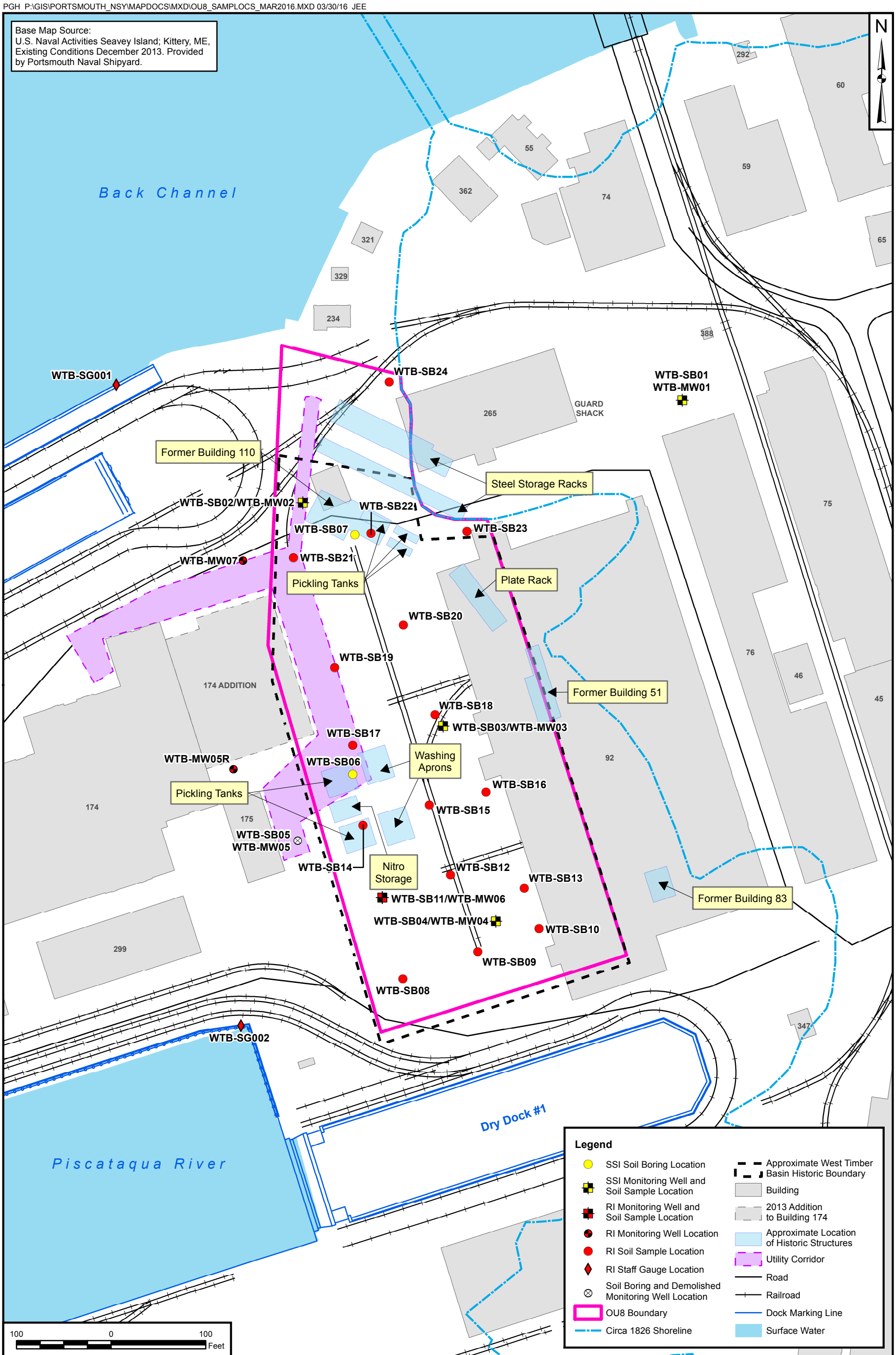

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CHECKED BY	DATE	RI AND SSI SAMPLING LOCATIONS	APPROVED BY	DATE
M. VED	03/30/16	OPERABLE UNIT 8	—	—
REVISED BY	DATE	PORTSMOUTH NAVAL SHIPYARD	APPROVED BY	DATE
—	—	KITTERY, MAINE	—	—
SCALE			FIGURE NO.	REV
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2.0 STUDY AREA INVESTIGATION

This section provides information on RI sampling activities and a data usability assessment of all the data included in the RI.

2.1 RI SAMPLING ACTIVITIES

The RI was conducted to define the nature and extent of contamination and to provide data to support the risk assessment. Sampling activities included collection of surface and subsurface soil and groundwater samples for analysis, and a tidal study using staff gauges to characterize groundwater flow and tidal influence at OU8. A list of samples collected as part of the RI sampling activities is included in Table A-5 in Appendix A.5. Figure 2-1 shows the RI sampling locations, along with all utility lines, the utility corridor, and trailers that were on site when the RI field work was conducted. The tidal study was conducted before sampling groundwater to determine the magnitude of tidal effects, response times, potential aquifer interactions with storm sewers, and proper sampling times around low tide for tidally influenced monitoring wells. These results are discussed further in Section 3.0.

The field effort was conducted between June 1 and June 15, 2015. The sampling locations were marked in the field on May 13, 2015, and it was noted that several locations had to be shifted a few feet from the locations marked in the SAP (Tetra Tech, May 2015) based on access issues related to the trailers, laydown areas, and buildings on site. The revised locations were presented to the Navy, USEPA, and MEDEP on a call on May 19, 2015. The most significant change involved WTB-MW05, which could not be located. This well location was sampled during the 1998 SSI, but was in the area of the utility corridor worked on by the Shipyard. It was determined that WTB-MW05 was demolished during the Building 174 extension construction, and a new monitoring well, WTB-MW05R was planned to be installed in an open area of the site approximately 8 feet south and 25 feet east of Building 174. The original WTB-MW05/WTB-SB05 location had an exceedance of the USEPA industrial risk-based screening level for mercury in surface soil during the 1998 SSI. As discussed in the SAP (Tetra Tech, May 2015), this exceedance was unexpected considering site history and the concentration detected was significantly outside the range of other mercury concentrations detected at OU8 and other PNS sites. Mercury was included during the analysis of 2015 soil samples to verify that the exceedance detected at WTB-SB05 was anomalous.

Public utilities were located and marked May 18 and 19, 2015, and Shipyard utility location was conducted May 20, 2015. Three locations (SB03, 06, and 16) could not be located at that time because they were covered, but the Shipyard personnel were able to coordinate moving the materials, and the areas were cleared prior to the installation of the borings. Monitoring well installation and groundwater and soil sample collection were conducted in accordance with the SAP (Tetra Tech, May, 2015) and the accepted

adjustment in locations, with one exception. WTB-SB25 was planned to be drilled in the northern area of OU8, but refusal was encountered at 5 inches below asphalt. Two more attempts were made within the area cleared for utilities, but refusal was encountered at both of these areas, and no further attempts were possible due to utilities and activities in the area. The sampling location was eliminated, as it was determined that the data from the other seventeen soil borings collected in June 2015, combined with the data from the 1998 SSI, were a sufficiently robust data set for the RI.

RI sampling and field information are provided in Appendix A. Appendix A.2 provides soil boring logs and monitoring well construction logs, Appendix A.3 provides the tidal lad study, Appendix A.4 provides the slug test results, Appendix A.6 provides field information including sampling and field logs, and Appendix A.7 provides survey information. Analytical data are provided in Appendix B. Data were validated as per the SAP (Tetra Tech, May 2015) and data validation reports are included in Appendix B.3

2.2 DATA USABILITY

As discussed in Sections 1.4 and 2.1, data for OU8 were generated during two investigations, the SSI and RI. Most data were considered useable for evaluating the nature and extent of contamination and site risks. The following discussion of data usability identifies the major data considerations and limitations for the data used in the RI and summarizes the conclusions of the DQR. Samples collected during these investigations were analyzed by fixed-base laboratories and validated in accordance with the project objectives provided in the associated investigation work plan/SAP.

A full DQR was prepared for the 2015 data used in the RI and is included in Appendix B.4. The overall data quality of the analytical suite is considered acceptable and satisfies the data quality objectives for the project. Sample data qualifications overall were considered minor in nature because none of the data was rejected or unusable. Non-compliances were noted for several metals and PAH samples for reasons including minor calibration issues, low recoveries of internal standards, and blank contamination; however, none of the non-compliances were significant enough to render the affected data unusable. Sensitivity, precision, and accuracy were also considered in the DQR and were acceptable. The completeness, comparability, and representativeness were all acceptable, and the data were determined to be representative of site conditions and comparable in quality to the data typically observed for similar analyses. The quality of the analytical data used in the RI is considered to be acceptable for use in decision making.

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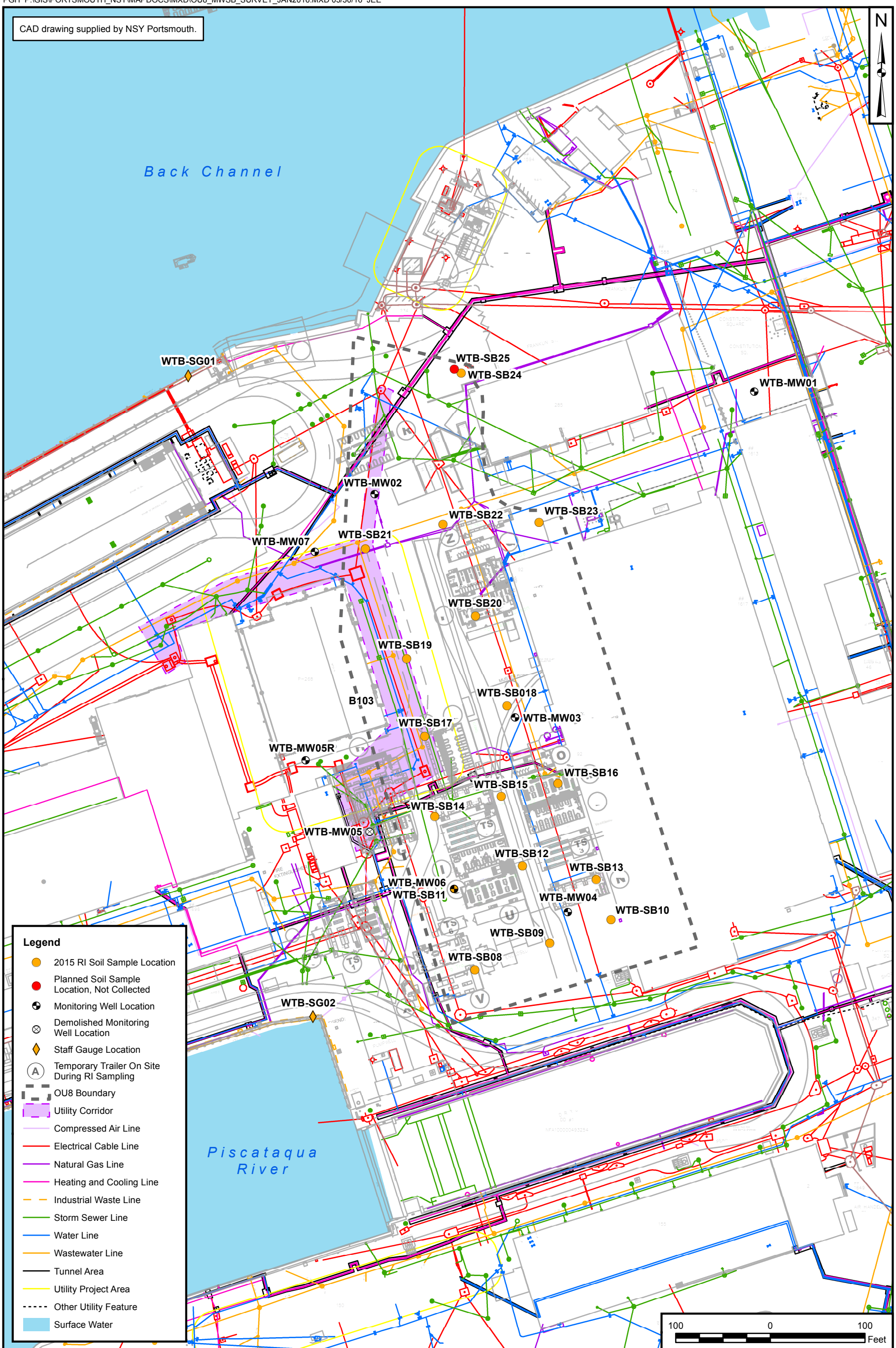

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CHECKED BY	DATE	2015 RI SAMPLING LOCATIONS AND SITE FEATURES DURING SAMPLING	APPROVED BY	DATE
M. VED	03/30/16	OPERABLE UNIT 8	—	—
REVISED BY	DATE	PORTSMOUTH NAVAL SHIPYARD	APPROVED BY	DATE
—	—	KITTERY, MAINE	—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 2-1	0

3.0 SITE CHARACTERIZATION

This section provides information on demography, land use, surface features, soils, geology, hydrogeology, surface water and hydrology, ecology, and climatology. Information on site characterization is used to support the evaluation of the nature and extent of contamination, development of the CSM, and understanding of potential site risks at OU8.

Elevations discussed herein are based on the 2002 PNS Vertical Datum and Control Network. The 2002 PNS Vertical Datum equates 0 feet relative to the North American Vertical Datum (NAVD) of 1988 to 96.78 feet (Civil Consultants, February 2002). Horizontal locations are based on the North American Datum (NAD) of 1983, Maine State Plane Coordinate System, West Zone.

3.1 DEMOGRAPHY AND LAND USE

PNS is located on an island in York County, Maine, south of the Town of Kittery and east of Portsmouth, New Hampshire. Portsmouth, located in Rockingham County in southeastern New Hampshire, is equidistant from Portland, Maine, to the north and Boston, Massachusetts, to the south. PNS is situated in the Piscataqua River, approximately 200 feet from Kittery, Maine, and approximately 800 feet from Portsmouth, New Hampshire. PNS is connected to Kittery via two bridges on the northern side of the facility. PNS has approximately 100 officers and enlisted personnel and over 5,000 civilian employees (PNS, June 2016). Kittery, Maine, is a residential community of 9,490 people, and Portsmouth, New Hampshire, has a population of approximately 21,230 (United States Census Bureau, 2010). Area industries include retail and wholesale trades, textiles, manufacturing, fishing, shipbuilding, power plants, and gas storage facilities. The countryside north and west of Kittery consists of forests and some farmland. Along the coast south of Portsmouth are small communities and seasonal dwellings.

Portsmouth is a part of the northeastern market area that serves about one-third of the nation's population in addition to eastern Canada. Major economic sectors in Portsmouth include tourism, retail and service industries, and fishing and agriculture. One of the area's major employers is PNS. The Port of Portsmouth is a center for exporters and importers of road salt, scrap metal, fuel oil, building materials, and other goods; many exporters are located in Portsmouth. Overall, more than 5 million tons of cargo per year are transported between the Atlantic Ocean and the port's dock. (City-data.com, June 2016).

Various vessels operate in Portsmouth Harbor including commercial tankers, cargo ships, fishing trawlers, lobster boats, recreational vessels, and submarines located at PNS. Commercial and recreational fishing activities occur in the harbor, including in the vicinity of PNS. Parts of the Portsmouth Harbor shoreline are

heavily developed, and PNS, commercial docks, and marinas dominate the landscape. Numerous parks and historical areas are also located nearby.

The Navy currently conducts maintenance of submarines at PNS, and these activities are conducted mainly in the western portion of the facility in the CIA, which includes all of the dry docks and submarine berths, and numerous buildings that house trade shops related to maintenance activities. Access to the CIA is tightly controlled and limited to individuals having appropriate clearances. Uses of other portions of PNS include administration offices, officers' residences, equipment storage, parking, and recreational facilities. However, only military operations (related to submarines) occur within the CIA, and no non-military residential or recreational facilities exist within the CIA.

A portion of PNS is on the National Register of Historic Places. The area between the two bridges connecting PNS to Kittery, Maine, was placed on the Register by the National Park Service in 1977. Based on a Cultural Resources Survey of PNS conducted in 1996 by Louis Berger Group, Inc., the boundary of the PNS Historic District was expanded and includes the majority of the CIA. Two other historic districts were also identified during the survey (Portsmouth Naval Hospital and Portsmouth Naval Prison Historic Districts). According to the survey, the potential for prehistoric and historic archaeological resources, including architectural resources, exists at PNS; however, the entire OU8 area is a low-sensitivity area in terms of potential historic archaeological resource sensitivities, and a no-sensitivity area in terms of prehistoric archaeological resources, as defined by the Cultural Resources Survey (Louis Berger Group, April 2003). Building 92 on the eastern side of OU8 has been classified as a National Register Eligible District, Contributing Element, and Building 174 on the western side of OU8 is classified as Not Eligible – Lacks Integrity. Based on these classifications, Building 92 was included in the proposed expansion of the PNS Historic District and Contributing Resources.

OU8 is located in the CIA, in the western portion of PNS. The layout of OU8 is presented on Figure 1-2. OU8 is in an industrial area surrounded by buildings and dry docks. The area of OU8 has been used for industrial uses since the mid-1800s, and the current land use at OU8 is industrial. The site is in an area that was previously filled with various materials and is bounded on the east, west, and south by historical quay walls. An addition to Building 174, completed in 2013, extends into a portion of OU8. Additional utility corridors were also installed during new building construction, and utility corridors also existed previously on site. The abundance of utilities on site may present obstacles to future construction, potential sampling, and site use.

3.2 SURFACE FEATURES

Approximate elevations at PNS range from a maximum of 160 feet in the interiors of the historical islands to 100 feet along the perimeter of the facility. Two-thirds of the facility is a high-density industrial area

containing over 300 buildings, and the remaining areas are flat to gently sloping grass-covered fields. Housing for military personnel is located in various areas of the Shipyard. Minor wooded areas exist on the eastern side of Jamaica Island. Two freshwater ponds are located in the central portion of the facility.

At OU8, the ground surface is relatively level. Elevations at OU8 range from 106 to 110 feet. Elevations are highest on the western side of Building 92 and decrease to the shorelines. The lowest elevation is in the northwestern portion of the site near well WTB-MW07. OU8 is entirely covered with pavement, both asphalt and concrete, or buildings. The shorelines have vertical quay walls. Surface water runoff is collected by storm drains that discharge to storm water outfalls along the shoreline (Figure 2-1).

3.3 SOILS

Natural material overlying bedrock on the original islands consists primarily of glacial till that ranges in thickness from 0 to more than 20 feet. Between and around the islands, 0 to 50 feet of fine-grained sand, silt, and mud have been deposited as tidal flats and beach deposits. Additionally, much of the tidal sediment has been covered by fill material of varying composition since the Shipyard was established in 1800 (McLaren/Hart, March 1994).

The naturally occurring soil material at the Shipyard is classified as Lyman fine sandy loam. In general, where the Lyman is still present, the upper several feet (approximately 2 to 4 feet) of the soil have been disturbed.

There is no evidence of any native material (Lyman) in OU8. The site is mapped as Urban Land (at least 85 percent of the surface covered with urban structures) in the soil survey for York County (USDA, 2009). The entire site has been filled; therefore, surface material is composed of fill consisting of silty fine sand to sandy silt mixed with metamorphic rock fragments and trace amounts of brick and other debris. A detailed description of the fill material is included in Section 3.4.

3.4 GEOLOGY

This section discusses regional and OU8 geology.

3.4.1 Regional Geology

The islands comprising PNS are formed on bedrock highs of the Kittery Formation covered with thin veneers of glacial till, recent alluvium, and fill materials. The bedrock is part of the Merrimack Group, which includes the Kittery, Berwick, and Eliot Formations. These formations consist of a variety of coarse-grained to fine-grained meta-sedimentary rocks that have been folded, faulted, and metamorphosed. The resulting rocks

consist of schist, phyllite, quartzite, and slate. Plutonic rocks, primarily granite, diorite, and quartz monzonite, have intruded the Merrimack Group and occur in generally lenticular bodies that parallel the structural trend. The general structural trend is northeast (strike of faults and fold axes) (Halliburton NUS, November 1995).

As a result of erosion, the bedrock formations have been leveled and now have a gently uneven surface of low relief. Near the bedrock surface, fractures are pervasive because of weathering of the rock. On hills and ridges, weathered bedrock is veneered by glacial till, a result of the most recent glaciation (Wisconsinan). Other unconsolidated materials located along the coastal areas consist of beach deposits and tidal flats.

3.4.2 OU8 Geology

Borings were advanced at OU8 during the SSI in 1998 and the 2015 RI, and geotechnical borings were advanced by PNS contractors as a part of geotechnical investigations associated with Buildings 92 and 174 construction projects. The environmental soil borings ranged in depths from 10 feet for the soil borings advanced for the RI to approximately 38 feet at WTB-SB06 (SSI boring in west-central portion of OU8). Geologic cross-sections were developed for OU8 using the available boring and monitoring well construction logs [provided in Appendix A.2 on compact disc (CD)]. Figure 3-1 presents the geologic cross-section locations, and Figures 3-2 and 3-3 present the geologic cross-sections.

A layer of silty fine sand to sandy silt mixed with metamorphic rock fragments and trace amounts of brick and other debris (i.e., wire, glass, and lead shot) underlies the surface of the entire site. This layer varies in thickness from 8.5 to 17.5 feet. A layer of cinders, ash, coal, and charcoal exists in the shallow subsurface across the area of the former West Timber Basin. The layer of cinders, ash, and carbonaceous material is thickest in the areas of WTB-SB07 and GTB-110 and thins toward the boundaries of the former West Timber Basin. Figure 3-4 shows the extent of the cinder, ash, slag, and coal material within OU8.

A layer of metamorphic rock fragments up to several feet thick underlies the silty sand/sandy silt unit on the landward side the quay wall in the area of boring WTB-SB06. These upper units represent historical fill material emplaced at the site. Underlying the fill material is a laterally continuous unit of gray organic silt to mottled clayey silt. The clayey silt is interpreted as the Presumpscot Formation, whereas the upper sediments may be recent shallow marine deposits of silt and clay. The silt/clayey silt blankets the former basin, thickening toward the center. Underlying the silt/clayey silt is a thin unit of fine sand containing varying amounts of metamorphic rock fragments. This unit is interpreted as till and directly overlies the bedrock surface.

The bedrock surface slopes generally to the west across OU8. Within the former West Timber Basin area, the bedrock slopes from approximately 20 feet (interpolated from geologic cross-section) in the east to 42.5 feet (geotechnical investigation boring B-9) in the west near the historical quay wall. From north to south, the bedrock surface slopes toward the Back Channel and toward the shoreline area of Dry Dock No. 1, from 17.4 feet at WTB-SB07 to approximately 23 feet to the north (WTB-MW02) and 37.4 feet to the south (WTB-MW04). East of OU8 in the area of WTB-MW01, the overburden consists of silt with fine sand, presumably till, directly overlying bedrock.

3.5 HYDROGEOLOGY

The following describes the hydrogeology of PNS and OU8. A detailed description of the hydrogeology of PNS is provided in the RCRA Facility Investigation (RFI) Data Gap Report (Halliburton NUS, November 1995), which also provides detailed figures showing groundwater elevations at the facility at high tide and low tide and salinity data. Several other reports have detailed information pertaining to the hydrogeology at PNS, including the RFI (McLaren/Hart, July 1992) and Groundwater Monitoring Summary Report (Tetra Tech, August 1999). These reports include estimates of hydraulic conductivities, groundwater elevations during several sampling events, and summaries of other hydrogeologic data collected (e.g., tidal data, groundwater quality parameter data during sampling, etc.). The discussion of the hydrogeology at OU8 is based on data collected during the SSI (1998) and RI (2015)

3.5.1 PNS General Hydrogeology

Groundwater is encountered within both unconsolidated materials and bedrock at the facility. In general, the unconsolidated overburden materials are moderately to highly permeable, and bedrock permeability is generally less than that of unconsolidated materials. Groundwater in bedrock occurs principally in fractures that intersect and enable groundwater to potentially travel in various directions. Near the bedrock surface, fractures are pervasive because of weathering of the rock. The size and interconnectedness of the fractures generally decrease with depth, potentially limiting the movement of groundwater.

Groundwater levels in the overburden at PNS are shallow, and groundwater flow directions generally mimic bedrock surface topography and are influenced by the thickness and composition of the overburden and tidal fluctuations. Overall, groundwater flow directions are from the original island interior toward the current coastline. The overall conceptual model of groundwater flow at the facility is that fresh groundwater originating from precipitation in the island interior flows downward and outward through both the overburden and bedrock. Tidal effects near the shorelines result in a localized back-and-forth movement of water between the overburden and bedrock; however, the net groundwater flow is outward into the Piscataqua River. Groundwater flow at the PNS facility is a localized system that is not affected by the mainland groundwater flow system.

For all areas along the coastline at PNS, tides play an important role in the hydrogeology. The Piscataqua River is a tidal estuary with diurnal tidal changes of up to 8 feet. At low tide, groundwater flow through the bedrock underlying the island interior has both lateral and downward components. At some locations in filled areas, groundwater in shallow bedrock moves upward toward the overburden. At some locations along the perimeter of the facility, there are upward gradients from deeper bedrock toward shallow bedrock. These potentials do not imply actual discharges at these locations. The point of discharge for groundwater in deep bedrock depends on the relative strengths of the vertical and lateral components and the size and interconnection of fractures between the deeper bedrock and more shallow bedrock.

At low tide, groundwater flow directions essentially mimic the bedrock surface. From areas of high bedrock elevations on the original island, fresh water from precipitation infiltrates through the overburden into the bedrock and moves downward and laterally toward the filled areas. Hydraulic gradients are steepest where the bedrock surface slope is steepest and are less steep where the bedrock has a gentler slope. As groundwater moves toward the fill areas, groundwater elevations continue to decline and are similar in the bedrock and overburden. Vertical flow components in the bedrock are downward within the interior of the original island. At high tide, vertical gradients may reverse depending on the degree of seawater intrusion from the Piscatacua River into the overburden and hydraulic loading on the bedrock. Seawater intrusion is primarily enhanced by greater hydraulic conductivities, higher tidal elevations, and weaker opposing freshwater gradients from upgradient source areas. The load on groundwater in the bedrock is increased by seawater intrusion, the weight of water in the overburden, and a hydraulic connection to the tidal load.

PNS does not use groundwater for any purpose. Potable water is supplied to PNS from the Kittery Water District. Kittery's potable water supply originates from surface reservoirs located in the vicinity of York, Maine.

3.5.2 OU8 Hydrogeology

Seven groundwater monitoring wells have been installed in and around OU8 (as shown on Figure 3-1), of which four are located within the OU8 boundary (WTB-MW02, WTB-MW03, WTB-MW04, and WTB-MW06). One well, WTB-MW01, is located upgradient of the OU8 boundary, and the two remaining wells (WTB-MW05R and WTB-MW07) are located downgradient of the OU8 boundary. Table 3-1 lists well construction details for the monitoring wells at OU8. The monitoring wells range in total depth from 15 to 19 feet below ground surface (bgs) and are screened in fill only (WTB-MW02, WTB-MW03, WTB-MW04, and WTB-MW06) or bedrock only (WTB-MW01). Specific details concerning construction of the groundwater monitoring wells and hydraulic conductivity testing methods and results are provided in the Appendix A.4.

The hydrogeology of OU8 is influenced by tidal changes in the Piscatqua River to the south and the Back Channel to the north. The area of the Shipyard experiences semi-diurnal tidal cycles, with two high and two low tides of approximately equal size every lunar day. Tidal effects are observed in several of the groundwater monitoring wells at OU8 because of the proximity of the site to the shoreline of the Back Channel and the berth near Dry Dock No. 1 and because the overburden at OU8 is composed mainly of permeable fill material. As part of the tidal study performed at OU8 as part of the RI, water levels in monitoring wells at OU8 and at two tidal gauges installed in the Back Channel and the berth near Dry Dock No. 1 were monitored for over 40 hours, which covered several tidal cycles between high tide and low tide. Graphs of tidal responses of the wells are provided in Appendix A.3.

Tidal influences were observed in four wells, WTB-MW02, WTB-MW05R, WTB-MW06, and WTB-MW07. Tidal ranges of 0.1 foot to 2 feet were observed in the wells. The average tidal lag times for the wells at low tide ranged from 230 to 300 minutes; a summary of the tidal lags is provided in Appendix A.3. Shorter lag times were observed for the high tides, with lag times generally averaging 80 minutes. Wells WTB-MW01, WTB-MW03, and WTB-MW04 did not exhibit responses indicating tidal influence. The decreasing water levels (less than 0.1-foot decrease observed in WTB-MW03 and WTB-MW04 and less than 0.2-foot in WTB-MW01) were interpreted to be related to background trend conditions.

The shallow groundwater at OU8 is brackish, with salinity values generally less than that of the Back Channel, which has salinities in excess of 20 parts per thousand (ppt). Brackish water is considered to have salinity values between 0.5 and 30 ppt., fresh water has salinity values of less than 0.5 ppt, and sea water has salinity values of greater than 30 ppt. Salinity values of groundwater at OU8 (excluding upgradient well WTB-MW01) ranged from approximately 0.41 to 23.6 ppt. The salinity of groundwater upgradient to OU8 (WTB-MW01) was 18.4 ppt, indicating that bedrock in the area also has brackish groundwater.

Because tides influence many of the groundwater monitoring wells at OU8, groundwater levels were measured during predicted low and high tides during the SSI in 1998 and the RI in 2015. The groundwater measurements are provided in Table 3-1. Figures 3-5 and 3-6 show the water table at the predicted low and high tides, respectively, on June 7, 2015. Groundwater flow directions vary at OU8 between high and low tide. During low tide, groundwater flows to the west from the island interior, with flow components to the northwest to the Back Channel and to the southwest toward the berth near Dry Dock No. 1. During high tide, groundwater in the eastern portions of OU8 continues to flow to the west from the island interior, but groundwater on the peripheries of the unit flow from the shorelines into the site. Groundwater flow directions in June 2015 were similar to flow directions observed in 1998.

Horizontal gradients were estimated based on groundwater elevations measured on June 7, 2015. Three horizontal gradient lines were calculated for low and high tides on June 7, 2015. For the groundwater flow line from the island interior through well WTB-MW03, the gradient was consistent between low and high tides with a value of 0.01. For the groundwater flow line from OU8 to the Back Channel, the horizontal gradient was 0.03 to the northwest during low tide but reversed to 0.01 to the southeast during high tide. Similarly, for the groundwater flow line from OU8 to the berth near Dry Dock No. 1, the horizontal gradient was 0.04 to the southwest during low tide but again reversed to 0.01 to the northeast during high tide.

The surface fill material is predominately coarse grained and relatively permeable. In-situ hydraulic conductivity tests (i.e., slug tests) were conducted in June 2015 during the RI. Slug tests were conducted in four wells within the boundary of the historical quay walls (WTB-MW02, WTB-MW03, WTB-MW04, and WTB-MW06) and one well outside the historical quay wall boundary (WTB-MW07). The results of the slug tests are summarized in Table 3-2, and the supporting test analysis information is provided in Appendix A.4. For wells within the boundary of the former West Timber Basin, hydraulic conductivity values ranged from 130 to 662 feet per day and had a geometric mean of 333 feet per day. The hydraulic conductivity estimate for well WTB-MW07, located outside the boundary of the quay wall, was 2.59 feet per day. The overall geometric mean hydraulic conductivity for all wells tested was 126 feet per day.

Assuming an effective porosity of 0.3[1] for the site and using an overall average hydraulic conductivity of 126 feet per day, average linear groundwater velocity from the island interior to OU8 is calculated to be 4.2 feet per day or 1,533 feet per year. For groundwater flow to the northwest, the average linear groundwater velocity was calculated to be 12.6 feet per day during low tide conditions and -4.2 feet per day (i.e., flow from the Back Channel toward the site) during high tide conditions. Similarly, the average linear groundwater velocity for flow to the northwest was calculated to be 16.8 feet per day during low tide conditions and -4.2 feet per day (i.e., flow back into the site) during high tide conditions.

Although the tides influence groundwater flow, with reversal during high tide, net groundwater flow is from the island interior to the Back Channel and the berth near Dry Dock No. 1. Infiltration is generally minimized due to the pavement at OU8. Therefore, the principal source of groundwater into the site is flow from the island interior.

[1] An effective porosity of 0.3 is assumed based on the heterogeneity of the subsurface of silty sand and gravel and rock. Given the ranges of porosities for these materials, a conservative average value of 0.3 is assumed based on literature values for these materials (Batu, February 1998).

3.6 SURFACE WATER USE AND HYDROLOGY

PNS is located approximately 3 miles inland from the Atlantic Ocean at the mouth of a broad tidal basin for inland rivers that comprise the Great Bay Estuary. The Great Bay Estuary is strongly influenced by tides, and the Piscatacua River is an ocean-dominated system. The City of Portsmouth lies on the western banks of the Piscataqua River. On the opposite bank of the Piscataqua is the Town of Kittery, Maine, in which PNS is located. The only seaport in the State of New Hampshire, Portsmouth has one of the deepest harbors in the world. Portsmouth Harbor's main channel is approximately 75 feet below Mean Low Water (MLW), and the Back Channel is approximately 20 feet below MLW in the vicinity of Seavey Island. The salinity of the surface water exceeds 20 ppt, and surface water in the area is not suitable for drinking (McLaren/Hart, March 1994). Commercial, recreational boating, and lobstering activities are conducted in the Back Channel in the general vicinity of OU8.

Much of the shoreline of the Great Bay Estuary is undeveloped, but industrial activities in southeastern New Hampshire, such as foundries and tanneries, have discharged wastes into the estuary, especially from 1940 to 1976. There are many point-source and non-point-source discharges throughout the Great Bay Estuary, including permitted discharges (Tetra Tech, October 1999). According to the Strafford Regional Planning Area New Hampshire Regional Master Plan (Strafford, May 2005), 44 communities are located in the New Hampshire portion of the Piscataqua River Basin including the Great Bay Estuary and Coastal Drainage Area. Sixteen of the communities have municipal sewage treatment plants or wastewater treatment facilities (e.g., wastewater pollution control facilities). The nearest wastewater treatment plant to PNS is the Portsmouth Wastewater Treatment Facility located on Pierce Island approximately 1,100 feet southwest of PNS (see Figure 1-1).

PNS is a highly developed industrialized area with limited natural surface water drainage. PNS is equipped with an extensive stormwater collection system that drains to the Piscataqua River. Direct surface water runoff also enters the Piscataqua River. Based on a flood zone map for the PNS area, the 100-year flood zone in the vicinity of OU8 is at an elevation of 105 feet (9 feet NAVD), and the OU8 area is not within the 100-year flood zone or between the 100-year and 500-year coastal flood zone (FEMA, July 1986). The shoreline in the vicinity of OU8 is at an elevation of approximately 107 to 110 feet.

According to Maine Department of Marine Resources (DMR) regulations effective February 2004 and as updated in August 2008 and June 2014, because of pollution, it is unlawful to collect clams, quahogs, oysters, and mussels from the shores, flats, or waters of Kittery, Eliot, and South Berwick southeast of a line across the Piscataqua River at the Memorial Bridge and northwest of a line running from Jaffrey Point, Newcastle Island, in New Hampshire to the dock at Fort Foster, Gerrish Island, in Maine, which includes the PNS area. In addition, a special permit is required for a restricted area north of the line across the mouth of Spinney Creek at the Causeway (Maine DMR, June 2014).

The New Hampshire Department of Environmental Services (NHDES) is responsible for the classification of shellfish-growing waters to determine whether water quality is acceptable for shellfish harvesting. NHDES uses the National Shellfish Sanitation Program to establish criteria and methodology to classify the shellfish-growing waters. The Piscataqua river waters around PNS are currently closed for shellfish harvesting. These closures are described in more detail in the NHDES Shellfish Program: 2005 Annual Report (June 2006). As discussed in this report, the closures are caused by fecal coliform bacterial loading from wastewater treatment plants.

Semi-diurnal tidal currents, the horizontal motions associated with tidal changes in water levels, predominate in Portsmouth Harbor. Near Seavey Island, the mean tidal range is 8.1 feet. The overall ebb and flood currents in the vicinity of PNS are high. The average flood currents range from 3.0 knots south of Seavey Island to 3.3 knots southwest of Badgers Island (located approximately 1,000 feet east of PNS). The average ebb currents are 3.8 knots south of Seavey Island and 3.7 knots southwest of Badgers Island. Because of the strong currents, most ships wait for favorable tides before moving up and down the narrow Piscataqua River. The estimated flushing rates of Portsmouth Harbor and the lower reaches of the Great Bay Estuary range from 3.3 to 6.3 tidal cycles (McLaren/Hart, March 1994).

3.7 ECOLOGY

PNS is a highly developed industrial property with limited vegetative growth. A few areas at PNS, such as Clark's Island, have habitat for ecological receptors, but most of the ground cover consists of landscaping plants, with only scattered remnants of naturally occurring species. Because of its general lack of habitat and the intensity of surrounding human and industrial activity, most of PNS is unattractive for most species of wildlife.

No known endangered, threatened, or protected species or critical habitats are located within the boundaries of PNS, including OU8. However, the entire State of Maine is considered a habitat of the federally listed endangered short-nosed sturgeon, and the Atlantic sturgeon in the Gulf of Maine is listed as a threatened species. PNS also does not include areas designated as Essential Habitat for either sturgeon species by the State of Maine. Essential habitats are habitats necessary to the conservation of endangered or threatened species, as determined by Maine Endangered Species Act and Regulations based on observation of the species and confirmed habitat use.

OU8 is mostly paved or covered with buildings. OU8 does not provide habitat for ecological receptors because it is entirely an industrial area. The area offshore of OU8 is considered separately as OU4, and there are no wetlands present within OU8.

3.8 CLIMATOLOGY

Climatology information was taken from the NOAA internet site for the National Climatic Data Center Office for the Portland, Maine, weather station, which is the NOAA coastal weather station closest to PNS. The climatological data for Portland, Maine, are based on mean observations from 1975 to 2006 (NOAA, January 2007). Precipitation (including liquid water equivalent for snowfall) is fairly evenly distributed over the year, with approximately 3 to 5 inches falling per month, for an annual total of approximately 46 inches for Portland. Monthly average temperatures for Portland range from approximately 20 to 40 degrees Fahrenheit (°F) from November through April and from approximately 50 to 70°F from May to October. Snowfall occurs mostly from November to April, with a little snow occurring in October and May. The annual snowfall is approximately 24 inches. Portsmouth's climate tends to be similar to Portland's; however, because of its location near the ocean, there tends to be a little less snow and more rainfall in Portsmouth than in Portland.

TABLE 3-1

MONITORING WELL CONSTRUCTION AND WATER LEVEL SUMMARY
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

Well Identification	Year Installed	Geologic Unit Screened	Well Inside Diameter (inches)	Ground Elevation (ft 2002 PNS Datum[1])	Reference Point[2] (ft 2002 PNS Datum[1])	Depth to Top of Well Screen (ft bgs)	Depth to Bottom of Well Screen (ft bgs)	Depth to Top of Bedrock (ft bgs)	July 29, 1998 - Low Tide		July 29, 1998 - High Tide		June 6, 2015 - Low Tide		June 6, 2015 - High Tide	
									Depth to Water[2] (ft from Reference Point)	Water Elevation[1] (ft 2002 PNS Datum)	Depth to Water[2] (ft from Reference Point)	Water Elevation[1] (ft 2002 PNS Datum)	Depth to Water[2] (ft from Reference Point)	Water Elevation[1] (ft 2002 PNS Datum)	Depth to Water[2] (ft from Reference Point)	Water Elevation[1] (ft 2002 PNS Datum)
Monitoring Wells																
WTB-MW01	1998	Bedrock	2	110.57	110.29	9.0	19.0	6.7	7.92	102.37	7.91	102.38	5.02	105.27	5.16	105.13
WTB-MW02	1998	Fill	2	106.93	106.59	5.0	15.0	22.8	8.32	98.27	7.82	98.77	7.82	98.77	7.78	98.81
WTB-MW03	1998	Fill	2	109.92	109.75	6.0	16.0	29.0	10.06	99.69	10.00	99.75	9.63	100.12	9.65	100.10
WTB-MW04	1998	Fill	2	108.94	108.56	7.0	17.0	37.4	8.83	99.73	8.77	99.79	8.58	99.98	8.59	99.97
WTB-MW05[3]	1998	Fill/ Overburden	2	106.40	106.10	4.0	14.0	17.7	7.90	98.20	7.08	99.02	Well Destroyed	--	Well Destroyed	--
WTB-MW05R	2015	Fill	2	106.36	106.02	6.0	16.0	NE	NI	--	NI	--	6.83	99.19	7.01	99.01
WTB-MW06	2015	Fill	2	106.24	105.67	6.0	16.0	NE	NI	--	NI	--	6.22	99.45	6.23	99.44
WTB-MW07	2015	Fill	2	105.84	105.55	5.0	15.0	NE	NI	--	NI	--	6.08	99.47	6.11	99.44
Staff Gauge																
DD1-SG	1998	NA	NA	NA	106.12	NA	NA	NA	12.90	93.22	5.89	100.23	Not Located [4]	--	Not Located [4]	--
DD3-SG	1998	NA	NA	NA	107.11	NA	NA	NA	12.84	94.27	6.80	100.31	Not Located [4]	--	Not Located [4]	--
WTB-SG01	2015	NA	NA	NA	108.03	NA	NA	NA	NI	--	NI	--	16.54	91.49	7.50	100.53
WTB-SG02	2015	NA	NA	NA	106.61	NA	NA	NA	NI	--	NI	--	15.10	91.51	5.90	100.71

Notes
[1] Elevations are feet relative to the 2002 PNS Datum. Conversions: PNS Mean High Water Datum to 2002 PNS Datum = subtract 0.08 foot; North American Vertical Datum of 1988 (NAVD1988) to 2002 PNS Datum = add 96.78 feet.
[2] Reference points are the TPVC casing on monitoring wells and stilling wells (staff gauges).
[3] Well apparently removed by PNC contractor during PNS Building 174 construction project.
[4] Staff guages installed for investigation during the 1998 SSI.

bgs = below ground surface.
ft = feet.
NA = not applicable.
NE = not encountered.
NI = not installed.
TPVC = top of polyvinyl chloride.

TABLE 3-2

HYDRAULIC CONDUCTIVITY SUMMARY
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Well	Test Type	Hydraulic Conductivity (K)	
		(feet/day)	(cm/sec)
WTB-MW02	Rising-head	239	8.43E-02
WTB-MW03	Rising-head	49	1.73E-02
WTB-MW04	Rising-head	66.2	2.34E-02
WTB-MW06	Rising-head	145	5.12E-02
WTB-MW07	Rising-head	2.53	8.93E-04
	Arithmetic Mean	100.3	3.54E-02
	Geometric Mean	49.1	1.73E-02
	Arithmetic Mean(1)	124.8	4.40E-02
	Geometric Mean(1)	103.0	3.63E-02

(1) WTB-MW07 appears to be a localized area of lower conductivity and is excluded from the arithmetic and geometric mean calculations.

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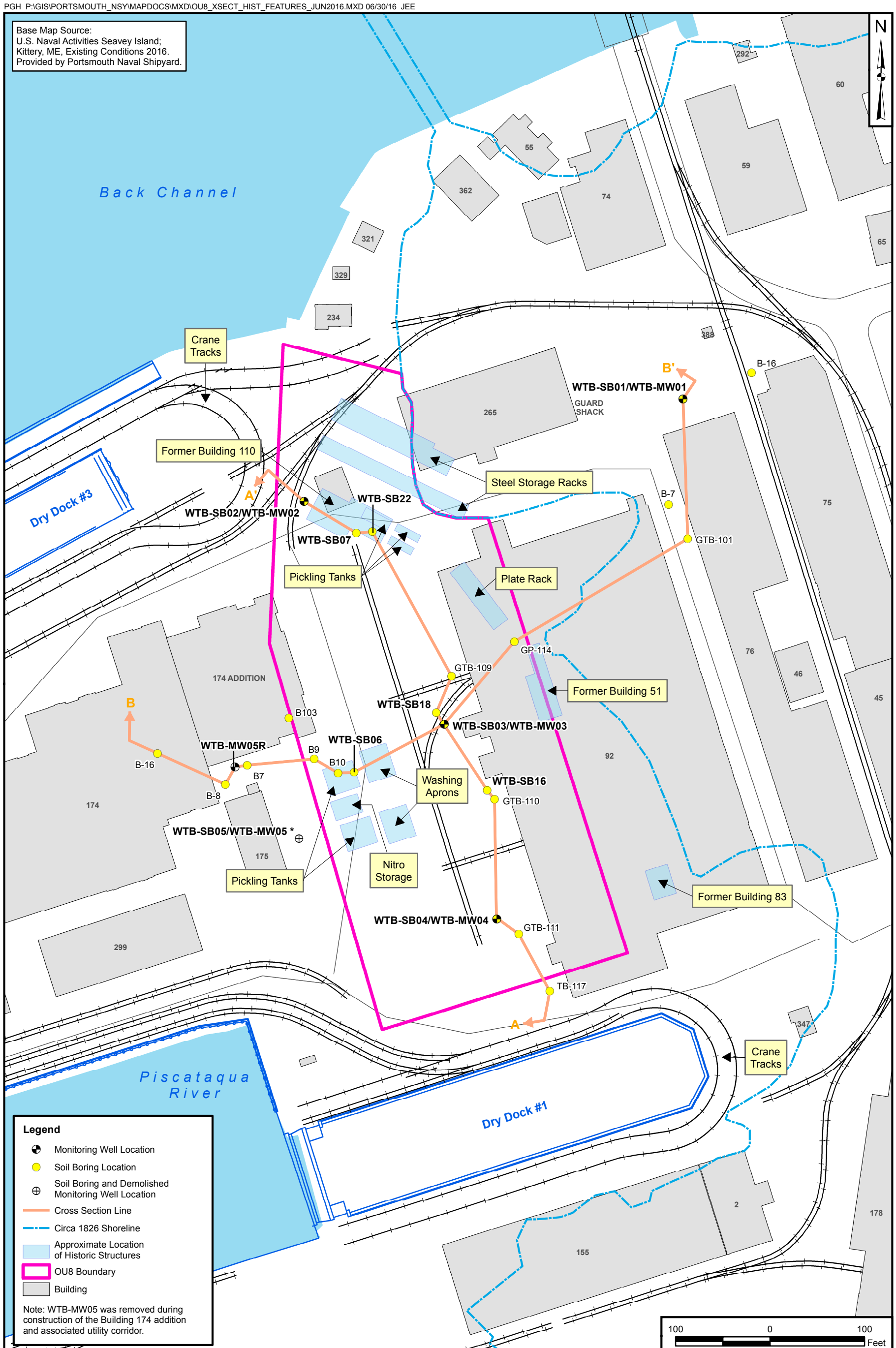
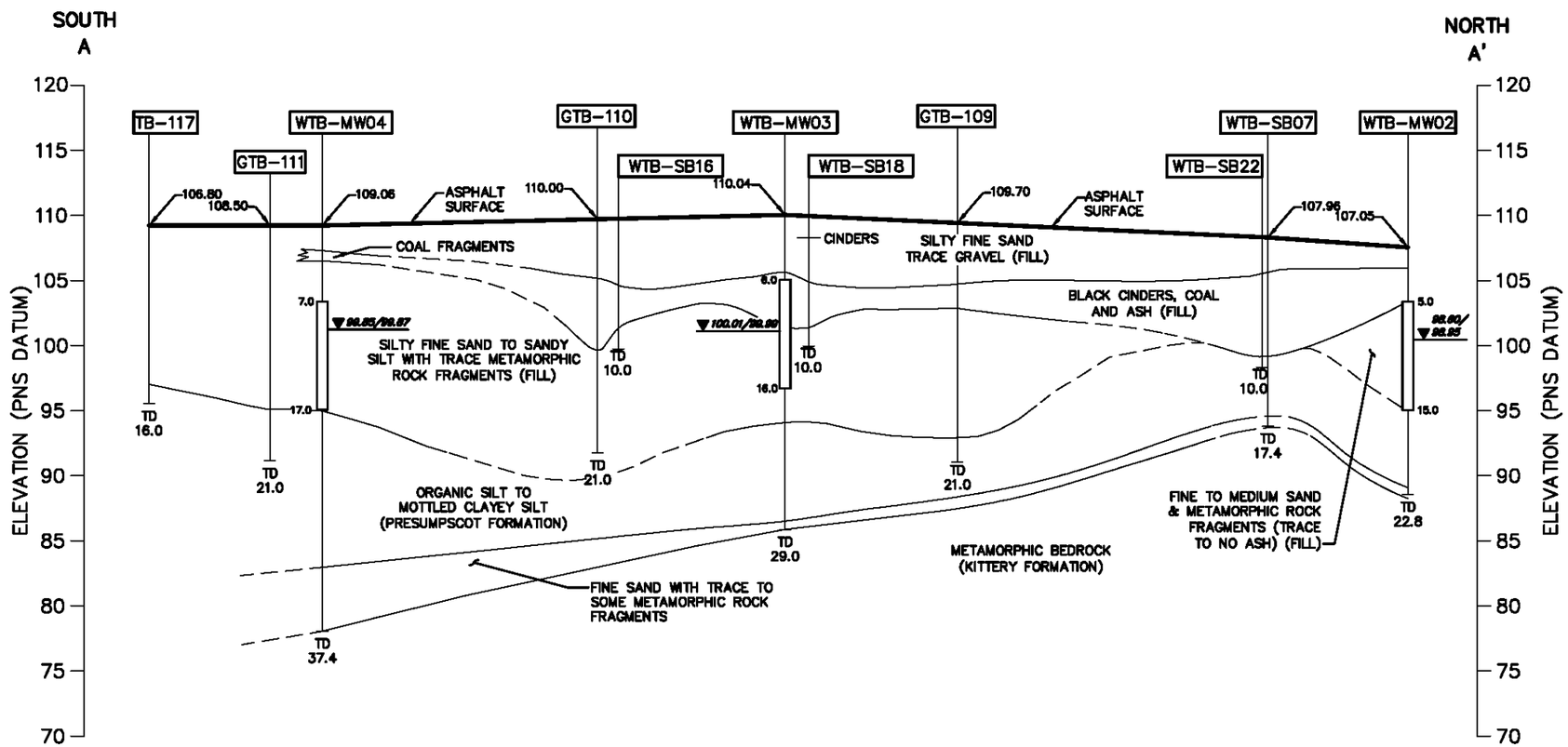


DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	06/28/16		3270	WE32
CHECKED BY	DATE	CROSS-SECTION LINE LOCATION MAP	APPROVED BY	DATE
M. VED	06/30/16	OPERABLE UNIT 8	—	—
REVISED BY	DATE	PORTMOUTH NAVAL SHIPYARD	APPROVED BY	DATE
—	—	KITTERY, MAINE	—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 3-1	0



LEGEND:

MONITORING WELL OR BORING NUMBER — WTB-MW03

GROUND SURFACE

GROUNDWATER ELEVATION LOW TIDE/HIGH TIDE (JUNE 7, 2015) — 99.81/99.87

TOP OF SCREENED INTERVAL (FT BGS) — 6.00

LITHOLOGIC CONTACT (DASHED WHERE INFERRED)

BOTTOM OF SCREENED INTERVAL (FT BGS) — 16.00

TOTAL DEPTH OF WELL OR BORING (FT BGS) — TD 29.0

NOTE:
PNS 2002 VERTICAL DATUM (96.78 FT = 0 FEET NAVD 88)

0 60 120
HORIZONTAL SCALE IN FEET

0 10 20
VERTICAL SCALE IN FEET

TETRA TECH
WWW.TETRATECH.COM
661 ANDERSEN DRIVE – FOSTER PLAZA 7
PITTSBURGH, PA 15220
T: (412) 921-7090 | F: (412) 921-4040

CROSS SECTION A–A'
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

DATE:	10/14/15
PROJECT NO.:	112G03270
DESIGNED BY:	
DRAWN BY:	CK
CHECKED BY:	TE
SHEET: 1 OF 2	

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FIGURE 3–2

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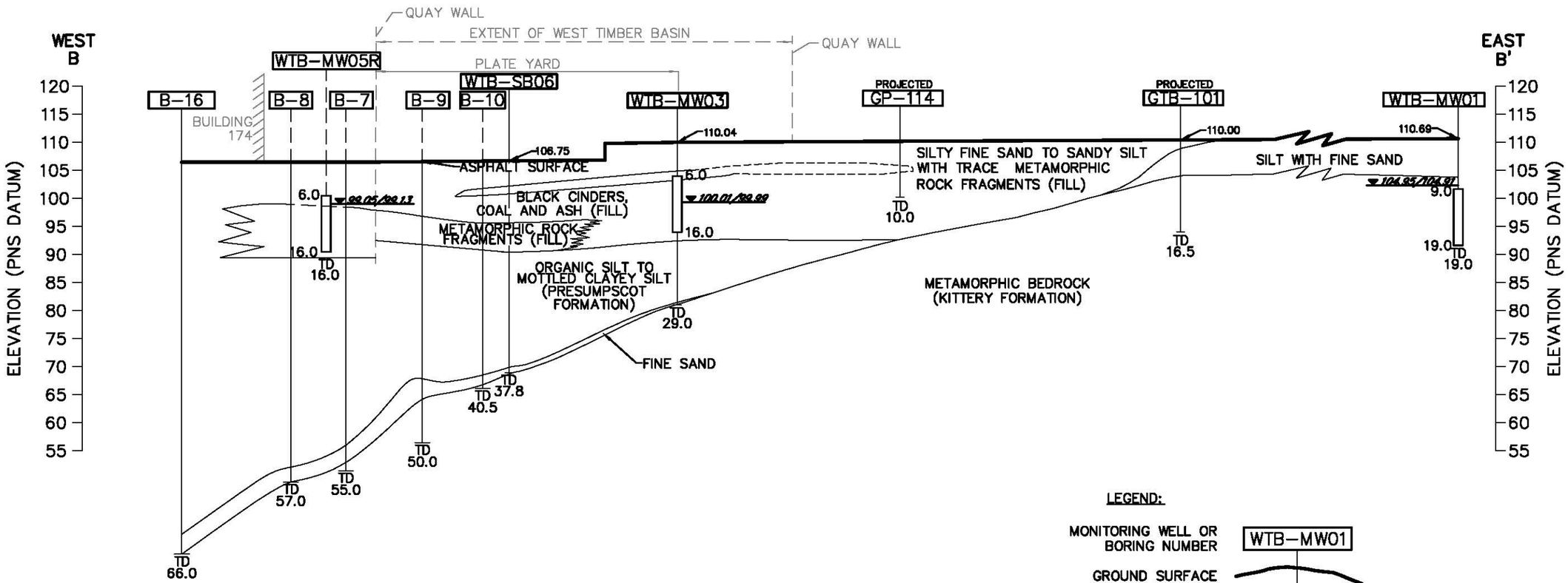

LEGEND:

MONITORING WELL OR BORING NUMBER — WTB-MW01

GROUND SURFACE

GROUNDWATER ELEVATION LOW TIDE/HIGH TIDE (JUNE 7, 2015) — 102.49/102.50

TOP OF SCREENED INTERVAL (FT BGS) — 9.00

LITHOLOGIC CONTACT (DASHED WHERE INFERRED)

BOTTOM OF SCREENED INTERVAL (FT BGS) — 19.00

TOTAL DEPTH OF WELL OR BORING (FT BGS) — TD 19.0

0 60 120
HORIZONTAL SCALE IN FEET

0 20 40
VERTICAL SCALE IN FEET

NOTE:
PNS 2002 VERTICAL DATUM (96.78 FT = 0 FEET NAVD 88)

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CROSS SECTION B–B'
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

DATE:	10/14/15
PROJECT NO.:	112G03270
DESIGNED BY:	
DRAWN BY:	CK
CHECKED BY:	TE
SHEET: 2 OF 2	

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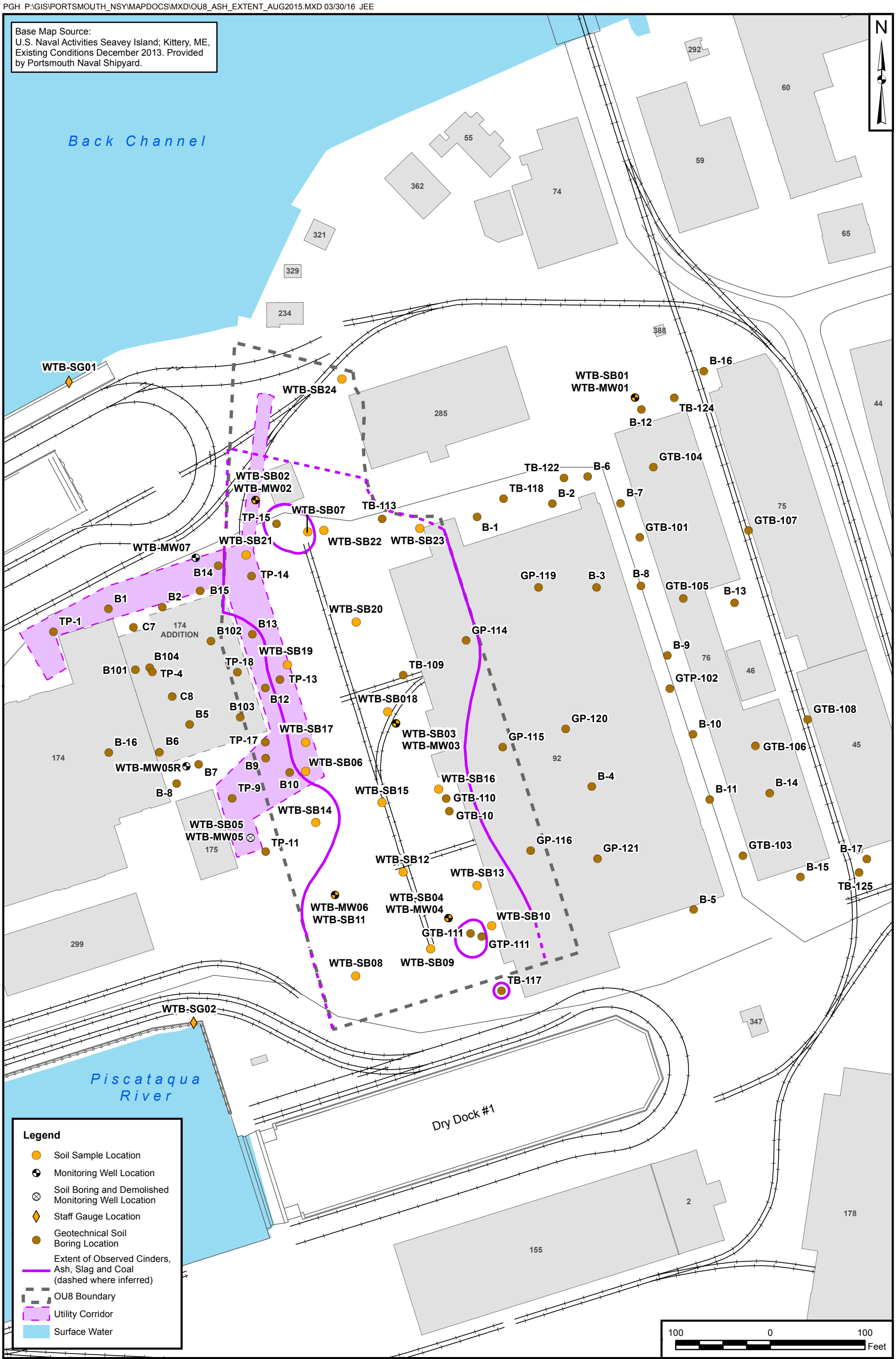
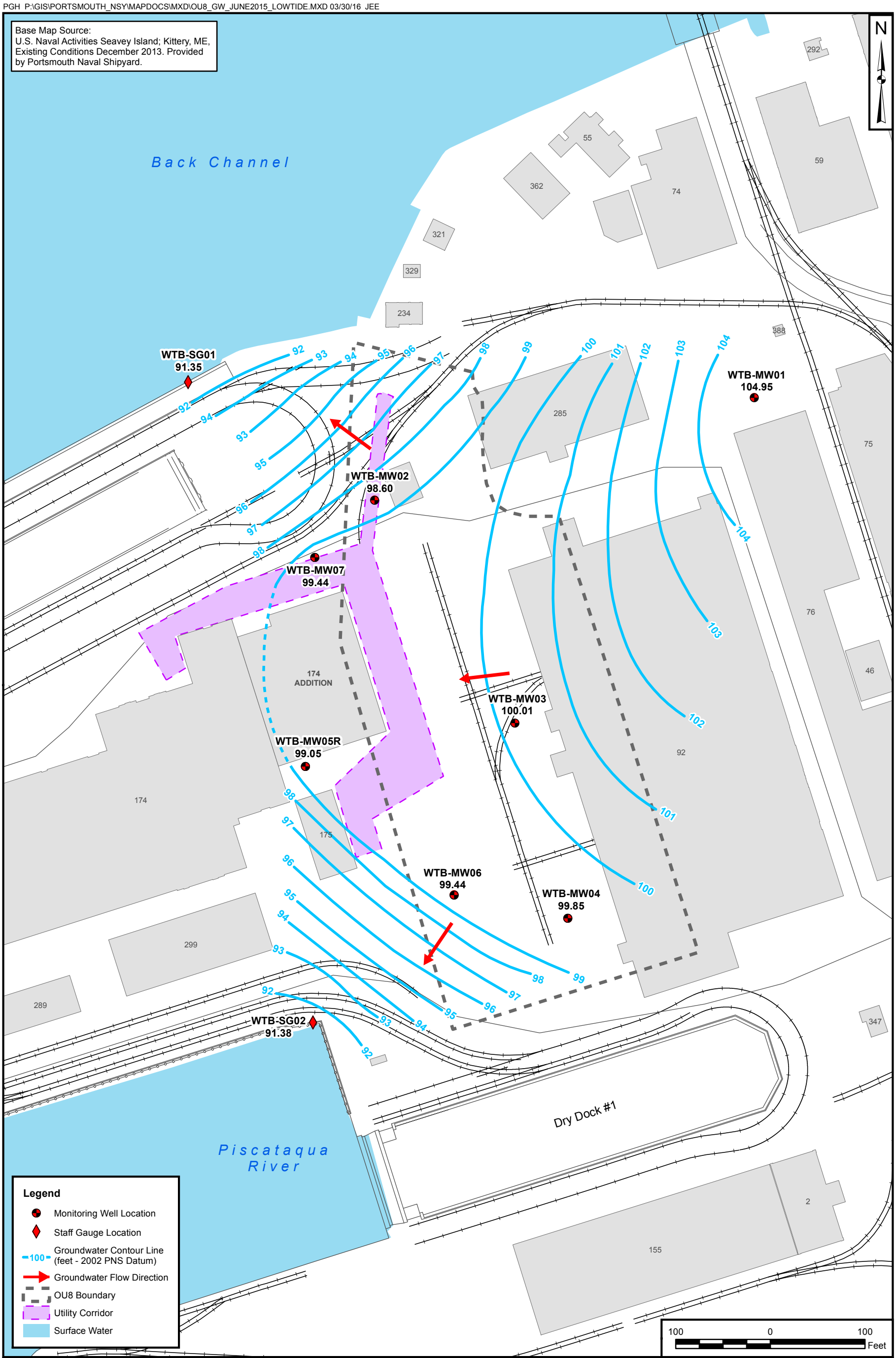
FIGURE 3–3

PGH P:\GIS\PORTSMOUTH_NSY\MAPDOCS\MXD\OU8_ASH_EXTENT_AUG2015.MXD 03/30/16 JEE



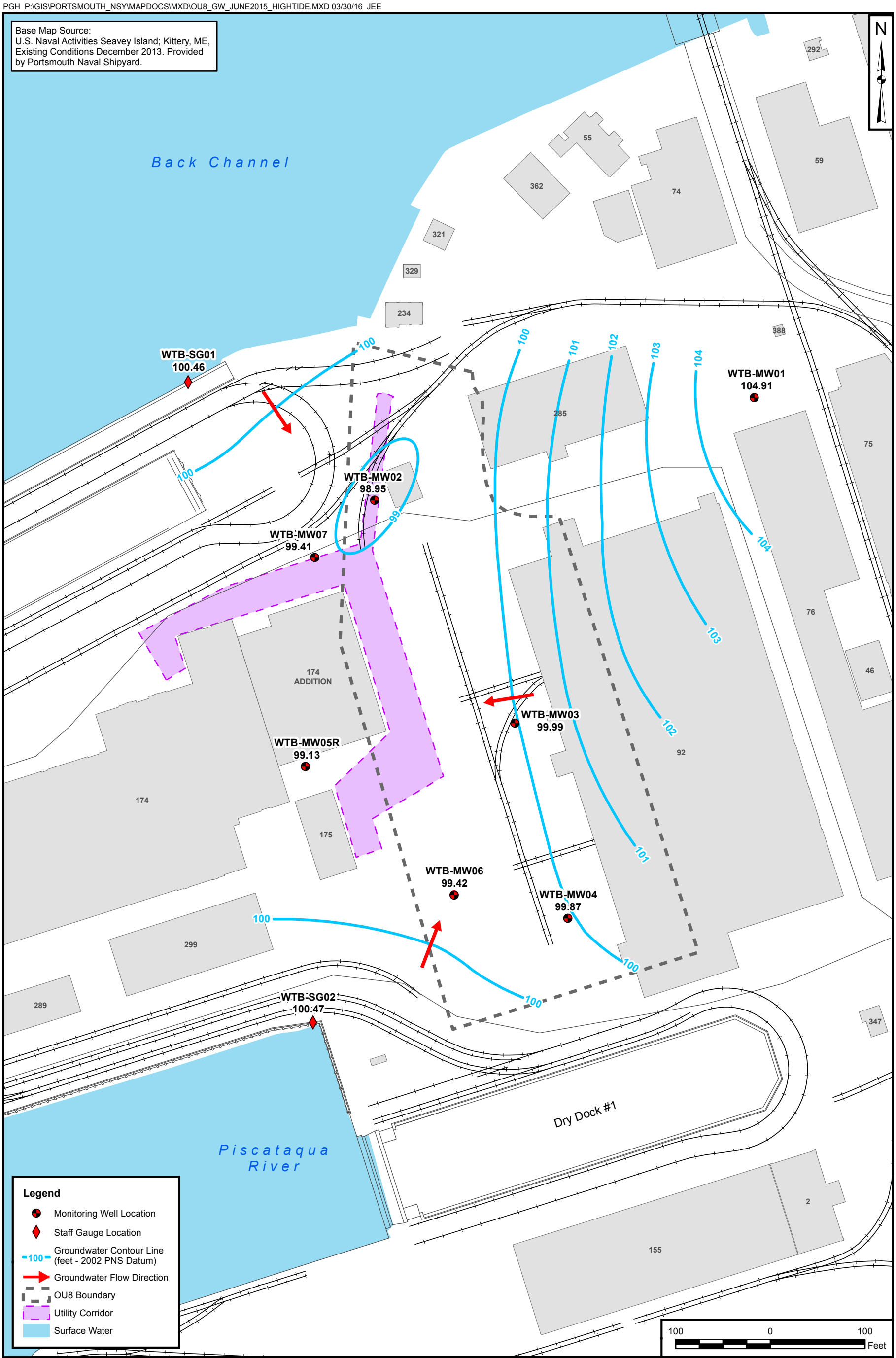
DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	10/23/15		3270	WE32
CHECKED BY	DATE	EXTENT OF OBSERVED ASH, CINDERS, SLAG AND COAL	APPROVED BY	DATE
M. VED	03/30/16	OPERABLE UNIT 8	—	—
REVISED BY	DATE	PORTSMOUTH NAVAL SHIPYARD	APPROVED BY	DATE
J. ENGLISH	03/30/16	KITTERY, MAINE	—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 3-4	0

PGH P:\GIS\PORTSMOUTH_NSY\MAPDOCS\MXD\OU8_GW_JUNE2015_LOWTIDE.MXD 03/30/16 JEE



DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
K. MOORE	08/04/15		3270	WE32
CHECKED BY	DATE	GROUNDWATER LOW TIDE CONTOUR MAP (JUNE 7, 2015) OPERABLE UNIT 8 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY	DATE
M. VED	03/30/16		—	—
REVISED BY	DATE		APPROVED BY	DATE
J. ENGLISH	03/30/16		—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 3-5	0

PGH P:\GIS\PORTSMOUTH_NSY\MAPDOCS\MXD\OU8_GW_JUNE2015_HIGHTIDE.MXD 03/30/16 JEE



DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
K. MOORE	08/04/15		3270	WE32
CHECKED BY	DATE	GROUNDWATER HIGH TIDE CONTOUR MAP (JUNE 7, 2015) OPERABLE UNIT 8 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY	DATE
M. VED	03/30/16		—	—
REVISED BY	DATE		APPROVED BY	DATE
J. ENGLISH	03/30/16		—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 3-6	0

4.0 NATURE AND EXTENT OF CONTAMINATION

The discussion of the nature and extent of contamination at OU8 focuses on the distribution of chemical concentrations in soil and groundwater across OU8 with consideration of site uses and geological conditions. This section discusses the sources of contamination, magnitudes, distribution, and extent of contaminants present in onshore media at OU8.

As discussed in Section 1.0, operations that resulted in the release of contamination at OU8 were related to the filling the historical West Timber Basin, including filling with material from site operations (e.g., the metal washing plant) and past industrial uses of the site. The timber basin, which was enclosed on three sides (east, west, and south) by granite block quay walls, stopped being used in 1917. At that time, the open end was enclosed, and the northern portion of the former timber basin was partially filled. The fill material appears to consist of rock, soil, bricks, metal debris, cinders, wood, gravel, and other materials. In 1915, because the prices of several non-ferrous metals such as copper, lead, and zinc were very high, PNS was tasked with smelting and pigging scrap metal from various Navy yards, and within 8 months, 2 million pounds were pigged at the facility. As a result of these operations, significant amounts of metal ash and skimmings (i.e., slag) had accumulated, so the Navy constructed a metal washing plant in 1917 at OU8 to further extract essential scrap. After 3 years, when the cost of non-ferrous metals had decreased, the metal washing plant ceased operations, and it is likely that much of the by-product from the metal washing plant was discarded into the former timber basin. It was also reported that material that could not be destroyed by the Shipyard's incinerator was discarded into the former timber basin. After the basin was completely filled in 1940, a metal plate yard was constructed over an area of the former timber basin, which included four pickling tanks, two washing aprons, and a potassium nitrate storage building. The plate yard was the primary steel storage and pickling location at the Shipyard; there is no evidence of plating operations taking place at the site (Dolph and Bolger, May 1996).

As presented in Section 1.0 and in Appendix A.1, physical items (i.e., quay walls, buildings, shorelines) in conjunction with observations from soil borings (i.e., ash, cinders, etc.) were used to define the boundary of the former West Timber Basin. All of the samples evaluated as part of OU8 were collected within the physical boundary of the former West Timber Basin except for the groundwater samples from WTB-MW05R and WTB-MW07. In addition, soil and groundwater samples were collected from the upgradient location (WTB-MW01/SB01), and soil samples were collected from WTB-MW05/WTB-SB05 during the SSI, which was subsequently determined to be located west of the site boundary. Data from WTB-MW01/SB01 and WTB-MW05/SB05 are not grouped with the site data in the tables presented in this section but are presented in separate columns in the tables. Groundwater samples collected from WTB-MW05R and WTB-MW07 are included in the groundwater tables because they are downgradient wells that could provide relevant data for identifying site contamination.

Figure 3-4 presents the soil boring and monitoring well locations at OU8 and indicates the areas where cinders, ash, slag, coal, etc. were observed. The complete database printout for OU8 sample results is presented in Appendix B.1.

Soil and groundwater samples were collected at OU8 in 1998 and 2015. The soil and groundwater samples collected during the 2015 RI were only analyzed for PAHs, EPH, and metals, whereas the 1998 SSI samples were analyzed for a larger set of parameters, as discussed in Section 1.4. Tables 4-1, 4-2, and 4-3 present summary statistics (i.e., minimum concentrations, maximum concentrations, frequencies of detection) for the 1998 and 2015 surface and subsurface soil data, and the 2015 groundwater data, respectively. The 1998 groundwater results are not presented on Table 4-3 because the 2015 groundwater data are more representative of current conditions. The results for the 1998 groundwater samples are presented in Appendix B.1.

4.1 SOIL CONTAMINATION

Tables 4-1 and 4-2 summarize results for chemicals detected in surface soil (0 to 2 feet bgs) and subsurface soil (2 to 11 feet bgs) samples, respectively. A few samples were collected as part of the SSI from depths between 13 and 20 feet. The results for these samples are not included in Table 4-2 because they are deeper than the interval that is evaluated in the risk assessment. However, the results are included in the discussion below for subsurface soil. PNS facility background values (Tetra Tech, April, 2014) and risk-based screening levels are presented on the tables to identify significant site-related chemicals and aid in focusing the discussion of the nature and extent of contamination. For soils, the risk-based screening levels are the USEPA residential and industrial Regional Screening Levels (RSLs) (May 2016). A copy of the analytical database for soil is presented in Appendix B.1. In addition, Tables 1 and 2 in Appendix B.1 present the surface soil and subsurface soil sample results, respectively, for chemicals that were detected at concentrations exceeding residential RSLs. Concentrations on the tables in Appendix B.1 are shaded if they exceed the greater of the industrial RSL or maximum background concentration. Notations are also made on the tables regarding whether cinders, ash, slag, coal, etc. was observed within the sample interval.

A statistical analysis of the data was conducted to determine whether chemical concentrations were within the ranges of facility-wide background concentrations (see Appendix B.2). The statistical analysis was only conducted on chemicals with concentrations in soil that exceeded residential RSLs. The background analysis is presented in Appendix B.2, and the results of the comparisons are presented in Tables 4-1 and 4-2. To aid in the background comparison, normal probability plots were generated for each chemical in surface soil and subsurface soil detected at concentrations greater than USEPA residential RSLs as a first step to visually compare the data. The normal probability plots are presented in Appendix B.2.

As discussed in Section 1.4, the 1998 SSI sampling included a full list of analytes and the 2015 RI sampling focused on chemicals potentially associated with the site (PAHs and metals).

Cyanide was not detected in any of the five 1998 surface soil samples and was only detected in 1 of the 11 subsurface soil samples (with starting depths between 2 and 10 feet). Cyanide also was not detected in any of the four deeper subsurface soil samples (below 10 feet deep). Therefore, it was only detected in 1 of 19 soil samples collected during the SSI. Cyanide is not expected to be related to site activities, as a thorough review of historical documents and information was conducted and cyanide-containing solutions are not believed to have been used for metal washing activities. Although the detected concentration of 34 milligrams per kilogram (mg/kg) (at WTB-SB02 from 3 to 5 feet) exceeded the industrial RSL of 1.2 mg/kg for free cyanide, the low detection frequency indicates that cyanide is not a site-related contaminant at OU8. Based on these results, the 2015 samples were not analyzed for cyanide. Hexavalent chromium was not detected in OU8 SSI soil samples; therefore, chromium at OU8 was assumed to be in the trivalent oxidation state. The site history did not indicate a reason to suspect VOC, SVOC (except PAH), pesticide, or PCB contamination at OU8, and there were no risk-based screening level exceedances for these compounds during the SSI (see Tables 4-1 and 4-2). For this reason, the 2015 soil samples were not analyzed for these parameters.

As discussed in Section 1.4, the mercury concentration in one of the 1998 surface soil samples (109 mg/kg at location WTB-SS05) was much greater than any of the other detections in the surface soil (maximum detection of 1.45 mg/kg) or subsurface soil (18.6 mg/kg) in 1998 or 2015 samples. The WTB-SB05 location is outside of the site boundary west of the western quay wall (see Figure 4-1). Samples were not collected at this location in 2015 to confirm the results because the location is outside the OU8 boundary and because the area was excavated as part of utility work for the Building 174 addition. The concentrations of mercury in surface soil at the three closest sample locations, WTB-SB14, WTB-SB17, and WTB-SB19, were less than 0.2 mg/kg. Also, the maximum concentration of mercury in any of the other surface soil samples was 1.45 mg/kg, which is less than the residential RSL (2.3 mg/kg), indicating the mercury in surface soil is not of concern at OU8. In subsurface soil, concentrations of mercury exceeded the residential RSL in a few samples but did not exceed the industrial RSL (35 mg/kg) in any sample. The two greatest concentrations of mercury, 18.6 mg/kg at WTB-SB11 from 2 to 6 feet bgs and 9.5 mg/kg at WTB-SB08 from 6 to 10 feet bgs, were detected in samples that also had elevated concentrations of other metals, including iron and lead (see Table 2 in Appendix B.1). Although no ash was observed in these samples, the very high iron levels (greater than 20 percent) indicates that there was likely some metal debris in the samples.

As discussed in Section 1.4, RI soil samples were analyzed for EPH (C11-C22 aromatics, C9-C18 aliphatics, and C19-C36 aliphatics) at the request of MEDEP to confirm that petroleum hydrocarbon contamination was not a concern for OU8. The only one of the three EPH groupings detected in OU8 soil

samples at concentrations exceeding its MEDEP residential Remedial Action Guideline (RAG) (MEDEP, May 2013) was C11-C22 aromatics. The MEDEP residential RAG of 750 mg/kg was exceeded in one surface soil sample (1,800 mg/kg at WTB-SB19) and two subsurface soil samples (1,100 mg/kg at WTB-SB08 from 2 to 6 feet bgs and 2,200 mg/kg at WTB-SB17 from 6 to 10 feet bgs). There were no exceedances of the MEDEP industrial RAGs. Concentrations of PAHs were not elevated in these samples. Because of the few and sporadic exceedences of the MEDEP residential RAG and because there were no exceedances of the MEDEP industrial RAG, petroleum hydrocarbon contamination is not a concern for OU8.

The extent of contamination exceeding residential RSLs is widespread and covers the full area of OU8. The remainder of this section focuses on the chemicals detected in OU8 soil samples at levels exceeding industrial soil RSLs, which include carcinogenic PAHs (cPAHs), arsenic, lead, and silver in surface soil and cPAHs, antimony, arsenic, cobalt, copper, iron, lead, manganese, and nickel in subsurface soil. For the cPAHs, benzo(a)pyrene (BAP) toxicity equivalent quotients (TEQs) were calculated as described in Section 6.0.

Tables 1 and 2 in Appendix B.1 list all of the cPAHs detected at concentrations exceeding residential RSLs, in comparison with background concentrations. Figure 4-2 presents BAP TEQs results for OU8 soil samples. Table 2 in Appendix B.1 presents the analytical results for chemicals detected in subsurface soil at concentrations exceeding residential RSLs. The chemical concentrations are shaded black in this table if they are greater than industrial RSLs and facility-wide background concentrations. With one exception [benzo(k)fluoranthene], all of the cPAH concentrations that exceeded residential RSLs also exceeded industrial RSLs. None of the non-carcinogenic PAHs were detected in OU8 soil samples at concentrations exceeding residential or industrial RSLs.

Concentrations of cPAHs exceeded their respective industrial RSLs in surface soil samples at four locations (WTB-SB12, -SB15, -SB16, and -SB23). Three of these locations, WTB-SB12, -SB15, and -SB16 are within 100 feet of each other, and WTB-SB23 is several hundred feet away (see Figure 4-2). Maximum concentrations of BAP TEQs in surface soil were at WTB-SB16 [13,576 micrograms per kilogram (µg/kg)] and WTB-SB23 (15,129 µg/kg).

In subsurface soil, concentrations of cPAHs, exceeded their respective industrial RSLs in nine samples at seven locations [WTB-MW02 (3 to 5 and 15 to 17 feet bgs), WTB-SB06 (5 to 7 feet), WTB-SB09 (6 to 10 feet), WTB-SB12 (6 to 10 feet), WTB-SB13 (2 to 6 feet), WTB-SB22 (2 to 6 feet), and WTB-SB23 (2 to 6 and 6 to 10 feet)]. Only two of these locations (WTB-SB12 and -SB23) also had concentrations of cPAHs that exceeded their respective industrial RSLs in surface soil. Maximum concentrations of BAP equivalents

in subsurface soil were at WTB-MW02 from 15 to 17 feet (12,664 µg/kg) and WTB-SB23 from 2 to 6 feet (17,430 µg/kg) and 6 to 10 feet bgs (10,086 µg/kg).

In surface soil, all of the BAP TEQs concentrations were greater than 10 times the industrial RSL of 290 µg/kg but less than 100 times the industrial RSL. In subsurface soil, five of the BAP TEQs concentrations were greater than 10 times the industrial RSL, but all of the concentrations were less than 100 times the industrial RSL. Only one sample that was collected with a starting depth greater than 10 feet had BAP TEQs concentrations that exceeded the industrial RSL (WTB-MW02 from 15 to 17 feet bgs). No distinct pattern to the elevated cPAH concentrations was evident, with the exception that the greatest concentrations were observed at WTB-SB23 in surface and subsurface soil. Ash, cinders, slag, etc. were observed in some of the subsurface soil samples with elevated cPAH levels (including at WTB-SB23). No ash was observed in any of the surface soil samples.

Metals were detected in surface and subsurface soil at concentrations exceeding residential and industrial RSLs and background concentrations. In general, maximum concentrations detected in subsurface soil were greater than maximum detected concentrations in surface soil, with one notable exception (silver), which is discussed in more detail below. However, no samples that was collected with a starting depth greater than 10 feet had metals concentrations that exceeded the greater of their respective industrial RSL or background concentrations. In fact, of the 12 metals detected at concentrations exceeding residential RSLs in surface soil, concentrations of only three of them exceeded their respective industrial RSLs. In subsurface soil samples, concentrations of 8 of the 14 metals detected at concentrations exceeding residential RSLs also exceeded their respective industrial RSLs.

In surface soil, concentrations of arsenic and lead exceeded their respective industrial RSLs. The maximum concentrations of both of these metals were within the range of their respective background concentrations, and their concentrations were also determined to be statistically within the range of background concentrations (see Appendix B.2). In subsurface soil, concentrations of antimony, arsenic, cobalt, copper, cyanide, iron, lead, manganese, and nickel exceeded their respective industrial RSLs and, except antimony, were determined to be greater than background concentrations. A statistical analysis could not be conducted for antimony because it was only detected in two of the twenty-five background samples. However, the maximum site concentration of 1,610 mg/kg was much greater than the maximum background concentration of 9.4 mg/kg.

Concentrations of lead exceeded its facility-wide background concentration (1,100 mg/kg), which is greater than its industrial RSL of 800 mg/kg, in 14 samples from 11 locations (WTB-MW02, -SB07, -SB08, -SB09, -SB11, -SB12, -SB16, -SB17, -SB21, -SB22, and -SB23). Concentrations of iron exceeded its industrial RSL in the next highest number of samples (10), with most of these exceedances (except WTB-MW04 from

9 to 11 feet and WTB-SB21 from 6 to 10 feet bgs) occurring in the same samples in which lead concentrations exceeded its background concentration. Other metals detected in one or more samples in excess of industrial RSLs and background concentrations, with the number of RSL exceedances in parentheses, include antimony (four), arsenic (one), cobalt (two), copper (seven), manganese (one), and nickel (two). All RSL exceedances for antimony, arsenic, cobalt, copper, manganese, and nickel were in samples where lead exceeded its industrial RSL and background concentration.

The locations with the greatest number of exceedances of industrial RSLs for metals are WTB-SB08, WTB-SB09, and WTB-SB11 from 2 to 6 and 6 to 10 feet bgs (see Table 2 in Appendix B.1). The samples from these locations also have the greatest concentration of antimony, arsenic, copper, lead, and nickel across the site. The only sample in which cyanide was detected was the sample from WTB-MW02, which also had an elevated lead concentration (9,080 mg/kg).

Industrial RSLs for all metals except arsenic and lead were greater than their respective background concentrations. For arsenic, the industrial RSL was 3 mg/kg, which is less than the PNS facility background range of 4.4 to 58.6 mg/kg. All but one arsenic concentration exceeded the industrial RSL. However, only the concentration in one sample, 61.9 mg/kg at WTB-SB08 from 2 to 6 feet bgs, slightly exceeded the maximum background concentration. For this reason, arsenic is not considered a site-related contaminant, although human health risks from arsenic were evaluated as described in Section 6.0.

As indicated above, concentrations of lead exceed its industrial RSL and the range of facility-wide background concentrations at most locations where the other metals exceed their respective industrial RSLs. Figure 4-3 shows the lead results compared to the industrial RSL. Although lead concentrations exceeded its industrial RSL and the range of facility-wide background concentrations at several locations, the greatest concentrations of lead and most of the other metals occurred in subsurface soil samples from locations WTB-SB08, WTB-SB09, and WTB-SB11. These locations are adjacent to each other in the southwestern portion of the site. No metals concentrations exceeded the greater of the industrial RSLs or background concentrations in surface soil samples, so metals contamination exceeding industrial RSLs is confined to subsurface soil.

4.2 GROUNDWATER CONTAMINATION

Table 4-3 summarizes results for chemicals detected in groundwater samples collected in 2015 and provides the maximum detected 1998 concentrations. Appendix B.1 presents the full database printout, including the results for samples collected in 1998. PNS facility background values and risk-based screening levels are presented to identify significant site-related chemicals and aid in focusing the discussion of the nature and extent of contamination. Also, the chemical concentrations in the 2015 sample from upgradient well WTB-MW01 were included in Table 4-3 in a separate column, as was the maximum

concentrations in the 1998 SSI samples (not including sample from WTB-MW01). For groundwater, the risk-based screening levels are PNS-specific screening levels for construction worker exposure (ingestion and dermal contact) to groundwater that were calculated using the methodology provided in the RI SAP (Tetra Tech, May 2015) and are found in Appendix A.8 of this report.

A statistical analysis of the data was not conducted to determine whether chemical concentrations were within the ranges of facility-wide background concentrations because OU8 groundwater concentrations were generally low and because groundwater at the site is brackish and not a potential potable water source.

The results of the 1998 samples are discussed in the SAP (Tetra Tech, May 2015). The site history did not indicate a reason to suspect the presence of VOC, SVOC, pesticide, or PCB contamination, and no risk-based criteria exceedances of these compounds were detected during the SSI. Therefore, 2015 groundwater samples were not analyzed for these parameters. The presence of PAHs and metals at the site was expected based on previous site activities, and PAHs and metals were detected in SSI soil samples. PAHs were not detected in SSI groundwater samples, but associated detection limits exceeded RSLs. Based on site history and other factors as discussed above, RI groundwater samples were analyzed for PAHs and metals. Petroleum hydrocarbons (particularly diesel range) were detected in SSI soil and groundwater samples, and based on resolution of MEDEP's comments on the SAP, 2015 groundwater samples were also analyzed for EPH to confirm that petroleum hydrocarbon contamination was not a concern for OU8. The 2015 groundwater EPH results were all nondetect.

Eight PAHs and 17 metals were detected in 2015 groundwater samples (not including the upgradient sample from WTB-MW01). Of these chemicals, only manganese was detected at concentrations that exceeded its construction worker screening level. Only one sample (not including the upgradient samples) had a manganese concentration that exceeded its screening level of 2,550 micrograms per liter (µg/L) (2,630 µg/L at the downgradient well WTB-MW05R); manganese concentrations in the upgradient samples at WTB-MW01 were 22,700 µg/L in 2015 and 9,730 µg/L in 1998. The next greatest manganese concentrations detected in the wells within and downgradient of OU8 were detections of 2,260 µg/L at WTB-MW07 (2015) and 1,190 µg/L at WTB-MW05 (1998), which are both downgradient wells located outside of the site boundary to the west. The maximum manganese concentration in groundwater samples collected from within the OU8 site boundary is 697 µg/L at WTB-MW06. This is the same location where the maximum concentration of manganese in soil was detected (12,600 mg/kg at WTB-SB11 from 6 to 10 feet bgs). Manganese concentrations in groundwater at WTB-MW04 (600 µg/L in 1998 and 455 µg/L in 2015) were only slightly less than the detection at WTB-MW06, but the maximum manganese concentration in soil from WTB-MW04 was only 1,150 mg/kg. Therefore, there does not appear to be a direct relationship between manganese concentrations in soil and groundwater. Also, because maximum manganese

concentrations were detected in groundwater samples collected from outside of the OU8 boundary, it does not appear that the elevated manganese concentration in groundwater at the downgradient well WTB-MW05R is site related.

As discussed in Section 4.1, several metals including antimony, copper, and lead exceeded the range of background concentrations and industrial RSLs, and nickel concentrations exceeded the range of background concentrations and the residential RSL in subsurface soil samples from WTB-SB11. However, antimony and copper were not detected in the groundwater sample from WTB-MW06, and concentrations of lead (13.1 µg/L) and nickel (9.5 µg/L) at WTB-MW06 were less than concentrations in several of the other wells. This supports the finding that there does not appear to be a direct relationship between metals concentrations in soil and groundwater at the site.

TABLE 4-1

SUMMARY STATISTICS FOR SURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Site Data within Background[3]? (Yes/No)	PNS Facility Background Range of Detected Concentrations[4]	Concentrations in Samples Collected Outside Site Boundary		USEPA RSL[5]	
									WTB-SS01-0001-98	WTB-SS05-0001-98	Residential Soil	Industrial Soil
VOLATILES												
Bromomethane	1 J	1 J	UG/KG	WTB-SS06-0001-98	1/3	10 - 11	--	ND	11 UJ	11 U	680 N	3000 N
SEMIVOLATILES												
Butyl Benzyl Phthalate	36 J	36 J	UG/KG	WTB-SS06-0001-98	1/3	330 - 330	--	ND	360 U	1700 U	290000 C	1200000 C
Carbazole	28 J	76 J	UG/KG	WTB-SS02-0001-98	2/3	330 - 330	--	94	360 U	1700 U	NA	NA
Dibenzofuran	28 J	28 J	UG/KG	WTB-SS06-0001-98	1/3	330 - 330	--	ND	360 U	1700 U	7300 N	100000 N
di-n-Butyl Phthalate	24 J	24 J	UG/KG	WTB-SS06-0001-98	1/3	330 - 330	--	100	360 U	1700 U	630000 N	8200000 N
POLYCYCLIC AROMATIC HYDROCARBONS												
2-Methylnaphthalene	25 J	38 J	UG/KG	WTB-SS02-0001-98	2/3	330 - 330	--	44	78 J	1700 U	24000 N	300000 N
Acenaphthene	5.1 J	1600 J	UG/KG	WTB-SS-16-0002	10/20	8.9 - 330	--	ND	360 U	1700 U	360000 N	4500000 N
Acenaphthylene	2.3 J	260	UG/KG	WTB-SS-12-0002	9/20	8.9 - 360	--	**74**	360 U	1700 U	360000 N[6]	4500000 N[6]
Anthracene	3.9 J	3900	UG/KG	WTB-SS-16-0002	15/20	8.9 - 330	--	**58 - 62**	360 U	1700 U	1800000 N	23000000 N
BAP Equivalent-HalfND	11	15000	UG/KG	WTB-SS-23-0002	19/20	9.9 - 9.9	No	**243 - 1575**	254	1006	**16 C**	**290 C**
BAP Equivalent-Pos	0.44	15000	UG/KG	WTB-SS-23-0002	19/20	9.9 - 9.9	No	**0 - 1575**	74	1006	**16 C**	**290 C**
Benzo(a)anthracene	4.7 J	13000	UG/KG	WTB-SS-16-0002	17/20	9.9 - 10	No	**37 - 640**	57 J	600 J	**160 C**	**2900 C**
Benzo(a)pyrene	6.3 J	10000	UG/KG	WTB-SS-23-0002	17/20	9.9 - 10	No	**36 - 1100**	51 J	610 J	**16 C**	**290 C**
Benzo(b)fluoranthene	4.4 J	15000	UG/KG	WTB-SS-23-0002	19/20	9.9 - 9.9	No	**41 - 1700**	110 J	950 J	**160 C**	**2900 C**
Benzo(g,h,i)perylene	5.4 J	6100	UG/KG	WTB-SS-23-0002	17/20	9.9 - 10	--	**39 - 410**	92 J	1700 UJ	180000 N[7]	2300000 N[7]
Benzo(k)fluoranthene	3.6 J	4700	UG/KG	WTB-SS-23-0002	16/20	8.9 - 10	No	**38 - 1100**	51 J	730 J	**1600 C**	29000 C
Chrysene	11 J	12000 J	UG/KG	WTB-SS-16-0002, WTB-SS-23-0002	16/20	8.9 - 10	--	37 - 1600	120 J	710 J	16000 C	290000 C
Dibenzo(a,h)anthracene	12 J	1700	UG/KG	WTB-SS-23-0002	15/20	8.9 - 10	NA	**180 - 190**	360 U	200 J	**16 C**	**290 C**
Fluoranthene	8.5 J	24000	UG/KG	WTB-SS-16-0002	17/20	9.9 - 10	--	**43 - 1700**	48 J	600 J	240000 N	3000000 N
Fluorene	4.5 J	1400 J	UG/KG	WTB-SS-16-0002	12/20	8.9 - 330	--	**42**	19 J	1700 U	240000 N	3000000 N
Indeno(1,2,3-cd)pyrene	5.2 J	6700	UG/KG	WTB-SS-23-0002	17/20	9.9 - 10	No	**38 - 440**	53 J	330 J	**160 C**	**2900 C**
Naphthalene	8.1 J	120	UG/KG	WTB-SS-15-0002	10/20	8.9 - 330	--	**42 - 43**	38 J	1700 U	3800 C	17000 C
Phenanthrene	2.1 J	13000	UG/KG	WTB-SS-16-0002	19/20	9.9 - 9.9	--	**40 - 470**	84 J	140 J	180000 N[7]	2300000 N[7]
Pyrene	9.2 J	27000 J	UG/KG	WTB-SS-23-0002	17/20	9.9 - 10	--	**42 - 1400**	120 J	660 J	180000 N	2300000 N
METALS												
Aluminum	1730	18600	MG/KG	WTB-SS-20-0002	20/20	-	Yes	4,930 - 33500	10000	11100	**7700 N**	110000 N
Antimony	0.1 J	3.2 J	MG/KG	WTB-SS02-0001-98	15/20	0.047 - 0.91	NA	7 - 9.4	0.39 UR	0.3 UR	**3.1 N**	47 N
Arsenic	1.64 J	18.6	MG/KG	WTB-SS-14-0002	20/20	-	Yes	4.4 - 58.6	15.3 J	10.6 J	**0.68 C**	**3 C**
Barium	8.02 J	276	MG/KG	WTB-SS-15-0002	20/20	-	--	**22.3 - 223**	76.8	50.3 J	1500 N	22000 N
Beryllium	0.269 J	1.09 J	MG/KG	WTB-SS-20-0002	17/20	0.267 - 0.568	--	0.34 - 1.1	0.29	0.43 J	16 N	230 N
Cadmium	0.038 J	1.9 J	MG/KG	WTB-SS06-0001-98	16/20	0.371 - 0.805	--	0.82 - 3.4	0.45 U	0.45 J	7.1 N	98 N
Calcium	448	13200 J	MG/KG	WTB-SS-22-0002	20/20	-	--	**682 - 7910**	5820 J	4580 J	NA	NA
Chromium	3.33 J	234	MG/KG	WTB-SS-11-0002	20/20	-	--	**11.6 - 103**	40.2 J	43.3 J	12000 N[8]	180000 N[8]
Cobalt	1.62	19.5	MG/KG	WTB-SS07-0001-98	20/20	-	Yes	3.1 - 24.2	10.1	11.3	**2.3 N**	35 N
Copper	4.68 J	769	MG/KG	WTB-SS-23-0002	20/20	-	No	**8.5 - 316**	155 J	37.6 J	**310 N**	4700 N
Iron	5280	48500	MG/KG	WTB-SS-23-0002	20/20	-	No	**8730 - 45000**	23700	24000	**5500 N**	82000 N
Lead	7.86 J	858	MG/KG	WTB-SS-23-0002	20/20	-	Yes	9.5 - 1100	293 J	46.4	**400**	**800**
Magnesium	587	12400	MG/KG	WTB-SS07-0001-98	20/20	-	--	1500 - 17200	6970	6800	NA	NA
Manganese	162 J-	672 J	MG/KG	WTB-SS-11-0002	20/20	-	No	**110 - 611**	224 J	346	**180 N**	2600 N
Mercury	0.0082 J	1.45 J	MG/KG	WTB-SS-18-0002	18/20	0.014 - 0.018	--	0.0825 - 1.8	0.18 J	109	2.3 N[9]	35 N[9]
Nickel	3.18	260	MG/KG	WTB-SS-11-0002	20/20	-	No	**8.1 - 73.2**	40.4	31.5 J	**150 N**	2200 N
Potassium	591 J	6040 J	MG/KG	WTB-SS-12-0002	20/20	-	--	585 - 6580	3360	3040	NA	NA
Selenium	0.19 J	0.75 J	MG/KG	WTB-SS-18-0002	5/20	0.46 - 2.5	--	**0.32 - 2.1**	0.63 UJ	0.48 UJ	39 N	580 N
Silver	0.049 J	0.8 J	MG/KG	WTB-SS-15-0002	9/20	0.31 - 1.3	NA	ND	0.52 U	0.6 J	39 N	580 N
Sodium	62.2 J	1470 J	MG/KG	WTB-SS-15-0002	18/20	116 - 266	--	**35.1 - 1370**	340 U	397	NA	NA
Thallium	0.0759	0.32	MG/KG	WTB-SS-20-0002	15/20	0.072 - 1	NA	**0.22 - 0.23**	1.2 U	0.51 U	**0.078 N**	1.2 N
Vanadium	4.08	69.3	MG/KG	WTB-SS-12-0002	20/20	-	Yes	13.5 - 89.5	34.9	34.1	**39 N**	580 N
Zinc	22.7 J	900 J	MG/KG	WTB-SS06-0001-98	20/20	-	--	**23.1 - 1390**	152 J	84.5 J	2300 N	35000 N

TABLE 4-1

SUMMARY STATISTICS FOR SURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Site Data within Background[3]? (Yes/No)	PNS Facility Background Range of Detected Concentrations[4]	Concentrations in Samples Collected Outside Site Boundary		USEPA RSL[5]	
									WTB-SS01-0001-98	WTB-SS05-0001-98	Residential Soil	Industrial Soil
PETROLEUM HYDROCARBONS												
Diesel Range Organics	160 J	170	MG/KG	WTB-SS06-0001-98	2/3	84 - 84	--	NA	440 U	120 J	NA	NA
Gasoline Range Organics	3.1	3.1	MG/KG	WTB-SS02-0001-98	1/3	2.5 - 2.5	--	NA	2.5 U	2.5 U	NA	NA
EPH												
C11-C22 Aromatics	10 J	1800	MG/KG	WTB-SS-19-0002	13/17	14 - 23	NA	NA	--	--	**750 [10]**	NA
C19-C36 Aliphatics	12 J	140	MG/KG	WTB-SS-11-0002	11/17	14 - 31	--	NA	--	--	10000 [10]	NA

Footnotes:
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - To determine whether chemical concentrations were within background levels, a statistical analysis was conducted for chemicals above screening levels using the site and background datasets. The statistical analysis was only conducted on chemicals with concentrations that exceeded the residential soil RSL. Cells are shaded if the site data are within the background data.
4 - Cells are shaded if the maximum site concentration is greater than the range of background concentrations (Tetra Tech, April 2014).
5 - USEPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites, May 2016 (unless otherwise noted). The noncarcinogenic values (denoted with a "N" flag) correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of $1x10^{-6}$ (carcinogens denoted with a "C" flag).
6 - Value is for acenaphthene.
7 - Value is for pyrene.
8 - Value for trivalent chromium.
9 - Value for mercuric chloride.
10 - MEDEP Remedial Action Guidelines for Sites Contaminated with Hazardous Substances, Residential (MEDEP, May 2013).

Definitions:
C = Carcinogen
J = Estimated value
J - = Estimated value, biased low
N = Noncarcinogen
NA = Not Applicable/Not Available
U = Not detected
ND = Non Detect
BAP Equivalent = BAP TEQs
mg/kg = milligram per killogram
µg/kg = microgram per killogram

Shaded criterion and chemical name indicates that the maximum detected concentration exceeds one or more screening criteria.

TABLE 4-2

SUMMARY STATISTICS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Site Data within Background[3]? (Yes/No)	PNS Facility Background Range of Detected Concentrations[4]	Concentrations in Samples Collected Outside Site Boundary				USEPA RSL[5]	
									WTB-SB01-0305-98	WTB-SB05-0305-98	WTB-SB05-0709-98	WTB-SB05-1315-98	Residential Soil	Industrial Soil
VOLATILES														
1,1,2-Trichlorotrifluoroethane	1 J	6 J	UG/KG	WTB-SB03-0305-98	3/11	11 - 16	--	NA	12 U	11 U	12 U	15 U	4000000 N	17000000 N
2-Butanone	8 J	8 J	UG/KG	WTB-SB02-0305-98	1/11	11 - 16	--	ND	12 U	11 U	4 J	13	2700000 N	19000000 N
Acetone	240	2500 J	UG/KG	WTB-SB06-0305-98	2/11	11 - 1900	--	ND	12 U	12 U	48 U	230	6100000 N	67000000 N
Benzene	2 J	2 J	UG/KG	WTB-SB07-0709-98	1/10	11 - 16	--	ND	12 U	11 U	12 U	15 U	1200 C	5100 C
Carbon Disulfide	4 J	4 J	UG/KG	WTB-SB04-0911-98	1/11	11 - 16	--	ND	12 U	11 U	2 J	4 J	77000 N	350000 N
Chloroform	1 J	4 J	UG/KG	WTB-SB07-0709-98	3/11	11 - 16	--	ND	1 J	11 U	12 U	15 U	320 C	1400 C
Ethylbenzene	2 J	2 J	UG/KG	WTB-SB07-0709-98	1/9	11 - 12	--	ND	12 U	11 U	12 U	15 UJ	5800 C	25000 C
Tetrachloroethene	6 J	6 J	UG/KG	WTB-SB07-0709-98	1/9	11 - 12	--	8	12 U	11 U	12 U	15 UJ	8100 N[6]	39000 N[6]
Toluene	6 J	6 J	UG/KG	WTB-SB02-0709-98, WTB-SB07-0709-98	2/9	11 - 12	--	**1**	12 U	11 U	12 U	15 UJ	490000 N	4700000 N
Trichloroethene	7 J	7 J	UG/KG	WTB-SB07-0709-98	1/10	3 - 12	--	ND	12 U	11 U	12 U	25	410 N[6]	1900 N[6]
SEMIVOLATILES														
Bis(2-ethylhexyl)phthalate	610	2000	UG/KG	WTB-SB03-0305-98	2/11	210 - 530	--	**58 - 650**	400 U	400 U	910	550	39000 C	160000 C
Butyl Benzyl Phthalate	38 J	38 J	UG/KG	WTB-SB06-0305-98	1/11	360 - 530	--	ND	400 U	360 U	21 J	27 J	290000 C	1200000 C
Carbazole	24 J	380 J	UG/KG	WTB-SB06-0507-98	6/11	400 - 430	--	**94**	400 U	360 U	400 U	500 U	NA	NA
Dibenzofuran	23 J	320 J	UG/KG	WTB-SB06-0507-98	4/11	360 - 530	--	ND	400 U	360 U	400 U	500 U	7300 N	100000 N
di-n-Butyl Phthalate	22 J	22 J	UG/KG	WTB-SB06-0305-98	1/11	360 - 530	--	100	400 U	360 U	400 U	500 U	630000 N	8200000 N
POLYCYCLIC AROMATIC HYDROCARBONS														
2-Methylnaphthalene	26 J	300 J	UG/KG	WTB-SB06-0507-98	8/11	360 - 400	--	**44**	400 U	360 U	400 U	500 U	24000 N	300000 N
Acenaphthene	1.9 J	2200	UG/KG	WTB-SB-23-0206	30/45	9.1 - 530	--	ND	400 U	360 U	400 U	500 U	360000 N	4500000 N
Acenaphthylene	2.3 J	290	UG/KG	WTB-SB-23-0206	20/45	9.1 - 530	--	**74**	400 U	360 U	400 U	500 U	360000 N[7]	4500000 N[7]
Anthracene	1.9 J	5100	UG/KG	WTB-SB-23-0206	41/45	9.1 - 530	--	**58 - 62**	400 U	360 U	400 U	500 U	1800000 N	23000000 N
BAP Equivalent-HalfND	12	17000	UG/KG	WTB-SB-23-0206	43/45	9.1 - 9.8	No	**243 - 1575**	400 U	360 U	284	109	**16 C**	**290 C**
BAP Equivalent-Pos	6.1	17000	UG/KG	WTB-SB-23-0206	43/45	9.1 - 9.8	No	**0 - 1575**	400 U	360 U	84	109	**16 C**	**290 C**
Benzo(a)anthracene	4.4 J	14000	UG/KG	WTB-SB-23-0206	43/45	9.1 - 9.8	No	**37 - 640**	400 U	360 U	63 J	66 J	**160 C**	**2900 C**
Benzo(a)pyrene	4.8 J	12000	UG/KG	WTB-SB-23-0206	43/45	9.1 - 9.8	No	**36 - 1100**	400 U	360 U	65 J	65 J	**16 C**	**290 C**
Benzo(b)fluoranthene	8.1 J	17000	UG/KG	WTB-SB-23-0206	43/45	9.1 - 9.8	No	**41 - 1700**	400 U	360 U	77 J	65 J	**160 C**	**2900 C**
Benzo(g,h,i)perylene	11 J	6100	UG/KG	WTB-SB-23-0206	40/45	9.1 - 400	--	**39 - 410**	400 U	360 U	400 UJ	34 J	180000 N[8]	2300000 N[8]
Benzo(k)fluoranthene	11 J	6700	UG/KG	WTB-SB-23-0206	41/45	9.1 - 530	No	**38 - 1100**	400 U	360 U	61 J	54 J	**1600 C**	29000 C
Chrysene	60	13000	UG/KG	WTB-SB-23-0206	42/45	9.1 - 10	--	**37 - 1600**	400 U	360 U	61 J	59 J	16000 C	290000 C
Dibenzo(a,h)anthracene	11 J	1600	UG/KG	WTB-SB-23-0206, WTB-SB-23-0610	40/45	9.1 - 13	NA	**180 - 190**	400 U	360 U	400 UJ	26 J	**16 C**	**290 C**
Fluoranthene	7.9 J	33000	UG/KG	WTB-SB-23-0206	43/45	9.1 - 9.8	--	**43 - 1700**	400 U	360 U	100 J	120 J	240000 N	3000000 N
Fluorene	3.9 J	2200	UG/KG	WTB-SB-23-0206	34/45	9.1 - 530	--	**42**	400 U	360 U	400 U	500 U	240000 N	3000000 N
Indeno(1,2,3-cd)pyrene	8.7 J	6500	UG/KG	WTB-SB-23-0206	43/45	9.1 - 10	No	**38 - 440**	400 U	360 U	39 J	41 J	**160 C**	**2900 C**
Naphthalene	6.9 J	470	UG/KG	WTB-SB-23-0206	30/45	9.1 - 400	--	**42 - 43**	400 U	360 U	400 U	500 U	3800 C	17000 C
Phenanthrene	5.1 J	13000	UG/KG	WTB-SB-23-0206	44/45	9.1 - 9.1	--	**40 - 470**	400 U	360 U	42 J	66 J	180000 N[8]	2300000 N[8]
Pyrene	8.9 J	25000	UG/KG	WTB-SB-23-0206	43/45	9.1 - 10	--	**42 - 1400**	400 U	360 U	110 J	130 J	180000 N	2300000 N
PESTICIDES/PCBS														
Aldrin	1.9 J	5.3 J	UG/KG	WTB-SB07-0305-98	3/10	1.8 - 2.7	--	ND	2 U	1.9 U	2 U	2.6 U	39 C	180 C
Endosulfan II	5 J	5 J	UG/KG	WTB-SB07-0709-98	1/11	3.6 - 5.3	--	ND	3.9 U	3.6 U	3.8 U	5 U	47000 N	700000 N
METALS														
Aluminum	1910	18100	MG/KG	WTB-SB-16-0206	45/45	-	Yes	4,930 - 33500	13100	8650	11600	15400	**7700 N**	110000 N
Antimony	0.11	1610 J	MG/KG	WTB-SB-09-0206	31/41	0.047 - 1.1	NA	**7 - 9.4**	0.46 UR	0.41 UR	0.43 UR	0.53 UR	**3.1 N**	**47 N**
Arsenic	2.48	61.9	MG/KG	WTB-SB-08-0206	45/45	-	No	**4.4 - 58.6**	13.2 J	10.5 J	14.3 J	30.9 J	**0.68 C**	**3 C**
Barium	14.1 J	959 J	MG/KG	WTB-SB-21-0206	45/45	-	--	**22.3 - 223**	56	41.7 J	74.2 J	148 J	1500 N	22000 N
Beryllium	0.262 J	1 J	MG/KG	WTB-SB-16-0206	35/45	0.18 - 4.94	--	0.34 - 1.1	0.74	0.32	0.42 J	0.87 J	16 N	230 N
Cadmium	0.053 J	7.64	MG/KG	WTB-SB-11-0206	29/45	0.153 - 5.22	No	**0.82 - 3.4**	0.53 U	0.48 U	0.49 U	0.61 U	**7.1 N**	98 N
Calcium	652 J	71900	MG/KG	WTB-SB-21-0206	45/45	-	--	682 - 7910	2470 J	2810 J	2250 J	8790 J	NA	NA
Chromium	10.7 J	5780	MG/KG	WTB-SB-11-0610	43/45	6.7 - 7	--	**11.6 - 103**	27.8 J	41.5 J	218 J	52.8 J	12000 N[9]	180000 N[9]
Cobalt	4	40.7	MG/KG	WTB-SB-11-0206	45/45	-	No	**3.1 - 24.2**	12.6	10.5	8.5	7.1	**2.3 N**	**35 N**
Copper	15.2	39600 J	MG/KG	WTB-SB-09-0610	45/45	-	No	**8.5 - 316**	21.3 J	17.2 J	392 J	4090 J	**310 N**	**4700 N**
Iron	8300	269000	MG/KG	WTB-SB-11-0206	45/45	-	No	**8730 - 45000**	21400	19000	42400	31400	**5500 N**	**82000 N**
Lead	4.79	20100	MG/KG	WTB-SB-09-0206	43/45	21.9 - 36.9	No	**9.5 - 1100**	14.6 U	8.4	98.7	1020	**400**	**800**
Magnesium	328	9960	MG/KG	WTB-SB03-0305-98	45/45	-	--	1500 - 17200	4880	5610	8910	8820	NA	NA
Manganese	33.3 J	12600 J	MG/KG	WTB-SB-11-0610	45/45	-	No	**110 - 611**	488 J	291	363	362	**180 N**	**2600 N**
Mercury	0.012 J	18.6 J	MG/KG	WTB-SB-11-0206	42/45	0.014 - 0.07	No	**0.0825 - 1.8**	0.01 UJ	0.01 UJ	0.22 J	2.4 J	**2.3 N**	35 N[10]
Nickel	9.1 J	3260	MG/KG	WTB-SB-11-0610	43/45	8.7 - 10.3	No	**8.1 - 73.2**	29.2	33.7 J	34.7 J	24.8 J	**150 N**	**2200 N**
Potassium	634	4720 J	MG/KG	WTB-SB-21-0206	45/45	-	--	585 - 6580	2600	2340	4240	4610	NA	NA
Selenium	0.22 J	1.6	MG/KG	WTB-SB-22-0206	14/45	0.52 - 19	--	0.32 - 2.1	0.74 UJ	0.67 UJ	1.1 U	0.86 UJ	39 N	580 N
Silver	0.063 J	6.86 J	MG/KG	WTB-SB-09-0206	22/45	0.26 - 9.23	--	ND	0.61 U	0.56 U	0.84 J	1.2 J	39 N	580 N
Sodium	154 J	2300 J	MG/KG	WTB-SB-21-0206	36/45	155 - 761	--	**35.1 - 1370**	480	429	2060	6750	NA	NA
Thallium	0.108	0.254	MG/KG	WTB-SB-10-0610	27/45	0.065 - 0.98	No	**0.22 - 0.23**	1.6 U	0.67 U	0.69 U	0.86 U	**0.078 N**	1.2 N

TABLE 4-2

SUMMARY STATISTICS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Site Data within Background[3]? (Yes/No)	PNS Facility Background Range of Detected Concentrations[4]	Concentrations in Samples Collected Outside Site Boundary				USEPA RSL[5]	
									WTB-SB01-0305-98	WTB-SB05-0305-98	WTB-SB05-0709-98	WTB-SB05-1315-98	Residential Soil	Industrial Soil
Vanadium	8.92	84.4 J	MG/KG	WTB-SB-17-0610	44/45	22.3 - 22.3	Yes	13.5 - 89.5	29.1	25.8	36.6	46.4	**39 N**	580 N
Zinc	30.6	7350	MG/KG	WTB-SB-09-0206	45/45	-	No	**23.1 - 1390**	54.8 J	38.3 J	158 J	317 J	**2300 N**	35000 N
MISCELLANEOUS PARAMETERS														
Cyanide	34	34	MG/KG	WTB-SB02-0305-98	1/11	2 - 2	NA	NA	2 UJ	2 U	2 U	2 U	**0.27 N**	**1.2 N**
PETROLEUM HYDROCARBONS														
Diesel Range Organics	57	340 J	MG/KG	WTB-SB02-0305-98	4/11	28 - 330	--	NA	6 U	20	100 J	740 J	NA	NA
Gasoline Range Organics	13	13	MG/KG	WTB-SB02-0305-98	1/11	2.5 - 4.8	--	NA	2.5 U	2.5 U	2.5 U	4.2	NA	NA
EPH MADEP														
C11-C22 Aromatics	12 J	2200	MG/KG	WTB-SB-17-0610	33/34	16 - 16	NA	NA	--	--	--	--	**750 [11]**	NA
C19-C36 Aliphatics	14 J	2500	MG/KG	WTB-SB-08-0206	28/34	15 - 28	--	NA	--	--	--	--	10000 [11]	NA
C9-C18 Aliphatics	11 J	170	MG/KG	WTB-SB-11-0206	15/34	15 - 120	--	NA	--	--	--	--	2700 [11]	NA

Note: This table only presents the results for samples collected with starting depths between 2 and 10 feet below ground surface.

Footnotes:
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - To determine whether chemical concentrations were within background levels, a statistical analysis was conducted for chemicals above screening levels using the site and background datasets. The statistical analysis was only conducted on chemicals with concentrations that exceeded the residential soil RSL. Cells are shaded if the site data are within the background data.
4 - Cells are shaded if the maximum site concentration is greater than the range of background concentrations (Tetra Tech, April 2014).
5 - USEPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites, May 2016 (unless otherwise noted). The noncarcinogenic values (denoted with a "N" flag)correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of $1x10^{-6}$ (carcinogens denoted with a "C" flag).
6 - One-tenth the non-carcinogenic screening level is less than the carcinogenic screening level; therefore, the non-carcinogenic screening level is presented.
7 - Value is for acenaphthene.
8 - Value is for pyrene.
9 - Value for trivalent chromium.
10 - Value for mercuric chloride.
11 - MEDEP Remedial Action Guidelines for Sites Contaminated with Hazardous Substances (MEDEP, May 2013).

Definitions:
C = Carcinogen
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
U = Not detected
R = Rejected

TABLE 4-3

SUMMARY STATISTICS FOR GROUNDWATER
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects(2)	Range of Background Concentrations(3)	Construction Worker Screening Level(4)	Upgradient Concentration(5)	Maximum Concentration from 1998 Samples(6)
POLYCYCLIC AROMATIC HYDROCARBONS										
Acenaphthene	0.26	0.39	UG/L	WTB-GW-MW06-0615	2/6	0.094 - 0.098	NA	3760 N	ND	ND
Anthracene	0.13 J	0.13 J	UG/L	WTB-GW-MW05R-0615	1/6	0.094 - 0.098	NA	10100 N	ND	ND
Fluoranthene	0.15 J	0.15 J	UG/L	WTB-GW-MW05R-0615	1/6	0.094 - 0.098	NA	779000 N	ND	ND
Fluorene	0.14 J	0.18 J	UG/L	WTB-GW-MW05R-0615	2/6	0.094 - 0.098	NA	5650 N	ND	ND
Indeno(1,2,3-cd)pyrene	0.13 J	0.14 J	UG/L	WTB-GW-MW03-0615	1/6	0.094 - 0.095	NA	1870 C	ND	ND
Naphthalene	0.085 J	0.38	UG/L	WTB-GW-MW06-0615	6/6	-	NA	23600 N	0.11	ND
Phenanthrene	0.12 J	0.69	UG/L	WTB-GW-MW05R-0615	2/6	0.094 - 0.098	NA	58400 N	ND	ND
Pyrene	0.12 J	0.12 J	UG/L	WTB-GW-MW05R-0615	1/6	0.094 - 0.098	NA	1850 N	ND	ND
METALS										
Arsenic	3.6 J	20 J	UG/L	WTB-GW-MW05R-0615	6/6	-	NA	345 N	17	48.6
Barium	44.3	1620	UG/L	WTB-GW-MW06-0615	6/6	-	23.1 - 80.3	35700 N	1100	279
Calcium	61800	330000	UG/L	WTB-GW-MW05R-0615	6/6	-	44200 - 130000	NA	862000	195000
Chromium	1 J	2.9 J	UG/L	WTB-GW-MW06-0615	4/6	1.2 - 14	0.76 - 5.5	27100 N	ND	ND
Cobalt	3.96	3.96	UG/L	WTB-GW-MW07-0615	1/6	0.55 - 4.22	NA	4570 N	48.1	ND
Copper	12 J	12 J	UG/L	WTB-GW-MW02-0615	1/6	2.2 - 10.7	NA	46000 N	22	ND
Iron	5980	8050	UG/L	WTB-GW-MW07-0615	4/6	15 - 417	597 - 728	804000 N	12300	5000
Lead	1.5 J	23.9	UG/L	WTB-GW-MW02-0615	5/6	4 - 20	NA	1340	ND	35.7
Magnesium	14100	820000	UG/L	WTB-GW-MW05R-0615	6/6	-	4010 - 23100	NA	54500	971000
Manganese	455	2630	UG/L	WTB-GW-MW05R-0615	5/6	4 - 4	6.1 - 340	**2550 N**	22700	1190
Mercury	0.059 J	0.152 J	UG/L	WTB-GW-MW02-0615	2/6	0.1 - 0.1	NA	357 N	ND	0.45
Nickel	1.4 J	69.5	UG/L	WTB-GW-MW04-0615	5/6	5.64 - 8	NA	8710 N	421	ND
Potassium	8800	337000	UG/L	WTB-GW-MW05R-0615	6/6	-	4730 - 17200	NA	41200	334000
Selenium	1.2 J	2.77 J	UG/L	WTB-GW-MW07-0615	2/6	0.29 - 15	NA	5750 N	ND	ND
Sodium	210000	7270000	UG/L	WTB-GW-MW05R-0615	6/6	-	95800 - 208000	NA	6450000	7470000
Vanadium	0.53 J	0.53 J	UG/L	WTB-GW-MW06-0615	1/6	4 - 20	NA	703 N	ND	ND
Zinc	7.1 J	126	UG/L	WTB-GW-MW02-0615	6/6	-	NA	412000 N	514	ND

Footnotes:
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - Source: Table 5, Saline/Brackish Groundwater Representative Concentrations in the Re-Evaluation of Facility Background Report (Tetra Tech, April 2014).
Cells are shaded if the maximum site concentration is greater than the range of background concentrations.
4 - PNS-specific screening levels for construction worker exposure (ingestion and dermal contact) to groundwater that were calculated using the methodology provided in Appendix A.8. The values shown are based on a target hazard quotient of 0.1 for non-carcinogens (N) and an ILCR of $1x10^{-6}$ for carcinogens (C).
5 - Values are for WTB-MW01. Cells are shaded if the maximum site concentration is less than the upgradient concentration.
6 - Maximum concentrations for 1998 samples are only presented if they were detected in 2015 samples. The complete summary statistics for chemicals detected in 1998 are presented in Appendix C.6.

Definitions:
C = Carcinogen
ILCR = Incremental Lifetime Cancer Risk
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available

Shaded criterion and chemical name indicates that the maximum detected concentration exceeds the screening criteria.

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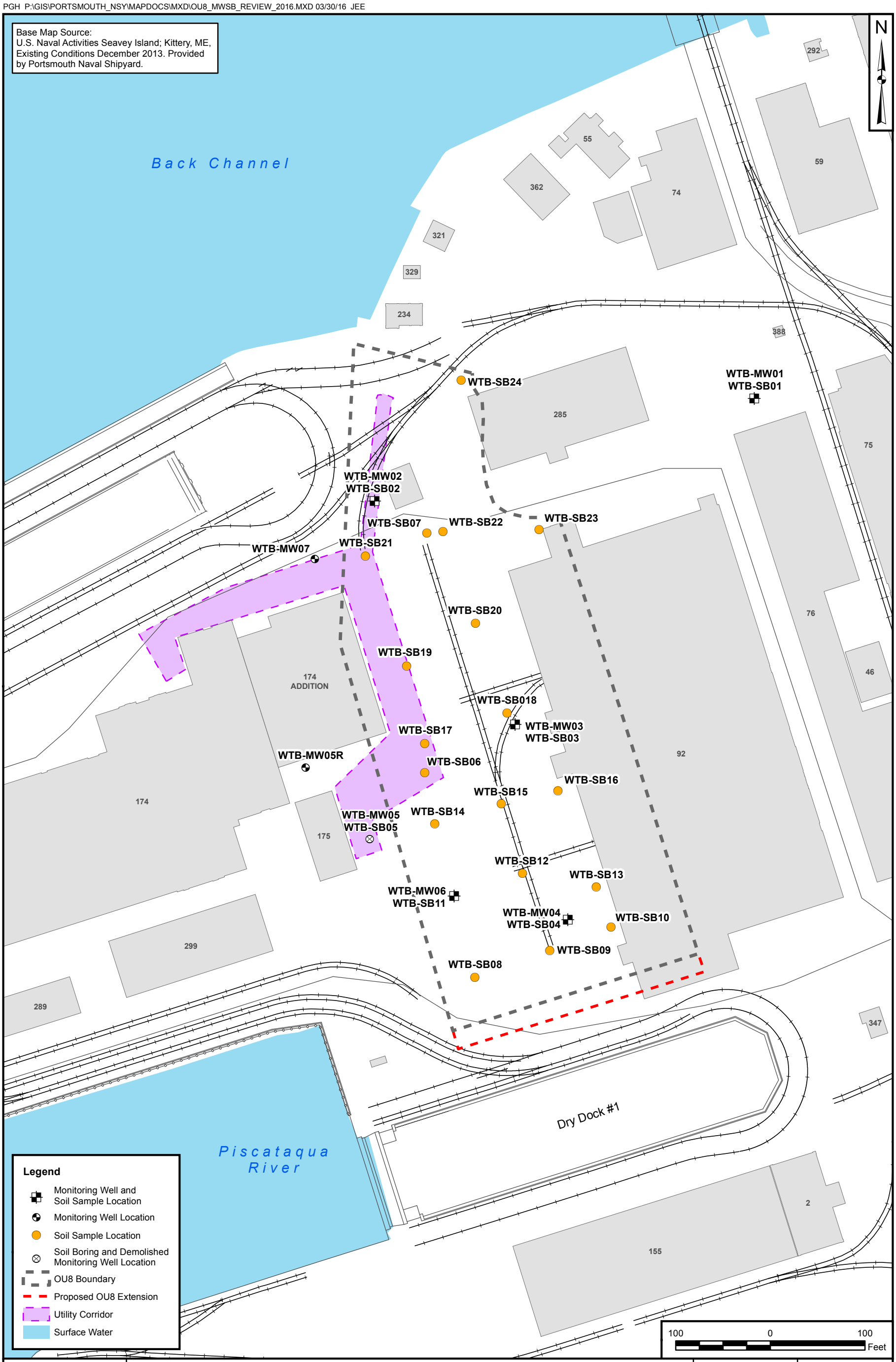

DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	01/21/16		3270	WE32
CHECKED BY	DATE	SOIL BORINGS AND MONITORING WELL LOCATIONS	APPROVED BY	DATE
M. VED	03/30/16	OPERABLE UNIT 8	—	—
REVISED BY	DATE	PORTSMOUTH NAVAL SHIPYARD	APPROVED BY	DATE
—	—	KITTERY, MAINE	—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 4-1	0

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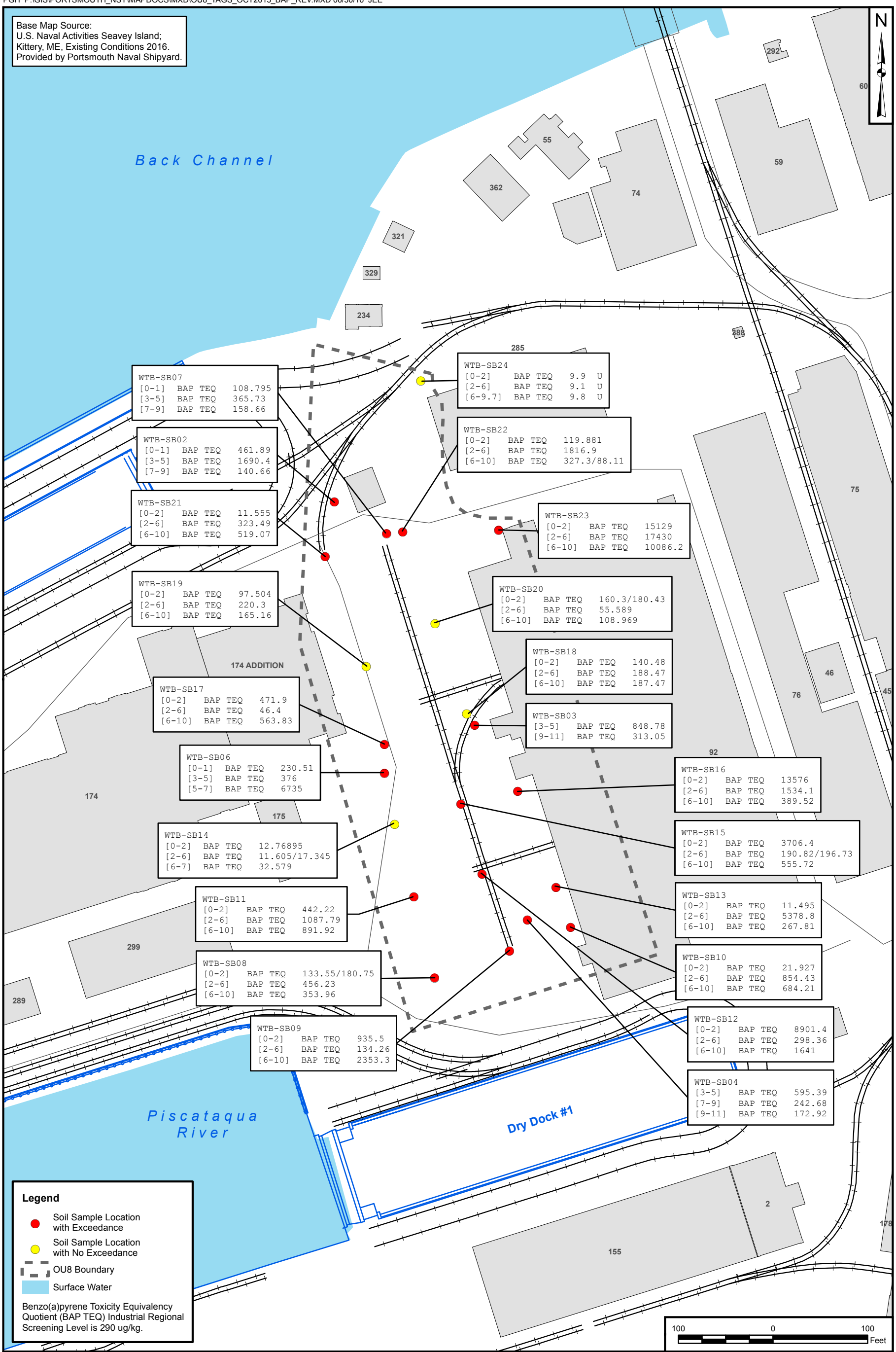

DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	01/21/16		3270	WE32
CHECKED BY	DATE	BENZO(A)PYRENE TOXICITY EQUIVALENCY QUOTIENT CONCENTRATIONS IN SOIL	APPROVED BY	DATE
M. VED	06/30/16	OPERABLE UNIT 8	—	—
REVISED BY	DATE	PORTSMOUTH NAVAL SHIPYARD	APPROVED BY	DATE
—	—	KITTERY, MAINE	—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 4-2	0

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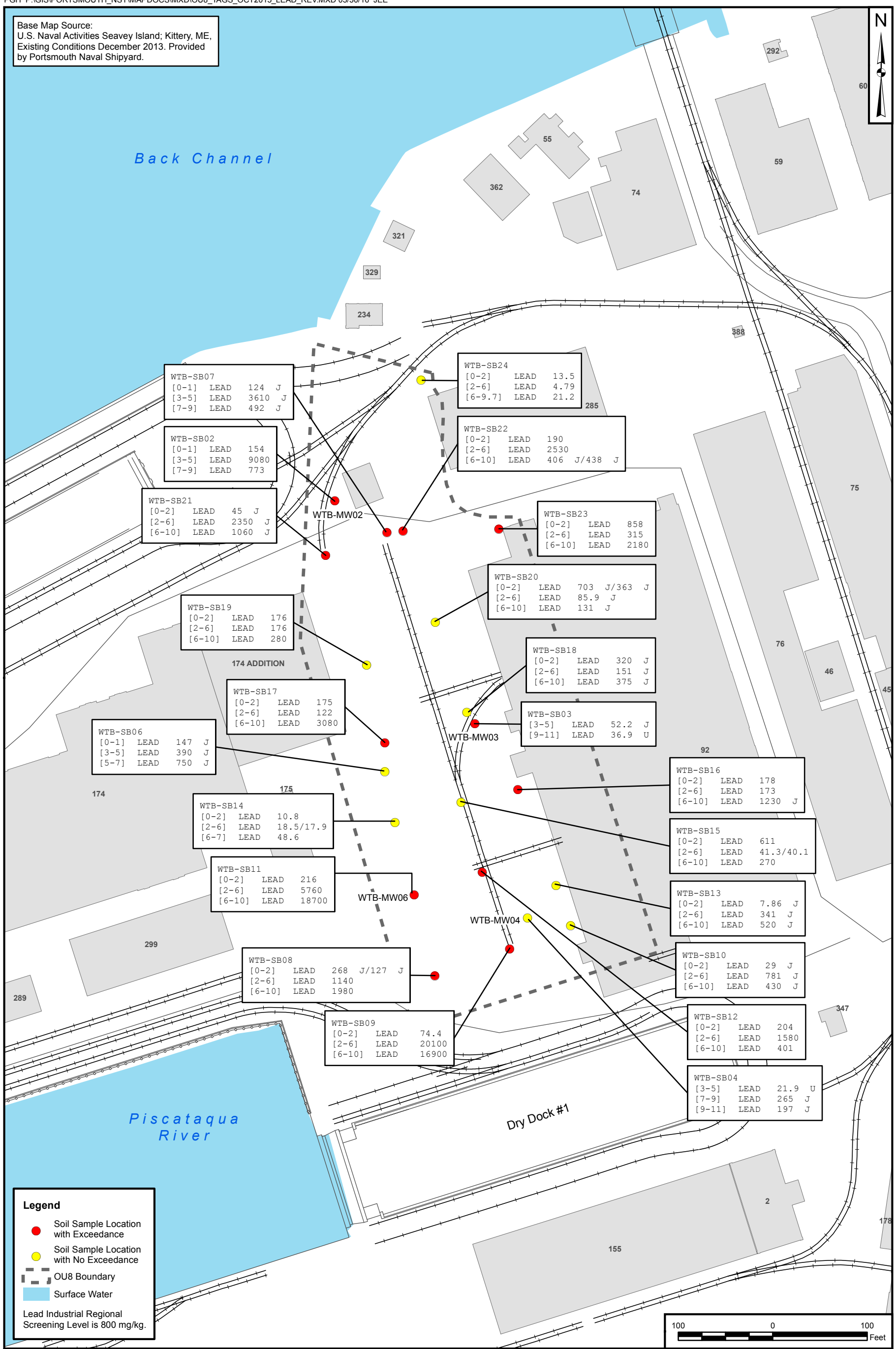


DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	01/22/16		3270	WE32
CHECKED BY	DATE	LEAD CONCENTRATIONS IN SOIL	APPROVED BY	DATE
M. VED	03/30/16	OPERABLE UNIT 8	—	—
REVISED BY	DATE	PORTSMOUTH NAVAL SHIPYARD	APPROVED BY	DATE
—	—	KITTERY, MAINE	—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 4-3	0

5.0 CONTAMINANT FATE AND TRANSPORT ANALYSIS

This section discusses the evaluation of contaminant fate and transport at OU8 to provide an understanding of potential risks from contaminant migration from soil to groundwater and to the offshore area. To support the evaluation, a discussion of the physical and chemical properties of the contaminants associated with OU8 sources and their potential persistence, migration, dispersion, and degradation pathways and the CSM of contaminant migration are provided.

5.1 PHYSICAL AND CHEMICAL PROPERTIES

The persistence of various classes of contaminants and their chemical and physical properties in soil-water environments are discussed in this section. Several chemical transformation mechanisms affect contaminant persistence, including hydrolysis, biodegradation, photolysis, and oxidation/reduction reactions. The following general classes of contaminants were identified as the chemicals associated with OU8 based on the evaluations in Section 4.0:

- PAHs
- Metals

5.1.1 PAHs

PAHs are generally considered to be fairly immobile chemicals in the environment. PAHs are large molecules that have low solubilities, vapor pressures, and Henry's Law constants and have high partitioning coefficients. The low molecular weight PAHs (e.g., acenaphthene, anthracene, fluorene, and phenanthrene) may volatilize from surface waters, whereas the higher molecular weight PAHs [e.g., benzo(a)pyrene, benzo(a)anthracene, dibenzo(a,h)anthracene, etc.] are less likely to volatilize. PAHs in soil are much more likely to bind to soil and be transported via mass transport mechanisms than through dissolution. These compounds, when found in the soil, generally do not migrate vertically to a great extent. Instead, they are more likely to adhere to soil particles and be removed from the site via surface water runoff and erosional processes. However, because the entire site is paved and not directly along the shoreline, surface water runoff and erosion of soil to the offshore area is not a concern for OU8.

PAHs are highly amenable to microbial degradation in soil and sediment. The rate of degradation is influenced by temperature, pH, oxygen concentrations, initial chemical concentrations, and moisture. Photolysis, hydrolysis, and oxidation are not important fate processes for the degradation of PAHs in soil (ATSDR, August 1995).

The most important fate processes for PAHs in water are photo-oxidation, chemical oxidation, and biodegradation. PAHs do not contain functional groups that are susceptible to hydrolytic reactions, and hydrolysis is considered an insignificant degradation mechanism. The rate of photodegradation is influenced by water depth, turbidity, and temperature. Benzo(a)pyrene, chrysene, fluorene, and pyrene are reported to be resistant to photodegradation. PAHs may also be oxidized by chlorination and ozonation, and they may be metabolized by microbes under oxygenated conditions (ATSDR, August 1995).

The mobility of PAHs via the groundwater pathway at OU8 is not considered significant because PAHs were detected infrequently in OU8 groundwater at levels several orders of magnitude less than risk-based screening levels.

5.1.2 Metals

The fate and transport of metals are controlled mainly by the mobility of soil particles and dissolution of the metals into water present in the immediate environment. Metals do not undergo degradation reactions that most organic chemicals do; therefore, they are considered to be persistent. The major fate mechanisms for metals are adsorption to the soil matrix and bioaccumulation. The mobility of metals is influenced primarily by their physical and chemical properties, in combination with the physical and chemical characteristics of the soil matrix. Factors that assist in predicting the mobility of inorganic species are soil/pore water pH, soil/pore water reduction potential (Eh), and cation exchange capacity. The mobility of metals generally increases with decreasing soil pH and cation exchange capacity. Soil pH at OU8 is generally alkaline or neutral, thus the metals in soil are likely immobile.

There are some instances where metals are found at such concentrations or in such forms (e.g., oxidation states) that they may migrate in solution. It is possible that industrial activities could saturate all available exchange sites in soil and result in a metal being mobilized. Metals are also more mobile under acidic conditions, which may exist in areas where plating-type activities have occurred. In these cases, it is possible for metals to migrate vertically through the soil column and reach groundwater. Therefore, the metals detected in groundwater samples at such sites may represent the total of dissolved metals and metals adhering to any suspended soil material that may be present in the samples. Groundwater pH was generally neutral at OU8, and the soil pH was generally alkaline or neutral (as stated above), so this was likely not an issue at OU8.

The following discussion of physical and chemical properties and general fate and transport of metals in the environment was summarized from information provided by Agency for Toxic Substances and Disease Registry (ATSDR) toxicological profiles (September 2008). The information available on physical and chemical properties as summarized by ATSDR indicates that under normal environmental conditions,

metals are not soluble (i.e., they have solubility limits of typically in the low milligrams per liter range under controlled laboratory conditions in distilled water). However, solubilities can be significantly altered by environmental conditions (such as pH, oxidizing or reducing conditions, presence of various naturally occurring organic or inorganic chemical species, water salinity, etc.), which can result in attenuating mechanisms such as precipitation, cation exchange, adsorption, etc. Often whether any metal is in a dissolved phase or solid phase depends on a combination of several chemical mechanisms that vary by metal and by oxidation state or valence. Acidity or alkalinity as measured by pH can directly influence the mobility of metals because metals solubilities generally increase with increasing hydrogen ion content (i.e., decreasing pH levels) and because pH may influence the intensity of oxidation/reduction reactions. Many studies have found that the predominant adsorbates of metal ions are iron and manganese oxides and organic matter such as detrial plant material and humic coatings on mineral surfaces. Metal hydroxides of iron, aluminum, and manganese are important reductive surfaces in subsurface materials with respect to interactions with charged species such as hydrogen, aluminum, cadmium, zinc, lead, and copper and with negatively charged species such as phosphate, sulfate, bicarbonate, and fluoride. The adsorption of species on oxides is strongly dependent on pH due to the variable pH-dependent surface charge and potential of metal hydroxides and due to a pH-dependent speciation of the adsorbate. Recorded pH in soil at OU8 ranged from 4.9 to 10.4, with most pH readings around 7 or slightly greater, and groundwater pH ranged from 6.9 to 7.5. These neutral to slightly alkaline conditions promotes immobility and low oxidation-reduction potential for metals.

Metals are found naturally in varying concentrations in mineral ores, and consequently, anthropogenic activities (e.g., mining) or natural forces (e.g., surface water erosion, wind, etc.) tend to disperse them over large land areas. However, metals are also co-occurring constituents within the inorganic (non-combustible) fractions of fossil fuels (mainly coal and sometimes fuel oil) at various concentrations. Therefore, the combustion of fossil fuels, which has been a primary source of heat and energy, has resulted in the inadvertent concentration of these metals in the non-combustible portion of fuels (e.g., bottom ash or fly ash) at elevated levels in residential and industrial areas. Metals are also present at varying concentrations in commercial chemical products of daily industrial use. Therefore, at industrial sites, not only do operations involving combustion of fossil fuels lead to releases of metals, but operations involving plumbing (copper pipes, galvanized steel pipes, lead/tin solder, etc.), pesticide/insecticide application, paint, and preservation of wood timbers (especially in older buildings), etc., may also lead to their release.

5.2 CONCEPTUAL SITE MODEL OF CONTAMINANT MIGRATION

The CSM for OU8 was developed based on site history and uses, site characterization (e.g., geology and hydrogeology information), and site contaminant fate and transport pathways and processes. The primary sources of contamination at OU8 are fill activities and industrial use of the site. Contaminants released

from industrial activities and from the fill can migrate via several pathways, as discussed in Section 5.2.1. Potential exposure routes and receptors are discussed in Section 5.2.2.

5.2.1 Potential Contaminant Migration Pathways

Figure 5-1 illustrates the potential current and future migration pathways of contaminants at OU8. Contaminant migration includes migration within the onshore environment, migration from the onshore environment to the offshore environment (including tidal flux and erosion), and migration within the offshore environment.

Contaminants have likely been introduced to the soil through direct deposition (e.g., filling or releases). Precipitation-driven migration and tidal flushing were likely past contamination migration mechanisms; however, leaching from soil to groundwater is not expected to be a significant current or future pathway because OU8 is covered with asphalt and buildings that prevent significant soil contact with precipitation and the majority of the fill is in the tidally saturated and saturated zones. Past leaching/flushing is expected to have already resulted in leaching of the majority of the leachable contaminants at the site, and observed concentrations in groundwater and offshore areas (i.e., MS-13 and MS-14) support this conclusion. However, if the buildings and asphalt were to be removed, or if their integrity were compromised, there is a slight possibility that migration of contaminants from the unsaturated zone could occur as indicated on Figure 5-1 as contaminants leach from the soil (illustrated by the future potential migration arrows).

Contaminants in groundwater migrate downgradient with groundwater flow, but their migration rates are not as fast as groundwater seepage velocity because most contaminants interact with soil and bedrock in a way that retards migration. Lead is one of the least mobile of the contaminants of interest and tends to move very slowly if at all, whereas the more soluble metals, soluble anions, and organic chemicals are more mobile. The rate of movement of each chemical, because of interactions with the matrix through which it moves in groundwater, is retarded relative to the groundwater flow rate. In addition, tidal effects may limit the net migration of contaminants in groundwater because of semi-diurnal (twice a day) hydraulic gradient changes. As discussed in Section 4.2, there did not appear to be a relationship between metals concentration in soil and groundwater at one location (WTB-MW06/SB11). Although high concentrations of metals were detected in subsurface soil samples at WTB-SB11, elevated concentrations of those metals were not detected in the groundwater sample from the collocated well WTB-MW06.

As discussed in the SAP, migration of groundwater to the offshore has been investigated as part of OU4 (offshore) investigations, and it was found that contaminants are not migrating to the offshore areas of OU8 at unacceptable levels (Navy, August 2013).

5.2.2 Potential Exposure Routes and Receptors

OU8 is located in the CIA, which requires additional authorization to access. The current land use for OU8 is industrial and is likely to remain the same for the foreseeable future. Therefore, current receptors at OU8 are construction and occupational workers.

Current and future human health exposure pathways for surface and subsurface soil and groundwater exist for construction workers digging in the soil and exposed to groundwater. These pathways are dermal contact, incidental ingestion, and inhalation of dust and vapors. Inhalation of vapors at this site is not considered a significant pathway because VOCs were detected infrequently and at low concentrations (less than 10 µg/kg) in OU8 soil samples. Also, 2-hexanone, which was detected in one groundwater sample at a concentration of 2 µg/L, was the only VOC detected in OU8 groundwater samples. Likewise, inhalation of dust is not considered a significant pathway because the entire site is paved, so the only exposure to dust would be during excavation of soil, which would be limited to small areas at a time unless all of the pavement is removed in the future. It is not expected that trucks or other vehicles would drive over the excavated areas, thus limiting the amount of dust generation.

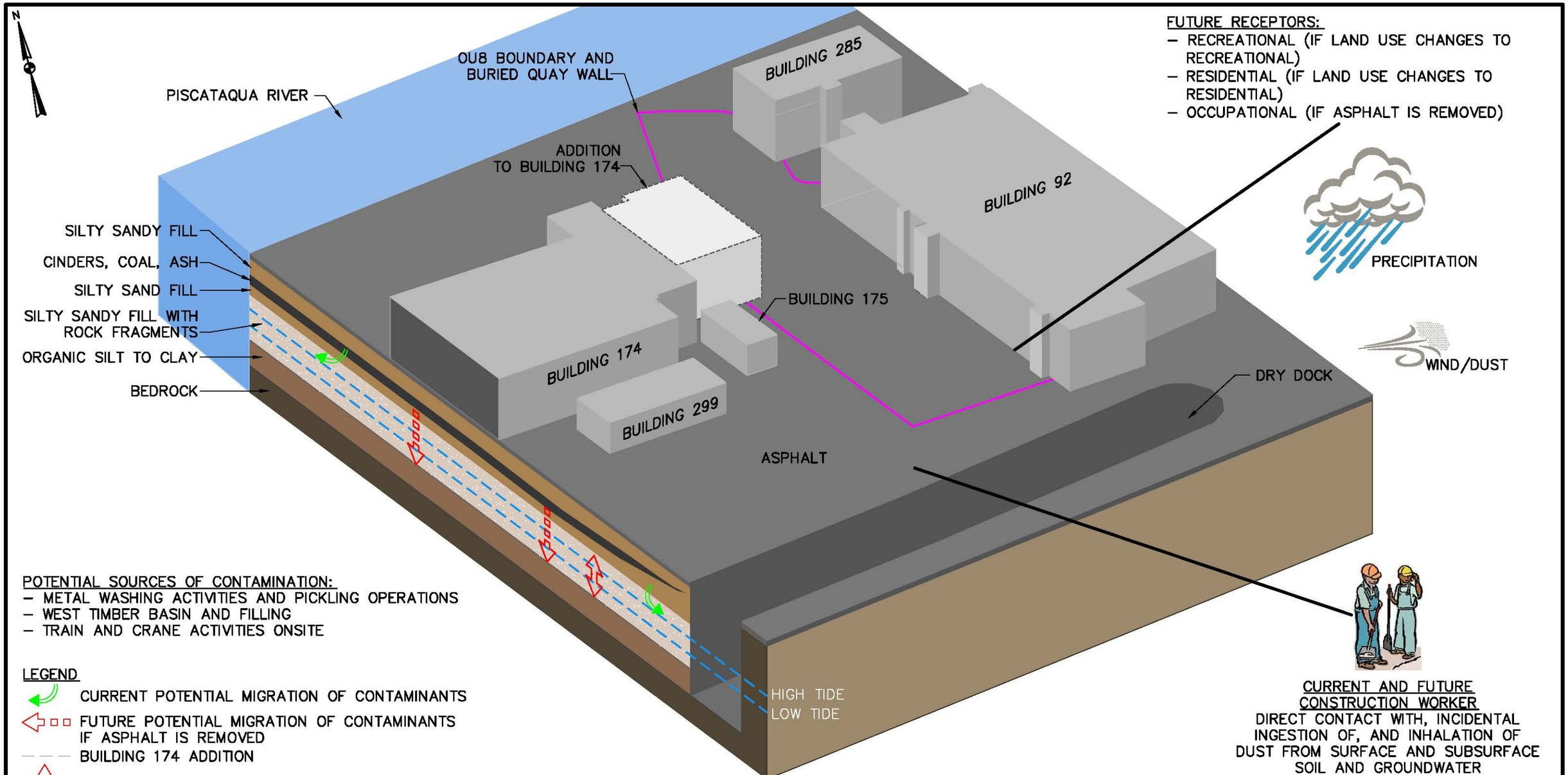
Occupational workers who visit the site daily for routine office work or similar activities that do not require contact with soil are not likely to be exposed to soil at OU8 under current conditions because of asphalt and buildings covering the entire site. Future occupational worker exposure to surface soil would be possible if the asphalt and/or buildings were removed. In this case, incidental ingestion of soil as resuspended dust particles is the most likely exposure pathway, but dermal contact and inhalation may also be possible. Recreational and residential uses of the site are not likely as long as the Shipyard is in operation; however, hypothetical future recreational and residential uses could occur if the Shipyard closed or if the site usage changed from an industrial area to either recreational or residential use. These receptors also could be exposed via dermal contact, inhalation, and incidental ingestion, with the resident at a higher risk for exposure than a recreational user.

5.3 CONTAMINANT FATE AND TRANSPORT SUMMARY

The site surface is covered with asphalt/pavement or buildings limiting mobilization of contaminants through surface water runoff or infiltration of precipitation. Although the fill material is in contact with groundwater, tidal flushing and leaching from soil to groundwater are not expected to be significant current or future pathways because the majority of site soil is in the tidally saturated and saturated zones, and because no adverse impacts associated with OU8 activities were identified in the offshore area. This confirmed by the relatively low concentrations of PAHs and metals in groundwater samples relative to their concentrations in soil samples and the low detection frequencies of these chemicals. For example, concentrations of PAHs in groundwater were all less than 1 µg/L, although concentrations of PAHs in soil were greater than

10,000 µg/kg. Also, metals such as copper and lead, which were detected in soil samples at maximum concentrations of 39,600 and 20,100 mg/kg, respectively, were detected at low concentrations in groundwater (12 mg/L for copper and 24 mg/L for lead).

The fate and transport of PAHs and metals (i.e., copper and lead) are controlled at OU8 mainly by the mobility of soil particles. PAHs are generally considered to be fairly immobile but persistent chemicals in the environment that generally do not migrate vertically to a great extent in soil, and site data indicate that this is the case at OU8. Metals do not undergo any of the degradation reactions that most organic chemicals do, and, while they can be mobile in certain environments, the conditions at OU8 indicate metals will be immobile; therefore, metals are considered to be persistent.



POTENTIAL SOURCES OF CONTAMINATION:
- METAL WASHING ACTIVITIES AND PICKLING OPERATIONS
- WEST TIMBER BASIN AND FILLING
- TRAIN AND CRANE ACTIVITIES ONSITE

LEGEND
- CURRENT POTENTIAL MIGRATION OF CONTAMINANTS
- FUTURE POTENTIAL MIGRATION OF CONTAMINANTS IF ASPHALT IS REMOVED
- BUILDING 174 ADDITION
- TIDAL FLUSHING

NOTES:
1. GEOLOGY DEPICTED IS SPECIFIC TO OU8.
2. MIGRATION RADIAL TO OFFSHORE AREA, SEE SITE FIGURE FOR LOCATION OF OFFSHORE.
3. NO ECOLOGICAL RECEPTORS.

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PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

CONCEPTUAL SITE MODEL
OPERABLE UNIT 8
SCALE: NOT TO SCALE

DATE:	3/30/16
PROJECT NO.:	112G03270
DESIGNED BY:	
DRAWN BY:	CK
CHECKED BY:	
SHEET: 1 OF 1	

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FIGURE 5-1

6.0 HUMAN HEALTH RISK ASSESSMENT

The HHRA was performed to characterize and quantify potential risks to select receptors at OU8 based on current and future land use scenarios, as provided in Section 5.0. Potential receptors at OU8 were identified as current and future construction workers, future occupational workers, hypothetical future recreational users (child and adult), and hypothetical future residents (child and adult).

Figure 6-1 illustrates the risk exposure model that was developed for the OU8 HHRA. Receptors evaluated include construction workers, occupational workers, hypothetical future recreational users, and hypothetical future residents. The risk exposure model indicates the potential exposure pathways that could occur for each receptor at OU8. All receptors were evaluated for exposure to surface soil, which is defined as soil from 0 to 2 feet bgs, in accordance with the SAP (Tetra Tech, May 2015) and other assessments conducted at PNS. OU8 soil is covered with pavement and buildings; therefore, risk evaluations of surface soil assume the removal of asphalt for exposure to uncovered soil under a theoretical future exposure scenario. In addition to surface soil, construction workers were evaluated for exposures to subsurface soil (2 to 10 feet bgs) and groundwater. Risks for occupational worker, hypothetical future recreational, and hypothetical future residential exposure to subsurface soil are presented in Section 6.6 (uncertainty analysis) because contact with subsurface soil for these receptors is not anticipated, but could occur in the future if site conditions change. No receptors were evaluated for direct ingestion of, dermal contact with, or inhalation of vapors from groundwater related to domestic water use because groundwater at OU8 is saline/brackish and therefore unsuitable for consumption. However, construction workers were evaluated for incidental ingestion of, dermal contact with, and inhalation of vapors from groundwater that may be encountered during construction/excavation.

No evaluation of vapor intrusion from soil is necessary because site data indicate that a soil source of sufficiently volatile and toxic chemicals does not exist at OU8. Vapor intrusion requires a source, a currently inhabited building or building with potential to be inhabited in the future, and a pathway. A soil source of compounds sufficiently volatile and toxic to pose a vapor intrusion threat is not present at OU8. The majority of soil concentrations for compounds sufficiently volatile and toxic to warrant a vapor intrusion concern were reported as not detected. Where such compounds were detected, the concentrations were low and did not indicate a source area. Vapor intrusion potential from groundwater was evaluated as discussed in Section 6.2.2.3. OU8 was evaluated as a single exposure unit (EU), in accordance with the SAP (Tetra Tech, May 2015). The potential risks to human health at OU8 are estimated based on the assumption that no actions are taken to control contaminant releases.

6.1 RISK ASSESSMENT PROCEDURES

Three major aspects of exposure to contaminants must be considered to assess potential public health risks: (1) contaminants with toxic characteristics must be identified in environmental media and be released by either natural processes or human action; (2) pathways by which actual or potential exposure occurs must be present; and (3) human receptors must be present at the point of exposure to complete the exposure route. Risk is a function of both toxicity and exposure; without one of the factors listed above, there is no risk. Once the three major aspects of exposure to contaminants identified above are considered, then the human health risk assessment process can begin.

The HHRA for OU8 consists of the following four major components:

- Data evaluation
- Exposure assessment
- Toxicity assessment
- Risk characterization (including uncertainty analysis)

Data evaluation is primarily concerned with data usability and the selection of chemicals of potential concern (COPCs), which are those contaminants that pose the greatest potential for causing adverse human health effects. A discussion of data usability as related to the HHRA is provided in Section 6.2.1. Methods for selection of COPCs are described further in Section 6.2.2, and COPC selection tables are presented in Appendix C.1.

Exposure assessment is the process of identifying potential receptor populations and exposure pathways by which receptors may come in contact with contaminants at the site. Potential exposure routes under current and future land uses are developed from information gathered about the source area, contaminant concentrations, contaminant release mechanisms, patterns of human activity, and other pertinent information. The exposure assessment includes the methodologies used to calculate quantitative estimates of contaminant intake for each identified receptor, pathway, and route of exposure under reasonable maximum exposure (RME) and central tendency exposure (CTE) scenarios. Relevant exposure input parameters and equations used to estimate contaminant intakes are presented in the USEPA Risk Assessment Guidance for Superfund (RAGS) Part D Table 4s included in Appendix C.1. The OU8 exposure assessment is discussed further in Section 6.3 and Appendix C.2.

The toxicity assessment presents contaminant-specific toxicity criteria for all identified COPCs at OU8. Toxicity criteria provide the basis for quantifying potential human health risks when integrated with

estimated intakes developed during the exposure assessment. Toxicity assessment is further detailed in Section 6.4.

Methodologies used to characterize non-carcinogenic and carcinogenic risks are provided in Section 6.5. Various uncertainties are associated with risk characterization because the quantitative risk estimates developed are based on a number of assumptions (concerning exposure, land use, toxicity, etc.). An uncertainty analysis is provided in Section 6.6 that reviews general uncertainties associated with the risk evaluation for OU8.

The HHRA for OU8 was conducted in accordance with current Navy, USEPA, and State of Maine human health risk assessment guidelines including the following:

- Conducting Human Health Risk Assessments under the Environmental Restoration Program (Navy, February 2001).
- Navy Policy on the Use of Background Chemical Levels (Navy, January 2004).
- Navy Human Health Risk Assessment Guidance (Navy, December 2008).
- Guidance for Human Health Risk Assessments for Hazardous Substance Sites in Maine (MEDEP, February 2011).
- Remediation Guidelines for Petroleum Contaminated Sites in Maine. Maine Department of Environmental Protection Bureau of Remediation and Waste Management (MEDEP, May 2014).
- RAGS - Volume I - Human Health Evaluation Manual (Part A) (USEPA, December 1989).
- Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors (USEPA, March 1991).
- Distribution of Preliminary Review Draft: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure (USEPA, May 1993).
- Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, July 1993).

- Revised Interim Guidance on Establishing Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities (USEPA, July 1994).

- Soil Screening Guidance: Technical Background Document (USEPA, May 1996).

- Exposure Factors Handbook (USEPA, August 1997).

- Use of the TRW Interim Adult Lead Methodology in Risk Assessment. Memorandum from Pat Van Leewven and Paul White to Mark Maddaloni (USEPA, April 1999).

- Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (USEPA, December 2002a).

- Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites (USEPA, December 2002b).

- Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil (USEPA, January 2003).

- RAGS, Volume I – Human Health Evaluation Manual – Part E, Supplemental Guidance for Dermal Risk Assessment – Final (USEPA, July 2004).

- Guidelines for Carcinogen Risk Assessment (USEPA, March 2005a).

- Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, March 2005b).

- User's Guide for the Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) Windows 32-bit version (USEPA, December 2007).

- Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment), Final (USEPA, January 2009).

- Update of the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Baseline Geometric Standard Deviation Parameters (USEPA, June 2009).

- Integrated Exposure Uptake Biokinetic Model for Lead in Children, Windows Version (IEUBKwin v 1.1 Build 11) (USEPA, February 2010).

- Exposure Factors Handbook: 2011 Edition (USEPA, September 2011).

- ProUCL Version 5.0.00 User Guide (USEPA, September 2013).

- Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors (USEPA, February 2014).

- Regional Screening Levels for Chemical Contaminants at Superfund Sites, https://www.epa.gov/risk/regional-screening-levels-rsls (USEPA, May 2016).

- Integrated Risk Information System, On-Line Data Base, http://www.epa.gov/iris/index.html (USEPA, June 2016).

The HHRA is structured and reported according to the guidelines of the RAGS, Human Health Evaluation Manual, Part D: Standardized Planning, Reporting, and Review of Superfund Risk Assessments (RAGS Part D) (USEPA, December 2001). The HHRA follows methodology presented in the OU8 RI SAP (Tetra Tech, May 2015), and deviations are noted in Section 6.6.5.

6.2 DATA EVALUATION

A site-specific data evaluation was performed to determine which of the detected contaminants at the site are most likely to present a risk to potential human receptors. The end result of this quantitative selection process is a list of COPCs for each environmental medium considered. Section 6.2.1 provides a summary of data usability for OU8 as it pertains to the HHRA. The selection process used to identify COPCs is described in Section 6.2.2. In conducting this data evaluation, the data from the entire OU8 soil area was considered as two data sets (surface and subsurface) because there are no other distinct populations in the soil, as discussed in Section 4.

6.2.1 Data Usability

Analytical data for soil and groundwater used in the HHRA for OU8 are expected to adequately characterize potential risks for direct and inadvertent exposure to contaminated site media. The list of COPCs was determined from validated data presented in Appendix B.1. Because location WTB-MW01 is upgradient of the OU8 boundary, groundwater data collected from this location are presented separately on the COPC

selection table (Appendix C.1). Soil data from samples collected from WTB-MW01 were not included in the HHRA because these samples were collected outside of the OU8 boundary. Similarly, soil data collected from location WTB-MW05 were not included in the HHRA because this location is outside of the OU8 boundary. However, groundwater data collected from location WTB-MW05/WTB-MW05R were included in the HHRA because this location is downgradient of the site. Groundwater at the site is tidally-influenced, so near downgradient groundwater data may represent site groundwater data.

Data qualified during the data validation process are not expected to compromise the results of the HHRA. Analytical data qualified as rejected ("R") were not used in the risk assessment. The 2015 data used in the HHRA did not contain rejected results; only the 1998 subsurface soil data contained some rejected results. Four results for antimony, one result for aldrin and beta-BHC, and one, two, or three results for several volatiles were rejected in the 1998 subsurface soil samples used in the HHRA. However, the rejected results represent only a small subset of the subsurface soil results, as there were 11 total subsurface soil samples included in the HHRA data set, and antimony was also an analyte in the 2015 subsurface soil samples. Analytical data qualified as estimated ("J") were used. The use of estimated data adds to the uncertainty associated with the risk assessment; however, the associated uncertainty is expected to be negligible compared with the other uncertainties inherent in the risk evaluation process (e.g., uncertainties associated with land uses, exposure scenarios, toxicological criteria, etc.). A more detailed discussion of data usability is presented in Section 2.0.

6.2.2 Selection of COPCs

The overall goal of the HHRA is to quantify risks associated with those contaminants that represent a potentially significant human health hazard on the basis of toxicity, environmental concentration, and mobility. USEPA guidance recommends focusing the risk assessment by quantifying risk only for a select list of COPCs at a site. COPCs, which are a subset of all detected contaminants in a given medium, are defined as those contaminants likely to dominate the overall potential risks for a site.

General selection criteria for inorganic and organic COPCs are discussed below:

Toxicity Screen. Current USEPA guidance recommends using the USEPA RSL table (USEPA, May 2016) for a source of general screening criteria to be used in COPC selection. The USEPA RSL table provides soil and tap water screening levels. The USEPA RSLs for residential soil were used as the screening criteria for all receptors exposed to surface and subsurface soil at the site. The residential criteria represent the most conservative land use scenario, and screening against residential criteria should be conservative for all potential future land uses. A carcinogenic contaminant detected at a maximum concentration equal to or less than the relevant USEPA RSL based on an incremental lifetime cancer risk (ILCR) level of $1x10^{-6}$

was not selected as a COPC. A non-carcinogenic contaminant detected at a maximum concentration equal to or less than the relevant USEPA RSL value based on a hazard quotient (HQ) of 0.1 was not selected as a COPC. Non-carcinogenic RSLs based on an HQ of 0.1 instead of an HQ of 1 were used to account for potential cumulative effects of multiple compounds affecting the same target organ or producing the same target effect. Contaminants with maximum concentrations greater than RSLs were selected as COPCs and carried through the quantitative risk assessment.

Soil data at OU8 were not compared to RSLs for groundwater protection because these RSLs are designed to protect groundwater used as drinking water. The saline/brackish groundwater at OU8 is not potable; therefore, comparison of contaminant concentrations to groundwater protection RSLs was unnecessary.

Facility-specific screening levels calculated for construction workers exposed to groundwater were presented in the SAP (Tetra Tech, May 2015) and the screening levels for chemicals detected in OU8 groundwater were updated to reflect any changes in toxicity criteria and exposure assumptions based on the most recent USEPA guidance (see Appendix A.8). These screening levels were used for groundwater COPC selection instead of using RSLs for tap water (i.e., drinking water) because the groundwater at OU8 is saline/brackish and is not potable. Therefore, only construction worker exposures to groundwater are anticipated, and only construction workers were evaluated for direct exposure to groundwater. The screening levels used for construction workers only account for ingestion and dermal contact exposures. Because some volatile chemicals were detected in groundwater, the inhalation exposure pathway was also evaluated, as discussed in Section 6.2.2.2, and chemical concentrations detected in groundwater were also compared to screening levels from USEPA's Vapor Intrusion Screening Level (VISL) Calculator Version 3.4.6 (USEPA, January 2016). The VISL values were used for evaluating vapor intrusion from groundwater to indoor air and correspond to a target cancer risk level of $1x10^{-6}$ or a HQ of 0.1 for carcinogens and noncarcinogens, respectively. The VISLs were derived to identify whether any chemical concentrations in groundwater could adversely affect the indoor air quality of a building overlying subsurface VOC contamination. The default vapor intrusion screening levels assume a subsurface attenuation factor of 0.001 from groundwater concentrations to indoor air concentrations.

Guidance from the Office of Prevention, Pesticides, and Toxic Substances and Office of Solid Waste and Emergency Response (OSWER) recommend 400 mg/kg as the lowest screening level for lead-contaminated soil in a residential setting where children are frequently present (USEPA, July 1994). Conservatively, 400 mg/kg was be used as the lead screening level for COPC selection for soil. However, guidance from the USEPA Technical Review Workgroup for lead indicates that "a reasonable screening level for soil lead at commercial/industrial (i.e., non-residential) sites is approximately 800 mg/kg for a typical non-contact intensive worker" (USEPA, August 2011). The USEPA RSL table lists 800 mg/kg as the RSL for lead in soil assuming an industrial land use scenario. A calculated screening level for lead in

groundwater of 1,340 µg/L was used, which was calculated using the methodology presented in Appendix A.8 and updated inputs for the Adult Lead Model (ALM) (USEPA, June 2009).

BAP equivalents (BAP TEQs) were calculated for the cPAHs benzo(a)anthracene, BAP, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene using a toxicity equivalence factor (TEF) approach based on the relative potency of each compound to that of benzo(a)pyrene (USEPA, July 1993). The TEFs are used to convert each individual cPAH concentration into an equivalent concentration of BAP; these individual concentrations were then summed to calculate the BAP equivalents concentration. BAP equivalents concentrations were calculated two different ways. First, a BAP equivalents-half non-detect value was calculated using one-half of the detection limit of non-detected cPAHs to represent non-detected cPAH concentrations in the calculation. Second, the BAP equivalents-positive results value was calculated using a value of 0 for non-detected results. In either case, if all of the cPAHs were not detected in a sample, then the sample quantitation limit for BAP was used as the equivalent concentration for that sample. Both BAP equivalents-half non-detect and BAP equivalents-positive results are presented on the COPC selection tables. BAP equivalents values were not calculated for groundwater because only one cPAH, indeno(1,2,3-cd)pyrene, was detected in groundwater. Example calculations for BAP equivalents parameters are presented in Appendix C.2.

Data Set Definition. OU8 was evaluated as a single EU. Soil exposures for OU8 were evaluated using two data sets: a surface soil (0 to 2 feet bgs) data set and a subsurface soil (2 to 10 feet bgs) data set. A number of samples were collected at depths greater than 10 feet bgs at OU8. Typically, data from greater than 10 feet is not evaluated in the HHRA because human exposure to soil greater than 10 feet is unlikely. The effects of omitting these data from the risk assessment are discussed in the uncertainty analysis (Section 6.6). For groundwater, individual well locations were considered when evaluating risks instead of evaluating the site as one groundwater unit.

The selection of COPCs for each environmental medium is summarized in the remainder of this section.

6.2.2.1 Soil

<u>Direct Contact COPCs for Surface Soil</u>

RAGS Part D Table 2.1, presented in Appendix C.1, shows the results of the comparison of maximum detected surface soil concentrations at OU8 to screening levels based on USEPA RSLs for residential soil. The following chemicals were retained as surface soil COPCs because their maximum concentrations in surface soil exceeded screening criteria:

- cPAHs.
- Metals: antimony, copper, iron, manganese, nickel, and thallium.

Maximum concentrations of aluminum, arsenic, cobalt, lead, and vanadium also exceeded USEPA residential RSLs but are within the ranges of facility background concentrations (see Appendix B.2). A discussion of chemicals eliminated from COPC selection on the basis of the background comparison is presented in Section 6.6, and detailed information on background screening methodology and data sets used are included in Appendix B.2.

The maximum concentration of the EPH parameter C11-C22 aromatics also exceeds the screening level from the MEDEP RAGs document (MEDEP, May 2013). In accordance with the SAP (Tetra Tech, May 2015), risks associated with EPH parameters are discussed qualitatively in the uncertainty analysis (Section 6.6) only.

Direct Contact COPCs for Subsurface Soil

RAGS Part D Table 2.2, presented in Appendix C.1, shows the comparison of maximum detected subsurface soil concentrations at OU8 to screening levels based on USEPA RSLs for residential soil. The following chemicals were retained as COPCs for subsurface soil because their maximum concentrations in subsurface soil exceeded screening criteria:

- cPAHs.
- Metals: antimony, arsenic, cadmium, cobalt, copper, iron, lead, manganese, mercury, nickel, thallium, and zinc.
- Miscellaneous parameters: cyanide.

Maximum concentrations of aluminum and vanadium also exceeded USEPA residential RSLs but are within the ranges of facility background concentrations (see Appendix B.2). A discussion of chemicals eliminated from COPC selection on the basis of the background comparison is presented in Section 6.6, and detailed information on background screening methodology and data sets used are included in Appendix B.2.

The maximum concentration of the EPH parameter C11-C22 aromatics also exceeds the residential screening level from the MEDEP RAGs document (MEDEP, May 2013). In accordance with the SAP (Tetra Tech, May 2015), EPH parameters are discussed qualitatively in the uncertainty analysis (Section 6.6) only.

6.2.2.2 Direct Contact COPCs for Groundwater

RAGS Part D Table 2.3, presented in Appendix C.1, shows COPC selection for groundwater. Only total (unfiltered) groundwater data were used in COPC selection. As discussed in Section 6.2.3, COPCs for groundwater were determined by comparing maximum detected concentrations to screening levels based on construction worker ingestion and dermal exposures to groundwater. Only the maximum concentration of manganese exceeds its corresponding groundwater screening level. The ranges of background concentrations for saline/brackish groundwater are also presented in Table 2.3. No statistical background comparison was conducted for manganese because the maximum concentration of manganese in site groundwater data (2,630 µg/L) clearly exceeds the range of detected background concentrations (6.1 to 340 µg/L). Therefore, manganese was selected as a COPC for groundwater at OU8. However, it should be noted that the maximum concentration of manganese in groundwater is within the range of freshwater background values (3 to 3,580 µg/L).

The screening levels used for construction workers only account for ingestion and dermal contact exposures. Because some chemicals considered to be volatile were detected in groundwater, the inhalation exposure pathway was also considered. PAHs and metals were detected in groundwater. None of the metals detected are considered to be volatile according to the RSL table (USEPA, May 2016). Of the PAHs detected in groundwater, naphthalene is the only chemical detected that is considered to be volatile and has inhalation toxicity criteria. No well-established models are available for estimating migration of volatiles from groundwater into a construction or utility trench. Spreadsheets that that calculate inhalation screening levels for construction workers exposure to groundwater are available from the Virginia Department of Environmental Quality (VDEQ) Voluntary Remediation Program (VDEQ, August 2014); these were used to calculate a screening level for inhalation of naphthalene from groundwater (see Appendix C.3). For naphthalene, the calculated construction worker inhalation screening level was 3.0 µg/L, which is greater than the maximum detected naphthalene concentration of 0.38 µg/L in the site groundwater data. Therefore, inhalation of chemicals from groundwater during construction/excavation was not further evaluated in the HHRA.

6.2.2.3 Vapor Intrusion from Groundwater

RAGS Part D Table 2.4, presented in Appendix C.1, shows COPC selection for vapor intrusion potential from groundwater. As discussed in Section 6.2.3, groundwater concentrations were compared to available VISLs (USEPA, October 2015). Naphthalene was the only chemical detected in groundwater for which a VISL was available, and the maximum concentration of naphthalene (0.38 µg/L) was less than the VISL (4.6 µg/L). Therefore, no COPCs were selected for vapor intrusion from groundwater, and this pathway was not further evaluated in the HHRA.

6.3 EXPOSURE ASSESSMENT

The exposure assessment defines and evaluates the exposures experienced by likely receptors at a site. The exposure assessment identifies the potential contaminant migration and exposure pathways, defines the contaminant concentrations at the point of exposure, and presents the exposure assumptions used to quantify exposure in terms of contaminant intake (dose). Appendix C.1 of this report includes the intake equations and sample calculations for the quantification of contaminant intakes. Spreadsheets presented in Appendix C.1 include the contaminant-specific intakes for each receptor and medium at OU8. A summary of potential exposure pathways is provided in RAGS Part D Table 1 in Appendix C.1. RAGS Part D Table 4s in Appendix C.1 provide the exposure parameters used to calculate the contaminant-specific intakes.

6.3.1 Exposure Setting

Site background and history, a description of sources of environmental contamination, contaminant release mechanisms, and transport/migration pathways are provided in Sections 1.0 and 5.0, respectively, of this report. A detailed description of background screening methodology is presented in Appendix B.2.

6.3.2 Potential Receptors

Potential receptors were identified for both current and hypothetical future land use conditions by analyzing current land use practices, possible future land use, and identified sources of contamination. Only construction workers are considered to be potential human receptors for OU8 under current land use. Construction workers, occupational workers, hypothetical future recreational users (child and adult), and hypothetical future residents (child and adult) may be potential receptors under future land use. Although current land use does not include recreational or residential land use, these scenarios were evaluated in case future land use would change. Future hypothetical recreational users and residents were evaluated to aid in risk management decisions.

6.3.3 Exposure Pathways

The basic exposure assessment assumptions for OU8 are as follows:

- The receptors evaluated were construction workers (e.g., remediation and excavation), occupational workers (e.g., the typical industrial/commercial workers performing routine activities), hypothetical future child and adult recreational users, and hypothetical future child and adult residents.

- The exposure routes include ingestion of, dermal contact with, and inhalation of air/dust particulates and vapors for soil, and ingestion of, dermal contact with, and inhalation of volatiles from groundwater. The potentially complete exposure pathways are summarized in Figure 6-1 and discussed in Appendix C.2.

Potential receptors can come into contact with contaminants in many ways, which are generally the result of interactions between a receptor's behavior or lifestyle and an exposure medium. For the purposes of this assessment, an exposure route is defined as a description of the behavior that brings a receptor into contact with a contaminated medium. The risk exposure model for OU8 displays the HHRA potential exposure routes (Figure 6-1).

6.3.3.1 Ingestion of and Dermal Contact with Soil

Potential receptors may come into direct contact with soil affected by the release of contaminants from the source area. During the receptor's period of contact, the individual may be exposed via inadvertent ingestion of a small amount of soil or via dermal absorption of contaminants from the soil.

Dermal contact with contaminants detected in the soil may or may not result in a significant exposure. For contaminants to be percutaneously absorbed, they must first desorb from soil and diffuse through the skin. Various factors affect the rate of dermal absorption, including the amount of soil on the skin surface, soil characteristics (moisture, pH, organic carbon content, etc.), skin characteristics (thickness, temperature, hydration, etc.), volatilization losses, and contaminant-specific properties. Dermal and ingestion exposures to contaminants in soil were evaluated quantitatively in this risk assessment.

6.3.3.2 Air

The air pathway is based on the scenario that a receptor inhales air that contains suspended particulates and/or volatile organic vapors originating from the source area.

The release of contaminants from soil via fugitive dust and volatile emissions is not expected at OU8 under current land use conditions. OU8 is currently paved and covered with buildings, preventing release of fugitive dust/volatile vapors from surface soil. At OU8, the release of surface soil and subsurface soil contaminants to the atmosphere can only occur as a result of ground-intrusive activities. Risks due to fugitive dust and volatile emissions were evaluated for current/future construction workers exposed to surface soil and subsurface soil as well as future occupational workers, hypothetical future recreational users, and hypothetical future residents in the risk characterization, and for future occupational, hypothetical

future recreational, and hypothetical future residential receptors exposed to subsurface soil in the uncertainty analysis only.

6.3.3.3 Ingestion of, Dermal Contact with, and Inhalation of Volatile Vapors from Groundwater

No freshwater wells exist within OU8 because all groundwater is saline or brackish. Consequently, residential exposure to groundwater is very unlikely because the groundwater is not potable; therefore, residential exposure to groundwater was not evaluated in the risk assessment.

It was assumed that construction workers may come into contact with groundwater during excavation activities or repair of utility lines; therefore, incidental ingestion, dermal contact, and inhalation (i.e., the receptors may be exposed to contaminants volatilizing from the groundwater) exposures to groundwater were evaluated for current and future construction workers. Manganese was selected as a COPC for groundwater using the screening levels developed for construction worker ingestion and dermal contact with groundwater (as noted in Section 6.2.3.3). Therefore, construction worker ingestion and dermal contact exposures were evaluated for groundwater. Naphthalene was the only potentially volatile chemical detected in groundwater, but it was not selected as a COPC based on comparisons to construction worker inhalation screening levels. Therefore, quantitative risk evaluation of inhalation from groundwater at OU8 was not necessary in this HHRA.

Potentially Complete Exposure Pathways	
Receptors	**Exposure Routes**
Construction Workers (current/future)	Ingestion of Soil (surface and subsurface) Dermal Contact with Soil (surface and subsurface) Inhalation of Air/Dust Particulates and Vapors from Soil (surface and subsurface) Groundwater Ingestion Groundwater Dermal Contact Groundwater Inhalation of Volatile Vapors(1)
Occupational Worker (future) (e.g., typical industrial worker, commercial worker, landscaper, or maintenance worker)	Ingestion of Soil (surface)(2) Dermal Contact with Soil (surface)(2) Inhalation of Air/Dust Particulates and Vapors from Soil (surface)(2)
Recreational Users (hypothetical future)	Ingestion of Soil (surface)(2) Dermal Contact with Soil (surface)(2) Inhalation of Air/Dust Particulates and Vapors from Soil (surface)(2)
Residents (hypothetical future)	Ingestion of Soil (surface)(2) Dermal Contact with Soil (surface)(2) Inhalation of Air/Dust Particulates and Vapors from Soil (surface)(2)

1 No COPCs were selected for this pathway.
2 For informational purposes, evaluations of occupational workers, hypothetical future recreational users, and hypothetical future residents for exposure to subsurface soil (2 to 10 feet) are included in the uncertainty analysis.

6.3.4 Exposure Point Concentrations

The following items summarize the protocol used in calculating exposure point concentrations (EPCs) for OU8 media.

- For the calculation of EPCs for soil, if the data set contained at least five analytical results and three positive detections, the 95-percent upper confidence limit (UCL) on the mean was calculated and used as the EPC, unless that value exceeded the maximum detected concentration. In this case, the maximum detected concentration was used as the EPC for the RME and CTE scenarios. Five samples were used as the minimum number of samples to calculate a UCL in accordance with USEPA guidance. The maximum concentration is also used as the EPC if there are few (i.e., three or less) positive detections in a data set, in accordance with USEPA guidance (USEPA, September 2013).

- The maximum detected concentration was also used as the EPC for groundwater. This was done to be conservative by allowing groundwater results to be discussed as individual locations rather than as a single groundwater unit.

- The 95-percent UCLs on the mean for all COPCs were calculated following USEPA's Calculating UCLs for EPCs at Hazardous Waste Sites (USEPA, December 2002b) and using USEPA's ProUCL (Version 5.0.00) software (USEPA, September 2013). Averages of original and duplicate samples were used in the calculation of EPCs for site media. In a field duplicate pair, if one result was detected and the corresponding result was non-detected, the detected result was used in the EPC calculation if it was less than the non-detected result; however, if the detected result was greater than or equal to the non-detected result, the two results were averaged using one-half the non-detected result and considered a detection for the EPC calculation. Non-detected results were evaluated using the procedures in ProUCL. Appendix C.4 contains ProUCL output files.

- In accordance with USEPA guidance for the IEUBK Model (February 1994) and ALM (January 2003), average lead concentrations were used to estimate blood-lead levels resulting from exposure to lead.

EPCs for OU8 are summarized in RAGS Part D Tables 3.1 through 3.3 presented in Appendix C.1.

6.3.5 Quantification of Exposure

Exposure intakes for the identified potential receptor groups were calculated using current USEPA risk assessment guidance (e.g., March 1991, July 2004, January 2009, and February 2014). Estimates of exposure are based on contaminant concentrations at exposure points and on scenario-specific assumptions and intake parameters. In general, standard default parameters that combine mid-range and upper-end exposure factors were used to assess the RME scenario. CTE was assessed primarily by the use of mid-range exposure factors presented in current risk assessment guidance (e.g., USEPA, May 1993). The same EPCs and equations were used to estimate intakes under the CTE scenario, but exposure input parameters (e.g., exposure frequencies) were modified to reflect average case exposure. The exposure parameters used for the CTE calculations reflect the latest USEPA guidance (see RAGS Part D Table 4s in Appendix C.1).

Exposure intake parameters were used in the equations presented in Appendix C.2 along with the EPCs previously defined to estimate contaminant intakes. Individual contaminant intakes for each receptor/exposure route combination at OU8 are presented in the risk assessment spreadsheets in Appendix C.1. Example calculations are provided in Appendix C.2.

6.4 TOXICITY ASSESSMENT

The objective of the toxicity assessment is to identify the potential adverse health effects in exposed populations. Quantitative estimates of the relationship between the magnitude and type of exposures and

the probability of human health effects are defined for the identified COPCs. Quantitative toxicity values determined during this component of the risk assessment are integrated with outputs of the exposure assessment to characterize the potential for the occurrence of adverse health effects for each receptor group.

The toxicity value used to evaluate non-carcinogenic health effects for ingestion and dermal exposures is the reference dose (RfD). The reference concentration (RfC) is used to evaluate non-carcinogenic health effects for inhalation exposures. RfDs and RfCs are estimates of daily exposure levels for the human population that are likely to be without appreciable risk during a portion or all of a lifetime. They are based on a review of available animal and/or human toxicity data, with adjustments for various uncertainties associated with the data. Carcinogenic effects are quantified using cancer slope factors (CSFs) for ingestion and dermal exposures and inhalation unit risks (IURs) for inhalation exposures, which are a plausible upper-bound estimate of the probability of development of cancer per unit intake of contaminant over a lifetime based on available dose-response data from human and/or animal studies.

6.4.1 Toxicity Criteria for Oral and Inhalation Exposures

Oral RfDs and CSFs and inhalation RfCs and IURs used in this risk assessment were obtained from the following primary USEPA literature sources (USEPA, December 2003):

- Integrated Risk Information System (IRIS) (USEPA, June 2016).

- USEPA Provisional Peer Reviewed Toxicity Values (PPRTVs) – The Office of Research and Development/National Center for Environmental Assessment (NCEA) Superfund Health Risk Technical Support Center develops PPRTVs on a contaminant-specific basis when requested by USEPA's Superfund program.

- Other toxicity values – These sources include but are not limited to California Environmental Protection Agency toxicity values, ATSDR values, and the Annual Health Effects Assessment Summary Tables (HEAST) (USEPA, July 1997).

Although toxicity criteria can be found in several toxicological sources, USEPA's IRIS online database is the preferred source of toxicity values. This database is continuously updated, and the presented values have been verified by USEPA. The toxicity criteria for the constituents selected as COPCs are presented in RAGs Part D Tables 5 and 6 presented in Appendix C.1.

6.4.2 Toxicity Criteria for Dermal Exposure

RfDs and CSFs found in the literature are frequently expressed as administered doses; therefore, these values are considered inappropriate for estimating risks associated with dermal routes of exposure. Oral dose-response parameters based on administered doses must be adjusted to absorbed doses before comparisons to estimated dermal exposure intakes are made.

When oral absorption is essentially complete (i.e., 100 percent), the absorbed dose is equivalent to the administered dose, and no toxicity adjustment is necessary. Conversely, when the gastrointestinal absorption of a contaminant is poor (e.g., 1 percent), the absorbed dose is smaller than the administered dose; thus, toxicity factors based on absorbed dose should be adjusted to account for the difference in the absorbed dose relative to the administered dose. USEPA (July 2004) recommends a cutoff of 50 percent absorption to reflect the intrinsic variability in the analysis of absorption studies. Therefore, the adjustment from administered to absorbed dose was only performed when the contaminant-specific gastrointestinal absorption efficiency was less than 50 percent. The adjustment from administered to absorbed dose was made using contaminant-specific gastrointestinal absorption efficiencies (ABSs) published in available guidance (e.g., USEPA, July 2004) and the following equations:

$$RfD_{dermal} = (RfD_{oral})(ABS_{GI})$$

$$CSF_{dermal} = (CSF_{oral}) / (ABS_{GI})$$

where:	ABS_{GI}	=	absorption efficiency in the gastrointestinal tract
	RfD_{dermal}	=	RfD for the dermal route of exposure
	RfD_{oral}	=	RfD for the oral route of exposure
	CSF_{dermal}	=	CSF for the dermal route of exposure
	CSF_{oral}	=	CSF of the oral route of exposure

If contaminant-specific gastrointestinal ABSs were not available, then complete oral absorption was assumed and the oral toxicity values were not adjusted for dermal absorbed doses. The contaminant-specific ABSs used in this HHRA are presented in RAGS Part D Tables 5.1 and 6.1 in Appendix C.1.

6.4.3 Toxicity Criteria for Carcinogenic Effects of PAHs

Risk estimates for PAHs have, in the past, assumed that all cPAHs have a relative potency equal to that for BAP. Whereas BAP was well studied, other Class B2 PAHs had insufficient data with which to calculate a CSF. USEPA has since published provisional guidance to assess PAHs (USEPA, July 1993). Estimated

orders of potential potency TEFs were developed and are rounded to one significant figure (based on an order of magnitude). The values are based on a comparable endpoint (complete carcinogenesis after repeated exposure to mouse skin). These TEFs were used to calculate the BAP equivalents, as discussed in Section 6.2.2. The BAP equivalents were used to collectively evaluate cPAHs in the HHRA.

USEPA's Guidelines for Carcinogen Risk Assessment (USEPA, March 2005a) and Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, March 2005b) specify the use of age-dependent adjustment factors (ADAFs) for carcinogens that act via a mutagenic mode of action. Carcinogenic PAHs are included in the group of contaminants that have been determined to act via the mutagenic mode of action. No contaminant-specific ADAFs have been derived for carcinogenic PAHs; therefore, the following default ADAFs were used: 10 for ages 0 to 2, 3 for ages 2 to 16, and 1 (no adjustment) for ages 16 to 70.

6.4.4 Toxicity Criteria for Thallium

Thallium was identified as a COPC in the soil data sets evaluated in this HHRA. However, toxicity criteria used to derive the RSLs for thallium are only suitable for screening. The study that was used to generate the USEPA RSL-based screening value suffers from severe study limitations and difficulties regarding the selection of appropriate toxicity endpoints. Therefore, although an RfD was published in an appendix to the PPRTV toxicity profile for thallium and compounds (USEPA, October 2012), an RfD was not derived and published by USEPA in IRIS. Because of this, the available PPRTV appendix RfD for thallium was not used to quantify risks. Uncertainty associated with toxicity criteria for thallium is discussed in the uncertainty analysis (Section 6.6).

6.5 RISK CHARACTERIZATION

This section provides the methodologies used for the characterization of potential human health risks associated with exposure to OU8 COPCs. Potential human health risks resulting from exposure to COPCs are estimated using algorithms established by USEPA (December 1989). The methods described by USEPA are protective of human health and are likely to overestimate (rather than underestimate) risk. The methodology uses specific algorithms to calculate risk as a function of contaminant concentration, human exposure parameters, and toxicity. Quantitative risks were not calculated for chemicals eliminated from COPC selection based on the background screening because chemicals with concentrations exceeding screening levels, but not exceed site background concentrations, are likely representative of regional contamination and not site conditions. Therefore, the risk characterization in this section provides risk estimates for site-related contaminants at OU8. Uncertainty associated with eliminating chemicals on the basis of background comparisons alone is discussed in Section 6.6 and in further detail in Appendix B.2.

Risks from hazardous contaminants are calculated for carcinogenic and non-carcinogenic effects. For carcinogenic contaminants that exhibit non-carcinogenic effects, potential impacts were characterized for both types of health effects. Section 6.5.1 defines the characterization methodology for carcinogenic effects. The methodology for non-carcinogenic effects is described in Section 6.5.2.

6.5.1 Carcinogenic Effects

Quantitative estimates of risk for contaminants other than lead were calculated according to risk assessment methods outlined in USEPA guidance (USEPA, December 1989). Lifetime cancer risks are expressed in the form of dimensionless probabilities, referred to as ILCRs, based on CSFs and IURs.

ILCR estimates for ingestion and dermal exposures were generated for each COPC using estimated exposure intakes and published CSFs, as follows:

$$\text{ILCR} = (\text{Estimated Exposure Intake})(\text{CSF})$$

ILCRs estimates for inhalation exposures were generated for each COPC using estimated exposure concentrations and published IURs, as follows:

$$\text{ILCR} = (\text{IUR})(\text{Exposure Concentration})(1{,}000\ \text{mg/mg})$$

Estimated ILCRs are compared to the USEPA target risk range, $1x10^{-6}$ to $1x10^{-4}$. Risks less than $1x10^{-6}$ (a risk less than 1 in 1 million) are generally considered to be “acceptable” by USEPA, whereas risks greater than $1x10^{-4}$ (1 in 10,000) are generally considered to be “unacceptable” by the agency. Depending on the risk management goals for the site, risks within $1x10^{-6}$ to $1x10^{-4}$ are also typically regarded as “acceptable”. The State of Maine uses an ILCR risk guideline of $1x10^{-5}$. The State of Maine risk guideline is not a regulatory requirement but is discussed in the HHRA for informational purposes.

6.5.2 Non-Carcinogenic Effects

Non-carcinogenic risks were assessed using the concept of HQs and hazard indices (HIs). The HQ for a COPC is the ratio of the estimated intake to the RfD and is calculated for ingestion and dermal exposures as follows:

$$\text{HQ} = (\text{Estimated Exposure Intake})/(\text{RfD})$$

For inhalation exposures, HQ is calculated as follows:

$$HQ = (\text{Exposure Concentration})/(RfC)$$

An HI is generated by summing the individual HQs for all the COPCs. If the HI exceeds 1, a potential exists for non-carcinogenic (toxic) effects to occur. When the HI exceeds 1, it is necessary to segregate the HQs by target-organ effects because the HQs for all non-carcinogens are not considered to be truly additive unless similar target organs are affected. If the HI for an individual target organ exceeds 1, a potential exists for adverse non-carcinogenic health effects.

The estimation of non-carcinogenic effects (i.e., the calculation of HQs/HIs) should not be construed as a probability in the manner of the ILCR, but rather a numerical indicator of the extent to which a predicted intake exceeds, or is less than, an RfD.

6.5.3 Quantitative Risk Estimates – RME Evaluation

Quantitative site-specific risk estimates for potential human receptors were developed for those contaminants identified as COPCs. Potential non-carcinogenic and carcinogenic risks for construction workers exposed to surface and subsurface soil and groundwater and for occupational workers, hypothetical future child and adult recreational users, and hypothetical future child and adult residents exposed to surface soil under the RME scenario are summarized in Table 6-1. Risks for each receptor are summed across all applicable exposure routes. Risk spreadsheets containing the detailed contaminant-specific risks calculated for OU8 are included in Appendix C.1. A discussion of the estimated non-carcinogenic and carcinogenic risks is provided in the remainder of this section. Cumulative risk estimates (including chemicals eliminated from COPC selection due to the background evaluation) are discussed in Section 6.6. Estimates of potential risks for occupational workers, hypothetical future recreational users, and hypothetical future residents exposed to COPCs in subsurface soil (2 to 10 feet bgs) were calculated for risk management purposes and are discussed in Section 6.6.

Non-carcinogenic Risks – RME Evaluation

HIs calculated for construction workers, occupational workers, hypothetical future child and adult recreational users, and hypothetical future child and adult residents exposed to COPCs in surface soil are less than or equal to 1, indicating that adverse non-carcinogenic effects are not anticipated these receptors under the defined exposure scenarios. The HI for construction workers exposed to COPCs in subsurface soil (HI is 11) exceeds 1. Antimony (HQ is 4) and cyanide (HQ is 7) are the primary risk contributors to HIs exceeding 1 for the blood (antimony) and thyroid (cyanide) target organs, respectively. The HQ for antimony contributes to the total HI primary via the ingestion pathway, and the HQ for cyanide contributes

to the total HI primarily via the inhalation pathway. The HI for construction workers exposed to COPCs in groundwater is less than 1, indicating that adverse non-carcinogenic effects are not anticipated under the defined exposure scenario for groundwater. No other receptors were evaluated for groundwater exposure (see Section 6.2.2).

Carcinogenic Risks – RME Evaluation

Carcinogenic risks estimated for construction workers exposed to COPCs in surface and subsurface soil and occupational workers, hypothetical future recreational users (child, adult, and lifelong), and hypothetical future adult residents exposed to COPCs in surface soil are within the USEPA target risk range of $1x10^{-6}$ to $1x10^{-4}$. Cancer risks for hypothetical future child and lifelong residents exposed to COPCs in surface soil exceed USEPA's target cancer risk range (ILCRs are $7x10^{-4}$ and $8x10^{-4}$, respectively). The cPAHs are the primary risk contributors for hypothetical future child and lifelong residents.

Cancer risks estimated for construction workers exposed to COPCs in surface and subsurface soil are less than the State of Maine risk guideline of $1x10^{-5}$. Carcinogenic risks for occupational workers (ILCR is $4x10^{-5}$), hypothetical future child, adult, and lifelong recreational users (ILCRs are $1x10^{-4}$, $2x10^{-5}$, and $1x10^{-4}$, respectively), and hypothetical future child, adult, and lifelong residents (ILCRs are $7x10^{-4}$, $1x10^{-4}$, and $8x10^{-4}$, respectively) exposed to COPCs in surface soil exceed the State of Maine risk guideline of $1x10^{-5}$. The primary contributors to these cancer risks are cPAHs.

6.5.4 <u>CTE Evaluation</u>

An evaluation of the potential risks associated with the CTE scenario is included to provide a measure of the central or average case exposure. Potential non-carcinogenic and carcinogenic risks for construction workers exposed to surface and subsurface soil and groundwater and for occupational workers, hypothetical future child and adult recreational users, and hypothetical future child and adult residents exposed to surface soil under the CTE scenario are summarized in Table 6-2.

Non-carcinogenic Risks – CTE Evaluation

HIs calculated for construction workers exposed to COPCs in surface soil and groundwater and for occupational workers, hypothetical future child and adult recreational users, and hypothetical future child and adult residents exposed to COPCs in surface soil under the CTE scenario are less than 1, indicating that no adverse non-carcinogenic effects are anticipated for these receptors under the defined exposure conditions.

The HI for construction workers exposed to subsurface soil under the CTE scenario exceeds 1 (HI is 5). The exceedance is due primarily to exposure to cyanide in subsurface soil by inhalation. The associated target organ (thyroid) HI exceeds 1.

Carcinogenic Risks – CTE Evaluation

For the CTE, the ILCRs for construction workers exposed to COPCs in surface soil, subsurface soil, and groundwater and for occupational workers, hypothetical future recreational users (child, adult, and lifelong), and hypothetical future residents (adult, child, and lifelong) exposed to COPCs in surface soil are less than or within USEPA's target cancer risk range of $1x10^{-6}$ to $1x10^{-4}$.

ILCRs for construction workers exposed to surface soil, subsurface soil, and groundwater and for occupational workers, hypothetical future recreational users (child, adult, and lifelong), and hypothetical future adult residents exposed to surface soil are less than or equal to the State of Maine risk guideline of $1x10^{-5}$. ILCRs for hypothetical future child and lifelong residents exposed to COPCs in surface soil (ILCRs are $8x10^{-5}$ and $9x10^{-5}$, respectively) exceed Maine's cumulative risk guideline. The cPAHs are the primary risk contributors.

6.5.5 Exposure to Lead

Lead was selected as a COPC in subsurface soil. The maximum concentration of lead in subsurface soil (20,100 mg/kg) exceeds the residential screening criterion of 400 mg/kg and the industrial screening criterion of 800 mg/kg (USEPA, May 2016). Construction worker exposure to lead in subsurface soil is addressed in this section; exposures to lead by occupational workers, hypothetical future recreational users, and hypothetical future residents as well as uncertainty associated with target levels for lead are addressed in the uncertainty analysis (Section 6.6). Exposure to lead in subsurface soil was assessed using the representative (mean) concentration of 2,210 mg/kg of lead in subsurface soil. Adult exposure to lead in soil is addressed by the ALM (USEPA, January 2003 and June 2009) using CTE exposure assumptions. Documentation for the assessment of lead via the ALM is presented in Appendix C.5.

The probability that fetal blood concentrations for construction workers exposed to subsurface soil would exceed the USEPA target level (i.e., 10 µg lead per deciliter blood or µg/dL) was 6.7 percent, greater than the benchmark of 5 percent. Based on the results of the quantitative risk analysis for lead, it is concluded that exposure to the representative lead concentration in subsurface soil may result in blood-lead concentrations and risks in excess of acceptable levels for construction workers. Additionally, there were several elevated lead concentrations (e.g., greater than 10,000 mg/kg) detected, with a maximum detected

lead concentration of 20,100 mg/kg; therefore, lead may present acute exposure concerns at some subsurface soil locations.

6.6 UNCERTAINTY ANALYSIS

The uncertainties associated with the OU8 HHRA are discussed in this section. Deviations from the SAP (Tetra Tech, May 2015) are also discussed in this section. Uncertainty in the selection of COPCs is related to the current status of the predictive databases, the grouping of samples, and the procedures used to include or exclude constituents as COPCs. Uncertainty associated with the exposure assessment includes the values used as input variables for a given intake route/scenario, the assumptions made to determine EPCs, and the predictions regarding future land use and population characteristics. Uncertainty in the toxicity assessment includes the quality of the existing toxicity data needed to support dose response relationships and the weight of evidence used for determining the carcinogenicity of COPCs. Uncertainty in risk characterization includes that associated with exposure to multiple contaminants and the cumulative uncertainty from combining conservative assumptions made in earlier steps of the risk assessment process.

Whereas there are various sources of uncertainty, as listed above, the direction of uncertainty can be influenced by the assumptions made throughout the risk assessment, including selection of COPCs and selection of values for dose response relationships. Throughout the entire risk assessment, assumptions that consider safety factors are made so that the final calculated risks are overestimated.

Generally, risk assessments carry two types of uncertainty, measurement and informational uncertainty. Measurement uncertainty refers to the usual variance that accompanies scientific measurements. For example, this type of uncertainty is associated with analytical data collected for the site. The risk assessment reflects the accumulated variances of the individual values used. Informational uncertainty stems from inadequate availability of information needed to complete the toxicity and exposure assessments. Often, this gap is significant, such as the absence of information on the effects of human exposure to low doses of a contaminant, on the biological mechanism of action on a contaminant, or on the behavior of a contaminant in soil.

After the risk assessment is complete, the results must be reviewed and evaluated to identify the type and magnitude of uncertainty involved. Reliance on results from a risk assessment without consideration of uncertainties, limitations, and assumptions inherent in the process can be misleading. For example, to account for uncertainties in the development of exposure assumptions, conservative estimates must be made to ensure that the particular assumptions used are protective of sensitive subpopulations or the maximum exposed individuals. If a number of conservative assumptions are combined in an exposure model, the resulting calculations can propagate the uncertainties associated with those assumptions,

thereby producing a much larger uncertainty for the final results. This uncertainty is biased toward over-predicting both carcinogenic and non-carcinogenic risks. Thus, both the results of the risk assessment and the uncertainties associated with those results must be considered when making risk management decisions.

This interpretation is especially relevant when the risks exceed the point of-departure for defining "acceptable" risk. For example, when risks calculated using a high degree of uncertainty are less than an acceptable" risk level (i.e., $1x10^{-6}$), the interpretation of no significant risk is typically straightforward. However, when risks calculated using a high degree of uncertainty exceed an "acceptable" risk level (i.e., $1x10^{-4}$), a conclusion can be difficult unless uncertainty is considered.

6.6.1 Uncertainty in Selection of COPCs

A minor amount of uncertainty is associated with the selection of COPCs that may affect the numerical risk estimates presented in the risk assessments. The most significant issues related to uncertainty in COPC selection are: the existing database (i.e., the quality of the analytical data), the samples excluded in the HHRA data sets, the exclusion of chemicals potentially attributable to background, the screening levels used, surrogate screening levels, and the absence of screening levels for a few contaminants detected in the site media. A brief discussion of each of these issues is provided in the remainder of this section.

Existing Database

Groundwater and soil analytical data from samples collected on site were used to evaluate potential risks to human receptors. All of the data used in the OU8 HHRA were validated. Therefore, only limited uncertainty is associated with the analytical data sets used, as summarized in Section 6.2 and discussed in Data Usability discussion presented in Section 2.0 and in the DQR (Appendix B.4). As discussed in Section 6.2.1, the 1998 subsurface soil data contained some rejected results. However, the rejected results represent only a small subset of the subsurface soil results; therefore, the rejected results are not expected to greatly impact the overall subsurface soil data set.

Uncertainty is associated with the maximum detected concentration of cyanide (34 mg/kg) in subsurface soil in sample WTB-SB02-0305-98. This sample was collected in 1998, and cyanide was not detected in any other of the five surface or 11 subsurface soil samples collected during the SSI. Cyanide was also not detected in any of the four deeper subsurface soil samples. Therefore, it was only detected in 1 of 19 samples (not included one duplicate where it was also not detected). Cyanide was not an analyte in the 2015 soil samples. Cyanide is not considered related to site operations based on a review of historical documents that indicated cyanide-containing solutions were not used for metal washing activities. No facility background value is available for cyanide in soil. Because there was only one detected cyanide

result, the maximum detected concentration was also used as the EPC. Therefore, risks due to cyanide in subsurface soil are likely overestimated. Cyanide was identified as a primary risk driver for construction workers exposed to subsurface soil primarily due to inhalation risks. Cyanide was also identified as a primary risk driver for occupational workers and hypothetical future residents in the subsurface soil evaluation for these receptors presented in Section 6.6.2 of the uncertainty analysis.

Samples Excluded from the HHRA Data Sets

In the SAP, the OU8 area was defined as the boundary shown on Figure 2 (Tetra Tech, May 2015). Therefore, the upgradient soil and groundwater samples (from location WTB-MW01) were excluded from the data set. Additionally, location WTB-MW05/WTB-MW05R is outside of the OU8 boundary; therefore, soil samples collected from this location were excluded from the risk assessment data set. (Even though the groundwater samples from WTB-MW05/WTB-MW05R were collected from outside the OU8 boundary, these samples were included in the groundwater data set because this sampling location is downgradient of OU8. Because groundwater is tidally influenced, near downgradient groundwater data may represent site groundwater data.)

For the purposes of this risk assessment, the list of COPCs for soil was developed using data from the 1998 SSI and data from the 2015 field event. However, for groundwater, only data from the 2015 field event were evaluated because it was expected that the most recent data are more representative of current site conditions. For completeness, the groundwater data collected during the 1998 SSI are evaluated in this section.

Tables C.6.1 and C.6.2 of Appendix C.6 show the analytical data and summary statistics for chemicals detected in 1998 groundwater samples excluded from the risk assessment. Shaded chemicals and concentrations in Table C.6.2 indicate that the 1998 groundwater concentrations exceed corresponding screening concentrations for groundwater. Dissolved metals were analyzed for in one groundwater sample; however, total metals concentrations are evaluated in the HHRA. Concentrations for some total metals in 1998 groundwater are greater than concentrations in 2015 groundwater; however, of these metals, only one thallium concentration exceeded the corresponding screening level. Thallium was detected in one sample from 1998 (46 µg/L) and was not detected in 2015 samples. The toxicity criteria used to develop the screening level for thallium is not suitable for quantifying risks; therefore, thallium would not have been quantitatively evaluated in the HHRA. Based on this evaluation, it is not likely that risk results would be considerably greater if concentrations in groundwater from 1998 were included in the HHRA.

In accordance with the SAP, subsurface soil exposure was evaluated with a data set that included soil samples collected between 2 and 10 feet bgs. Subsurface soil risk was evaluated where appropriate (i.e.,

for the construction worker) for total receptor risks. Subsurface soil risks are also considered for the remaining receptors in Section 6.6.2, although exposure of these receptors to subsurface soil at OU8 is unlikely.

It is assumed that potential risks from chemicals in soil deeper than 10 feet bgs were adequately accounted for by evaluating exposures to surface and subsurface soil as long as notably greater concentrations are not present in deep soil. For completeness, the deep soil (i.e., greater than 10 feet bgs) data are evaluated in this section.

Tables C.7.1 and C.7.2 of Appendix C.7 show the analytical data and summary statistics for chemicals detected in deep soil samples excluded from the risk assessment. Shaded chemicals and concentrations in Table C.7.2 indicate that deep soil concentrations exceed corresponding screening concentrations for soil. Concentrations of some chemicals in deep soil are greater than concentrations in subsurface soil; however, of these chemicals, only aluminum exceeded the corresponding RSL. The maximum concentration of aluminum in deep soil is 22,100 mg/kg, which is only slightly greater than the maximum concentration in shallower subsurface soil (18,100 mg/kg). Also, the aluminum concentrations are within the facility background range of 4,930 to 33,500 mg/kg. Therefore, it is not likely that risks for receptors would be considerably greater if concentrations in deep soil were considered.

Chemicals Potentially Attributable to Background

COPCs for OU8 were selected, in part, using available background concentrations for soil and groundwater. A statistical data set-to-data set background comparison was conducted to determine if site concentrations exceeded background concentrations for chemicals with concentrations exceeding screening criteria (see Appendix B.2).

Chemicals Eliminated Due to Background

A background screen (i.e., a data set-to-data set comparison) was conducted for chemicals detected at concentrations exceeding screening criteria in soil at OU8 (see Appendix B.2). The following chemicals were eliminated from COPC selection as a result of the background screen:

- Surface soil: aluminum, arsenic, cobalt, lead, and vanadium.
- Subsurface soil: aluminum and vanadium.

The maximum arsenic concentration exceeds the RSL based on an ILCR of $1x10^{-6}$ or an HI of 1. Maximum concentrations of the other chemicals eliminated from COPC selection as a result of the background screen

exceed the RSL based on an HQ of 0.1, but not the RSL based on an HQ of 1. The maximum concentration of lead in surface soil exceeds the screening level of 400 mg/kg.

The elimination of the aforementioned metals from the quantitative risk assessment could result in an underestimation of risk. To evaluate the implications of omitting these metals from the quantitative risk assessment, ILCRs and HIs were recalculated including the metals listed above. Cumulative site risks, including those chemicals eliminated as COPCs based on background comparison, were calculated and are presented in Appendix C.8.1. The results of this analysis are presented in the following table.

ANALYSIS OF RISKS FOR CHEMICALS OMITTED FROM THE QUANTITATIVE RISK ASSESSMENT ON THE BASIS OF BACKGROUND – RME SCENARIO – OU8		
Receptor	**ILCR(1)**	**HI(1)**
Surface Soil		
Construction Worker	$3x10^{-6}$ ($4x10^{-6}$)	0.1 (0.2)
Occupational Worker	$4x10^{-5}$ ($5x10^{-5}$)	0.07 (0.1)
Child Recreational User (hypothetical)	$1x10^{-4}$ ($1x10^{-4}$)	0.1 (0.3)
Adult Recreational User (hypothetical)	$2x10^{-5}$ ($2x10^{-5}$)	0.01 (0.03)
Lifelong Recreational User (hypothetical)	$1x10^{-4}$ ($2x10^{-4}$)	NA
Child Resident (hypothetical)	$7x10^{-4}$ ($7x10^{-4}$)	1 (2(2))
Adult Resident (hypothetical)	$1x10^{-4}$ ($1x10^{-4}$)	0.1 (0.2)
Lifelong Resident (hypothetical)	$8x10^{-4}$ ($8x10^{-4}$)	NA
Subsurface Soil		
Construction Worker	$1x10^{-6}$ ($1x10^{-6}$)	11 (11)

1 – Risk values not in parentheses are for COPCs only. Risk values shown in parentheses are for COPCs and chemicals eliminated on the basis of background.
2 – Target organ HIs are less than 1.
NA – Not applicable.

In general, HIs and ILCRs for the site-specific and cumulative evaluations for the receptors evaluated are similar. Although the HI for the hypothetical future child resident exposed to surface soil exceeds 1 in the cumulative evaluation and did not exceed 1 in the site-specific evaluation, the target organ HIs are less than or equal to 1 in the cumulative evaluation; therefore, adverse effects would not be anticipated for the cumulative exposure. The ILCR for the hypothetical future lifelong resident in the cumulative evaluation ($2x10^{-4}$) exceeded USEPA's target risk range, whereas the ILCR in the site-specific evaluation ($1x10^{-4}$) did not. Arsenic (ILCR is $3x10^{-6}$) is an additional risk contributor for the hypothetical future lifelong recreational user in the cumulative evaluation; arsenic (maximum concentration is 61.9 mg/kg) was eliminated from surface soil COPC selection due to background. Arsenic is naturally occurring in soil and was detected in all 25 background soil samples at concentrations ranging from 4.4 to 58.6 mg/kg. With the exception of the

hypothetical future lifelong resident exposed to surface soil, overall risk conclusions are the same regardless of whether background is included or excluded in the evaluation. Therefore, the elimination of chemicals within background levels does not add significant uncertainty to the HHRA.

Lead in surface soil was eliminated from COPC selection based on the background evaluation. The average lead exposure concentration in surface soil of 213 mg/kg was used as the representative lead concentration for surface soil at OU8. Because the representative lead concentration is less than the residential soil RSL for lead (400 mg/kg), lead in surface soil was not quantitatively evaluated in this section.

COPC Screening Levels

The use of screening values based on conservative land use scenarios (i.e., residential land use for soil and construction worker ingestion and dermal contact for groundwater) corresponding to ILCRs of $1x10^{-6}$ and HQs of 0.1 should ensure that the significant risk-contributing chemicals at OU8 were evaluated. The elimination of chemicals that are present at concentrations that correspond to ILCRs less than $1x10^{-6}$ and HIs less than 0.1 should not affect the final conclusions of the risk assessment because these chemicals are not expected to cause a potential health concern for the receptors identified at the concentrations detected.

Absence of COPC Screening Levels

Several contaminants had no available screening levels or toxicity information: carbazole and petroleum hydrocarbons (diesel and gasoline range) in surface soil and subsurface soil. Therefore, these chemicals were not included as COPCs in the risk assessment. Exclusion of these chemicals from COPC selection adds some uncertainty to the risk assessment; however, it is assumed that chemicals lacking toxicity criteria would not contribute significantly to overall risks. In addition, because risk assessments are generally designed to be conservative (i.e., they tend to over predict rather than under predict risk), it is unlikely that the exclusion of these chemicals from the quantitative risk analysis will result in a significant underestimation of risk. In surface soil and subsurface soil, EPH parameters were analyzed instead of diesel-range and gasoline-range petroleum hydrocarbons in the 2015 soil samples; therefore, petroleum hydrocarbons were assessed through the EPH parameters. In accordance with the SAP, risks associated with EPH parameters are discussed in the uncertainty analysis only.

Evaluation of EPH Parameters

The EPH parameters C11-C22 aromatics were selected as COPCs for both surface and subsurface soil in Section 6.2.2.1 based on a comparison to MEDEP criteria. The detected concentrations and frequency of detection of these parameters in each soil data set is presented below.

EPH COPCs in Soil: C11-C22 Aromatics

Medium	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Frequency of Detection	MEDEP Criterion (mg/kg)(1)
Surface Soil	10 J	1800	13/17	750
Subsurface Soil	12 J	2200	33/34	

1 - MEDEP Remedial Action Guidelines for Sites Contaminated with Hazardous Substances (MEDEP, May 2013).
J = Estimated value

In surface soil, only the maximum concentration exceeds the MEDEP criterion; all remaining surface soil concentrations are 300 mg/kg or less. The maximum concentration in surface soil was detected at location WTB-SB19. The MEDEP criterion of 750 mg/kg is based on residential exposures; MEDEP guidance (MEDEP, May 2013) lists criteria of 5,500 mg/kg and 10,000 mg/kg for outdoor commercial workers and construction workers, respectively. Based on these considerations, detections of C11-C22 aromatics in surface soil are not anticipated to be a concern for human health at OU8 because the current and anticipated future land use is industrial.

In subsurface soil, only the two greatest concentrations, 2,200 mg/kg and 1,100 mg/kg, detected at locations WTB-SB17 and WTB-SB08, respectively, exceed the MEDEP residential criterion. Remaining subsurface soil concentrations are 680 mg/kg or less. All subsurface soil concentrations of C11-C22 aromatics are less than the industrial criteria quoted above, and as stated in the SAP (Tetra Tech, May 2015), it is unlikely that any receptors other than construction workers would be exposed to subsurface soil. Based on these considerations, detections of C11-C22 aromatics in subsurface soil are not anticipated to be a concern for human health at OU8 because the current and anticipated future land use is industrial.

Surrogate Screening Levels

During COPC screening, the following surrogates were used for some chemicals lacking screening levels: acenaphthene was used for acenaphthylene, and pyrene was used for benzo(g,h,i)perylene and phenanthrene. Applying toxicity values for one compound to another adds to the uncertainty in the risk assessment both in regard to the selection of COPCs and subsequently calculated risks. The direction of the bias is unknown (i.e., it is not known if the surrogate criteria selected for the chemical lacking screening levels are more or less conservative than the actual unavailable screening level would be). However, surrogate screening levels were used to be conservative rather than excluding these chemicals that lack screening levels from COPC selection and the quantitative risk assessment.

6.6.2 Uncertainty in the Exposure Assessment

Uncertainty in the exposure assessment arises because of the methods used to calculate EPCs, the determination of land use conditions, the selection of receptors and scenarios, and the selection of exposure parameters. Each of these is discussed below.

Land Use

The past and current land use patterns at the site are well established, thereby reducing the uncertainty associated with land use assumptions. Land use for OU8 is industrial and is likely to remain as such for the foreseeable future. To be conservative, future hypothetical residents, occupational workers, and hypothetical future recreational users were evaluated.

Exposure Point Concentrations

Uncertainty is associated with the use of 95-percent UCLs on the mean as the EPCs. As a result of using 95-percent UCLs, the estimations of potential risk for the RME scenario are most likely overstated because this is a representation of the upper limit to which potential receptors would be exposed to over the entire exposure period. Uncertainty is introduced when the non-detected results are incorporated into the UCL calculation by using detection limits for non-detects as input values when using ProUCL software. This may either overstate or understate the risks to the receptors. However, this methodology is in accordance with USEPA guidance (USEPA, September 2013). The use of the maximum concentration as the EPC also tends to overestimate risks. The maximum concentration was used as the EPC when evaluating groundwater and for cyanide in subsurface soil. No risk benchmarks were exceeded for the evaluation of groundwater; therefore, no considerable uncertainty is associated with using the maximum detected concentration as the EPC for manganese in groundwater. As discussed previously, cyanide in subsurface soil was identified as a primary risk driver for several evaluations; therefore, it is important to consider the uncertainty associated with the EPC used to represent cyanide in subsurface soil.

Exposure Routes and Receptor Identification

An attempt was made to simplify the various receptor groups and exposure routes of potential concern in this report. The uncertainty associated with this approach is minimal because exposure routes and potential receptors are considered to be well defined based on the land use observed at the site. The conservative exposure assumptions used in the risk assessment should be protective of receptor use of the site.

Occupational, Hypothetical Future Recreational, and Hypothetical Future Residential Exposures to Subsurface Soil

The risk assessment assumed that occupational workers, future hypothetical recreational users, and future hypothetical residents would be exposed to surface soil only. The possibility that subsurface soil would be excavated and spread across the land surfaces and the possibility that future land use would be residential are very remote. However, for purposes of completeness, the Navy has included a quantitative evaluation of exposure by future occupational workers, hypothetical future recreational users, and residents to surface and subsurface soil contamination (to a depth of 10 feet) in Appendix C.8.2 for the site-specific evaluation and Appendix C.8.1 for the cumulative evaluation. A summary of occupational worker, hypothetical future recreational user, and hypothetical future resident risks estimated for subsurface soil exposures is summarized below.

Estimated RME and CTE Risks for Occupational Workers, Hypothetical Future Recreational Users, and Hypothetical Future Residents Exposed to Subsurface Soil

Summary of RME and CTE Risks

Receptor	Reasonable Maximum Exposure				Central Tendency Exposure			
	Site-Specific		Cumulative		Site-Specific		Cumulative	
	ILCR	HI	ILCR	HI	ILCR	HI	ILCR	HI
Occupational Worker	**$2x10^{-5}$**	**4**	**$2x10^{-5}$**	**4**	$2x10^{-6}$	**3**	$2x10^{-6}$	**3**
Child Recreational User (hypothetical)	**$4x10^{-5}$**	**5**	**$4x10^{-5}$**	**5**	$3x10^{-6}$	1	$3x10^{-6}$	1
Adult Recreational User (hypothetical)	$6x10^{-6}$	0.8	$6x10^{-6}$	0.8	$3x10^{-7}$	0.2	$3x10^{-7}$	0.2
Lifelong Recreational User (hypothetical)	**$4x10^{-5}$**	NA	**$4x10^{-5}$**	NA	$3x10^{-6}$	NA	$3x10^{-6}$	NA
Child Resident (hypothetical)	**$2x10^{-4}$**	**40**	**$2x10^{-4}$**	**40**	**$2x10^{-5}$**	**20**	**$2x10^{-5}$**	**20**
Adult Resident (hypothetical)	**$3x10^{-5}$**	**10**	**$3x10^{-5}$**	**10**	$3x10^{-6}$	**7**	$3x10^{-6}$	**7**
Lifelong Resident (hypothetical)	**$2x10^{-4}$**	NA	**$2x10^{-4}$**	NA	**$3x10^{-5}$**	NA	**$3x10^{-5}$**	NA

Values shaded black indicate that the USEPA noncancer benchmark of 1 or cancer benchmark of $1x10^{-4}$ was exceeded for the associated receptor. Values shaded gray indicate that the State of Maine risk guideline ($1x10^{-5}$) was exceeded for the associated receptor.
NA – Not applicable.

As shown above, site-specific and cumulative risk estimates for occupational workers, hypothetical future recreational users, and hypothetical future residents were the same. Only aluminum and vanadium concentrations were determined to be within the ranges of background in subsurface soil. Aluminum and vanadium maximum concentrations in subsurface soil exceed the residential soil RSL based on an HQ of 0.1 but do not exceed the RSL based on an HQ of 1.

For the site-specific and cumulative RME scenarios, total ILCRs for exposure to subsurface soil by hypothetical future child and lifelong residents exceed USEPA's target cancer risk range ($1x10^{-6}$ to $1x10^{-4}$) and the State of Maine risk guideline ($1x10^{-5}$) due to cPAHs and arsenic. Total ILCRs for occupational workers, hypothetical future child and lifelong recreational users, and hypothetical future adult residents exceed the State of Maine risk guideline value of $1x10^{-5}$ due to cPAHs and arsenic, but not USEPA's target cancer risk range for the RME scenario. The HI for occupational workers users exceeded 1 on a target organ basis under the RME scenarios primarily due cyanide, and the HI for hypothetical future child recreational users exceed 1 on a target organ basis primarily due to antimony. Target organ HIs for hypothetical future child residents exceeded 1 primarily due to antimony, cobalt, copper, iron, manganese, mercury, and cyanide, and target organ HIs exceeded 1 for hypothetical future adult residents primarily due to antimony and cyanide.

For the site-specific and cumulative CTE scenarios, total ILCRs for hypothetical future child and lifelong residents exceed the State of Maine risk guideline due to cPAHs and arsenic, but did not exceed USEPA's target cancer risk range. The HI for occupational workers users exceed 1 on a target organ basis under the CTE scenarios primarily due cyanide. Target organ HIs for hypothetical future child residents exceed 1 primarily due to antimony, cobalt, copper, iron, and cyanide, and a target organ HI exceed 1 for hypothetical future adult residents primarily due to cyanide.

Lead was selected as a COPC for subsurface soil. Lead risks for occupational workers, hypothetical future recreational users, and hypothetical future residents exposed to subsurface soil are discussed in this section.

The exposure and potential risks to a child (0 to 6 years) exposed to lead are assessed through the use of the USEPA IEUBK Model (USEPA, February 1994 and February 2010) because of the absence of published dose-response parameters for lead. Adult exposure to lead in soil is addressed by the Lead Model for Adult Exposure (USEPA, January 2003 and June 2009). Documentation for the assessment of lead through the IEUBK Model and the ALM is presented in Appendix C.6. Residential exposure to lead was assessed by evaluating the child hypothetical future resident (i.e., the most conservative residential receptor for the lead evaluation) using the USEPA IEUBK Model. The average lead exposure concentration in OU8 subsurface soil of 2,210 mg/kg was used to estimate blood-lead levels in children, and model default exposure parameters were used for other input parameters. Because groundwater at OU8 cannot be used as a source of potable water, the model default lead water concentration of 4 µg/L was used. The estimated geometric mean blood-lead level for a hypothetical child resident is 15.8 µg/dL, which is greater than the established level of "concern" (10 µg/dL), and approximately 84 percent of children assumed to be exposed

are expected to experience blood-lead levels greater than 10 µg/dL. This estimate exceeds the USEPA's goal of limiting childhood risk of exceeding the 10 µg/dL blood-lead concentration to 5 percent.

Occupational worker and hypothetical future adult recreational user exposures to lead in OU8 subsurface soil were assessed using the ALM (USEPA, June 2009) and CTE exposure assumptions. The probability that fetal blood concentrations for occupational workers exposed to subsurface soil would exceed the USEPA target level (i.e., 10 µg lead per deciliter of blood) was less than 5 percent (the probability was 4.8 percent). The probability that fetal blood concentrations for hypothetical future adult recreational users exposed to subsurface soil would exceed the USEPA target level (i.e., 10 µg lead per deciliter of blood) was also less than 5 percent (the probability was 0.53 percent).

Based on the results of the quantitative risk analysis for lead, it is concluded that exposure to the representative lead concentration in subsurface soil at OU8 may result in blood-lead concentrations and risks in excess of acceptable levels for hypothetical future child residents. Results of the ALM indicate that adverse health effects are not anticipated for occupational workers and hypothetical future adult recreational users based on average lead concentrations for those exposure scenarios. A target blood lead level of 10 µg/dL was used based on current USEPA guidance. It is possible that this target level may change, and the Navy will revisit the issue as appropriate (e.g., as part of the five-year review process). However, as stated in Section 6.5.5, there were several elevated lead concentrations (e.g., greater than 10,000 mg/kg) detected in subsurface soil, including the maximum detected lead concentration of 20,100 mg/kg; therefore, lead may present acute exposure concerns at some subsurface soil locations.

The IEUBK lead model is inappropriate for evaluation of the hypothetical future child recreational user exposure scenario because it is designed to address lead exposures for residents, and the ALM model is overly conservative because it is designed to address lead exposures for the fetuses of pregnant workers. Therefore, a quantitative evaluation could not be performed for hypothetical future child recreational users. Lead risks for hypothetical future child recreational users are instead qualitatively assessed. Because there were several elevated lead concentrations (e.g., greater than 10,000 mg/kg) detected in subsurface soil, including the maximum detected lead concentration of 20,100 mg/kg, the potential of acute risks for hypothetical future child recreational users exposed to lead exists at OU8.

The preceding summary indicates that additional risks are possible for occupational workers, hypothetical future recreational users, and hypothetical future residents exposed to subsurface soil. Risk drivers in subsurface soil for these receptors include cPAHs and several metals. However, exposure to subsurface soil by the aforementioned receptors at OU8 is unlikely because site conditions make it unlikely that subsurface soil will be brought to the surface.

Receptors/Pathways Not Evaluated

Hypothetical future residents (adult and child) were not evaluated for exposures to groundwater in this HHRA because the groundwater at OU8 is saline/brackish and unsuitable as a drinking water supply. Therefore, excluding an evaluation of residential exposure to groundwater is not expected to add uncertainty to the HHRA.

No evaluation of vapor intrusion from soil was conducted because site data indicate that a soil source of sufficiently volatile and toxic chemicals does not exist at OU8. Vapor intrusion requires a source, an inhabited building, and a pathway. A soil source of compounds sufficiently volatile and toxic to pose a vapor intrusion threat is not present at OU8. The majority of soil concentrations for compounds sufficiently volatile and toxic to warrant a vapor intrusion concern were reported as not detected. Where such compounds were detected, the concentrations were low and did not show a source. Additionally, vapor intrusion screening criteria are not available for soil. Detected groundwater concentrations were screened against available VISLs, and no COPCs were selected for the vapor intrusion from groundwater pathway.

Exposure Parameters

Each exposure factor (for RME and CTE scenarios) selected for use in the risk assessment has some associated uncertainty. Generally, exposure factors are based on surveys of physiological and lifestyle profiles across the United States. The attributes and activities studied in these surveys generally have a broad distribution. To avoid underestimation of exposure, in most cases, USEPA guidelines (USEPA, March 1991) on the RME receptor were used, which generally specify the use of the 95th percentile for most parameters; therefore, the selected values for the RME receptor represent the upper bound of the observed or expected habits of the majority of the population.

Generally, uncertainty can be assessed quantitatively for many assumptions made in determining factors for calculating exposures and intakes. Many of these parameters were determined from statistical analyses on human population characteristics. Often the database used to summarize a particular exposure parameter (i.e., body weight) is quite large. Consequently, the values chosen for such variables in the RME scenario have low uncertainty. For many parameters for which limited information is available (e.g., dermal absorption of organic contaminants from soil), greater uncertainty exists.

Many of the exposure parameters used to calculate exposures and risks in this report are selected from a distribution of possible values including USEPA guidance (March 1991, May 1993, July 2004, and February 2014). For the RME scenario, the value representing the 95th percentile is generally selected for each parameter to ensure that the assessment bounds the actual risks from a postulated exposure. This risk

number is used in risk management decisions but does not indicate what a more average or typical exposure might be, or what risk range might be expected for individuals in the exposed population.

To address these issues, USEPA (February 1992) has suggested the use of the CTE receptor, whose intake variables are often set at approximately the 50th percentile of the distribution. The risks for this receptor seek to incorporate the range of uncertainty associated with various intake assumptions. Some of the parameters presented in this risk assessment were estimated using professional judgment, although USEPA does provide limited guidance for the CTE evaluation (USEPA, May 1993).

Some differences exist between the exposure assumptions used to calculate the COPC screening levels for construction workers exposed to groundwater (Appendix A.8) and the exposure assumptions used for determining construction worker risk estimates for groundwater exposures in the HHRA. For calculating the COPC screening levels, an exposure frequency of 150 days per year was used, whereas in the HHRA an exposure frequency of 30 days per year was used. The reduced exposure frequency of 30 days per year was used in the HHRA because it is assumed that construction workers would not be exposed to groundwater every day of a construction project. A higher exposure frequency was used for calculating the COPC screening levels in order to ensure that conservative screening levels were used for COPC selection. Additionally, a duration of event value of 2 hours/event was used in calculating the COPC screening levels; however, 4 hours per event was used for the duration of event value in the HHRA for determining construction worker risk estimates for groundwater exposures. Although a longer duration of event value was used in the HHRA, the COPC screening levels are still expected to be sufficiently conservative for COPC selection because of the conservative exposure frequency (150 days per year) used in calculating the screening levels. Risk estimates for construction workers exposed to groundwater did not exceed benchmark values; therefore, overall risk assessment conclusions are not affected by using a longer duration of event assumption in the HHRA.

As noted in Appendix C.2, a particulate emission factor (PEF) relates the concentration of the chemical in soil with the concentration of dust particles in air and is used for evaluating risks from inhalation of fugitive dust emissions from soil. A separate, more conservative PEF is often used for construction workers than for other receptors because air emissions resulting from fugitive dust emissions settings are different than dust emissions generated during construction activities. Equations presented in the supplemental soil screening level guidance document (USEPA, December 2002a) are used for calculating the construction worker PEF. These equations assume that a site is completely unpaved and that there is truck traffic stirring up the soil. However, OU8 is completely paved, and even under a future construction scenario, it is highly unlikely that the entire site would be unpaved with truck traffic generating dust throughout the site. For this reason, using a separate PEF for the construction worker would be overly conservative for OU8. Instead, the same PEF that was used for the other receptors evaluated (i.e., industrial workers, hypothetical future

recreational users, and hypothetical future residents) was used, which conservatively assumes that the pavement is removed but does not assume that truck traffic generates additional dust. Even this scenario is overly conservative, but it is more reasonable than the PEF often used for the construction worker.

6.6.3 Uncertainty in the Toxicological Evaluation

Uncertainties associated with the toxicity assessment (determination of RfDs and CSFs and use of available criteria) are presented in this section.

Derivation of Toxicity Criteria

Toxicity assessment uncertainty is associated with hazard assessment and dose-response evaluations for the COPCs. The hazard assessment deals with characterizing the nature and strength of the evidence of causation, or the likelihood that a contaminant that induces adverse effects in animals will also induce adverse effects in humans. Hazard assessment of carcinogenicity is evaluated as a weight-of-evidence determination using USEPA methods. Positive animal cancer test data suggest that humans contain tissue(s) that may manifest a carcinogenic response; however, the animal data cannot necessarily be used to predict the target tissue in humans. In the hazard assessment of non-cancer effects, however, positive animal data often suggest the nature of the effects (i.e., the target tissues and type of effects) anticipated in humans.

Uncertainty in hazard assessment arises from the nature and quality of the animal and human data. Uncertainty is reduced when similar effects are observed across species, strain, gender, and exposure route; when the magnitude of the response is clearly dose-related; when pharmacokinetic data indicate a similar fate in humans and animals; when postulated mechanisms of toxicity are similar for humans and animals; and when the contaminant of concern is structurally similar to other contaminants for which the toxicity is more completely characterized. Because of the great variability in factors affecting the uncertainty arising from the nature and quality of animal and human data, the direction of bias (i.e., more or less conservative) is generally not known.

Uncertainty in the dose-response evaluation includes the determination of a CSF or IUR for the carcinogenic assessment and derivation of an RfD or RfC for the non-carcinogenic assessment. Uncertainty is introduced from interspecies (animal to human) extrapolation, which, in the absence of quantitative pharmacokinetic or mechanistic data, is usually based on consideration of interspecies differences in basal metabolic rate. Uncertainty also results from intraspecies variation. Most toxicity experiments are performed with animals that are very similar in age and genotype, so that intragroup biological variation is minimal, but the human population of concern may reflect a great deal of heterogeneity including unusual sensitivity or tolerance to the COPC. Even toxicity data from human

occupational exposure reflect a bias because only those individuals sufficiently healthy to attend work regularly (the "healthy worker effect") and those not unusually sensitive to the contaminant are likely to be occupationally exposed. Finally, uncertainty arises from the quality of the key study from which the quantitative estimate is derived and the database. For cancer effects, the uncertainty associated with dose-response factors is mitigated by assuming the 95-percent upper bound for the slope factor. Another source of uncertainty in carcinogenic assessment is the method by which data from high doses in animal studies are extrapolated to the dose range expected for environmentally exposed humans. The linearized multistage model, which is used in nearly all quantitative estimations of human risk from animal data, is based on a non-threshold assumption of carcinogenesis. Evidence suggests, however, that epigenetic carcinogens, as well as many genotoxic carcinogens, have a threshold below which they are non-carcinogenic (Williams and Weisburger, 1991); therefore, the use of the linearized multistage model is conservative for contaminants that exhibit a threshold for carcinogenicity. Several chemicals quantitatively evaluated in the HHRA, including some identified as risk drivers (i.e., copper for chronic exposures and cyanide for subchronic exposures), have Tier 3 toxicity values that are subject to greater uncertainty than the Tier 1 and Tier 2 toxicity values used in the HHRA.

For non-cancer effects, additional uncertainty factors may be applied in the derivation of RfDs or RfCs to mitigate poor quality of the key study or gaps in the database. Uncertainty for non-cancer effects arises from the use of an effect level in the estimation of an RfD or RfC because this estimation is predicated on the assumption of a threshold below which adverse effects are not expected. Therefore, an uncertainty factor is usually applied to estimate a no-effect level. Additional uncertainty arises in estimation of an RfD or RfC for chronic exposure from subchronic data. Unless empirical data indicate that effects do not worsen with increasing duration of exposure, an additional uncertainty factor is applied to the no-effect level in the subchronic study. Uncertainty in the derivation of RfDs is mitigated by the use of uncertainty and modifying factors that normally range between 3 and 10. The resulting combination of uncertainty and modifying factors may reach 1,000 or more. The use of uncertainly and modifying factors tends to increase the conservatism in the risk assessment.

The derivation of dermal RfDs and CSFs from oral values may cause uncertainty, when no gastrointestinal absorption rates are available in the literature or when only qualitative statements regarding absorption are available. If adjustments for gastrointestinal absorption are not made, risks from dermal exposure may be underestimated by the use of oral RfDs.

Uncertainty Associated with Evaluation of the Dermal Exposure Pathway

Uncertainty is associated with evaluation of the dermal pathway. USEPA Region 1 only assesses risks to contaminants for which ABS values are provided in RAGS Part E. The contaminants with ABS values in

RAGS Part E evaluated in this assessment are arsenic, cadmium, and PAHs. Therefore, the dermal route of exposure has been evaluated quantitatively for these contaminants only. Risks from dermal exposure to several metals identified as COPCs at OU8 were not quantified in the risk assessment. Consequently, potential risks may be underestimated by excluding these constituents from the dermal risk assessment calculations.

Quantitation of the dermal pathway for PAHs may add additional uncertainty to the risk assessment because it may not be appropriate to use the oral slope factor to evaluate risks from dermal exposure to PAHs (USEPA, December 1989). This is because PAHs are known to cause skin cancer at the point of contact rather than from systemic action.

Uncertainty Associated with Evaluation of Arsenic

Although the more restrictive basis for evaluating risk associated with exposure to arsenic is to assume it is a carcinogen, carcinogenic effects are not the primary health effects expected to be manifested on exposure to arsenic. Scientific information indicates that humans are capable of metabolizing arsenic to expedite its elimination from the body (ATSDR, August 2007). Its elimination from the body obviously mitigates the possibility for arsenic to manifest carcinogenic effects. Therefore, evaluating arsenic as a noncarcinogen would be more appropriate. However, arsenic was conservatively evaluated as a carcinogen in this risk assessment. Consequently, risks for this chemical are probably overestimated to some degree.

The body methylates arsenic to form monomethyl arsenic and dimethyl arsenic. A limited capacity exists for the body to methylate arsenic, but this limit is generally reached when the body's intake of arsenic approximately exceeds 500 µg/day. The intake associated with a given amount of arsenic in soil, assuming a soil ingestion rate of 200 mg/day, may be calculated and related to the 500 µg/day limit. These concentrations result in intakes that are related to the body's ability to metabolize arsenic. Although some humans may be more sensitive to arsenic, in that they are "poor methylators," the average exposure concentration for a site is usually orders of magnitude less than normal limit of metabolic saturation and is most likely less than levels that would trigger responses in sensitive individuals.

Arsenic was eliminated as a COPC in surface soil based on the background evaluation but was identified as a COPC in subsurface soil. Arsenic in subsurface soil was not identified as a major contributor in the site-specific RME evaluation presented in Section 6.5. Arsenic in subsurface soil was a primary risk contributor for hypothetical future residents under the RME scenario in the site-specific evaluation conducted as part of the uncertainty analysis (Section 6.6.2).

In the HHRA, arsenic was evaluated using a CSF of 1.5 $(mg/kg\text{-}day)^{-1}$, which is from IRIS. IRIS is the preferred source of toxicity values (USEPA, December 2003) for HHRAs. IRIS normally represents the official Agency scientific position regarding the toxicity of the chemicals based on the data available at the time of the review. IRIS values are Tier 1 values in USEPA's recommended human health toxicity value hierarchy. The California EPA CSF for arsenic is 9.5 $(mg/kg\text{-}day)^{-1}$ (OEHHA, 2004) and is considered to be a Tier 3 value by USEPA. Cancer risk estimates for arsenic would be approximately 6 times higher using the Tier 3 California EPA CSF for arsenic.

Use of Chronic Toxicity Values for Construction Workers

Under the guidelines established by the Superfund program, exposures to construction workers of one year or less are classified as subchronic exposures. Risks for non-carcinogenic effects associated with subchronic exposures should incorporate toxicity values for subchronic and not chronic effects. Subchronic toxicity values are not as widely available as chronic values. Chronic toxicity values were used when subchronic toxicity values were not available. Using chronic toxicity criteria to evaluate subchronic exposures for construction workers tends to overestimate potential non-carcinogenic risks. HIs exceed 1 for construction worker exposures to subsurface soil primarily due to antimony and cyanide in the site-specific RME evaluation and cyanide in the site-specific CTE evaluation. HI exceedances due to antimony were primarily for the ingestion pathway, and HI exceedances due to cyanide were primarily for the inhalation pathway. No subchronic toxicity RfCs are available for cyanide; therefore, the HIs for the construction worker exposed to soil via the inhalation pathway may be overestimated.

Uncertainty Associated with Thallium Toxicity Criteria

Toxicity criteria for thallium were not used to quantify risks because the RfD used to derive the RSLs for thallium are only suitable for screening. USEPA recommended RfDs are derived based on available toxicological studies which are reviewed by the USEPA. The study that was used to generate the USEPA RSL-based screening value for thallium suffers from severe study limitations and difficulties regarding the selection of appropriate toxicity endpoints. Therefore, an RfD was not derived and published by USEPA in IRIS. Hence, any evaluation of thallium suffers from severe limitations and fails to provide a basis for identifying it as a contaminant of concern. Although there are human studies assessing the effects of exposure to thallium, the majority are case reports of poisonings, suicide attempts or accidental ingestion of rodenticides which do not provide sufficient data for extrapolating a reliable RfD based on environmental exposures. Occupational exposure studies provide inconclusive associations between thallium exposure and any specific health effects. Generally, available human studies do not support oral RfD derivation (USEPA, October 2012). Animal studies assessing thallium exposure are also generally of poor quality (USEPA, June 2016). The uncertainty associated with thallium is not expected to add considerable uncertainty to the HHRA because although thallium was selected as a COPC for the soil data sets using

conservative screening criteria based on an HQ of 0.1, the concentrations of thallium detected at OU8 do not exceed the USEPA RSL for residential soil based on an HQ of 1. Therefore, overall risk assessment conclusions should not be impacted by excluding thallium from the quantitative risk evaluation.

Use of Chromium Toxicity Criteria

Criteria for trivalent chromium were used to evaluate total chromium concentrations in the HHRA in accordance with the SAP (Tetra Tech, May 2015). Chromium at OU8 is assumed to be in the trivalent oxidation state because hexavalent chromium was not detected in soil during the SSI. Therefore, risks due to chromium at OU8 are not expected to be underestimated based on the use of trivalent chromium criteria.

6.6.4 Uncertainty in the Risk Characterization

Uncertainty in risk characterization results primarily from assumptions made regarding additivity of effects from exposure to multiple COPCs from various exposure routes. High uncertainty exists when summing cancer risks for several substances across different exposure pathways. This assumes that each substance has a similar effect and/or mode of action. Often chemicals affect different organs, have different mechanisms of action, and differ in their fate in the body, so additivity may not be an appropriate assumption. However, the assumption of additivity is made to provide a conservative estimate of risk. Additionally, some contaminants were eliminated as COPCs based on background comparisons alone, as noted in Section 6.2.2 (see Appendix B.2 for further information). Although the site concentrations of some contaminants exceeded background concentrations, uncertainty exists because some chemicals that were risk drivers could still have a considerable background component adding to risks.

Finally, the risk characterization does not consider antagonistic or synergistic effects. Little or no information is available to determine the potential for antagonism or synergism for the COPCs. Therefore, this uncertainty cannot be discussed for its impact on the risk assessment because it may either underestimate or overestimate potential human health risk.

6.6.5 Deviations from the SAP

The HHRA followed the methodology presented in the SAP (Tetra Tech, May 2015) except as noted in this section.

Groundwater Screening Criteria

The SAP provided screening criteria to use for construction worker exposures to groundwater if the groundwater was determined to be saline/brackish. Because analytical groundwater results collected during the 2015 sampling event indicated that the groundwater at OU8 was saline/brackish, these

construction worker screening levels for groundwater were used for COPC selection in the HHRA, and drinking water criteria (e.g., tap water RSLs) were not used for COPC selection. However, the groundwater screening levels provided in the SAP only incorporated ingestion and dermal contact exposures, whereas the CSM presented in the SAP indicated that construction workers could also be exposed to chemicals in groundwater via inhalation. Because some volatile chemicals were detected in groundwater, a separate evaluation was conducted to identify any chemicals detected in groundwater that were both volatile and toxic via inhalation. Naphthalene was the only chemical detected in groundwater that met these criteria; therefore, separate construction worker inhalation screening levels were compared to naphthalene concentrations to determine if naphthalene should also be evaluated for inhalation exposures. Naphthalene concentrations were less than the calculated inhalation screening level, and no further evaluation was conducted for construction worker inhalation of volatiles from groundwater.

Although the SAP did not identify the vapor intrusion pathway as a possible exposure pathway, because there were some volatile chemicals detected in soil and groundwater, the vapor intrusion pathway was discussed. A qualitative evaluation was conducted for soil, and groundwater concentrations were screened against available VISLs. Based on the qualitative vapor intrusion discussions, no further evaluation of this pathway is needed.

Background Evaluation for Groundwater

The SAP indicated that a background evaluation would be conducted for any detected chemicals with concentrations exceeding screening levels. However, a background evaluation was not conducted for groundwater because only one metal, manganese, exceeded construction worker screening levels for groundwater. Groundwater manganese concentrations exceed the range of background concentrations for saline/brackish groundwater but are within the range of background concentrations for freshwater groundwater. Manganese was selected as a COPC and evaluated quantitatively in the HHRA for construction worker exposures. Risk estimates for manganese in groundwater did not exceed acceptance benchmarks.

6.7 SUMMARY AND CONCLUSIONS

This section and Table 6-3 present a summary of the major risk assessment findings for OU8. Four potential receptor groups were evaluated: current and future construction workers, future occupational workers, hypothetical future child and adult recreational users, hypothetical future child and adult residents. The risk characterization section of the HHRA evaluated risks to all receptors across the entire site. All receptors were evaluated for exposure to surface soil in the risk characterization, and construction workers were also evaluated for exposures to subsurface soil in the risk characterization. Only construction workers were evaluated for exposure to groundwater because the groundwater at OU8 is saline/brackish and

therefore is not suitable as a drinking water supply. The uncertainty analysis considered subsurface soil exposure for receptors not evaluated for subsurface soil exposure in the risk characterization (i.e., occupational workers, hypothetical future recreational users, and hypothetical future residents). The results of these evaluations are summarized below.

6.7.1 Summary of Risks – Risk Characterization

6.7.1.1 Non-Carcinogenic Risks

RME and CTE HIs are less than or equal to 1 for construction workers, occupational workers, hypothetical future child and adult recreational users, and hypothetical future child and adult residents exposed to surface soil and for construction workers exposed to groundwater. Adverse non-carcinogenic health effects are not anticipated for these receptor groups.

RME and CTE HIs were greater than 1 for construction workers exposed to subsurface soil. For the RME scenario, antimony and cyanide are the primary risk contributors to HIs exceeding 1 for the blood and thyroid target organs, respectively. For the CTE scenario, cyanide is the primary risk contributor to the HI exceeding 1 for the thyroid target organ. However, considerable uncertainty is associated with risks estimated for receptor exposure to cyanide because the risk assessment was conducted using only the maximum cyanide detection from the 1998 sampling (which is likely anomalous).

6.7.1.2 Carcinogenic Risks

RME cancer risk estimates for construction workers exposed to surface and subsurface soil and occupational workers, hypothetical future recreational users (child, adult, and lifelong), and hypothetical future adult residents exposed to surface soil were less than or within USEPA target cancer risk range ($1x10^{-6}$ to $1x10^{-4}$). RME cancer risks for hypothetical future child residents ($7x10^{-4}$) and lifetime residents ($8x10^{-4}$) exceeded USEPA's target cancer risk range primarily due to cPAHs.

RME cancer risks for occupational workers ($4x10^{-5}$), hypothetical future child recreational users ($1x10^{-4}$), adult recreational users ($2x10^{-5}$), lifelong recreational users ($1x10^{-4}$), and hypothetical future child residents ($7x10^{-4}$), adult residents ($1x10^{-4}$), and lifelong residents ($8x10^{-4}$) exceeded the State of Maine risk guideline of $1x10^{-5}$ primarily due to cPAHs.

CTE cancer risk estimates for construction workers exposed to surface and subsurface soil and occupational workers, hypothetical future recreational users (child, adult, and lifelong), and hypothetical future residents (child, adult, and lifelong) exposed to surface soil were less than or within USEPA target cancer risk range ($1x10^{-6}$ to $1x10^{-4}$).

CTE cancer risks for hypothetical future child residents ($8x10^{-5}$) and lifelong residents ($9x10^{-5}$) exceeded the State of Maine risk guideline of $1x10^{-5}$ primarily due to cPAHs.

No cancer risks were calculated for construction workers exposed to groundwater, as no cancer toxicity criteria are available for manganese, the only groundwater COPC.

6.7.1.3 Exposure to Lead

Lead was selected as a COPC for construction worker exposure in subsurface soil. The probability that fetal blood concentrations for construction workers exposed to subsurface soil would exceed the USEPA target level (i.e., 10 µg lead per deciliter of blood) was 6.7 percent, greater than the benchmark of 5 percent. Based on the results of the quantitative risk analysis for lead, exposure to subsurface soil may result in blood-lead concentrations and risks in excess of acceptable levels for construction workers. Additionally, several elevated lead concentrations (e.g., greater than 10,000 mg/kg) were detected, including the maximum detected lead concentration of 20,100 mg/kg; therefore, lead may present acute exposure concerns at some subsurface soil locations.

6.7.2 Summary of Risks – Uncertainty Analysis

6.7.2.1 Non-Carcinogenic Risks

Under the RME scenario, noncancer HIs exceeded 1 for occupational workers, hypothetical future child recreational users, and hypothetical future child and adult residents exposed to subsurface soil. Primary risk contributors included antimony, cobalt, copper, iron, manganese, mercury, and cyanide.

Under the CTE scenario, noncancer HIs exceeded 1 for occupational workers, hypothetical future child and adult residents exposed to subsurface soil. Primary risk contributors included antimony, cobalt, copper, iron, and cyanide.

Considerable uncertainty is associated with risks estimated for receptor exposure to cyanide because the risk assessment was conducted using only the maximum cyanide detection from the 1998 sampling (which is likely anomalous).

6.7.2.2 Carcinogenic Risks

Subsurface soil RME cancer risks were within the USEPA target range ($1x10^{-6}$ to $1x10^{-4}$) for occupational workers, hypothetical future recreational users (adult, adolescent, and lifelong), and hypothetical future

adult residents. Subsurface soil RME cancer risks exceeded USEPA's target cancer risk range for hypothetical future child residents ($2x10^{-4}$) and lifelong residents ($2x10^{-4}$) primarily due to cPAHs and arsenic. Subsurface soil RME cancer risk estimates for occupational workers ($2x10^{-5}$), hypothetical future child recreational users ($4x10^{-5}$) and lifelong recreational users ($4x10^{-5}$), and hypothetical future child residents ($2x10^{-4}$), adult residents ($3x10^{-5}$), and lifelong residents ($2x10^{-4}$) exceeded the Maine risk guideline of $1x10^{-5}$. Subsurface soil cancer risks for hypothetical future child ($2x10^{-4}$), adult ($3x10^{-5}$) and lifetime ($2x10^{-4}$) residents exceeded Maine's cumulative risk guideline primarily due to cPAHs and arsenic in subsurface soil.

Under the CTE scenario, cancer risks did not exceed USEPA's target cancer risk range for any receptors. Only CTE risks for hypothetical future child residents ($2x10^{-5}$) and lifelong residents ($3x10^{-5}$) exceeded Maine's cumulative risk guideline. The cPAHs and arsenic were the primary contributors to the cancer risks for these receptors.

6.7.2.3 Exposure to Lead

Risks due to lead in subsurface soil exceeded USEPA target of no more than 5 percent of children having a blood-lead concentration greater than 10 µg/dL for occupational workers and hypothetical future child residents exposed to subsurface soil. Risks for hypothetical future adult recreational users exposed to subsurface soil did not exceed the USEPA target of no more than 5 percent of children having a blood-lead concentration greater than 10 µg/dL. Additionally, there were several elevated lead concentrations (e.g., greater than 10,000 mg/kg) detected, including the maximum detected lead concentration of 20, mg/kg; therefore, lead may present acute exposure concerns at some subsurface soil locations for all receptors evaluated.

6.7.3 <u>Human Health Risk Assessment Risk Drivers</u>

Risk Drivers – Risk Characterization

Based on the non-cancer and cancer evaluations, the following USEPA risk drivers (i.e., contaminants with noncancer HQs greater than 0.1 contributing to a target organ HI greater than 1 or with cancer risks greater than $1x10^{-6}$ in a medium with total cancer risks greater than $1x10^{-4}$) were identified in the risk characterization: cPAHs in surface soil based on hypothetical future residential exposures, and antimony and cyanide in subsurface soil based on construction worker exposures. Lead was retained as a primary risk driver for construction workers exposed to subsurface soil because of elevated lead concentrations in subsurface soil. If considering the State of Maine ILCR guideline (i.e., contaminants with cancer risks greater than $1x10^{-6}$ in a medium with total cancer risks greater than $1x10^{-5}$), additional receptors would be

identified as having risks exceeding the benchmark, but no additional risk drivers would be identified. The State of Maine risk guideline is not a regulatory requirement.

Risk Drivers – Uncertainty Analysis

Based on the noncancer and cancer evaluations, the following USEPA risk drivers (i.e., contaminants with non-cancer HQs greater than 0.1 contributing to a target organ HI greater than 1 or with cancer risks greater than $1x10^{-6}$ in a medium with total cancer risks greater than $1x10^{-4}$) were identified in the uncertainty analysis: cPAHs, arsenic, antimony, cobalt, copper, iron, manganese, mercury, cyanide, and lead in subsurface soil based on hypothetical future residential exposures, cyanide in subsurface soil based on future occupational worker exposures, and antimony in subsurface soil based on hypothetical future child recreational user exposures. Lead was retained as a primary risk driver for all receptors exposed to subsurface soil because of elevated lead concentrations in subsurface soil. If considering the State of Maine risk guideline, additional receptors would be identified as having risks exceeding this benchmark, but no additional risk drivers would be identified based on the MEDEP risk guideline.

6.7.4 Conclusions

COPCs for the site were identified based on a comparison of maximum concentrations to risk-based screening levels for direct contact. The only COPC for groundwater was manganese.

Quantitative estimates of non-carcinogenic and carcinogenic risks (HIs and ILCRs, respectively) for COPCs were developed for potential human receptors directly contacting site media. The risks are summarized in Table 6-3. The risks associated with groundwater exposures were acceptable; however, unacceptable risks were identified for several soil exposure scenarios. The following chemicals were identified as risk drivers (i.e., contaminants with non-cancer HQs greater than 0.1 contributing to a target organ HI greater than 1 or with cancer risks greater than $1x10^{-6}$ in a medium with total cancer risks greater than $1x10^{-4}$):

- Potentially Complete Exposures for Surface Soil – cPAHs for hypothetical future residential exposures.

- Potentially Complete Exposures for Subsurface Soil – Antimony, lead, and cyanide for current and future construction worker exposures.

- Incomplete Exposures for Subsurface Soil – Cyanide for future occupational exposures; lead and/or antimony for hypothetical future child and lifelong recreational exposures; cPAHs, arsenic, antimony, cobalt, copper, iron, lead, manganese, mercury, and cyanide for some hypothetical future residential exposures.

As stated in Section 6.6.1, there is a significant amount of uncertainty associated with the risks associated with cyanide in subsurface soil. Cyanide was detected in only 1 of 19 soil samples (34 mg/kg at location WTB-SB02 from 3 to 5 feet bgs) collected during the 1998 SSI. Although soil samples collected in 2015 were not analyzed for cyanide, this is not considered to be problematic because cyanide is not considered to be related to site operations. Cyanide-containing solutions can be used for metal washing activities; however, a thorough review of the historical documentation for the facility did not result in the identification of the use of cyanide-containing solutions. In addition, the use of the cyanide detection as the EPC and the use of toxicity criteria for hydrogen cyanide in the absence of speciation analyses results in an overestimation of the risks for exposures to cyanide in subsurface soils. Therefore, cyanide is not considered to be an actual risk driver at OU8, and will not be considered as a contributing factor to risks that must be addressed in the development of potential remedial alternatives.

The chemicals contributing to risk are cPAHs, antimony, arsenic, cobalt, copper, iron, lead, manganese, and mercury, which will be considered the chemicals of concern (COCs) for OU8, as shown on Table 6-3. Based on the risk evaluation, surface and subsurface soil are the media off concern for OU8. The COCs for each current and hypothetical future receptor are shown below by associated medium.

- Surface soil:
  - Current industrial workers: none.
  - Hypothetical future recreational users: none.
  - Hypothetical future residents: cPAHs.

- Subsurface soil:
  - Current industrial workers: antimony and lead.
  - Hypothetical future recreational users: antimony and lead.
  - Hypothetical future residents: cPAHs, antimony, arsenic, cobalt, copper, iron, lead, manganese, and mercury.

- Groundwater: There are no unacceptable risks to construction workers for groundwater exposure during construction activities.

TABLE 6-1

SUMMARY OF CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $> 10^{-4}$	Chemicals with Cancer Risks $> 10^{-5}$ and $\leq 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-5}$	Hazard Index (HI)	Chemicals Contributing to an Target Organ HI > 1
Current/Future Construction Workers	Surface Soil	Incidental Ingestion	2E-06	--	--	cPAHs	0.1	--
		Dermal Contact	1E-06	--	--	--	--	--
		Inhalation	5E-11	--	--	--	0.0009	--
		Total	3E-06	--	--	cPAHs	0.1	--
	Subsurface Soil	Incidental Ingestion	1E-06	--	--	--	4	Antimony
		Dermal Contact	3E-07	--	--	--	0.01	--
		Inhalation	6E-10	--	--	--	8	Cyanide
		Total	1E-06	--	--	--	12	Antimony, Cyanide
	Groundwater	Incidental Ingestion	--	--	--	--	0.001	--
		Dermal Contact	--	--	--	--	0.04	--
		Inhalation	--	--	--	--	--	--
		Total	--	--	--	--	0.04	--
Future Occupational Workers	Surface Soil	Incidental Ingestion	3E-05	--	cPAHs	--	0.06	--
		Dermal Contact	2E-05	--	cPAHs	--	--	--
		Inhalation	2E-09	--	--	--	0.002	--
		Total	4E-05	--	cPAHs	--	0.07	--
Hypothetical Future Child Recreational Users	Surface Soil	Incidental Ingestion	8E-05	--	cPAHs	--	0.1	--
		Dermal Contact	5E-05	--	cPAHs	--	--	--
		Inhalation	3E-10	--	--	--	0.0003	--
		Total	1E-04	--	cPAHs	--	0.1	--
Hypothetical Future Adult Recreational Users	Surface Soil	Incidental Ingestion	9E-06	--	--	cPAHs	0.01	--
		Dermal Contact	1E-05	--	--	cPAHs	--	--
		Inhalation	5E-10	--	--	--	0.0003	--
		Total	2E-05	--	cPAHs	--	0.01	--
Hypothetical Future Lifelong Recreational Users (Child and Adult)	Surface Soil	Incidental Ingestion	9E-05	--	cPAHs	--	NA	--
		Dermal Contact	6E-05	--	cPAHs	--	NA	--
		Inhalation	8E-10	--	--	--	NA	--
		Total	1E-04	--	cPAHs	--	NA	--
Hypothetical Future Child Residents	Surface Soil	Incidental Ingestion	6E-04	cPAHs	--	--	1	--
		Dermal Contact	2E-04	cPAHs	--	--	--	--
		Inhalation	6E-09	--	--	--	0.007	--
		Total	7E-04	cPAHs	--	--	1	--
Hypothetical Future Adult Residents	Surface Soil	Incidental Ingestion	7E-05	--	cPAHs	--	0.09	--
		Dermal Contact	4E-05	--	cPAHs	--	--	--
		Inhalation	1E-08	--	--	--	0.007	--
		Total	1E-04	--	cPAHs	--	0.1	--
Hypothetical Future Lifelong Residents (Child and Adult)	Surface Soil	Incidental Ingestion	6E-04	cPAHs	--	--	NA	--
		Dermal Contact	2E-04	cPAHs	--	--	NA	--
		Inhalation	2E-08	--	--	--	NA	--
		Total	8E-04	cPAHs	--	--	NA	--

Acronyms:
HI = Hazard Index
NA = Not Applicable

TABLE 6-2

SUMMARY OF CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $> 10^{-4}$	Chemicals with Cancer Risks $> 10^{-5}$ and $\leq 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-5}$	Hazard Index	Chemicals Contributing to an Target Organ HI > 1
Construction Workers	Surface Soil	Incidental Ingestion	6E-07	--	--	--	0.03	--
		Dermal Contact	2E-07	--	--	--	--	--
		Inhalation	3E-11	--	--	--	0.0005	--
		Total	7E-07	--	--	--	0.03	--
	Subsurface Soil	Incidental Ingestion	3E-07	--	--	--	0.9	--
		Dermal Contact	5E-08	--	--	--	0.002	--
		Inhalation	3E-10	--	--	--	4	Cyanide
		Total	3E-07	--	--	--	5	Cyanide
	Groundwater	Incidental Ingestion	--	--	--	--	0.001	--
		Dermal Contact	--	--	--	--	0.02	--
		Inhalation	--	--	--	--	--	--
		Total	--	--	--	--	0.02	--
Occupational Workers	Surface Soil	Incidental Ingestion	5E-06	--	--	cPAHs	0.03	--
		Dermal Contact	8E-07	--	--	--	--	--
		Inhalation	7E-10	--	--	--	0.001	--
		Total	5E-06	--	--	cPAHs	0.03	--
Child Recreational Users	Surface Soil	Incidental Ingestion	8E-06	--	--	cPAHs	0.03	--
		Dermal Contact	2E-06	--	--	cPAHs	--	--
		Inhalation	3E-11	--	--	--	0.00008	--
		Total	1E-05	--	--	cPAHs	0.03	--
Adult Recreational Users	Surface Soil	Incidental Ingestion	6E-07	--	--	--	0.003	--
		Dermal Contact	2E-07	--	--	--	--	--
		Inhalation	4E-11	--	--	--	0.00008	--
		Total	8E-07	--	--	--	0.003	--
Lifelong Recreational Users (Child and Adult)	Surface Soil	Incidental Ingestion	9E-06	--	--	cPAHs	NA	--
		Dermal Contact	2E-06	--	--	cPAHs	NA	--
		Inhalation	6E-11	--	--	--	NA	--
		Total	1E-05	--	--	cPAHs	NA	--
Child Residents	Surface Soil	Incidental Ingestion	8E-05	--	cPAHs	--	0.3	--
		Dermal Contact	9E-06	--	--	cPAHs	--	--
		Inhalation	2E-09	--	--	--	0.005	--
		Total	8E-05	--	cPAHs	--	0.3	--
Adult Residents	Surface Soil	Incidental Ingestion	6E-06	--	--	cPAHs	0.03	--
		Dermal Contact	9E-07	--	--	--	--	--
		Inhalation	2E-09	--	--	--	0.005	--
		Total	7E-06	--	--	cPAHs	0.03	--
Lifelong Residents (Child and Adult)	Surface Soil	Incidental Ingestion	8E-05	--	cPAHs	--	NA	--
		Dermal Contact	1E-05	--	--	cPAHs	NA	--
		Inhalation	4E-09	--	--	--	NA	--
		Total	9E-05	--	cPAHs	--	NA	--

Acronyms:
HI = Hazard Index
NA = Not Applicable

TABLE 6-3

RISK SUMMARY TABLE
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Receptor	Matrix	ILCR	Chemical of Concern[1]	EPC (mg/kg or ug/L)	HI	Chemical of Concern[1]	Target System	EPC (mg/kg or ug/L)	Is Lead a Risk Driver[2]	Lead Mean Concentration (mg/kg or ug/L)
Current/Future Construction Worker	SS	3.E-06	- -	- -	0	- -	- -	- -	No	NA[3]
	SB	1.E-06	- -	- -	11	Antimony (HQ = 3)	Blood	610	Yes (6.7% > 10 µg/dL)	2,210
						Cyanide (HQ = 7)[9]	Thyroid	34		
	GW	- -	- -	- -	0.04	- -	- -	- -	No	NA[4]
Future Occupational Worker	SS	4.E-05	- -	- -	0.07	- -	- -	- -	No	NA[3]
	SB[5]	2.E-05	- -	- -	4	Cyanide (HQ = 2)[9]	Thyroid	34	Yes (Although 4.8% > 10 µg/dL based on lead model, acute risks may be possible)*	2,210
Hypothetical Future Child Recreational User	SS	1.E-04	- -	- -	0.1	- -	- -	- -	No[6]	NA[3]
	SB[5]	4.E-05	- -	- -	4	Antimony (HQ = 3)	Blood	610	Yes[6]*	2,210
Hypothetical Future Adult Recreational User	SS	2.E-05	- -	- -	0.01	- -	- -	- -	No	NA[3]
	SB[5]	6.E-06	- -	- -	0.8	- -	- -	- -	Yes (Although 0.53% > 10 µg/dL based on lead model, acute risks may be possible)*	2,210
Hypothetical Future Lifelong Recreational User	SS	1.E-04	- -	- -	NA[8]	- -	- -	- -	No[6]	NA[3]
	SB[5]	4.E-05	- -	- -	NA[8]	- -	- -	- -	Yes[6]*	2,210
Hypothetical Future Child Resident	SS	7.E-04	cPAHs (7E-04)	13	1	- -	- -	- -	No	NA[3]
	SB[5]	2.E-04	cPAHs (2E-04)	3.4	37	Antimony (HQ = 19)	Blood	610	Yes (84% > 10 µg/dL)	2,210
						Cobalt (HQ = 0.6)	Thyroid	13		
						Copper (HQ = 4)	GS	11,700		
			Arsenic (2E-05)	20.9		Iron (HQ = 2)	GS	102,000		
						Manganese (HQ = 1)	CNS	1900		
						Mercury (HQ = 0.2)	CNS	3.66		
						Cyanide (HQ = 9)[9]	Thyroid	34		
Hypothetical Future Adult Resident	SS	1.E-04	- -	- -	0.1	- -	- -	- -	No	NA[3]
	SB[5]	3.E-05	cPAHs (3E-05)	3.4	11	Antimony (HQ = 2)	Blood	610	Yes (84% > 10 µg/dL)[7]	2,210
			Arsenic (8E-06)	20.9		Cyanide (HQ = 9)[9]	Thyroid	34		
Hypothetical Future Lifelong Resident	SS	8.E-04	cPAHs (8E-04)	13	NA[8]	- -	- -	- -	No	NA[3]
	SB[5]	2.E-04	cPAHs (2E-04)	3.4	NA[8]	- -	- -	- -	Yes (84% > 10 µg/dL)[7]	2,210
			Arsenic (3E-05)	20.9						

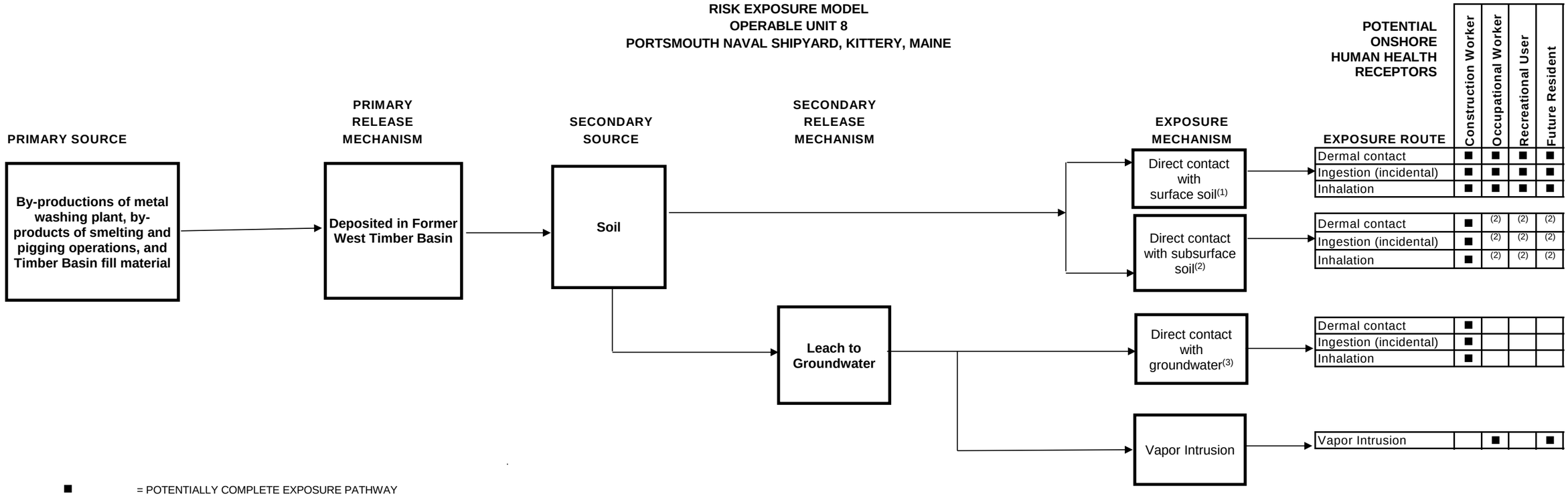
* Lead is retained as a primary risk driver for subsurface soil due to elevated concentrations detected that may pose acute exposure risks.
All ILCRs and HIs are for the site-specific RME scenario.

Acryomns
CNS = Central Nervous System
EPC = Exposure Point Concentration
GS = Gastrointestinal
GW = Groundwater
HHRA = Human Health Risk Assessment
HI = Hazard Index
HQ = Hazard Quotient
ILCR = Incremental Lifetime Cancer Risk
NA = Not Applicable
RME = Reasonable Maximum Exposure
SB = Subsurface Soil
SS = Surface Soil
TS = Target System

Footnotes
1 - For receptors with a total RME ILCR greater than 1E-04, any carcinogenic chemical with an ILCR greater than 1E-06; for receptors with a RME target organ HI greater than 1, any non-carcinogenic chemical contributing greater than an HQ of 0.1 to target organ HI greater than 1.
2 - Blood concentration modeling results are presented when applicable and were considered as a factor in determining if lead was a risk driver.
3 - Lead was not selected as a COPC in surface soil due to the background screen.
4 - Lead was not selected as a COPC in groundwater.
5 - Evaluated as part of the uncertainty analysis only.
6 - Determined qualitatively.
7 - Values presented are for the child resident.
8 - Lifelong risks are not calculated for noncancer risks because those risks are not additive.
9 - Cyanide is not a COC for OU8 because it is not a site-related contaminant and the risks were overestimated during the HHRA.

FIGURE 6-1

RISK EXPOSURE MODEL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE



■ = POTENTIALLY COMPLETE EXPOSURE PATHWAY

Footnotes:

1 - Surface soil at OU8 is currently covered with pavement. Any surface soil exposures assume uncovered soil during a theoretical future exposure event.
2 - Direct contact with subsurface soil is considered to be an incomplete pathway for occupational workers, recreational users, and residents because site conditions make it unlikely that subsurface soil will be brought to the surface. However, exposure to subsurface soil for these receptors is considered as part of the uncertainty analysis, because if site conditions changed in the future, this could become a complete pathway for future users.
3 - Exposure to groundwater is considered to be a potentially complete pathway only for the construction worker because the groundwater at OU8 is saline/brackish and is not suitable as a drinking water supply. Direct contact for construction workers is considered to be a potentially complete pathway because contact could occur during excavation activities.

7.0 REMEDIAL ACTION OBJECTIVES

This section identifies the ARARs, discusses the media of concern, and develops the RAOs for remedial activities at OU8. ARARs are regulatory requirements and guidance that govern remedial activities. The media of concern at OU8 are defined along with the volume of the contaminated media. RAOs are medium-specific goals that define the objectives of conducting remedial actions and are developed to allow consideration of a range of remedial alternatives developed in subsequent sections.

7.1 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED CRITERIA

This subsection discusses the federal and state of Maine ARARs and "to be considered" (TBC) criteria for OU8. The two threshold criteria that remedial alternatives must meet are: (1) protection of human health and the environment and (2) compliance with ARARs. Remedial alternatives must attain or exceed conformance with all ARARs unless a waiver of an ARAR is justified, as described further in this section.

ARARs address a chemical, location, or action at a site and are defined as any standard, requirement, criterion, or limitation under federal environmental law, or any promulgated standard, requirement, criterion, or limitation under a state environmental or facility-siting law that is more stringent than the associated federal standard, requirement, criterion, or limitation, and is either legally applicable to the CERCLA hazardous substance(s) at the site, or is relevant and appropriate under the circumstances of the hazardous substance release.

One of the primary concerns during the development of remedial action alternatives for hazardous waste sites under CERCLA is the degree of human health and environmental protection afforded by a given remedy. Section 121 of CERCLA requires that primary consideration be given to remedial alternatives that attain or exceed ARARs. The purpose of this requirement is to make CERCLA response actions consistent with other pertinent federal and state environmental requirements.

Definitions of ARARs, as well as TBC criteria, are as follows:

- Applicable Requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site [40 Code of Federal Regulations (CFR) §300.5].

- Relevant and Appropriate Requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, although not "applicable," address problems or situations sufficiently similar (relevant) to those encountered at the CERCLA site that their use is well suited (appropriate) to the particular site (40 CFR §300.5).

- TBC Criteria are non-promulgated non-enforceable guidelines or criteria that may be useful for developing remedial action alternatives and for determining action levels that are protective of human health and/or the environment. Examples of TBC criteria include CSFs and RfDs (40 CFR §300.5).

Section 121(d)(4) of CERCLA allows the selection of a remedial alternative that will not attain all ARARs if any of the following six conditions for a waiver of ARARs exists: (1) the remedial action is an interim measure, whereby the final remedy will attain the ARAR upon completion; (2) compliance will result in greater risk to human health and the environment than other options; (3) compliance is technically impracticable; (4) an alternative remedial action will attain the equivalent of the ARAR; (5) for state requirements, the state has not consistently applied the requirement in similar circumstances; (6) compliance with the ARAR will not provide a balance between protecting public health, welfare, and the environment at the facility with the availability of fund money for response at other facilities (fund-balancing). The last condition only applies to Superfund-financed actions.

ARARs and TBCs fall into three categories. The characterization of these categories is not conclusive because many requirements could fall into more than one of the categories. These categories are as follows:

- Chemical-Specific: Health- or risk-based numerical values or methodologies that establish concentration or discharge limits for particular contaminants within the media of concern.

- Location-Specific: Restrictions based on the concentrations of hazardous substances or the conduct of activities in specific locations. These may restrict or preclude certain remedial actions or may apply only to certain portions of a site. Location-specific ARARs and TBCs pertain to special site features, and examples include floodplain and coastal zone requirements.

- Action-Specific: Technology- or activity-based controls or restrictions on activities related to management of hazardous substances. Action-specific ARARs and TBCs pertain to implementing a given remedy. Examples are RCRA requirements for management of hazardous waste that may be generated as part of remedial actions.

Potential chemical-specific, location-specific, and action-specific ARARs and TBCs for OU8 are listed in Tables 7-1, 7-2, and 7-3, respectively.

7.2 MEDIA OF CONCERN

The media of concern that pose potential unacceptable risk addressed in this RI/FS are surface and subsurface soils because COCs are present at concentrations that could result in potentially unacceptable risk levels for current and/or hypothetical future receptors through exposure. Consistent with the HHRA results presented in Section 6.0, there are potentially unacceptable risks for hypothetical future residential receptors exposed to surface soil (0 to 2 feet bgs) and to subsurface soil (2 to 10 feet bgs) and for industrial receptors (construction and occupational workers) and hypothetical future recreational receptors exposed to subsurface soil (2 to 10 feet bgs). Based on the risk conclusions, groundwater is not a medium of concern for OU8. COCs for surface soil are cPAHs, and subsurface soil COCs include antimony, arsenic, cobalt, copper, iron, lead, manganese, mercury, and cPAHs.

7.3 REMEDIAL ACTION OBJECTIVES

RAOs are medium-specific goals for protecting human health and the environment. RAOs are required to specify the COCs, exposure routes and receptors of concern, and an acceptable contaminant level or range of levels for each exposure route. Acceptable contaminant levels are based on site-specific PRGs as a starting point, after which a final remediation goal is determined when a remedy is selected.

As discussed in Section 6.7.4, potentially unacceptable human health risks have been identified for certain receptors that may be exposed to soil contaminants at OU8. Based on an understanding of these potential human health risks, the following RAOs have been developed for OU8:

- Prevent residential exposure through ingestion of, inhalation of dust from, and dermal contact with surface soil containing cPAHs concentrations exceeding residential PRGs, and with subsurface soil containing antimony, arsenic, cobalt, copper, iron, lead, manganese, mercury, and cPAHs concentrations exceeding residential PRGs.

- Prevent recreational exposure through ingestion of, inhalation of dust from, and dermal contact with subsurface soil containing antimony and lead concentrations exceeding recreational PRGs.

- Prevent industrial worker (construction and occupational) exposure through ingestion of, inhalation of dust from, and dermal contact with subsurface soil with antimony and lead concentrations exceeding industrial PRGs.

PRGs are chemical-specific goals for representative site concentrations (based on a representative EPC for an EU, not individual sample result concentrations) that, when achieved, is associated with an acceptable level of risk for receptors. PRGs have been developed on a receptor-specific basis for protection of human health from exposure to soil contaminants and were used to determine the remediation areas and volumes to be addressed in this FS. The PRGs and associated remediation areas and volumes are discussed in subsequent sections. A discussion of the development of PRGs can be found in Appendix D.

7.4 PRGs FOR OU8

Current, likely future, and hypothetical future site uses and associated receptors that may be exposed to contaminated soil at OU8 were considered in the development of PRGs. Exposures for receptors with potentially unacceptable risks as determined by the HHRA are summarized below. For existing site conditions, little or no exposure to surface soil would occur for occupational workers because the majority of OU8 surface soil is covered by parking lots or buildings. Although residents at PNS are on short-term military assignments (3- to 4-year tours of duty) and it is unlikely that an area as industrial as OU8 would be used for residents, residential PRGs for OU8 were developed for hypothetical future residential exposure based on the standard risk assessment residential exposure duration of 30 years for exposure to surface soil and subsurface soil if brought to the surface in the future. Current and future construction worker exposure to soil would only occur if construction activities took place. Occupational worker exposure to subsurface soil is not a current exposure concern and would only occur in the future if subsurface soil were brought to the surface. There are no current plans to change the land use at OU8.

Site-specific risk-based PRGs were developed for all of the OU8 COCs except lead for hypothetical residential users. An ARAR-based PRG was used for lead for hypothetical residential users. Table 7-4 lists OU8 PRGs for COCs and targeted receptors.

TABLE 7-4: PRG SUMMARY

Receptor	Medium	COC	PRG[(1)] (mg/kg)	Basis
Industrial Worker[(2)]	Subsurface Soil	Antimony	240	Site-specific risk-based; based on HI = 1 for all receptors (Target organ/system = blood)
		Lead	2,000	Based on blood concentration modeling results
Recreational User	Subsurface Soil	Antimony	220	Site-specific risk-based; based on HI = 1 for all receptors (Target organ/system = blood)
		Lead	4,600	Based on blood concentration modeling results

TABLE 7-4: PRG SUMMARY

Receptor	Medium	COC	PRG[1] (mg/kg)	Basis
Resident	Surface Soil	cPAHs[3]	1.6	Site-specific risked-based; based on ILCR of 1.0×10^{-4}
Resident	Subsurface Soil	Lead	400	OSWER Directive 9355.4-12
		cPAHs[3]	0.79	Site-specific risked-based; based on ILCR of 5.0×10^{-5}
		Arsenic	34	Site-specific risked-based; based on ILCR of 5.0×10^{-5}
		Antimony	31	Site-specific risk-based; based on HI = 1 for all receptors (Target organ/system = blood)
		Cobalt	23	Site-specific risk-based; based on HI = 1 (Target organ/system = thyroid)
		Copper	1,600	Site-specific risk-based; based on HI = 0.5 (Target organ/system = gastrointestinal system [GS])
		Iron	27,000	Site-specific risk-based; based on HI = 0.5 (Target organ/system = GS)
		Manganese	900	Site-specific risk-based; based on HI = 0.5 (Target organ/system = CNS)
		Mercury	12	Site-specific risk-based; based on HI = 0.5 (Target organ/system = CNS)

1 PRGs are goals for representative exposure concentrations for an EU and are not intended as pick-up levels. It is possible for a COC to remain on site at concentrations greater than the corresponding EPC while still being protective of human health and the environment, provided the EPC for that COC is less than the listed PRG.
2 Industrial workers include construction and occupational workers.
3 cPAHs are evaluated collectively as BAP TEQs.

7.5 REMEDIATION AREAS AND VOLUMES

Remediation areas and volumes were estimated by evaluating areas and volumes of that would need to be remediated for the EPCs for COCs to be less than PRGs. Initially, the remediation areas and volumes were estimated by evaluating each area and volume of contaminated soil that would need to be remediated for unlimited use and unrestricted exposure (i.e., for residential PRGs to be met). For the EPCs to be less than the PRGs for hypothetical future residential or recreational exposure to surface and subsurface soil, the entire site was identified as the remediation area (i.e., limit of potentially unacceptable risk as shown on

Figure 7-1). Because the area required to address the risk to hypothetical future residents and recreational users is the same, these receptors were considered together in developing alternatives. Based on contaminant distribution, to meet the most conservative residential PRGs and allow for unlimited use and unrestricted exposure for all hypothetical future receptors, OU8 would require remediation to 10 feet bgs across the entire 181,800-square-foot remediation area for an estimated 67,400 cubic yards, as shown on Figure 7-1. This area includes the areas under Buildings 92 and 178 because no samples were collected from soil beneath the buildings and therefore it was conservatively assumed that contamination also exists in these sections of the site.

The greatest concentrations of lead and antimony in subsurface soil are isolated within a portion of the former timber basin, and are the major contributors to potential unacceptable risk for industrial worker exposure. Based on the samples with the most elevated concentrations of lead and antimony, two areas within the former timber basin area were identified for subsurface soil remediation to address unacceptable industrial risk. The two areas with elevated COC concentrations are within the limits of potentially unacceptable industrial risk shown on Figure 7-2. Because antimony and lead exceeded screening levels at the same locations, only the lead results were used to define the two areas were subsurface soil presented an unacceptable risk to industrial receptors. The first remediation area is an approximately 63-foot-square area around WTB-MW02 with an elevated lead concentration (9,080 mg/kg) that drives potential unacceptable residential risks in subsurface soil (2 to 10 feet bgs), as shown on Figures 7-1 and 7-2. The estimated volume of soil in this area with COC concentrations greater than risk-based PRGs is 1,350 cubic yards. The second area around WTB-SB08, WWTB-SB-09, and WTB-SB11 encompasses approximately 32,100 square feet, and the depth of contamination extends to 10 feet bgs. The greatest OU8 soil concentrations of lead were detected at WTB-SB11 and WTB-SB09 (18,700 and 20,100 mg/kg, respectively) in subsurface soil (6 to 10 feet bgs). Therefore, the estimated volume of soil with lead concentrations greater than the risk-based PRG for lead in the area around WTB-SB08, WTB-SB09, and WTB-SB11 is approximately 11,900 cubic yards.

Remediation of subsurface soil in these areas would reduce subsurface soil risks to acceptable levels for industrial exposure in the area of the site not covered by buildings based on the EPC, even though subsurface soil with concentrations of lead and antimony may still be present on site at levels greater than the PRGs. This determination was made by calculating estimated post-remedial risks based on the assumption that the two areas with the greatest lead concentrations areas were excavated and backfilled with uncontaminated soil.

Calculations supporting post-remedial risk estimates and estimated areas are included in Appendix F.

TABLE 7-1: POTENTIAL CHEMICAL-SPECIFIC ARARS AND TBCS				
MEDIUM/ACTIVITY	**REQUIREMENT/CITATION**	**STATUS**	**SYNOPSIS**	**EVALUATION/ACTION TO BE TAKEN**
FEDERAL				
Soil/Risk Assessment	Office of Solid Waste and Emergency Response (OSWER) Directive 9355.4-12	TBC	USEPA has provided recommended methodology for assessing risk caused by exposure to lead in surface soil under residential scenarios.	Guidelines were used to develop risk-based cleanup goals for lead in soil.
	USEPA RfDs from Integrated Risk Information System (IRIS)	TBC	RfDs are estimates of daily exposure for human populations (including sensitive subpopulations) considered unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure over a lifetime.	RfDs were used to develop risk-based soil cleanup goals for non-carcinogenic COCs, including antimony, copper, cobalt, iron, manganese, and mercury.
	USEPA Human Health Assessment Group CSFs from IRIS	TBC	CSFs present the most up-to-date information on cancer risk potency for known and suspected carcinogens.	CSFs were used to develop risk-based soil cleanup goals for carcinogenic COCs, including PAHs and arsenic.
Soil/Risk Assessment	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (2005a)	TBC	These guidelines are used to perform HHRA. They provide a framework for assessing possible cancer risks from exposures to pollutants or other agents in the environment.	These guidelines were used to develop risk-based soil cleanup goals for carcinogenic COCs, including PAHs and arsenic.
	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (2005b)	TBC	These guidelines are used to perform HHRA and address a number of issues pertaining to cancer risks associated with early-life exposures in general and provide specific guidance on potency adjustment for carcinogens acting through a mutagenic mode of action.	This guidance was used to develop risk-based soil cleanup goals for carcinogenic COCs, including PAHs and arsenic.
STATE				
Soil/Risk Assessment	Maine Remedial Action Guidelines (RAGs) for Soil Contaminated with Hazardous Substances (Section V.H) (MEDEP, 2013)	TBC	Maine RAGs provide procedures to determine soil cleanup levels unless site-specific risk-based cleanup levels are calculated. Chemical-specific guidelines that may assist in making remedial decisions are also provided. Guidelines are presented for four exposure scenarios.	These guidelines can be used to develop soil cleanup levels. However, per Section V.H, site-specific risk-based cleanup levels were used for OU8 instead of RAGs table values.

TABLE 7-2: POTENTIAL LOCATION-SPECIFIC ARARS AND TBCS				
REQUIREMENT	**CITATION**	**STATUS**	**SYNOPSIS**	**EVALUATION / ACTION TO BE TAKEN**
FEDERAL				
Coastal Zone Management	Coastal Zone Management Act [16 United States Code (USC) 1451 *et seq*].	Applicable	This act provides for the preservation and protection of coastal zone areas. Federal activities that are in or directly affecting the coastal zone must be consistent, to the maximum extent practicable, with a federally approved state management program.	Remedial activities, such as excavation near the shoreline, that take place in the coastal zone would be controlled according to the requirements of the MEDEP program. MEDEP would review remedial action documents and work plans to ensure that they meet the substantive requirements of this act.
Wetlands and United States Waters	Clean Water Act (CWA) Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR 230; 33 CFR 320, 322, and 323).	Applicable	These regulations outline the requirements for the discharge of dredged or fill material into US waters, including wetlands. No activity that adversely affects a US waters is permitted if a practicable alternative that has less effect is available. If there is no other practicable alternative, impacts must be mitigated.	Remedial activities, such as excavation near the shoreline, would be performed so as to not impact the offshore area.
Other Natural Resources	The Endangered Species Act of 1973 (16 USC 1531 *et seq*.; 50 CFR Parts 17 and 402).	Applicable	Provides for consideration of impacts to endangered and threatened species and their critical habitats. Requires federal agencies to ensure that any action carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or adversely affect its critical habitat. The entire state of Maine is considered a habitat of the federally-listed endangered short-nosed sturgeon. The Gulf of Maine population of Atlantic sturgeon is listed as a threatened species	There are no known endangered, threatened, or protected species or critical habitats within the boundaries of PNS. However, short-nosed and Atlantic sturgeon are present in the Piscataqua River. Remedial activities would be conducted so as to avoid any adverse effect under the act to these sturgeon.
Other Natural Resources	Fish and Wildlife Coordination Act (16 USC 661 *et seq*.)	Applicable	This act requires any federal agency proposing to modify a body of water to coordinate with the United States Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS) and appropriate state agencies if alteration of a body of water, including discharge of pollutants into a wetland or construction in a wetland, will occur as a result of offsite remedial activities.	For activities such as excavation near the shoreline that may impact the coastal floodplain and river, the Navy would coordinate with USFWS in the event that the remedy disturbs these areas.

TABLE 7-2: POTENTIAL LOCATION-SPECIFIC ARARS AND TBCS				
REQUIREMENT	**CITATION**	**STATUS**	**SYNOPSIS**	**EVALUATION / ACTION TO BE TAKEN**
National Historic Preservation Act (NHPA, 1966)	Public Law 89-665; 16 USC § 470 *et. seq.;* 36 CFR Part 800	Applicable	Provides requirements relating to potential loss or destruction of significant scientific, historical, or archaeological data due to remedial actions at a site.	Prehistoric and historical archeological resource sensitivity for OU8 is low; however, the boundary of the PNS Historic District includes the majority of the Controlled Industrial Area (CIA), and the quay walls forming the boundary of the site are historic elements. Remedial design and work plans would address measures to preserve the integrity of these structures during remedial actions.
Floodplain Management and Protection of Wetlands	44 CFR 9	Relevant and Appropriate	Federal Emergency Management Agency (FEMA) regulations that set forth the policy, procedure, and responsibilities to implement and enforce Executive Order 11988, Floodplain Management, and Executive Order 11990, Protection of Wetlands.	Remedial activities conducted within the 100-year floodplain of the Piscataqua River or federal jurisdictional wetlands would be implemented in compliance with these standards.
STATE				
Other Natural Resources	Maine Natural Resources Protection Act Permit by Rule Standards [38 Maine Revised Statutes Annotated (MRSA) 480 et seq.; 06-096 Code of Maine Rules (CMR) Part 305, 1, 2, and 8]	Applicable	This act regulates activity conducted in, on, or over any protected natural resource or any activity conducted adjacent to and operated in such a way that material or soil may be washed into any freshwater or coastal wetland, great pond, river, stream, or brook.	Remedial activities such as excavation near the shoreline would be conducted so as to avoid washing any soil into the nearby Piscataqua River or adjacent wetlands. Stormwater management and erosion control practices would be used to prevent sediment from entering the river or adjacent wetlands during remedial activities.
Wetlands	Maine Wetland Protection Rules (06-096 CMR Part 310)	Applicable	Standards are provided for protection of wetlands, as defined in MEDEP Ch. 1000 Guidelines for Municipal Shoreline Zoning Ordinances. Jurisdiction under the Rules includes the area adjacent to the wetlands, which is the area within 75 feet of the normal high water line. Activities that have an unreasonable impact on wetlands are prohibited.	Remedial activities such as excavation near the shoreline would be conducted to avoid impacts to wetlands and coastal wetlands, which include tidal and subtidal lands.

TABLE 7-2: POTENTIAL LOCATION-SPECIFIC ARARS AND TBCS				
REQUIREMENT	**CITATION**	**STATUS**	**SYNOPSIS**	**EVALUATION / ACTION TO BE TAKEN**
Coastal Zone	Maine Coastal Management Policies (38 MRSA 1801 *et seq*.) (06-096 CMR Chapter 1000)	Applicable	Regulates activities near great ponds, rivers and larger streams, coastal areas, and wetlands. Regulates shoreland activities and development, including (but not limited to) water pollution prevention and control, wildlife habitat protection, and freshwater and coastal wetlands protection. The law is administered at the local government level. Shoreland areas include areas within 250 feet of the normal high-water line of any river or saltwater body and areas within 75 feet of the highwater line of a stream.	Remedial activities such as excavation near the shoreline that may affect storm water runoff, erosion and sedimentation, and surface water quality would be controlled according to these regulations.

TABLE 7-3: POTENTIAL ACTION-SPECIFIC ARARS AND TBCS				
REQUIREMENT	**CITATION**	**STATUS**	**SYNOPSIS**	**EVALUATION/ACTION TO BE TAKEN**
FEDERAL				
Surface Water	CWA (33 USC §1251 *et seq*.); National Recommended Water Quality Criteria (NRWQC) (40 CFR Part 122.44)	Relevant and Appropriate	These criteria are used to establish water quality standards for the protection of aquatic life.	Remedial activities would be conducted to reduce adverse impacts to the Piscataqua River. Stormwater management and erosion control practices would be used to prevent soil and contamination from entering the river during remedial activities.
Water Management	CWA Section 402 National Pollutant Discharge Elimination System (NPDES) (40 CFR 122.26)	Applicable	CWA Section 402 requires NPDES permits for stormwater discharges to navigable waters.	Stormwater management would be implemented to minimize discharges of contaminants to the Piscataqua River and meet the substantive requirements of this act.
STATE				
Hazardous Waste	Identification of Hazardous Wastes 06-096 CMR Part 850	Applicable	These standards establish requirements for determining whether wastes are hazardous based on either characteristic or listing.	Wastes generated during remedial activities would be analyzed to determine whether they are RCRA characteristic hazardous wastes. If determined to be hazardous, then the waste would be managed in accordance with regulatory requirements.
	Standards for Generators of Hazardous Waste, (38 MRSA 1301 *et seq*., 06-096 CMR Part 851 (5) and (8))	Applicable	These regulations contain requirements for the generators of hazardous waste.	Waste generated during remedial activities that are determined to be hazardous would be managed on site according to the regulation until disposal off site.
Water Management	Maine Discharge Licenses (38 MRSA 413 *et seq*.) and Waste Discharge Permitting Program (06-096 CMR 520-629)	Applicable	These standards regulate the discharge of pollutants from point sources.	These regulations would be applicable to water management during soil excavation and discharges of treat water to a surface water body, if required. The substantive requirements would be met if any discharges of treated water to surface water bodies are required during the remedial action.

TABLE 7-3: POTENTIAL ACTION-SPECIFIC ARARS AND TBCS				
REQUIREMENT	**CITATION**	**STATUS**	**SYNOPSIS**	**EVALUATION/ACTION TO BE TAKEN**
Erosion and Sedimentation Control	Erosion and Sedimentation Control (38 MRSA Part 420-C)	Applicable	Erosion control measures must be in place before activities such as filling, displacing, or exposing soil or other earthen materials occur. Prior MEDEP approval is required if the disturbed area is in the direct watershed of a body of water most at risk for erosion or sedimentation.	These controls would be applicable to remedial activities that need to address erosion and sedimentation. Applicable plans would be coordinated with MEDEP before implementation.
Storm Water Management	Storm Water Management (38 MRSA Part 420-D; 06-096 CMR Part 500)	Applicable	Storm water management measures must be in place before activities such as filling, displacing, or exposing soil or other earthen material occur on land greater than or equal to 1 acre.	These regulations apply to earth disturbance activities equal to or greater than 1 acre and would be applicable to runoff resulting from earth disturbance activities. Applicable plans would be coordinated with MEDEP before implementation.
Waste Management	Additional Standards Applicable to Waste Facilities Located in a Flood Plain (06-096 CMR 854.16)	Relevant and Appropriate	Any facility located or to be located within 300 feet of a 100-year flood zone must be constructed, operated, and maintained to prevent wash-out of any hazardous waste by a 100-year flood or have procedures in place that which will cause the waste to be removed to a location where the waste will not be vulnerable to flood waters and to a location which is authorized to manage hazardous waste safely before flood water can reach the facility.	Any remedial activities conducted within 300 feet of the 100-year flood zone would be conducted in compliance with these standards.
Air Emissions	Visible Emissions Regulation (38 MRSA Part 584; 06-096 CMR Part 101).	Applicable	These regulations establish opacity limits for emissions from several categories of air contaminant sources, including general construction activities.	These regulations would be considered for remedial activities that have the potential to impact air quality, such as excavation and backfilling. These standards would be met if any of the activities result in emission of particulate matter and fugitive matter to the atmosphere (e.g., dust generation).

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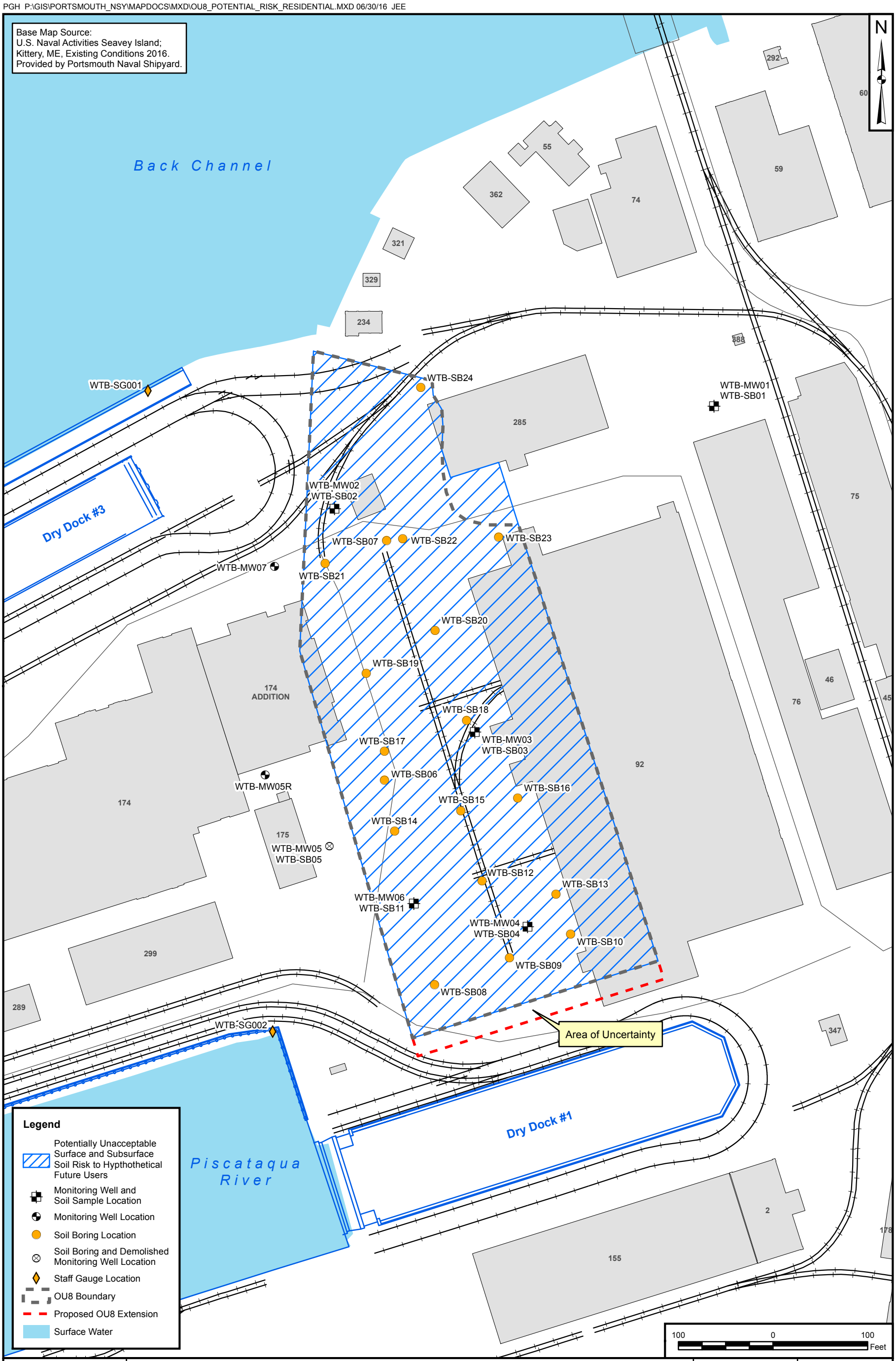

DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	12/17/15		3270	WE32
CHECKED BY	DATE	LIMITS OF POTENTIALLY UNACCEPTABLE RISK FOR HYPOTHETICAL FUTURE USERS	APPROVED BY	DATE
M. VED	06/30/16	OPERABLE UNIT 8	—	—
REVISED BY	DATE	PORTSMOUTH NAVAL SHIPYARD	APPROVED BY	DATE
—	—	KITTERY, MAINE	—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 7-1	0

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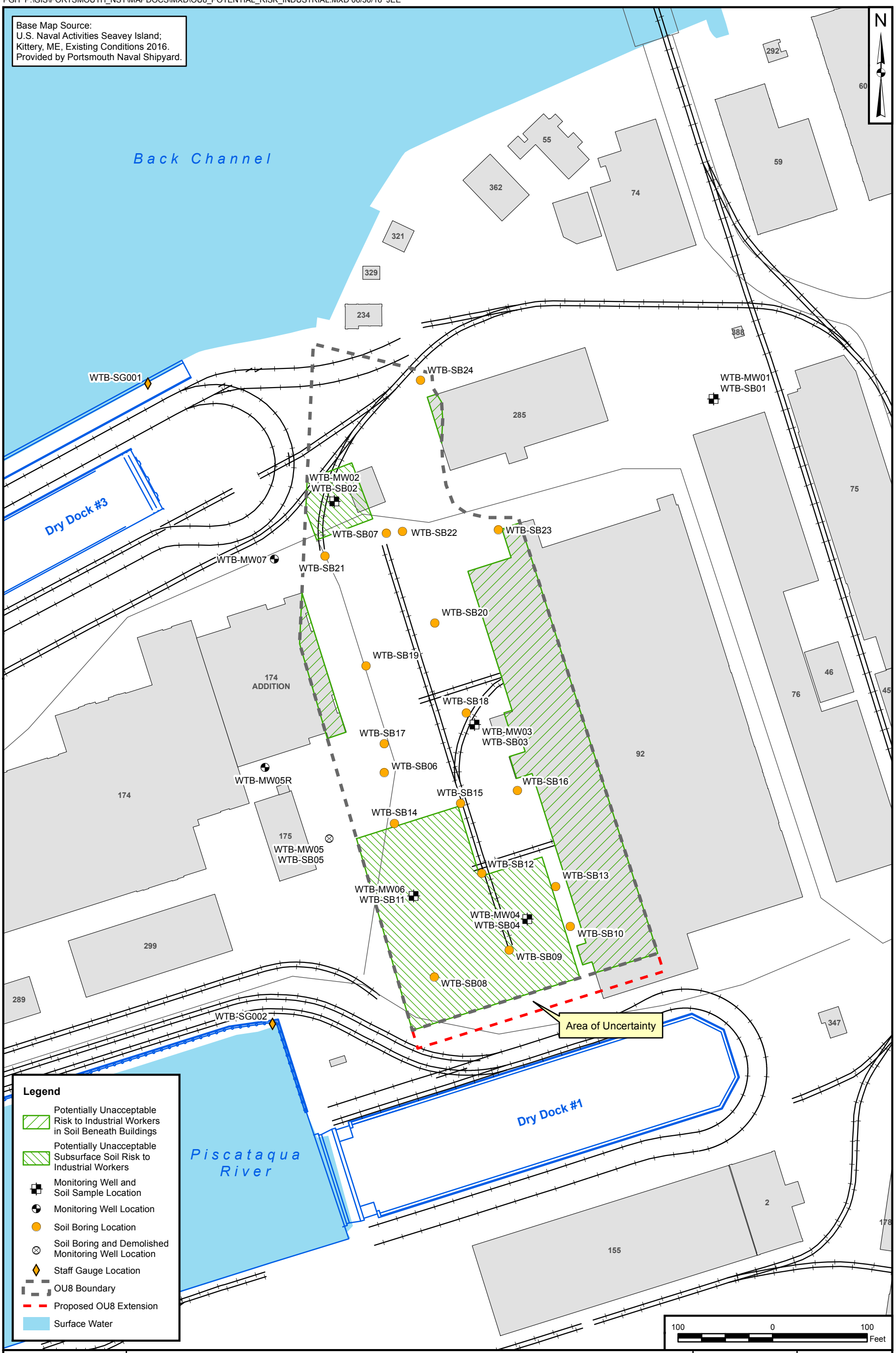

DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	12/17/15		3270	WE32
CHECKED BY	DATE	LIMITS OF POTENTIALLY UNACCEPTABLE INDUSTRIAL RISK	APPROVED BY	DATE
M. VED	06/30/16	OPERABLE UNIT 8	—	—
REVISED BY	DATE	PORTSMOUTH NAVAL SHIPYARD	APPROVED BY	DATE
—	—	KITTERY, MAINE	—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 7-2	0

8.0 IDENTIFICATION AND SCREENING OF TECHNOLOGIES AND DEVELOPMENT OF ALTERNATIVES

This section identifies and screens potential technologies and process options for the assembly of remedial alternatives for OU8. The primary objective of this phase of the RI/FS is to develop an appropriate range of remedial technologies and process options to be used for developing remedial alternatives. Technologies for soil remediation are discussed, and remedial alternatives are assembled in this section. The descriptions of the developed soil remedial alternatives and a detailed analysis of these alternatives are provided in Section 9.0.

Soil remediation technology identification and screening considers the ARARs, COCs, RAOs, PRGs, and areas and volumes of contaminated soil discussed in Section 7.0. This section includes identification of GRAs (Section 8.1), preliminary screening of technologies and process options (Section 8.2), and evaluation of representative remedial technologies (Section 8.3). Alternatives are then developed using the retained technologies and process options (Section 8.4). The selection of remediation technologies and process options for initial screening is based on USEPA (October 1988) and Navy guidance (August 2006). The screening is first conducted at a preliminary level to focus on relevant remediation technologies and process options and then the screening is conducted at a more detailed level based on three broad evaluation criteria. Finally, process options are selected to represent the remediation technologies that passed the detailed evaluation and screening.

The evaluation criteria for the detailed screening of soil remediation technologies and process options retained after the preliminary screening are effectiveness, implementability, and cost. The following are descriptions of these evaluation criteria:

- Effectiveness
  - Protection of human health and environment; reduction in toxicity, mobility, or volume through treatment; and permanence of solution.
  - Ability of the technology to address the estimated areas and volumes of the contaminated media.
  - Ability of the technology to meet the RAOs.
  - Technical reliability (innovative versus well proven) with respect to contaminants and site conditions.

- Implementability
  - Overall technical feasibility of the technology at the site.
  - Availability of vendors, mobile units, storage and disposal services, etc.
  - Administrative feasibility.

- Special long-term considerations (e.g., maintenance and operation requirements).

· Cost (Qualitative)
  - Capital cost.
  - Operation and maintenance (O&M) costs.

8.1 GENERAL RESPONSE ACTIONS

GRAs are the broad framework under which remedial technologies are identified to attain RAOs. An assembly of GRAs sets the framework for the development of remedial alternatives for a site. The GRAs for OU8 were assembled with consideration of current and potential future land uses at OU8. The following GRAs were developed for OU8 and are described in the remainder of this subsection:

· No Action
· Limited Action
· Removal
· Treatment
· Disposal

8.1.1 No Action

The no action response is retained throughout the FS process as required by the NCP. The no action response provides a comparative baseline against which other alternatives can be evaluated. Under this response, no remedial action is taken. The contaminated media are left “as is” without the implementation of any monitoring, land use controls (LUCs), containment, removal, treatment, or other mitigating actions.

8.1.2 Limited Action

Limited action includes various LUCs to reduce or eliminate direct contact pathways of exposure. These controls could involve the use of monitoring, land use restrictions, and access controls. The toxicity, mobility, or volume of the contaminants is not reduced through the implementation of LUCs.

8.1.3 Removal

Technologies in this category are used to remove a contaminated medium from its current location for treatment then return it to the site after treatment or for disposal elsewhere without treatment. Removal actions are combined with other GRAs, such as treatment or disposal actions, to develop remedial alternatives.

8.1.4 Treatment

Technologies in this category include in-situ and ex-situ methods to remove a contaminant from or modify or bind a contaminant in an impacted medium and could include physical, chemical, biological, or thermal treatment techniques. The options typically reduce the overall toxicity, mobility, and volume of the impacted medium. Ex-situ treatment processes are combined with other GRAs, such as removal and disposal actions, to develop alternatives.

8.1.5 Disposal

Disposal actions include placement of removed and/or treated materials within a permanent, approved, and permitted disposal facility. Disposal actions are combined with removal actions and could be combined with treatment actions to develop alternatives. Although the location of the contaminant may change, the toxicity, mobility, and volume of the contaminants are not reduced through the implementation of disposal without a treatment process.

8.2 PRELIMINARY SCREENING OF SOIL TECHNOLOGIES AND PROCESS OPTIONS

A variety of technologies and process options were identified under each GRA and screened to focus on relevant technologies and process options based on the conditions, media of concern, and COCs at OU8. Technologies and process options retained after the preliminary screenings are provided in Table 8-1, and Table 8-2 summarizes the preliminary screening of technologies and process options.

TABLE 8-1: RETAINED OPTIONS FOR REMEDIAL ALTERNATIVES

GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTION
No Action	None	Not Applicable
Limited Action	LUCs	Passive Controls: Land Use Restrictions
	Monitoring	Inspection
Removal	Bulk Excavation	Limited Excavation
Disposal	Landfill	Offsite Landfilling

TABLE 8-2: PRELIMINARY SCREENING OF SOIL REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS				
GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTION	DESCRIPTION	SCREENING COMMENT
No Action	None	Not applicable	No activities conducted at the site to address contamination.	**Required by NCP. Retain for baseline comparison to other technologies.**
Limited Action	LUCs	Active Controls: Physical Barriers/ Security Guards	Fencing, markers, warning signs, and monitoring to restrict site access.	Eliminate because risk to current receptors is in the subsurface and because active controls are not required to prevent exposure for current site users.
		Passive Controls: Deed or Land Use Restrictions	Administrative action using property deeds or other land use prohibitions to restrict future site activities.	**Retain to restrict future residential and recreational development, prevent unauthorized exposure to subsurface soil in portions of the site for current users, and manage excavated soil.**
	Monitoring	Sampling and Analysis	Sampling and analysis of soil, groundwater, or other media to evaluate migration of chemical constituents in the environment.	Eliminate because no unacceptable risks associated with migration of contamination are present.
		Inspection	Visual inspection of site conditions.	**Retain. Inspection could be used in conjunction with LUCs to ensure protectiveness.**
Containment	Surface Protection	Asphalt Cover	Installation of an asphalt cover to prevent direct exposure to contaminated soil and to prevent offsite migration of soil through erosion.	Eliminate because it is not required to prevent current or future exposure based on industrial land use, and contaminant migration is not a concern.
		Cap	Installation of a multimedia cap to prevent direct exposure to contaminated soil and to prevent infiltration of precipitation to unsaturated zone soil.	Eliminate because it is not required to prevent current of future exposure based on industrial land use, and contaminant migration is not a concern.
	Vapor Protection	Sealing Building Foundations and Installing Vents	Sealing the foundations of buildings and installation of vents outside of the buildings to mitigate vapor intrusion.	Eliminate because VOCs are not COCs for OU8.

TABLE 8-2: PRELIMINARY SCREENING OF SOIL REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS				
GENERAL RESPONSE ACTION	**REMEDIAL TECHNOLOGY**	**PROCESS OPTION**	**DESCRIPTION**	**SCREENING COMMENT**
Removal	Bulk Excavation	Full Excavation	Use of construction equipment such as a backhoe, front-end loader, or grader to remove contaminated soil.	**Retain. Excavation would effectively remove contaminated soil from the site.**
		Limited Excavation	Use of construction equipment such as a backhoe, front-end loader, or grader to remove contaminated subsurface soil in two areas based on four RI sampling locations to eliminate unacceptable risk to industrial workers.	**Retain. Excavation would effectively remove contaminated soil from the site.**
In-Situ Treatment	Biological	Anaerobic/Aerobic Treatment	Inoculation of microorganisms and nutrients to enhance naturally occurring biodegradation of COCs.	Eliminate because biodegradation is and not effective for the COCs at OU8.
	Physical/ Chemical	Soil Flushing	Use of water or other solvents to remove COCs by flushing and collecting and treating or disposing of the contaminated fluids.	Eliminate because this process would be very difficult to control in situ based on the very heterogeneous nature of the soil.
		Dynamic Underground Stripping	Injection of steam at the periphery of the contaminated area to volatilize COCs and removal of these COCs through a centrally located extraction well.	Eliminate because of the non- or low-volatility of the COCs at OU8.
		Soil Vapor Extraction	Use of vacuum and possibly air sparging to volatilize COCs.	Eliminate because PAHs are only partially volatile and metals are not volatile.
		Chemical Fixation/ Solidification	Mixing of pozzolanic agents in the vadose zone to chemically fix COCs and solidify the matrix. This technology is primarily used to reduce the mobility of contaminants, but it can also be used to prepare a surface barrier for human uptake.	Eliminate because migration of COCs is not a concern at OU8 and the contamination exists in the subsurface, so receptors are currently protected by a barrier of surface soil and buildings and parking lots.

TABLE 8-2: PRELIMINARY SCREENING OF SOIL REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS				
GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTION	DESCRIPTION	SCREENING COMMENT
In-Situ Treatment (continued)	Thermal	Vitrification/Radio Frequency Heating	Use of moderate to high temperatures to either volatilize COCs or to fuse them into a glass matrix.	Eliminate because the OU8 COCs are not particularly volatile and because in-situ application of this technology would be difficult to control due to the very heterogeneous nature of the soil.
Ex-Situ Treatment	Physical/ Chemical	Soil Washing/Solvent Extraction	Use of water or other solvents to remove COCs by solubilization and/or gravity-based separation of contaminated soil particles.	Eliminate because the combination of metals and PAH COCs would require different solvents, and there is a lack of usable space in the area.
		Chemical Fixation/ Solidification	Mixing of pozzolanic agents to chemically fix COCs and solidify the matrix.	Eliminate because of uncertainty about its effectiveness for PAHs in soil.
	Biological	Onsite Land Farming	Spreading and tilling of contaminated soil into layers of clean surface soil to aerate and biodegrade organic COCs.	Eliminate because it would not be effective for removal of metals COCs and because Shipyard areas for construction of a treatment bed are very limited.
		Bioslurry Reactor/Biopile	Treatment of soil in a bioslurry reactor or biopile under controlled conditions using natural or cultured microorganisms to biodegrade organic COCs.	Eliminate because it would not be effective for the removal of metals COCs.
	Thermal	Incineration	Use of high temperatures to destroy COCs.	Eliminate because it would not be effective for destroying metal COCs.
		Low-Temperature Thermal Desorption	Use of low to moderate temperatures to evaporate COCs and remove them from soil.	Eliminate because it would not be effective in removing metal COCs.
	Solids Processing	Screening	Removal/segregation of material based on size either as a means to remove associated COCs or as a preliminary process to aid in downstream treatment.	Eliminate because of lack of available space at OU8 to act as a laydown area and because screening does not reduce contamination.

TABLE 8-2: PRELIMINARY SCREENING OF SOIL REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS				
GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTION	DESCRIPTION	SCREENING COMMENT
Ex-Situ Treatment (continued)	Solids Processing (continued)	Crushing/Grinding	Size reduction of wastes as a preliminary process to aid in downstream treatment.	Eliminate because of lack of available space at OU8 to act as a laydown area and because crushing/grinding does not reduce contamination.
Disposal	Landfill/Recycling	Onsite Landfilling	Disposal of excavated soil and treatment residues in a Shipyard landfill.	Eliminate because of lack of space on the Shipyard.
		Offsite Landfilling	Disposal of excavated soil and treatment residues in an offsite permitted treatment, storage, and disposal (TSD) facility.	**Retain to dispose of contaminated soils.**
		Recycling	Recycling of recovered material such as metallic lead pieces.	Eliminate because recoverable materials are not expected in OU8 excavated materials.

8.3 DESCRIPTION AND EVALUATION OF SOIL REMEDIATION TECHNOLOGIES AND PROCESS OPTIONS

The technologies and process options retained after preliminary screening were retained based on an evaluation of three broad evaluation criteria. Screening evaluations generally focus on effectiveness and implementability, with less emphasis on cost. Process options that would be precluded by waste or chemical characteristics and inapplicability to site conditions are screened and eliminated from further consideration. At this stage, no process options are eliminated based on cost; however, a process option within a technology category may not be carried through to the alternative development stage if an equally effective process option is available at a lower cost.

8.3.1 No Action

No action would include no controls, remediation, or other actions to mitigate risks at the site.

Effectiveness

The no action alternative would not be effective in meeting the RAOs because there would be no action to prevent unacceptable risks from direct human exposure to contaminated subsurface soil or surface soil (if buildings and/or pavement were to be removed) at OU8.

Implementability

There would be no technical implementability concerns because no actions would be implemented.

Cost

There would be no costs associated with no action.

Conclusion

Although the no action alternative is not effective in meeting the RAOs for OU8, it is retained as required under CERCLA and the NCP. The no action alternative is carried through the FS to provide a baseline for comparison with other alternatives and their effectiveness in mitigating risks posed by site contaminants.

8.3.2 Limited Action

The limited action GRA retained is use restrictions enforced by LUCs, including deed restrictions and other LUCs to limit the potential for exposure to impacted media. The type of LUCs used would depend on the current and likely future use of the site. The Navy would establish LUCs for a remedy in a post-ROD LUC

Remedial Design (RD) that would document the specific actions needed to implement, operate, maintain, and enforce the LUC component of the remedy.

Effectiveness

LUCs are effective in restricting the type of activities that can be performed in the future at identified areas. However, the effectiveness of LUCs is dependent on the system used to communicate the locations and restrictions associated with parcels of property that require LUCs. Currently, there is no reason to anticipate the transfer of OU8 land to the public (i.e., OU8 will be owned by the Navy in the near and extended future); therefore, deed restrictions are not needed for OU8. LUCs would require inspections of land use, identification of planned changes to land use, and restrictions on digging.

Implementability

Resources are readily available for the implementation of LUCs at OU8. Long-term inspection and maintenance of the LUCs would also be readily implementable.

Cost

Both capital and O&M costs associated with LUCs are low compared to excavation and disposal of contaminated media.

Conclusion

LUCs are retained for the development of remedial alternatives. LUCs would be required for remedial alternatives (except no action) where contaminated material remains on site.

8.3.3 Removal

The only technology considered under the removal GRA was bulk excavation, which can be performed by a variety of equipment such as tractor shovels (front-end loaders), backhoes, and graders. The type of equipment selected must take into consideration several factors such as the type of material to be removed, load-bearing capacity of the ground surrounding the removal area, depth and areal extent of removal, required rate of removal, and elevation of the groundwater table over the tidal cycle. Excavation is the technology of choice for the removal of well-consolidated material such as soil to depths of up to 30 feet and from well-defined areas of ground with significant load-bearing capacity (i.e., greater than 1,500 pounds per square foot).

Complete excavation of all contaminated material and limited excavation of select areas of soil with the greatest concentrations of COCs contributing to risk were considered under this GRA.

The logistics of excavation must take into account factors such as the available space for operating equipment, loading and unloading to transport the removed material, and location of the site. After excavation is completed, the location is generally filled and graded with clean fill material or treated soil. Both total and limited excavation were considered for OU8.

Effectiveness

Excavation is a well-proven and effective method of removing contaminated soil from a site. Properly designed full excavation would remove contaminated soil such that the site meets the RAOs and has no restrictions for the area of OU8 not covered by buildings and pavement. Limited excavation designs could remove the majority of the contamination and reduce the severity and amount of restrictions for the area of OU8 not covered by buildings. LUCs would be required for the soil under the buildings even under a full excavation scenario because no samples were collected under the buildings and therefore the soil was conservatively assumed to also have unacceptable risks. Excavation could expose workers to contaminants during the implementation phase, although exposure would be minimized through the use of proper health and safety procedures. Excavation could adversely impact the environment if appropriate control measures are not implemented. Combined with appropriate treatment and disposal technologies, excavation would provide greater protection of human health than LUCs because contaminated material would be removed from the site.

Implementability

Depending on the areas and volumes involved, removal of soil at OU8 would be difficult to very difficult to implement when extending to or below the groundwater table because excavation activities would have to be carefully managed with respect to existing structures and underground utilities, tidal groundwater level fluctuations, and ongoing operations at and near OU8. Dewatering of the excavated soil would also be required. Excavation equipment and services are readily available from multiple vendors or contractors, and this technology is well proven and established in the construction/remediation industry. During excavation, site-specific health and safety procedures and Occupational Safety and Health Act (OSHA) regulations would have to be complied with to ensure that the exposure of workers to COCs is minimized. This would include the wearing of appropriate personal protective equipment (PPE) and implementation of dust suppression measures.

Under removal/excavation, consideration was given to limited excavation in a portion of the former timber basin area and complete excavation of contaminated material at OU8. Buildings in the surrounding area

currently have an occupational use; therefore, dust, debris, and noise produced as a result of excavation would have to be controlled so that occupational workers would not be adversely affected by excavation activities. Excavation would also need to take into account the tidal cycle and changing groundwater table depths. Appropriate measures would be needed for excavation around above-ground and underground utilities and adjacent to buildings and any temporary trailers on site.

Cost

The cost of limited excavation activities at the areas with the greatest concentrations contributing to risk would be moderately greater than typical remedial actions located on undeveloped land because the expected excavation areas are located around existing structures and extensive utilities. The cost of complete excavation across the areas of OU8 not covered by buildings to meet residential (and recreational) PRGs would be extremely high due to the size of the site, level of site use and activity, depth of contamination, and extensive utilities. The area of OU8 is approximately 4.2 acres. As an example, if the entire exposed (not covered by buildings) area of the site (approximately 3.6 acres) were excavated to 10 feet bgs, the estimated cost of the excavation and disposal alone, without markup or costs associated with planning, site preparation and support, or decontamination and post-construction, would be approximately $12.6 million. Primarily due to potential costs but also with consideration of interferences to day-to-day Shipyard operations (e.g., potential significant utility interferences, parking restrictions, and long-term shut-down of operations in Buildings 92 and 178), the complete excavation alternative is not further developed in Section 9.0.

Conclusion

Limited excavation, to be conducted in only a portion of the former timber basin (two areas totaling approximately 36,100 square feet), was retained in combination with other processes (e.g., offsite disposal) for the development of remedial alternatives. Complete excavation (complete removal of all contaminants across the exposed area of OU8) was not considered for alternative development due to implementation difficulties and high costs.

8.3.4 Disposal

The only technology considered under this GRA was offsite landfilling, which consists of transporting excavated soil for disposal in a permitted offsite TSD facility. RCRA non-hazardous waste may be disposed of in an RCRA Subtitle D, or solid waste, landfill. RCRA hazardous waste must be disposed in an RCRA Subtitle C, or hazardous waste, landfill. Soil would be characterized for proper disposal. It is anticipated that the material excavated from OU8 would include both RCRA non-hazardous and RCRA hazardous materials.

Effectiveness

Offsite landfilling does not permanently or irreversibly reduce contaminant concentrations. Although the CERCLA preference for treatment relegates direct landfilling to a less preferable option, offsite landfilling would be an effective disposal option for contaminated soil at OU8. Offsite landfills are only permitted to operate if they meet certain requirements of design and operation governing foundation, liner, leak detection, leachate collection and treatment, daily cover, post-closure inspections, and monitoring, etc., which ensure the effectiveness of these facilities. The requirements of a RCRA Subtitle C hazardous waste landfill are significantly more stringent than those of a RCRA Subtitle D solid waste landfill.

Implementability

Offsite landfilling without treatment would be easily implementable. Permitted RCRA Subtitle C TSD facilities and Subtitle D landfill facilities are available for this purpose. The majority of soil at OU8 has moderate to low concentrations of COCs and would be characterized as RCRA non-hazardous waste; however, soil in the areas with the greatest lead concentrations in soil in the former timber basin may be characterized as RCRA hazardous waste. Based on the low volume of hazardous waste anticipated, it is assumed that any treatment required prior to disposal would be conducted at the hazardous waste TSD facility.

Cost

The cost of offsite landfilling would be low to moderate for disposal at a RCRA Subtitle D solid waste landfill and high for treatment/disposal at a RCRA Subtitle C hazardous waste landfill.

Conclusion

Offsite landfilling is retained in combination with other process options for the development of remedial alternatives.

8.4 DEVELOPMENT OF SOIL REMEDIATION ALTERNATIVES

The following technologies/process options were retained to develop soil remedial alternatives:

- No Action
- LUCs
- Excavation and Offsite Landfilling

The retained technologies/process options were used to develop three soil remedial alternatives for OU8. Detailed descriptions and evaluations of the alternatives are provided in Section 9.0. The alternatives being considered are discussed below.

- Alternative 1 – No Action
- Alternative 2 – LUCs
- Alternative 3 – Limited Excavation and LUCs

9.0 DESCRIPTION AND DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES

This section presents descriptions of the remedial alternatives developed for OU8 and evaluations of each remedial alternative with respect to the criteria of the NCP of 40 CFR 300. The criteria and relative importance of these criteria in the CERCLA process are discussed in Section 9.1, and the descriptions and detailed analyses of alternatives are provided in Section 9.2.

9.1 NCP EVALUATION CRITERIA AND RELATIVE IMPORTANCE OF CRITERIA

The evaluation criteria as required by the NCP and the relative importance of these criteria in the CERCLA process are described in the following subsections.

9.1.1 Evaluation Criteria

In accordance with the NCP (40 CFR 300.430), the following nine criteria are used for the evaluation of remedial alternatives:

- Overall Protection of Human Health and the Environment
- Compliance with ARARs
- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume through Treatment
- Short-Term Effectiveness
- Implementability
- Cost
- State Acceptance
- Community Acceptance

Overall Protection of Human Health and the Environment

Remedial alternatives must be assessed for adequate protection of human health and the environment in both the short and long term. The remedial alternatives must be able to diminish the unacceptable risks posed by hazardous substances or contaminants present at the site by eliminating, reducing, or controlling exposure to levels exceeding remediation goals.

Compliance with ARARs

Remedial alternatives must be assessed to determine whether they attain ARARs under federal environmental laws and state environmental or facility siting laws. If one or more regulations that are applicable cannot be complied with, a waiver must be invoked.

Long-Term Effectiveness and Permanence

Remedial alternatives must be assessed for the long-term effectiveness and permanence they offer, along with the degree of certainty that the alternative would prove successful. Factors that are considered as appropriate include the following:

- Magnitude of Residual Risk - Risk posed by untreated waste or treatment residuals at the conclusion of remedial activities. The characteristics of residuals are considered to the degree that they remain hazardous, taking into account their volume, toxicity, mobility, and propensity to bioaccumulate.

- Adequacy and reliability of controls - Controls, such as containment systems and LUCs, necessary to manage treatment residuals and untreated waste must be shown to be reliable. In particular, this evaluation considers the uncertainties associated with land disposal for providing long-term protection from residual contamination, assessment of the potential need to replace technical components of the alternative (such as a surface cover or treatment system), and the potential exposure pathways and risks posed if technical components or the entire remedial action needs to be replaced.

Reduction of Toxicity, Mobility, or Volume through Treatment

The degree to which the remedial alternative employs recycling or treatment that reduces the toxicity, mobility, or volume is assessed. This assessment includes how treatment is used to address threats posed by the site. Factors to be considered as appropriate include the following:

- Treatment or recycling processes that the remedial alternative employs and the materials that they will treat.

- Amount of hazardous substances, pollutants, or contaminants that will be destroyed, treated, or recycled.

- Degree of expected reduction in toxicity, mobility, or volume of waste due to treatment or recycling and the specification of which reduction(s) is occurring.

- Degree to which the treatment is irreversible.

- Type and quantity of residual contamination that will remain following treatment considering the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents.

- Degree to which treatment reduces the inherent hazards posed by principal threats at the site.

Short-Term Effectiveness

The short-term impacts of the remedial alternative are assessed considering the following:

- Short-term risks that might be posed to the community during implementation.

- Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures taken to minimize these impacts.

- Potential environmental impacts of the remedial action and the effectiveness and reliability of mitigative measures during implementation.

- Time until protection is achieved.

- Environmental impact based on the Environmental Footprint Assessment.

Implementability

The ease or difficulty of implementing the alternative is assessed considering the following types of factors, as appropriate:

- Technical feasibility, including technical difficulties and unknowns associated with the construction and operation of a technology, reliability of the technology, ease of undertaking additional remedial actions, and ability to monitor the effectiveness of the remedy.

- Administrative feasibility, including activities needed to coordinate with other offices and agencies and the time required to obtain approvals and permits (if needed) from other agencies.

- Availability of services and materials, including the availability of adequate offsite treatment, storage capacity, and disposal capacity and services; availability of necessary equipment, specialists, and additional resources; availability of services and materials; and availability of prospective technologies.

Cost

Costs for remedial alternatives include both capital costs and annual O&M costs. Capital costs include both direct and indirect costs expected at the time of alternative implementation. Annual O&M costs include periodic costs that occur following alternative implementation. Typical O&M costs include periodic long-term monitoring and inspections. A net present worth (NPW) of the capital and O&M costs is also provided. The NPW of a remedial alternative is the total of all capital and O&M costs expressed in today's dollars. Typically, the cost estimate accuracy range during the FS stage is plus 50 percent to minus 30 percent of the actual remedial action cost.

State Acceptance

This criterion reflects the statutory requirements to provide for substantial and meaningful state regulatory involvement. Formal assessment of state regulatory acceptance is completed during the ROD phase, occurring after the Proposed Remedial Action Plan (PRAP) public comment period. However, regulatory concerns are continually considered through resolution of regulatory comments received on this RI/FS Report and PRAP.

Community Acceptance

This criterion refers to the community's comments on the remedial alternatives under consideration, where "community" is broadly defined to include all interested parties. These comments are considered throughout the CERCLA process. The community acceptance criterion is evaluated as part of the responsiveness summary presented in the ROD after the public comment period on the PRAP is held. However, community input is obtained through presentation of draft documents including the draft RI/FS Report and PRAP at Restoration Advisory Board (RAB) meetings.

9.1.2 Relative Importance of Criteria

Among the nine criteria, the threshold criteria are considered to be:

- Overall Protection of Human Health and the Environment
- Compliance with ARARs

The threshold criteria must be satisfied for an alternative to be eligible for selection.

Among the remaining criteria, the following five criteria are considered to be the primary balancing criteria:

- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume through Treatment
- Short-Term Effectiveness
- Implementability
- Cost

The balancing criteria are used to weigh the relative merits of alternatives.

The remaining two criteria, State Acceptance and Community Acceptance, are considered to be modifying criteria that must be considered during remedy selection. These last two criteria are evaluated after the end of the public comment period on the PRAP. Therefore, this FS addresses seven of the nine criteria.

9.2 DESCRIPTION AND DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES

As noted in Section 8.4, the following remedial alternatives have been developed for soil at OU8:

- Alternative 1 – No Action
- Alternative 2 – LUCs
- Alternative 3 – Limited Excavation and LUCs

A description and detailed analysis of these alternatives are provided in the following sections.

9.2.1 Alternative 1: No Action

9.2.1.1 Description

The no action alternative is required under CERCLA to establish a basis for comparison with other alternatives. No action would include no controls, remediation, or other actions to mitigate risks. Five-year reviews would also not be included under the no action alternative.

9.2.1.2 Detailed Analysis

Overall Protection of Human Health and the Environment

Alternative 1 would not be protective of human health and the environment and would not meet the RAOs for OU8 because no action would be conducted to ensure that exposure to site contamination does not occur in the long term.

Compliance with ARARs

As shown in Table B-1 in Appendix E, there are no chemical-specific, location-specific, or action-specific ARARs for this alternative. Chemical-specific TBCs would not be met.

Long-Term Effectiveness and Permanence

Alternative 1 would not provide long-term effectiveness or permanence. No action would provide no reduction of risks or reliable controls to protect against unacceptable exposure to contamination in the long term.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative 1 would not reduce the toxicity, mobility, or volume of contamination through treatment. There are no principal treatments or processes associated with the no action alternative. Reduction of contaminant toxicity, mobility, and volume may occur over the long term through natural processes, but with the contaminants on site, this would be expected to be a lengthy process.

Short-Term Effectiveness

No actions would be taken; therefore, implementation of Alternative 1 would not pose a short-term risk to onsite workers or result in adverse impacts to the local community or the environment. Alternative 1 would not provide adequate protection and would not meet RAOs because no action would be conducted.

Implementability

Alternative 1 would be readily implementable because there would be nothing to implement. The technical feasibility criteria including constructability, operability, and reliability are not applicable. The implementability of administrative measures is not applicable because no such measures would be taken.

Cost

There would be no costs associated with Alternative 1 because there would be no remedial components.

9.2.2 Alternative 2: LUCs

9.2.2.1 Description

Alternative 2 consists of instituting LUCs to prevent unacceptable exposure to contaminated surface and subsurface soil (Figure 9-1). The LUC boundary includes the 20-foot area of uncertainty to the south proposed to the OU8 boundary in Section 1.0 and Appendix A.1. The LUC boundary is also squared off in the northeastern corner for ease and practicality in LUC evaluations. The individual components of Alternative 2 are as follows:

- LUCs – LUCs would be used to ensure that contact with soil contaminants at concentrations that would cause potentially unacceptable risk are prevented for the life of the remedy. LUCs would restrict hypothetical future users (residential and recreational) land use within the hypothetical future users LUC boundary and prevent unrestricted exposure to subsurface soil within the industrial LUC boundary (see Figure 9-1). To implement LUCs, the Navy would prepare a LUC RD that would document the LUCs, associated implementation actions, inspection requirements, and organizations responsible for implementation of LUCs. Requirements for management of excavated soil as part of any future construction activities at the site would also be included as part of the LUCs. Most of the site is covered by pavement and buildings, and contamination presenting an unacceptable risk for current industrial use is not present in surface soil; therefore, fencing for perimeter controls, asphalt or ground cover, or other active measures are not necessary to prevent exposure to site contamination. The LUCs would require maintenance of the existing buildings and building foundations. For the purposes of the FS and developing a cost estimate, it was assumed that annual inspections of the site would be conducted to verify continued effectiveness of the LUCs.

- Five-Year Reviews – Because contamination would remain in excess of levels that allow for unlimited use and unrestricted exposure, five-year reviews would be required under this alternative to evaluate the continued adequacy of the remedy.

9.2.2.2 Detailed Analysis

Overall Protection of Human Health and the Environment

Alternative 2 would be protective of human health and the environment. Implementation of LUCs under Alternative 2 would provide a formal process to inspect and maintain the controls at the site to ensure their

effectiveness in preventing unacceptable exposure of industrial workers within the industrial LUC boundary and in preventing unacceptable exposure of hypothetical future users within the residential LUC boundary. Five-year reviews would be conducted to evaluate the continued adequacy of the remedy.

Compliance with ARARs

Alternative-specific ARARs for Alternative 2 are provided in Table B-2 in Appendix B. The implementation of Alternative 2 would comply with all ARARs applicable to this alternative.

Long-Term Effectiveness and Permanence

Alternative 2 would provide long-term effectiveness and permanence. Although soil COC concentrations would not be actively reduced, exposure to soil with COC concentrations associated with unacceptable risks to human health would be prevented through implementation of LUCs. Under Alternative 2, the site would be suitable for continued industrial use, and LUCs would restrict hypothetical future receptors use within the hypothetical future use LUC boundary. LUCs would provide a process to inspect and maintain site restrictions and existing buildings and building foundations to prevent unacceptable exposure of current site users to contamination in subsurface soil within the industrial LUC boundary and proper management of soil if it is excavated in the future. Five-year reviews would be conducted to evaluate the continued adequacy of the remedy.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative 2 would not provide any active treatment technologies to reduce the toxicity, mobility, or volume of the contaminants in surface or subsurface soil. Reduction of contaminant toxicity, mobility, and volume may occur over the long term through natural processes, but with the contaminants on site, this would be expected to be a lengthy process.

Short-Term Effectiveness

Alternative 2 would be effective in the short term. Implementation of LUCs would not pose short-term risk to site workers or result in adverse impacts to the surrounding community or the environment.

Alternative 2 would have an overall low environmental impact based on the results of the Environmental Footprint Evaluation discussed in Appendix G. The environmental impact due to greenhouse gas (GHG) emissions, nitrous and sulfur oxide emissions, particulate matter emissions, and energy consumption is estimated to be low, and the activity responsible for all of these impacts is the transportation of personnel for LUC inspections.

Alternative 2 could be implemented within 12 months with the preparation of the LUC RD, which would include requirements for LUC inspection and maintenance. RAOs would be attained after the LUC RD is implemented.

Implementability

Alternative 2 would be readily implementable. Administratively, implementation and enforcement of LUCs and five-year reviews would be relatively simple to implement.

Cost

Cost estimates for Alternative 2 are included in Appendix F.2. The estimated costs (rounded to $1,000) for Alternative 2 are as follows:

- Capital cost: $15,000
- Annual costs: $3,000 per year, plus $25,000 every 5 years
- 30-year NPW: $197,000

9.2.3 Alternative 3: Limited Excavation and LUCs

9.2.3.1 Description

Alternative 3 would consist of excavation and offsite disposal of lead- and antimony-contaminated soil from two areas within the former timber basin to eliminate unacceptable industrial risks and LUCs to prevent hypothetical future user exposure to surface and subsurface soil. Figure 9-2 shows the proposed excavation areas and LUCs boundaries. The boundary for OU8 has been extended 20 feet to the south and the LUC boundary has been squared off in the northeastern corner in accordance with the discussion in Section 1 and Appendix A.1. The following describes the individual components of Alternative 3:

- Excavation and Offsite Disposal – Two areas with the greatest lead and antimony contamination encompassing approximately 36,090 square feet would be excavated to a depth of 10 feet bgs. The excavation would reduce subsurface soil risks to acceptable levels for industrial exposure in the exposed area of OU8. Confirmation samples would be collected from the floor and sidewalls of each excavation area to confirm that soil with lead and antimony concentrations driving potentially unacceptable subsurface soil industrial worker risks have been removed. The actual limits and depths of excavation would be determined by the results of the confirmation samples. All excavated material would be stockpiled, characterized, and properly transported and disposed of at an appropriate TSD facility. Dewatering would also be required, because a significant amount of the material removed will

be from the saturated and tidally saturated zones. Sampling would be required in association with the dewatering. For the purposes of the FS and developing a cost estimate, it was assumed that shoring would be needed to protect workers, utilities and the building foundation within or adjacent to the excavation areas.

- Site Restoration – Following excavation, the excavated areas would be backfilled to establish pre-construction grades, elevations, and surface types using uncontaminated soil from off site and pavement where necessary.

- LUCs – LUCs would be implemented to restrict hypothetical future users land use within the hypothetical future user LUCs boundary (see Figure 9-2), to prevent disturbance of soil beneath site buildings and building foundations (because the soil beneath the buildings has not been characterized and is assumed to be contaminated), and to require specific management practices for handling any excavated soil. To implement LUCs, the Navy would prepare a LUC RD that would document the LUCs, associated implementation actions, inspection requirements, and organizations responsible for implementation of LUCs. Requirements for management of excavated soil as part of any future construction activities at the site would also be included as part of the LUC RD. For the purposes of the FS and developing a cost estimate, it was assumed that annual inspections of the site would be conducted to verify continued effectiveness of the LUCs.

- Five-Year Reviews – Because contamination would still remain in excess of levels that allow for unlimited use and unrestricted exposure, five-year reviews would be required under this alternative to evaluate the continued adequacy of the remedy.

9.2.3.2 Detailed Analysis

Overall Protection of Human Health and the Environment

Alternative 3 would be protective of human health and the environment. Excavation and offsite disposal of contaminated soil in limited areas with the greatest concentrations of lead and antimony would reduce site risks for exposure to subsurface soil to an acceptable level for industrial use (if subsurface soil is brought to the surface in the future). Proper controls during excavation and appropriate transportation and disposal of excavated soil and backfilling would minimize the adverse impact from contaminated soil to human health and the environment during any future construction activities at the site. After implementation, LUCs would provide a formal process to inspect and maintain the controls and existing buildings and building foundations at the site to ensure the prevention of unacceptable exposure for hypothetical future users within the hypothetical future use LUC boundary and current and future industrial users on site. LUCs would also include a requirement that precautions be taken in construction projects involving excavation to

greater than 2 feet bgs in areas under the buildings. Five-year reviews would be conducted to evaluate the continued adequacy of the remedy.

Compliance with ARARs

Alternative-specific ARARs for Alternative 3 are provided in Table B-3 in Appendix E. The implementation of Alternative 3 would comply with all ARARs applicable to this alternative.

Long-Term Effectiveness and Permanence

Alternative 3 would provide long-term effectiveness and permanence. Excavation of the most contaminated areas would reduce COC concentrations to acceptable levels in subsurface for industrial worker exposure. LUCs would provide a process to inspect and maintain hypothetical future user and industrial site restrictions and proper management of subsurface soil if excavated in the future. Following implementation of Alternative 3, the site would be suitable for continued industrial use, and LUCs would restrict residential and recreational use and prevent unacceptable industrial exposure to contamination in subsurface soil. Five-year reviews would be conducted to evaluate the continued adequacy of the remedy.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative 3 would not provide any active treatment technologies that would reduce the toxicity, mobility, or volume of contaminants in surface or subsurface soil. Reduction of contaminant toxicity, mobility, and volume may occur over the long term through natural processes, but with the contaminants on site, this would be expected to be a lengthy process.

Short-Term Effectiveness

Alternative 3 would be effective in the short term. Controls would be implemented during excavation, offsite transportation and disposal, backfilling, and regrading activities to protect remediation construction workers, site users, Shipyard employees, and the environment until the construction is completed. These controls would include providing adequate PPE for remediation construction workers, designated access trails for employees of buildings around the excavation area, and construction best management practices to prevent the spread of contamination during construction. In addition, because the excavation would be occurring within an active portion of the Shipyard, implementation of engineering controls, such as dust suppression and erosion controls, and appropriate location of equipment and construction-related facilities and timing of activities would be needed to ensure that the activities would not adversely impact the Shipyard daily operation or the environment. Upon construction completion, the restored excavation area and implementation of LUCs would not adversely impact the Shipyard or the environment.

The remedial action documents (design and/or work plan) would specify the necessary activities to ensure protection of human health and the environment during remedial activities. The work plan would specify the necessary health and safety requirements for remedial activities, including appropriate PPE to minimize exposure to onsite workers and dust suppression requirements during excavation.

Alternative 3 would have an overall high environmental impact as detailed in Appendix G. The impact due to GHG emissions and nitrous and sulfur oxide emissions is considered high, and the greatest contribution to this impact is the production of materials required for excavation and backfilling. The impact of Alternative 3 on particulate matter emissions is also considered high, with the greatest contribution to these emissions being the handling of residuals. The energy consumption for Alternative 3 is considered high, and the production of steel for shoring and fencing is the greatest consumer of energy. The total amount of water that would be consumed for Alternative 3 is high, with an estimated at 903,392 gallons, with water used in materials production resulting in the greatest consumption of water.

Alternative 3 could be implemented within 22 months. Remedial action documents and LUC RD preparation could be completed within 12 months. Construction activities (excavation, offsite transportation and disposal, grading, backfilling, and repaving) would be expected to be completed in 10 months. Unexpected delays and slower production times were assumed in this estimate due to the presence of utilities and industrial activity in the area. RAOs would be attained after excavation of contaminated soil is complete and the LUC RD is implemented.

Implementability

Alternative 3 would be difficult to implement. The resources, equipment, and materials required for the excavation, backfilling and grading are readily available. Permitted landfill facilities are also available for soil disposal. However, this is a very active area of the Shipyard with various utilities in the area. Utilities would need to be located and protected during implementation of this alternative, and site activities would have to be coordinated with onsite activities as much as possible, with the potential for significant stoppages of work and site traffic congestion during construction.

The remedial action documents would provide the specifications for excavation, characterization, transportation and disposal of contaminated soil and backfilling of clean soil in the excavation area. The necessary health and safety requirements for any construction activities conducted as part of implementation of the remedy would be identified in the work plan.

Offsite transportation of the excavated soil could cause significant truck traffic through the Shipyard and would require preparation and implementation of a traffic control plan and completion of waste manifests. Offsite disposal of the excavated soil would require prior securing of waste acceptance from the disposal

facility. Significant coordination with the Shipyard during remedial activities would be required to ensure that the activities do not adversely impact Shipyard operations. Shipyard operations in the area to be excavated and the surrounding area would also need to be halted to allow for the excavation activities. These administrative procedures could likely be accomplished but would require significant scheduling and planning efforts in coordination with the Shipyard.

Administratively, implementation and enforcement of LUCs and five-year reviews would be relatively simple to implement, and excavation would be difficult to implement.

Cost

Cost estimates for Alternative 3 are included in Appendix F.2. The estimated costs (rounded to $1,000) for Alternative 3 are as follows:

- Capital cost: $13,702,000
- Annual costs: $3,000 per year, plus $25,000 every 5 years
- 30-Year NPW: $13,884,000

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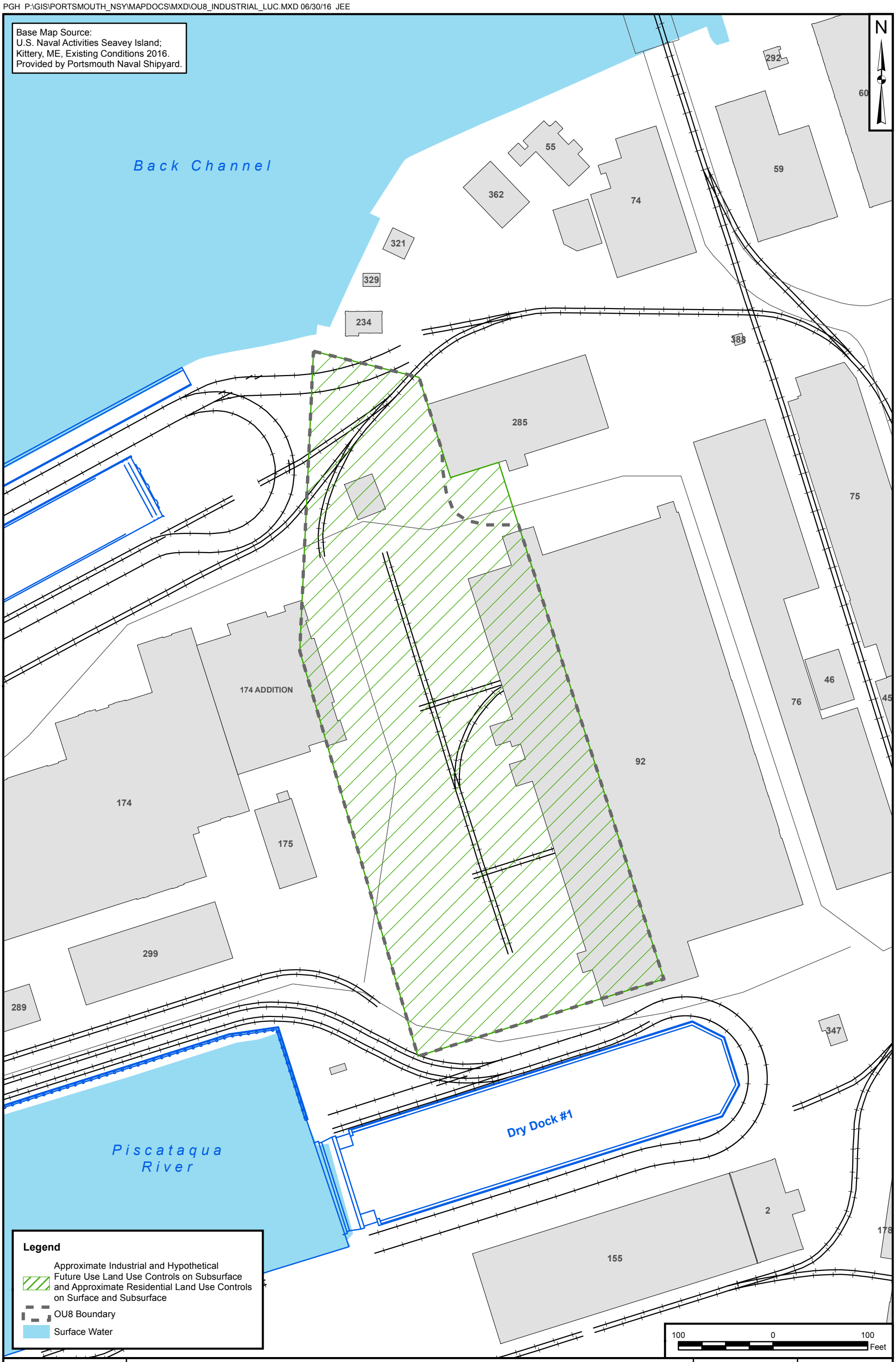

DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	12/17/15		3270	WE32
CHECKED BY	DATE	ALTERNATIVE 2 - INDUSTRIAL AND HYPOTHETICAL FUTURE USE LAND USE CONTROL BOUNDARIES OPERABLE UNIT 8 PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY	DATE
M. VED	06/30/16		—	—
REVISED BY	DATE		APPROVED BY	DATE
—	—		—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 9-1	0

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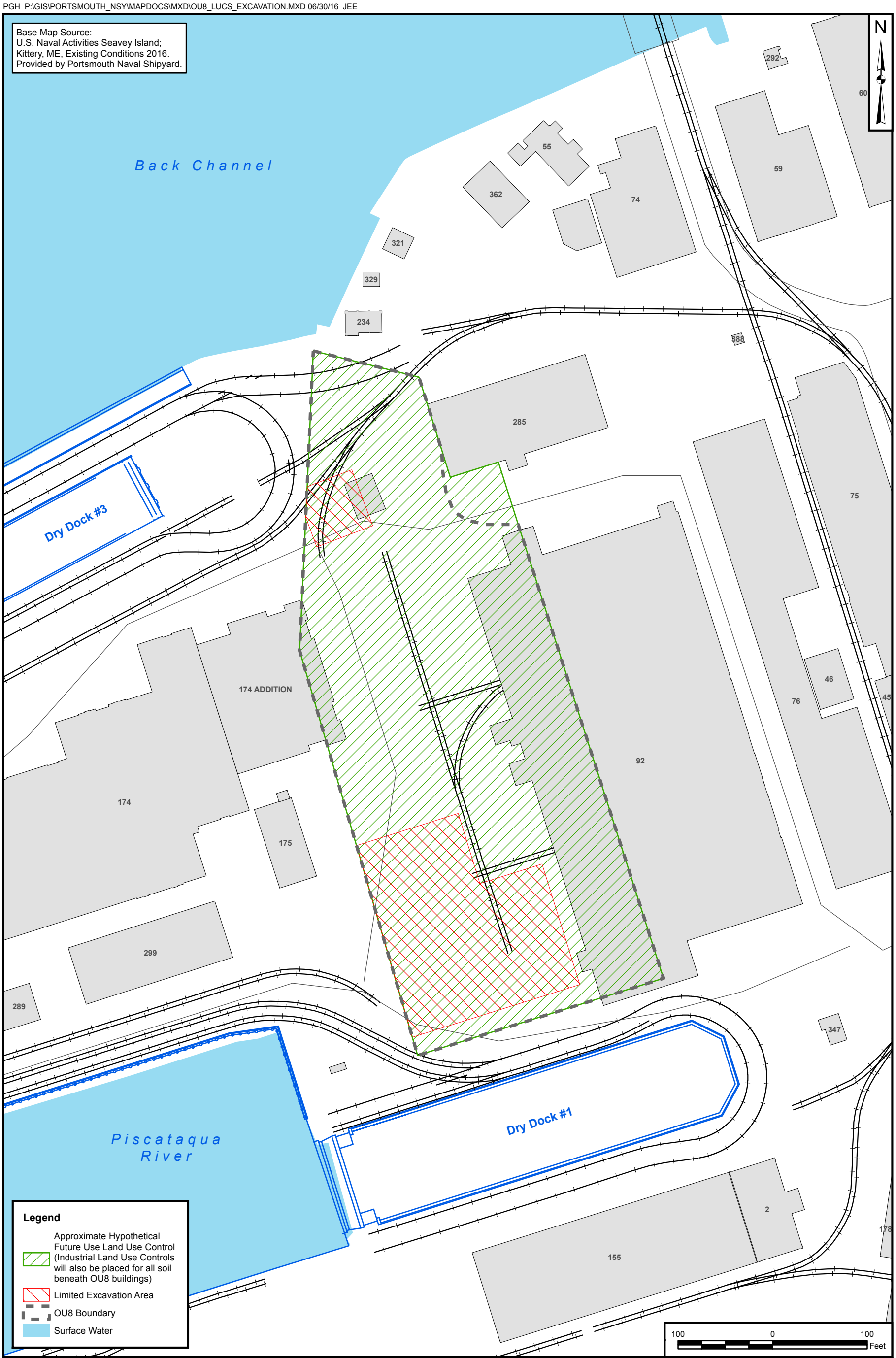

DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	12/17/15		3270	WE32
CHECKED BY	DATE	ALTERNATIVE 3 - EXCAVATION AND LAND USE CONTROL BOUNDARIES	APPROVED BY	DATE
M. VED	06/30/16	OPERABLE UNIT 8	—	—
REVISED BY	DATE	PORTSMOUTH NAVAL SHIPYARD	APPROVED BY	DATE
—	—	KITTERY, MAINE	—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 9-2	0

10.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

This section compares the analyses for each of the remedial alternatives presented in Section 9.0 of this RI/FS Report using the criteria used for the detailed analysis of individual alternatives.

TABLE 10-1: COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES

EVALUATION CRITERION	ALTERNATIVE 1: NO ACTION	ALTERNATIVE 2: LUCS	ALTERNATIVE 3: LIMITED EXCAVATION AND LUCS
Overall Protection of Human Health and the Environment	Would not be protective of human health and the environment and would not meet the RAOs because no action would be taken to ensure that exposure to site contamination would not occur in the future.	Would be protective of human health and the environment by implementing LUCs to prevent exposure to site contamination.	Would protect human health and the environment by removing the areas of most contaminated soil to reduce the EPC to an acceptable level in subsurface soil for industrial exposure. LUCs would be implemented to prevent hypothetical future user exposure to soil and to prevent industrial exposure to soil beneath buildings. LUCs would also detail management of excavated soil.
Compliance with ARARs	No applicable ARARs; chemical-specific TBCs would not be met.	Would comply with ARARs.	Would comply with ARARs.
Long-Term Effectiveness and Permanence	Would not provide long-term effectiveness and permanence because no action would occur.	Would provide long-term effectiveness and permanence as long as LUCs are maintained. Periodic inspections would be conducted to ensure that LUCs are being maintained.	Would provide long-term effectiveness and permanence by removing contaminated soil to reduce the EPC to an acceptable level in subsurface soil for industrial exposure in the exposed area of the site, and LUCs to prevent hypothetical future user exposure and industrial exposure to soil beneath buildings. LUCs would also detail management of excavated soil. Periodic inspections would be conducted to ensure that LUCs are being maintained.

TABLE 10-1: COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES			
EVALUATION CRITERION	ALTERNATIVE 1: NO ACTION	ALTERNATIVE 2: LUCS	ALTERNATIVE 3: LIMITED EXCAVATION AND LUCS
Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment	Would not reduce contaminant toxicity, mobility, or volume through treatment because no treatment would occur.	Would not reduce contaminant toxicity, mobility, or volume through treatment because no treatment would occur.	Would not reduce contaminant toxicity, mobility, or volume through treatment because no treatment would occur on site. Treatment could occur as necessary to treat soil deemed hazardous prior to disposal.
Short-Term Effectiveness	Would not result in any short-term risk to site workers or adversely impact the surrounding community or environment because no action would occur. RAOs would not be attained.	Would not result in any short-term risk to site workers or adversely impact the surrounding community or environment because no construction actions would occur. Could be implemented within 12 months and would attain RAOs upon implementation.	Would require appropriate use of PPE and best management practices to prevent exposing site workers, the surrounding community, and the environment to contaminated materials during excavation and offsite disposal activities. Could be implemented within 12 months and would attain RAOs within 10 months of implementation.
Implementability	Technical and administrative implementation would be simple because there would be no action to implement.	Readily implementable. There would be no technical implementation under this alternative. Administrative implementation, which would require development of a LUC RD, is expected to be a simple process.	Difficult to implement due to active work area, traffic congestion, many utilities, etc. Technical implementation of this alternative would include the excavation to a depth of 10 feet and offsite transportation and disposal of contaminated soils, and backfilling and regrading the excavated areas. The main implementability concern for excavation is for excavating around utilities and near building foundations, along with the need to stop Shipyard operations at and around OU8. Dewatering would also be required for the excavated soil. Administrative implementation, which would require development of a LUC RD, is expected to be a simple process.

TABLE 10-1: COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES			
EVALUATION CRITERION	ALTERNATIVE 1: NO ACTION	ALTERNATIVE 2: LUCS	ALTERNATIVE 3: LIMITED EXCAVATION AND LUCS
Costs (rounded to $1,000): Capital Annual NPW	 $0 $0 $0	 $15,000 $3,000/year and $25,000 every 5 years $197,000	 $13,702,000 $3,000/year and $25,000 every 5 years $13,884,000

REFERENCES

ATSDR (Agency for Toxic Substances and Disease Registry), August 1995. Toxicological Profile for Polycyclic Aromatic Hydrocarbons. U.S. Department of Health and Human Services, Public Health Service, Atlanta, Georgia.

ATSDR, August 2007. Toxicological Profile for Arsenic. U.S. Department of Health and Human Services, Public Health Service, Atlanta, Georgia.

ATSDR, September 2008. Toxicological Profiles, U.S. Department of Health and Human Services, Public Health Service online. http://www.atsdr.cdc.gov/toxprofiles/index.asp#index. Accessed September 2008.

Batu, Verdat, February 1998. Aquifer Hydraulics: A Comprehensive Guide to Hydrogeologic Data Analysis. New York, New York: John Wiley & Sons, Inc.

City-data.com, June 2016. City-data.com online at http:/www.city-data.com/us-cities/northeast/portsmouht-economy. Accessed June 2016.

Civil Consultants, February 2002. U.S. Naval Activities Seavey Island; Kittery, Maine Survey Control Network Drawing No. BS-03-171.

Dolph, J.E. and LCDR F.T. Bolger, May 1996. Industrial History of West Timber Basin, Portsmouth Naval Shipyard, Kittery, Maine. Prepared for Environmental Affairs Office, Portsmouth Naval Shipyard, Kittery, Maine.

FEMA (Federal Emergency Management Agency), July 1986. Flood Insurance Rate Map for the Town of Kittery, Maine, York County, Community-Panel Number 230171 0008.

Halliburton NUS, November 1995. RCRA Facilities Investigation (RFI) Data Gap Report (Final) for Portsmouth Naval Shipyard, Kittery, Maine. Halliburton NUS Corporation, Wayne, Pennsylvania.

Louis Berger Group, Inc., April 2003. Cultural Resources Survey for Portsmouth Naval Shipyard, Kittery, Maine. Louis Berger Group, Inc., East Orange, New Jersey.

Maine DMR (Maine Department of Marine Resources), August 2008. Notice of Emergency Rule-Making for Bacterial Closures for Shellfish Pollution Area Inventory, Area 1 – Piscataqua River (Kittery, Eliot,

South Berwick) and Area 2A – Portsmouth Harbor and vicinity (Kittery) and Isle of Shoal. Effective Date August 28, 2008 as updated June 25, 2014.
Maine Fisheries and Wildlife, January 1989. Significant Fish and Wildlife Resources of Coastal York County Maine. Prepared by Maine Department of Inland Fisheries and Wildlife, Augusta, Maine.

Maine Department of Inland Fisheries and Wildlife, 2003. Maine Endangered Species Program Shortnose Sturgeon. http://www.maine.gov/ifw/wildlife/species/endangered_species/shortnose_sturgeon /index.htm.

MEDEP (Maine Department of Environmental Protection), February 2011. Guidance for Human Health Risk Assessments for Hazardous Substance Sites in Maine. MEDEP and Center for Disease Control. With hyperlinks updated May 23, 2013.

MEDEP, May 2013. Maine Remedial Action Guidelines (RAGs) for Sites Contaminated with Hazardous Substances. Maine Department of Environmental Protection, Bureau of Remediation and Waste Management. As updated February 5, 2016.

MEDEP, May 2014. Remediation Guidelines for Petroleum Contaminated Sites in Maine. MEDEP Bureau of Remediation and Waste Management.

McLauren/Hart, July 1992. Draft RCRA Facility Investigation Report Portsmouth Naval Shipyard, Kittery, Maine, McLaren/Hart Environmental Engineering Corporation, Albany, New York.

McLaren/Hart, March 1994. Public Health and Environmental Risk Evaluation Part A: Human Health Risk Assessment. McLaren/Hart Environmental Engineering Corporation, Albany, New York.

Navy, November 2015. FY16 Amended Site Management Plan for Portsmouth Naval Shipyard Kittery, Maine.

Navy, February 2001. Conducting Human Health Risk Assessments Under the Environmental Restoration Program, Chief of Naval Operations (N45) 5090 Ser N453E/1U595168.

Navy, January 2004. Navy Final Policy on the Use of Background Chemical Levels. Memorandum No. 5090 SER N45C/N4U732212.

Navy, August 2006. Navy Environmental Restoration Program (NERP) Manual, Chapter 8, Remedial Investigation/Feasibility Study.

Navy, December 2008. U.S. Navy Human Health Risk Assessment Guidance.

Navy, August 2013. Record of Decision for Operable Unit 4 – Site 5 and Offshore Areas Potentially Impacted by PNS Onshore IR Program Sites, Portsmouth Naval Shipyard, Kittery, Maine.

NFEC (Naval Facilities Engineering Command), August 1993. Natural Resources Management Plan for Portsmouth Naval Shipyard, Kittery, Maine. Naval Facilities Engineering Command, Northern Division, Natural Resources Management Branch, Planning Division, Philadelphia, Pennsylvania, and Environmental Affairs, Portsmouth Naval Shipyard, Kittery, Maine.

NHDES (New Hampshire Department of Environmental Services), June 2006. NHDES Shellfish Program 2005 Annual Report (http://www.des.state.nh.us/WMB/Shellfish/2005AnnualReport/).

NOAA (National Oceanic and Atmospheric Administration), January 2007. National Climatic Data Center Office of NOAA (www.ncdc.noaa.gov/oa/climate/research/cag3/cag3.html) for the Portland Maine weather station. Data from 1975 to 2006, updated in January 2007.

PNS (Portsmouth Naval Shipyard), June 2016. Portsmouth Naval Shipyard facts provided on Naval Sea Systems Command (NAVSEA) website. http:/www.navsea.navy.mil/home/shipyards/Portsmouth/facts. Accessed June 2016.

Strafford, May 2005. Strafford Regional Planning Area New Hampshire Regional Master Plan: Toward the Year 2020. Strafford Regional Planning Commission, Dover, New Hampshire. Available at www.strafford.org.

Tetra Tech, August 1999. Groundwater Monitoring Summary Report (December 1996 – November 1997), Portsmouth Naval Shipyard, Kittery, Maine. King of Prussia, Pennsylvania.

Tetra Tech, October 1999. Interim Offshore Monitoring Plan Operable Unit 4 for Portsmouth Naval Shipyard, Kittery, Maine. King of Prussia, Pennsylvania.

Tetra Tech, May 2000. Site Screening Investigation Report for Site 30 (Building 184), Site 31 (West Timber Basin), and Site 32 (Topeka Pier) for Portsmouth Naval Shipyard, Kittery, Maine. King of Prussia, Pennsylvania.

Tetra Tech, July 2007. Remedial Investigation Report for Operable Unit 1, Portsmouth Naval Shipyard, Kittery, Maine. King of Prussia, Pennsylvania.

Tetra Tech, April 2014. Technical Memorandum – Re-Evaluation of Facility Background Report, Portsmouth Naval Shipyard, Kittery, Maine. King of Prussia, Pennsylvania.

Tetra Tech, May 2015. Final Sampling and Analysis Plan for Operable Unit 8 Remedial Investigation, Portsmouth Naval Shipyard, Kittery, Maine. King of Prussia, Pennsylvania.

United States Census Bureau, 2010. United States census 2010 available at http://www.census.gov/2010census/

USDA (United States Department of Agriculture), 2009. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/. Accessed on October 29, 2009.

USEPA (United States Environmental Protection Agency), October 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA - Interim Final. EPA/540/G-89/004. Office of Emergency and Remedial Response, Washington, D.C.

USEPA, March 1989. HSWA Permit for Portsmouth Naval Shipyard, Permit Under The Hazardous and Solid Waste Amendments of 1984.

USEPA, December 1989. Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A) - Interim Final. EPA/540/1-89/002. Office of Emergency and Remedial Response, Washington, D.C.

USEPA, March 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. Directive 9285.6-03. Office of Solid Waste and Emergency Response, Washington, D.C.

USEPA, February 1992. Memorandum: Guidance on Risk Characterization for Risk Managers and Risk Assessors. Henry Habicht II, Deputy Administrator, Washington, D.C.

USEPA, May 1993. Distribution of Preliminary Review Draft: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure. Office of Solid Waste and Emergency Response, Washington, D.C.

USEPA, July 1993. Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons. EPA/600/R-93/089. Environmental Criteria and Assessment Office.

USEPA, February 1994. Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children. NTIS #PB93-963510, EPA 9285.7-15-1. Office of Emergency and Remedial Response, Washington, D.C.

USEPA, July 1994. Revised Interim Guidance on Establishing Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. OSWER Directive 9355.4-12. Office of Solid Waste and Emergency Response, Washington, D.C. July 14.

USEPA, August 1995. Region I Risk Updates, Number 3. Waste Management Division, Boston, Massachusetts.

USEPA, May 1996. Soil Screening Guidance: Technical Background Document. EPA/540/R-95/128, Office of Solid Waste and Emergency Response, Washington, D.C.

USEPA, July 1997. Health Effects Assessment Summary Tables; FY 1997 Update, EPA 540/R-97-036, National Center for Environmental Assessment, Cincinnati, Ohio.

USEPA, August 1997. Exposure Factors Handbook. EPA/600/8-89/043. Office of Health and Environmental Assessment, Exposure Assessment Group, Washington, D.C.

USEPA, April 1999. Use of the TRW Interim Adult Lead Methodology in Risk Assessment. Memorandum from Pat Van Leewven and Paul White to Mark Maddaloni.

USEPA, December 2001. Risk Assessment Guidance for Superfund: Volume I Human Health Evaluation Manual (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments) – Final. Publication 9285.7-47. Office of Emergency and Remedial Response, Washington, D.C.

USEPA, December 2002a. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. Office of Solid Waste and Emergency Response, Washington, D.C.

USEPA, December 2002b. Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10. Office of Emergency and Remedial Response, Washington, D.C.

USEPA, January 2003. Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. USEPA, Washington, DC. http://www.epa.gov/superfund/ programs/lead/adult.htm.

USEPA, November 2003. Assessing Intermittent or Variable Exposures at Lead Sites. EPA-540-R03-008, OSWER 9285.7-76. Office of Solid Waste and Emergency Response, Washington, D.C.

USEPA, December 2003. Human Health Toxicity Values in Superfund Risk Assessments. OSWER 9285.7-53. Office of Superfund Remediation and Technology Innovation, Washington, D.C.

USEPA, July 2004. Risk Assessment Guidance for Superfund, Volume I – Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) – Final. EPA/540/R/99/005. Office of Superfund Remediation and Technology Innovation, Washington, D.C.

USEPA, March 2005a. Guidelines for Carcinogen Risk Assessment. EPA/630/P-03/001B. Risk Assessment Forum, Washington, D.C.

USEPA, March 2005b. Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens. EPA/630/R-03/003F. Risk Assessment Forum, Washington, D.C.

USEPA, December 2007. Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) Windows version (IEUBKwin v.1.0 build 264), 2005 32-bit version.

USEPA, January 2009. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment) - Final. EPA-540-R-070-002, OSWER 9285.7-82. Office of Superfund Remediation and Technology Innovation, Washington, D.C.

USEPA, May 2009. User's Guide for the Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) Windows 32-bit version. [EPA 9285.7-42].

USEPA, June 2009. Update of the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Baseline Geometric Standard Deviation Parameters. EPA-540-R-070-002, OSWER 9200.2-82. Office of Superfund Remediation and Technology Innovation, Washington, D.C.

USEPA, February 2010. Integrated Exposure Uptake Biokinetic Model for Lead in Children, Windows® version (IEUBKwin v 1.1 Build 11).

USEPA, August 2011. USEPA Technical Review Workgroup for Lead. Guidance Document. Frequently Asked Question (FAQs) on the Adult Lead Model. http://www.epa.gov/superfund/lead/almfaq.htm

USEPA, September 2011. Child-Specific Exposure Factors Handbook. EPA/600/R-06/096F. National Center for Environmental Assessment. Office on Research and Development, Washington D.C.

USEPA, October 2012. Provisional Peer-Reviewed Toxicity Values for Thallium and Compounds. Superfund Health Risk Technical Support Center, National Center for Environmental Assessment. Cincinnati, Ohio.

USEPA, September 2013. ProUCL Version 5.0.00 User Guide. EPA/600/R-07/038. Office of Research and Development, Washington, D.C.

USEPA, February 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors.

USEPA, June 2015. Integrated Risk Information System, On-Line Data Base. Environmental Criteria and Assessment Office, Cincinnati, OH. http://www.epa.gov/iris/index.html

USEPA, October 2015. Vapor Intrusion Screening Level Calculation. http://www.epa.gov/vaporintrusion.

USEPA, May 2016. Regional Screening Levels for Chemical Contaminants at Superfund Sites. https://www.epa.gov/risk/regional-screening-levels-rsls.

VDEQ (Virginia Department of Environmental Quality), August 2014. VDEQ, online. http://www.deq.state.va.us/Programs/LandProtectionRevitalization/RemediationProgram/VoluntaryRemediationProgram/VRPRiskAssessmentGuidance.aspx).

Weston, June 1983. Initial Assessment Study of Portsmouth Naval Shipyard. Naval Energy and Environmental Support Activity, NEESA 13-032, Port Hueneme.

Williams, G. M., and J. H. Weisburger. 1991. Chemical carcinogens. In *Casarett and Doull's toxicology.* Fourth edition, ed. M. V. Amdur, J. Doull, and C. D. Klaassen, 127—200. New York.

APPENDIX A

SUPPORTING INFORMATION

A.1 HISTORICAL USE AND FIGURES AND BOUNDARY EVALUATION

A.2 SOIL BORING AND MONITORING WELL CONSTRUCTION LOGS (ON CD)

A.3 TIDAL LAG STUDY

A.4 SLUG TESTS (ON CD)

A.5 SAMPLE LIST

A.6 2015 FIELD INFORMATION (ON CD)

A.7 2015 SURVEY INFORMATION

A.8 CONSTRUCTION WORKER SCREENING LEVEL DEVELOPMENT FOR GROUNDWATER (ON CD)

A.1 HISTORICAL USE AND FIGURES AND BOUNDARY EVALUATION

HISTORICAL USE AND FIGURES

HISTORICAL FIGURES AND USES FOR THE OPERABLE UNIT 8 AREA

The following discusses the review of historical figures and documents to understand the history of site uses at OU8 (Site 31, West Timber Basin) and historical and archaeological potential. The review of the historical figures and a description of historical uses of OU8 are provided herein.

OU8 is an industrial area surrounded by buildings and dry docks. The site is an area that was previously filled with various materials and is bounded on the east, west, and south by historical quay walls. There are two main buildings flanking OU8, Building 92 on the east and Building 174 on the west. An addition to Building 174 was completed in 2013. Additional utility corridors were also installed during new building construction, and utility corridors also existed previously on site.

Review of Historical Figures

Historical figures for Portsmouth Naval Shipyard (PNS), Kittery, Maine, were reviewed to determine the historical uses of the OU8 area. Using ArcMap 9.1, the figures were electronically scanned and aligned with the PNS base map (July 2011). To align the maps, the maps were georeferenced using the buildings on the map and the GIS building layer for the current PNS base map. The georeferencing was considered complete when the buildings on the historical map "matched" the buildings in the GIS data layer as close as possible across the entire facility, or the area that was shown in the map. However, there may be some offset in site features for the various historical maps, which is particularly evident when looking at the OU8 area maps that show the quay walls of the former Timber Basin.

Available Shipyard maps were reviewed and select maps were scanned that would show information on the changes in historical uses of Site 31. These maps were further reviewed to select maps to print that show the site layout (using the 2014 PNS Base Map) with the scanned features on the historical map. These maps were used to understand changes land uses. The Shipyard provided a map with the circa 1826 shoreline; a line representing the circa 1826 shoreline was drawn and labeled on Figures 1 through 9. Figure 10 provides various historical shorelines on an aerial photograph of the area. For the historical shorelines, the outer limits of the quay wall of the Timber Basin were used as the shoreline.

The historical maps that are included for the OU8 area are from 1861 to 1957.

- Figure 1 - 1861: The 1861 historical map shows the location of the Timber Dock and Timber Sheds. The quay walls that form the boundary of the Timber Basin can be seen. A pitch house (later identified as Building 51) can be seen on the eastern quay wall.
- Figure 2 - 1910: The 1910 historical map is essentially similar to the 1901, 1904, and 1907 historical maps. Since 1861, the main change is that Building 92 was built where the Timber Sheds were previously located and the Timber Dock is now listed as "Old Timber Basin." The Shiphouse to the north of OU8 is now labeled Building 53, and is listed on other maps as the Franklin Shiphouse. There are some structures and railroad lines to the east and south of the eastern and southern quay walls of the Timber Basin. Building 83, a latrine that was built in 1902, can be seen east of the eastern quay wall. The 1910 historical map shows two distinct breaks in the quay wall, with the northern break in a slightly different location than as shown on the 1861 map. Differences between the northeastern shoreline of the Timber Basin from 1861 and on the 1901 to 1910 maps appear to be minor.
- Figure 3 - 1915: Filling of the northern portion of the Timber Basin likely began between 1913, when the Timber Basin was no longer being used, and 1915. A railroad line is present north of the 1915 northern shoreline of the Timber Basin, in the portion of the area that was filled.
- Figure 4 - 1917: Several changes have taken place between 1915 and 1917. Filling of the Timber Basin and use of the filled area continued in the northern portion of OU8. Racks for iron are now located in the northern portion of the site, in between the railroad

lines. The north-northeastern portion of the Timber Basin has been filled and Building 110 is present. Based on site history, Building 110 was used from 1917 until 1920 as a metal washing plant. Although the figure does not reflect the enclosure of the quay wall, which was reportedly done in 1917; the enclosure is reflected on the 1919 map (Figure 5).

- Figure 5 - 1919: Additional filling has taken place south of Building 110 and on the eastern-southeastern side of the site.
- Figure 6 - 1925: Additional filling has taken place and only a small area remains to be filled in the south western corner of the site. This small area is shown on maps from 1926 and 1930 and appears to be about the same size. Use of Building 110 changed to cleaning of steel plates (pickling) and pickling tanks and plate racks are now located in the vicinity of Building 110. By 1917, Building 51 was converted to an acetylene plant and the building was enlarged by 1925. Fuel oil tanks (in use until approximately 1939) supporting Building 92 (before expansion of the building into the OU8 area) can be seen east of the eastern quay wall.
- Figure 7 - 1940: From the 1935 map, filling appears to be completed in the Timber Basin, and the 1940 historical map shows the plate yard operations covering the area that was filled last at OU8. Building 110 and associated pickling tanks and plate racks are no longer present. Buildings 51 (within OU8) and Building 83 (east of OU8) were demolished as part of the construction of the Building 92 extension around 1939 to 1940. Before 1939, the acetylene plant was moved to another location. Building 53, which burnt to the ground around 1935, is no longer on the map. The plate yard includes plate racks, pickling tanks, washing aprons, and a potassium nitrate storage building (Building 157). As can be seen on this figure, filling to the west of the western quay wall has not begun. [Note that fuel tanks seen on the 1925 map (Figure 6), which were located in portion of Building 92 expansion that is east of the eastern quay wall, were apparently removed or abandoned in placed as part of the building expansion.]
- Figure 8 - 1947: The area west of OU8 has now been filled and Buildings 174 and 175 are present to the west of OU8. Review of a historical figure from 1941 shows that filling west of OU8 had begun and information on Building 174 and 175 indicate that they were built in 1941 or 1942. OU8 features remains similar; although it appears that a train track now runs along where the western quay wall was shown on the 1940 map (Figure 7). To the north of OU8, Building 234 is now adjacent to the site and Building 244 is adjacent to the north-east.
- Figure 9 - 1957: By 1957, the plate yard is still depicted as operational; however, no pickling tanks are present.
- Figure 10 – Aerial layout with historical shorelines: This figure shows the shorelines from different years. The western quay wall of the Timber Basin is the western-most shoreline until 1947. The offset in the western quay wall from the various historical maps can be seen and is within approximately 10 feet of what is depicted as the site boundary.

Based on review of maps from the 1960s to present and information on site history, the plate yard was in use until the late 1990s. Storage of potassium nitrate in Building 157 ended in the 1990s and the building was used as an office. The former plate yard was used for equipment storage and temporary facilities until 2006 when Building 157 and surface features were removed. The area is now used for office trailers, temporary buildings, and equipment storage.

Description of Historical Uses of OU8 and Historical and Archaeological Potential of OU8

In addition to the historical figures, the following documents were reviewed to understand the historical uses of OU8:

- Industrial History of West Timber Basin (Dolph and Bolger, May 1996)
- Initial Assessment Study (IAS) (Weston, 1983)
- Cradle of American Shipbuilding (PNS, December 1978)

- Cultural Resources Survey (Louis Berger Group, April 2003)

The following provides a summary of the site history, a listing of buildings within and immediately adjacent to OU8, and historical and archaeological potential for the OU8 and surrounding area.

The OU8 site history information is mainly based on the Industrial History of the West Timber Basin (Dolph and Bolger, May 1996) and review of historical maps for OU8. Naval warships built at PNS throughout the 19th Century were constructed with wood, and the wet storage and seasoning (drying) of the wood was conducted in the West Timber Basin. The Timber Basin was constructed between 1800 and 1830 for storage and seasoning of timber. In 1900 the Navy has proposed filling in the West Timber Basin to create additional space for other activities; however, the Timber Basin remained in used until a new Timber Basin was constructed. The new Timber Basin was constructed on the eastern side of the Shipyard, and by 1913, wet storage of timber in the West Timber Basin had ceased and was conducted in the new Timber Basin. Around 1917, the former West Timber Basin's granite block quay wall was enclosed, the northern portion of the former Timber Basin was partially filled, and a metal washing plant, Building 110, was constructed to further extract essential scrap. Based on excavations and borings advanced at the site, the fill material appears to consist of rock, soil, bricks, metal debris, cinders, wood, gravel, and other waste materials. Some of the by-products of operations in the metal washing plant, which operated for approximately 3 years, may have been discarded into the former West Timber Basin, including metals, ash, and skimmings. Between 1920 and 1940, cleaning of steel plates (pickling) continued in the area of Building 110.

The majority of filling of the former Timber Basin was completed by 1925, when only a small area in the southwestern corner had not been filled. By 1940, filling of the former Timber Basin was complete. Fill apparently included soil, rock, cinders, and other industrial debris. By 1940, Building 92 had been extended into the former West Timber Basin fill area. Around 1940, a metal plate yard was also constructed, which included a traveling crane, four pickling tanks, two washing aprons, and a potassium nitrate storage building (Building 157). There is no evidence of plating operations taking place at the site. Also in 1940, the metal washing plant (Building 110) and the acetylene plant (Building 51) were demolished. The plate yard was active for approximately 20 years and was the primary steel storage and pickling location at the Shipyard. The pickling tanks for the plate yard were removed from the site by 1957. Storage of potassium nitrate in Building 157 ended in the 1990s and the building was used as an office. The former plate yard was used for equipment storage and temporary facilities until 2006 when Building 157 and surface features were removed. The area is now used for office trailers, temporary buildings, and equipment storage.

Filling west of OU8 began sometime in 1941, and by 1947, the fill area west of OU8 extended to the current shoreline. Buildings 174 and 175, adjacent to the west of OU8, were built in 1941 or 1942.

The following discusses buildings within and immediately adjacent to OU8 that were present during OU8 past operations.

- Building 51: Within OU8. Originally built as a pitch house in 1858 and later converted to an acetylene plant. The building was demolished in 1940.
- Building 53: North of OU8. Shown on historical maps as the Franklin Shiphouse, which burnt to the ground around 1935.
- Building 83: East of OU8. Built in 1902. This building was a latrine until it was demolished in 1940.
- Building 92: Portion extends into OU8. The original portion of the building that was built around 1900 is located east of OU8. In 1940, the building was expanded to the west and a portion of the expanded building covers the eastern quay wall boundary of OU8. The

building is the Shipfitter's Shop and it is considered a historical building. Figure 7 shows the portion of the building that extends into OU8.

- Building 157: Within OU8. Built in 1939 for potassium nitrate storage. Used as part of the plate yard for storage and later as an office. Demolished in 2006 when the plate yard surface features were removed.
- Building 174: Mostly west of OU8. Built in 1941 or 1942 as a utility building, the building was expanded as part of a project conducted from 2011 to 2013 and a small portion of the expansion on the eastern side of the building was built over OU8. A utility trench to support the building expansion also extended into OU8.
- Building 175: West of OU8. Built in 1941 or 1942. This building continues to be used as a substation. The building is considered a historical building.
- Building 234: North of OU8. Built in 1951 and has been in use as an AC Switching Station.
- Building 244/285: East of OU8. Information is not available on Building 244, which is on the 1947 and 1957 historic maps. Building 285, built in 1963, is located where Building 244 was located. Building 285 is a sandblast shed.

A portion of PNS is on the National Register of Historic Places. The area between the two ridges connecting PNS to Kittery, Maine, was placed on the Register by the National Park Service in 1977. A Cultural Resources Survey of PNS was conducted in the early 2000s by Louis Berger Group, Inc. Based on the survey, the boundary of the PNS Historic District was expanded and includes the majority of the Controlled Industrial Area (CIA), which includes OU8. Two other historic districts were identified in the survey (Portsmouth Naval Hospital and Portsmouth Naval Prison Historic Districts), which are located on the eastern portion of PNS. According to the survey, the potential for prehistoric and historic archaeological resources, including architectural resources, exists at PNS; however, the entire OU8 area is in a no-sensitivity area in terms of potential prehistoric archaeological resources, and the eastern portion of the site is in a low-sensitivity area for historic archaeological resources, as defined by the Cultural Resources Survey (Louis Berger Group, April 2003). The Cultural Resources Survey shows Building 92 as a contributing element in the PNS Historic District. Building 175, located west of OU8 is also considered a historic facility. During construction activities associated with the recent expansion of Building 174, the western quay wall of the West Timber Basin (which forms the western boundary of OU8), was located. The quay wall is also considered to have historical significance.

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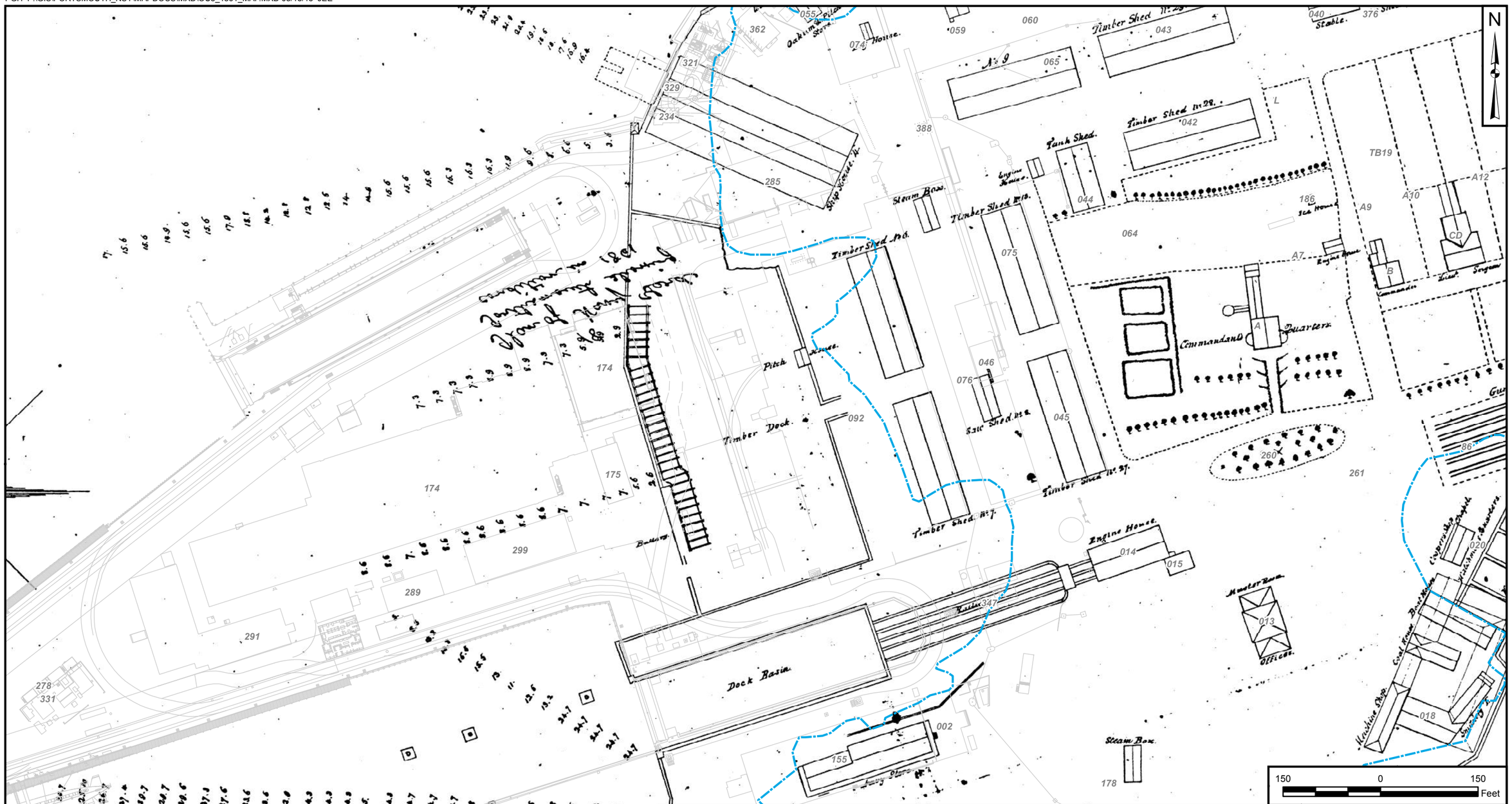

DRAWN BY	DATE
S. PAXTON	11/25/13
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D. COHEN	08/13/15
REVISED BY	DATE
J. ENGLISH	08/13/15
SCALE	
AS NOTED	

TETRA TECH

1861 HISTORICAL MAP FOR OPERABLE UNIT 8 AREA
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

CONTRACT NUMBER	CTO NUMBER
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APPROVED BY	DATE
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APPROVED BY	DATE
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FIGURE NO. FIGURE 1	REV 0

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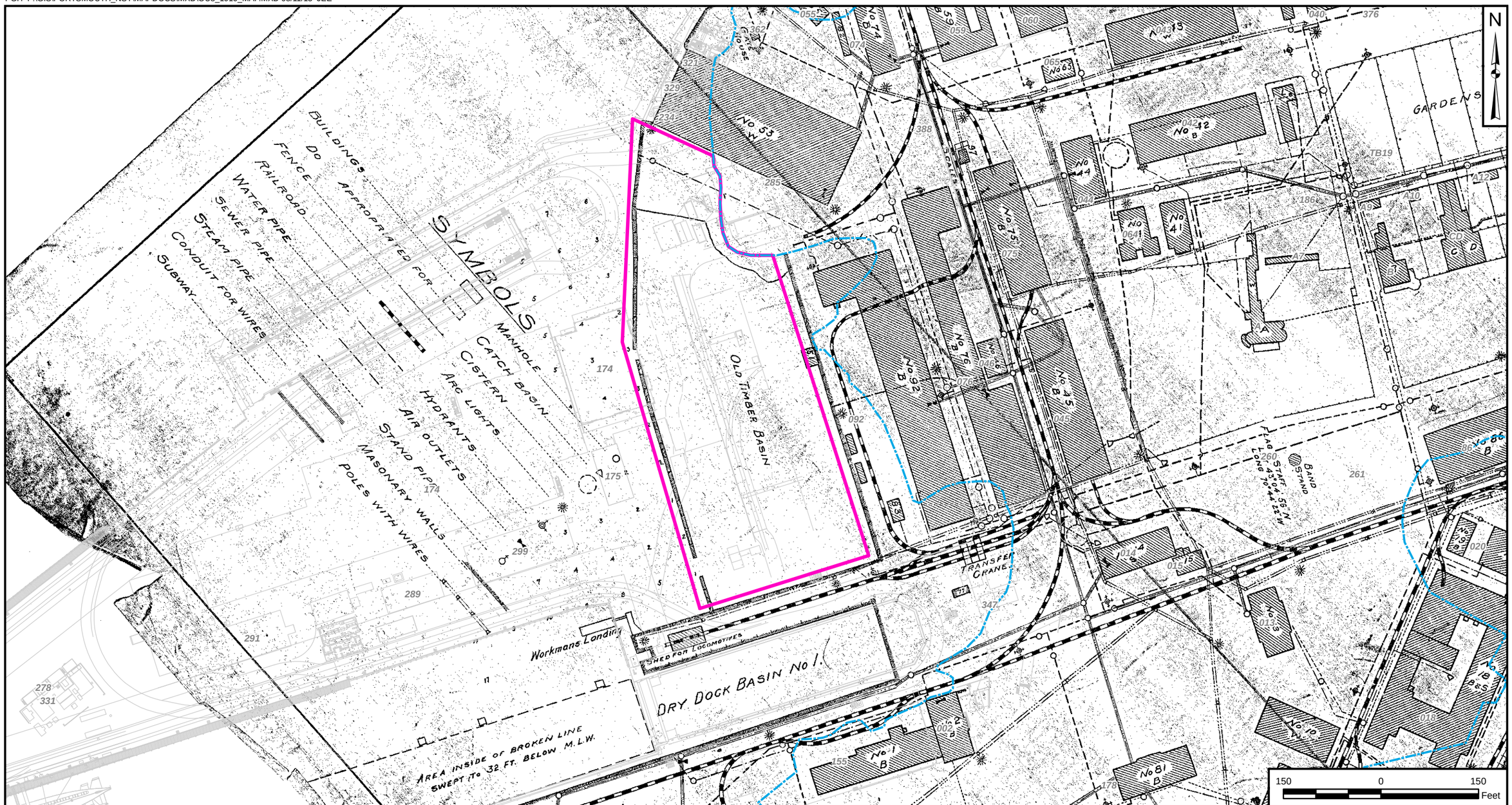
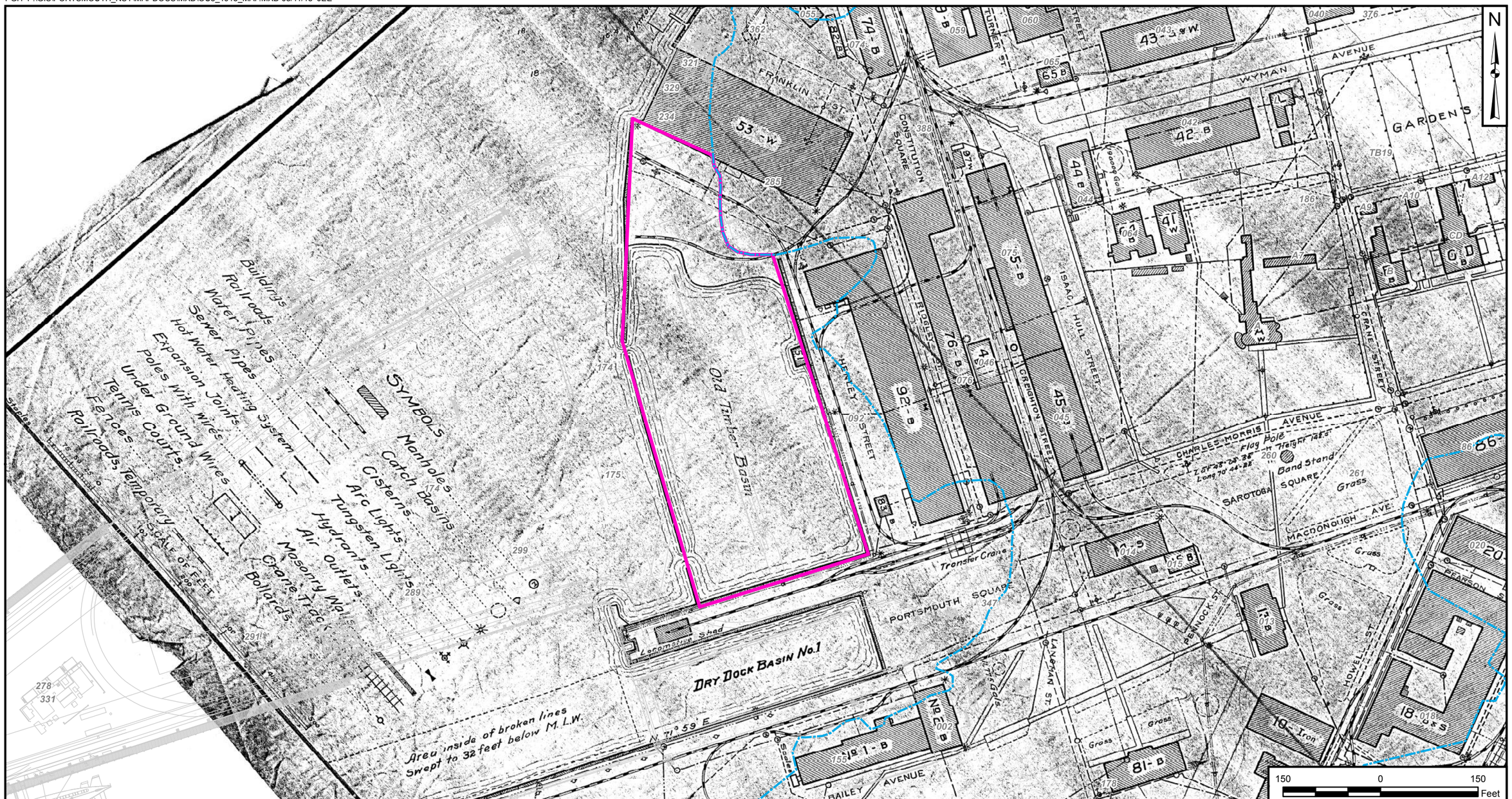


Legend

- Circa 1826 Shoreline
- Site 31 Boundary

DRAWN BY S. PAXTON	DATE 11/25/13	TETRA TECH	CONTRACT NUMBER ___ / CTO NUMBER ___
CHECKED BY D. COHEN	DATE 08/11/15	1910 HISTORICAL MAP FOR OPERABLE UNIT 8 AREA PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY ___ / DATE ___
REVISED BY J. ENGLISH	DATE 08/11/15		APPROVED BY ___ / DATE ___
SCALE AS NOTED			FIGURE NO. FIGURE 2 / REV 0

PGH P:\GIS\PORTSMOUTH_NSY\MAPDOCS\MXD\OU8_1915_MAP.MXD 08/11/15 JEE



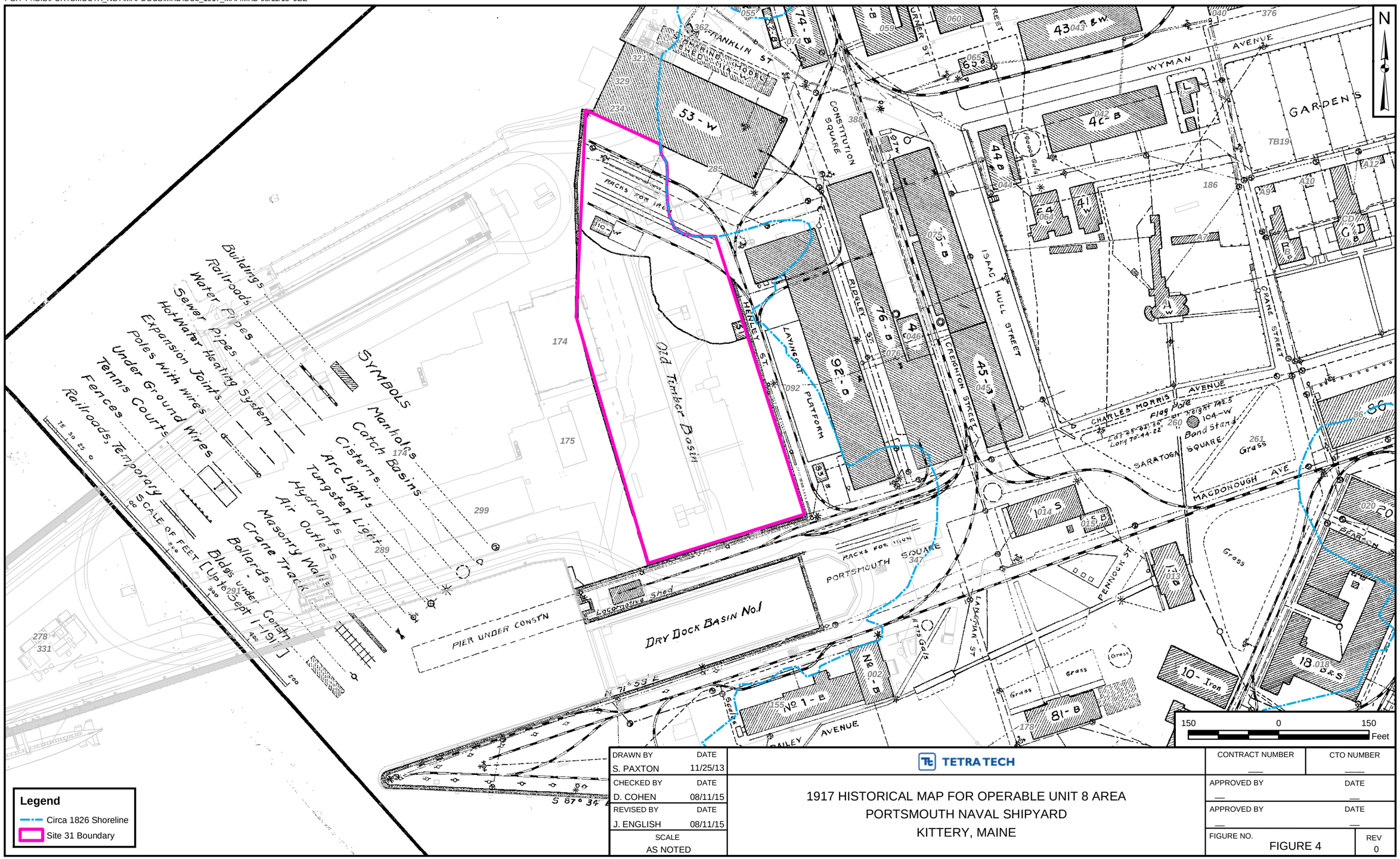
DRAWN BY	DATE
S. PAXTON	11/25/13
CHECKED BY	DATE
D. COHEN	08/11/15
REVISED BY	DATE
J. ENGLISH	08/11/15
SCALE	
AS NOTED	

TETRA TECH

1915 HISTORICAL MAP FOR OPERABLE UNIT 8 AREA
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

CONTRACT NUMBER	CTO NUMBER
—	—
APPROVED BY	DATE
—	—
APPROVED BY	DATE
—	—
FIGURE NO. FIGURE 3	REV 0

PGH P:\GIS\PORTSMOUTH_NSY\MAPDOCS\MXD\OU8_1917_MAP.MXD 08/11/15 JEE



DRAWN BY	DATE
S. PAXTON	11/25/13
CHECKED BY	DATE
D. COHEN	08/11/15
REVISED BY	DATE
J. ENGLISH	08/11/15
SCALE	
AS NOTED	

TETRA TECH

1917 HISTORICAL MAP FOR OPERABLE UNIT 8 AREA
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

CONTRACT NUMBER	CTO NUMBER
—	—
APPROVED BY	DATE
—	—
APPROVED BY	DATE
—	—
FIGURE NO.	REV
FIGURE 4	0

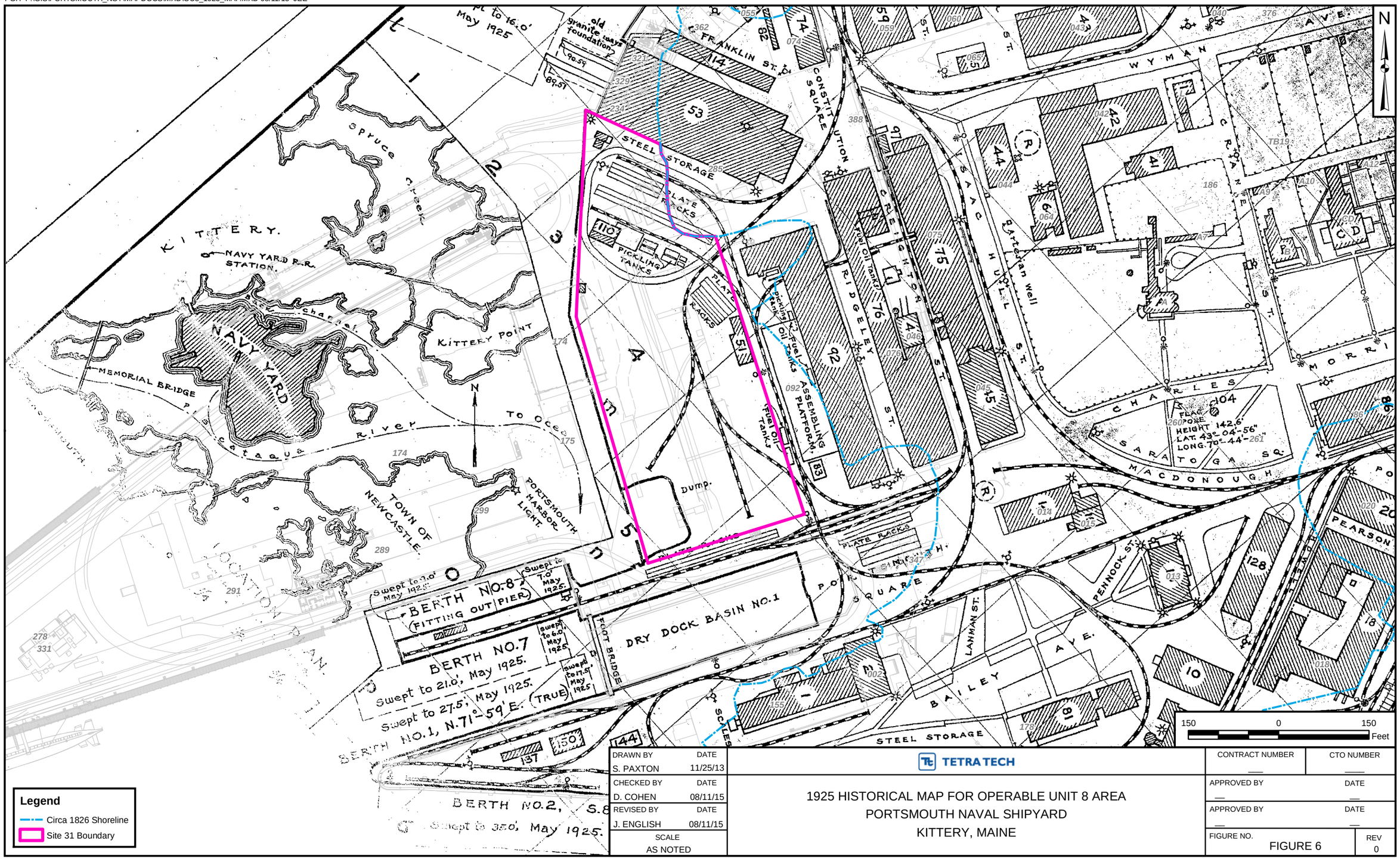
PGH P:\GIS\PORTSMOUTH_NSY\MAPDOCS\MXD\OU8_1919_MAP.MXD 08/11/15 JEE

Legend

- Circa 1826 Shoreline
- Site 31 Boundary

DRAWN BY S. PAXTON	DATE 11/25/13	TETRA TECH	CONTRACT NUMBER — / CTO NUMBER —
CHECKED BY D. COHEN	DATE 08/11/15	1919 HISTORICAL MAP FOR OPERABLE UNIT 8 AREA PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY — DATE —
REVISED BY J. ENGLISH	DATE 08/11/15		APPROVED BY — DATE —
SCALE AS NOTED			FIGURE NO. FIGURE 5 / REV 0

PGH P:\GIS\PORTSMOUTH_NSY\MAPDOCS\MXD\OU8_1925_MAP.MXD 08/11/15 JEE

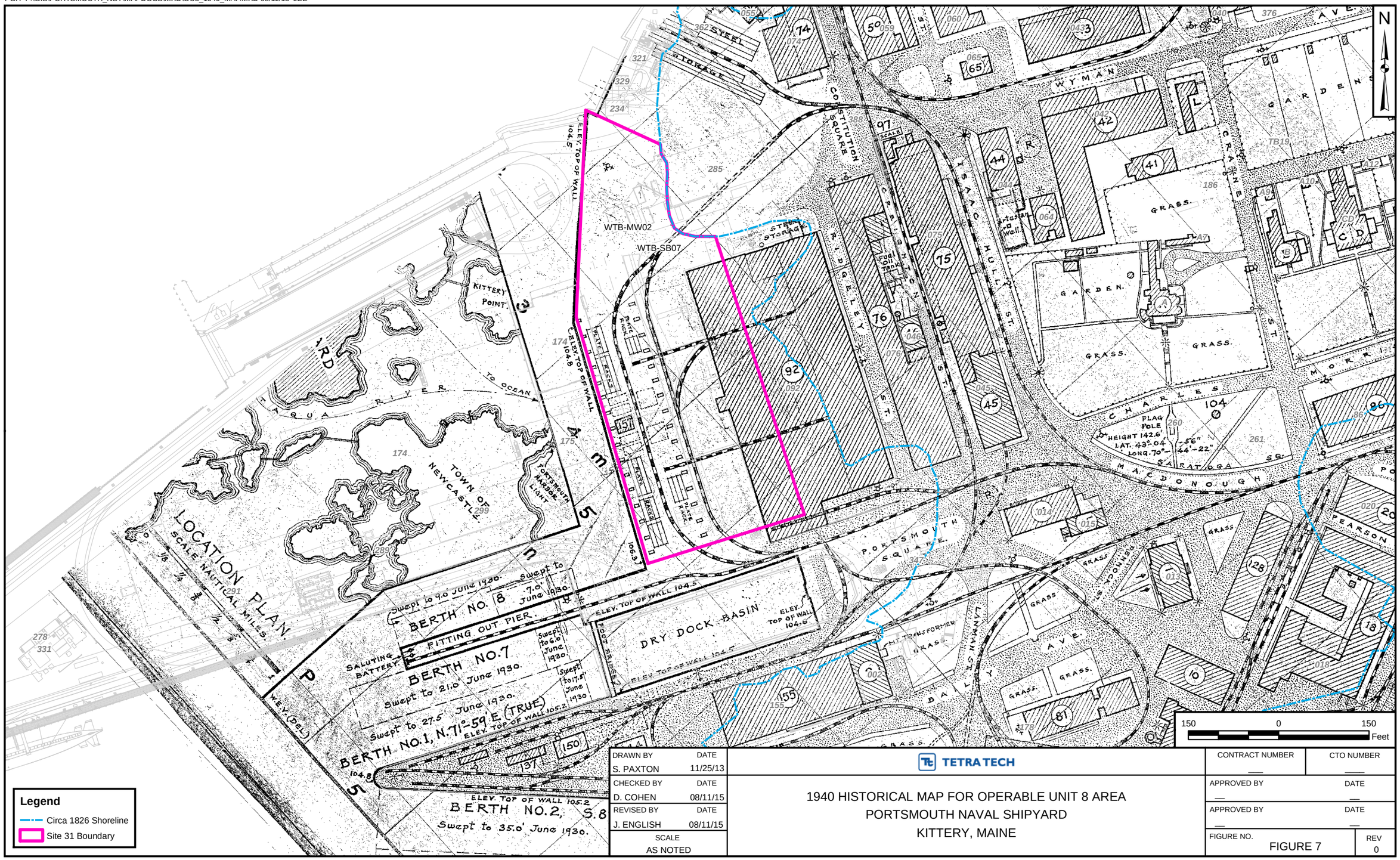


Legend

- Circa 1826 Shoreline
- Site 31 Boundary

DRAWN BY S. PAXTON	DATE 11/25/13	TETRA TECH	CONTRACT NUMBER — / CTO NUMBER —
CHECKED BY D. COHEN	DATE 08/11/15	1925 HISTORICAL MAP FOR OPERABLE UNIT 8 AREA PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY — / DATE —
REVISED BY J. ENGLISH	DATE 08/11/15		APPROVED BY — / DATE —
SCALE AS NOTED			FIGURE NO. FIGURE 6 / REV 0

PGH P:\GIS\PORTSMOUTH_NSY\MAPDOCS\MXD\OU8_1940_MAP.MXD 08/11/15 JEE



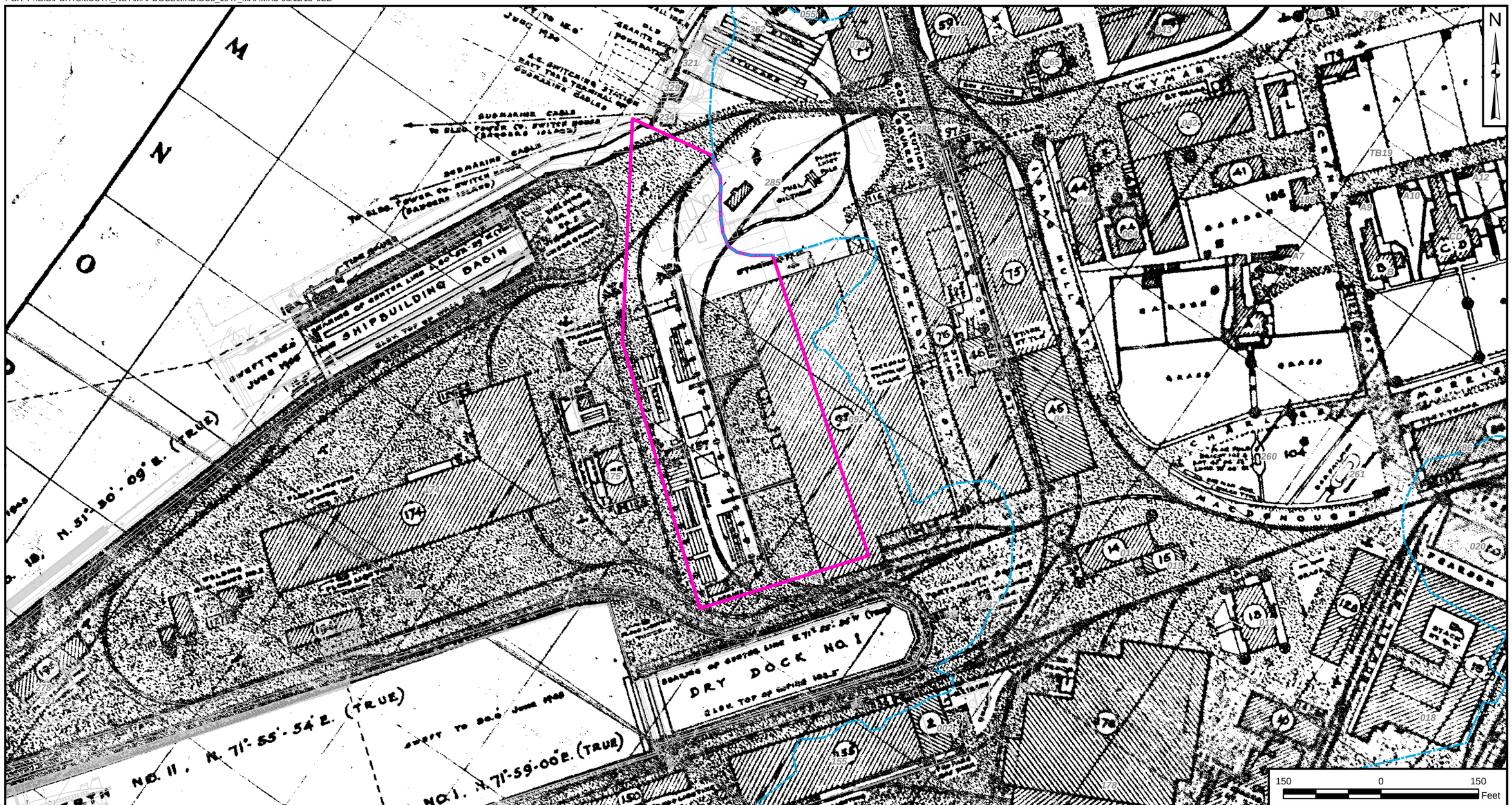
DRAWN BY	DATE
S. PAXTON	11/25/13
CHECKED BY	DATE
D. COHEN	08/11/15
REVISED BY	DATE
J. ENGLISH	08/11/15
SCALE	
AS NOTED	

TETRA TECH

1940 HISTORICAL MAP FOR OPERABLE UNIT 8 AREA
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

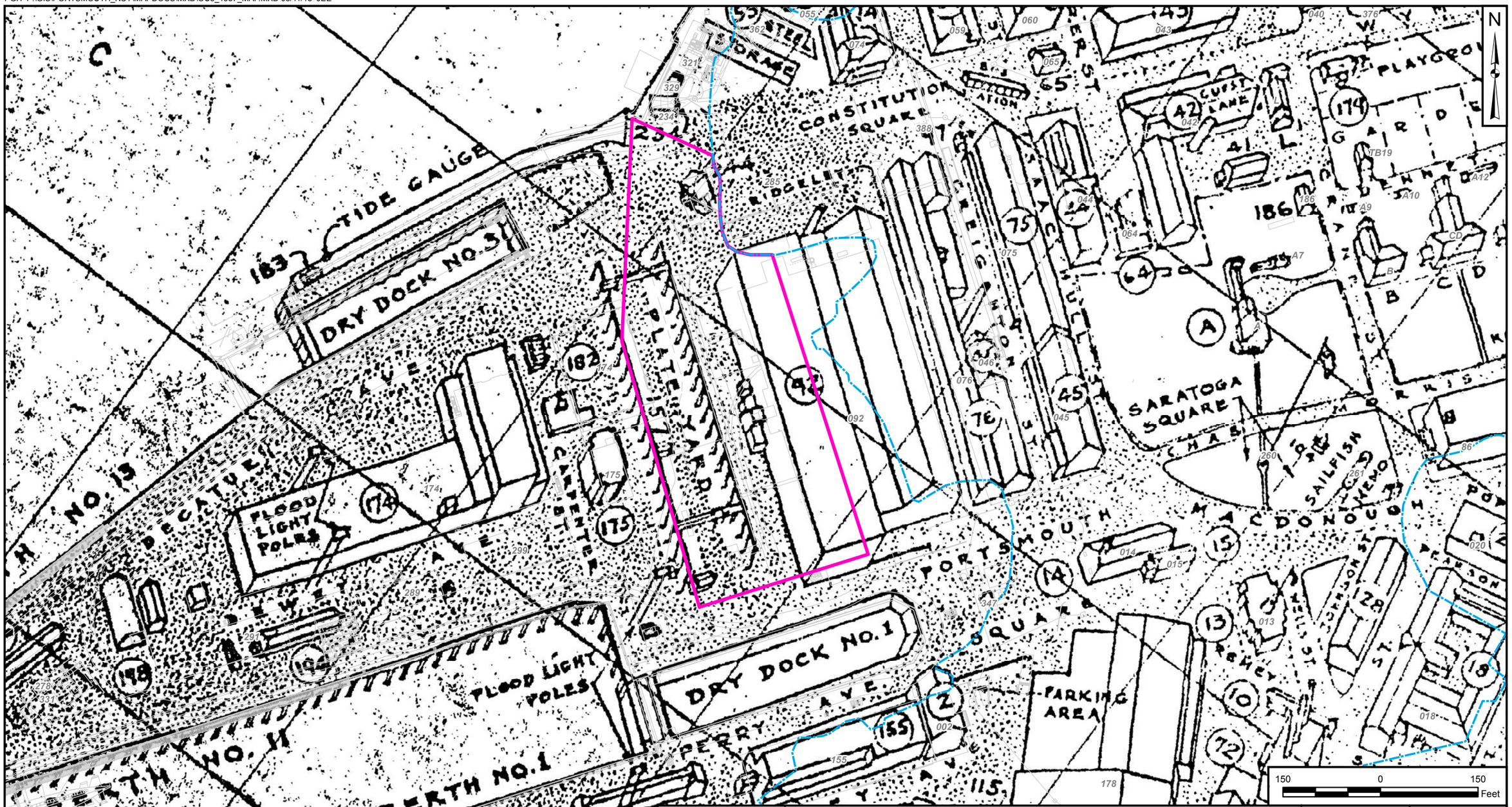
CONTRACT NUMBER	CTO NUMBER
—	—
APPROVED BY	DATE
—	—
APPROVED BY	DATE
—	—
FIGURE NO. FIGURE 7	REV 0

PGH P:\GIS\PORTSMOUTH_NSY\MAPDOCS\MXD\OU8_1947_MAP.MXD 08/11/15 JEE



DRAWN BY S. PAXTON	DATE 11/25/13	TETRA TECH	CONTRACT NUMBER ___ / CTO NUMBER ___
CHECKED BY D. COHEN	DATE 08/11/15	1947 HISTORICAL MAP FOR OPERABLE UNIT 8 AREA PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY ___ / DATE ___
REVISED BY J. ENGLISH	DATE 08/11/15		APPROVED BY ___ / DATE ___
SCALE AS NOTED			FIGURE NO. FIGURE 8 / REV 0

PGH P:\GIS\PORTSMOUTH_NSY\MAPDOCS\MXD\OU8_1957_MAP.MXD 08/11/15 JEE



DRAWN BY	DATE
S. PAXTON	11/25/13
CHECKED BY	DATE
D. COHEN	08/11/15
REVISED BY	DATE
J. ENGLISH	08/11/15
SCALE	
AS NOTED	

TETRA TECH

1957 HISTORICAL MAP FOR OPERABLE UNIT 8 AREA
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

CONTRACT NUMBER	CTO NUMBER
—	—
APPROVED BY	DATE
—	—
APPROVED BY	DATE
—	—
FIGURE NO. FIGURE 9	REV 0

PGH P:\GIS\PORTSMOUTH_NSY\MAPDOCS\MXD\OU8_HISTORICAL_SHORELINES_AERIAL.MXD 08/11/15 JEE

DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
K. MOORE	08/10/15		—	—
CHECKED BY	DATE	HISTORICAL SHORELINES	APPROVED BY	DATE
D. COHEN	08/11/15	OPERABLE UNIT 8	—	—
REVISED BY	DATE	PORTSMOUTH NAVAL SHIPYARD	APPROVED BY	DATE
J. ENGLISH	08/11/15	KITTERY, MAINE	—	—
SCALE			FIGURE NO.	REV
AS NOTED			FIGURE 10	0

BOUNDARY EVALUATION

INFORMATION TO SUPPORT OU8 SITE BOUNDARY

As part of development of the Remedial Investigation (RI) Sampling and Analysis Plan (SAP), the site boundary was develop based on the past site operations within the boundaries of the filled in West Timber Basin and in an area north of former Building 110 and south of former Building 53, the boundaries of OU8 were established by Timber Basin quay wall to the east, south, and west and to the edge of former Building 53. In the small northeastern portion where there was no quay wall, the circa 1826 shoreline was used for the site boundary. The following is a re-evaluation of the site boundary based on the additional information collected during the RI. Filling of the area around and at the West Timber Basin was evaluated based on historical maps and information on the Timber Basin history. Soil boring logs from the 1998 SSI and 2015 RI field work for OU8 and from Shipyard renovation projects for Buildings 92 and 174 were reviewed to identify where fill material contained slag, cinders, and ash, which may have contributed to metals and PAH contamination in soil at OU8. A recommendation is also provided for modification to the OU8 boundary for evaluation of alternatives in the FS.

The Timber Basin was constructed between 1800 and 1830. Historical maps were not available for the time before the Timber Basin was constructed; however, the Shipyard has a map showing the approximate 1826 to 1831 shoreline (referred to as the circa 1826 shoreline). The circa 1826 shoreline reflects the shoreline before the Timber Basin was built and Dry Dock No. 1 (to the south of the Timber Basin) was built. The area between the 1826 shoreline and the Timber Basin walls as shown on the 1861 historical map, excluding where Dry Dock No. 1 is now, was apparently filled sometime between 1826 and 1860. Although the current Dry Dock No. 1 was constructed in 1943, the location has been used as a dry dock since at least the 1850s. As part of the historical evaluation, figures were prepared overlaying the current base map on historical maps between 1861 and 1957. Figure 1 shows the boundary of the Timber Basin as depicted on the 1861 historical map and approximately lines of filling of the Timber Basin after use was discontinued in 1913. Based on available historical maps for the area, filling was completed by 1935 and use of the area as a plate yard began by 1940. To overlay the historical map on current facility maps, existing buildings also present on historical maps were aligned as close as possible across the entire facility, or the area that was shown on the historical map. For OU8, an offset can be seen in the quay wall locations (see Figure 10 in Appendix A.1). This offset appears to be within approximately 10 feet, and likely affected the exact location of the extent of filling of the Timber Basin as reflected on Figure 11. This offset was considered in the recommendations for modification to the OU8 boundary.

Features forming boundary of West Timber Basin and OU8:

North: The Franklin Shiphouse (shown as Shiphouse on the 1861 map and later as Building 53) was built from 1835 to 1838. The building was present until approximately 1935. This building was used as the northern most extent of OU8 based on site operations (e.g., metal washing) occurring between the northern wall of the Timber Basin and the southern wall of the Shiphouse. The northern portion of the site (north of the northern quay wall) was completed before 1861 and likely around the time the Shiphouse was built. Soil boring WTB-024, located north of the northern quay wall, installed and sampled as part of the 2015 RI field work showed no slag/ash cinders), further supporting placement of the northern boundary.

East: The 1826 shoreline on the northeast portion and the eastern quay wall of the Timber Basin were used as the eastern site boundary for the RI SAP. The eastern portion of the site was filled between approximately 1915 to 1919. Borings show that cinder, ash, slag, and/or coal were observed in soil in borings west of the eastern quay wall, but not in borings east of the eastern quay wall. The portion of the eastern boundary that aligns with the eastern quay wall is under the addition to Building 92 that was built in 1940. Based on the location of the eastern quay wall on the various historical maps and the borings showing cinder, ash, slag, and/or coal was not

observed to the east of this quay wall, the eastern boundary for OU8 is supported by geological data from boring logs and historical maps. It is suggested that the northern portion of the eastern boundary be squared up such that the northern boundary is extended southeast and the line from the for the quay wall extended north until the two lines meet, rather than using the curving line of the 1826 shoreline. This may be easier for implementing LUCs and would extend the area east of WTB-SB23 to address any uncertainty in the extent of PAH contamination in soil.

South: The southern quay wall of the Timber Basin was used as the southern site boundary for the RI SAP. The dry dock has been present since 1861 and the area between the dry dock and southern quay wall was filled before 1861. A railroad line, approximately 25 feet north of the dry dock and approximately 25 feet south of the southern quay wall, was present since the early 1900s until at least 1947. Most of the southern portion of the site was filled from 1917 to 1925, except for the western corner, which was filled between 1925 and 1935. One boring collected as part of the Building 92 renovation project apparently was collected south of the quay wall and slag was observed in the boring. Because the southern quay wall has not been field located and there are no other borings south of the quay wall, it is possible that the actual location of the quay wall may be shifted south. Therefore, shifting the southern boundary of OU8 10 to 20 feet to the south would account for the uncertainty in the southern extent.

West: The western quay wall was used as the western site boundary. Because filling of the site occurred from north-northeast to west-southwest, filling along the northern portion of the western side occurred between 1915 and 1919 and most of the remaining portion was filled by 1925. The southwestern corner was filled between 1925 and 1940. A portion of the western quay wall was field confirmed during the Building 174 renovation project and borings installed as part of the renovation project show that cinders, ash, slag, and/or coal were not observed west of the quay wall. WTB-MW05/SB05, sampled as part of the SSI and located west of the western quay wall, showed concentrations similar to or less than concentrations in the upgradient WTB-MW01/SB01 in soil, other than an elevated detection of mercury (109 mg/kg). The mercury in the surface soil at this location could not be confirmed based on the other sample results from the SSI and RI sampling and is not considered related to OU8 and is likely an anomaly. Lead in subsurface soil was slightly elevated, but within the range of lead detections in facility background. Therefore, this location was not included in the site boundary.

Based on the evaluation, the following changes to the boundary are recommended:

- North: No change is recommended.
- East: Recommend squaring off the boundary for ease of LUC inspection and maintenance.
- South: Recommend extending the boundary 20 feet to the south.
- West: No change is recommended.

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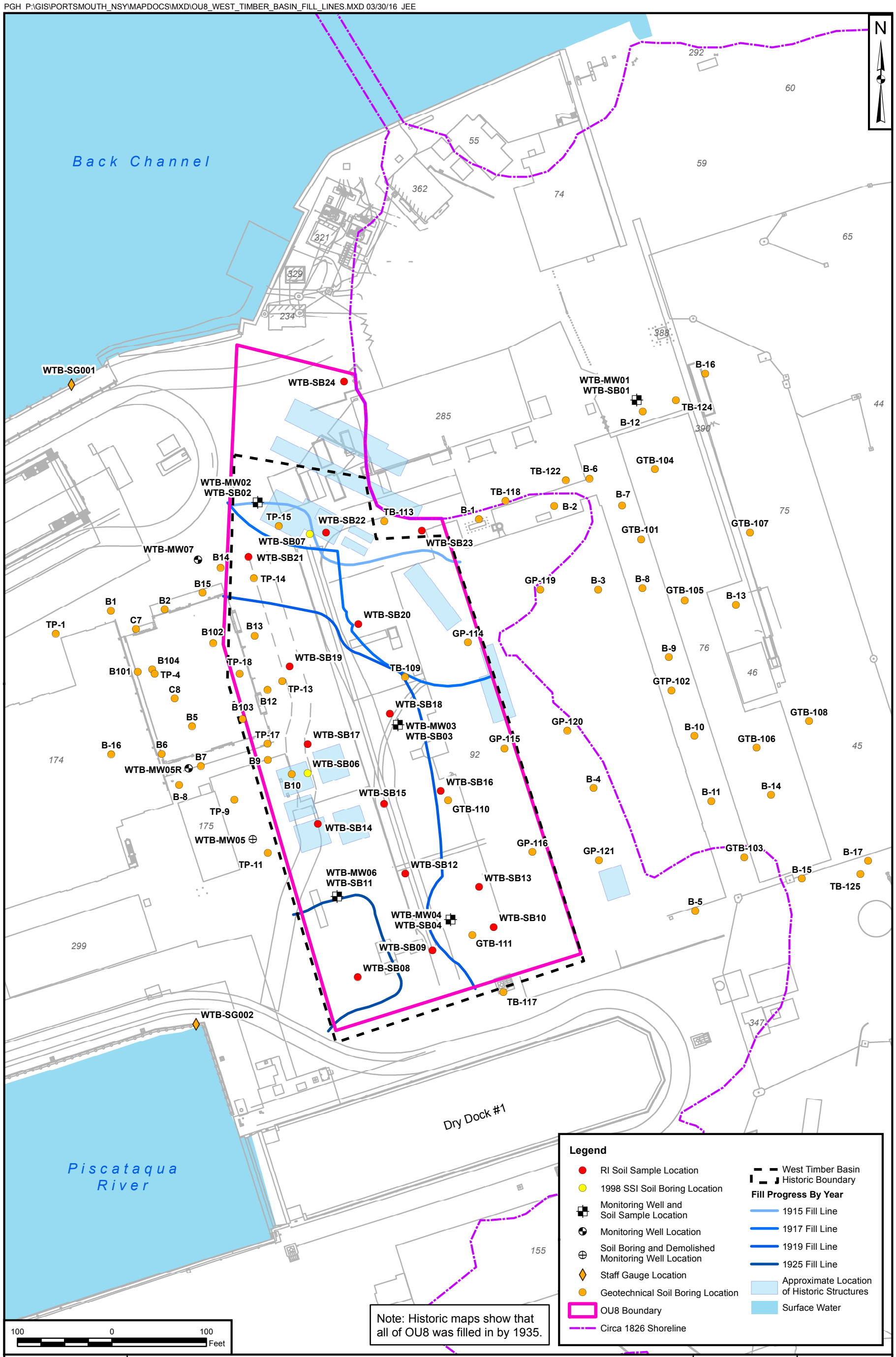


DRAWN BY	DATE	TETRA TECH	CONTRACT NUMBER	CTO NUMBER
J. ENGLISH	08/13/15		3270	____
CHECKED BY	DATE	WEST TIMBER BASIN BOUNDARY AND FILL LINES PORTSMOUTH NAVAL SHIPYARD KITTERY, MAINE	APPROVED BY	DATE
M. VED	03/30/16		___	___
REVISED BY	DATE		APPROVED BY	DATE
___	___		___	___
SCALE AS NOTED			FIGURE NO. FIGURE 11	REV 0

A.2 SOIL BORING AND MONITORING WELL CONSTRUCTION LOGS (ON CD)

2015 SOIL BORING AND MONITORING WELL CONSTRUCTION LOGS

TETRA TECH

BORING LOG

PROJECT NAME: Portsmouth NSY - OU8
PROJECT NUMBER: 112G03270
DRILLING COMPANY: TDS
DRILLING RIG: Geoprobe 54 LT Track

BORING No.: WTB-SB08
DATE: 6-4-15
GEOLOGIST: T. Evans
DRILLER: A. Natsis

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Headspace	Borehole**	BZ**
	0								Time				
* DPT-1			1.5			Tan	Asphalt 5"	SP	0820		N/A		
	2		2.0			Brn DKBrn	F Sand Tr Rock Chips m F Sand Some C Sand Slag	SW	Dry Rock Frags @ 1.5-2				
** DPT-2			2.9			Brn	Silty F Sand	SM	0825				
			4.0				Some Rock Chips, Slag	SW	Dry				
						Blk	Slag Cinders (C Sand Size) Tr Ash	SW					
	6					LtBrn			Moist @ 5'				
*** DPT-3			1.7			Brn	F-M Sand Tr Brick	SP	0830				
			4.0						Sleeve wet				
									Water @ ~7.8'				
	10					Tan Brn	Rock Chips Some Silt Tr Ash(?)	GW					
						Blk	Rock Chips Tar(?) Some metal Tr Glass	GW					
							EOB @ 10'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: Macrocore 0 - 10'
* WTB-SS-08-0002 + WTB-FD01-060415
** WTB-SB-08-0206 *** WTB-SB-08-0610

Converted to Well: Yes ____ No X Well I.D. #: ____

TETRA TECH

BORING LOG

PROJECT NAME: Portsmouth NSY - OU8
PROJECT NUMBER: 112G03270
DRILLING COMPANY: TDS
DRILLING RIG: Geoprobe 54 LT Track

BORING No.: WTB-SB09
DATE: 6-4-15
GEOLOGIST: T. Evans
DRILLER: A. Natsis

	Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Headspace	Borehole**	BZ**
		0								TIME				
*	DPT-1			1.9/	xxx		Brn	ASPHALT 2" F-C Sand	SW	0840		N	/A	
		2		/2.0			Gray Tan Brn	Rock Frags Silty F Sand, Slag @ bottom	GW SM	Dry Damp				
**	DPT-2			2.3/			Brn	Brown Rock Frags &	SM	0845				
				/4.0				Silty F Sand						
					4.2		Blk	Cinders (C Sand-Size)	SW	Dry				
		6						Tr Coal, Ash, Slag						
***	DPT3			2.5/	5		Red Brn to Blk	Cinders & Slag (C Sand Size)	SW	0850				
				/4.0				Tr F Gravel-Size)		wet ~6-7'				
							to Lt Brn							
		10			9.5		Blk	Silt (?) some C Sand size material Tr Rubber, Wood	MH	(Graphite - feel)				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: Macrocore 0-10'
* WTB-SS-09-0002 *** WTB-SB-09-0610
** WTB-SB-09-0206

Converted to Well: Yes ____ No X Well I.D. #: ____

TETRA TECH

BORING LOG

PROJECT NAME: Portsmouth NSY - OU8
PROJECT NUMBER: 112G03270
DRILLING COMPANY: TDS
DRILLING RIG: Geoprobe 54 LT Track

BORING No.: WTB-SB10
DATE: 6-5-15
GEOLOGIST: T. Evans
DRILLER: A. Natsis

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Headspace	Borehole**	BZ**
	0								Time				
* DPT-1			2.0	0.9		Gray	Asphalt 2" Broken rock Subase	GP	0850		N/A		
	2		2.0			Tan	F-M Sand Tr Br. Rock	SP	Dry-Damp				
** DPT-2			2.3						0855				
			4.0				Tr C Sand - F Gravel 3-4'						
				4.5									
	6					Blk	Cinder, Slag Tr Br Rock						
DPT-3			0.2			Blk	- Poor Recovery -		0900				
			4.0				F-M Sand /	GM	V Moist				
				3			Weath Metapelite						
	10						Tr Silt, Slag						
							Re-collect						
							6-10' interval						
							@ location 18"N						
	6												
** DPT-4			1.4			Dk	F-M Sandy Silt	SM	1000				
			4.0			Brn	Some Br Rock	/	Sleeve wet				
						Blk	Tr Brick	GM	Water @ 8.3'				
	10												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: Macro core 0-10
* WTB-SS-10-0002 *** WTB-SB-10-0610
** WTB-SB-10-0206

Converted to Well: Yes ____ No X Well I.D. #: ____

TETRA TECH

BORING LOG

PROJECT NAME: Portsmouth NSY - OU8
PROJECT NUMBER: 112G03270
DRILLING COMPANY: TDS
DRILLING RIG: Geoprobe 54LT Track

BORING No.: WTB-SB12
DATE: 6-4-15
GEOLOGIST: T. Evans
DRILLER: A. Natsis

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Headspace	Borehole**	BZ**
	0								Time				
* DPT-1			1.8			Gray	Asphalt 2" Rock Subbase	GP	1005		N	/A	
	2		2.0			Blk/Gray	Broken Asphalt Broken Rock w/ F-C Sand	GW	Dry				
						Gray	Broken Rock						
** DPT-2			3.2			Blk to Lt Brn	Cinders, Slag	GW/SW	1008 wet				
			4.0			Gray	Rock Frag						
	6					Tan Brn Blk	F Sand Cinders (5.5-6.0')	SP	Moist to wet				
						Blk to	Cinders	SW	1015				
*** DPT-3			2.3				Tr Some Slag		Moist				
			4.0			Lt Brn	Tr Red Dog, Brick Ash						
	10			9.7			Silt Some F Sand Tr Rock	SM	Wet 8-9'				
							EOB @ 10'						
							Collect additional		1055				
							Sample 0-2' Aver 2' South						
	0						Asphalt 2"						
DPT-4							Broken Asphalt / Subbase to 1'	SW					
	2					Dk Brn Brn	Wood F-C Sand Tr Rock	SW					

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: macrocore 0-10'
* WTB-SS-12-0002 *** WTB-SB-12-0610
** WTB-SB-12-0206

Converted to Well: Yes ____ No X Well I.D. #: ____

TETRA TECH

BORING LOG

PROJECT NAME: Portsmouth NSY - OU8
PROJECT NUMBER: 112G03270
DRILLING COMPANY: TDS
DRILLING RIG: Geoprobe 54LT Track

BORING No.: WTB-SB13
DATE: 6-5-15
GEOLOGIST: T. Evans
DRILLER: A. Natsis

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Headspace	Borehole**	BZ**
	0								Time				
* DPT-1			1.1			Grey	Asphalt 2" Broken Rock Subbase	GP	0830		N	A	
	2		2.0			Tan Brn	F-M Sand Tr F Gravel	SP	Damp				
* * DPT-2			2.6			↓	↓		0833				
			4.0	3.6		Dk Brn	Silt & Slag, Br. Rock	GM	Moist				
				5.2									
	6					Blk	Cinders, Slag (Sand Tr Coal / Sides)	SW	Dry Ash @ 5.6'				
* * * DPT-3			2.0						0840				
			4.0										
				8.4	Slag	White Tan	F-M Sand Tr F Gravel	SP	Wet @ 9'				
	10					Blk	Cinders @ 9-9.1'	SW					
						Brn	Silty F-M Sand Some Rock Frags Tr Cinders & Brick	GM	9.1-9.5				
						Dk Brn	Rock Frags & F-C Sand Some Silt	GW	9.5-10				
							EOB @ 10'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): -

Remarks: Macrocore 0-10'
* WTB-SS-13-0002 *** WTB-SB-13-0610
** WTB-SB-13-0206

Converted to Well: Yes ____ No X Well I.D. #: ____

TETRA TECH

BORING LOG

PROJECT NAME: Portsmouth NSY - OU8
PROJECT NUMBER: 112G03270
DRILLING COMPANY: TDS
DRILLING RIG: Geoprobe 54LJ Track

BORING No.: WTB - SB14
DATE: 6-3-15
GEOLOGIST: T. Evans
DRILLER: A. Natsis

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Headspace	Borehole**	BZ**
	0								Time				
DPT-1			1.9	XXX			Asphalt 0-5"		0915 *		N/A		
	2		2.0			Brn	F, M Sand TR C Sand & F&C Gravel	SP	Dry				
						Brn	Same as above	↓					
DPT-2			2.3				- Rock Frag -		0925 **				
			4.0			Blk	Brn C Sand Some Silt	SW	Dry				
	6					Brn	F-C Sand Some F Gravel	SW					
DPT-3			1.0/1.0			Gray	Rock Frags TR C Sand	GP	Wet @ ~ 6.8'				
			1 "				- Wood @ 6.5-7 (creosote) in		0930 6-7'				
				EOB @ 7'			first hole		Refusal @ 7'				
	10			(Refusal)					Move 3' SW 0950 Refusal @ 7'				
									Move 3' SW 1020 Refusal @ 7'				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: MacroCore 0 - 7'
* WTB-SS14-0002
** WTB-SB14-0206 + WTB-FD01-060315

Converted to Well: Yes ____ No X Well I.D. #: ____

TETRA TECH

BORING LOG

PROJECT NAME: Portsmouth NSY - OU8
PROJECT NUMBER: 112G03270
DRILLING COMPANY: TDS
DRILLING RIG: Geoprobe 54LT Track

BORING No.: WTB - SB 15
DATE: 6-4-15
GEOLOGIST: T. Evans
DRILLER: A. Natsis

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Headspace	Borehole**	BZ**
	0												
* DPT-1			1.7/			Gray	Asphalt 3" Broken Rock Shale	GW	1025		N	/A	
	2		2.0			Gray Brn	Broken Rock & F-C Sand	GW	Dry				
						Gray	Broken Rock Frag	GW	1030				
** DPT-2			3.0/4.0										
				4.5		Tan	Silty F Sand Tr Clay	SM	Moist				
	6			5.7		Brn	Silty F-M Sand Debris Rock Frags & Tr C Sand	GW	Moist Blk Cinders 5.9-6.0				
*** DPT-3			2.1/4.0			Brn & Gray	Broken Rock & F-C Sand	GW	1035 Dry				
				8.4		Blk	Cinders & Slag (C-Sand Size) Tr Wood Coal	SW	Moist - Wet				
	10								Water @ ~8-9'				
							EOB @ 10						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): –

Remarks: Machine 0-10'
* WTB-SS-15-0002 *** WTB-SB-15-0610
** WTB-SB-15-0206 + WTB-FD02-060415

Converted to Well: Yes ____ No X Well I.D. #: ____

TETRA TECH

BORING LOG

PROJECT NAME: Portsmouth NSY - OU8
PROJECT NUMBER: 112G03270
DRILLING COMPANY: TDS
DRILLING RIG: Geoprobe SH LT Track

BORING No.: WTB-SB16
DATE: 6-4-15
GEOLOGIST: T. Evans
DRILLER: A. Natsis

	Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Headspace	Borehole**	BZ**
		0												
*	DPT-1			1.7/2.0	XXX 1.2		Gray	Asphalt 3" Broken Rock	GM	1105		N/A		
		2					Brn	Silty F Sand Some C Sand & Rock Tr Asphalt	GM	Dry-Damp				
**	DPT-2									1110				
				0.9/4.0				-Poor Recovery						
							Brn	Same as 1.2-2'	GM	Moist				
		6			5.8		Blk	Cinders & Slag	SW					
* **	DPT-3			1.8/4.0			Blk to	Same as above	SW	1115				
					9.0		LtBrn							
		10					LtBrn & Gray	Silty F-M Sand & Rock Frags	GM	Wet @ ~ 9.5' Tr Large Metal Frag				
								EOB @ 10'						
								Collect additional		1240				
								sample volume 0-2'						
								@ 2'						
								- Same material						
								Tr Brick						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: Macrocore 0-10'
* WTB-SS-16-0002 + MS/MSD
** WTB-SB-16-0206 *** WTB-SB-16-0610

Converted to Well: Yes ____ No X Well I.D. #: ____

TETRA TECH

BORING LOG

PROJECT NAME: Portsmouth NSY - OU8
PROJECT NUMBER: 112G03270
DRILLING COMPANY: TDS
DRILLING RIG: Geoprobe 54LT Track

BORING No.: WTB-SB17
DATE: 6-3-15
GEOLOGIST: T. Evans
DRILLER: A Natsis

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Headspace	Borehole**	BZ**
	0								Time				
DPT-1			2.0/						1035 *		N/A		
	2		2.0			Brn Dk Brn	F-C Sand Tr F Gravel @ ~1.8	SW	Dry				
						Brn	F-M Sand &	SW					
DPT-2			3.0/4.0				C Sand / F Gravel		1040 **				
						Blk	Cinders / Slag	SW	Dry				
	6					Brn	Tr Red Bag / Ash Silt & Rock	GM					
						Tan Brn	F-M Sand Tr C Sand	SP					
DPT-3			2.4/						1045 ***				
			4.0			Blk Brn	Coal / Charcoal M Sand Tr Ash	SW SP	Wet @ 8'				
	10					Red Brn Blk Brn	Slag & Sand Slag / Rock Frags	SW GW	Tr Glass Sl. Sheen				
							EOB @ 10'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: MacroCore 0-10'
* WTB-SS17-00002
** WTB-SB17-0206 *** WTB-SB17-0610

Converted to Well: Yes ____ No X Well I.D. #: ____

TETRA TECH

BORING LOG

PROJECT NAME: Portsmouth NSY - OU8
PROJECT NUMBER: 112G03270
DRILLING COMPANY: TDS
DRILLING RIG: Geoprobe 54 LT Track

BORING No.: WTB-SB18
DATE: 6-4-15
GEOLOGIST: T. Evans
DRILLER: A. Natsis

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Headspace	Borehole**	BZ**
	0								Time				
* DPT-1			2.0			Gray	Asphalt 3" Rock Subase	GW	1310		N	/A	
	2		2.0			Brn	Silty Sand Tr Rock	SM	Dry to Damp Cinders @ 1.8-2'				
** DPT-2			2.9			Gray	Broken Rock	GW	1315				
			4.0	3.6			(1 piece tarry material)						
							Silty Sand Tr Clay	SM					
	6			5.7		Blk	Rock Frags Cinders		Dry				
*** DPT-3			2.3				Tr Slag 6-8'		1320				
			4.0										
						Brn	Silty F Sand tr Clay Tr C Sand + Rock	SM					
	10			9.5		Gray Blk & white	- Cinders/Ash	SW	wet @ ~9'				
						Brn	Silty F Sand Tr Clay Tr Rock	(SM)	@ 9.8-10'				
							EOB @ 10'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: Macrocore 0-10'
* WTB-SS18-0002 *** WTB-SB18-0610
** WTB-SB18-0206

Converted to Well: Yes ____ No X Well I.D. #: ____

TETRA TECH

BORING LOG

PROJECT NAME: Portsmouth NSY - OU8
PROJECT NUMBER: 112G03270
DRILLING COMPANY: TDS
DRILLING RIG: GPOProbe 54LT Track

BORING No.: WTB-SB(9)
DATE: 6-3-15
GEOLOGIST: T. Evans
DRILLER: A. Natsis

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Headspace	Borehole**	BZ**
	0								Time				
DPT-1			2.0	XXX		Brn	Asphalt 7" F-C Sand & Rock Frags	SW	1100		N	/A	
	2		2.0			DkBrn	Silty FSand & CSand	SW	Dry				
						BlkBrn	F-C Sand & Rock Chips	SW	Dry				
DPT-2			2.9						1105				
			4.0			TanBrn	F Sand Tr Charcoal & Gravel	SP					
	6					Brn	Silt & F Sand	SM	Damp				
DPT-3			0.5				-Poor Recovery-		1115				
			4.0			Dk	Silt & Sand Some	SM	Moist				
						Brn	CSand	SW	do				
	10					BlkBrn			wet				
							EOB @ 10'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: MacroCore 0-10'

Drilling Area Background (ppm): —

Converted to Well: Yes ____ No X Well I.D. #: ____

TETRA TECH

BORING LOG

PROJECT NAME: Portsmouth NSY - OU8
PROJECT NUMBER: 112G03270
DRILLING COMPANY: TDS
DRILLING RIG: Geoprobe 54LT Track

BORING No.: WTB-SB20
DATE: 6-4-15
GEOLOGIST: T. Evans
DRILLER: A. Natsis

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Headspace	Borehole**	BZ**
	0												
* DPT-1			2.0			Gray	Asphalt 3" Rock Subbase	GW	1335		N	/A	
				0.6	Loose	Brn	F C Sand Tr Slag, Silt	SW					
	2		2.0		v Stiff	Tan	Clay Tr C Sand, Silt	CL					
** DPT-2			2.6		M Stiff	Brn	Silt Tr F Sand	ML	1340				
			4.0				V Tr F Gravel						
				4.7	V Loose	Blk	Cinders	SW					
	4			5.3		Tan	Brn F Sand Tr Rock Frags	SP					
*** DPT-3			1.8			Dk Brn	Silt Some M Sand	SM	1345				
			4.0				Tr Rock						
				8.7		Tan	F Sand Tr Silt	SP					
						Cream	Slag	SW					
	10					Tan	F Sand	SP	wet @ 9'				
							EOB @ 10'						
						Dk Brn	Silt Some F Sand & C Sand 9.8-10	SM					

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: Macro core 0-10'

* WTB-SS-20-0002 + WTB-FD03-060415

~~** WTB-SB-20-0206 + MS/MSD~~ *** WTB-SB-20-0610

Converted to Well: Yes ____ No X Well I.D. #: ____

TETRA TECH

BORING LOG

PROJECT NAME: Portsmouth NSY - OU8
PROJECT NUMBER: 112G03270
DRILLING COMPANY: TDS
DRILLING RIG: Geoprobe 54LT Track

BORING No.: WTB-SB21
DATE: 6-4-15
GEOLOGIST: T. Evans
DRILLER: A. Natsis

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Headspace	Borehole**	BZ**
	0												
DPT-1			1.8/2.0				Asphalt 8"		1405		N/A		
	2				Vloose	Tan	F-M Sand & Rock Chips (Fill)	SW	Dry				
DPT-2			1.6/4.0		Vloose	Tan	Same as above	SW	1410				
							↓		Dry				
				4.8		Gray	Brn Silt Some F Sand Some Rock Frags	GM					
	6			5.3		Blk/orange/Red Brn	- Cinders	SW					
DPT-3			2.5/4.0			Pk Brn	F Sand - 1 piece of white glass	SP	1415 Moist				
						Brn & Blk	Cinders & Slag Tr Silt	SW					
	10					Dk Brn	Silty F Sand Some Slag	SM	Wet @ ~8'				
							EOB @ 10'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): –

Remarks: Macro Core 0-10'
* WTB-SS-21-0002 *** WTB-SB-21-0610
** WTB-SB-21-0206

Converted to Well: Yes ____ No X Well I.D. #: ____

TETRA TECH

BORING LOG

PROJECT NAME: Portsmouth NSY - OU8
PROJECT NUMBER: 112G03270
DRILLING COMPANY: TDS
DRILLING RIG: Geoprobe 54LT Track

BORING No.: WTB-SB22
DATE: 6-3-15
GEOLOGIST: T. Evans
DRILLER: A. Natsis

	Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Headspace	Borehole**	BZ**
		0								Time				
*	DPT-1			2.0/	XXX			Asphalt 5"		1310		N	A	
		2		2.0			Gray & Brn	Rock Frags, Sand, Silt, Sand, M-C Sand	GW	Dry				
**	DPT-2			2.0/				Same as above to 4'		1405				
				4.0			Blk	Cinders/Slag (C Sand Size)	SW	Dry				
		6						Tr Coal						
***	DPT-3			3.0/			Blk	Same as above						
				4.0			to	Tr C Sand		1410				
							Lt Brn			Wet @ 9'				
		10					Blk							
								EOB @ 10'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: Macrocore 0-10'
* WTB-SS-22-0002 *** WTB-SB-22-0610
** WTB-SB-22-0206 † WTB-FD02-060315

Converted to Well: Yes ____ No X Well I.D. #: ____

TETRA TECH

BORING LOG

PROJECT NAME: Portsmouth NSY - OU8
PROJECT NUMBER: 112G03270
DRILLING COMPANY: TDS
DRILLING RIG: Geoprobe 54LT Track

BORING No.: WTB-SB23
DATE: 6-3-15
GEOLOGIST: T. Evans
DRILLER: A. Natsis

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Headspace	Borehole**	BZ**
	0								Time				
DPT-1			2.0	XXX			Asphalt 5"		1420		N	/A	
	2		2.0			Dk Brn	F-C Sand tr Rock Chips Tr Coal, Brick, Slag	SW	Dry - Damp				
						Brn &	Bands of Broken Rock	GW	1435				
DPT-2			2.4			Gry	& Slag / Cinders	SW					
			4.0			Lt Brn	~1" Zone of tar/asphalt		Wet				
	6					Brn	F Sand Some Silt Tr Clay	SM	Moist-Wet				
						Blk	Rock Chips & Slag		1440				
DPT-3			2.7										
			4.0			Blk Brn	Organic Silt 7.5 to 8.5	OL					
	10						Organic Material (Woody) Friable	Pt					
							Tr F Gravel (Rounded)						
							FOB @ 10'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: No Core 0-10'

Drilling Area Background (ppm): —

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

TETRA TECH

BORING LOG

PROJECT NAME: Portsmouth NSY - OU8
PROJECT NUMBER: 112G03270
DRILLING COMPANY: TDS
DRILLING RIG: Geoprobe 54 LT

BORING No.: WTB-SB24
DATE: 6-3-15
GEOLOGIST: T. Evans
DRILLER: A. Natsis

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Headspace	Borehole**	BZ**
	0								Time				
* DPT-1			1.7/	~~XXX~~			Asphalt 0-5"		1325		N	/ A	
	2		/2.0			BRN	FSAND Tr FGravel	SP	Dry				
						Brn	same as above	SP	1330				
** DPT-2			3.0/				Tr CSand		Dry to				
			/4.0						Damp				
	6												
*** DPT-3			3.0/			Brn	F-Sand Tr CSand	SP	1335 (sleeve wet)				
			/4.0						moist				
				8/7									
	10					Brn/DkGy	Rock Chips + Silty FSand	GM	wet @ ~8.7'				
							weath Rock(?) m shoe						
							↓						
							metapelite						
							Refusal @ 9.7'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: Macrocore 0-9.7'
* WTB-SS24-0002 *** WTBSB24-0697+MS/MSD
** WTB SB24-0206

Converted to Well: Yes ____ No X Well I.D. #: ____

TETRA TECH

BORING LOG

PROJECT NAME: Portsmouth NSY - OU8
PROJECT NUMBER: 112G03270
DRILLING COMPANY: TDS
DRILLING RIG: Geoprobe 54LT Track

BORING No.: WTB-SB25
DATE: 6-3-15
GEOLOGIST: T. Evans
DRILLER: A. Natsis

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Headspace	Borehole**	BZ**
	0								Time				
DPT-1				XXX			Asphalt 0-5"		1345		N	/A	
							Refusal @ 5" -						
							Appears to be concrete						
							Relocate ~2' NE						
							Refusal @ 5"		1350				
							- Concrete						
							Discontinue boring due to						
							proximity of electric						
							line running through						
							cleared area (utilities)						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: Macro core

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

TETRA TECH

BORING LOG

PROJECT NAME: Portsmouth NSY - OU8
PROJECT NUMBER: 112G03270
DRILLING COMPANY: TDS
DRILLING RIG: Diedrich D-120

BORING No.: WTB- MW05R
DATE: 6-2-15
GEOLOGIST: T. Evans
DRILLER: D. Newton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks (Time)	PID/FID Reading (ppm): Sample	Headspace	Borehole**	BZ**
		14	0.9	XXX		Brn	0-0.6 Asphalt F-C Sand & Rock Frags	SW	1135 Dry		N/A		
S-1		23/21	1.5		Dense								
S-2		23/23	1.5/2.0		Dense	Brn	Same as above	SW	1140 Dry				
		16/27											
S-3	5	15/10	0.5/2.0		MDense	Brn	Same as above	SW	1150 Dry				
		10/10											
S-4		8/8	0.4/2.0		Loose	Brn	F-C Sand & Rock Frags Tr silt	SW	1155				
		4/2							<1203 High Tide>				
S-5		2/5	0.4/2.0		MDense	Pk Gray	Rock Chips & Some C Sand	SW	1205 Wet @ 7.5'				
	10	8/13											
S-6		4/2	0/2.0		Loose		-No Recovery- Rock in Shoe						
		3/5											
S-7		6/8			MDense	Dk Gray	Rock Chips & C Sand (1 piece of asphalt)	SW					
		7/5											
S-8	15	5/2			Loose		Rock Frags &	SW	1225				
		4/5					M-C Sand						
							Install Well		1230				
							2" PVC 6-16'		10-slot				
							Sand 4-16'		Hollister				
							Bentonite 2-4'						
							10½ bags used		(7 bags @ 6' alone - void?)				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: 2" SPT 0-16'
4¼" ID HSA 0-16'

Converted to Well: Yes X No ____ Well I.D. #: WTB-MW05R

TETRA TECH

BORING LOG

PROJECT NAME: Portsmouth NSY - OU8
PROJECT NUMBER: 112G03270
DRILLING COMPANY: TDS
DRILLING RIG: DIEDRICH D-120

BORING No.: WTB-SB11 / MW06
DATE: 6-1-15
GEOLOGIST: T. EVANS
DRILLER: D. NEWTON

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Headspace	Borehole**	BZ**
	0								Time				
S-1		9 / 48	0.4 / 1.1		V Dense	Brn-Tan	0-0.3 Asphalt F-M Sand & F Gravel	SW	1100 Dry		N/A		
S-2		120/48 / 19	0.7 /		Dense	Blk-Brn	F-M Sand Some Sand	SW	1105 Dry				
		15 / —	/ 1.0				Rock @ 1.7-1.8						
S-3		6 / 4	0.4 /		M Dense	Brn Blk	F-M Sand Some (Sand + White F Sand (Ash?)	SW	1115				
	5	14 / 8	/ 2.0			Red & Brn	Sand & C Sand	SW					
S-4		7 / 5	0.6 / 1.0		M Dense	↓	M-C Sand & Slag	SW	1120 moist to wet				
S-5		4 / 3	0.4 /		V Loose	Brn	M-C Sand & F Gravel	SW	→ F Gravel Size 1125 wet				
		2 / 2	/ 2.0			Red Brn w/ white	M-C Sand & F Gravel (Slag) - Ash?	SW	< 1123 High Tide >				
S-6		3 / 1	0.0 /		V Loose		-No Recovery except		1130 Saturated				
	10	1 / 1	/ 2.0				Tr Metal Piece 0.3' long						
S-7		1 / 1	0.7 /		Loose	Brn	C Sand & F Gravel	SW	1135 Tr Brick,				
		3 / 4	/ 2.0				Rock Tr Silt + Wood in Shoe		metal washer, glass				
S-8		1 / 1	0.9 /		V Loose				1140 (1210 WL = 7.5')				
		1 / 1	/ 2.0			Blk	Cinder / Ash	SW	Light Sheen on water on spoon				
S-9	15	4 / 3	0.3 /		V Loose	↓	Same as above	↓	1225				
		1 / 2	/ 2.0			↓	Tr Rubber, wood in shoe						
							Install well		1230				
							2" PVC 6-16' (10-slot)						
							Hollister Sand 5-16' (5 bags)						
							Bentonite 2-5'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: 2" SPT 0-16' 4¼" 10 HSA 0-16'
* WTB-SS11-0002 @ 0-2'
** WTB-SB11-0206 @ 2-6'; *** WTB-SB11-0610 @ 6-10'

Converted to Well: Yes ✓ No ____ Well I.D. #: WTB-MW06

TETRA TECH

BORING LOG

PROJECT NAME: Portsmouth NSY - OU8
PROJECT NUMBER: 112G03270
DRILLING COMPANY: TDS
DRILLING RIG: Diedrich D-120

BORING No.: WTB-MW07
DATE: 6-2-15
GEOLOGIST: T. Evans
DRILLER: D. Newton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks (Time)	PID/FID Reading (ppm): Sample	Headspace	Borehole**	BZ**
S-1	0	14	0.8	XXX	M Dense	Brn	0-0.5 Asphalt	—	0850		N/A		
		17/11	1.5				M-C Sand Some Rock Frag	SW	Dry Fill				
S-2		8/7	0.8		M Dense	Brn	M-C Sand Tr Some	SW	0852				
		8/8	2.0				Rock Frags		Dry				
S-3	5	16/10	0.65		M Dense	Brn	Rock Frags Some F-C Sand	GW	1425				
		8/6	2.0			Blk	Asphalt 5.8-5.9		Damp				
S-4		6/8	0.25	▽ 3	M Dense	Brn	F-C Sand &	SW	1430				
		11/9	2.0				F Gravel		Damp				
S-5		11/9	0.6		V Dense	Brn	F-C Sand Some Silt	SW	1440 Boulder 9.5-10'				
	10	50/3"	1.8				Some F Gravel		1450 WL=7'				
S-6		8/5	0.7		Loose	Brn	F-C Sand Some Silt	SW	1500 Sat.				
		4/2	2.0				Some F Gravel		Till?				
S-7		4/6	0.8		Loose	Brn	F Gravel & Rock Frags	GW	1503 Sat.				
		6/3	2.0				Some Silty F-C Sand						
S-8	15	3/3	0.7		M Dense	Brn	Silty F-C Sand	SW	1505 Sat.				
		8/9	2.0				Some Rock Frags						
							EOB @ 16'						
							Set Well		1515				
							2" PVC 10-Slot 5-15'						
							Hollistan 25 Sand 4-15'		(5½ bags)				
							Bentonite 2-4'						
							WL = 6.7'		1535				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: 2" SPT 0-16'
4¼" ID HSA 0-15'

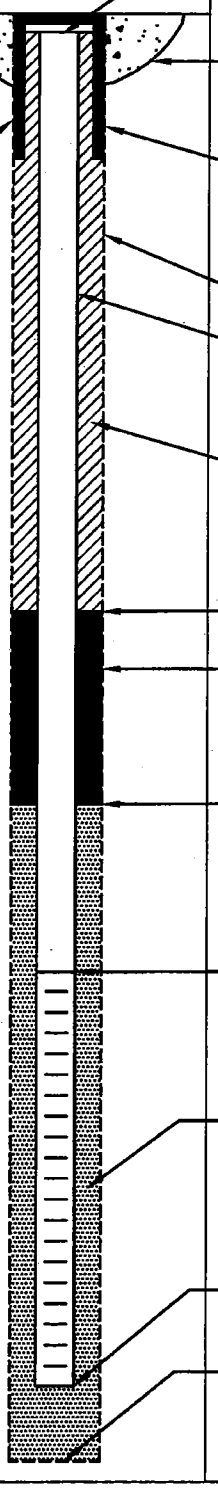
Converted to Well: Yes ✓ No _____ Well I.D. #: WTB-MW07

WELL NO.: WTB-MW05R

TETRA TECH

OVERBURDEN
MONITORING WELL SHEET
FLUSH - MOUNT

PROJECT OU8 RI	LOCATION Portsmouth NSY	DRILLER TDS / D. Newton
PROJECT NO. 112G03270	BORING WTB MW05R	DRILLING METHOD HSA
DATE BEGUN 6/2/15	DATE COMPLETED 6/2/15	
FIELD GEOLOGIST T. Evans		DEVELOPMENT METHOD Pumping
GROUND ELEVATION 106.36	DATUM 2002 PNS	



ELEVATION TOP OF RISER: 106.02

TYPE OF SURFACE SEAL: Concrete

TYPE OF PROTECTIVE CASING: Steel

I.D. OF PROTECTIVE CASING: 7"

DIAMETER OF HOLE: 8"

TYPE OF RISER PIPE: Sch 40 PVC

RISER PIPE I.D.: 2"

TYPE OF BACKFILL/SEAL: Concrete

ELEVATION/DEPTH TOP OF SEAL: 104.36 / 2'

TYPE OF SEAL: Bentonite

ELEVATION/DEPTH TOP OF SAND: 102.36 / 4'

ELEVATION/DEPTH TOP OF SCREEN: 100.36 / 6'

TYPE OF SCREEN: Sch 40 PVC

SLOT SIZE x LENGTH: 0.010" x 10'

TYPE OF SAND PACK: Hollister 2S

ELEVATION / DEPTH BOTTOM OF SCREEN: 90.36 / 16'

ELEVATION / DEPTH BOTTOM OF SAND: 90.36 / 16'

ELEVATION/DEPTH BOTTOM OF HOLE: 90.36 / 16'

BACKFILL MATERIAL BELOW SAND: N/A

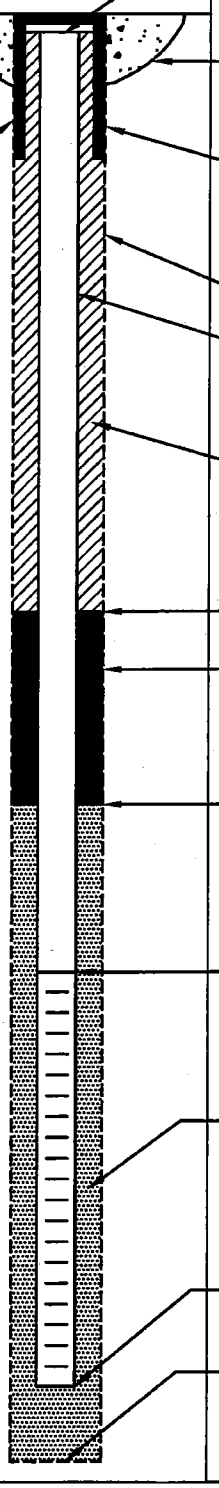
ACAD: FORM_MWFM.dwg 07/20/99 INL

WELL NO.: WTB-MW06

TETRA TECH

OVERBURDEN
MONITORING WELL SHEET
FLUSH - MOUNT

PROJECT OU8 RI	LOCATION Portsmouth NSY	DRILLER TDS/ D. Newton
PROJECT NO. 112G03270	BORING WTB-SB11 / MW06	DRILLING METHOD HSA
DATE BEGUN 6/1/15	DATE COMPLETED 6/1/15	
FIELD GEOLOGIST T. EVANS		DEVELOPMENT METHOD Pumping
GROUND ELEVATION 106.24	DATUM 2002 PNS	



ELEVATION TOP OF RISER: 105.67

TYPE OF SURFACE SEAL: Concrete

TYPE OF PROTECTIVE CASING: Steel

I.D. OF PROTECTIVE CASING: 7"

DIAMETER OF HOLE: 8"

TYPE OF RISER PIPE: Sch 40 PVC

RISER PIPE I.D.: 2"

TYPE OF BACKFILL/SEAL: Grout

ELEVATION/DEPTH TOP OF SEAL: 104.24, 2'

TYPE OF SEAL: Bentonite

ELEVATION/DEPTH TOP OF SAND: 101.24, 5'

ELEVATION/DEPTH TOP OF SCREEN: 100.24, 6'

TYPE OF SCREEN: Sch 40 PVC

SLOT SIZE x LENGTH: 0.010" x 10'

TYPE OF SAND PACK: Hollistan 28

ELEVATION / DEPTH BOTTOM OF SCREEN: 90.24, 16'

ELEVATION / DEPTH BOTTOM OF SAND: 90.24, 16'

ELEVATION/DEPTH BOTTOM OF HOLE: 90.24, 16'

BACKFILL MATERIAL BELOW SAND: N/A

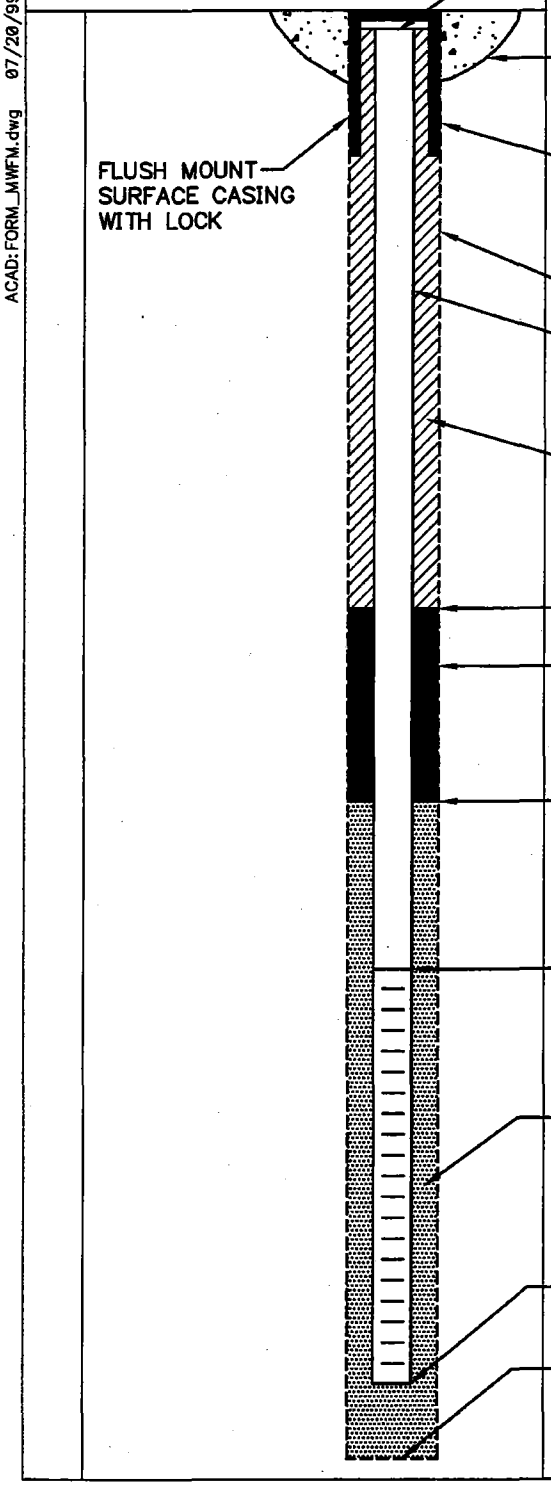
ACAD: FORM_MWFM.dwg 07/20/99 INL

WELL NO.: WTB-MW07

TETRA TECH

OVERBURDEN
MONITORING WELL SHEET
FLUSH - MOUNT

PROJECT OU8 RI	LOCATION Portsmouth NSY	DRILLER TDS / D. Newton
PROJECT NO. 112G03270	BORING WTB-MW07	DRILLING METHOD HSA
DATE BEGUN 6-2-15	DATE COMPLETED 6-2-15	
FIELD GEOLOGIST T. EVANS		DEVELOPMENT METHOD Pump
GROUND ELEVATION 105.84	DATUM 2002 PNS	



ELEVATION TOP OF RISER: 105.55

TYPE OF SURFACE SEAL: Concrete

TYPE OF PROTECTIVE CASING: Steel

I.D. OF PROTECTIVE CASING: 7"

DIAMETER OF HOLE: 8"

TYPE OF RISER PIPE: Sch 40 PVC

RISER PIPE I.D.: 2"

TYPE OF BACKFILL/SEAL: Grout

ELEVATION/DEPTH TOP OF SEAL: 103.84 / 2'

TYPE OF SEAL: Bentonite

ELEVATION/DEPTH TOP OF SAND: 101.84 / 4'

ELEVATION/DEPTH TOP OF SCREEN: 100.84 / 5'

TYPE OF SCREEN: Sch 40 PVC

SLOT SIZE x LENGTH: 0.010" x 10'

TYPE OF SAND PACK: Hollister 2S

ELEVATION / DEPTH BOTTOM OF SCREEN: 90.84 / 15'

ELEVATION / DEPTH BOTTOM OF SAND: 90.84 / 15'

ELEVATION/DEPTH BOTTOM OF HOLE: 90.84 / 15'

BACKFILL MATERIAL BELOW SAND: N/A

ACAD: FORM_MWFM.dwg 07/20/99 INL

1998 SOIL BORING AND MONITORING WELL CONSTRUCTION LOGS

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: PORTSMOUTH NSY
PROJECT NUMBER: 6515
DRILLING COMPANY: Maxim Tech
DRILLING RIG: CME 75
BORING NO.: WTB - SB01
DATE: 7-13-98
GEOLOGIST: T. EVANS
DRILLER: J Leathard

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	0.0												
	1.0			0.3-0.5		Dk	Asphalt 0-0.3		1515				
						Brn	Gravel Some silty sand	Gp	road base	0.0			
S-1		7/7	1.5/2.0		M Dense	Brn	Silty F Sand	SM	WTB-SB01-0001-98 (0.5-1.0)				
						Brn	Silt Tr-Some VF Sand	ML/SM	1531 Dry	0.0			
	3.0	5/7							(Till)				
S-2		7/10	1.8/2.0		M Dense	Brn & Gray	Silt Some F Sand /	ML/	1536 WTB-SB01-0305-98	0.0			
	5.0	14/10					(mottled) Clay	SM	(Till)				
S-3		11/20	1.2/1.2		Dense	Tan Brn	F Sandy Silt Tr weathered rock frags	ML/	1547 Damp	0.0			
	7.0	24/100/2		6.7			(Till?) C Sand	SM	1619 Drive 6" temp				
	8.0					Dk Gray	Paragtzite		casing to 6.8' 1625 5 7/8" M R				
	11.0								1656 10'				
							10.5-11.0 Fracture						
	12.0						11.6-12.5 Frac / H_2O ?						
	13.0												
				13.2 ▽ @ 1720					1715 13.5'				
	15.0								1753 Continue.				
									1804 15.5'				
	17.0												
	18.0								1812 17.5'				
	19.0						18.25 Frac		1820 19.0				
				EOBE 19.0									
							#1 valve sand 7.8-19.0	-	1½ bags				
							2" PVC 20 slot 9-19						
							Bentonite 5.6-7.8		2/3 bag				
							Grout 1.0-5.6		(neat cement)				

1930 leave site

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: 4 1/4" ID HSA, 3" SS

Drilling Area Background (ppm): 0.0

Converted to Well: Yes _____ No _____ Well I.D. #: _____

Tetra Tech NUS, Inc.

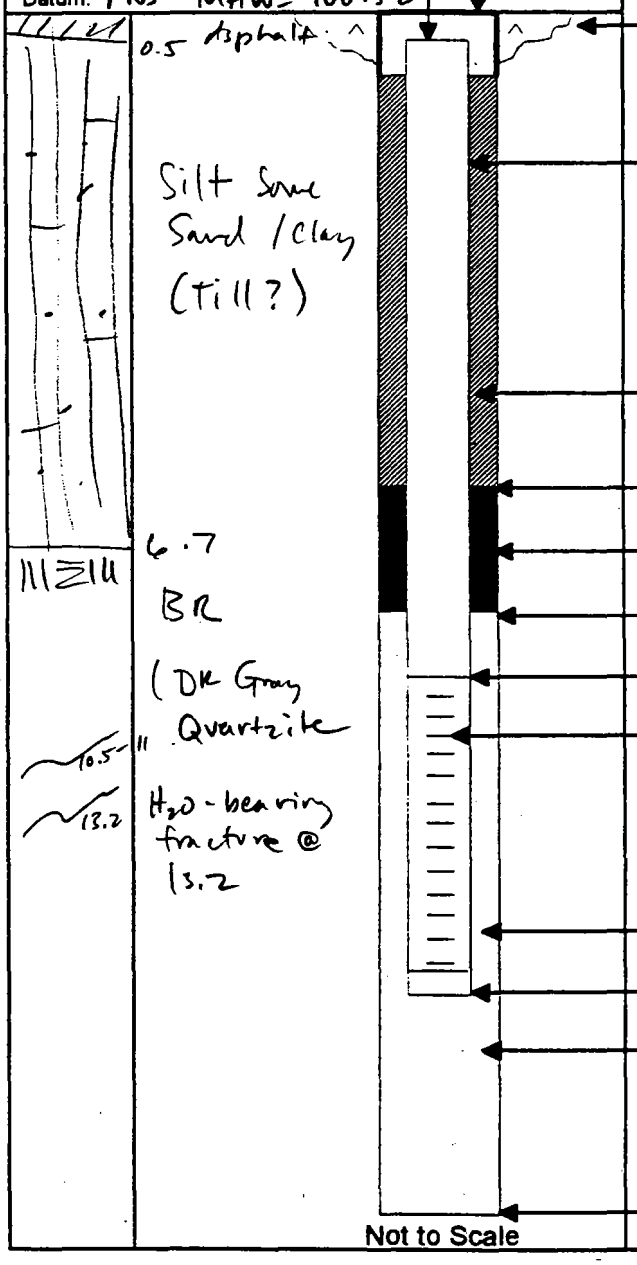
WELL No.: WTB-MW01

MONITORING WELL SHEET

PROJECT:	PNSY	DRILLING Co.:	Maximtech	BORING No.:	WTB-SB01
PROJECT No.:	6515	DRILLER:	J. Leonhardt	DATE COMPLETED:	7/15/98
SITE:	31	DRILLING METHOD:	HSA	NORTHING:	91599.33
GEOLOGIST:	T. Evans	DEV. METHOD:	Bail	EASTING:	346397.23

Ground Elevation = 110.65 ft

Datum: PNS MHW = 100.32



Elevation / Depth of Top of Riser:	110.37 / 0.28
Elevation / Height of Top of Surface Casing:	110.71 / 0.06
I.D. of Surface Casing:	8" Ø x 12" Long
Type of Surface Casing:	Steel
Type of Surface Seal:	Concrete
I.D. of Riser:	2"
Type of Riser:	Sch 40 PVC
Borehole Diameter:	6"
Type of Backfill:	Cement Grout
Elevation / Depth of Seal:	105.05 / 5.6
Type of Seal:	Bentonite
Elevation / Depth of Top of Filter Pack:	102.85 / 7.8
Elevation / Depth of Top of Screen:	101.65 / 9.0
Type of Screen:	Sch 40 PVC
Slot Size x Length:	0.020" x 10'
I.D. of Screen:	2"
Type of Filter Pack:	#1 Qtz Sand
Elevation / Depth of Bottom of Screen:	91.65 / 19.0
Elevation / Depth of Bottom of Filter Pack:	91.65 / 19.0
Type of Backfill Below Well:	NA
Elevation / Total Depth of Borehole:	91.65 / 19.0

Tetra Tech NUS, Inc.

WELL DEVELOPMENT DATA SHEET

PROJECT:	PORTSMOUTH NSY	WELL No.:	WTB - MW01
PROJECT No.:	6515	DATE INSTALLED:	7-13-98
SITE:	Site 31	DATE DEVELOPED:	7-22-98
PROJECT GEOLOGIST:	T. Evans	DRILLING Co.:	Maxim Tech

WELL DATA

WELL MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER:

TOTAL DEPTH:	18.51 (solid)	feet (TOC / bgs)	CASING ID:	2"	inches
STATIC WATER LEVEL:	7.73	feet (TOC / bgs)	SCREEN LENGTH:	10	feet
CASING VOLUME	1.75	(gal. / L)	BOREHOLE DIA.:	6	inches

PURGE DATA

START TIME:	1338	(hr.)	METHOD:	Bail
STOP TIME:	1534	(hr.)	PUMP TYPE:	NA

Time	Cumulative Volume (gal / L)	Pumping Rate (gpm / Lpm)	Water Level (ft. / m.)	Water Meter Type: HORIBA U-10 / LaMotte 2020* pH	Sp. Cond. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	Remarks (Color/Odor)
1350	6		17.34						Gray Brn Bail
1413	7		18.00						Gray Brn Bail Dry
1431	–		16.00						–
1433	8		-	6.91	1.84	19.3	>999/OR*	6.95	Gray Brn Bail
1437	9		18.03						Bail Dry
1451			16.38						
1458	10		18.14						Bail/Dry
1514			16.35						
1516			-	6.99	1.80	19.4	>999/OR	7.64	Gray Brn Bail
1518			17.93						Bail Dry
1530	10.5		16.60	6.97	1.82	19.5	424/220	6.75	Cloudy
1534	11		17.73						Bail Dry/S

TOTAL PURGE VOLUME: 11 (gal / L) TOTAL PURGE TIME: 116 (min. / hrs.)

NOTE: All depth measurements to nearest 0.01 foot.

COMMENTS/CALCULATIONS:

HORIBA S/N 507012
LaMotte 2020 S/N 0416-4457

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: PORTSMOUTH NSY
PROJECT NUMBER: 6515
DRILLING COMPANY: Maxim Tech
DRILLING RIG: CME 75
BORING NO.: WTB-SB02
DATE: 7-8-98
GEOLOGIST: T. EVANS
DRILLER: J. Leonhardt

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	0.0								Time				
•	1.0					Brn	Asphalt 0.0 - 0.35 Silty F Sand Tr F Gravel	SW	0810 WTB-SS02-0001-98	0.0			
S-1		11 100/4"	0.8/0.9		V Dense	Brn	Silty F Sand Tr F Gravel	SW	0.35 - 0.9	0.0			
	3.0						+ Coal Frag in Shoe		Hard drilling 1.9-3.0				
* S-2		2 3	0.9/2.0		V Loose	Black & White	Coal & Ash	SP	0850 WTB-SB02-0305-98	0.0			
	5.0	2 2					Tr Fiber mat?						
S-3		3 2	1.4/2.0		Loose	Brn & white to Rust	M Sand, Coal granular, Ash	SP	0854	0.0			
	7.0	2 3											
* S-4		2 2	1.3/2.0	▽	V Loose	Rust	M-C Sand, Ash?	SW	0902 WTB-SB02-0709-98	0.0			
	9.0	2 2				Brn	Some Met Rock Frags		wet				
S-5		1 2	0.9/2.0		Loose	Rust Brn + Black	Met Rock Frags, Some Ash, M Sand, Tr Lead Shot	SW/GW	0907	0.0			
	11.0	3 2											
S-6		3 3	0.8/2.0		Loose	DK Gray	F-M Sand Tr Lead Shot Met Rock Frags	SP/SW	0910	0.0			
	13.0	3 2											
S-7		1 1	0.8/2.0		Loose	Lt Brn	Met Rock Frags (0.05'-0.1' ø)	GP	0917	0.0			
	15.0	3 5											
* S-8		1 2	1.0/2.0		Soft	Olive Gray	Organic Silt Tr Plant stems & Shell	OL	0925 WTB-SB02-1517-98	11.5			
	17.0	2 2								0.0			
S-9		2 3	2.0/2.0		M Stiff	Gray to Tan Gray	Organic Silt to Clayey Silt	OL / ML	0930	0.0			
	19.0	3 2											
"SS S-10		2 3	2.0/2.0		Soft	Tan Brn	F Sandy Silt	MH	0933	0.0			
	21.0	3 1											
S-11		WOH WOH	1.8/1.8		V Soft →	Brn Gray	Silt Some F Sand	MH	0938	0.0			
	23.0	1 100/3"				Yellow Brn	F Sand & Met Rock Frags	SP/GP					
									Refusal @ 22.8'				
							Natural backfill 16-22.8' 0" screen 5-15		0950				

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

#1 Sand 3.8 - 16.0 ← 3½ bags
Bentonite 1.4 - 3.8 ← 1 bag

Drilling Area ρ
Background (ppm): 0 ppm

Remarks: 4¼" ID HSA 3" SS 0800-0930 P. Blais present
• Collect MS/MSD High Tide @ 1127
* Collect normal set

Converted to Well: Yes ✓ No _____ Well I.D. #: WTB-MW02

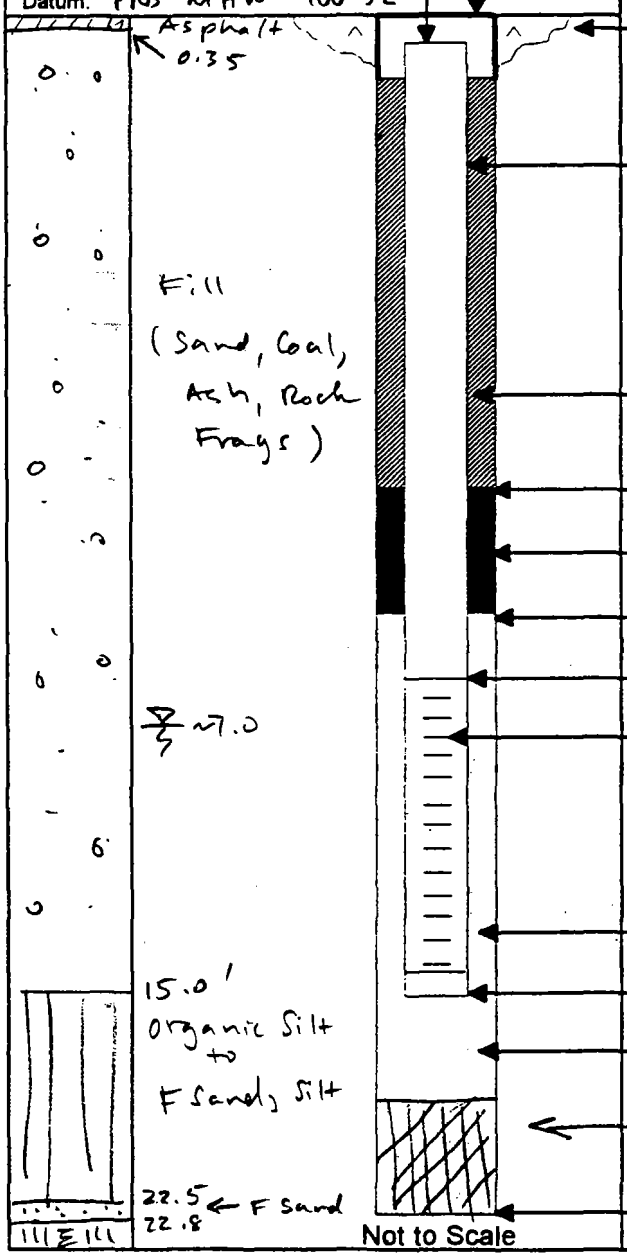
Tetra Tech NUS, Inc.

WELL No.: WTB-MW02

MONITORING WELL SHEET

PROJECT:	PNSY	DRILLING Co.:	Maxim Tech	BORING No.:	WTB-SB02
PROJECT No.:	6515	DRILLER:	J. Leonhardt	DATE COMPLETED:	7-8-98
SITE:	31	DRILLING METHOD:	HSA	NORTHING:	91491.04
GEOLOGIST:	T. Evans	DEV. METHOD:	Bail / Pump	EASTING:	345996.07

Ground Elevation = 107.01 ft
Datum: PNS MHW = 100.32



Elevation / Depth of Top of Riser:		106.67 / 0.34
Elevation / Height of Top of Surface Casing:		107.03 / 0.02
I.D. of Surface Casing:	8" ϕ x 1' Length	
Type of Surface Casing:	Steel	
Type of Surface Seal:	Concrete	
I.D. of Riser:	2"	
Type of Riser:	Sch 40 PVC	
Borehole Diameter:	8"	
Type of Backfill:	N/A	
Elevation / Depth of Seal:		105.61 / 1.4
Type of Seal:	Bentonite	
Elevation / Depth of Top of Filter Pack:		103.21 / 3.8
Elevation / Depth of Top of Screen:		102.01 / 5.0
Type of Screen:	Sch 40 PVC	
Slot Size x Length:	0.020" x 10'	
I.D. of Screen:	2"	
Type of Filter Pack:	#1 Qtz Sand	
Elevation / Depth of Bottom of Screen:		92.01 / 15.0
Elevation / Depth of Bottom of Filter Pack:		91.01 / 16.0
Type of Backfill Below Well:	Natural 16.0-22.8'	
Elevation / Total Depth of Borehole:		84.21 / 22.8

Tetra Tech NUS, Inc.

WELL DEVELOPMENT DATA SHEET

PROJECT:	PORTSMOUTH NSY	WELL No.:	WTB-MW07
PROJECT No.:	6515	DATE INSTALLED:	7-8-98
SITE:	Site - West Timber Basin	DATE DEVELOPED:	7-22-98
PROJECT GEOLOGIST:	T. Evans	DRILLING Co.:	maxim Tech

WELL DATA

WELL MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER:

TOTAL DEPTH:	14.67	feet (TOC / bgs)	CASING ID:	2"	inches
STATIC WATER LEVEL:	7.35	feet (TOC / bgs)	SCREEN LENGTH:	10	feet
CASING VOLUME	1.2	(gal. / L)	BOREHOLE DIA.:	8	inches

PURGE DATA

START TIME:	1124	(hr.)	METHOD:	Bail/pump
STOP TIME:	1222	(hr.)	PUMP TYPE:	Grundfos RediFlo BM1/TP1

Water Meter Type: Horiba U-10 / LaMotte 2020

Time	Cumulative Volume (gal. / L)	Pumping Rate (gpm / Lpm)	Water Level (ft / m.)	pH	Sp. Cond. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	Remarks (Color/Odor)
1124-1139	10								Bail Brn
1149	–		7.20						start pump
1155	20	1.7	7.18	6.67	22.5	18.9	479/300*	1.22	Cloudy
1200	30	2.0	7.14	6.69	22.4	18.6	626/390	1.18	cloudy brn
1207	45	2.1	7.18	6.72	22.6	18.3	58/38	1.14	clear
1214	55	1.4	7.11	6.72	22.7	18.2	2/7.6	1.35	clear
1219	65	2.0	7.14	6.71	22.7	18.3	1/5.9	1.45	clear
1222	71	2.0	6.98	6.72	22.9	18.1	0/4.0	1.52	Clear/stop

TOTAL PURGE VOLUME: 71 (gal / L) TOTAL PURGE TIME: 58 (min / hrs.)

NOTE: All depth measurements to nearest 0.01 foot.

COMMENTS/CALCULATIONS:

Bail 1st 10 gal to remove fines

Horiba S/N 507012

LaMotte 2020 S/N 0416-4497

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: PORTSMOUTH NSY
PROJECT NUMBER: 6515
DRILLING COMPANY: Maxim Tech
DRILLING RIG: CME 75

BORING NO.: WTB- SB03
DATE: 7-11-98
GEOLOGIST: T. EVANS
DRILLER: J. Leonhardt

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	0.0								Time				
X	1.0					Gray	Asphalt 0.0 - 0.5 Met Rock Gravel Tr M-C Sand	GP	1018 70-90% rock - No Sample -	-			
S-1		8 / 8	0.9/2.0		Loose	Brn	Silty F Sand Tr C Sand + Met Rock Frags	SM	1020	0.0			
	3.0	4 / 5											
S-2		2 / 7	1.0/2.0			Brn	Silty M Sand Tr Coal Frags + Met Rock Frags	SM	1027 WTB-SB03-0305-98 +GRO +VOC Tox PIP +Metals Cr+6 CN, PH, TOC +GRO	0.0			
	5.0	11 / 11											
S-3		6 / 7	1.0/2.0			Black to Brn	Ash, Cinders, Coal Frags to F Sandy Silt Tr Rock Frags	SW	1032	0.0			
	7.0	14 / 12						SM					
S-4		6 / 6	0.6/2.0			Brn	1" Ø Met Rock Frags &	GP/SW	1042	0.0			
	9.0	5 / 5					M-C Sand Some Silt						
S-5		2 / 6	0.6/2.0			Black to yellow brn	F Sandy Silt Tr Met Rock Frags	SM/ML	1048	0.0			
	11.0	3 / 3											
	13.0												
S-6		3 / 7	0.0/2.0				-No Recovery-		1052	-			
	15.0	7 / 6											
					17.5								
	18.0												
S-7		1 / 4	2.0/2.0	18.8		DKBrn to	Organic Silt Tr Shell	OH	1109 Natural	0.0			
	20.0	4 / 4				Gray	Silt Tr Clay	ML	WTB-SB03-1820-98				
	23.0												
"SS S-8		2 / 1	2.0/2.0			Tan Brn to	Clayey Silt to	ML/CL	1124	0.0			
	25.0	1 / 1				Gray	VF Sandy Silt	MH					

* When rock coring, enter rock brokeness. 3"SS 4 1/4", 0 HSA

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area PIP

Background (ppm): 0.0

Remarks: • VOC, SVOC, PIP, GRO, DRO, metals, CN, pH, TOC, cr+6
• VOC, SVOC, PIP, DRO, GRO, metals, CN, pH, TOC, cr+6
•• Normal set

Converted to Well: Yes ✓ No _____ Well I.D. #: WTB- MW03

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: PORTSMOUTH NSY
PROJECT NUMBER: 6515
DRILLING COMPANY:
DRILLING RIG:

BORING NO.: WTB-SB03
DATE: 7-11-98
GEOLOGIST: T. EVANS
DRILLER: J. Leonhardt

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
									Time				
	28.0												
S-9		2 2	1.0/1.0	28.3	VLoose	Gray	Silt Tr F sand	MH	1138	0.0			
	30.0	100/0"		11 12 14		yellow brn	F Sand	SP	Refusal @ 29.0'				
				11 12 14 EOB @ 29.0									
							Natural Backfill 25-29						
							Bentonite 17-25						
						#1	Sand 4.7-17		7½ bags to 8.0' (50#) +4 x 100 bags				
							2" screen (20-slot) 6-16						
							Bentonite 2.5-4.7		2 x 50# bags				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 0.0

Converted to Well: Yes ✓ No

Well I.D. #: WTB-MW03

Tetra Tech NUS, Inc.

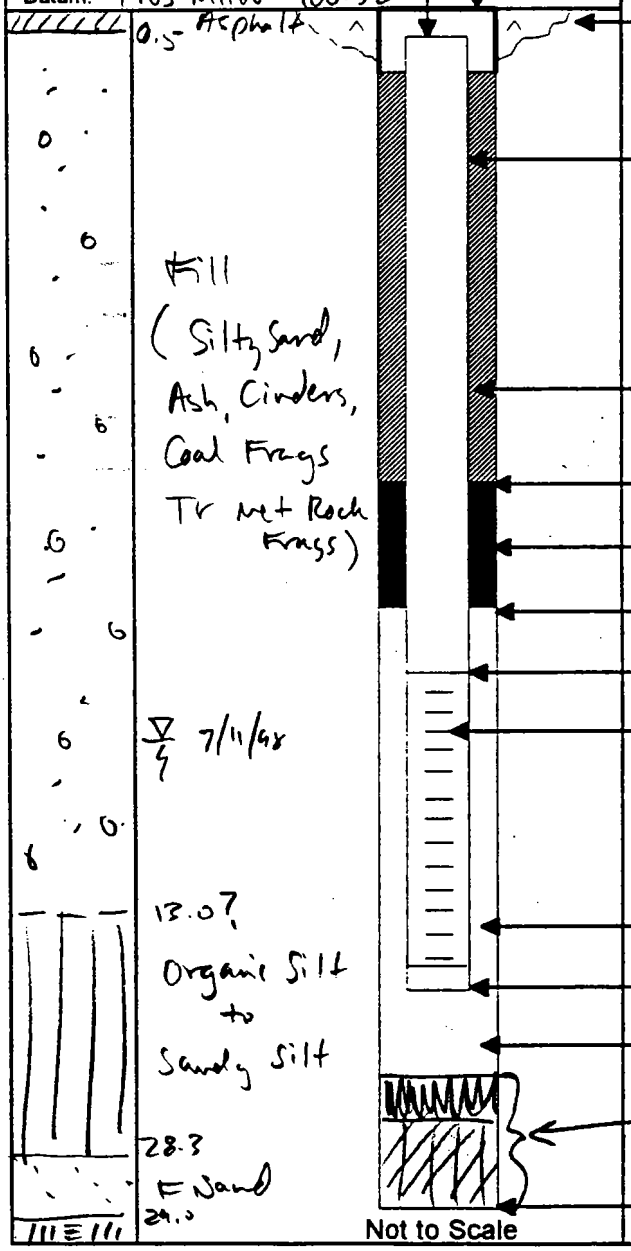
WELL No.: WTB-MW03

MONITORING WELL SHEET

PROJECT:	PNSY	DRILLING Co.:	Maxim Tech	BORING No.:	WTB-SB03
PROJECT No.:	6515	DRILLER:	J. Leonhardt	DATE COMPLETED:	7-11-98
SITE:	31	DRILLING METHOD:	HSA	NORTHING:	91255.33
GEOLOGIST:	T. Evans	DEV. METHOD:		EASTING:	346144.42

Ground Elevation = 110.00 ft

Datum: PNS MHW = 100.32



Elevation / Depth of Top of Riser:	109.83 / 0.17
Elevation / Height of Top of Surface Casing:	110.03 / 0.03
I.D. of Surface Casing:	8" ϕ x 12" Long
Type of Surface Casing:	Steel
Type of Surface Seal:	Concrete
I.D. of Riser:	2"
Type of Riser:	Sch 40 PVC
Borehole Diameter:	8"
Type of Backfill:	Concrete
Elevation / Depth of Seal:	107.50 / 2.5
Type of Seal:	Bentonite
Elevation / Depth of Top of Filter Pack:	105.30 / 4.7
Elevation / Depth of Top of Screen:	104.00 / 6.0
Type of Screen:	Sch 40 PVC
Slot Size x Length:	0.020" x 10'
I.D. of Screen:	2"
Type of Filter Pack:	#1 Qtz Sand
Elevation / Depth of Bottom of Screen:	94.00 / 16.0
Elevation / Depth of Bottom of Filter Pack:	93.00 / 17.0
Type of Backfill Below Well:	Natural 25-29', Bentonite 17.0-25.0
Elevation / Total Depth of Borehole:	81.00 / 29.0

Tetra Tech NUS, Inc.

WELL DEVELOPMENT DATA SHEET

PROJECT: PORTSMOUTH NSY
PROJECT No.: 6515
SITE: 31
PROJECT GEOLOGIST: T. Evans

WELL No.: WTB- MW03
DATE INSTALLED: 7-11-98
DATE DEVELOPED: 7-22-98
DRILLING Co.: Maxim

WELL DATA

WELL MATERIAL: [X] PVC [ ] STAINLESS STEEL [ ] OTHER:

TOTAL DEPTH: 15.99 feet (TOC / bgs)
STATIC WATER LEVEL: 9.72 feet (TOC / bgs)
CASING VOLUME 1.02 / 3.86 (gal. / L)

CASING ID: 2" inches
SCREEN LENGTH: 10 feet
BOREHOLE DIA.: 8 inches

PURGE DATA

START TIME: 0945 (hr.)
STOP TIME: 1057 (hr.)

METHOD: Bail / Pump
PUMP TYPE: Grundfos RediFlo

Time	Cumulative Volume (gal. / L)	Pumping Rate (gpm / Lpm)	Water Level (ft. / m.)	pH	Sp. Cond. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	Remarks (Color/Odor)
				Water Meter Type: Horiba U-10 / LaMotte 2020					
1003	10								Gray Brn (Silty opaque
1006	—	—	9.72			~~20.7~~			Start + pump
1012	20	1.7	9.78	7.40	.547	20.7	>999/OR	0.80	gray (sil
1018	30	1.7	9.80	7.21	.525	20.5	954/800	0.61	tan
1023	40	2.0	9.81	7.19	.522	20.4	999/OR	0.47	tan
1028	50	2.0	9.74	7.21	.516	20.6	82/70	0.69	clear
1032	60	2.5	9.79	7.22	.515	20.5	39/28	0.48	clear
1037	70	2.0	9.81	7.20	.511	20.5	14/13	0.59	clear
1042	80	2.0	9.79	7.21	.509	20.5	7/9.1	0.88	clear
1047	90	2.0	9.81	7.23	.509	20.6	12/6.3	0.46	clear
1052	100	2.0	9.81	7.21	.509	20.6	5/5.2	0.58	clear
1057	109	1.8	9.81	7.22	.510	20.6	0/4.5	0.67	clear/strong

TOTAL PURGE VOLUME: 109 (gal / L)
TOTAL PURGE TIME: 72 (min. / hrs.)

NOTE: All depth measurements to nearest 0.01 foot.

COMMENTS/CALCULATIONS:
Bail 1st 10 gal to remove fines

HORIBA S/N 507012
LaMotte 2020 S/N 0416-4447

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: PORTSMOUTH NSY
PROJECT NUMBER: 6515
DRILLING COMPANY: Maxim Tech
DRILLING RIG: CME 75

BORING NO.: WTB-SB04
DATE: 7-8-98
GEOLOGIST: T. EVANS
DRILLER: J Leonhardt

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	0.0												
	1.0						Asphalt 0-0.25' Limestone Gravel 0.25-1.0		1235 Auger → No Sample				
S-1		12/12	0.8/2.0		M Dense	Brn to	Silty F Sand Some Met Rock (0.05"Ø)		1320	0.0			
	3.0	7/7				Black	Coal						
S-2		3/7	1.2/2.0		Dense	Brn	Silty F Sand Tr Met Rock	SP	1326 WTB-SB04-0305-98	0.0			
	5.0	20/22				to OK Brn	Tr Brick @ bottom Frag (1"Ø)						
S-3		7/11	1.0/2.0		V Dense	OK	M-C Sand Tr Lead Shot, Brick	SW	1333	0.0			
	7.0	72/12				Brn	F Gravel						
S-4		6/5	1.3/2.0		V Loose	Tan Brn	Silty F Sand /	SP/	1340 WTB-SB04 0709-98	0.0			
	9.0	2/2					F Sand some Silt	SM	wet @ bottom				
S-5		6/12	2.0/2.0	9.4	M Dense	OK Gray	Sandy Silt Asphalt Frags?	ML SW	1343 Saturated	0.0			
	11.0	7/7		10.4		to Black	↓ Sandy Silt	↓ ML					
S-6		1/4	0.9/2.0		V Soft	Brn	F-C Sandy Silt Tr Met Rock Frags	SW	1347	0.0			
	13.0	1/1											
S-7		5/10	0.4/2.0		M Dense	OK Gray	F-C Sandy Silt Some Met Rock Frags	SW	1357 Poor Recovery	0.0			
	15.0	8/5											
S-8		3/15	1.2/2.0		Loose	OK Gray	Met Rock Frags Tr Silt, Beach Rock (white), wood	GW	1400	0.0			
	17.0	8/9		17.1									
S-9		2/5	2.0/2.0		V Stiff	Gray	F Sandy Silt to Clayey Silt Tr Shell + wood	ML	1412 Natural Marine Mud	0.0			
	19.0	8/9											
S-10		WOH/3	1.4/2.0		Stiff	Tan to Gray	Clayey Silt (mottled)	ML	1420	0.0			
	21.0	4/5											
S-11		2/2	2.0/2.0		M Stiff	Brn	Clayey Silt Tr VF Sand	ML	1426	0.0			
	23.0	3/2											
S-12		2/3	2.0/2.0		Stiff	Brn to Gray	Clayey Silt (mottled Tr Shell	ML	1435	0.0			
	25.0	5/7											

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area PID

Remarks: 4 1/4" ID HSA, 3" SS 1310-1415 Paula (rad) @ WTB
Low Tide @ 1713 High Tide @ 1127

Background (ppm): 0.0 ppm

Converted to Well: Yes ✓ No ____ Well I.D. #: WTB-MW04

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: PORTSMOUTH NSY
PROJECT NUMBER: 6515
DRILLING COMPANY: Maxim Tech
DRILLING RIG: CME 75
BORING NO.: WTB-SB04
DATE: 7-8-94
GEOLOGIST: T. EVANS
DRILLER:

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	25.0								Time				
S-13		2/3	1.8/2.0		M Stiff	Brn &	Silt Some F Sand Clay	ML	1445	0.0			
	27.0	5/3				Gray	tr Rust Spots						
	28.0												
S-14		1/2	2.0/2.0		M Stiff	Brn &	Clayey Silt (mottled)	ML	1455	0.0			
	30.0	2/3				Gray		to MH					
				?-?-									
				31.5									
	33.0												
S-15		3/6	1.6/2.0	34.0	Dense	tan Brn	Sandy Silt / Silty F Sand	ML/SM	1505	0.0			
	35.0	12/19		34.65		to Lt Brn	F Sand F Sand Some Wet Rock Frags	SP					
	38.0							1515	Auger Refusal @ 37.4'				
				EOB @ 37.4									
	40.0												
									1530 Pull augers to 20'				
									Natural Backfill to 23.0'				
							1537 Convert boring to WTB-MW04						
							Bentonite 18'-23'						
							2" PVC Screen 7'-17'						
							#1 Sand 6 - 18.0						
							Bentonite 1.5-6						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 0.0

Converted to Well: Yes ✓ No ____ Well I.D. #: WTB-MW04

Tetra Tech NUS, Inc.

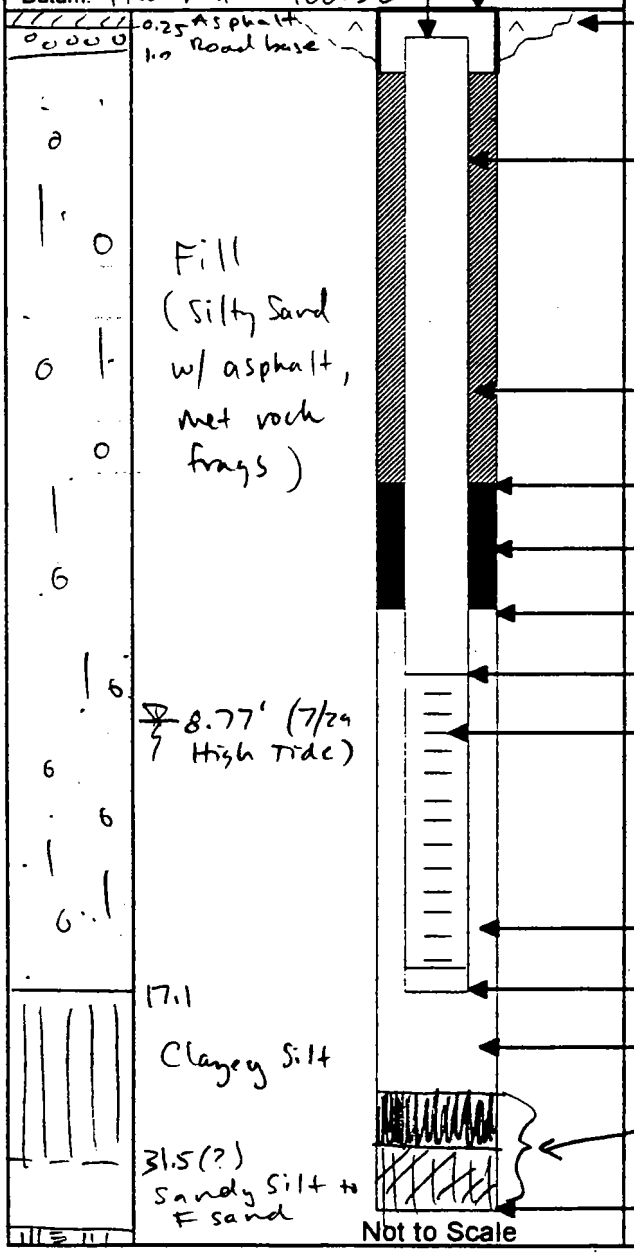
WELL No.: WTB-MW04

MONITORING WELL SHEET

PROJECT:	PNSY	DRILLING Co.:	Maxim Tech	BORING No.:	WTB-SB04
PROJECT No.:	6515	DRILLER:	J. Leonhardt	DATE COMPLETED:	7/8/98
SITE:	31	DRILLING METHOD:	HSA	NORTHING:	91049.46
GEOLOGIST:	T. Evans	DEV. METHOD:	Bail/Pump	EASTING:	346200.53

Ground Elevation = 109.02 ft

Datum: PNS MHW=100.32



Elevation / Depth of Top of Riser: 108.641 0.38

Elevation / Height of Top of Surface Casing: 109.011 0.01

I.D. of Surface Casing: 8"Ø x 12" Long

Type of Surface Casing: Steel

Type of Surface Seal: Concrete

I.D. of Riser: 2"

Type of Riser: Sch 40 PVC

Borehole Diameter: 8"

Type of Backfill: N/A

Elevation / Depth of Seal: 107.521 1.5'

Type of Seal: Bentonite

Elevation / Depth of Top of Filter Pack: 103.021 6.0

Elevation / Depth of Top of Screen: 102.021 7.0

Type of Screen: Sch 40 PVC

Slot Size x Length: 0.020" x 10'

I.D. of Screen: 2"

Type of Filter Pack: #1 Qtz Sand

Elevation / Depth of Bottom of Screen: 92.021 17.0

Elevation / Depth of Bottom of Filter Pack: 91.021 18.0

Type of Backfill Below Well: Natural 23-37.4'; Bentonite 18-23'

Elevation / Total Depth of Borehole: 71.621 37.4

Tetra Tech NUS, Inc.

WELL DEVELOPMENT DATA SHEET

PROJECT: PORTSMOUTH NSY
PROJECT No.: 6515
SITE: Site 31
PROJECT GEOLOGIST: T. Evans

WELL No.: WTB - MW04
DATE INSTALLED: 7-8-98
DATE DEVELOPED: 7-22-98
DRILLING Co.: Maxim Tech

WELL DATA

WELL MATERIAL: ☑ PVC ☐ STAINLESS STEEL ☐ OTHER:

TOTAL DEPTH: 17.13 feet (TOC / bgs)
STATIC WATER LEVEL: 8.53 feet (TOC / bgs)
CASING VOLUME (gal. / L)

CASING ID: 2" inches
SCREEN LENGTH: 10 feet
BOREHOLE DIA.: 8" inches

PURGE DATA

START TIME: 0800 (hr.)
STOP TIME: 0924 (hr.)

METHOD: Bail / Pump
PUMP TYPE: Grundfos Rediflo

Water Meter Type: HORIBA U-10 / LaMotte 2020* BMI / TPI

Time	Cumulative Volume (gal. / L)	Pumping Rate (gpm / Lpm)	Water Level (ft. / m.)	pH	Sp. Cond. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	Remarks (Color/Odor)
0813	10	-							Gray Brn opaque / Bad
0826	15	1.3	8.71	6.69	.684	19.5	735/600*	0.51	Gray Brn / Pur Cloudy
0834	25	1.3	8.71	7.00	.652	19.2	540/400	0.54	Tan / Clou
0842	35	1.3	8.71	7.01	.640	19.4	49/40	0.68	Clear
0850	45	1.3	8.72	7.02	.626	19.4	158/95	0.48	Clear/tan
0858	55	1.3	8.70	7.05	.627	19.4	78/50	0.44	clear
0906	65	1.3	8.76	7.07	.621	19.5	11/9.3	0.53	Clear
0914	75	1.3	8.72	7.03	.620	19.6	7/7.2	0.58	clear
0922	85	1.3	8.70	7.08	.619	19.3	3/4.4	1.01	clear
0924	87.5		-						Stop

TOTAL PURGE VOLUME: 87.5 (gal. / L)
TOTAL PURGE TIME: 84 (min. / hrs.)

NOTE: All depth measurements to nearest 0.01 foot.

COMMENTS/CALCULATIONS:
Bail 1st 10 gal to remove fines.
0822 Switch to pump

HORIBA U-10 S/N 507012
LaMotte 2020 S/N 0416-4497

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: PORTSMOUTH NSY
PROJECT NUMBER: 6515
DRILLING COMPANY: Maxim Tech
DRILLING RIG: CME 75

BORING NO.: WTB- SB05
DATE: 7-7-98
GEOLOGIST: T. EVANS
DRILLER: J. Leonhardt

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	0.0								Time				
	1.0					Brn	Asphalt 0-0.5' F Sand Tr F Gravel	SW	1340 WTB-SS05-0001-98 @ 0.5-1.0	0.0	0.0		
S-1		14/15	1.0/2.0	1.8	Dense		F-M Sand Tr F Gravel	SP	1352 Dry	0.0	0.0	0.0	0.
	3.0	14/20				yellow brn	to silty F Sand Tr Gravel	SM					
S-2		8/20	0.6/2.0		Dense	Tan Brn	F Sandy Silt Tr F Gravel Poor Recovery	SM	1402 WTB-SB05-0305-98	0.0			
	5.0	19/14							Dry				
S-3		6/5	1.4/2.0		M Dense	Tan Brn	F-M Sand VTr F Gravel	SP	1408 moist	0.0			
	7.0	6/7		6.0		D Gray	Silt / Sandy Silt Rust Spots	ML					
S-4		4/8	0.8/2.0		Stiff	F.			1418	0.0			
	9.0	9/4		8.5		Rust Brn	Met Rock Frags Some F Sand	GW	Rust Stained Saturated @ 8.5				
S-5		4/8	1.3/2.0		M Dense				1423	0.0			
	11.0	5/6											
				??									
	13.0												
S-6		1/3	1.5/2.0		Loose	Black Gray	F Sandy Silt / Silt Tr Shell & wood	SM/ML	1442 Natural (marine mud)	3.1			
	15.0	3/2							H_2S odor				
	17.0												
2"SS S-7	18.0	100/0"							Refusal @ 17.7'				
				EOB 17.7									
							Backfill Bentonite 15-17.7		1515				
							2" PVC Screen 4-14						
							#1 Sand 2.9-15		← 3/4 bags				
							Bentonite 1.3-2.9						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area P.

Remarks: 4 1/4" ID HSA, 3" SS 1330 P. Blaise @ WTB (1510) to
1622 Low Tide 1402 MR @ WTB (1510)
•• 1 jar: Metals, Crt6, TOC, pH, CN ; 1 jar SVOC / P/P ; 1 jar TCL VOC, 2-GRO, 1 jar

Background (ppm): 0. ppm

Converted to Well: Yes ✓ No ____ Well I.D. #: WTB- MW05

••• 1 jar - Metals + TOC ; 1 jar SVOC + P/P ; others normal sets
• Normal

Tetra Tech NUS, Inc.

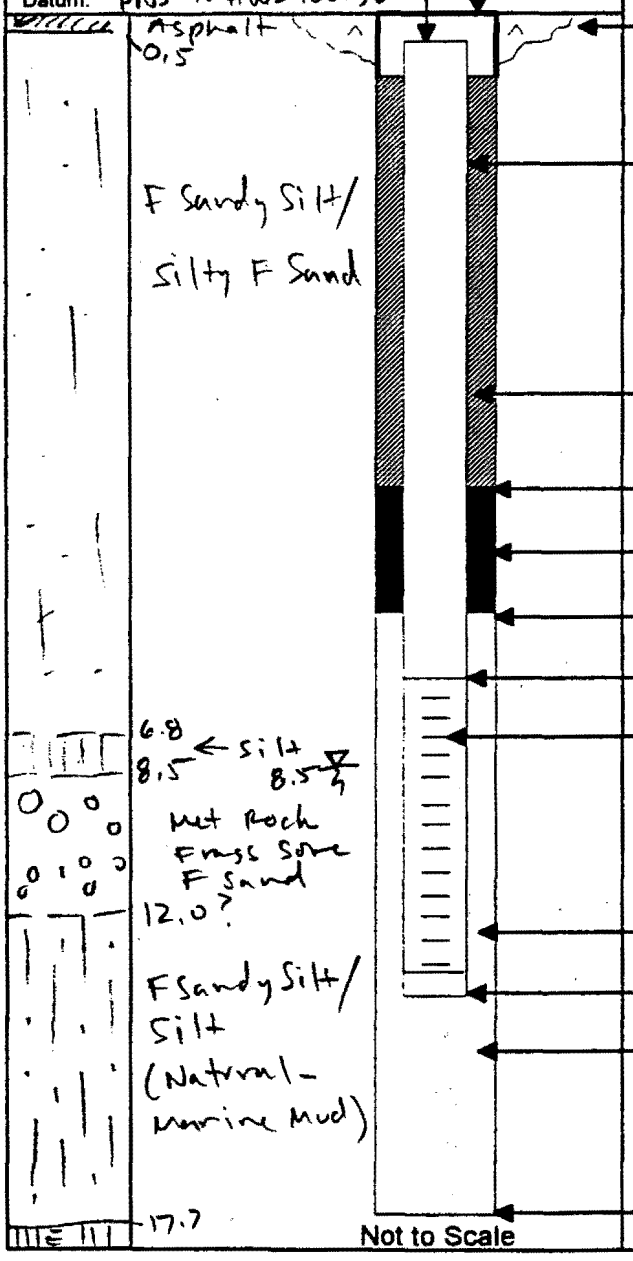
WELL No.: WTB-MW05

MONITORING WELL SHEET

PROJECT:	PNSY	DRILLING Co.:	MaximTech	BORING No.:	WTB-SB05
PROJECT No.:	6515	DRILLER:	J. Leonhardt	DATE COMPLETED:	7-7-98
SITE:	31	DRILLING METHOD:	HSA	NORTHING:	91134.30
GEOLOGIST:	T. Evans	DEV. METHOD:	Pump	EASTING:	345990.68

Ground Elevation = 106.48 ft

Datum: PNS MHW=100.32



Not to Scale

Elevation / Depth of Top of Riser:	106.18 / 0.30
Elevation / Height of Top of Surface Casing:	106.501 0.02
I.D. of Surface Casing:	8"
Type of Surface Casing:	Steel
Type of Surface Seal:	Concrete
I.D. of Riser:	2"
Type of Riser:	Sch 40 PVC
Borehole Diameter:	8"
Type of Backfill:	N/A
Elevation / Depth of Seal:	105.58 / 1.3
Type of Seal:	Bentonite
Elevation / Depth of Top of Filter Pack:	103.58 / 2.9
Elevation / Depth of Top of Screen:	102.48 / 4.0
Type of Screen:	Sch 40 PVC
Slot Size x Length:	0.020" x 10'
I.D. of Screen:	2"
Type of Filter Pack:	#1 Qtz Sand
Elevation / Depth of Bottom of Screen:	92.48 / 14.0
Elevation / Depth of Bottom of Filter Pack:	91.48 / 15.0
Type of Backfill Below Well:	Bentonite 15.0-17.7
Elevation / Total Depth of Borehole:	88.78 / 17.7

Tetra Tech NUS, Inc.

WELL DEVELOPMENT DATA SHEET

PROJECT:	PORTSMOUTH NSY	WELL No.:	WTB- MW05
PROJECT No.:	6515	DATE INSTALLED:	7-7-98
SITE:	Site 31- West Timber Basin	DATE DEVELOPED:	7-21-98
PROJECT GEOLOGIST:	T. Evans	DRILLING Co.:	Maxim Tech

WELL DATA

WELL MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER:

TOTAL DEPTH:	14.36' (solid)	feet (TOC / bgs)	CASING ID:	2"	inches
STATIC WATER LEVEL:	7.45'	feet (TOC / bgs)	SCREEN LENGTH:	10	feet
CASING VOLUME	1.13 / 4.26	(gal. / L)	BOREHOLE DIA.:	8	inches

PURGE DATA

START TIME:	1414	(hr.)	METHOD:	Pump
STOP TIME:	1614	(hr.)	PUMP TYPE:	Grundfos Redi Flo (RTI/MPI)

Water Meter Type: Horiba U-10 / La Motte 2020*

Time	Cumulative Volume (gal / L)	Pumping Rate (gpm / Lpm)	Water Level (ft. / m.)	pH	Sp. Cond. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	Remarks (Color/Odor)
1420	5.0	0.83	10.76						DK Gray opaque
1427	10.0	0.71	11.35						Gray Brn/opaque
1437	15.0	1.0	10.45	7.49	37.1	17.0	>999/OR*	1.34	Gray Brn/cloudy
1451	20.0	0.71	11.25	7.53	37.4	16.2	470/300	1.97	Lt Gray Brn/ cloudy
1505	30.0	0.71	11.53	7.50	37.5	15.7	141/70	0.68	Tan/Clear
1513	35.0	0.63	12.02	7.50	38.0	15.4	70/33	0.62	Tan/Clear
1519	40.0	0.81	12.02	7.51	38.1	15.2	73/45	0.69	Clear
1527	45.0	0.63	12.00	7.50	38.0	15.2	28/20	0.46	clear
1534	50.0	0.71	11.82	7.50	38.0	15.2	25/16	0.56	clear
1541	55.0	0.71	DM	7.50	38.0	15.2	14/11	0.41	clear
1547	60.0	0.83	11.79	7.51	38.1	15.2	16/7.9	0.59	clear
1602	70.0	0.67	11.81	7.52	38.1	15.0	14/10	0.92	clear
1609	75.0	0.71	11.84	7.51	38.0	15.2	5/6.0	0.66	clear
1614	79.0								Clear/Strong

TOTAL PURGE VOLUME: 79 (gal / L) TOTAL PURGE TIME: 120 (min. / hrs.)

NOTE: All depth measurements to nearest 0.01 foot.

COMMENTS/CALCULATIONS: High Tide @ 1025
Low Tide @ 1615

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: PORTSMOUTH NSY
PROJECT NUMBER: 6515
DRILLING COMPANY: Maxim Tech
DRILLING RIG: CME 75
BORING NO.: WTB - SB06
DATE: 7-15-98
GEOLOGIST: T. EVANS
DRILLER: J. Leonhardt

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	0.0												
	1.0						Asphalt 0-0.3 Gravel Base 0.3-0.65		1430	0.0			
S-1		100/1'				Brn	M-C Sand Tr F Gravel	SW	0.65-1.0 Re-Sample 5'N	0.0			
	3.0						(2nd pocket Met Rock Frags	→	N=12/40/18/10)				
S-2		3/3	1.4/2.0		Loose	Brn to	F-C Sand Tr F Grave	SW	1450	0.0			
	5.0	3/3		4.5		Brn Black	Cinders & Coal Frags	SW					
S-3		31/16	1.5/2.0		M Dense	Red Brn to	Cinders (White Ash 60-62)	SW	1458	0.0			
	7.0	11/17				Dk Brn	Silty F Sand Tr Rock Frags	SM	Wet @ 6.0				
S-4		7/5	1.4/2.0		Loose	Black Red Brn	Silt Some C Sand &	SW	1505 Saturated	0.0			
	9.0	3/2				Black	Ash (from water?)						
				11									
	13.0												
S-5		4/3	0.2/2.0		Dense	Black	Met Rock Frags		1515 H_2S odor	0.0			
	15.0	21/12					- Poor Recovery -						
				?-?									
	15.0												
S-6		3/6	2.0/2.0		M Dense	Tan &	F Sandy Silt to	ML	1525 + SBFD-071598	0.0			
	20.0	9/9				Gray	Clayey Silt	ML/CL					
	23.0												
S-7		3/4	1.8/2.0		Stiff	Tan &	Clayey Silt	ML/CL	1531	0.0			
	25.0	4/5				Gray							

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): [ ]

Remarks: 4/4" 10 HSA 3" SS 1415-1530 P Blais @ WTB
1415 Plate yard closes @ 1500 hrs - talk to worker - will stay open to 1600

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: PORTSMOUTH NSY
PROJECT NUMBER: 6515
DRILLING COMPANY:
DRILLING RIG:

BORING NO.: WTB-SB06
DATE: 7-15-98
GEOLOGIST: T. EVANS
DRILLER:

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	28.0												
S-8		2 / 1	2.0/2.0		V Soft	Grn & Gray	Clayey Silt	MH	1540	0.0			
	30.0	1 / 1				Gray							
	33.0												
S-9		wo/H / 1	2.0/2.0	33.9	V Loose	Gray	Silt Tr F Sand	SM/H	1550	0.0			
	35.0	1 / 1		34.4		Brn → silty sand Gray	Silt Tr F Sand	SP/SM MH					
	37.0												
				37.8									
									Augur Refusal @ 37.8				
									16oz TEF DW to PWM				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm):

Converted to Well: Yes ____ No X Well I.D. #:

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: PORTSMOUTH NSY
PROJECT NUMBER: 6515
DRILLING COMPANY: Maxim Tech
DRILLING RIG: CME 75

BORING NO.: WTB-SB07
DATE: 7-11-98
GEOLOGIST: T. EVANS
DRILLER: J. Leonhardt

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	0.0								Time				
	1.0					Brn	Asphalt 0.0-0.2 m-c Sand (Slaty)	SW	1425 WTB-SS07-0001-98	0.0			
S-1		15/16	1.4/2.0		V Dense	Gray-Brn	Met Rock Frags & F Sandy Silt	GW/SM	1443 (0.2-0.5)				
	3.0	20/60											
S-2		3/3	1.1/2.0		Loose	Black	Granular (m gr) Cinders, Ash, Tr Coal	SW	1450 WTB-SB07-0305-98	0.0			
	5.0	3/3											
S-3		2/2	1.3/2.0		Loose				1454	0.0			
	7.0	3/2											
S-4		1/1	1.1/2.0		V loose				1458 wet @ bottom	0.0			
	9.0	2/1		8.4		orange & black	Rust Stained Cinder		WTB-SB07-0709-98				
				11.0 ??									
	13.0												
S-5		1/2	0.5/2.0		Soft		Organic Silt Tr Shell (Poor Recovery)	OH	1510 WTB-SB07-1315-98 H_2S odor	52.2			
	15.0	1/2											
	17.0												
				EOB @ 17.4					1520 Auger Refusal @ 17.4'				
									Natural Backfill	to	8.8'		
									Grout 0.0-8.8'				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): ____

Remarks: 4¼" ID HSA, 3" SS 1435-1510 P. Beaudoin @ WTB
* Normal set
** VOC, SVOC, PP; Metals, Cr+6; TOC, CN, PH; DRO; GRO

Converted to Well: Yes ____ No X Well I.D. #: ____

2010 GEOTECHNICAL EVALUATION FOR WATERFRONT SUPPORT FACILITY

R. W. Gillespie & Associates, Inc.
Geotechnical Engineering • Geohydrology • Materials Testing Services

12 June 2009
05 January 2010 (Revised)

Steven J. Towne, P.E.
Oak Point Associates
73 Court Street
Portsmouth, NH 03801

Subject: Geotechnical Evaluation
Waterfront Support Facility - Portsmouth Naval Shipyard
Kittery, Maine
RWG&A Project No. 767-42

Dear Mr. Towne:

R. W. Gillespie & Associates, Inc., (RWG&A) is pleased to present the results of our geotechnical evaluation for the Waterfront Support Facility at the Portsmouth Naval Shipyard in Kittery, Maine. This work was performed in general accordance with RWG&A's proposal to you dated 20 January 2009 (revised) (note: RWG&A Proposal No. P-6354GI). The purpose of the evaluation was to obtain information regarding subsurface conditions and soil/rock properties on which to base recommendations for design and construction of foundations and floor slabs. RWG&A prepared a draft Geotechnical Evaluation dated 12 June 2009. This report incorporates recent field work and recommendations for an addition to Building 175 and rack storage in the high bay area of Building 174, and supercedes the draft report in it's entirety.

The attached report presents the results of RWG&A's subsurface explorations, laboratory testing, and engineering evaluations, and provides geotechnical design recommendations. In summary, subsurface conditions consist of bituminous pavement over fill underlain by naturally deposited stiff to very soft silty clay underlain by silty sand with gravel extending to bedrock. Fill extended to depths of 12.5 to 23 feet below local ground surface and consisted of silty sand, sandy silt, and/or gravelly sand mixed with varying amounts of shot rock, brick, organics, and other debris. Organic silt was encountered in four explorations between the fill and silty clay. Explorations were terminated on refusal surfaces at depths of 16 to 76 feet below current ground surface. Boring B-103 encountered refusal on an obstruction in the fill at a depth of 16 feet below current ground surface. Two explorations were extended below refusal surfaces using rock coring

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techniques, and two explorations were extended below refusal using roller-cone drilling techniques. Free water was observed in each of the explorations at depths of about 5 to 8.5 feet below local ground surface. Crosshole testing was performed in two boreholes to measure shear wave velocity of on-site soils.

The fill and organic silt encountered are not suitable to support the proposed additions or rack storage areas on conventional shallow foundations. Removal of these materials and replacement with structural fill is not considered practicable due to depth, groundwater levels, and potential environmental issues; it is recommended the proposed addition to Building 174 and rack storage area be supported on a deep foundation system consisting of driven steel H-piles. The addition to Building 175 could be supported on a mat foundation, but the magnitude of total and differential settlement is greater than tolerable limits and should be supported on driven H-piles. The floor slab of pile supported areas should be designed as a structural slab. The on-site fill soils are not suitable for reuse as structural fill or pavement base or subbase, but might be suitable to be used as fill beneath pile supported areas and as backfill around pile caps and grade beams. On-site materials should be stockpiled and tested during construction.

We have enjoyed working with Oak Point Associates on this project. If you have any questions or if we may be of further service, please contact us.

Very truly yours,
R. W. GILLESPIE & ASSOCIATES, INC.

Marc R. Grenier, P.E.
Project Geotechnical Engineer

Robert W. Gillespie, P.E.
Principal Geotechnical Engineer

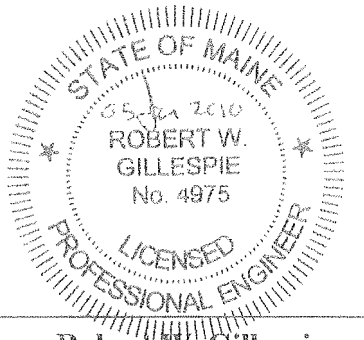
MRG/RWG:md
In quadruplicate

G:\PROJECTS\0700\0767\0767-042\Report\2010-01-05 GI Report (Revised) (With changes of 2010-01-08).wpd

Report
of
GEOTECHNICAL EVALUATION
for
WATERFRONT SUPPORT FACILITY - PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

Prepared
for
OAK POINT ASSOCIATES
PORTSMOUTH, NEW HAMPSHIRE

Prepared
by
R. W. GILLESPIE & ASSOCIATES, INC.
PORTSMOUTH, NEW HAMPSHIRE



Robert W. Gillespie
Maine PE No. 4975

RWG&A Project No. 767-42

12 June 2009
05 January 2010 (revised)

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1.0 INTRODUCTION

1.1 Background

The project consists of an addition to the east side of Building 174, an addition to the north side of Building 175, and rack storage in the high bay area of Building 174 at the Portsmouth Naval Shipyard in Kittery, Maine, as illustrated on Figure 1, *Locus Map*. Currently, the project area is covered with bituminous pavement, occupied temporary structures, and dumpsters. Topography is relatively flat, but slopes down slightly from north to south.

R.W. Gillespie & Associates, Inc.'s (RWG&A's) understanding of site conditions and proposed construction is based on review of the current plans and record drawings provided, as follows:

Current Project Plans

- Sheet CX-101, *Existing Conditions Site Plan*, dated 25 November 2009, prepared by Oak Point Associates.
- Sheet C-101, *Site Plan*, dated 25 November 2009, prepared by Oak Point Associates.

Record Drawings

- *Building 174 Utility Building Foundation Plan and Details*, dated June 5, 1942, prepared by Chas T. Main Inc. Engineers.
- *Polaris Overhaul Facility, East and West Additions to Building 174, Location Plan and Boring Logs*, dated November 2, 1960, prepared by the Department of the Navy.
- *Addition for Polaris Launch System Overhaul, Borings*, dated March 14, 1963, prepared by the Department of the Navy.
- *Addition for Polaris Launch System Overhaul, Foundation and 1st Floor Plan*, dated March 14, 1963, prepared by the Department of the Navy.
- *Addition to Building 174, Foundation Plan and Sections*, dated December 4, 1978, prepared by Lev Zetlin Associates, Inc.

1.2 Scope

This evaluation was performed to develop site-specific soil conditions, and to make geotechnical evaluations for the proposed construction. As performed, our scope of work included the following items:

1. Prepared a program of subsurface explorations to obtain information for foundation and earthwork design.

2. Arranged to have the subsurface explorations performed by a local contractor. Provided technical monitoring of the exploration activities so that depths, locations, and sampling methods could be modified in response to the subsurface conditions encountered. As part of the exploration activities, installed PVC casing in two bore holes to facilitate crosshole shear wave testing. Coordinated with Hager-Richter Geoscience, Inc., to perform crosshole shear wave testing in order to evaluate seismic design parameters.

3. Performed laboratory tests on selected soil samples recovered from the subsurface explorations to aid in soil description and for determination of engineering properties needed for foundation design and site development evaluations.

4. Conducted engineering evaluations of the geotechnical aspects of foundation and slab design, and evaluated construction and site development issues. The engineering evaluations emphasized building foundations and slabs, and site design criteria.

5. Prepared this report presenting the findings, conclusions, and recommendations of the geotechnical evaluation.

RWG&A's scope of services on this project did not include an environmental site assessment for the presence or impact of oil or hazardous materials on the proposed construction or worker safety. The Government should provide RWG&A's reports and all other information related to subsurface and environmental site conditions that might be encountered or affect construction activities or worker safety to project contractors for informal purposes.

2.0 SUBSURFACE EXPLORATION

The subsurface exploration program consisted of seventeen test borings advanced to depths ranging from 16 to 76 feet below local ground surface. Explorations were drilled between 27 April and 08 May 2009 and 09 to 11 November 2009 by Great Works Pump & Test Boring, Inc., of

Rollinsford, New Hampshire, using a truck-mounted drill rig. Split-barrel sampling with standard penetration testing (*ASTM D1586, Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils*) was performed at about 5-foot intervals in most of the explorations. Relatively continuous sampling of the existing fill was performed in boring B-7. The explorations were advanced with driven casing and washed boring techniques. Borings B-9 and B-15 were extended 7.5 feet and 5.5 feet, respectively, below refusal surfaces with rock coring techniques, and borings B-101 and B-104 were extended 16.5 feet and 17.5 feet, respectively, with roller cone drilling techniques. Thin-wall tube samples of soft silty clay were recovered from boring B-5. Borings B-3, B-4, and B-11 were not drilled in the initial phase of drilling due to access problems and issues with underground utilities. Borings B-101 and B-104 were drilled as replacements for B-4 and B-3, respectively. PVC casing (3-inch ID) was grouted in borings B-101 and B-104 to allow verticality measurements by Hager-Richter Geoscience, Inc. as part of their seismic survey analysis. Field vane tests (ASTM D2573, *Standard Test Method for Field Vane Shear Test in Cohesive Soil*) were conducted with an Acker field vane in silty clay deposits in boring B-104 in lieu of standard penetration tests.

A total of 11 test pits (designated TP) and 12 trench excavations (designated Q) were also made at the site in order to obtain samples for environmental testing or to determine the location of a historic quay wall. The logs of test pits and trench excavations are included in Appendix B and excavation locations are shown on the *Exploration Location Plan* for informational purposes only. Results of analytic testing will be provided to Oak Point Associates by RWG&A under separate cover.

Exploration activities were coordinated and monitored by RWG&A personnel who prepared the exploration logs. The soils were described in general accordance with *ASTM D2488, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).* Logs of the explorations are included in Appendix A. Stratification lines shown on the exploration logs represent the estimated boundaries between the different soil types encountered and approximate refusal depths; the actual transitions will be more gradual and vary over short distances.

Figure 2, *Exploration Location Plan*, shows the locations of the explorations. Exploration locations shown were located in the field by Oak Point Associates using GPS and other survey techniques. Elevations of the borings were measured during the survey operations. Locations and elevations should be considered accurate only to the degree implied by the methodology used to determine them.

3.0 LABORATORY TESTING

Laboratory testing was performed to assist in description and estimation of engineering properties of the soils. The laboratory testing program consisted of six (6) sieve analyses and fourteen (14) natural moisture content determinations. The tests were performed in general accordance with the following methods and procedures:

- *ASTM D2216, Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.*
- *ASTM D422, Standard Test Method for Particle-Size Analysis of Soils.*

Moisture content test results are presented on the test boring logs. Results of the other laboratory tests are presented in Appendix D, *Laboratory Test Results*. All tests were conducted at the RWG&A soil and materials testing laboratory in Saco, Maine, which is accredited by the American Association of State Highway and Transportation Officials (AASHTO) for the tests performed.

4.0 SUBSURFACE CONDITIONS

4.1 Subsurface Soils

Six different units were encountered in the explorations: concrete, bituminous pavement, fill, organic silt, silty clay, and silty sand with gravel. In general, the conditions encountered consisted of concrete or bituminous pavement over fill underlain by stiff to very soft silty clay underlain by silty sand with gravel extending to refusal. Fill extended to depths of 12.5 to 23 feet below local ground surface and consisted of silty sand, sandy silt, silty clay, and/or gravelly sand mixed with varying amounts of shot rock, brick, organic material, and other debris. An organic silt layer 4.5 to 5 feet thick was encountered between fill and silty clay in borings B-6, B-13, B-14, and B-16.

Explorations were advanced to depths of 16 to 76 feet below local ground surface and were terminated on refusal surfaces. Boring B-103 encountered refusal on an obstruction at a depth of 16 feet below ground surface. Borings B-9 and B-15 were extended 7.5 feet and 5.5 feet, respectively, below top of bedrock using rock coring techniques. Borings B-101 and B-104 were extended 16.5 feet and 17.5 feet, respectively, below top of bedrock using roller cone drilling techniques. Please refer to the exploration logs in Appendix A for detailed descriptions at specific locations.

4.2 Groundwater

Free water was observed in the explorations at depths of about 5 to 8.5 feet below local ground surface. Water levels observed during the subsurface exploration program were influenced by the exploration methods (e.g., introduction of wash water and slow groundwater response due to low soil permeability) and are not considered representative of stabilized groundwater levels. Groundwater levels at the site will fluctuate due to tide, season, temperature, rainfall and construction activity in the area; therefore, water levels during and following construction will vary from those observed in the explorations.

4.3 Bedrock

Based on the results of the rock coring, refusals encountered in the explorations are interpreted to represent bedrock. Bedrock recovered during coring in borings B-9 and B-15 was described as medium hard, moderately weathered, light gray, fine grained Argillaceous Slate, with very close to close fracture spacing. The bedrock encountered is part of the Kittery Formation and is highly fractured, especially near the top of bedrock surface.

4.4 Concrete

Concrete slabs inside Building 174 and in existing and demolished buildings within the proposed building area were cored to determine thickness. Core C-4 was performed in an area of asphalt pavement. Core C-8 consisted of 7.5 inches of concrete underlain by 3 inches of asphalt. The following table shows the results of the concrete coring. Locations are provided on Figure 2.

Location	Thickness (in)	Location	Thickness (in)
B-5	5	C-4	4**
B-16	7	C-5	7
C-1	8.5	C-6	7
C-2	6.5	C-7	4.25
C-3	9.5	C-8	10.5*

* 7.5 inches of concrete underlain by 3 inches of asphalt.

** 4 inches of asphalt only.

4.5 Seismic Design Parameters

Hager-Richter Geoscience, Inc., performed crosshole seismic testing in a two borehole array (comprised of borings B-101 and B-104 with 3-inch ID PVC casing installed) on 19 November 2009. The testing was conducted in accordance with applicable portions of *ASTM D4428/D4428 M-00 Standard Test Methods for Crosshole Seismic Testing* and was performed to confirm the UBC site seismic designation. Hager-Richter's report is provided in its entirety in Appendix C.

5.0 EVALUATION OF GEOTECHNICAL DATA

5.1 General

Engineering evaluations for this project are based on the subsurface explorations, laboratory testing data, and the conceptual construction information currently available to RWG&A. Proposed site grades were not finalized when this report was written. This report addresses geotechnical issues with addition finished floors matching the existing buildings and site layout as illustrated on *Site Plan*, dated 25 November 2009, prepared by Oak Point Associates.

This report is suitable for planning and design but not for construction. The engineering evaluations that follow should be reviewed by RWG&A to confirm their continued applicability after proposed finished floor elevations, site layout, and site grading have been finalized. It is recommended foundation design and construction be in compliance with the requirements of all applicable ordinances, regulations, and codes.

5.2 Proposed Construction

The proposed project consists of a new building addition to the east side of Building 174, an addition to the north side of Building 175, and rack storage in the high bay of Building 174. Construction of the addition to Building 174 is anticipated to be steel frame with metal cladding and pitched roofs. Overall building dimensions would be approximately120 feet by 150 feet, and finished floor would match Building 174. Structural information provided by Oak Point Associates indicates maximum allowable column loads (note: dead plus snow plus live) of about 284 kips, and maximum allowable post-construction settlement of ½ inch.

Review of record drawings indicates Building 174 was constructed *circa* 1942 and is supported on 30-foot timber piles with a 12-inch butt diameter. The portion of Building 174 adjacent to the currently proposed addition was constructed around 1963, and appears to be supported on steel H-piles. Information related to the H-piles indicates 12BP74 (F_y=36ksi) driven

to approximately 60 feet with an allowable capacity of 40 tons. The existing timber pile report was not available at the time of preparation of this report.

The addition to Building 175 would be one-story in height with a footprint of about 11 feet by 14 feet. It is understood the finished floor would match Building 175. The addition would house compressed air tanks, and piping would connect to Building 175. Structural information provided by Oak Point Associates indicates the building would have an overall ground pressure of about 1,000 pounds per square foot, including dead, live, and snow loading. It is understood the maximum allowable post-construction settlement would need to be determined by the Navy. It is also understood that the existing portion of Building 175 is supported on a pile foundation system.

Construction of the high bay rack storage system proposed for the interior of Building 174 would include removing the existing ground floor slab-on-grade and pile caps, and replacing it with new piles and a structural slab to support the storage rack system. Structural loading in the new rack area would about 1,500 pounds per square foot under the racks and 250 pounds per square foot in the rows between the racks.

5.3 Foundation Considerations

5.3.1 Addition to Building 174 and Rack Storage

The fill, which was likely placed in an uncontrolled manner, underlying organic silt, and silty clay will settle under the new foundation loads. These materials are not considered suitable for support of the proposed construction, and removal and replacement will not be practicable. Consequently, the addition and rack storage will require support on a deep foundation system.

Several alternatives were considered, including precast concrete piles, drilled shafts, and steel H-piles. Precast concrete piles are not considered readily available in the area, especially in a small quantity lot, and driving could be difficult. In addition, precast concrete is usually considered as a friction pile rather than end-bearing. Drilled shafts would require disposal of soils (environmental issues), casing and dewatering, and the use of Type V portland cement to resist sulfate attack from the salt water environment. Steel H-piles driven to, or into, bedrock offer a high capacity capable of being installed with locally available equipment.

Several sizes were considered in our evaluations, including HP10x42, HP10x57, HP12x53, and HP12x74. A sacrificial layer was assumed to account for corrosion losses in the organic and salt water zones, and hammer energy was limited to 20,000 foot-pounds to reflect local equipment. By wave equation analysis, working capacities range from 40 to 65 tons for a geotechnical factor of safety of 2.5.

An old quay wall transects the new building from south to north about 30 feet west of the eastern building wall (See Figure 2). Observations made during test pit excavation show wall construction is granite quarry blocks augmented (chinked) with smaller, randomly sized stones. A pile plan provided to Independent Archeological Consulting (IAC) indicates that the quay wall will be physically impacted at five locations related to pile caps, grade beams, or trenches. The vertical and horizontal impacts presented below are derived from the IAC *End-of-Field Report* dated 27 December 2009.

Location	Arch. Exposure	Length (m)	Length (ft)	Vertical Impact (ft)
South Wall of building addition	Trench 1	4.9	16	4
Eastern portion of bldg – internal pile	not exposed	3.7	12	2
Eastern portion of bldg-- internal pile	not exposed	3.7	12	2
Eastern portion of bldg-- internal pile	Trench 2	2.4	8	2
Northeast corner of building	Trench 3	9.8	32	6

Once lowering of the wall is completed at those pile cap locations, the balance of the wall is still restrained horizontally even with a pile cap excavation. It follows that pile driving will have little if any effect on the wall. It should be noted that the wall expands laterally somewhat with depth, and pile locations might require modifications in the field.

5.3.2 Addition to Building 175

The existing fill is variable in nature and not suitable to support the addition on conventional shallow foundations. However, the addition could be supported on a mat foundation. Mat foundations have a rigidity which tends to equalize applied loads over its area, thereby reducing the likelihood of abrupt differential settlement.

Settlement estimates suggest that post-construction total and differential settlement will be on the order of about 2 inches and 1 inch, respectively. Most of the settlement is expected to occur in the first 6 months after construction; the balance may take an additional 2 to 5 years. If settlements of this magnitude are not acceptable, the addition should be supported on deep foundations consisting of driven piles, similar to the addition to Building 174 and rack storage area. For purposes of this report and based on our discussions with Oak Point Associates, the estimated total and differential settlements exceed tolerable limit and a mat foundation has been removed from further consideration.

5.4 Construction Considerations

Construction Dewatering: The on-site soils are very sensitive to disturbance when wet. To reduce disturbance of exposed subgrade soils, it will be important to divert runoff, provide positive grading to shed seepage and runoff from flat areas, and compact exposed soils to reduce rutting, ponding, and surface water infiltration.

Groundwater levels observed in the explorations were below anticipated finished floor elevations. RWG&A anticipates that groundwater control can be accomplished through the use of ditches, sumps, and open pumping to depths of about 1 to 2 feet below free water levels encountered during construction. Temporary detention ponds, trenches, ditches, and dewatering sumps should not be made within or near areas to be filled.

Use of On-site Soils: The subsurface soils from foundation and site work excavations will generally consist of gravelly sand (pavement base/subbase), and mixtures of silt, sand, and clay with varying amounts of gravel, brick, concrete fragments, shot rock, and debris. In a broad sense, the existing fills can be reused as fill under structural slabs, and around pile caps and grade beams. The more granular materials can be used to establish pavement subgrade but will require observation when segregation is underway. Silt, clay, and other fine-grained soils should not be used as fill beneath the proposed additions. If on-site soil is proposed for use other than common fill, the soil should be stockpiled separately and tested to determine if it meets specification requirements for its intended use.

The on-site soils are moisture sensitive due to their high fines content and will be difficult to place and compact when they are wet. Moisture-density relationships should be established during construction to provide guidance for appropriate working moisture contents. Working moisture content for moisture sensitive soils typically ranges from about minus three to plus one percent of optimum moisture content.

5.5 Pavement Section

The typical CIA area pavement section consists of 2 inches of bituminous concrete wearing surface (MeDOT 703.09, Type 12.5mm), an inch of bituminous concrete base (MeDOT 703.09, Type 19mm), and 6 inch of subbase (MeDOT 703.06, Type D). No traffic data are available as of this writing, so assumptions were made in order to evaluate the proposed pavement section. They are as follows:

Subgrade:	CBR of 5%; Resilient Modulus of 3,000 PSI
Max Axle Load:	20 Kips
Max Vehicle Weight:	60 Kips

Using the foregoing, our evaluation worked backwards through the design process to estimate the number of design vehicles per day and the design life. Both Asphalt Institute and AASHTO methods were used with similar results from each. The results are summarized below.

Method	No. Of Design Vehicles	Design Life, years
AI	30 to 40 per day	10±
AASHTO	40 to 50 per day	10±

The service life might be extended with a maintenance program and possibly an overlay.

Observations of the other pavements in the paved areas surrounding the project site show signs of rutting and indentations from pallets, blocks supporting (temporarily) equipment, and trailer pads. A portland cement concrete pavement would eliminate the foregoing, and possibly provide a longer service life.

6.0 RECOMMENDATIONS

6.1 Site Preparation

1. Site preparation should include demolition and removal of existing structures, associated foundations and utilities, and backfilling. All topsoil, loose soils, organic material, fill materials, demolition debris, active and abandoned utilities, and bituminous pavement should be removed from the area of new construction. The ends of underground pipes and utility conduits outside the proposed addition footprints that will be abandoned in-place should be filled with concrete and capped to reduce the likelihood of erosion of material into the conduit or pipe.

2. Obstructions to pile installation which might be encountered at the site include, but are not limited to rubble fill, concrete foundations, piles that supported previous structures, the quay wall, and abandoned utilities. It is anticipated that obstruction removal will be accomplished by excavation and that other methods, such as spudding, might be needed. It might be necessary to relocate or increase the number of piles where obstructions are encountered which cannot be removed or otherwise overcome.

3. All excavation and filling, including excavation and filling associated with removal of obstructions, should be completed before pile driving. Excavations to remove obstructions should be backfilled with compacted sand or gravel fill free of organics, silty clay, ice, loam, organic and other deleterious materials.

4. Site grading should provide positive drainage away from constructed facilities both during and after construction.

5. It should be practicable to dewater excavations extending to 1-foot below groundwater by open pumping methods. Excavations deeper than 1-foot below groundwater may require the use of side trenches within or adjacent to excavations, or other dewatering methods. Surface runoff and infiltration of groundwater should be controlled so that excavation, filling, and foundation construction can be completed in-the-dry.

   Dewatering of contaminated soils is a possibility and will require testing of groundwater before evacuation begins to determine type(s) of treatment, and to establish suitable discharge points.

   Recent projects close to the river which required dewatering experienced high flow rates in areas of coarse fill such as shot rock and concrete rubble. Construction documents should provide for dewatering flow rates of 300 gallons per minute (GPM) or more.

6.2 Site Filling

6. Structural fill should be a well-graded sand and gravel mixture meeting the following gradation requirements:

Screen Number or Sieve Size	Percent Passing
6 inches	100
3 inches	70 - 100
Number 4	35 - 70
Number 40	5 - 35
Number 200	0 to 5

Note: Maximum particle size limited to 3 inches within 3 feet of foundation walls, pile caps, and floor slabs or if compacted by hand-guided equipment.

Gradations performed on fill encountered in the upper five feet indicate that it is not suitable for use as structural fill, but can be used as fill to raise grade below the addition to Building 174, the rack storage area, paved areas, and utility trench backfill. However, RWG&A's experience at PNSY is that soil conditions can vary greatly across construction areas. Therefore, the on-site inorganic soils should be stockpiled separately after excavation and evaluated for reuse in the project.

7. In open areas, fill should be placed in level, uniform lifts not exceeding 9 inches in uncompacted thickness and be compacted with self-propelled compaction equipment. In confined areas and within 4 feet of mat foundations, pile caps, and/or grade beams, fill should be placed in lifts not exceeding 6 inches in uncompacted thickness and be compacted with hand-operated compaction equipment. All fill placed should be structural fill compacted to at least 95 percent of the maximum dry density as determined by ASTM Standard D1557 *Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).*

6.3 Foundations - General

8. The additions and rack storage area should be designed to withstand lateral, uplift, and overturning forces due to earthquake. Fill materials encountered in the explorations are not considered susceptible to liquefaction. In accordance with the 2006 *International Building Code®*, the soil profile at the site is classified as Site Class D.

9. If the addition to building 175 is unheated, the fill should be removed to a depth of at least 4 feet below adjacent exterior finished grade and replaced with a non-frost susceptible material such as 3/4 inch crushed stone. The stone should extend laterally 3 feet beyond addition limits and be densified with a small self propelled vibratory roller.

10. Excavation of foundation bearing surfaces in soil or fill should be performed by earthwork equipment fitted with smooth-edged buckets. Final subgrade preparation should include recompaction of subgrades with hand-guided, vibratory compaction equipment. Following recompaction and prior to placement of concrete, care should be taken to limit disturbance of the bearing surfaces. Any loose, softened, or disturbed material due to construction traffic should be removed prior to placement of concrete.

11. The integrity of subgrade soils must be maintained during cold weather conditions. Foundation subgrades should not be allowed to freeze. Freezing of subgrade soils beneath foundations might result in frost heaving and post-construction settlement. The Contractor should make every effort to prevent freezing of subgrade soils. In the event frost penetration occurs, granular fill or naturally deposited soils should be removed and replaced to the depth of the frozen soils. At no time should frozen material be placed as fill.

12. Lateral loads from wind and earthquake may be resisted by friction between the bottom of foundation and supporting subgrades. A friction coefficient of 0.25 should be used in design of foundations.

6.3.1 Pile Foundations

13. The proposed additions, rack storage area, and addition to Building 175 should be supported on a deep foundation system that will transmit the relatively high foundation loads through the in-place fill, organic silt, and soft silty clay to the underlying glacial till or bedrock. Review of the exploration logs yields estimated pile lengths on the order of 35 to 70 feet. In some locations, the bedrock is highly fractured, and piles may extend below boring refusal elevations. The following pile sections and design capacities are technically feasible and locally available:

Pile Section	Design Capacity (Tons)
HP 10 x 42	40
HP 10 x 57	45
HP 12 x 53	60
HP 12 x 74	65

14. The above driving criteria assumes the piles are driven to refusal with a single or double acting hammer delivering about 20,000 to 30,000 foot-pounds of energy. The design capacity at the end of driving should include a geotechnical safety factor of 2.5. A wave equation analysis should be submitted by the contractor to demonstrate that his proposed pile hammer can drive the piles to the required minimum ultimate capacity and depth without over stressing or damaging the piles.

15. The building code requires a pile load test for design capacities greater than 40 tons.

16. Driving stresses should be limited to a maximum compressive stress of 45 kips per square inch for the steel H-piles with a yield stress, F_y, of 50 ksi. Splices should not be allowed in the upper 10 feet of the embedded portion of the pile. Cast steel points should be provided to reduce damage while driving through debris in the fill. The pile points should be "Hard-Bite" pile points manufactured by American Pile Fittings of Clifton, New Jersey, or equivalent.

17. Each pile should be driven plumb at the prescribed location. A pile should be considered out of plumb if the inclination is greater than 2 inches in 10 feet from its design alignment.

18 Center-to-center pile spacing should be not less than 30 inches for groups of two or more piles. Recommended minimum design eccentricity between the columns and centroid of the supporting piles is 3 inches.

19. It is recommended design bottom of exterior pile cap level be a minimum of 4 feet below lowest adjacent ground surface exposed to freezing. At heated interior locations, pile caps may be designed to bear a minimum of 24 inches below top of ground floor slab. If exposure to freezing is anticipated either during or following construction, then interior pile caps should be lowered in accordance with the recommendations for exterior pile caps.

20. Lateral loads from wind and earthquake may be counteracted by earth pressure against below grade structures. An earth pressure equivalent fluid unit weight of 125 pounds per cubic foot ($K_p = 1.0$) may be used against pile cap faces. Piles can be battered to achieve additional lateral resistance; batter should not be steeper than 1 horizontal to 12 vertical.

6.4 Ground Floor Slabs

21. Due to the potential for post-construction settlement, a pile supported structural slab is recommended for ground floors.

6.5 Utilities

22. Utilities within the site and beneath paved areas may be earth supported. Bedding placed between the utility and subgrade should meet the utility and manufacturer requirements for the type of conduit or pipe being installed.

6.6 Temporary Excavations

23. Soils at this site, encountered within the anticipated depths of excavations, consist of concrete, bituminous pavement, fill, and naturally deposited organic silt, silty clay, and silty sand with gravel. We anticipate that foundation and utility excavations can be accomplished using sloped, open-cut techniques. It is also anticipated that dewatering can be accomplished using sumps and open pumping methods. Refer to Recommendation 5 for additional information.

    The Contractor should be aware that slope height, slope inclination, and excavation depths (including utility trench excavations) should in no case exceed those specified in local, state, or federal safety regulations (e.g., OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations). Such regulations are strictly enforced and, if they are not followed, the Owner, Contractor, and/or earthwork and utility subcontractors could be liable for substantial penalties.

    As a safety measure, it is recommended all vehicles and spoil piles be kept a minimum lateral distance from the top of excavations equal to no less than 100 percent of the slope height. Exposed slope faces should be protected against the elements.

6.7 Geotechnical Observation

The geotechnical recommendations provided as the basis for design of this project were developed using limited numbers of observations and tests. The Owner should be sensitive to the potential need for adjustment in the field. We recommend that the Owner retain RWG&A to observe geotechnical construction aspects of the project. These services should include observing general compliance with the design concepts, specifications and recommendations, and assisting in development of design changes should subsurface conditions differ from those anticipated prior to the start of construction. Observation improves the likelihood that the design intent will be carried out during construction. In addition, it allows RWG&A to confirm its design recommendations.

In addition to geotechnical observation, RWG&A can also provide full service construction inspection and materials testing. This would include soils, portland cement and asphaltic concrete, structural steel and welding inspections, destructive and non-destructive testing, and special inspection services in fulfillment of building code requirements.

7.0 CLOSURE

This report has been prepared for specific application to the proposed Waterfront Support Facility at the Portsmouth Naval Shipyard in Kittery, Maine, for the exclusive use of Oak Point Associates. This work has been completed in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made. In the event any changes are made in the nature, design, or location of the proposed construction, the conclusions and recommendations of this report should be reviewed by RWG&A.

The recommendations presented are based on the results of widely spaced explorations. The nature of variations between the explorations may not become evident until construction has begun. If variations are encountered, it will be necessary for RWG&A to re-evaluate the recommendations presented in this report. RWG&A requests an opportunity for a general review of the final design and specifications in order to determine that earthwork and foundation recommendations have been interpreted in the manner in which they were intended.

R. W. Gillespie & Associates, Inc.
Geotechnical Engineering • Geohydrology • Materials Testing Services

22 June 2009

Stephen Towne, P.E.
Oak Point Associates
73 Court Street
Portsmouth, New Hampshire 03801

Subject: Building 307 Air Compressor and Piping System
Portsmouth Naval Shipyard
Kittery, Maine
Project No. 767-42

Dear Mr. Towne:

This letter is in response to recent email communications concerning Building 307 and the compressed air pipelines which exist beneath the proposed addition to Building 174 at the Portsmouth Naval Shipyard in Kittery, Maine. It is understood the Navy does not want the building or the pipelines relocated outside of the proposed addition area. Oak Point Associates (OPA) asked RWG&A to evaluate potential affects of foundation and earthwork construction activities on the pipelines. Our evaluation is presented in the following paragraphs.

RWG&A completed a Geotechnical Evaluation for the proposed addition to Building 174 and provided a draft of the report to OPA on 12 June 2009. In the report, RWG&A recommended supporting the addition on driven steel H-piles and a structural slab. Building 307 is located adjacent to Building 174 in the southwest quadrant of the proposed addition. The compressed air pipelines run north-south, approximately along the centerline of the proposed addition. It is understood the pipelines are encased in concrete, buried at a relatively shallow depth (although the depth is not known), and the air is at a pressure of approximately 4,500 pounds per square inch.

RWG&A's evaluation focused on the impact of construction on the pipelines, if they are not relocated. RWG&A evaluated alternate pile types because of concerns that vibrations from driven pile installation could damage the pipelines. It is our recommendation that the compressed air pipelines be relocated outside of the proposed addition area or that a minimum horizontal separation of 50 to 75 feet be maintained between the placement of steel H-piles and the pipeline. To reduce horizontal separation, alternative piles could be considered, but do not seem practicable

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for the following reasons. Drilled shafts would cause less ground vibration and horizontal separation to the pipeline could be reduced when compared to driven piles, but their installation would require disposal of soils (environmental issues), casing and dewatering, and would require the use of Type V portland cement to resist sulfate attack from the salt water environment; augered, cast-in-place piles would also require significant expense for disposal of soils when compared to driven piles. One other option would be augered, cast-in-place displacement piles, which require less disposal of soils, although some disposal would still likely be required. Because of poor subsoil conditions, augered helical piles would not satisfy seismic requirements for this project. Also, all alternate pile systems likely would require a contractor from outside the local area which would result in higher costs for foundation installation. Driven steel H-Piles have low displacement during driving, probably less expensive than the aforementioned alternatives, and can be installed by local contractors.

Another issue, if the pipelines remain under the proposed construction area, is construction equipment trafficking over the pipelines. Heavily loaded equipment or equipment with high ground pressure could cause damage to the pipelines, depending on the depth to the top of pipe, age of the pipe, and type of pipe and joints. Equipment used at the project would probably be subject to weight or ground pressure restrictions but detailed geotechnical evaluations would be required to develop vehicle weight and ground pressure limitations. Higher costs associated with specialty equipment or limitations during construction should be anticipated at this time. The Navy and/or their consultant would need to provide any requirements for construction traffic over the pipelines.

In summary, it is our opinion that foundation construction could be accomplished if the building and pipelines remain in their current location, but with higher to significantly higher costs and the risk to damage of the pipelines, and potential collateral damage. If you have any questions or if we may be of further service, please contact us.

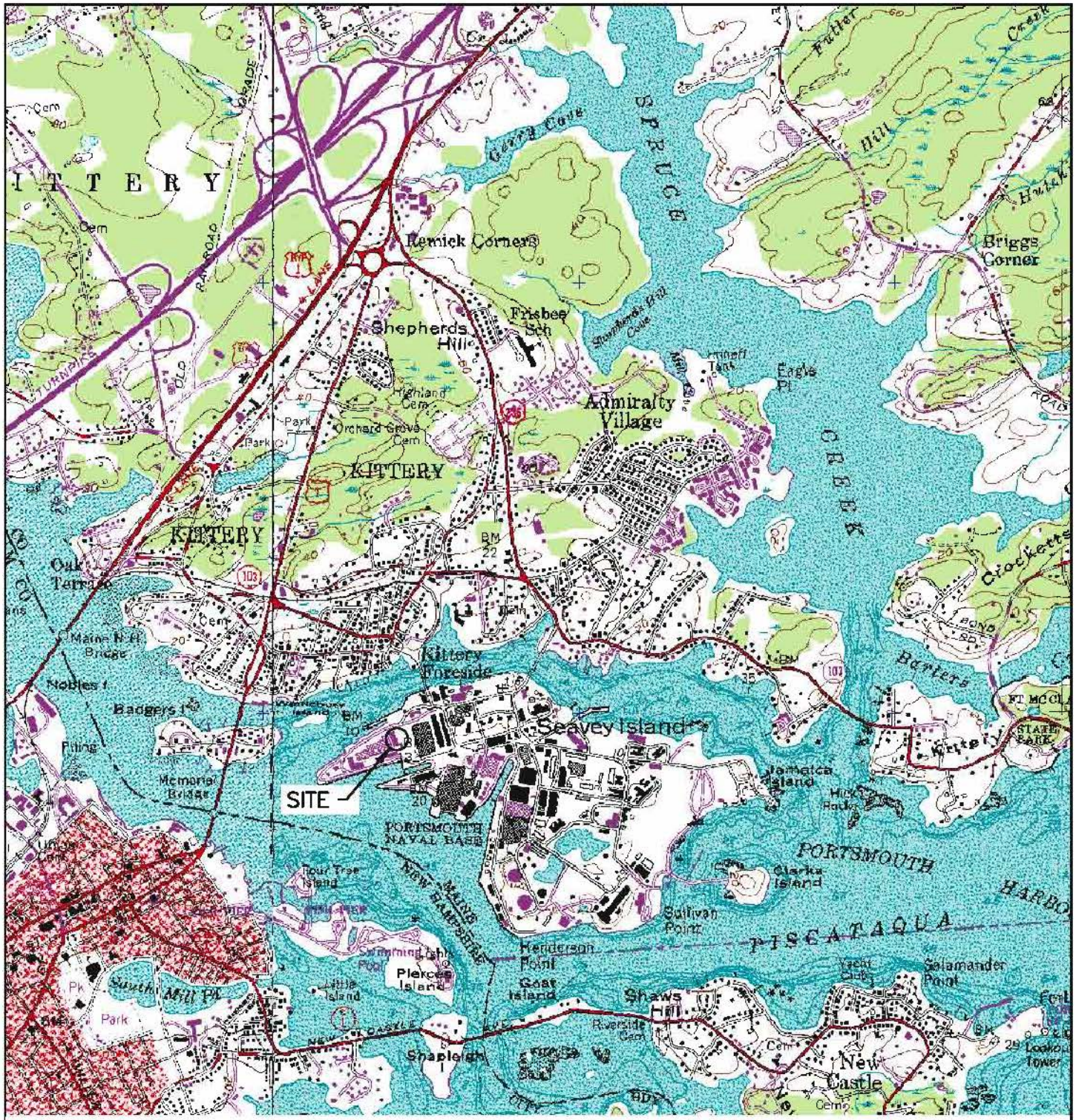
Very truly yours,
R. W. GILLESPIE & ASSOCIATES, INC.

Marc R. Grenier, P.E.
Project Geotechnical Engineer

Robert W. Gillespie, P.E.
Principal Geotechnical Engineer

MRG/RWG:md

G:\PROJECTS\0700\0767\0767-042\Corresp\2009-06-19 Building 307 Air Compressor and Piping System.wpd



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0 2000 3000 4000

SCALE, FEET

FIGURE 1
LOCUS MAP
WATERFRONT SUPPORT FACILITY
KITTERY, MAINE

JUNE 2009

PROJECT NO. 767-42

R.W Gillespie & Associates, Inc.
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86 Industrial Park Rd., Suite 4 Scarborough, Maine 04074 (207) 885-9008
Fax: (207) 885-2882 E-mail: rwg-a@rwg-a.com

SOURCE:
USGS 7.5-MINUTE TOPOGRAPHIC QUADRANGLES OF KITTERY, MAINE AND PORTSMOUTH, NH, DATED 1990 AND 1993 RESPECTIVELY.

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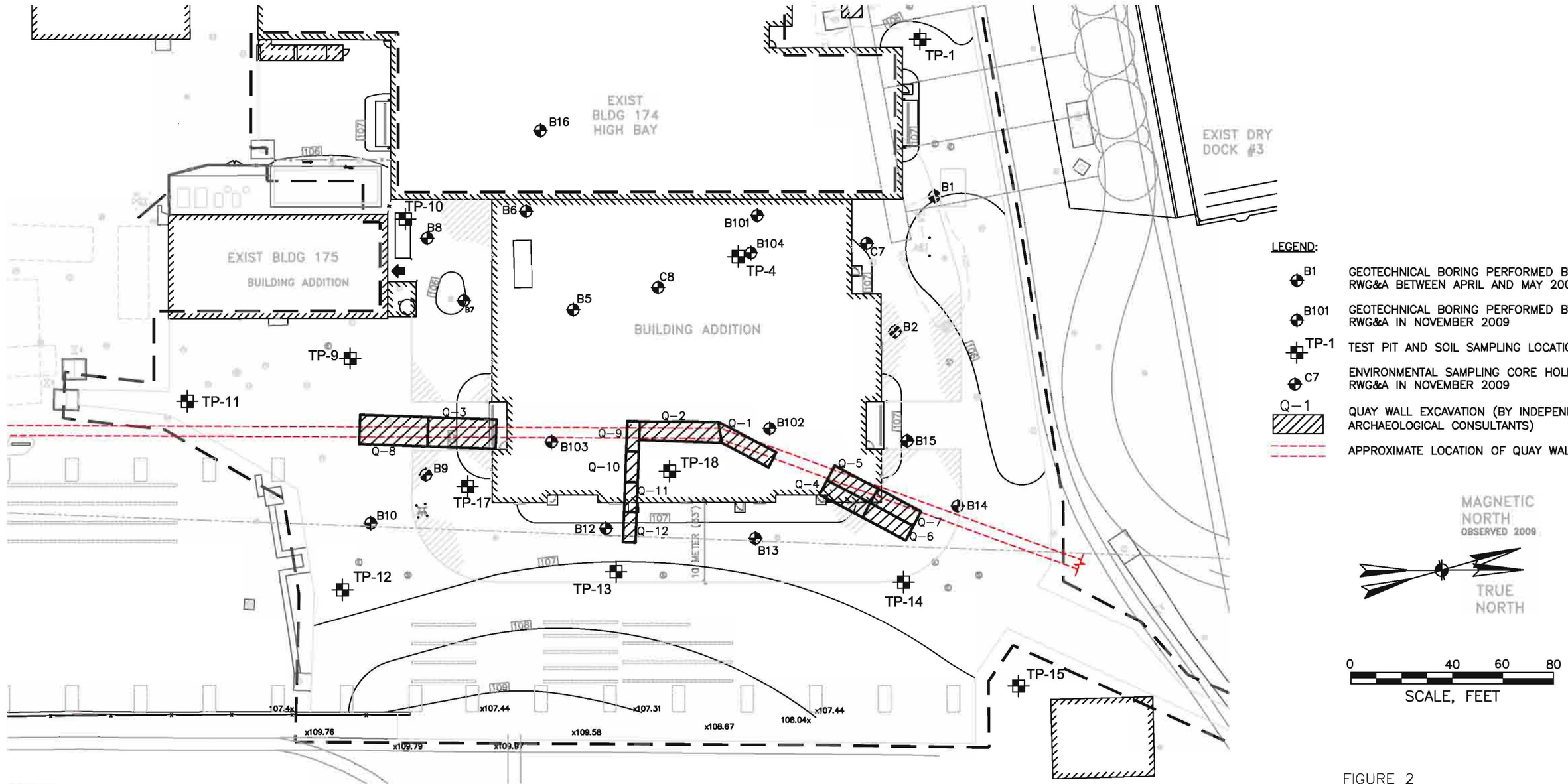

SOURCE:
SHEET C101 TITLED "SITE PLAN" BY OAK POINT ASSOCIATES, DATED 25 NOVEMBER 2009

NOTE:
- BORING AND TEST PIT LOCATIONS SHOWN WERE DETERMINED BY OAK POINT ASSOCIATES, INC., USING GPS AND OTHER SURVEY TECHNIQUES.
- BORINGS B-3, B-4 AND B-11 WERE NOT DRILLED DUE TO SURFACE OBSTRUCTIONS OR UTILITY CONFLICTS AND ARE NOT SHOWN. TEST PITS TP-2, TP-3, TP-5 THROUGH TP-8 AND TP-16 WERE NOT EXCAVATED AND ARE NOT SHOWN.

FIGURE 2
EXPLORATION LOCATION PLAN
WATERFRONT SUPPORT FACILITY
KITTERY, MAINE

JANUARY 2010 PROJECT NO. 767-42

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APPENDIX A

TEST BORING LOGS

Geotechnical Evaluation
Waterfront Support Facility - Portsmouth Naval Shipyard
Kittery, Maine

R.W. Gillespie & Associates, Inc.
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Boring Log: B-1
Total Depth (ft): 64
Sheet 1 of 3

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 7 (feet)

Drilling Contractor: Great Works Test Boring
Drill Rig: B 59 Truck
Driller Rep.: Pete Michaud
Date Started: 04/29/09
Date Completed: 04/29/09
Surface Elevation: 105 ()
Drilling Method: 4-inch Tri-Cone
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (2 inches).					
			S-1	SILTY SAND (FILL); Dense to medium dense, moist to wet, fine to medium sand, little silt, few fine gravel, brown.	18	10 20 21 14	41	6	GS
5			S-2		2	5 5 4	9	11	
▽			S-3		6	4 8 12 7 8	19	13	
10									
				SAND (FILL); Dense, wet, fine to medium sand, trace shotrock fill, brown. grades coarser with depth.					
15			S-4		10	20 20 12 15	32	19	
20			S-5		6	7 22 17 5	39	10	
				SILTY CLAY (CL); Stiff, wet, silt and clay, blue gray. trace fine sand seams.					
25			S-6	Pocket Penetrometer: Undrained Shear Strength, Su = 1.25ksf	10	8 10 13 10	23		
30									

Notes:

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Boring Log: B-1
Total Depth: 64
Sheet 2 of 3

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 7 (feet)

RWG&A Project No. 767-42
Surface Elevation: 105 ()
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
30			S-7		18	2 2 1 2	3		
35									
40			S-8		22	WOH WOH WOH WOH	WOH		
45									
50									
55									
60									

Notes:

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Boring Log: B-1
Total Depth: 64
Sheet 3 of 3

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 7 (feet)

RWG&A Project No. 767-42
Surface Elevation: 105 ()
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
60			S-9	SILTY SAND WITH GRAVEL (SM); Very dense, wet, fine sand, little silt and clay, few fine gravel, blue gray.	6	24 25 40 40	65		
				Bottom of exploration at 64 ft; rollercone refusal, probable bedrock.					
65									
70									
75									
80									
85									
90									

Notes:

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Boring Log: B-2
Total Depth (ft): 52.5
Sheet 1 of 2

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 7 (feet)

Drilling Contractor: Great Works Test Boring
Drill Rig: B 59 Truck
Driller Rep.: Pete Michaud
Date Started: 04/29/09
Date Completed: 04/29/09
Surface Elevation: 105 ()
Drilling Method: 4-inch Tri-Cone
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (2 inches).					
				SILTY SAND (FILL); Medium dense to very loose, moist to wet, fine to medium sand, little silt, few fine gravel and shotrock fill, brown.					
5			S-1		7	5 8 8 6	16	10	GS
10			S-2		3	16 11 7 8	18		
15			S-3		0	1 1 0 0	1		
				SILTY CLAY (CL); Stiff, wet, silt and clay, blue gray. trace fine sand seams.					
20			S-4	Pocket Penetrometer: Undrained Shear Strength, Su = 2.0ksf	17	.4 5 6 6	11		
25			S-5	Pocket Penetrometer: Undrained Shear Strength, Su = 1.75ksf	19	2 3 6 7	9		
30									

Notes:

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Boring Log: B-2
Total Depth: 52.5
Sheet 2 of 2

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 7 (feet)

RWG&A Project No. 767-42
Surface Elevation: 105 ()
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
30			S-6		24	WOH WOH WOH WOH	0		
35									
40									
45									
50			S-7	SILTY SAND WITH GRAVEL (SM); Very dense, wet, fine sand, little silt and clay, few fine gravel, blue gray.		50/0	100+		
				Bottom of exploration at 52.5 ft; rollercone refusal, probable bedrock.					
55									
60									

Notes:

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Boring Log: B-5
Total Depth (ft): 57
Sheet 1 of 2

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Expl. Loc. Plan-Offset 8 ft toward B-7
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 7 (feet)

Drilling Contractor: Great Works Test
Drill Rig: B 59 Truck
Driller Rep.: Pete Michaud
Date Started: 05/06/09
Date Completed: 05/06/09
Surface Elevation: 106 ()
Drilling Method: 4-inch Tri-Cone
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				SILTY SAND (FILL); Loose, moist to wet, fine sand, few to some silt, trace medium sand, light brown.					
5			S-1		5	3 3 2 3	5	22	GS
				SILTY SAND (FILL); Very dense, wet, fine sand, little silt, trace fine gravel, organic odor, black gray.					
10			S-2		9	9 22 30 14	52		
15			S-3	wood fragments	2	1 1 2 50	3		
				SILTY CLAY (CL); Stiff, wet, silty clay, trace fine sand, blue gray.					
20			S-4	Pocket Penetrometer: Undrained Shear Strength, Su = 3.25ksf	19	6 12 7 11	19		
25									
30									

Notes:

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Boring Log: B-5
Total Depth: 57
Sheet 2 of 2

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 7 (feet)

RWG&A Project No. 767-42
Surface Elevation: 106 ()
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
30			U-1		23				
35									
40			U-2		24				
45									
50			S-5	SILTY SAND WITH GRAVEL (SM); wet, fine sand, little fine gravel, few silt, blue gray.	3	3 8 60 30	68		
55									
60				Bottom of exploration at 57ft; rollercone refusal, probable bedrock.					

Notes:

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Boring Log: B-6
Total Depth (ft): 57
Sheet 1 of 2

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Expl. Loc. Plan-Offset 10 ft toward B-7
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 5 (feet)

Drilling Contractor: Great Works Test Boring
Drill Rig: B 59 Truck
Driller Rep.: Pete Michaud
Date Started: 05/06/09
Date Completed: 05/06/09
Surface Elevation: 106 ()
Drilling Method: 4-inch Tri-Cone
Casing Type: 4 inch driven, 3 inch telescope

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT(2 inches).					
				SILTY SAND (FILL); moist to wet, fine to medium sand, little silt, few fine gravel and shotrock fill, brown.					
5 ▽									
10									
				SILTY SAND (FILL); Dense, wet, fine sand, little silt, trace fine gravel, black gray. Hard drilling from 11 ft to 15 ft, possible boulder.					
15			S-1		3	12 33 15 7	48		
				ORGANIC SILT (OL); Stiff, wet, clayey silt, few fine sand, trace organics, organic odor, black and gray.					
20			S-2		6	2 8 6 7	14		
				SILTY CLAY (CL); Medium stiff, wet, silty clay, trace fine sand, blue gray.					
25			S-3		20	4 3 5 7	8		
30									

Notes:

R.W. Gillespie & Associates, Inc.
Geotechnical Engineering•Geohydrology•Materials Testing Services

Boring Log: B-6
Total Depth: 57
Sheet 2 of 2

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 5 (feet)

RWG&A Project No. 767-42
Surface Elevation: 106 ()
Casing Type: 4 inch driven, 3 inch telescope

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
30									
35									
40									
45									
50									
55				SILTY SAND WITH GRAVEL (SM); Wet. Logged change in materials based on change in probe resistance.					
				Bottom of exploration at 57 ft; probe refusal.					
60									

Notes:

R.W. Gillespie & Associates, Inc.
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Boring Log: B-7
Total Depth (ft): 55
Sheet 1 of 2

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 7 (feet)

Drilling Contractor: Great Works Test Boring
Drill Rig: B 59 Truck
Driller Rep.: Pete Michaud
Date Started: 04/29/09
Date Completed: 04/28/09
Surface Elevation: 106 ()
Drilling Method: 4-inch Tri-Cone
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (2 inches).					
			S-1	SANDY SILT (FILL); Medium dense, moist, silt, little fine sand, trace coarse sand, dark brown.	6	11 13 11 7	24	8	
5			S-2		4	12 23 15	38	17	
▽			S-3	GRAVELLY SAND (FILL); Loose to dense, wet, medium to coarse sand, little gravel, few silt, organic odor, gray.	3	8 12 8 4	12	14	
10			S-4		3	5 6 27 23	50	21	
			S-5		1	5 8 6 6	12	8	
15			S-6		2	6 11 12 6	18	16	
			S-7		3	6 4 4 3	7		
20			S-8	SILTY CLAY (CL); Medium stiff to very soft, wet, silty clay, trace fine sand, blue gray. shell fragments in spoon sample Pocket Penetrometer: Undrained Shear Strength, Su = 4.0ksf	16	4 6 13 12 21	25		
25			S-9		2	7 8 10 12	18		
30									

Notes:

R.W. Gillespie & Associates, Inc.
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Boring Log: B-7
Total Depth: 55
Sheet 2 of 2

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 7 (feet)

RWG&A Project No. 767-42
Surface Elevation: 106 ()
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
30			S-10		20	WOH WOH WOH WOH	0		
35									
40									
45									
50				SILTY SAND WITH GRAVEL (SM); wet, fine sand, little silt and clay, few fine gravel, blue gray.					
55				Bottom of exploration at 55 ft; rollercone refusal, probable bedrock beginning at 54 ft.					
60									

Notes:

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Geotechnical Engineering•Geohydrology•Materials Testing Services

Boring Log: B-8
Total Depth (ft): 58
Sheet 1 of 2

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 7 (feet)

Drilling Contractor: Great Works Test Boring
Drill Rig: B 59 Truck
Driller Rep.: Pete Michaud
Date Started: 04/29/09
Date Completed: 04/28/09
Surface Elevation: 106 ()
Drilling Method: 4-inch Tri-Cone
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (3 inches).					
			S-1	SILTY SAND (FILL); Medium dense, moist to wet, fine to medium sand, little silt, few fine gravel and shotrock, brown.	14	11 11 8 8	19	10	GS
5			S-2		4	5 5 5	10		
			S-3	increased shotrock fraction	3	4 3 4 10 12	14		
10			S-4	drilling resistance increased from 12 ft to 14 ft, probable boulder. (12' to 14')	2	50/4"	100+		
15			S-5	SILTY CLAY (CL); Very stiff to very soft, wet, silty clay, trace fine sand, dark gray.	16	10 12 12 11	24		
20			S-6		2	3 4 10 9	14		
25			S-7	Pocket Penetrometer: Undrained Shear Strength, Su = 1.25ksf	12	12 12 9 12	21		
30									

Notes:

R.W. Gillespie & Associates, Inc.
Geotechnical Engineering•Geohydrology•Materials Testing Services

Boring Log: B-8
Total Depth: 58
Sheet 2 of 2

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 7 (feet)

RWG&A Project No. 767-42
Surface Elevation: 106 ()
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
30			S-8		20	WOH WOH WOH WOH	0		
35									
40									
45									
50									
55									
				Bottom of exploration at 58 ft; rod probe refusal, probable bedrock.					
60									

Notes:

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Boring Log: B-9
Total Depth (ft): 50
Sheet 1 of 2

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 8.5 (feet)

Drilling Contractor: Great Works Test Boring
Drill Rig: B 59 Truck
Driller Rep.: Pete Michaud
Date Started:
Date Completed:
Surface Elevation: 106 ()
Drilling Method: 4-inch Tri-Cone
Casing Type:

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (2 inches).					
				SILTY SAND (FILL); Medium dense, moist to wet, fine to medium sand, few to little silt, few to some fine gravel and shotrock fill, brown.					
5			S-1		4	8 5 6 4	11	11	GS
10			S-2		2	3 8 9 5	17		
				SILTY CLAY (FILL); Medium, wet, silt and clay, trace fine sand, with wood fragments, organic odor, black gray.					
15			S-3		20	1 1 4 4	5		
				SILTY CLAY (CL); Very stiff to soft, wet, silt and clay, blue gray. Trace fine sand seams.					
20			S-4		2	12 10 18 21	28		
25			S-5	Pocket Penetrometer: Undrained Shear Strength, Su = 1.0ksf	20	8 7 9 10	16		
30									

Notes:

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Boring Log: B-9
Total Depth: 50
Sheet 2 of 2

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 8.5 (feet)

RWG&A Project No. 767-42
Surface Elevation: 106 ()
Casing Type:

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
30			S-6		24	WOH WOH 2 2	2		
35			S-7	SILTY SAND WITH GRAVEL (SM); Very dense, wet, fine sand, little silt and clay, few fine gravel, blue gray.	11	30 29 33 16	62		
40				Top of bedrock at 42.5 feet, Rollerbit to 45 feet and begin rock core					
45			R-1	(45' To 50'); Medium, moderately weathered, light gray, fine grained, ARGILLACEOUS SLATE; very close to close fracture spacing, wet; (Argillaceous interbedding within Kittery Formation). Recovery = 30"/60.0" = 50% RQD = 16"/60.0" = 27%					
50				Bottom of exploration at 50 ft; terminated boring 7.5 ft into bedrock.					
55									
60									

Notes:

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Boring Log: B-9A
Total Depth (ft): 7
Sheet 1 of 1

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan-Off set 5 ft from B-9
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: Not Obs.

Drilling Contractor: Great Works Test Boring
Drill Rig: B 59 Truck
Driller Rep.: Pete Michaud
Date Started: 04/30/09
Date Completed: 04/30/09 09:10
Surface Elevation: ()
Drilling Method: 4-inch Tri-Cone
Casing Type:

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (2 inches).					
				SANDY SILT (FILL); moist, silt, little fine sand, trace coarse sand, dark brown.					
				Drilled through concrete from 3 ft to 7 ft, abandoned boring and offset 5 ft.					
5									
				Bottom of exploration at 7 ft; auger refusal on concrete, offset 5 ft and redrilled.					
10									
15									
20									
25									
30									

Notes:

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Boring Log: B-10
Total Depth (ft): 40.5
Sheet 1 of 2

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 7 (feet)

Drilling Contractor: Great Works Test Boring
Drill Rig: B 59 Truck
Driller Rep.: Pete Michaud
Date Started: 05/04/09
Date Completed: 05/04/09
Surface Elevation: 106 ()
Drilling Method: 4-inch Tri-Cone
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (2 inches).					
				SILTY SAND (FILL); Medium dense, moist to wet, fine to medium sand, little silt, few fine gravel and shotrock, brown.					
5			S-1		6	4 4 7 6	11		
10			S-2		4	7 8 8 10	16		
				SILTY CLAY (CL); Medium to very soft, wet, silt and clay, trace fine sand, black gray.					
15			S-3		2	2 3 4 3	7		
20			S-4	Pocket Penetrometer: Undrained Shear Strength, Su = 3.5ksf	13	2 6 8 12	14		
25			S-5	Pocket Penetrometer: Undrained Shear Strength, Su = 1.5ksf	22	4 5 7 9	12		
30									

Notes:

R.W. Gillespie & Associates, Inc.
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Boring Log: B-10
Total Depth: 40.5
Sheet 2 of 2

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 7 (feet)

RWG&A Project No. 767-42
Surface Elevation: 106 ()
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
30			S-6		10	WOH WOH WOH WOH	WOH		
35									
				SILTY SAND WITH GRAVEL (SM); Very dense, wet, fine sand, little silt and clay, few fine gravel, blue gray.					
40			S-7			75	100+		
				Bottom of exploration at 40.5 ft; rollercone refusal, probable bedrock.					
45									
50									
55									
60									

Notes:

R.W. Gillespie & Associates, Inc.
Geotechnical Engineering•Geohydrology•Materials Testing Services

Boring Log: B-12
Total Depth (ft): 35
Sheet 1 of 2

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 6 (feet)

Drilling Contractor: Great Works Test Boring
Drill Rig: B 59 Truck
Driller Rep.: Pete Michaud
Date Started: 05/04/09
Date Completed: 05/04/09
Surface Elevation: 106 ()
Drilling Method: 4-inch Tri-Cone
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (2 inches).					
				SILTY SAND (FILL); Loose, moist to wet, fine to medium sand, little silt, few fine gravel and shotrock fill, brown.					
5			S-1		4	2 4 6 6	10	35	
10			S-2		1	2 1 1 1	2	37	
				SILTY CLAY (FILL); Soft, wet, silt and clay, trace fine sand, with wood fragments, organic odor, black gray.					
15			S-3		8	2 2 1	3	64	
			S-4		1	2 2 2 2	4	31	
				SILTY CLAY (CL); Stiff to very soft, wet, silt and clay, blue gray. trace fine sand seams. Pocket Penetrometer: Undrained Shear Strength, Su = 1.75ksf					
20			S-5		16	2 3 5 7 6	12		
25			S-6		12	WOH WOH WOH WOH	WOH		
				SILTY SAND WITH GRAVEL (SM); Medium dense, wet, fine sand, little silt and clay, few fine gravel, blue gray.					
30									

Notes:

R.W. Gillespie & Associates, Inc.
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Boring Log: B-12
Total Depth: 35
Sheet 2 of 2

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 6 (feet)

RWG&A Project No. 767-42
Surface Elevation: 106 ()
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
30			S-7		10	7 6 5 11	11		
35				Bottom of exploration at 35 ft; rollercone refusal, probable bedrock beginning at 34 ft.					
40									
45									
50									
55									
60									

Notes:

R.W. Gillespie & Associates, Inc.
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Boring Log: B-13
Total Depth (ft): 32.5
Sheet 1 of 2

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 7 (feet)

Drilling Contractor: Great Works Test Boring
Drill Rig: B 59 Truck
Driller Rep.: Pete Michaud
Date Started: 05/05/09
Date Completed: 05/05/09
Surface Elevation: 106 ()
Drilling Method: 4-inch Tri-Cone
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (2 inches).					
				SAND WITH GRAVEL (FILL); Loose to medium dense, moist to wet, fine to medium sand, few fine gravel, trace silt, brown. with brick fragments.					
5			S-1		10	7 6 4 3	10	34	GS
10			S-2		3	2 3 1 2	4		
				ORGANIC SILT (OL); Soft, wet, silt and clay, few fine sand, with shells, organic odor, black gray.					
15			S-3		4	3 2 2 1	4		
				SILTY CLAY (CL); Stiff to soft, wet, silt and clay, blue gray.					
20			S-4	Pocket Penetrometer: Undrained Shear Strength, Su = 1.5ksf	22	3 4 5 4	9		
25			S-5		15	2 2 1 1	3		
30				SILTY SAND WITH GRAVEL (SM); Very dense, wet, fine sand, little silt					

Notes:

R.W. Gillespie & Associates, Inc.
Geotechnical Engineering•Geohydrology•Materials Testing Services

Boring Log: B-13
Total Depth: 32.5
Sheet 2 of 2

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 7 (feet)

RWG&A Project No. 767-42
Surface Elevation: 106 ()
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
30			S-6	and clay, few fine gravel, blue gray.	1	50	50/4"		
				Bottom of exploration at 32.5 ft; rollercone refusal, probable bedrock.					
35									
40									
45									
50									
55									
60									

Notes:

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Boring Log: B-14
Total Depth (ft): 42
Sheet 1 of 2

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Expl. Loc. Plan-Offset 3 ft north
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 8 (feet)

Drilling Contractor: Great Works Test Boring
Drill Rig: B 59 Truck
Driller Rep.: Pete Michaud
Date Started: 05/05/09
Date Completed: 05/05/09
Surface Elevation: ()
Drilling Method: 4-inch Tri-Cone
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (2 inches).					
				SAND WITH GRAVEL (FILL); Loose, moist to wet, fine to medium sand, few fine gravel, trace silt, brown.					
5			S-1		10	4 4 5 4	9		
10			S-2		4	11 10 11 7	21		
				ORGANIC SILT (OL); Medium, wet, silt and clay, few fine sand, with shells, organic odor, black gray.					
15			S-3		5.	4 5 4 4	9		
				SILTY CLAY (CL); Stiff to very stiff, wet, silt and clay, blue gray. trace fine sand seams at 25 ft.					
20			S-4		11	4 6 7 8	13		
25			S-5		8	WOH WOH WOH WOH	0		
30									

Notes:

R.W. Gillespie & Associates, Inc.
Geotechnical Engineering•Geohydrology•Materials Testing Services

Boring Log: B-14
Total Depth: 42
Sheet 2 of 2

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 8 (feet)

RWG&A Project No. 767-42
Surface Elevation: ()
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
30			S-6		4	WOR WOR WOR WOR	WOR		
35			S-7	SILTY SAND WITH GRAVEL (SM); Very dense, wet, fine sand, little silt and clay, few fine gravel, blue gray.	7	20 29 50/3"	79+		
40									
				Bottom of exploration at 42 ft; rollercone refusal, probable bedrock.					
45									
50									
55									
60									

Notes:

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Geotechnical Engineering•Geohydrology•Materials Testing Services

Boring Log: B-15
Total Depth (ft): 53
Sheet 1 of 2

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Expl. Loc. Plan-Offset 5ft west
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 8 (feet)

Drilling Contractor: Great Works Test Boring
Drill Rig: B 59 Truck
Driller Rep.: Pete Michaud
Date Started: 04/27/09
Date Completed: 04/27/09
Surface Elevation: 106 ()
Drilling Method: 4-inch Tri-Cone
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0			S-1	ASPHALTIC PAVEMENT (3 inches).	15	14 18 15	33		
			S-2	SAND WITH GRAVEL (FILL); Dense, moist to wet, fine to medium sand, few fine gravel, trace silt, brown.	6	11 6 5	10		
5			S-3		5	5 5 5	11		
			S-4		2	6 6 5	11		
10			S-5		1	5 6 6 15	29		
			S-6		2	15 14 12	30		
15			S-7		2	15 15 6 7	14		
				SILTY CLAY (CL); Stiff to very soft, wet, silt and clay, blue gray. trace fine sand seams at 25 ft.		8 6 6			
20			S-8		1	6 7 8 9	15		
25			S-9	Pocket Penetrometer: Undrained Shear Strength, Su = 1.25ksf.	20	3 3 3 4	6		
30									

Notes:

R.W. Gillespie & Associates, Inc.
Geotechnical Engineering•Geohydrology•Materials Testing Services

Boring Log: B-15
Total Depth: 53
Sheet 2 of 2

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 8 (feet)

RWG&A Project No. 767-42
Surface Elevation: 106 ()
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
30									
35			S-10		24	WOH WOH WOH WOH	WOH		
40									
				SILTY SAND WITH GRAVEL (SM); Medium dense, wet, fine sand, little silt and clay, few fine gravel, blue gray.					
45			S-11		3	9 10 15 13	25		
			R-1	Top of bedrock at 47.5 feet, Rollerbit to 48 feet and begin rock core. (48' To 53'); Medium, moderately weathered, light gray, fine grained, ARGILLACEOUS SLATE; very close to close fracture spacing, wet; (Argillaceous interbedding within Kittery Formation). Recovery = 36"/60.0" = 60% RQD = 11"/60.0" = 18%					
50									
				Bottom of exploration at 53 ft, terminated boring 5.5 ft into rock.					
55									
60									

Notes:

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Boring Log: B-16
Total Depth (ft): 66
Sheet 1 of 3

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 7 (feet)

Drilling Contractor: Great Works Test Boring
Drill Rig: B 59 Truck
Driller Rep.: Pete Michaud
Date Started: 05/08/09
Date Completed: 05/08/09
Surface Elevation: ()
Drilling Method: 4-inch Tri-Cone
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0			S-1	CONCRETE (6 inches).	10	20 25 26 22	51		
				GRAVELLY SAND (FILL); Very dense, moist to wet, fine to coarse sand, little fine gravel, trace silt, brown.					
				GRAVELLY SILT WITH CLAY (FILL); Medium dense to very loose, silt and clay, little fine gravel, trace sand, organic odor, brown gray.					
5			S-2		9	12 12 7 5	19		
10			S-3		16	1 2 1 2	3		
15			S-4		20	2 3 2 4	5		
				ORGANIC SILT (OL); Medium, wet, clayey silt, few fine sand, trace shells, organic odor, black and gray.					
20			S-5		19	2 4 3 4	7		
				SILTY CLAY (CL); Stiff to very soft, wet, silty clay, trace fine sand, gray.					
25			S-6		22	6 7 7 8	14		
30									

Notes:

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Boring Log: B-16
Total Depth: 66
Sheet 2 of 3

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 7 (feet)

RWG&A Project No. 767-42
Surface Elevation: ()
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
30			S-7		20	3 3 3 3	6		
35			S-8		16	WOR WOR WOR WOR	WOR		
40									
45									
50									
55									
60									

Notes:

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Boring Log: B-16
Total Depth: 66
Sheet 3 of 3

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 7 (feet)

RWG&A Project No. 767-42
Surface Elevation: ()
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
60									
65				SILTY SAND WITH GRAVEL (SM); Wet. Soil change logged based on change in drilling resistance. Bottom of exploration at 66 ft; rollercone refusal, probable bedrock.					
70									
75									
80									
85									
90									

Notes:

APPENDIX B

TEST PIT AND TRENCH EXCAVATION LOGS

Geotechnical Evaluation
Waterfront Support Facility - Portsmouth Naval Shipyard
Kittery, Maine

R.W. Gillespie & Associates, Inc.
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Boring Log: B-101
Total Depth (ft): 76
Sheet 1 of 3

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 6 (feet)

Drilling Contractor: Great Works Test Boring
Drill Rig: B 59 Truck
Driller Rep.: Pete Michaud
Date Started: 11/10/09
Date Completed: 11/10/09
Surface Elevation: ()
Drilling Method: 4-inch Tri-Cone
Casing Type: 4-inch Driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (3 inches).					
				SAND (FILL); Loose, moist to wet, fine to medium sand, few silt, trace gravel and coarse sand, brown.					
5			S-1		8	4 5 3 4	8		
10			S-2	CLAYEY SILT WITH SAND (FILL); Medium dense, wet, silt and clay, few fine sand, with shell fragments, organic odor, black and gray.	4	6 12 10 8	22		
				GRAVELLY SAND (FILL); Medium dense, wet, fine to medium sand, little gravel, with rock fill, organic odor, dark gray.					
15			S-3		6	7 17 7 10	24		
20			S-4	SILTY CLAY (CL); Very stiff, wet, silty clay, with occasional fine sand seams, brown and gray.	0	4 5 5 9	10		
25			S-5		4	7 11 7 5	18		
30									

Notes: Installed 3-inch PVC casing for cross-hole seismic testing.

R.W. Gillespie & Associates, Inc.
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Boring Log: B-101
Total Depth: 76
Sheet 2 of 3

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 6 (feet)

RWG&A Project No. 767-42
Surface Elevation: ()
Casing Type: 4-inch Driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
30			S-6		20	WOR WOR WOR WOR	WOR		
35									
40									
45									
50									
			S-7	SILTY SAND WITH GRAVEL (SM); Medium dense, wet, fine sand, little silt, few fine gravel, gray.	21	8 17 3 20	20		
55									
60									

Notes: Installed 3-inch PVC casing for cross-hole seismic testing.

R.W. Gillespie & Associates, Inc.
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Boring Log: B-101
Total Depth: 76
Sheet 3 of 3

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 6 (feet)

RWG&A Project No. 767-42
Surface Elevation: ()
Casing Type: 4-inch Driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
60				Top of bedrock at 59.5', begin rollercone drilling.					
65									
70									
75									
				Bottom of Exploration at 76'; Boring terminated 16.5' below top of bedrock.					
80									
85									
90									

Notes: Installed 3-inch PVC casing for cross-hole seismic testing.

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Boring Log: B-102
Total Depth (ft): 46
Sheet 1 of 2

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 8 (feet)

Drilling Contractor: Great Works Test Boring
Drill Rig: B 59 Truck
Driller Rep.: Pete Michaud
Date Started: 11/09/09
Date Completed: 11/09/09
Surface Elevation: ()
Drilling Method: Rotary Wash
Casing Type: 4-inch Driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (3 inches).					
				GRAVELLY SAND (FILL); Medium dense, moist, fine to medium sand, little gravel, trace silt, brown.					
5			S-1		6	9 8 4 4	12		
10			S-2	SILTY SAND WITH GRAVEL (FILL); Loose, wet, fine to medium sand, little silt, few gravel, organic odor, brown and black gray.	4	3 4 3 6	7		
15									
				SILTY CLAY (CL); wet, gray.					
20									
25									
30									

Notes: Logged strata changes below 12ft based on drilling resistance.

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Boring Log: B-102
Total Depth: 46
Sheet 2 of 2

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 8 (feet)

RWG&A Project No. 767-42
Surface Elevation: ()
Casing Type: 4-inch Driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
30									
35									
40									
				SILTY SAND WITH GRAVEL (SM).					
45									
				Bottom of exploration at 46ft; Refusal, probable bedrock.					
50									
55									
60									

Notes: Logged strata changes below 12ft based on drilling resistance.

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Boring Log: B-103
Total Depth (ft): 16
Sheet 1 of 1

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 8 (feet)

Drilling Contractor: Great Works Test Boring
Drill Rig: B 59 Truck
Driller Rep.: Pete Michaud
Date Started: 11/09/09
Date Completed: 11/09/09
Surface Elevation: ()
Drilling Method: 4-inch Tri-Cone
Casing Type: 4-inch Driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0			S-1	ASPHALTIC PAVEMENT (3 inches).	5	7 9 50/0"	100+		
				GRAVELLY SAND (FILL); Very dense, moist, fine to medium sand, with rock fill and brick fragments, little fine gravel, trace silt, dark brown.					
5			S-2		5	6 7 17 11	24		
10			S-3	GRAVELLY SILT WITH CLAY (FILL); Very stiff, wet, clayey silt, little fine gravel, few fine sand, organic odor, black and gray.	2	3 50/3"	100+		
15			S-4		13	8 6 6 12	12		
				Bottom of Exploration at 16'; Refusal due to obstruction.					
20									
25									
30									

Notes:

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Boring Log: B-104
Total Depth (ft): 70.5
Sheet 1 of 3

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 6 (feet)

Drilling Contractor: Great Works Test Boring
Drill Rig: B 59 Truck
Driller Rep.: Pete Michaud
Date Started: 11/10/09
Date Completed: 11/11/09
Surface Elevation: ()
Drilling Method: Rotary Wash
Casing Type: 4-inch Driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (2 inches).					
				SAND (FILL); Loose, moist to wet, fine to medium sand, few silt, trace gravel and coarse sand, brown.					
5									
10				GRAVEL AND SILT (FILL); wet, gravel, with rock fill, few silt and clay, gray.					
15			S-1		6	16 10 13 4	23		
20				Drilling resistance increased, possible boulder or cobble. (20' to 22')					
			S-2	SILTY CLAY (CL); Very stiff to very soft, wet, silty clay, gray.	19	5 10 14 15	24		
25			S-3		12	4 6 6 7	12		
30									

Notes:

R.W. Gillespie & Associates, Inc.
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Boring Log: B-104
Total Depth: 70.5
Sheet 2 of 3

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 6 (feet)

RWG&A Project No. 767-42
Surface Elevation: ()
Casing Type: 4-inch Driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
30			FV	Field Vane: Undrained Shear Strength: Su=0.87 ksf, Residual=0.11 ksf.					
35			S-4		24	WOR WOR WOR WOR	0		
40			FV	Field Vane: Undrained Shear Strength: Su=0.71 ksf, Residual=0.22 ksf.					
			FV	Field Vane: Undrained Shear Strength: Su=0.69 ksf, Residual=0.22 ksf.					
45			FV	Field Vane: Undrained Shear Strength: Su=0.76 ksf, Residual=0.22 ksf.					
			FV	Field Vane: Undrained Shear Strength: Su=0.76 ksf, Residual=0.22 ksf.					
50			S-5	Occasional fine sand seams.	19	WOH WOH 10 10	10		
				SILTY SAND WITH GRAVEL (SM); Medium dense, wet, fine sand, little silt, few fine gravel, gray.					
				Top of bedrock at 53', begin rollercone drilling.					
55									
60									

Notes:

R.W. Gillespie & Associates, Inc.
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Boring Log: B-104
Total Depth: 70.5
Sheet 3 of 3

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 6 (feet)

RWG&A Project No. 767-42
Surface Elevation: ()
Casing Type: 4-inch Driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
60									
65									
70									
				Bottom of Exploration at 70.5'; Boring terminated 17.5' below top of bedrock.					
75									
80									
85									
90									

Notes:

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Boring Log: B-105
Total Depth (ft): 1.8
Sheet 1 of 1

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: Not Obs.

Drilling Contractor: N/A
Drill Rig: N/A
Driller Rep.: N/A
Date Started: 11/11/09
Date Completed: 11/11/09
Surface Elevation: ()
Drilling Method: Hand Auger
Casing Type: N/A

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				CONCRETE (7.5 inches).					
				SAND (FILL); moist, fine to medium sand, trace coarse sand, trace silt, light brown.					
				Bottom of exploration at 1.8'; Hand auger refusal, possible cobble.					
5									
10									
15									
20									
25									
30									

Notes:

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TEST PIT LOG
Test Pit No. TP-1

PROJECT: Waterfront Support Facility	PROJECT NO.: 767-42
CLIENT: Oak Point Associates	DATE: 11/11/09
LOCATION: Kittery Maine	ELEV.:
EXCAVATION METHOD: Volvo ECR 88 Excavator	LOGGER: C. Morrell
DEPTH TO - Water: Not Obs. When checked:	Caving:

DEPTH	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION	LAB TESTS	MOISTURE %
0				ASPHALTIC PAVEMENT (3.5 inches).		
				SAND (FILL); moist, fine to coarse sand, few silt, brown.		
				Bottom of exploration at 2.3 ft; hand auger refusal, possible cobble.		
5						
10						
15						
20						
25						

Notes: *Sawcut pavement and used hand auger for sampling.*

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TEST PIT LOG
Test Pit No. TP-4

PROJECT: Waterfront Support Facility	PROJECT NO.: 767-42
CLIENT: Oak Point Associates	DATE: 12/01/09
LOCATION: Kittery Maine	ELEV.:
EXCAVATION METHOD: Volvo ECR 88 Excavator	LOGGER: C. Morrell
DEPTH TO - Water: 5.8 (feet) When checked:	Caving:

DEPTH	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION	LAB TESTS	MOISTURE %
0				ASPHALTIC PAVEMENT (4.5 inches).		
				SILTY SAND WITH GRAVEL (FILL); moist, fine to medium sand, little silt, few coarse sand and gravel, grayish brown.		
				GRAVELLY SAND (FILL); moist, fine to medium sand, little gravel and cobble sized fill, trace silt, orangish brown. brick fragments.		
5				SAND (FILL); moist, fine to medium sand, trace silt, yellowish brown.		
				SILTY SAND WITH GRAVEL (FILL); moist, fine to medium sand, little silt, few gravel, gray. Occasional boulder sized fill. (4' to 6')		
				Bottom of exploration at 6 ft; not refusal.		
10						
15						
20						
25						

Notes:

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TEST PIT LOG
Test Pit No. TP-9

PROJECT: Waterfront Support Facility	PROJECT NO.: 767-42
CLIENT: Oak Point Associates	DATE: 11/19/09
LOCATION: Kittery Maine	ELEV.:
EXCAVATION METHOD: Volvo ECR 88 Excavator	LOGGER: C. Morrell
DEPTH TO - Water: Not Obs. When checked:	Caving:

DEPTH	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION	LAB TESTS	MOISTURE %
0				ASPHALTIC PAVEMENT (4 inches).		
				SAND (FILL); moist, fine to medium sand, trace coarse sand, light brown.		
				GRAVEL WITH SILT (FILL); moist, gravel and shotrock fill, few silt, gray and black.		
5				GRAVELLY SILT (FILL); moist, silt and clay, little gravel, with shotrock fill, brownish gray.		
				Bottom of exploration at 2.7 ft; bucket refusal on granite boulder (possible displaced quay wall block).		
10						
15						
20						
25						

Notes:

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TEST PIT LOG
Test Pit No. TP-10

PROJECT: Waterfront Support Facility	PROJECT NO.: 767-42
CLIENT: Oak Point Associates	DATE: 12/01/09
LOCATION: Kittery Maine	ELEV.:
EXCAVATION METHOD: Volvo ECR 88 Excavator	LOGGER: C. Morrell
DEPTH TO - Water: Not Obs. When checked:	Caving:

DEPTH	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION	LAB TESTS	MOISTURE %
0				ASPHALTIC PAVEMENT (4 inches).		
				SILTY SAND WITH GRAVEL (FILL); moist, fine to medium sand, little silt, few gravel, brown, with brick and metal fragments. Shotrock and boulder sized fill. (1' to 6')		
5						
				Bottom of exploration at 6.5 ft; terminated due to caving of test pit.		
10						
15						
20						
25						

Notes:

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TEST PIT LOG
Test Pit No. TP-11

PROJECT: Waterfront Support Facility	PROJECT NO.: 767-42
CLIENT: Oak Point Associates	DATE: 11/23/09
LOCATION: Kittery Maine	ELEV.:
EXCAVATION METHOD: Volvo ECR 88 Excavator	LOGGER: C. Morrell
DEPTH TO - Water: Not Obs. When checked:	Caving:

DEPTH	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION	LAB TESTS	MOISTURE %
0				ASPHALTIC PAVEMENT (6 inches).		
				SANDY GRAVEL AND SILT (FILL); moist, gravel and shotrock fill, little fine sand, little silt, brownish gray, some wood and ceramic fragments.		
				GRAVELLY SAND (FILL); moist, fine to medium sand, little gravel and cobble sized fill, brown. Intact metal utility pipe (likely abandoned) (3.5' to 3.6')		
5				Bottom of exploration at 3.6 ft; terminated excavation due to unidentified utility pipe.		
10						
15						
20						
25						

Notes:

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TEST PIT LOG
Test Pit No. TP-12

PROJECT: Waterfront Support Facility	PROJECT NO.: 767-42
CLIENT: Oak Point Associates	DATE: 11/23/09 14:19
LOCATION: Kittery Maine	ELEV.:
EXCAVATION METHOD: Volvo ECR 88 Excavator	LOGGER: C. Morrell
DEPTH TO - Water: Not Obs. When checked:	Caving:

DEPTH	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION	LAB TESTS	MOISTURE %
0				ASPHALTIC PAVEMENT (3.5 inches).		
				GRAVELLY SAND (FILL); moist, fine to medium sand, little gravel, few coarse sand, light brown and dark brown.		
				Bottom of exploration at 0.9 ft; refusal on concrete surface.		
5						
10						
15						
20						
25						

Notes:

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TEST PIT LOG
Test Pit No. TP-13

PROJECT Waterfront Support Facility	PROJECT NO. 767-42
CLIENT Oak Point Associates	DATE 11/24/09
LOCATION Kittery Maine	ELEV.
EXCAVATION METHOD Volvo ECR 88 Excavator	LOGGER C. Morrell
DEPTH TO - Water: 6.8 (feet) When checked:	Caving:

DEPTH	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION	LAB TESTS	MOISTURE %
0				ASPHALTIC PAVEMENT (3 inches).		
				GRAVELLY SAND (FILL); moist, fine to coarse sand, little gravel, with brick fragments, dark brown.		
				SILTY SAND (FILL); moist, fine sand, little silt, trace shotrock fill, yellowish brown, with brick fragments.		
5				GRAVELLY SAND (FILL); moist to wet, medium to coarse sand, few gravel, few fine sand, black, with brick, wood and charcoal fragments.		
				Bottom of exploration at 7.2 ft; not refusal.		
10						
15						
20						
25						

Notes:

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TEST PIT LOG
Test Pit No. TP-14

PROJECT: Waterfront Support Facility	PROJECT NO.: 767-42
CLIENT: Oak Point Associates	DATE: 11/24/09
LOCATION: Kittery Maine	ELEV.:
EXCAVATION METHOD: Volvo ECR 88 Excavator	LOGGER: C. Morrell
DEPTH TO - Water: Not Obs. When checked:	Caving:

DEPTH	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION	LAB TESTS	MOISTURE %
0				ASPHALTIC PAVEMENT (3.5 inches).		
				SANDY GRAVEL (FILL); moist, gravel and shotrock fill, little fine to medium sand, dark grayish brown, with wood and brick fragments.		
				SILTY SAND WITH GRAVEL (FILL); moist, fine to medium sand, little silt, few gravel, grayish brown and dark brown.		
5				SILTY SAND (FILL); moist, fine sand, little silt, trace fine gravel, yellowish brown.		
				GRAVELLY SAND (FILL); moist, medium to coarse sand, few gravel, few fine sand, black, with brick, wood and charcoal fragments.		
10				SILTY SAND (FILL); moist, fine to medium sand, few silt, brick fragments, light brown.		
				Bottom of exploration at 7.2 ft; bucket refusal on possible boulder or brick fill.		
15						
20						
25						

Notes:

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TEST PIT LOG
Test Pit No. TP-15

PROJECT: Waterfront Support Facility	PROJECT NO.: 767-42
CLIENT: Oak Point Associates	DATE: 11/25/09
LOCATION: Kittery Maine	ELEV.:
EXCAVATION METHOD: Volvo ECR 88 Excavator	LOGGER: C. Morrell
DEPTH TO - Water: Not Obs. When checked:	Caving:

DEPTH	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION	LAB TESTS	MOISTURE %
0				ASPHALTIC PAVEMENT (3 inches).		
				GRAVELLY SAND (FILL); moist, fine to medium sand, little fine gravel, trace coarse sand, light brown.		
				GRAVELLY SAND (FILL); moist, fine to medium sand, few gravel, trace silt, dark brown, with metal fragments.		
5				Bottom of exploration at 1.5 ft; bucket refusal on concrete pad.		
10						
15						
20						
25						

Notes:

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TEST PIT LOG
Test Pit No. TP-17

PROJECT: Waterfront Support Facility	PROJECT NO.: 767-42
CLIENT: Oak Point Associates	DATE: 11/23/09
LOCATION: Kittery Maine	ELEV.:
EXCAVATION METHOD: Volvo ECR 88 Excavator	LOGGER: C. Morrell
DEPTH TO - Water: 7.5 (feet) When checked:	Caving:

DEPTH	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION	LAB TESTS	MOISTURE %
0				ASPHALTIC PAVEMENT (3.5 inches).		
				GRAVELLY SAND (FILL); moist, fine to medium sand, little gravel, trace coarse sand and silt, dark brown, with brick and concrete fragments.		
5				SAND (FILL); moist, fine to medium sand, few coarse sand and gravel, trace silt, orangish brown.Observed yellow, brittle material on west side of test pit.		
				SAND (FILL); moist, fine to medium sand, little coarse sand, few silt, black, with charcoal and brick fragments, metal wire.		
				Terminated excavation due to caving of test pit.		
10						
15						
20						
25						

Notes:

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TEST PIT LOG
Test Pit No. TP-18

PROJECT: Waterfront Support Facility	PROJECT NO.: 767-42
CLIENT: Oak Point Associates	DATE: 11/24/09
LOCATION: Kittery Maine	ELEV.:
EXCAVATION METHOD: Volvo ECR 88 Excavator	LOGGER: C. Morrell
DEPTH TO - Water: Not Obs. When checked:	Caving:

DEPTH	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION	LAB TESTS	MOISTURE %
0				ASPHALTIC PAVEMENT (4 inches).		
				GRAVELLY SAND (FILL); moist, fine to medium sand, little gravel and cobble sized fill, dark brown, with shotrock fill, metal, brick, and wood fragments.		
				SAND (FILL); moist, fine to medium sand, few coarse sand and gravel, trace silt, light brown.		
5				Bottom of exploration at 3 ft; bucket refusal on concrete pad.		
10						
15						
20						
25						

Notes:

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Boring Log: Q-1
Total Depth (ft): 7.5
Sheet 1 of 1

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 7.5 (feet)

Drilling Contractor: W.M. Shapleigh Construction
Drill Rig: Volvo ECR 88 Excavator
Driller Rep.: See Remarks
Date Started: 11/13/09
Date Completed: 11/13/09
Surface Elevation: ()
Drilling Method: N/A
Casing Type: N/A

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (4.5 inches).					
				GRAVELLY SAND (FILL); moist, fine to medium sand, little gravel and cobble sized fill, trace silt, orangish brown, occasional brick fragments. Quay Wall encountered.					
5									
				BOE-terminated excavation at 7.5' due to groundwater and slope stability concerns.					
10									
15									
20									
25									
30									

Notes:

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Boring Log: Q-2
Total Depth (ft): 1.8
Sheet 1 of 1

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: Not Obs.

Drilling Contractor: W.M. Shapleigh Construction
Drill Rig: Volvo ECR 88 Excavator
Driller Rep.: See Remarks
Date Started: 11/16/09
Date Completed: 11/16/09
Surface Elevation: ()
Drilling Method: N/A
Casing Type: N/A

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (6 inches).					
				GRAVELLY SAND (FILL); moist, fine to medium sand, little gravel and cobble sized fill, trace silt, orangish brown. occasional brick, metal pipe, and ceramic fragments.					
				BOE-terminated excavation at 1.8ft, top of quay wall.					
5									
10									
15									
20									
25									
30									

Notes:

R.W. Gillespie & Associates, Inc.
Geotechnical Engineering•Geohydrology•Materials Testing Services

Boring Log: Q-3
Total Depth (ft): 7.5
Sheet 1 of 1

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 7.5 (feet)

Drilling Contractor: W.M. Shapleigh Construction
Drill Rig: Volvo ECR 88 Excavator
Driller Rep.: See Remarks
Date Started: 11/16/09
Date Completed: 11/16/09
Surface Elevation: ()
Drilling Method:
Casing Type: N/A

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (5 inches).					
				GRAVELLY SAND (FILL); moist, fine to medium sand, little gravel and cobble sized fill, trace silt, brown, with brick, shotrock, and metal fragments.					
				SAND (FILL); moist, fine to medium sand, some shotrock fill/brick fragments, dark brown and black, with occasional green colored substances (oxidized copper).					
5				Quay Wall encountered					
				GRAVELLY SAND (FILL); moist to wet, fine to medium sand, little gravel and cobble sized fill, trace silt, brown.					
				BOE-terminated excavation at 7.5ft due to groundwater and slope stability concerns.					
10									
15									
20									
25									
30									

Notes:

R.W. Gillespie & Associates, Inc.
Geotechnical Engineering•Geohydrology•Materials Testing Services

Boring Log: Q-4
Total Depth (ft): 4.2
Sheet 1 of 1

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: Not Obs.

Drilling Contractor: W.M. Shapleigh Construction
Drill Rig: Volvo ECR 88 Excavator
Driller Rep.: See Remarks
Date Started: 11/17/09
Date Completed: 11/17/09
Surface Elevation: ()
Drilling Method: N/A
Casing Type: N/A

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (6 inches).					
				GRAVELLY SAND (FILL); moist, fine to medium sand, little gravel and cobble sized fill, trace silt, dark brown and grayish black, with concrete, brick, shotrock, wood, and metal fragments.					
				SILTY SAND (FILL); moist, fine sand, little silt, few coarse sand, light brown.					
5				SAND (FILL); moist, medium to coarse sand, black, with charcoal-like, porous material in coarse sand to fine gravel sized particles, possibly burn/ boiler slag.					
				Bottom of exploration at 4.2 ft; not refusal.					
10									
15									
20									
25									
30									

Notes:

R.W. Gillespie & Associates, Inc.
Geotechnical Engineering•Geohydrology•Materials Testing Services

Boring Log: Q-5
Total Depth (ft): 4
Sheet 1 of 1

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: Not Obs.

Drilling Contractor: W.M. Shapleigh Construction
Drill Rig: Volvo ECR 88 Excavator
Driller Rep.: See Remarks
Date Started: 11/17/09
Date Completed: 11/17/09
Surface Elevation: ()
Drilling Method: N/A
Casing Type: N/A

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (6 inches).					
				GRAVELLY SAND (FILL); moist, fine to medium sand, little gravel and cobble sized fill, trace silt, dark brown, with wood and metal fragments, occasional oxidation.					
5				SAND (FILL); moist, medium to coarse sand, black, with charcoal-like, porous material in coarse sand to fine gravel sized particles, possibly burn/ boiler slag.					
				Bottom of exploration at 4 ft; terminated excavation 1.8 ft below top of quay wall.					
10									
15									
20									
25									
30									

Notes:

R.W. Gillespie & Associates, Inc.
Geotechnical Engineering•Geohydrology•Materials Testing Services

Boring Log: Q-6
Total Depth (ft): 5
Sheet 1 of 1

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: Not Obs.

Drilling Contractor: W.M. Shapleigh Construction
Drill Rig: Volvo ECR 88 Excavator
Driller Rep.: See Remarks
Date Started: 11/18/09
Date Completed: 11/18/09
Surface Elevation: ()
Drilling Method: N/A
Casing Type: N/A

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (4.5 inches).					
				GRAVELLY SAND (FILL); moist, fine to medium sand, little gravel and cobble sized fill, trace silt, dark brown and orangish brown, with brick, shotrock, and asphaltic pavement fragments.					
5				SAND (FILL); moist, medium to coarse sand, black, with charcoal-like, porous material in coarse sand to fine gravel sized particles. Encountered utility duct bank.					
				Bottom of exploration at 5 ft; not refusal, terminated due to potential for undermining adjacent utility duct bank.					
10									
15									
20									
25									
30									

Notes:

R.W. Gillespie & Associates, Inc.
Geotechnical Engineering•Geohydrology•Materials Testing Services

Boring Log: Q-7
Total Depth (ft): 7
Sheet 1 of 1

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 7 (feet)

Drilling Contractor: W.M. Shapleigh Construction
Drill Rig: Volvo ECR 88 Excavator
Driller Rep.: See Remarks
Date Started: 11/19/09
Date Completed: 11/19/09
Surface Elevation: ()
Drilling Method: N/A
Casing Type: N/A

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (4.5 inches).					
				GRAVELLY SAND (FILL); moist, fine to medium sand, little gravel and cobble sized fill, trace silt, dark brown and orangish brown. with brick, wood, and shotrock fragments, styrofoam pieces. Encountered top of quay wall (southern-most block)					
5				SAND (FILL); moist, medium to coarse sand, few shotrock fill, trace silt, black, with charcoal-like, porous material in coarse sand to fine gravel sized particles, electrical wires.					
				SAND WITH SILT (FILL); moist to wet, fine to medium sand, few fine gravel, few silt, reddish brown and black, shotrock and porous metal fill, wood, brittle yellow brick material. Encountered top of quay wall (all subsequent blocks north of southern-most block)					
10				Bottom of exploration at 7 ft; not refusal.					
15									
20									
25									
30									

Notes: Water caused cave in, unable to sample below 6 ft (would have been outside of trenchbox, causing a safety issue)

R.W. Gillespie & Associates, Inc.
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Boring Log: Q-8
Total Depth (ft): 1.8
Sheet 1 of 1

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: Not Obs.

Drilling Contractor: W.M. Shapleigh Construction
Drill Rig: Volvo ECR 88 Excavator
Driller Rep.: See Remarks
Date Started: 11/19/09
Date Completed: 11/19/09
Surface Elevation: ()
Drilling Method: N/A
Casing Type: N/A

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (4.5 inches).					
				GRAVELLY SAND (FILL); moist, fine to medium sand, little gravel and cobble sized fill, brown, with brick and shotrock fragments.					
				Bottom of exploration at 1.8 ft; terminated excavation at top of quay wall.					
5									
10									
15									
20									
25									
30									

Notes:

R.W. Gillespie & Associates, Inc.
Geotechnical Engineering•Geohydrology•Materials Testing Services

Boring Log: Q-9
Total Depth (ft): 7.8
Sheet 1 of 1

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 7.5 (feet)

Drilling Contractor: W.M. Shapleigh Construction
Drill Rig: Volvo ECR 88 Excavator
Driller Rep.: See Remarks
Date Started: 11/25/09
Date Completed: 11/25/09
Surface Elevation: ()
Drilling Method: N/A
Casing Type: N/A

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (9 inches).					
				GRAVELLY SAND (FILL); moist, fine to medium sand, little gravel and cobble sized fill, trace silt, light brown, with brick fragments.					
5									
				Bottom of exploration at 7.8 ft; not refusal.					
10									
15									
20									
25									
30									

Notes:

R.W. Gillespie & Associates, Inc.
Geotechnical Engineering•Geohydrology•Materials Testing Services

Boring Log: Q-10
Total Depth (ft): 2.7
Sheet 1 of 1

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: Not Obs.

Drilling Contractor: W.M. Shapleigh Construction
Drill Rig: Volvo ECR 88 Excavator
Driller Rep.: See Remarks
Date Started: 11/25/09
Date Completed: 11/25/09
Surface Elevation: ()
Drilling Method: N/A
Casing Type: N/A

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (6 inches).					
				GRAVELLY SAND (FILL); moist, fine to medium sand, little gravel, dark brown, with brick and metal fragments.					
				SILTY SAND WITH GRAVEL (FILL); moist, fine sand, little silt, trace gravel, yellowish brown.					
5				Encountered top of utility duct bank in west side of pit. Bottom of exploration at 2.7 ft; refusal on top of concrete structure associated with former plate racks.					
10									
15									
20									
25									
30									

Notes:

R.W. Gillespie & Associates, Inc.
Geotechnical Engineering•Geohydrology•Materials Testing Services

Boring Log: Q-11
Total Depth (ft): 2.7
Sheet 1 of 1

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: Not Obs.

Drilling Contractor: W.M. Shapleigh Construction
Drill Rig: Volvo ECR 88 Excavator
Driller Rep.: See Remarks
Date Started: 11/25/09
Date Completed: 11/25/09
Surface Elevation: ()
Drilling Method: N/A
Casing Type: N/A

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (4 inches).					
				GRAVELLY SAND (FILL); moist, fine to medium sand, little gravel, dark brown, with brick, wood and metal fragments.					
				SILTY SAND WITH GRAVEL (FILL); moist, fine sand, little silt, trace gravel, yellowish brown.					
5				Encountered top of utility duct bank in west side of pit.					
				Bottom of exploration at 2.7 ft; refusal on top of concrete duct bank.					
10									
15									
20									
25									
30									

Notes:

R.W. Gillespie & Associates, Inc.
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Boring Log: Q-12
Total Depth (ft): 6.8
Sheet 1 of 1

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 6.8 (feet)

Drilling Contractor: W.M. Shapleigh Construction
Drill Rig: Volvo ECR 88 Excavator
Driller Rep.: See Remarks
Date Started: 11/25/09 15:00
Date Completed: 11/25/09 15:03
Surface Elevation: ()
Drilling Method: N/A
Casing Type: N/A

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT (4 inches).					
				GRAVELLY SAND (FILL); moist, fine to medium sand, little gravel, brick and metal fragments, wood fragments, dark brown.					
				SILTY SAND WITH GRAVEL (FILL); moist, fine sand, little silt, trace gravel, yellowish brown. Encountered top of two concrete structures associated with former plate racks in east and west sides of pit.					
5				GRAVELLY SAND (FILL); moist to wet, medium to coarse sand, little gravel, few fine sand, black, with brick,wood, charcoal and metal fragments.					
▽				Bottom of exploration at 6.8 ft; terminated due to groundwater and fill cave-in.					
10									
15									
20									
25									
30									

Notes:

APPENDIX C

HAGER-RICHTER GEOSCIENCE, INC. REPORT

Geotechnical Evaluation
Waterfront Support Facility - Portsmouth Naval Shipyard
Kittery, Maine

HAGER-RICHTER
GEOSCIENCE, INC.

CROSSHOLE SEISMIC TESTING
BUILDING 174
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

Prepared for:

R.W. Gillespie & Associates, Inc.
200 International Drive, Suite 170
Portsmouth, New Hampshire 03801

Prepared by:

Hager-Richter Geoscience, Inc.
8 Industrial Way, Suite D10
Salem, New Hampshire 03079

File 09VD28
December, 2009

0. EXECUTIVE SUMMARY

Hager-Richter Geoscience, Inc. (Hager-Richter) performed crosshole seismic testing in one two-borehole array at the Portsmouth Naval Shipyard in Kittery, Maine for R. W. Gillespie & Associates, Inc. of Saco, Maine as part of the seismic design for proposed construction at the Site. The testing was conducted on November 19, 2009 in accordance with the applicable portions of ASTM D4428/D4428 M-07 "Standard Test Methods for Crosshole Seismic Testing."

The site is an active naval facility. The crosshole seismic testing was conducted in a two-borehole array. The borings were located adjacent to Building 174 and designated by Gillespie as Borings B-101 and B-104. The depth of the borings available for the crosshole seismic measurements was 67.5 ft.

The boring logs report the soils penetrated by the borings as 20 ft of fill over about 30 ft of clay over a few feet of sand and gravel. The depths of bedrock are reported as 59.5 ft and 53 ft for Borings B-101 and B-104, respectively.

The objective of the crosshole seismic testing program was to determine the velocity of shear waves as a function of depth at the specified location.

The velocity of shear waves V_s vary with depth Z as follows:

ΔZ (feet)	VELOCITY (feet/second)
5 to 14.7	500
14.7 to 22.9	Vs = 23.192 * Z + 158.3
22.9 to 27.5	700
27.5 to 58	550
58 to 100	7350

The average shear wave velocity to a depth of 100 ft determined in accordance with the procedures specified in the building code is 968 fps and the Site Class is D.

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1 ASTM D4428/D4428M - 07, Standard Test Methods for Crosshole Seismic Testing
2 Boring Logs
3 Deviation Data

1. INTRODUCTION

Hager-Richter Geoscience, Inc. (Hager-Richter) performed crosshole seismic testing in a two-borehole array at the Portsmouth Naval Shipyard in Kittery, Maine for R. W. Gillespie & Associates, Inc. of Saco, Maine as part of the seismic design for proposed construction at the Site. The testing was conducted November 19, 2009 in accordance with the applicable portions of ASTM D4428/D4428 M-07 "Standard Test Methods for Crosshole Seismic Testing," copy reproduced in Appendix 1.

The site is an active naval facility. The general project location is shown in Figure 1. The crosshole seismic testing was conducted in a two-borehole array. The borings were located adjacent to Building 174 and were designated by Gillespie as Borings B-101 and B-104. The locations of the borings are shown in Figure 2. The depth of the borings available for the crosshole seismic measurements was 67.5 ft.

The boring logs, reproduced in Appendix 2, report the soils penetrated by the borings as 20 ft of fill over about 30 ft of clay over a few feet of sand and gravel. The depths of bedrock are reported as 59.5 ft and 53 ft for Borings B-101 and B-104, respectively.

The objective of the crosshole seismic testing program was to determine the velocity of shear waves as a function of depth at the specified location.

The field work was performed November 19, 2009 by Jeffrey Reid, P.G., and Eric Rickert of Hager-Richter. The project was coordinated with Marc R. Grenier, P.E., Project Geotechnical Engineer, of Gillespie. Mr. Christopher Morrell, also of Gillespie, was onsite during the field work. The field work and subsequent data processing were performed in accordance with the ASTM document referenced above and included in the Appendix. The project records will be kept for at least 3 years.

2. CROSSHOLE SEISMIC TESTING

2.1 General

As noted in the Introduction, the testing was performed in substantial conformance with ASTM D4428/D4428 M-07 "Standard Test Methods for Crosshole Seismic Testing." The document is reproduced in Appendix 1.

2.2 Field Procedures

The two borehole method was used. The ASTM document specifies the construction details of the boreholes, including a requirement for grouting the casing from bottom to top. The grout provides a path for the elastic signals from the source to the borehole wall in one borehole and from the borehole wall to the geophone in one or more other boreholes.

The geometry of the measuring system is shown in Figure 3. The source and geophones are positioned at the same elevation. The source generates a seismic signal that travels as an elastic wave to the geophones, where it is converted to an electric signal, sent to the seismograph via cable, and amplified, filtered, and recorded by the seismograph.

The seismograph is a 24-channel seismograph (Geometrics Geode), coupled to a downhole geophone assembly. The downhole geophone assembly includes a Mark Products triaxial geophone and an electrically controlled spring to secure the assembly to the inside of the casing. The source is a downhole sparker that produces a shear wave. The seismograph records data digitally and the records are available immediately to verify the quality of the data. The stored digital data are transferred to a laptop computer at the end of the field day for storage, backup, and future data processing.

The seismograph is coupled to the three-component triaxial geophones with electrical cables. The geophones are positioned at the same elevation as the source, and are clamped to the PVC casing. The vertical axis of the geophones is oriented vertically (because it is constrained by the borehole), but the horizontal axes are not oriented.

Seismic energy is provided by a downhole source, Geotomographie Borehole Sparker S-Wave Probe SH-66 and Impulse Generator. The Impulse Generator delivers short electrical impulses of energy up to about 1000 J at a voltage up to 5 kV through a rugged high voltage coaxial cable to an electrode enclosed in a metallic tube filled with water and having a single long narrow window. The discharge of the electrical energy through the electrode creates a pressure pulse that travels along the axis of the metallic tube and is converted at the window into a horizontal directed pressure pulse that generates a horizontal shear motion in the adjacent material. The SH-66 Probe is clamped to the casing and the shear motion is transmitted through the casing

and grout in the casing/borehole annulus to the material outside the borehole. Before the Probe is clamped, it is oriented so that the horizontally polarized shear wave propagates toward the receiver(s). The direction of first motion of the shear wave can be reversed, thereby facilitating recognition of the onset of the shear waves at the geophone(s). The downhole source also creates a compressional wave. The number of stacks per shot depth/direction is variable, and the quality of the stacked seismic signal for each shot depth/direction is verified in the field.

The deviation probe is a Mount Sopris downhole tool 2DVA-1000 that is operated with a Mount Sopris portable logger MGX2. The downhole tool includes a 3-axis magnetometer and three accelerometers. The manufacturer's stated accuracy is Azimuth ±1° and Inclination ±0.3°. Additional specifications and the manual for the deviation probe are available on the website www.mountsopris.com.

2.3 Data Analysis

The seismic data are analyzed using the digital data and commercially available software. The arrival times for the shear and compressional waves at each geophone are determined from the digital seismic data. The *apparent*[1] velocities are calculated for each depth from the arrival times and the distances between the three pairs of boreholes as follows:

$$V_S\,(S\text{-}R_1) = L\,(S\text{-}R_1)\,/\text{Ä}T_S\,(S\text{-}R_1) \qquad (1)$$

$$V_P\,(S\text{-}R_1) = L\,(S\text{-}R_1)\,/\text{Ä}T_P\,(S\text{-}R_1) \qquad (2)$$

where

V is the velocity, with subscripts S and P indicating shear and compressional waves, respectively,
L ($S\text{-}R_1$) is the distance between borings containing the source and Receiver R_1;
ÄT ($S\text{-}R_1$) is the time of transit of elastic energy from the source to Receiver R_1, averaged for source up and down, and with subscripts and superscripts as defined for V.

Similar equations are used for the times and distances of source to Receiver R_2 and R_1 to R_2 for the case of testing with a three hole array.

[1]Apparent velocity is the ratio of distance between source and Receiver 1, between source and Receiver 2, or between Receivers 1 and 2 divided by the time required for the seismic signal to travel from source to Receiver 1, source to Receiver 2, or from Receiver 1 to Receiver 2, respectively.

The assumptions inherent in Equations 1 and 2 are that the medium is isotropic and homogeneous within layers, the interface between layers is horizontal, and the displacements are small.

The velocities determined with Equations 1 and 2 are *apparent* velocities. The actual velocities would be determined by correcting for the effects of refraction, if refraction is present, using Snell's Law, which for any two layers is given by

$$\text{SIN } á_1/\text{SIN } á_2 = V_1/V_2 \qquad (3)$$

where

$á_1$ is the angle of incidence,
$á_2$ is the angle of the refracted wave, and
V_1 and V_2 are the velocities of layers 1 and 2, respectively.

For a homogeneous isotropic elastic medium, there are only two independent elastic parameters, and the velocities V_p and V_s are two such parameters. Therefore, based on the definitions and equations of infinitesimal elasticity theory, the velocities V_p and V_s together with density ρ can be used to calculate shear modulus, modulus of elasticity (also called Young's modulus), and Poisson's ratio.

2.4 Determination of Average Shear Wave Velocity for Building Code Purposes.

The 2008 International Building Code (2008 IBC) and most, if not all, codes based on it use the average shear wave velocity averaged over the upper 100 ft as one method to determine Seismic Site Class. The average velocity V_{avg} is defined as follows:

$$V_{avg} = \left[\sum_{i=1}^{N} d_i\right] / \sum_{i=1}^{N} d_i / V_i \qquad \text{Eq. 2.4-1}$$

where V_{avg} is average shear wave velocity
d_i is thickness of the ith layer
V_i is the shear wave velocity of the ith layer
N is the number of layers

Equation 2.4-1 assumes that the velocity is constant in each layer. Such, however, is not always the case, and a function of the form Y = a * X + b often fits the observed data well. For sections in which the velocity varies as Y = a * X + b, the denominator of Eq 3.1-1 can be replaced with the following integral:

$$\int_{Z1}^{Z2} dZ / (aZ + b) = [Ln(aZ_2 + b) - Ln(aZ_1 - b)] / a \qquad \text{Eq. 2.4-2}$$

where Z_1 and Z_2 are the depths of top and bottom of the layer in which the velocity varies as $Y = a * X + b$.

The Site Class, based on average shear wave velocity, is defined as follows:

Site Class	Soil Profile Name	Soil Shear Wave Velocity (ft/s)
A	Hard rock	$v_s > 5000$
B	Rock	$2500 < v_s \leq 5000$
C	Very dense soil and soft rock	$1200 < v_s \leq 2500$
D	Stiff soil profile	$600 \leq v_s \leq 1200$
E	Soft soil profile	$v_s < 600$

2.5 Site Specific

The borings were reportedly constructed in accordance with the recommendations of ASTM D4428/D4428 M-07 "Standard Test Methods for Crosshole Seismic Testing." A deviation survey was performed by Hager-Richter in both borings, and the data are given in Appendix 3. Examination of the plots for the two borings shows that they are essentially vertical through the fill to 20 ft depth and that most of the deviation occurs in the soft clay where the N-values are mostly "WOR." The maximum deviation is in the Boring B-104, 0.7 in Easting and 3.5 in Northing, resulting in a departure of about 3.57 inches at 63 ft.

The distance between borings, calculated as a function of depth using (1) the distance between borings at the surface and (2) the deviations is given in Table 1 and plotted in Figure 4.

Crosshole seismic data were obtained at an interval of 5 ft from 5 ft depth to the bottoms of the borings. We used an interval of 2.5 ft near the fill/natural soil and soil/bedrock interfaces. No more than three stacks of the seismic signals were required to increase the signal-to-noise ratio to an acceptable value.

2.6 Limitations of the Method

Like all geophysical methods, the crosshole seismic method is based on the assumption that the local geology is uncomplicated, and that rock and soil interfaces are planar. For those tests in which the signals are generated in a single boring only, the interfaces are assumed to be horizontal, and this assumption is inherent in correcting for refraction.

Thin units with velocities that are lower than the velocity of adjacent materials may not be detectable with the geometry of a particular installation. (The details important to this limitation are the velocities of adjacent materials, thickness of the units, and the distances as functions of depth between pairs of borings.)

If deviation measurements are not available, then the distance between boreholes is *assumed* to be constant from the surface to the bottom of the boreholes. Although ASTM D4428 does not require deviation measurements to be made for borings with depths less than 50 ft, we have measured departures from vertical of several feet in borings that were only 30 ft deep.

If the casing in each borehole is not grouted in accordance with ASTM D4428, or the grout is not continuous, then the signal may be significantly degraded for at least some depths. The practical result is that the velocity determined for a particular depth under such conditions is less accurate at best, and in some cases may not be determinable. The acoustic noise in the subsurface can be a significant problem, particularly at active construction sites and active industrial facilities, and may interfere with the signals generated in the crosshole seismic testing. Drilling, pile driving, and the activity of heavy construction equipment have been especially troublesome at some sites.

3. RESULTS AND DISCUSSION

3.1 General

The *apparent* shear wave velocities are reported in Table 1 and are plotted as functions of depth in Figure 5.

As noted above, the boring logs for Borings B-101 and B-104 are reproduced in Appendix 2. In general, the stratigraphic sequence from surface downwards consists of 20 ft of fill over about 30 ft of clay over a few feet of sand and gravel. The depths of bedrock are reported as 59.5 ft and 53 ft for Borings B-101 and B-104, respectively. Blow counts are "WOR" for the clay.

3.2 Data Quality

The quality of the seismic data obtained in this project is fair to good. The validity of this assessment can be confirmed by examining (1) Figure 6 which shows the arrivals at a depth of 35 ft and (2) Figure7, a composite plot of horizontal component seismograms.

3.3 Refraction Effects

As noted in section 2.3, the velocity obtained by dividing the distance between borings by the time required for the signal to travel between the borings, called *apparent* velocity, may not be the true velocity, especially where the source and receiver are located at a depth near an interface between two materials with different velocities and/or the distance between borings is large. The difference between apparent and true velocity is due to refraction. Inspection of the shear waves as a function of depth, Figure 5, shows a large change of velocity at the soil/bedrock interface. Only small changes of velocity are present at other depths.

We calculated the effects of refraction at the bedrock interface using the velocities of 550 fps and 4835 fps above and below the interface, respectively. We assumed a horizontal interface at a depth of 57.5 ft. Figure 8 shows the results. The calculated apparent velocities for depths of 52.5 ft, 55 ft, and 57.5 ft match the measured values well, and we interpret the good match as showing the measured values at those depths are in fact due to refraction.

3.4 Results

Our models of the velocities of shear waves consist of the simple functions Y = C and Y = A * X + B, where A, B, and C are constants determined by averaging or fitting by least squares the measured data, and the simple functions fit the data well.

The *apparent* velocity of shear waves ranges between about 500 fps and 600 fps for the fill — depths to about 20 ft — between about 550 fps and 5450 fps for the clay — depths between about 20 ft and 60 ft — and between about 7300 fps and 7400 fps for bedrock.

For the model velocities (that is, the true velocities) over the intervals 5-14.7 ft, 22.9-27.5 ft, 27.5-58 ft, and 58-100 ft, we have used the averages of the velocities measured for those intervals. For the model velocity in the interval 14.7-22.9 ft, we have fitted the function Y = A * X + B to the measured values. The results are reported in Table 2 and shown in Figure 8.

Using the model velocities — the true velocities — with the equation of section 2.4 above to determine the average shear wave velocity for the upper 100 ft, we obtain 968 fps. This value is near the middle of the velocity range for Site Class D, 600 fps-1200 fps, and, therefore, the Site Class is D.

4. CONCLUSIONS

On the basis of the crosshole seismic testing conducted in the two-borehole array at the Portsmouth Naval Shipyard in Kittery, Maine, we conclude that the velocity of shear waves V_s varies with depth Z as follows:

ÄZ (feet)	VELOCITY (feet/second)
5 to 14.7	500
14.7 to 22.9	Vs = 23.192 * Z + 158.3
22.9 to 27.5	700
27.5 to 58	550
58 to 100	7350

The average shear wave velocity to a depth of 100 ft determined in accordance with the procedures specified in the building code is 968 fps and the Site Class is D.

5. LIMITATIONS

This report was prepared for the exclusive use of R. W. Gillespie & Associates, Inc. and its client (collectively Client) . Any use by any third party of this Report or any information, documents, records, data, interpretations, advice or opinions given to the Client by Hager-Richter Geoscience, Inc. in the performance of its work shall be at such third party's own risk and without any liability to Hager-Richter Geoscience, Inc.

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This geophysical testing included a limited set of data obtained at the project Site and was conducted with limited knowledge of the Site and its subsurface conditions. Hager-Richter Geoscience, Inc. does not assume responsibility for the accuracy of information that was provided to us by others about the Site and its subsurface conditions. The findings provided by Hager-Richter Geoscience, Inc. are based solely on the information described in this document. The conclusions drawn from this investigation are considered reliable; however, there may exist localized variations in subsurface conditions that have not been completely defined at this time. It should be noted that our conclusions might be modified if subsurface conditions were better delineated with additional subsurface exploration including, but not limited to, coring and laboratory testing.

TABLE 1
APPARENT VELOCITY OF SHEAR WAVES

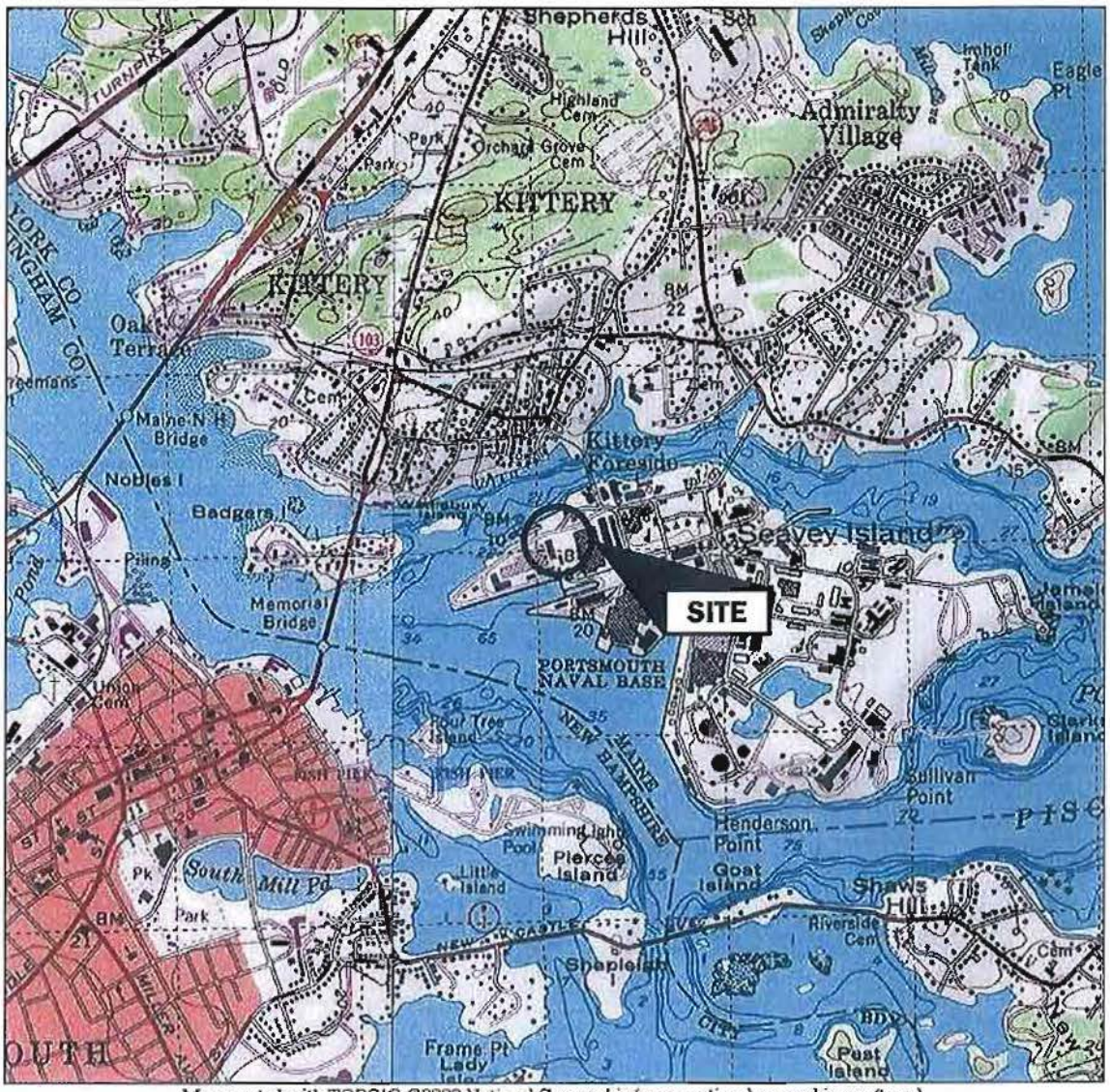
Depth (ft)	Distance between Borings (ft)	Vs (fps)
0	15.25	
5	15.24	498
10	15.24	499
15	15.29	514
17.5	15.34	557
20	15.41	614
22.5	15.47	688
25	15.52	691
30	15.54	558
35	15.46	532
40	15.32	559
45	15.12	562
47.5	15.03	555
50	14.93	510
52.5	14.85	1154
56	14.80	2189
57.5	14.78	5433
60	14.81	7305
62.5	14.87	7336
65	14.98	7391
67.5	15.19	7400

TABLE 2
MODEL VELOCITY OF SHEAR WAVES

ÄZ (feet)	VELOCITY (feet/second)	COMMENTS
5 to 14.7	500	N = 3, Std = 7.2 fps, 1.4% of mean
14.7 to 22.9	Vs = 23.192 * Z + 158.3	N = 4, r^2 = 0.986
22.9 to 27.5	700	N = 2, Std = 1.3 fps, 0.2% of mean
27.5 to 58	550	N = 6, Std = 18.9 fps, 3.4% of mean
58 to 100	7350	N = 4, Std = 39.1 fps, 0.5% of mean

Abbreviations:

Vs = Velocity of shear waves, fps
Z = Depth, feet
ÄZ = Depth interval, feet
N = Number of data points used
Std = Standard deviation
r^2 = Coefficient of determination



Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

LOCATION

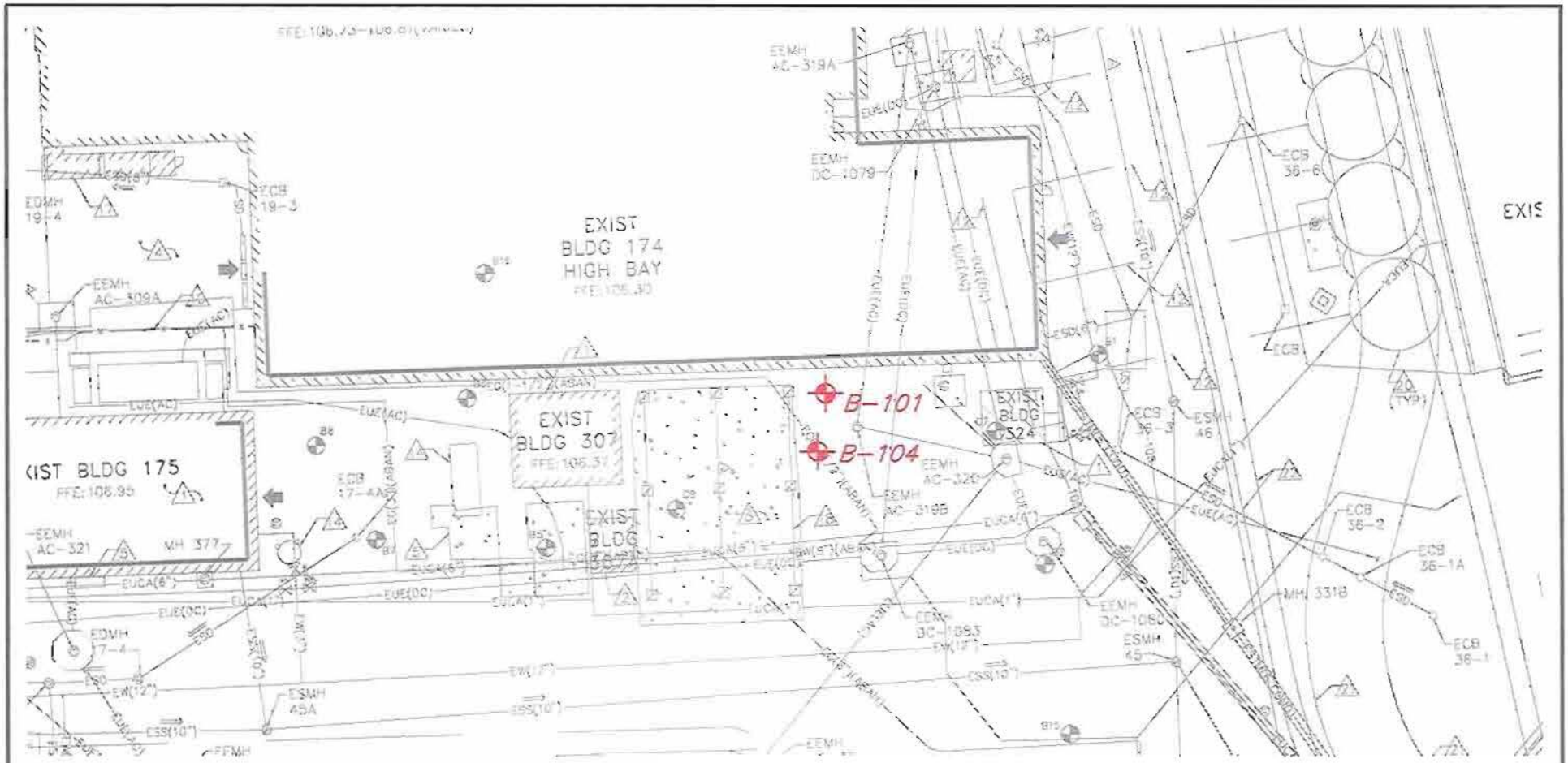
SCALE (feet)

0 2000 4000

Figure 1
General Site Location
Building 174
Portsmouth Naval Shipyard
Kittery, Maine

File 09VD28	December, 2009

HAGER–RICHTER GEOSCIENCE, INC.
Salem, New Hampshire



H-R

N

LEGEND

BORING USED FOR CROSSHOLE SEISMIC SURVEY

SCALE (feet)

0 40 80

NOTE:

Modified from site plan provided by R.W. Gillespie & Associates, Inc.

Figure 2
Site Plan
Building 174
Portsmouth Naval Shipyard
Kittery, Maine

File 09VD28	December, 2009

HAGER-RICHTER GEOSCIENCE, INC.
Salem, New Hampshire

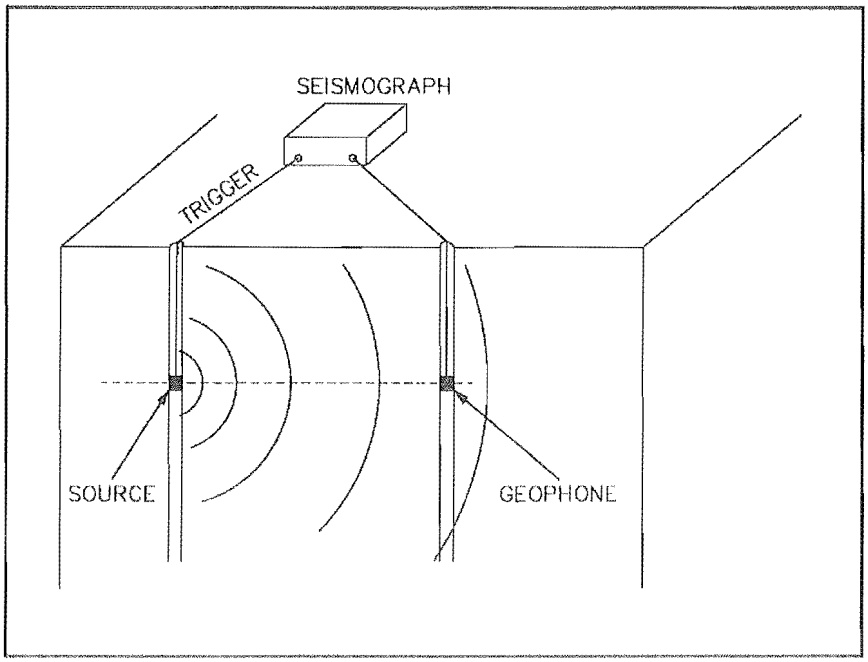


Figure 3. Geometry of crosshole seismic survey. The source and receivers are placed at the same depths in two different borings. A horizontally polarized shear wave is generated by the source, radiates in all directions, travels at the speed determined by the elastic properties and density of the soils, and is detected by the geophone in the receiver hole. When the wave is initiated, a signal is transmitted to the seismograph to start a timing clock, and the wave is recorded as a function of time in the seismograph.

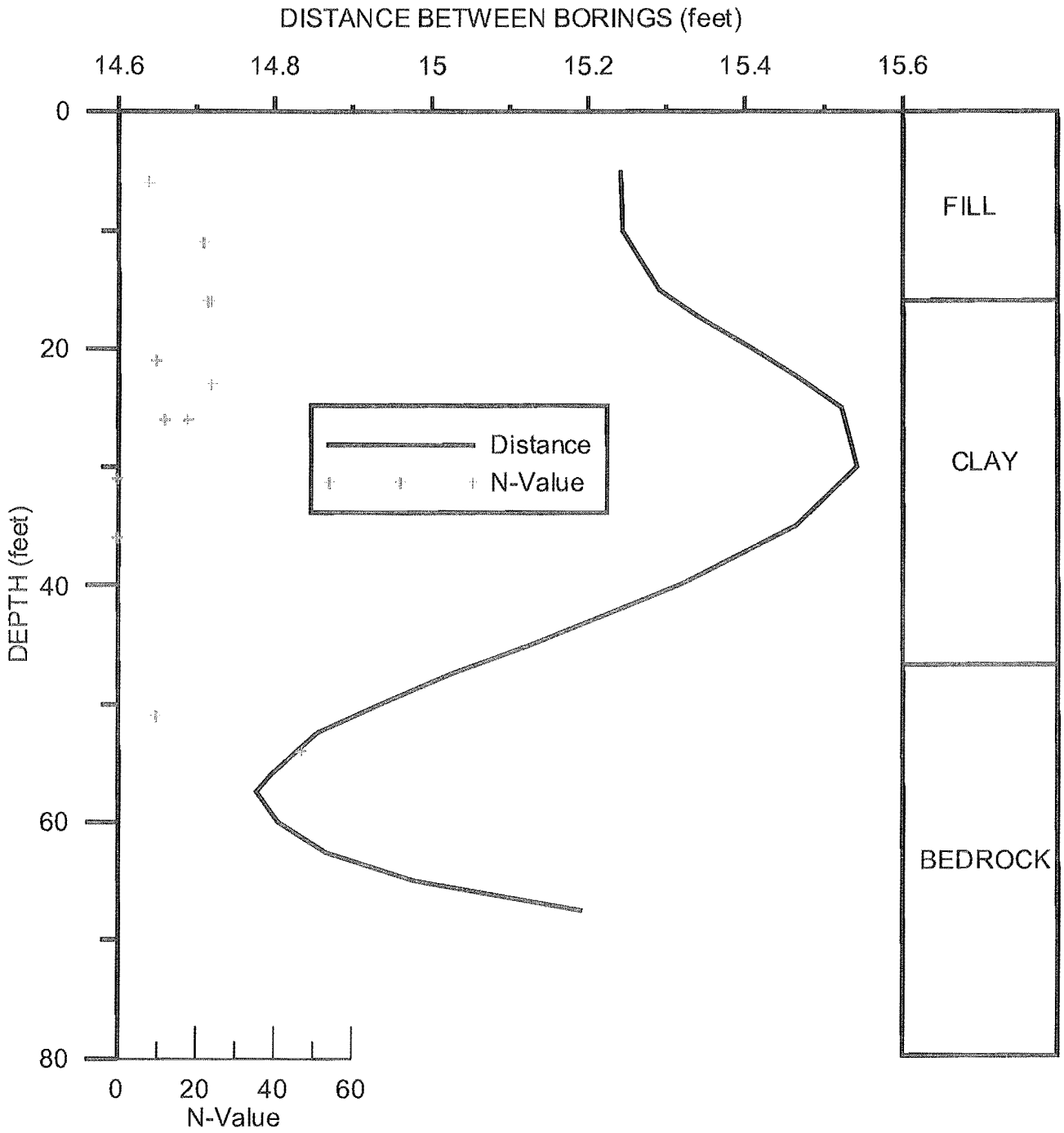


Figure 4. Distance between boreholes as a function of depth.

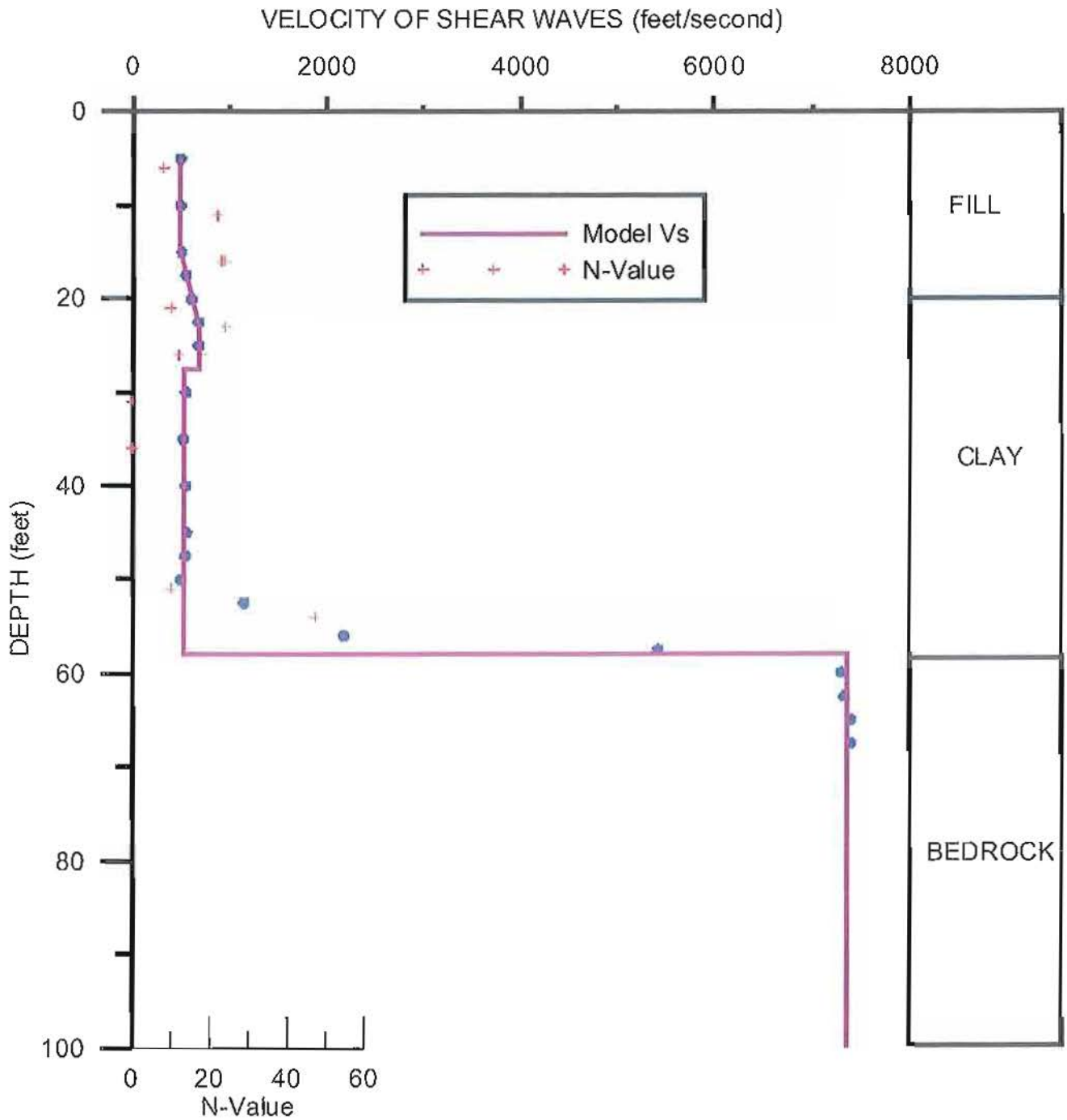


Figure 5. Velocity of Shear Waves. The line represents model velocity, and its parameters are reported in Table 2. The N-values for both borings are shown. The generalized boring log is for Boring B-101. The value of Vs shown for bedrock is the average of the four measurements at depths of 60-67.5 ft extrapolated to 100 ft.

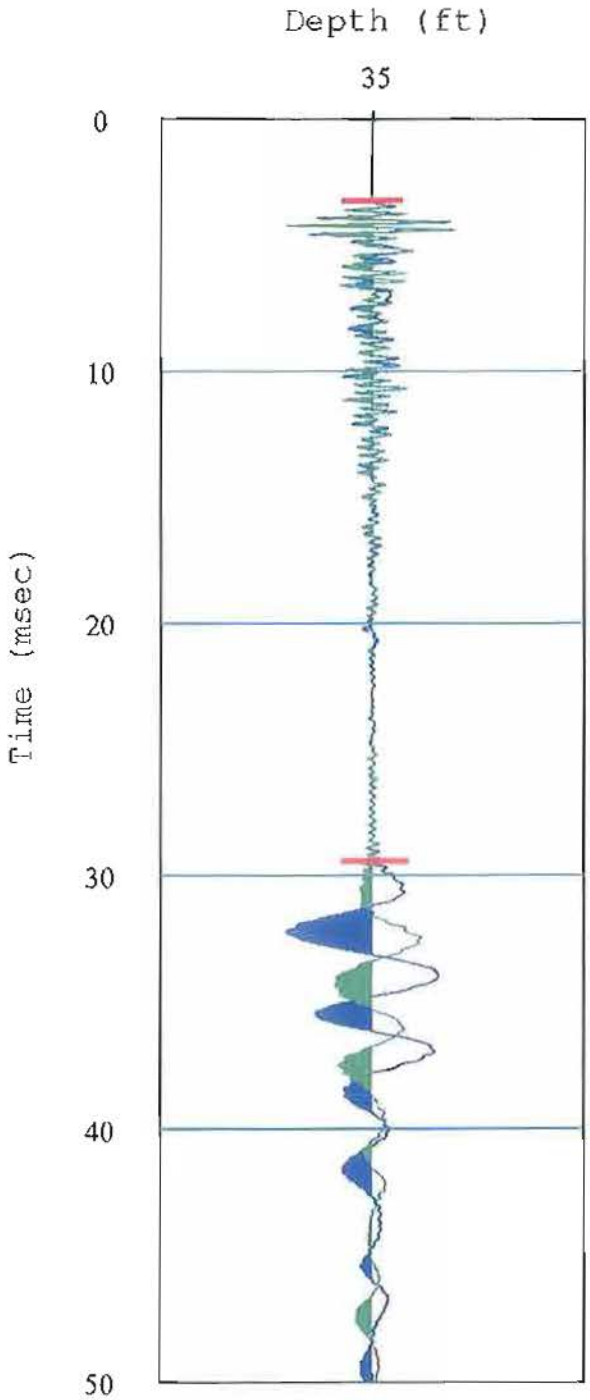


Figure 6. Opposing polarity of signals at 35 feet deep. The short red lines at about 3.2 ms and 29 ms mark the times of arrival of the compressional and shear waves, respectively. The opposite polarity of the shear waves is a major assistance in recognizing the arrival of the shear wave.

Crosshole Seismic Survey
Building 174
Portsmouth Naval Shipyard
File 09VD28 December, 2009

HAGER-RICHTER
GEOSCIENCE, INC.

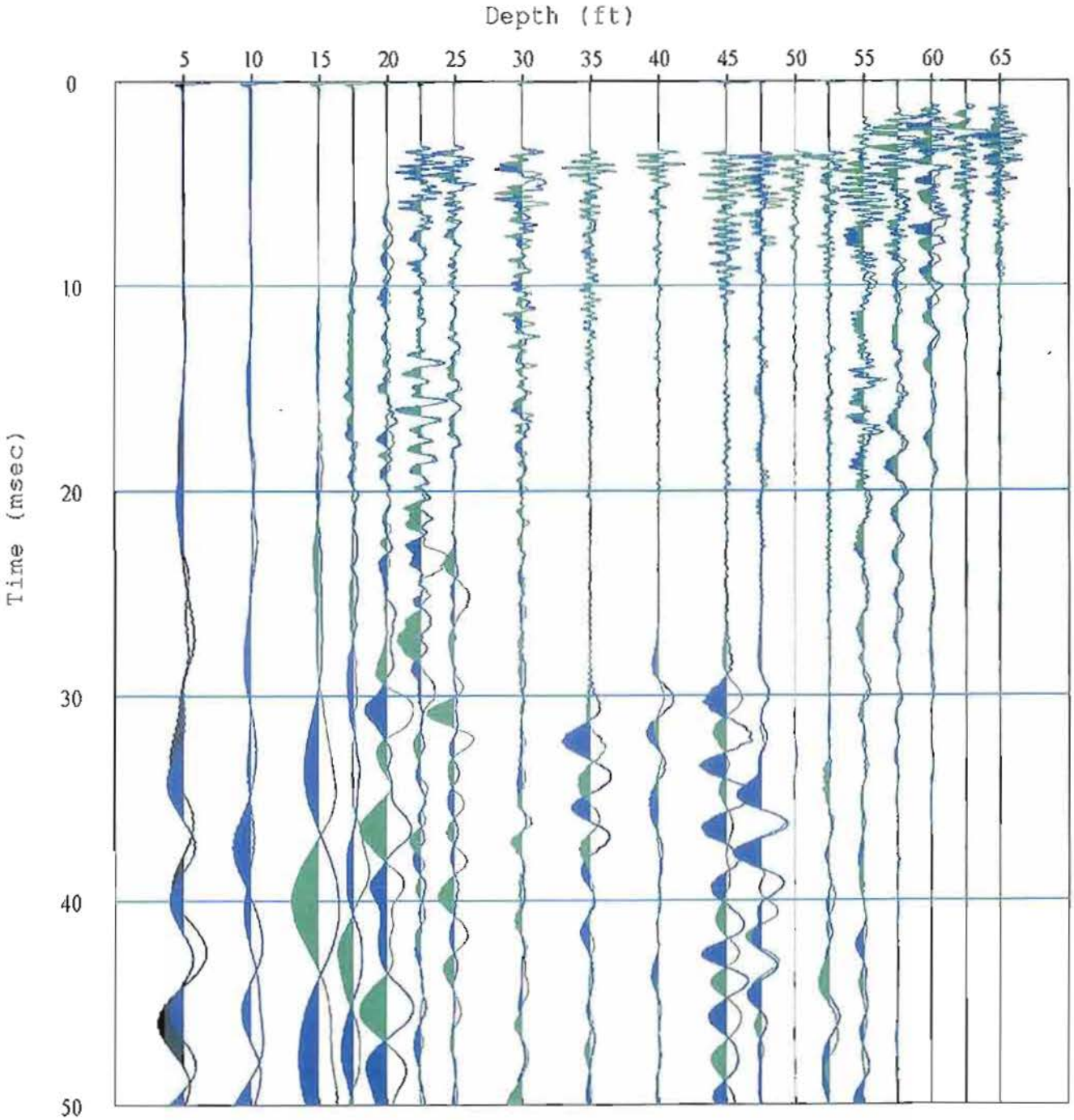


Figure 7. Composite seismograms. The source and geophone are at the same depth for each seismogram. Horizontal components of all seismograms are shown as a function of depth of the source/receiver geophone.

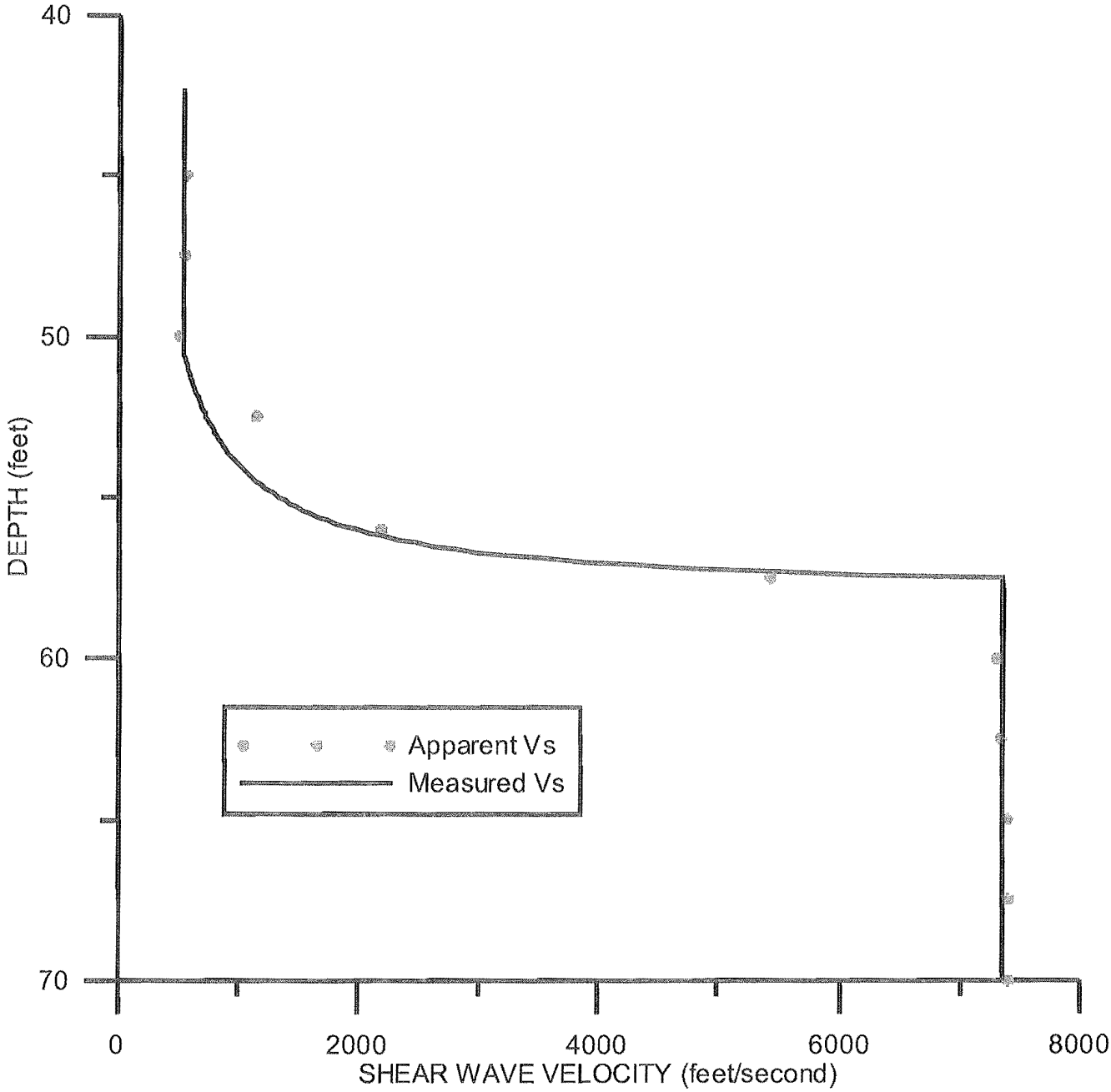


Figure 8. Refraction effects. The model used to calculate the line in the plot consisted of an interface at 57.5 ft depth, consistent with the depths of bedrock reported in the boring logs for Borings B-101 (59.5 ft) and B-104 (53 ft), and shear wave velocities of 550 fps and 7350 fps above and below the interface, respectively. See text.

APPENDICES

APPENDIX 1

ASTM D4428/D4428M - 07
STANDARD TEST METHODS FOR CROSSHOLE SEISMIC TESTING

Designation: D 4428/D 4428M – 07

Standard Test Methods for Crosshole Seismic Testing[1]

This standard is issued under the fixed designation D 4428/D 4428M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 These test methods are limited to the determination of horizontally traveling compression (*P*) and shear (*S*) seismic waves at test sites consisting primarily of soil materials (as opposed to rock). A preferred test method intended for use on critical projects where the highest quality data must be obtained is included. Also included is an optional method intended for use on projects which do not require measurements of a high degree of precision.

1.2 Various applications of the data will be addressed and acceptable interpretation procedures and equipment, such as seismic sources, receivers, and recording systems will be discussed. Other items addressed include borehole spacing, drilling, casing, grouting, deviation surveys, and actual test conduct. Data reduction and interpretation is limited to the identification of various seismic wave types, apparent velocity relation to true velocity, example computations, effective borehole spacing, use of Snell's law of refraction, assumptions, and computer programs.

1.3 It is important to note that more than one acceptable device can be used to generate a high-quality P wave or S wave, or both. Further, several types of commercially available receivers and recording systems can also be used to conduct an acceptable crosshole survey. Consequently, these test methods primarily concern the actual test procedure, data interpretation, and specifications for equipment which will yield uniform test results.

1.4 All recorded and calculated values shall conform to the guide for significant digits and rounding established in Practice D 6026.

1.4.1 The procedures used to specify how data are collected/recorded and calculated in these test methods are regarded as the industry standard. In addition, they are representative of the significant digits that should generally be retained. The procedures used do not consider material variation, purpose for obtaining the data, special purpose studies, or any considerations for the user's objectives; and it is common practice to increase or reduce significant digits of reported data to be commensurate with these considerations. It is beyond the scope of these test methods to consider significant digits used in analysis methods for engineering design.

1.4.2 Measurements made to more significant digits or better sensitivity than specified in these test methods shall not be regarded a nonconformance with this standard.

1.5 These test methods are written using SI units. Inch-pound units are provided for convenience. The values stated in inch pound units may not be exact equivalents; therefore, they shall be used independently of the SI system. Combining values from the two systems may result in nonconformance with these test methods.

1.5.1 The gravitational system of inch-pound units is used when dealing with inch-pound units. In this system, the pound (lbf) represents a unit of force (weight), while the unit for mass is slugs. The rationalized slug unit is not given, unless dynamic (F = ma) calculations are involved.

1.5.2 It is common practice in the engineering/construction profession to concurrently use pounds to represent both a unit of mass (lbm) and of force (lbf). This implicitly combines two separate systems of units; that is, the absolute system and the gravitational system. It is scientifically undesirable to combine the use of two separate sets of inch-pound units within a single standard. As stated, these test methods include the gravitational system of inch-pound units and do not use or present the slug unit for mass. However, the use of balances or scales recording pounds of mass (lbm) or recording density in lbm/ft^3 shall not be regarded as nonconformance with this standard.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 653 Terminology Relating to Soil, Rock, and Contained Fluids

D 3740 Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

[1] These test methods are under the jurisdiction of ASTM Committee D18 on Soil and Rock and are the direct responsibility of Subcommittee D18.09 on Cyclic and Dynamic Properties of Soils.

Current edition approved July 1, 2007. Published August 2007. Originally approved in 1984. Last previous edition approved in 2000 as D 4428/D 4428M – 00.

*A Summary of Changes section appears at the end of this standard.

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D 6026 Practice for Using Significant Digits in Geotechnical Data

3. Terminology

3.1 *Definitions:* For definitions of other terms used in these Test Methods, see Terminology D 653.

4. Summary of Test Method

4.1 The Crosshole Seismic Test makes direct measurements of compression velocities, shear wave velocities, or both, in boreholes advanced through soil or rock. At selected depths down the borehole, a borehole seismic source is used to generate a seismic wave train. Downhole receivers are used to detect the arrival of the seismic wave train in offset borings. Cased borings that are spaced 10 to 20 ft apart are typically used. The distance between boreholes at the test depths is measured using a borehole deviation survey. The borehole seismic source is connected to and triggers a data recording system that records the response of the downhole receiver(s), thus measuring the travel time of the wave train between the source and receiver(s). The compression or shear wave velocity is calculated from the measured distance and travel time for the respective wave train.

NOTE 1—The quality of the results produced by these test methods is dependent on the competence of the personnel performing it and the suitability of the equipment and facilities. Agencies that meet the criteria of Practice D 3740 are generally considered capable of competent and objective testing/sampling/inspection and so forth. Users of these test methods are cautioned that compliance with Practice D 3740 does not in itself assure reliable results. Reliable results depend on many factors; Practice D 3740 provides a means of evaluating some of those factors.

5. Significance and Use

5.1 The seismic crosshole method provides a designer with information pertinent to the seismic wave velocities of the materials in question (**1**).[2] This data may be used as input into static/dynamic analyses, as a means for computing shear modulus, Young's modulus, and Poisson's ratio, or simply for the determination of anomalies that might exist between boreholes.

5.2 Fundamental assumptions inherent in the test methods are as follows:

5.2.1 Horizontal layering is assumed.

5.2.2 Snell's laws of refraction will apply. If Snell's laws of refraction are not applied, velocities obtained will be unreliable.

6. Apparatus

6.1 The basic data acquisition system consists of the following:

6.1.1 *Energy Sources*—These energy sources are chosen according to the needs of the survey, the primary consideration being whether P-wave or S-wave velocities are to be determined. The source should be rich in the type of energy required, that is, to produce good P-wave data, the energy source must transmit adequate energy to the medium in compression or volume change. Impulsive sources, such as explosives, hammers, or air guns, are all acceptable P-wave generators. To produce an identifiable S wave, the source should transmit energy to the ground primarily by directionalized distortion. For good S waves, energy sources must be repeatable and, although not mandatory, reversible. The S-wave source must be capable of producing an S-wave train with an amplitude at least twice that of the P-wave train. Fig. 1 and Fig. 2 show examples of impulse and vibratory seismic sources.

6.1.2 *Receivers*—The receivers intended for use in the crosshole test shall be transducers having appropriate frequency and sensitivity characteristics to determine the seismic wave train arrival. Typical examples include geophones and accelerometers. The frequency response of the transducer must not vary more than 5 % over a range of frequencies from ½ to 2 times the predominant frequency of the site-specific S-wave train. Each receiving unit will consist of at least three transducers combined orthogonally to form a triaxial array, that is, one vertical and two horizontal transducers mounted at right angles, one to the other. In this triaxis arrangement, only the vertical component will be acceptable for S-wave arrival determinations. In cases where P-wave arrivals are not desired, a uniaxial vertical transducer may be used. P-wave arrivals will be determined using the horizontal transducer oriented most nearly radially to the source. The transducer(s) shall be housed in a single container (cylindrical shape preferred) not exceeding 450 mm [18 in.] in length. Provision must be made for the container to be held in firm contact with the sidewall of the borehole. Examples of acceptable methods include: air bladder, wedge, stiff spring, or mechanical expander.

6.1.3 *Recording System*— The system shall consist of separate amplifiers, one for each transducer being recorded, having identical phase characteristics and adjustable gain control. Only digital signal filtering will be acceptable. Analog filtering, active or passive, will not be acceptable because of inherent phase delays. The receiver signals shall be displayed in a manner such that precision timing of the P and S-wave arrival referenced to the instant of seismic source activation can be

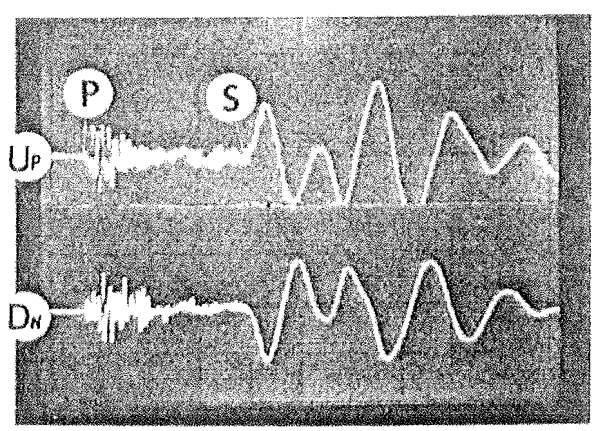


FIG. 1 Reversible Impulse Seismic Source (Produces Both P and S Wave Trains)

[2] The boldface numbers in parentheses refer to the list of references at the end of this standard.

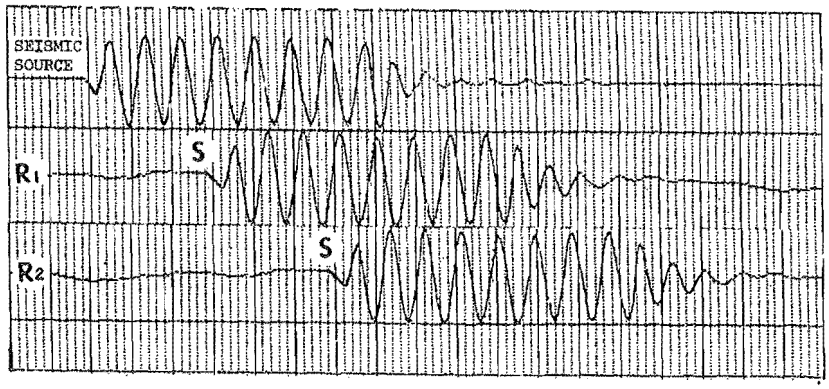


FIG. 2 Borehole Vibratory Seismic Source (Produces S Wave Train Only)

determined within 0.1 ms when materials other than rock are being tested. Timing accuracy shall be demonstrated both immediately prior to and immediately after the conduct of the crosshole test. Demonstrate accuracy by inducing and recording on the receiver channels an oscillating signal of 1000 Hz derived from a quartz-controlled oscillator, or, a certified laboratory calibration obtained within the time frame recommended by the instrument manufacturer. Further, the timing signal shall be recorded at every sweep rate or recorder speed, or both, used during conduct of the crosshole test. As an optional method, the true zero time shall be determined by (*1*) a simultaneous display of the triggering mechanism along with at least one receiver, or (*2*) a laboratory calibration (accurate to 0.1 ms) of the triggering mechanism which will determine the lapsed time between the trigger closure and development of that voltage required to initiate the sweep on an oscilloscope or seismograph. Permanent records of the seismic events shall be made by either scope-mounted camera or oscillograph.

7. Procedure

7.1 *Borehole Preparation*:

7.1.1 *Preferred*—The preferred method for preparing a borehole set for crosshole testing incorporates three boreholes in line, spaced 3.0 m [10 ft] apart, center-to-center on the ground surface, as illustrated in Fig. 3. If, however, it is known that S wave velocities will exceed 450 m/s [1500 ft/s], such as is often encountered in alluvial materials, borehole spacings may be extended to 4.5 m [15 ft].

7.1.1.1 Drill the boreholes, with minimum sidewall disturbance, to a diameter not exceeding 175 mm [7.0 in.]. After the drilling is completed, case the borings with 50 to 100 mm [2 to 4 in.] inside diameter PVC pipe or aluminum casing, taking into consideration the size of the borehole source and downhole receivers. Before inserting the casing, close the bottom of the pipe with a cap which has a one way ball-check valve capable of accommodating 38 mm [1½ in.] outside diameter grout pipe. Center the casing with spacers and insert it into the bottom of the borehole. Grout the casing in place by (*1*) inserting a 38 mm [1½ in.] PVC pipe through the center of the casing, contacting the one-way valve fixed to the end cap (Fig. 4 (side A)), or (*2*) by a small diameter grout tube inserted to the bottom of the borehole between the casing and the borehole sidewall (Fig. 4 (side B)). Another acceptable method would be to fill the borehole with grout which would be displaced by end-capped fluid-filled casing. The grout mixture should be formulated to approximate closely the density of the surrounding in situ material after solidification. That portion of the boring that penetrates rock should be grouted with a conventional portland cement which will harden to a density of about 2.20 Mg/m^3 [140 lb/ft^3]. That portion of the boring in contact with soils, sands, or gravels should be grouted with a mixture simulating the average density of the medium (about 1.80 to 1.90 Mg/m^3[110 to 120 lb/ft^3]) by premixing 450 g [1 lb] of bentonite and 450 g [1 lb] of portland cement to 2.80 kg [6.25 lb] of water. Anchor the casing and pump the grout using a conventional, circulating pump capable of moving the grout through the grout pipe to the bottom of the casing upward from the bottom of the borehole (Fig. 4). Using this procedure, the annular space between the sidewall of the borehole and the casing will be filled from bottom to top in a uniform fashion displacing mud and debris with minimum sidewall disturbance. Keep the casing anchored and allow the grout to set before using the boreholes for crosshole testing. If shrinkage occurs near the mouth of the borehole, additional grout should be inserted until the annular space is filled flush with the ground surface (*4*).

7.1.2 *Optional*—If the scope or intended use of a particular project does not warrant the time and expense which would be incurred by the preferred method, or if the specific project such as an investigation beneath a relatively small machine foundation is undertaken, this optional method may be used.

7.1.2.1 In all cases, a minimum of two boreholes must be used. If the borings are to be 15 m [50 ft] deep or less, verticality will be controlled using a level on the drill stem extending into the borehole. Center-to-center surface borehole spacing will be determined by the nature of the project. Borings may be used either with or without casing; however, if casing is used, grout must be injected between the casing and sidewall of the borehole to ensure good contact in the manner described in 7.1.1.1. If the center-to-center surface borehole spacing exceeds 6.0 m [20 ft], the probability of measurement of refracted waves rather than a direct wave in each layer greatly increases. As a consequence, data obtained by the optional method must be used with caution.

7.2 *Borehole Deviation Survey*—A borehole deviation survey must be conducted to determine accurately the horizontal distance between borings.

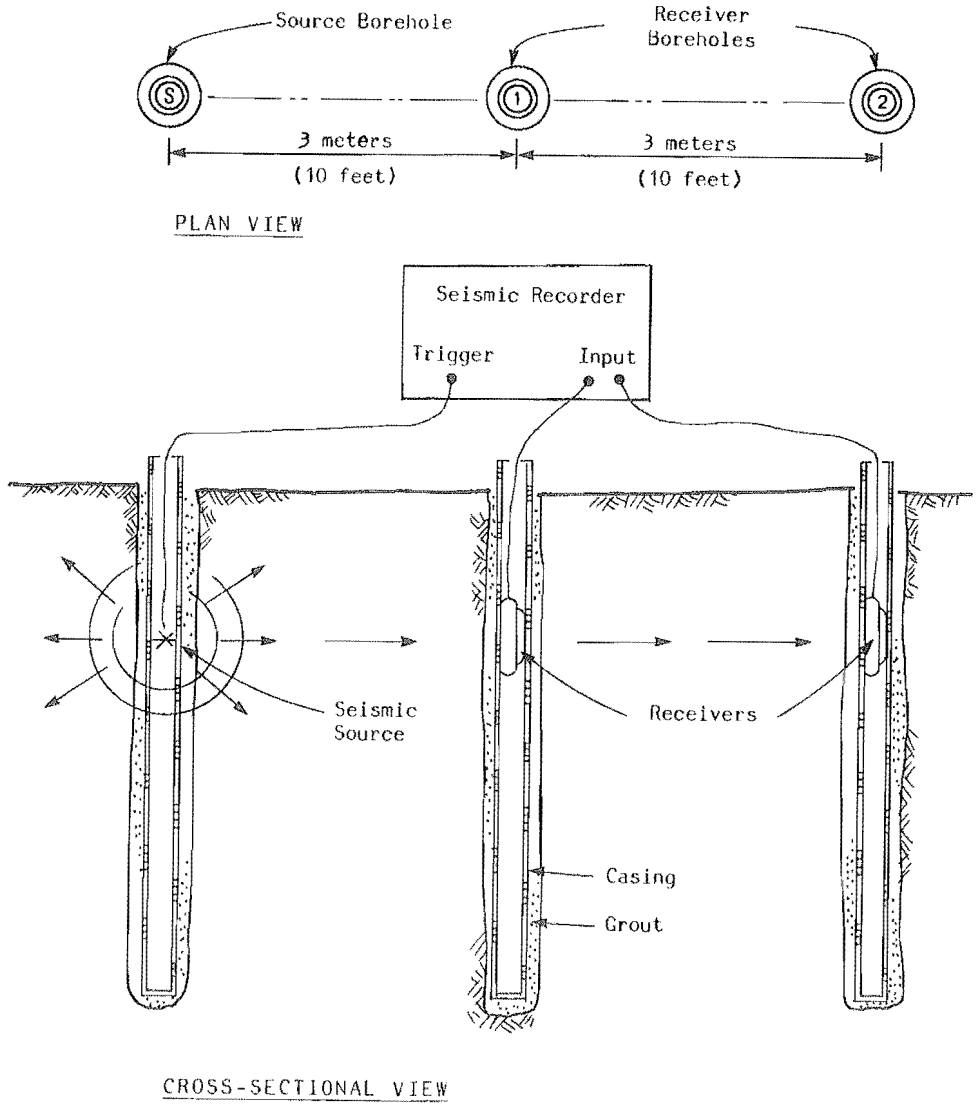


FIG. 3 Crosshole Seismic Test

7.2.1 *Preferred Method*—Conduct a borehole deviation survey in all three crosshole borings with an instrument capable of measuring the precise vertical alignment of each hole. The instrument must have the capability of determining horizontal orientation with a 2° sensitivity and an inclination range from 0 to 30° with a sensitivity of 0.1°. Information thus obtained will enable the investigator to compute true vertical depth and horizontal position at any point within the borehole so that actual distance between the holes can be computed to within ±2 % to a depth of about 30.0 m [100 ft].

7.2.1.1 Proceed with the survey beginning at the mouth of the borehole obtaining deviation data at intervals not exceeding 3.0 m [10 ft] to the bottom of the boring. Repeat the measurements on the withdrawal trip at intervals not exceeding 6.0 m [20 ft] so that closure can be determined at the mouth of the borehole.

7.2.2 *Optional Method*—If the scope of a project dictates the use of the optional procedure described in 7.1.2, the following precautions must be undertaken to ensure verticality of the borings.

7.2.2.1 Level the borehole drilling apparatus using a level placed on the drill stem extending into the mouth of the borehole.

7.2.2.2 As drilling progresses, recheck the drill stem at 3.0 m [10 ft] depth intervals and realign as necessary.

7.2.2.3 Limit the maximum depth of investigation to less than 15 m [50 ft]. If the depth of investigation exceeds 15 m [50 ft] a deviation survey such as described in 7.2.1 must be conducted.

7.2.2.4 If casing is used, grout as described in 7.1.1, then evacuate all fluid from the interior and insert a lighted plumb-bob observing its attitude at 3-m [10-ft] intervals. If the plumb-bob strikes the sidewall, note that depth and the direction of deviation.

7.2.2.5 Estimate the distance between borings and provide appropriate caution statements on all data.

7.3 *Crosshole Test*:

7.3.1 *Preferred Method*—Begin the crosshole test by placing the energy source in an end hole at a depth no greater than 1.5 m [5 ft] (Fig. 3) into the stratum being investigated. Place

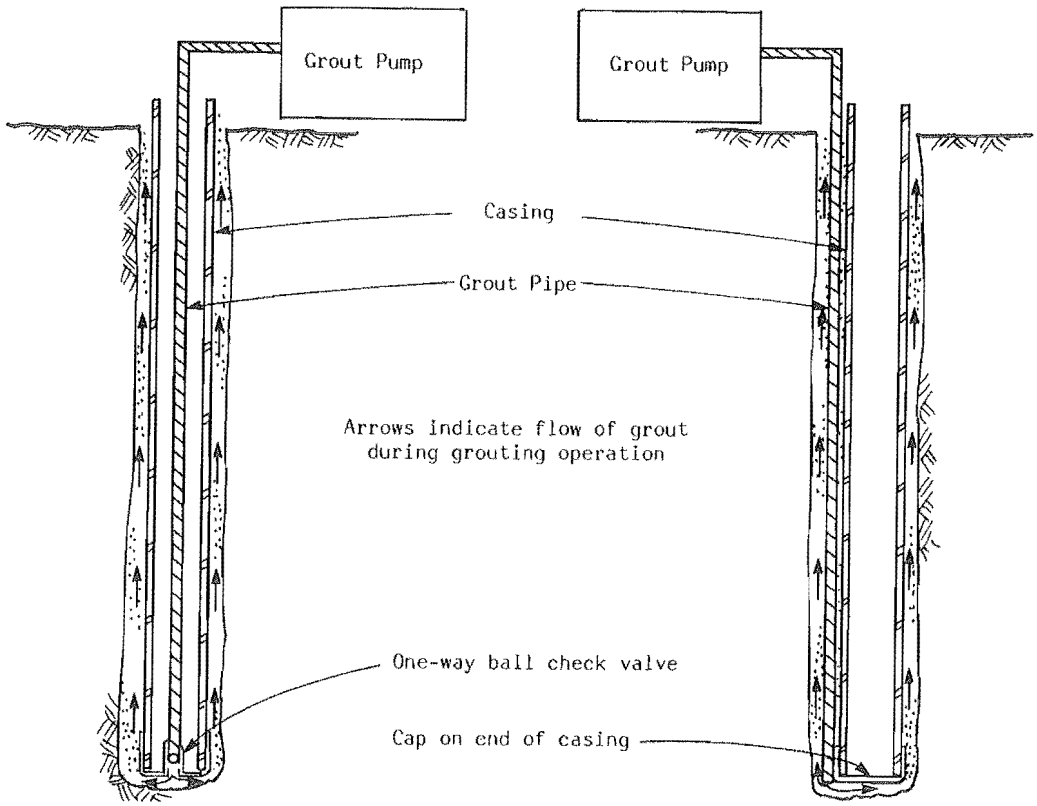


FIG. 4 Acceptable Grouting Techniques

the two receivers at the same elevation in each of the designated receiver holes. Clamp the source and receivers firmly into place. Check recording equipment and verify timing. Activate the energy source and display both receivers simultaneously on the recording device. Adjust the signal amplitude and duration such that the P-wave train or S-wave train, or both, are displayed in their entirety.

7.3.1.1 Best results will be obtained by performing two separate tests: one optimized for P-wave recovery (fastest sweep/recorder rate, higher gain settings) and the second for S-wave recovery (slower sweep/recorder rate, lower gain settings). If enhancement equipment is being used, repeatedly activate the energy source until optimum results are displayed. Do not overrange memory circuitry. A clipped signal is unacceptable. Perform the second test by lowering the energy source and receivers to a depth dictated by known stratification, but no greater than 1.5 m [5.0 ft] from the previous test locations in the borings and repeat the above procedure. Perform succeeding tests at intervals determined by stratification, or at intervals of 1.5 m [5 ft] until the maximum borehole depth has been reached. During withdrawal of the energy source and receivers from the boreholes, perform repeat tests at 6.0-m [20-ft] intervals until the ground surface is reached.

7.3.2 *Optional Method*—Use a minimum of two boreholes. If, however, only two boreholes are used, the importance of true zero time determination as described in 6.1.3 cannot be overemphasized. Place the energy source in one borehole at a depth dictated by test objectives and the receiver at the same elevation in the second borehole. Activate the seismic source and display the trigger mechanism and the receiver simultaneously on the recording device. Adjust the sweep rate so that the P-wave train or S-wave train, or both, are displayed in their entirety. If enhancement/stacking equipment is being used, the seismic source should be activated repeatedly until optimum results are displayed. After wave trains have been identified and duly recorded in their entirety, sweep rates may be expanded for optimum determination of arrival times. Additional permanent records should then be made. Overranging of memory circuitry resulting in a clipped signal is not acceptable. Repeat the test at a second location as predetermined by known stratification information and repeat the above procedure. Perform succeeding tests at intervals of about 1.5 m [5 ft], or intervals determined by stratification.

8. Data Reduction and Interpretation

8.1 *Deviation Survey*—The primary objective of the borehole deviation survey is to establish the correct horizontal distance between the three in-line borings. Seismic wave velocities compensating for borehole deviation will be computed by determining the straight-line distance, l, from source to receivers. To do this, the following data are needed:

E_S = elevation of the top of the source hole,

E_G = elevation of the top of the geophone hole,

D_S = depth of the seismic source,

D_G = depth of the geophone,

L = horizontal distance between the top of the source hole and geophone hole,

ϕ = azimuth with respect to north from the top of the source hole to the geophone hole,

x_S = the north deviation of the source borehole at the source depth,

y_S = the east deviation of the source borehole at the source depth,

x_G = the north deviation of the geophone borehole at the geophone depth, and

y_G = the east deviation of the geophone borehole at the geophone depth.

8.1.1 The following equation determines the straight-line distance, l, from source to geophone using the data of 8.1:

$$l = \sqrt{[(E_S - D_S) - (E_G - D_G)]^2 + (L\cos\phi + x_G - x_S)^2 + (L\sin\phi + y_G - y_S)^2}$$

The apparent velocity is equal to l divided by the travel time. Use the same method to determine the straight-line distances between the geophone holes.

8.2 *Wave Train Identification*:

8.2.1 Identify the P-wave train arrival time as the first departure of the static horizontal receiver trace after time $T = 0$. It should be noted that the horizontally oriented geophones will often (correctly) respond earlier than the vertically oriented because of the longitudinal particle motion associated with the P wave (5). If both wave trains (P and S) are displayed simultaneously on the records, the S wave will be identified on the seismic signature by the following characteristics:

8.2.1.1 A sudden increase in amplitude of at least two times that of the P-wave train, and,

8.2.1.2 An abrupt change in frequency coinciding with the amplitude change which results in a period increase of at least two times that of the characteristic period of the P wave.

8.2.1.3 *Optional*—If a reversible polarity seismic source is used, the S wave arrival will be determined as that point meeting the criteria of 8.2.1.1 and 8.2.1.2 and where a 180° polarity change is noted to have occurred.

8.2.2 The above characteristics are displayed in Fig. 1. Determine the arrival time for the P wave or S wave directly from the record as the lapsed time between time zero (activation of the seismic source) and the arrival of the respective wave trains at each of the receivers. If a vertically polarized S wave vibratory source is used, the arrival time of the S wave will be determined from the time lapsed between the start up of the seismic source monitor geophone and the first arrival of a seismic signal bearing the same characteristic frequency. No discernible P-wave signal is present; consequently, the vibratory source is unacceptable for P wave determinations (see Fig. 2).

8.3 *Data Tabulation*:

8.3.1 Three separate travel times observed in the field and recorded are as follows:

8.3.1.1 Source to Receiver 1,

8.3.1.2 Source to Receiver 2, and

8.3.1.3 Time difference between Receivers 1 and 2.

8.3.2 Tabulate the data in a manner similar to that shown in Fig. 5. Determine preliminary velocity in the field (recognizing that borehole deviations have not been taken into account) by dividing the measured surface distance between source and receivers by the arrival time at each respective receiver. Determine incremental velocity by dividing the measured distance between receivers R_1 and R_2 by the difference in arrival times between source and R_2 and source and R_1.

NOTE 2—Under ideal circumstances, (that is, nonlayered homogeneous materials, vertical boreholes, and no trigger delays in the recording equipment) all three computed velocities ($S - R_1$, $S - R_2$, and $R_1 - R_2$) should be the same value. In normal testing, however, this will rarely be true. Trigger delays up to 3 ms have been observed in some equipment, causing erroneously high computed velocities between $S - R_1$ and $S - R_2$. If this occurs, $S - R_1$ will compute the highest velocity, followed by $S - R_2$. The incremental $R_1 - R_2$ velocity will not be affected by trigger errors. Other factors which can affect incremental velocity determinations are: (*a*) dissimilar materials between borings 1–2 and 2–3, (*b*) faulting or drastically inclined layering, and (*c*) refraction caused by the presence of a nearby higher velocity layer. Items (*a*) and (*b*) can only be determined by other direct tests. If such conditions exist, the usefullness of the crosshole test should be judged according to the purpose of the site investigation. Item (*c*) can be accounted for by proper use of Snell's law of refraction. Therefore, the standard crosshole velocity will be determined from the incremental time recorded between receiver holes R_1 and R_2 (5).

8.4 *Data Reduction*:

8.4.1 In materials where abrupt changes in density or elasticity occur, the ray travel path of the wave might not be a straight line (6). In such cases, Snell's law of refraction must be used. Examples are shown in Fig. 6 and the Appendixes.

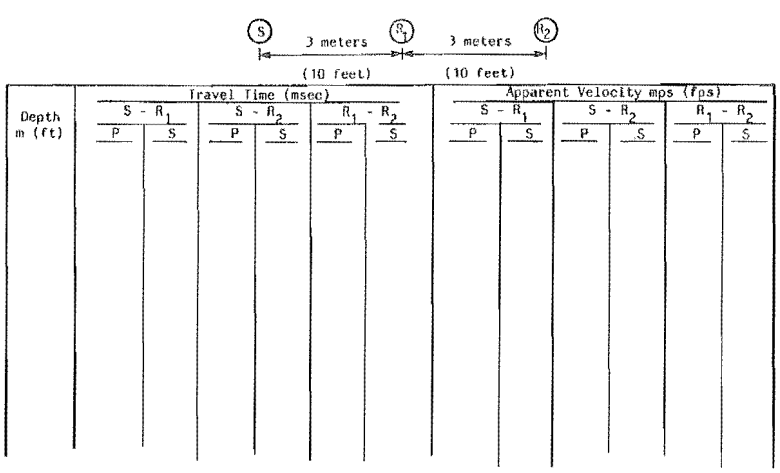
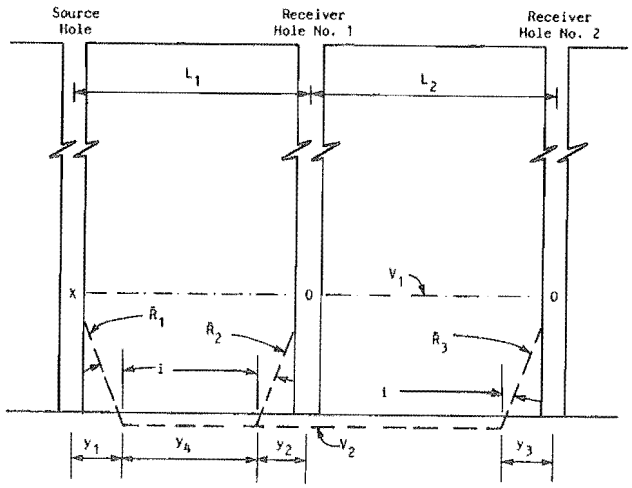


FIG. 5 Crosshole Data Tabulation



LEGEND:		Velocity	f/s	m/s
X	Location of Source	V_1	3500	1100
O	Location of Receivers	V_2	10000	3000
—·—	Straight Line Distance Travel Point			
— —	Refracted Travel Path			
		Distance	Feet	Metres
$L_1 = L_2$	10.00	3.00		
$\bar{R}_1 = \bar{R}_2 = \bar{R}_3$	5.34	1.61		
$y_1 = y_2 = y_3$	1.87	0.59		
$y_4 = L_1 - (y_1 + y_2)$	6.26	1.82		

FIG. 6 Example Crosshole Computation

TABLE 1 Apparent Velocity as a Function of Hole Spacing

Depth, m [ft]	Time velocity profile, m/s [ft/s]	Interface depth, m [ft]	Apparent velocities^A for hole spacings of:				
			6 m [20 ft]	12 m [40 ft]	18 m [60 ft]	21 m [70 ft]	30 m [100 ft]
1.5 [5.0]	300 [1000]		300 [1000]	367 [1245]	423 [1424]	532 [1760]	630 [2086]
3.0 [10.0]	300 [1000]		427 [1485]	499 [1705]	551 [1833]	682 [2252]	796 [2630]
		3.70 [12.0]					
4.5 [15.0]	600 [2000]		600 [2000]	600 [2000]	707 [2295]	858 [2792]	985 [3210]
6.0 [20.0]	600 [2000]		600 [2000]	697 [2363]	873 [2816]	1038 [3360]	1171 [3801]
7.5 [25.0]	600 [2000]	8.50 [28.0]	761 [2632]	931 [3175]	1141 [3644]	1313 [4218]	1444 [4658]
9.0 [30.0]	1200 [4000]		1200 [4000]	1286 [4000]	1522 [4726]	1675 [5264]	1783 [5651]
10.5 [35.0]	1200 [4000]		1286 [4000]	1675 [4981]	1862 [5697]	1973 [6139]	2046 [6439]
12.0 [40.0]	1200 [4000]	12.0 [42.0]	2400 [5942]	2400 [6819]	2400 [7172]	2400 [7362]	2400 [7482]
13.5 [45.0]	2400 [8000]		2400 [8000]	2400 [8000]	2400 [8000]	2400 [8000]	2400 [8000]
		14.0 [46.0]					
15.0 [50.0]	1800 [6000]		1855 [6000]	2092 [6801]	2186 [7158]	2236 [7527]	2290 [7782]
16.5 [55.0]	1800 [6000]		2022 [7355]	2312 [8095]	2428 [8376]	2491 [8524]	2530 [8615]
		17.4 [57.0]					
18.0 [60.0]	2700 [9000]		2700 [9000]	2700 [9000]	2700 [9000]	2700 [9000]	2700 [9000]

^A All velocities are expressed in m/s [ft/s].

NOTE 3—Table 1 illustrates the differences between apparent and true velocities in a crosshole survey. This survey was conducted at 1.6-m [5-ft] increments to a depth of 18 m [60 ft] at the hypothetical site characterized by the true profile shown in the table. Assuming the data were obtained at the same elevations in receiver holes located about 6 to 30 m [20 to 100 ft] from the source, the user will observe that as borehole spacing increases, the low velocity zone located at a spacing increases, the low velocity zone located at a depth of 14 m [46 ft] becomes appreciably less evident at distances greater than 6 m [20 ft]; hence, the overall philosophy of limiting borehole spacing for a crosshole standard test to a maximum of 9 m [30 ft].

8.4.2 *Calculations*—Due to the nature and number of calculations which are involved in a typical application of the crosshole technique to a layered site where refractions are likely to occur, a computer program for crosshole seismic data interpretation may be used (7). The program must apply Snell's law to develop a true velocity interpretation consistent with all the data from a given survey. An acceptable example output of a computer program capable of solving the corrected distances, true velocities using Snell's law, and interface depths is shown

in Table 2. Computerized or manual data reduction and interpretation shall incorporate the following information:

8.4.2.1 Source and receiver depths,

8.4.2.2 Arrival times of P waves or S waves, or both,

8.4.2.3 Surface distance between holes, and

8.4.2.4 Borehole deviations (N–S and E–W).

8.4.3 The procedure used in either computer programs or hand calculations begins by assuming that the apparent velocity measured in either the shallowest or deepest crosshole test is a true velocity (Note 4). Layer interfaces are tentatively assumed to exist at middepth between successive test points in the hole, and arrival times from the second test point are computed for all possible paths from the apparent velocities and critical angles. The arrival time(s) at the geophone at the level consistent with the data is the plausible true path. The procedure is repeated until a consistent explanation for all of the data from all of the tests in the borehole is determined. Fig. 6 and the Appendixes provide a numerical (hand) example of the process.

NOTE 4—The better practice is to use the shallowest depth since this velocity can be independently checked by a surface survey.

NOTE 5—*Example Calculation*—Consider the hypothetical case illustrated in Fig. 6. A seismic source and receivers are located at an assumed depth in a medium having a P wave velocity of 1100 m/s [3500 ft/s]. The receiver holes are spaced at distances of 0 and 6.0 m [0 and 20 ft] respectively, from the source hole. A zone of 3000 m/s [10 000 ft/s] velocity is assumed to be encountered at a depth 1.5 m [5 ft] below the source and receivers (Computations are given in Table 3). Example 1, in Appendix X1. and Appendix X2., is a case where the seismic source is located at a 3.0 m [10 ft] distance from the geophone. When Snell's law is applied, the shortest travel time results when the wave front travels through the 1100 m/s [3500 ft/s] velocity zone. Example 2 of Appendix X3 and Appendix X4. is a case where the seismic source is located 6.0 m

TABLE 2 Results and Interpretation of Data from Crosshole Computer Program

Crosshole Data—S-wave, no name dam, downstream slope (horizontal distance between holes is 10.0)

Depth		Direct Path Distance	Time Increment	Apparent Velocity	Rec_1		Rec_2	
Rec_1	Rec_2				X-Dev	Y-Dev	X-Dev	Y-Dev
Crosshole Data								
5.0	5.0	10.0	0.0110	908	−0.07	−0.03	−0.06	−0.07
10.0	10.0	10.0	0.0095	1051	−0.14	−0.07	−0.11	−0.14
15.0	15.0	10.0	0.0100	998	−0.14	−0.07	−0.11	−0.14
20.0	20.0	10.0	0.0098	1024	−0.14	−0.07	−0.11	−0.14
25.0	25.0	10.0	0.0088	1141	−0.16	−0.09	−0.13	−0.16
30.0	30.0	10.0	0.0085	1175	−0.18	−0.11	−0.14	−0.18
35.0	35.0	10.0	0.0090	1109	−0.11	−0.07	−0.08	−0.14
40.0	40.0	10.0	0.0085	1175	−0.04	−0.03	−0.01	−0.10
45.0	45.0	10.0	0.0085	1175	0.05	−0.00	0.09	−0.07
50.0	50.0	10.0	0.0075	1331	0.15	0.02	0.18	−0.05

Computed Travel Times, s

Rec_1 Depth	Rec_2 Depth	True Velocity Average	Interface Depth	Direct	Down 1 Layer	Down 2 Layer	Down 3 Layer	Up 1 Layer	Minimum Time	Apparent Velocities	
										Computed	Measured
Crosshole Interpretation—S-wave, no name dam, downstream slope											
5.0	5.0	908		0.0120	0.0110		0.0230		0.0110	908	908
		1051	6.3								
10.0	10.0			0.0095		0.0185	0.0442		0.0095	1051	1051
			14.2								
15.0	15.0	998		0.0100	0.0146	0.0382		0.0100	0.0100	998	998
20.0	20.0	998		0.0100	0.0097	0.0316		0.0131	0.0097	1024	1024
			21.0								
25.0	25.0	1142		0.0087	0.0266				0.0087	1142	1141
30.0	30.0	1142		0.0087	0.0221				0.0087	1142	1175
35.0	35.0	1142		0.0087	0.0176				0.0087	1142	1109
40.0	40.0	1142		0.0087	0.0131				0.0087	1142	1175
45.0	45.0	1142		0.0087	0.0086				0.0086	1158	1175
50.0	50.0	1331	46.2	0.0075					0.0075	1331	1331

Crosshole Diagnostic—S-wave, no name dam, downstream slope

Caution—The interface calculated to be at 6.3 could be anywhere between 6.3 and 10.0	Execution Check	Layer 1	Depth 1	Down 1
Caution—The interface calculated to be at 14.2 could be anywhere between 10.0 and 14.2.	Execution Check	Layer 2	Depth 2	Down 1
Caution—At geophone depth 20.0, the 1024 could be a true velocity.	Execution Check	Layer 3	Depth 3	Down 1
Caution—The interface calculated to be at 25.6 could be anywhere between 25.6 and 30.0.	Execution Check	Layer 4	Depth 5	Down 1
Caution—The interface calculated to be at 34.2 could be anywhere between 30.0 and 34.2.	Execution Check	Layer 5	Depth 6	Up 1
Caution—At geophone depth 40.0, the 1175 could be a true velocity.	Execution Check	Layer 6	Depth 7	Down 1
Caution—The interface calculated to be at 46.2 could be anywhere between 46.2 and 50.0.	Execution Check	Layer 7	Depth 9	Down 1

[20 ft] from the geophone. In this example, the application of Snell's law shows that the shortest travel time would be along a path influenced by the 3000 m/s [10 000 ft/s] velocity zone. Example 2, a case involving the same velocity profile and a 6.0 m [20 ft] spacing, shows a case where analysis reveals that the measured travel time is not an arrival via a straight-line path and that the apparent velocity is not a true velocity.

8.5 *Comparisons With Other Data*—After the reduction and interpretation of the crosshole data, the results must be analyzed in conjunction with other data, including surface refraction and available boring data, and a velocity zone profile descriptive of subsurface conditions made.

9. Report: Test Data Sheet(s)/Form(s)

9.1 The methodology used to specify how data are recorded on the test data sheet/form, as given below, is covered in 1.4.

9.2 Record as a minimum the following general information (data):

9.2.1 Project description, operator, weather conditions.

9.2.2 Make and model of borehole seismic source, downhole receivers and recording equipment.

9.2.3 Borehole information, method of installation, casing diameter(s).

9.2.4 Method used to interpret results.

9.2.5 Distance between each borehole or borehole coordinates at ground surface.

9.3 Record as a minimum the following test data at each measurement depth:

9.3.1 Measured deviations of each bore hole.

9.3.2 Distance between each pair of borehole sets.

9.3.3 Travel time between each of the three borehole pairs.

9.3.4 Apparent velocity between each of the three borehole pairs.

10. Precision and Bias

10.1 *Precision*—Test data on precision are not presented due to the nature of the soil or rock, or both materials tested by these test methods. It is either not feasible or too costly at this time to have ten or more laboratories participate in a round-robin testing program. In addition, it is either not feasible or too costly to produce multiple specimens that have uniform physical properties. Any variation observed in the data is just as likely to be due to specimen variation as to operator or laboratory testing variation.

10.1.1 Subcommittee D18.09 is seeking any data from users of this test method that might be used to make a limited statement on precision.

10.2 *Bias*—There is no accepted reference value for these test methods, therefore, bias cannot be determined.

11. Keywords

11.1 accelerometers; compression wave; geophones; machine foundations; seismic waves; shear waves; wave velocity

APPENDIXES

(Nonmandatory Information)

X1. Example 1 of the Application of Snell's Law in SI Units

X1.1 Assume seismic source and receiver 3.0 m apart in velocity layer and above a 3000 m/s velocity layer:

X1.1.1 The critical angle of refraction is:

$$I = \arcsin\left(\frac{V_1}{V_2}\right) = \frac{1100 \text{ m/s}}{300 \text{ m/s}} = 21.5° \quad \text{(X1.1)}$$

X1.1.2 Hypotenuse distances:

$$\bar{R}_1 = (1.5 \text{ m}/\cos 21.5°) = 1.61 \text{ m} \quad \text{(X1.2)}$$

$$\bar{R}_2 = (1.5 \text{ m}/\cos 21.5°) = 1.61 \text{ m}$$

X1.1.3 Abscissa distances:

$$Y_1 = 1.5 \tan(21.5°) = 0.59 \text{ m} \quad \text{(X1.3)}$$

$$Y_2 = 1.5 \tan(21.5°) = 0.59 \text{ m}$$

X1.2 Assume possible travel path through both 1100 m/s and 3000 m/s materials:

X1.2.1 Travel time in 1100 m/s material:

$$t_1 = 2(1.61)/1100 = 0.003 \text{ s} \quad \text{(X1.4)}$$

X1.2.2 Travel time in 3000 m/s material:

$$t_2 = (3 - 2(0.59))/3000 = 0.00061 \text{ s} \quad \text{(X1.5)}$$

X1.2.3 Total travel time:

$$(t_1 + t_2) = 0.00361 \text{ s} \quad \text{(X1.6)}$$

X1.3 Assume possible travel path through 1100 m/s material only using straight line distance method:

X1.3.1 Then travel time:

$$1.5 \text{ m (at 1100 m/s)} = 3.0/1100 = 0.0027 \text{ s} \quad \text{(X1.7)}$$

X1.3.2 Actual measured time = 0.0027 s.

X1.3.3 Since travel time by direct path is equal to measured time and less than possible refracted path travel time, it is concluded that the velocity is true and indicative of a path through the lower velocity layer only.

X2. Example 1 of the Application of Snell's Law in Inch-Pound Units

X2.1 Assume seismic source and receiver 10 ft apart in 3500 ft/s velocity and 5 ft above a 10 000 ft/s velocity layer:

X2.1.1 The critical angle of refraction is:

$$I = \arcsin \frac{V_1}{V_2} = \frac{3500 \text{ ft/s}}{10\ 000 \text{ ft/s}} = 20.5° \quad \text{(X2.1)}$$

X2.1.2 Hypotenuse distances are:

$$\bar{R}_1 = (5 \text{ ft}/\cos 20.5°) = 5.34 \text{ ft} \quad \text{(X2.2)}$$

$$\bar{R}_2 = (5 \text{ ft}/\cos 20.5°) = 5.34 \text{ ft}$$

X2.1.3 Abscissa distances are:

$$Y_1 = 5 \tan 20.5° = 1.87 \text{ ft} \quad \text{(X2.3)}$$

$$Y_2 = 5 \tan 20.5° = 1.87 \text{ ft}$$

X2.2 Assume possible travel path through both 3500 ft/s and 10 000 ft/s materials:

X2.2.1 Travel time in 3500 ft/s material:

$$t_{3500} = (2(5.34)/3500) = 0.003\ s \quad \text{(X2.4)}$$

X2.2.2 Travel time in 10 000 ft/s material:

$$t_{10\ 000} = (10 - (2 \times 1.87)/10\ 000) = 0.00063 \text{ s} \quad \text{(X2.5)}$$

X2.2.3 Total travel time, $(t_{3500} + t_{10\ 000}) \approx 0.00363$ s

X2.3 Assume possible travel path through 3500 ft/s material only using straight-line distance method:

X2.3.1 Travel time, $5_{3500} = {}^{10}\!/_{3500} = 0.0029$ s.

X2.3.2 Actual measured travel time = 0.0029 s

X2.3.3 Since travel time by direct path is equal to measured time and less than possible refracted path travel time, it is concluded that the velocity is true and indicative of a path through the lower velocity layer only.

X3. Example 2 of the Application of Snell's Law in SI Units

X3.1 Assume seismic source and receiver geophone 6 m apart in 1100 m/s velocity layer and 1.6 m above a 3000 m/s velocity layer:

X3.1.1 The critical angle of refraction is:

$$I = \arcsin \frac{V_1}{V_2} = 1100 \text{ m/s}/3000 \text{ m/s} = 21.5° \quad \text{(X3.1)}$$

X3.1.2 Hypotenuse distances:

$$\bar{R}_1 = 1.5/\cos(21.5°) = 1.61 \text{ m} \quad \text{(X3.2)}$$

$$\bar{R}_2 = 1.5/\cos(21.5°) = 1.61 \text{ m}$$

X3.1.3 Abscissa distances:

$$Y_1 = 1.5 \tan(21.5°) = 0.59 \text{ m} \quad \text{(X3.3)}$$

$$Y_3 = 1.5 \tan(21.5°) = 0.59 \text{ m}$$

X3.2 Assume possible travel path through both 1100 m/s and 3000 m/s materials:

X3.2.1 Travel time in 1100 m/s material:

$$t_1 = 2(1.61)/1100 = 0.003 \text{ s} \quad \text{(X3.4)}$$

X3.2.2 Travel time in 3000 m/s material:

$$t_2 = (6 - (2 \times 0.59))/3000 = 0.00161 \text{ s} \quad \text{(X3.5)}$$

X3.2.3 Total travel time:

$$(t_1 + t_2) = 0.003 + 0.00161 = 0.00461 \text{ s} \quad \text{(X3.6)}$$

X3.3 Assume possible travel path through 1100 m/s material only using straight line distance method:

X3.3.1 Then travel time:

$$t_1 = 6/1100 = 0.0055 \text{ s} \quad \text{(X3.7)}$$

X3.3.2 Actual measured travel time = 0.0055 s.

X3.3.3 Since travel time by the possible refracted path is equal to the measured time and less than the direct path travel time, it is concluded that the ray path was refracted. If the velocity had been computed from the straight line distance (6 m) divided by the measured time (0.0055), the value 1300 m/s would be apparent rather than true.

X4. Example 2 of the Application of Snell's Law in Inch-Pound Units

X4.1 Assume seismic source and receiver geophone 20 ft apart in 3500 ft/s velocity layer and 5 ft above a 10 000 ft/s velocity layer:

X4.1.1 The critical angle of refraction is:

$$I = \arcsin \frac{V_1}{V_2} = \frac{3500 \text{ ft/s}}{10\ 000 \text{ ft/s}} = 20.5° \quad \text{(X4.1)}$$

X4.1.2 Hypotenuse distances are:

$$\bar{R}_1 = (5 \text{ ft}/\cos 20.5°) = 5.34 \text{ ft} \quad \text{(X4.2)}$$

$$\bar{R}_2 = (5 \text{ ft}/\cos 20.5°) = 5.34 \text{ ft}$$

X4.1.3 Abscissa distances are:

$$Y_1 = 5 \tan 20.5° = 1.87 \text{ ft} \quad \text{(X4.3)}$$

$$Y_3 = 5 \tan 20.5° = 1.87 \text{ ft}$$

X4.2 Assume possible travel path through both 3500 ft/s and 10 000 ft/s materials:

X4.2.1 Travel time in 3500 ft/s material:

$$t_{3500} = (2(5.34)/3500) = 0.003 \text{ s} \quad (X4.4)$$

X4.2.2 Travel time in 10 000 ft/s material:

$$t_{10\ 000} = (20 - (2 \times 1.87)/10\ 000) = 0.00163 \text{ s} \quad (X4.5)$$

X4.2.3 Total travel time ($t_{3500} + t_{10\ 000}$) = 0.003 + 0.00163 = 0.00463 s.

X4.3 Assume possible travel path through 3500 ft/s material only using straight-line distance method:

X4.3.1 Travel time, $t_{3500} = 20/3500 = 0.0057$ s.

X4.3.2 Actual measured travel time = 0.0046 s

X4.3.3 Since travel time by the possible refracted path is equal to the measured time and less than the direct path travel time, it is concluded that the ray path was refracted. If the velocity had been computed from the straight-line distance (20 ft) divided by the measured time (0.0046), the value 4350 ft/s would be apparent rather than true.

REFERENCES

(1) Woods, Richard D.," Measurement of Dynamic Soil Properties," *Proceedings of the ASCE Geotechnical Engineering Division Specialty Conference on Earthquake Engineering and Soil Dynamics*, ASCE, Vol I, 19–21 June 1978, pp. 91–178.

(2) Ballard, R. F., Jr., "Method for Crosshole Seismic Testing," *Geotechnical Engineering Division* , ASCE, Vol 102, No. GT12, December 1976, pp. 1261–1273.

(3) Auld, B., "Cross-Hole and Down-Hole V_s by Mechanical Impulse," *Geotechnical Engineering Division*, ASCE, Vol 103, GT12, December 1977, pp. 1381–1398.

(4) Department of the Army, Engineer Manual EM 1110-1-1802, "Geophysical Exploration," May 1979, Washington, DC.

(5) Stokoe, K. H., II, and Hoar, R. J., "Variables Affecting In Situ Seismic Measurements," *Proceedings of the ASCE Geotechnical Engineering Division Specialty Conference on Earthquake Engineering and Soil Dynamics* , ASCE, Vol II, 19–21 June 1978, pp. 919–939.

(6) Butler, Dwain K., and Curro, Joseph R., Jr., "Crosshole Seismic Testing—Procedures and Pitfalls," *Geophysics*, Vol 46, No. 1, January 1981, pp. 23–29.

(7) Butler, Dwain K., Skoglund, George R., and Landers, Glenn B., "Crosshole: An Interpretive Computer Code for Crosshole Seismic Test Results, Documentation, and Examples," Miscellaneous Paper No. S-78-8, U.S. Army Engineer Waterways Experiment Station, CE, Vicksburg, MS July 1978.

SUMMARY OF CHANGES

Committee D18 has identified the location of selected changes to this standard since the last issue (D 4428/D 4428M – 00) that may impact the use of this standard. (Approved July 1, 2007.)

(*1*) Added Section 1.4 on significant digits.
(*2*) Updated Section 1.5 on the use of SI units.
(*3*) Added Section 2, Referenced Documents.
(*4*) Added Section 3, Terminology.
(*5*) Added Section 4, Summary of Test Methods.
(*6*) Added Note 1.
(*7*) Modification to precision statement in 10.1.
(*8*) Addition of bias statement in 10.2.
(*9*) Added Section 9, Report.

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APPENDIX 2

BORING LOGS

R.W. Gillespie & Associates, Inc.
Geotechnical Engineering•Geohydrology•Materials Testing Services

Boring Log: B-101
Total Depth (ft): 76
Sheet 1 of 3

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: As marked
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 6'

Drilling Contractor: Great Works Test Boring
Drill Rig: B 59 Truck
Driller Rep.: Pete Michaud
Date Started: 11/10/09
Date Completed: 11/10/09
Surface Elevation: ()
Drilling Method: 4-inch Tri-Cone
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT.					
				SAND (FILL); Loose, moist to wet, fine to medium sand, few silt, trace gravel and coarse sand, brown.					
5			S-1		8	4 5 3 4	8		
10			S-2	CLAYEY SILT WITH SAND (FILL); Medium dense, wet, silt and clay, few fine sand, with shell fragments, organic odor, black and gray.	4	6 12 10 8	22		
				GRAVELLY SAND (FILL); Medium dense, wet, fine to medium sand, little gravel, with rock fill, organic odor, dark gray.					
15			S-3		6	7 17 7 10	24		
20			S-4	SILTY CLAY (CL); Very stiff, wet, silty clay, with occasional fine sand seams, brown and gray. No recovery, pushed small cobble through sample interval.	0	4 5 5 9	10		
25			S-5		4	7 11 7 5	18		
30									

Notes:

Preliminary

R.W. Gillespie & Associates, Inc.
Geotechnical Engineering•Geohydrology•Materials Testing Services

Boring Log: B-101
Total Depth: 76
Sheet 2 of 3

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 6'

RWG&A Project No. 767-42
Surface Elevation: ()
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
30			S-6	Becomes very soft.	20	WOR WOR WOR WOR	0		
35									
40									
45									
50									
			S-7	SILTY SAND WITH GRAVEL (SM); Dense, wet, fine sand, little silt, few fine gravel, gray.	21	8 17 3 20	20		
55									
60									

Notes:

Preliminary

R.W. Gillespie & Associates, Inc.
Geotechnical Engineering•Geohydrology•Materials Testing Services

Boring Log: B-101
Total Depth: 76
Sheet 3 of 3

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 6'

RWG&A Project No. 767-42
Surface Elevation: ()
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
60				Top of bedrock, began rollercone drilling.					
65									
70									
75									
				Bottom of Exploration at 76'; Refusal at 59.5'.					
80									
85									
90									

Notes:

Preliminary

R.W. Gillespie & Associates, Inc.
Geotechnical Engineering•Geohydrology•Materials Testing Services

Boring Log: B-104
Total Depth (ft): 70.5
Sheet 1 of 3

Project Name: Waterfront Support Facility
RWG&A Project No. 767-42
Location: Kittery, Maine
Client: Oak Point Associates
RWG&A Representative: C. Morrell
Boring Location: As marked
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 8'

Drilling Contractor: Great Works Test Boring
Drill Rig: B 59 Truck
Driller Rep.: Pete Michaud
Date Started: 11/10/09
Date Completed: 11/11/09
Surface Elevation: ()
Drilling Method: 4-inch Tri-Cone
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0				ASPHALTIC PAVEMENT.					
				SAND (FILL); Loose, moist to wet, fine to medium sand, few silt, trace gravel and coarse sand, brown.					
5									
10				GRAVEL AND SILT (FILL); wet, gravel, with rock fill, few silt and clay, gray.					
15			S-1		6	16 10 13 4	23		
20				Drilling resistance increased, possible boulder. (20' to 22')					
			S-2	SILTY CLAY (CL); Very stiff to very soft, wet, silty clay, gray.	19	5 10 14 15	24		
25			S-3		12	4 6 6 7	12		
30									

Notes:

Preliminary

R.W. Gillespie & Associates, Inc.
Geotechnical Engineering•Geohydrology•Materials Testing Services

Boring Log: B-104
Total Depth: 70.5
Sheet 2 of 3

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 8'

RWG&A Project No. 767-42
Surface Elevation: ()
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT, %	LAB TESTS
30			FV	Field Vane: Undrained Shear Strength: Su=0.87 ksf, Residual=0.11 ksf.					
35			S-4		24	WOR WOR WOR WOR	0		
40			FV	Field Vane: Undrained Shear Strength: Su=0.71 ksf, Residual=0.22 ksf.					
			FV	Field Vane: Undrained Shear Strength: Su=0.69 ksf, Residual=0.22 ksf.					
45			FV	Field Vane: Undrained Shear Strength: Su=0.76 ksf, Residual=0.22 ksf.					
			FV	Field Vane: Undrained Shear Strength: Su=0.76 ksf, Residual=0.22 ksf.					
50			S-5	Occasional fine sand seams.	19	WOH WOH 10 10	10		
				SILTY SAND WITH GRAVEL (SM); Dense, wet, fine sand, little silt, few fine gravel, gray.					
55				Top of bedrock, began rollercone drilling.					
60									

Notes:

Preliminary

R.W. Gillespie & Associates, Inc.
Geotechnical Engineering•Geohydrology•Materials Testing Services

Boring Log: B-104
Total Depth: 70.5
Sheet 3 of 3

Project Name: Waterfront Support Facility
Location: Kittery, Maine
Client: Oak Point Associates
Observed Water Depth: 8'

RWG&A Project No. 767-42
Surface Elevation: ()
Casing Type: 4 inch driven

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT N BLOWS PER FT.	MOISTURE CONTENT, %	LAB TESTS
60									
65									
70									
				Bottom of Exploration at 75'; Refusal at 53'					
75									
80									
85									
90									

Notes:

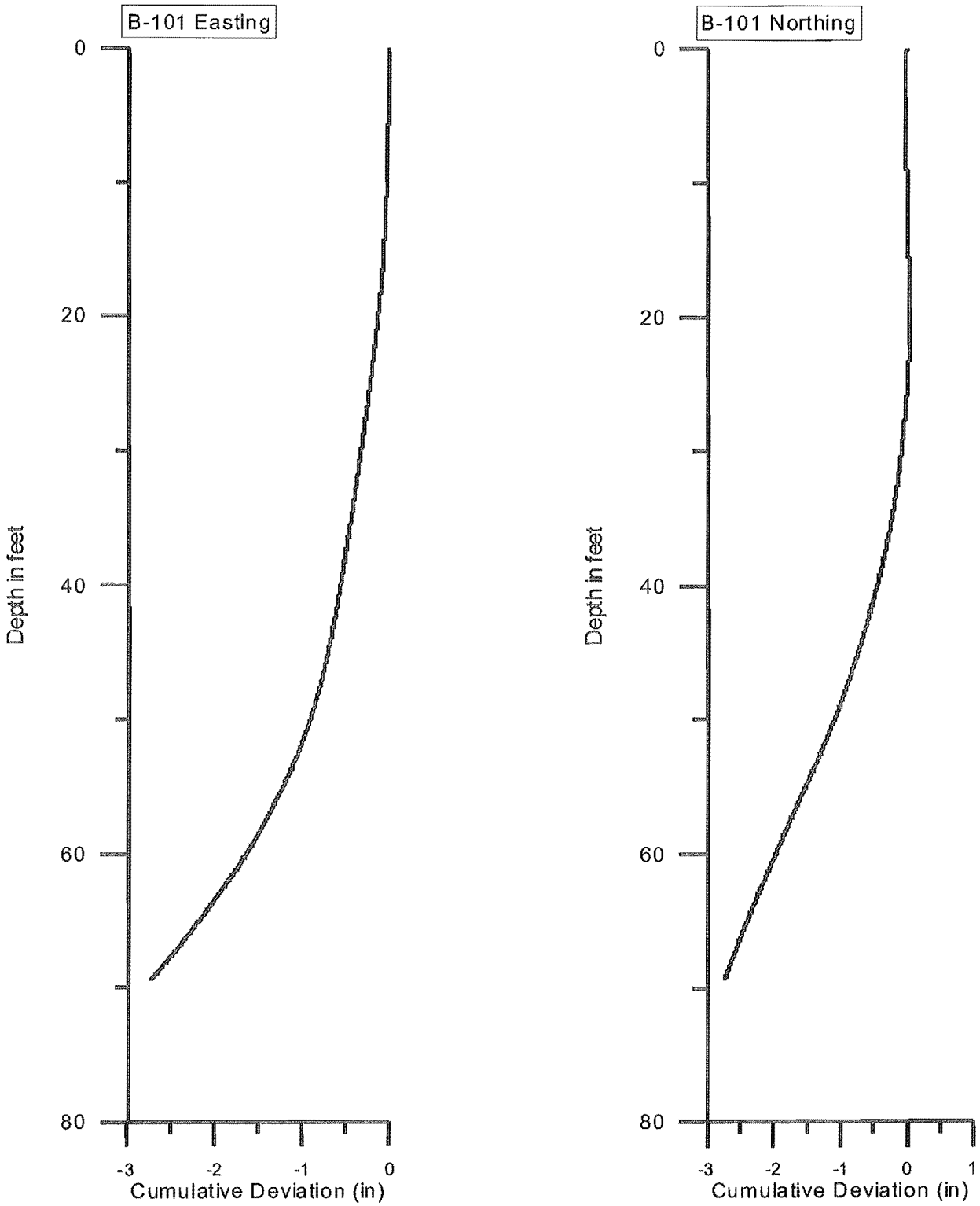
Preliminary

APPENDIX 3

DEVIATION DATA

Crosshole Seismic Survey
Building 174
Portsmouth Naval Shipyard
File 09VD28 December, 2009

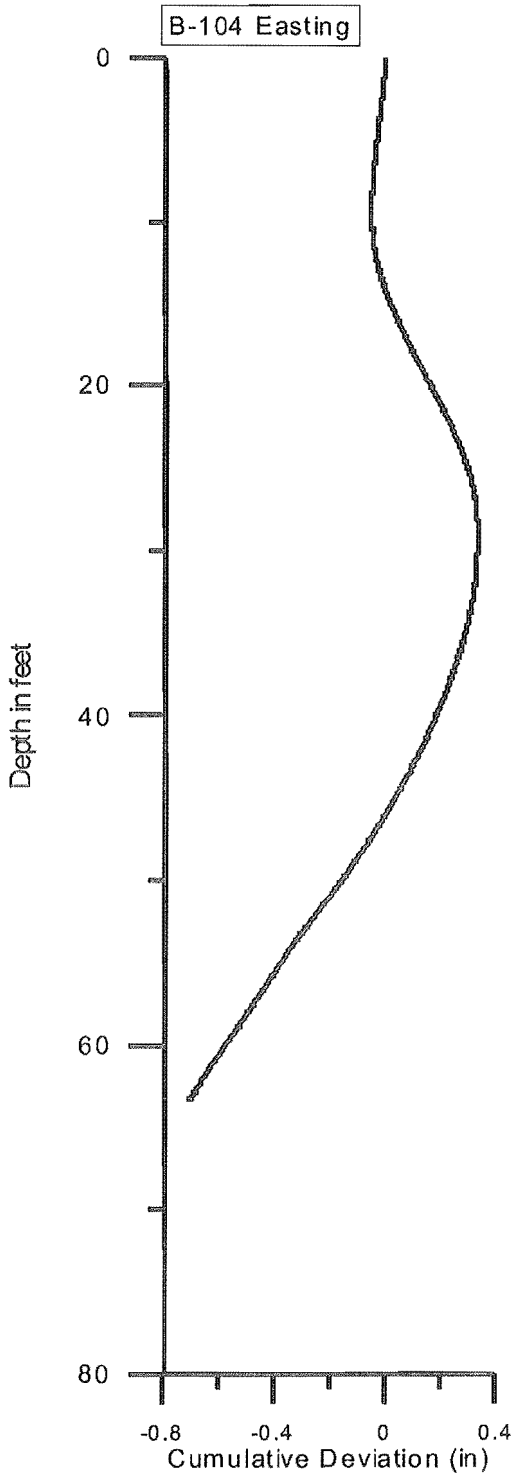
HAGER-RICHTER
GEOSCIENCE, INC.

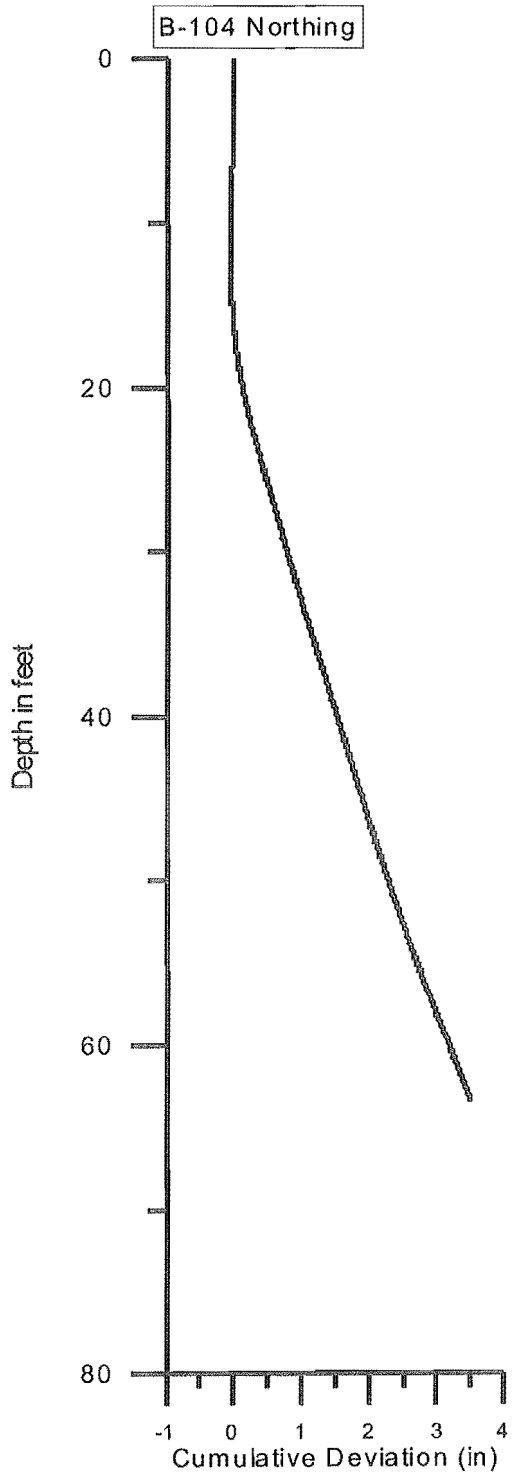


Deviation Survey, Boring B-101.

Crosshole Seismic Survey
Building 174
Portsmouth Naval Shipyard
File 09VD28 December, 2009

HAGER-RICHTER
GEOSCIENCE, INC.





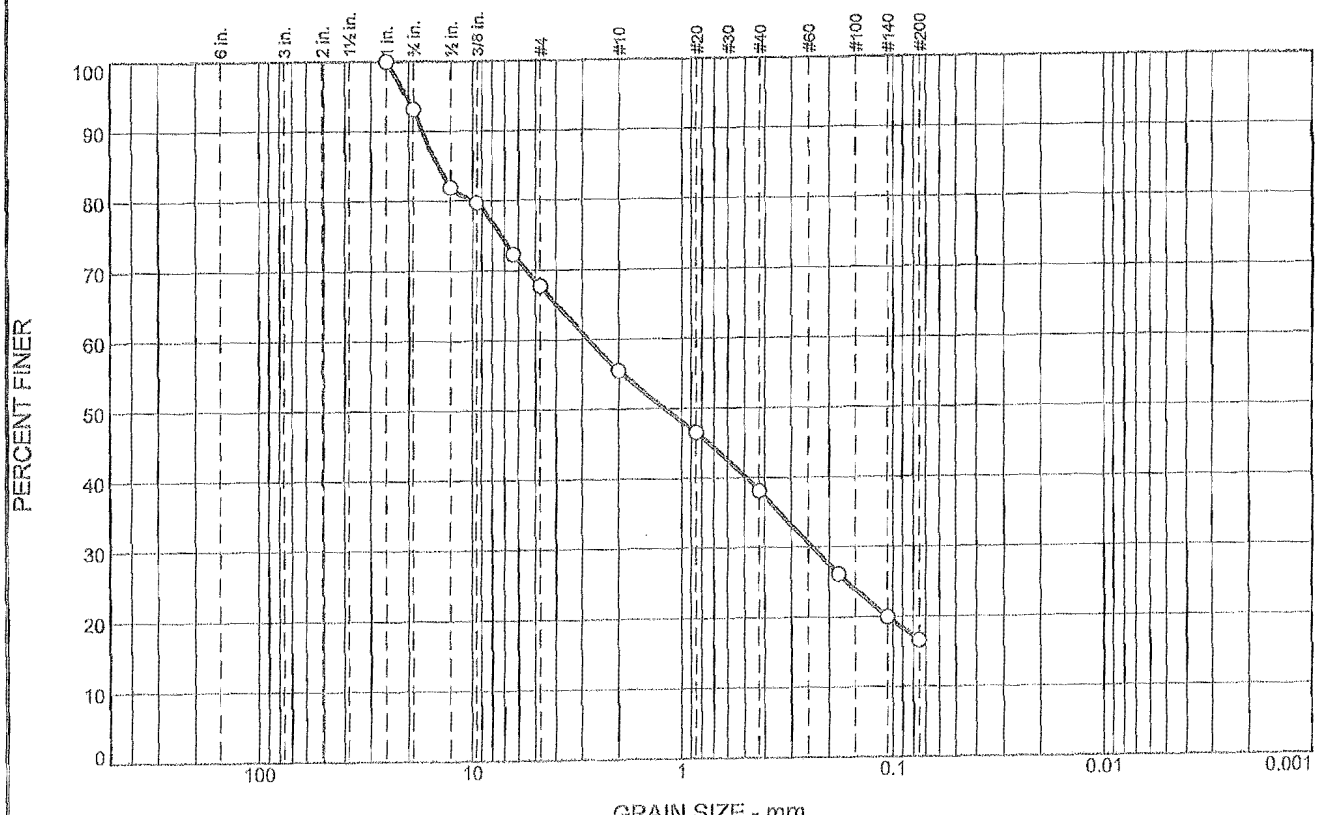
Deviation Survey, Boring B-104.

APPENDIX D

LABORATORY TESTING

Geotechnical Evaluation
Waterfront Support Facility - Portsmouth Naval Shipyard
Kittery, Maine

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.9	25.4	12.2	17.4	21.5	16.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	93.1		
1/2"	82.0		
3/8"	79.7		
1/4"	72.3		
#4	67.7		
#10	55.5		
#20	46.5		
#40	38.1		
#80	26.1		
#140	20.0		
#200	16.6		

* (no specification provided)

Soil Description

silty sand with gravel

Atterberg Limits

PL= np LL= nv PI= np

Coefficients

D_{85}= 14.5843 D_{60}= 2.7952 D_{50}= 1.1955
D_{30}= 0.2396 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-1-b

Remarks

Moisture Content:6.4%

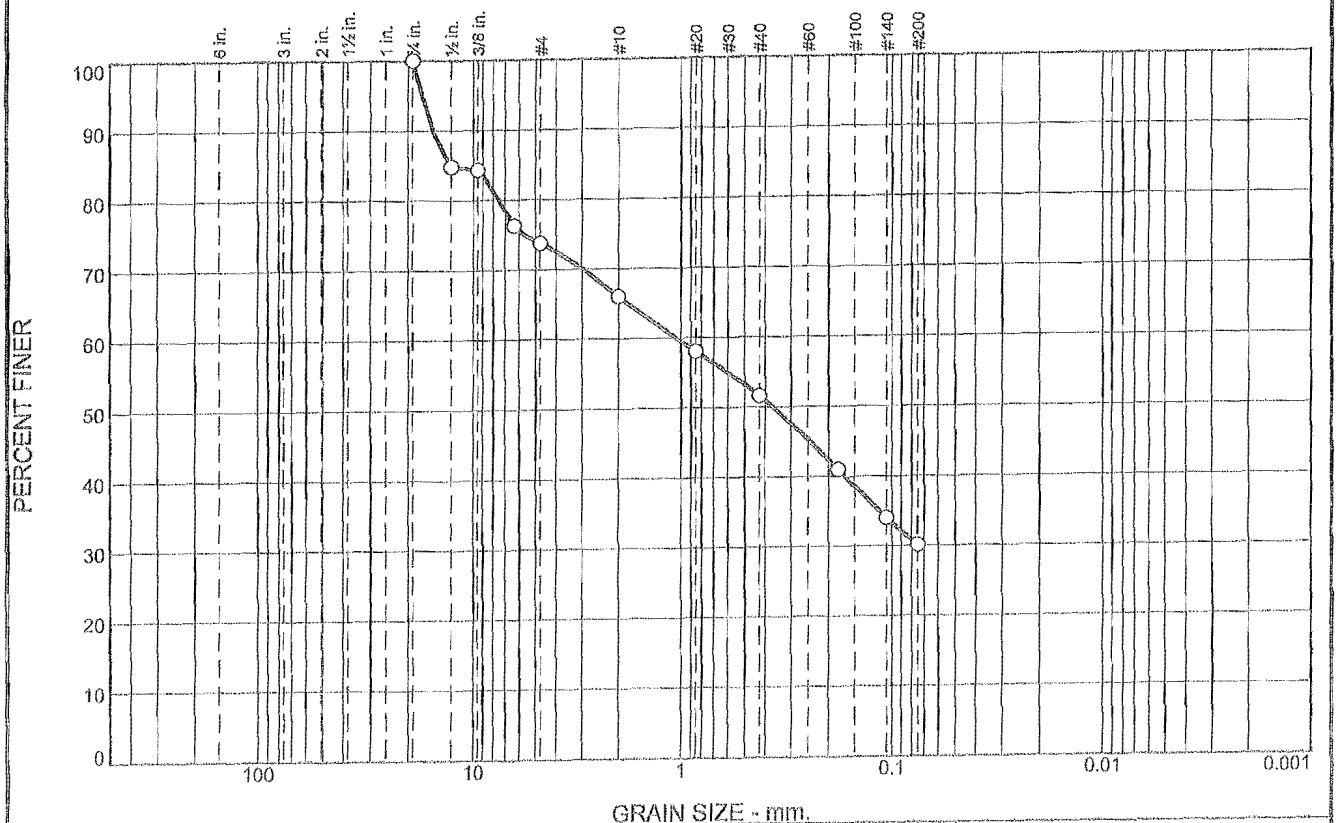
Sample No.: S-1 **Source of Sample:** B-1 **Date:** 6/12/09
Location: Kittery, Maine **Elev./Depth:** 1' to 3'

R.W. Gillespie & Associates, Inc.
Saco, Maine

Client: Oak Point Associates
Project: MCON Waterfront Support Facility
Project No: 767-42 **Figure** 10807A

Tested By: JJH **Checked By:** MTG

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	26.2	7.8	14.3	21.6	30.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	84.8		
3/8"	84.4		
1/4"	76.4		
#4	73.8		
#10	66.0		
#20	58.1		
#40	51.7		
#80	41.0		
#140	34.1		
#200	30.1		

* (no specification provided)

Soil Description

silty sand with gravel

Atterberg Limits

PL= np LL= nv PI= np

Coefficients

D_{85}= 12.8668 D_{60}= 1.0567 D_{50}= 0.3650
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Moisture Content:10.2%

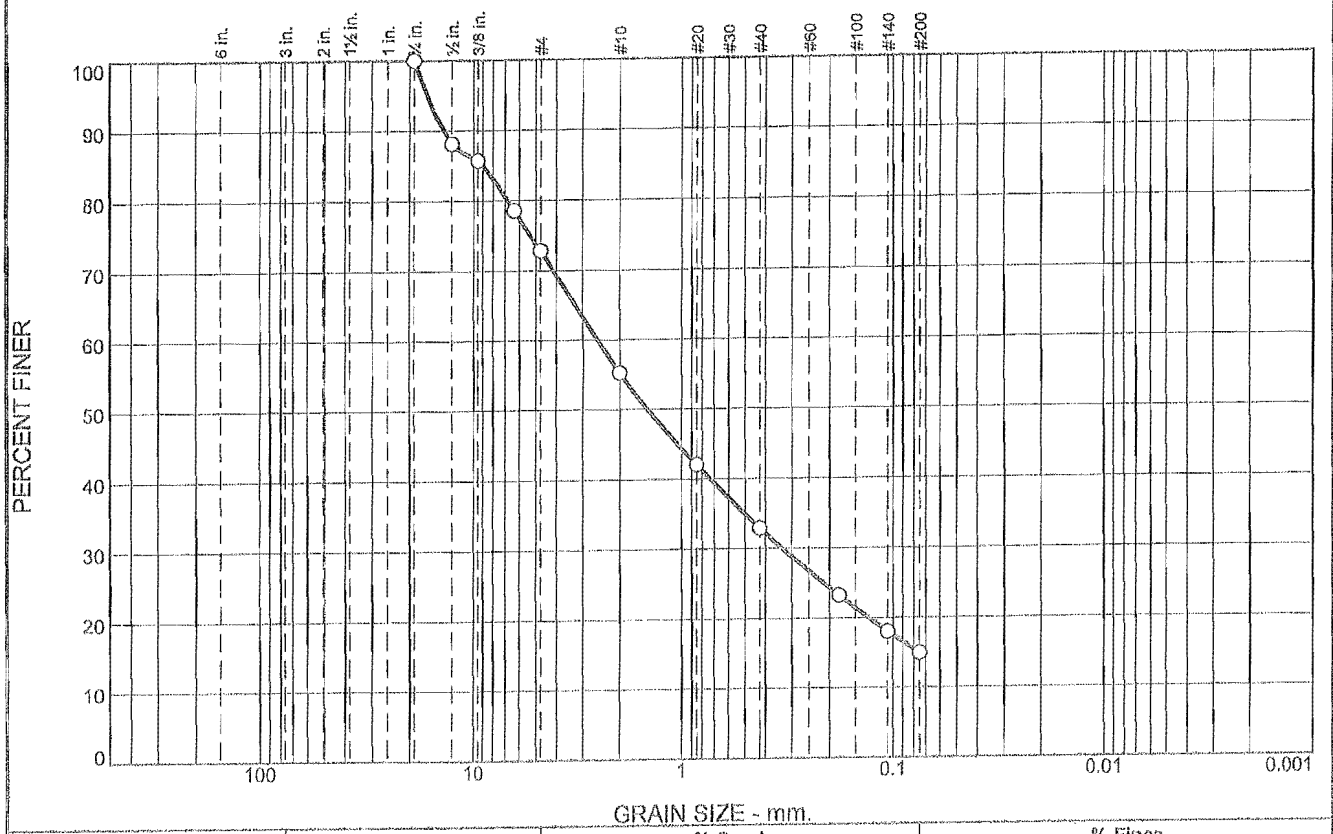
Sample No.: S-1 **Source of Sample:** B-8 **Date:** 6/12/09
Location: Kittery, Maine **Elev./Depth:** 1' to 3'

R.W. Gillespie & Associates, Inc.
Saco, Maine

Client: Oak Point Associates
Project: MCON Waterfront Support Facility
Project No: 767-42 **Figure** 10807B

Tested By: JJH **Checked By:** MTG

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	27.1	17.6	22.4	18.0	14.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	88.1		
3/8"	85.8		
1/4"	78.6		
#4	72.9		
#10	55.3		
#20	42.1		
#40	32.9		
#80	23.3		
#140	18.0		
#200	14.9		

* (no specification provided)

Soil Description

silty sand with gravel

Atterberg Limits

PL= np LL= nv PI= np

Coefficients

D_{85}= 8.9182 D_{60}= 2.5511 D_{50}= 1.4679
D_{30}= 0.3328 D_{15}= 0.0756 D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-1-b

Remarks

Moisture Content:34.3%

Sample No.: S-1 **Source of Sample:** B-13 **Date:** 6/12/09
Location: Kittery, Maine **Elev./Depth:** 5' to 7'

R.W. Gillespie & Associates, Inc.
Saco, Maine

Client: Oak Point Associates
Project: MCON Waterfront Support Facility
Project No: 767-42 **Figure** 10807C

Tested By: JJH **Checked By:** MTG

MOISTURE DETERMINATIONS

Project Name: MCON Waterfront Support Facility
Project No. 767-42

Lab No. 10807
Date: June 12, 2009

BORING NO.	B-1	B-1	B-1	B-1			
SAMPLE NO.	S-2/5'-7'	S-3/7'-9'	S-4/15'-17'	S-5/20'-22'			
TARE No.	M-3	15	M-1	1			
Wt of Dish + Wet Soil	174.8	206.5	252.8	204.7			
Wt of Dish + Dry Soil	166.4	193.6	227.6	194.8			
Wt. of Tare	92.2	92.7	92.2	96.8			
Wt. of Water	8.4	12.9	25.2	9.9			
Wt. Of Dry Soil	74.2	100.9	135.4	98.0			
Percent Moisture	11.3	12.8	18.6	10.1			

BORING NO.	B-7	B-7	B-7	B-7	B-7	B-7	
SAMPLE NO.	S-1/1'-3'	S-2/5'-7'	S-3/7'-9'	S-4/10'-12'	S-5/12'-14'	S-6/15'-17'	
TARE No.	17	M-4	14	10	M-4	47	
Wt of Dish + Wet Soil	197.4	243.3	221.4	212.6	131.7	195.8	
Wt of Dish + Dry Soil	189.6	221.8	205.4	192.5	128.7	181.8	
Wt. of Tare	94.0	92.2	94.0	96.5	92.3	94.1	
Wt. of Water	7.8	21.5	16.0	20.1	3.0	14.0	
Wt. Of Dry Soil	95.6	129.6	111.4	96.0	36.4	87.7	
Percent Moisture	8.2	16.6	14.4	20.9	8.2	16.0	

BORING NO.	B-12	B-12	B-12	B-12			
SAMPLE NO.	S-1/5'-7'	S-2/10'-12'	S-3/15'-17'	S-4/17'-19'			
TARE No.	13	11	55	M-6			
Wt of Dish + Wet Soil	192.4	130.2	189.5	173.2			
Wt of Dish + Dry Soil	167.2	120.1	151.8	154.6			
Wt. of Tare	94.1	92.6	92.5	94.0			
Wt. of Water	25.2	10.1	37.7	18.6			
Wt. Of Dry Soil	73.1	27.5	59.3	60.6			
Percent Moisture	34.5	36.7	63.6	30.7			

Checked by: Walter T. Gillespie

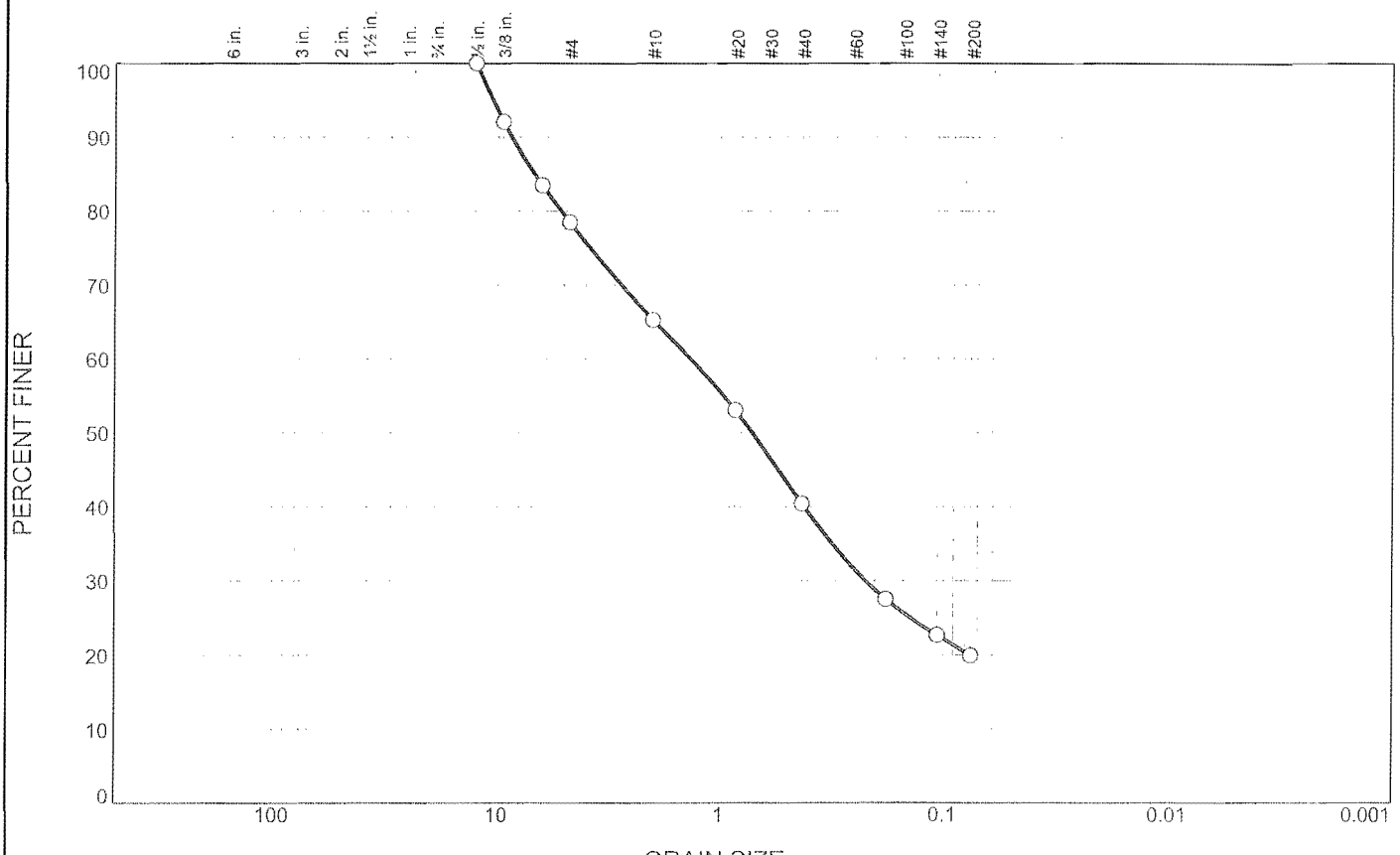
R.W. GILLESPIE & ASSOCIATES, INC.

86 Industrial Park Road, Suite 4
Saco, Maine 04072

200 International Drive, Suite 170
Portsmouth, NH 03801

P.O. Box 289
Augusta, Maine 04332

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	21.5	13.2	24.9	20.5	19.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	92.1		
1/4"	83.5		
#4	78.5		
#10	65.3		
#20	53.1		
#40	40.4		
#80	27.6		
#140	22.7		
#200	19.9		

* (no specification provided)

Soil Description

silty sand with gravel

Atterberg Limits

PL= np LL= nv PI=

Coefficients

D_{85}= 6.8715 D_{60}= 1.3523 D_{50}= 0.7125
D_{30}= 0.2201 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-1-b

Remarks

Moisture Content: 9.9%

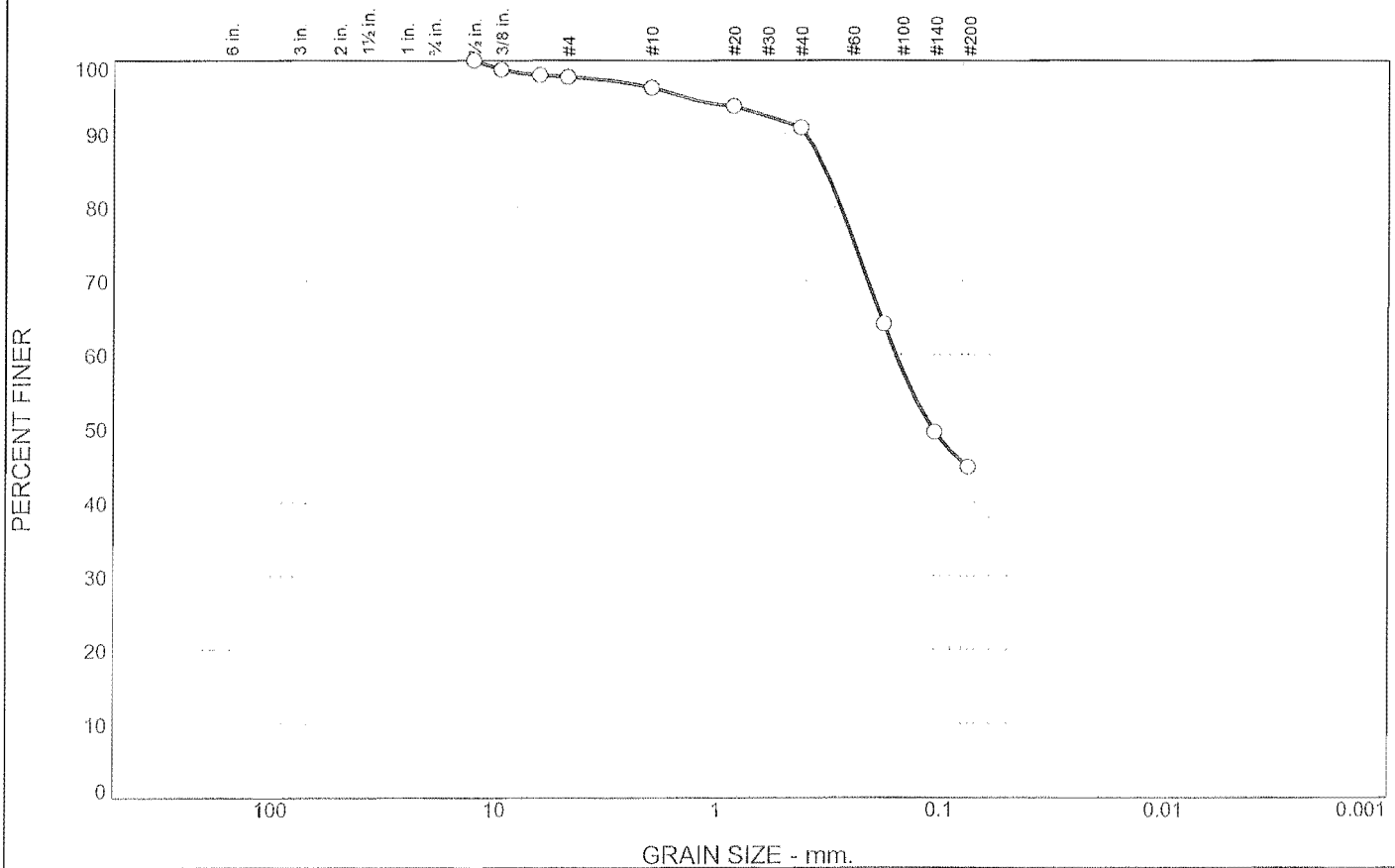
Sample No.: S-1 **Source of Sample:** B-2 **Date:** 12/29/09
Location: Kittery, ME **Elev./Depth:** 5'-7'

R.W. Gillespie & Associates, Inc.
Saco, Maine

Client: Oak Point Associates
Project: MCON P-268
Project No: 767-42 **Lab No.** 11081a

Tested By: JJH **Checked By:** MTG MTG

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.3	1.4	5.4	46.1	44.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	98.8		
1/4"	98.0		
#4	97.7		
#10	96.3		
#20	93.8		
#40	90.9		
#80	64.2		
#140	49.6		
#200	44.8		

* (no specification provided)

Soil Description

silty sand

Atterberg Limits

PL= NP LL= NV PI=

Coefficients

D_{85}= 0.3299 D_{60}= 0.1587 D_{50}= 0.1085
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

Miosture Content: 21.9 %

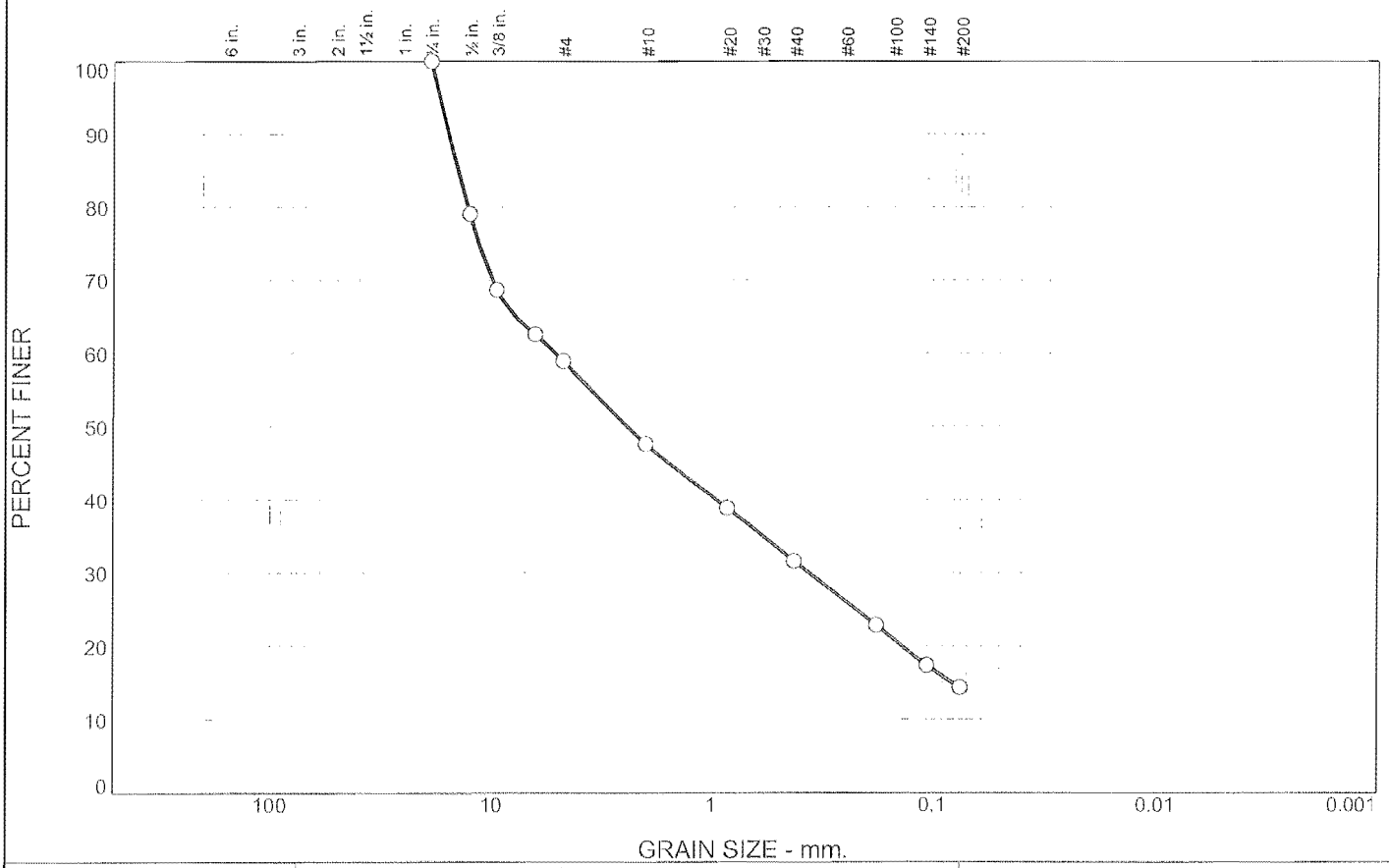
Sample No.: S-1 **Source of Sample:** B-5 **Date:** 12/29/09
Location: Kittery, ME **Elev./Depth:** 5'-7'

R.W. Gillespie & Associates, Inc.
Saco, Maine

Client: Oak Point Associates
Project: MCON P-268
Project No: 767-42 **Lab No.** 11081b

Tested By: JJH **Checked By:** MTG MTG

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	41.1	11.3	16.0	17.2	14.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	79.1		
3/8"	68.7		
1/4"	62.6		
#4	58.9		
#10	47.6		
#20	38.9		
#40	31.6		
#80	22.9		
#140	17.4		
#200	14.4		

* (no specification provided)

Soil Description

silty sand with gravel

Atterberg Limits

PL= np LL= nv PI=

Coefficients

D_{85}= 14.3858 D_{60}= 5.1509 D_{50}= 2.4319
D_{30}= 0.3636 D_{15}= 0.0807 D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-1-b

Remarks

Moisture content: 11.1%

Sample No.: S-1 **Source of Sample:** B-9 **Date:** 12/29/09
Location: Kittery, ME **Elev./Depth:** 5'-7'

R.W. Gillespie & Associates, Inc.
Saco, Maine

Client: Oak Point Associates
Project: MCON P-268
Project No: 767-42 **Lab No.** 11081c

Tested By: JJH **Checked By:** MTG MTG

2011 GEOTECHNICAL ENGINEERING SERVICES FOR STRUCTURAL SHOPS ADDITION

Pennoni

GEOTECHNICAL ENGINEERING SERVICES

Structural Shops Addition – Portsmouth Naval Shipyard

Kittery, ME

Prepared For:

Ewing Cole architects
Federal Reserve Bank Building
100 N. 6th Street
Philadelphia, PA 19106-4590

Prepared By:

Pennoni Associates Inc.
2041 Avenue C, Suite 100
Bethlehem, PA 18017

May 25, 2011

Craig B. St. Peter, PE

ECCF 1003

Pennoni

May 25, 2011

ECCF 1003

Mr. Peter J. Welsh, PE, SE
Principal, Director of Structural Engineering
Ewing Cole Architects
Federal Reserve Bank Building
100 N. 6th Street
Philadelphia, PA 19106-4590

RE: Geotechnical Engineering Services
Structural Shops Addition
Portsmouth Naval Shipyard
Kittery, ME

Mr. Welsh:

We are pleased to submit our geotechnical engineering report for the proposed project. Work was initiated in general accordance with the scope of work presented in our proposal and your authorization to proceed.

We trust that the information presented in this report is what you require at this time and we thank you for the opportunity to assist you with this project. If you have any questions, or if you need any further assistance with this project, please contact this office at your earliest convenience.

Respectfully yours,

PENNONI ASSOCIATES INC.

Edward J. Sander
Vice President
Chief Geotechnical Engineer

Craig B. St Peter, PE
Principal Engineer

Pennoni

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APPENDIX A – Field Data

Geotechnical Boring Logs	GTB-101 through GTB-111;
Geoprobe Logs	GP- 114 through GP-116; GP-119 through GP-121
Environmental Boring Logs	TB-113, TB-117, TB-118, TB-122, TB-124 and TB-125
GeoConcepts Engineering Inc Boring Logs	B-1 through B-17A
Test Boring Location Plan	Drawing TB-1
Estimated Top of Rock Contour Map	Drawing TOR - 1

APPENDIX B – Laboratory Data

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1. INTRODUCTION

1.1 PROPOSED CONSTRUCTION

The purpose of this project is to consolidate and improve the functions of the Structural Shop Facilities and Operations at the Portsmouth Naval Shipyard located in Kittery, Maine. This project will be divided into two distinct phases that may occur simultaneously or separately. Task P-266, Structural Shops Addition - Phase 1, will relocate and consolidate the Sheet Metal Shop operations from Building 75 into the southern portion of Building 76. Task P-266 includes the partial demolition of Building 76 and Building #46 Shredder Building; the remaining LAN equipment slab will require underpinning and a new enclosure. Task P-266 also includes the addition of an Annex which replaces the demolished portion of Building 76 and infills a portion of Ridgeley Street between Buildings 76 and 92. Task P-326, Consolidation of Structural Shops - Phase 2, will serve to relocate and consolidate the Welding and Forge / Heat Treat Shop operations in the northern portion of Building 76. Task P-326 includes the partial demolition of Building 76 and the addition of an Annex which replaces the demolished portion of Building 76 and infills a portion of Ridgeley Street between Buildings 76 and 92. Renovations to Building 92 are planned as part of a separate special project, RM 09-3802 Repair and Energy Improvements for Structural Shop. RM 09-3802 will include the addition of a steel framed mezzanine and the relocation of large/heavy pieces of equipment within Building 92. The new additions will be separated from remaining existing Buildings 76 and 92 by expansion joints.

The existing structures and resulting proposed structure are 1-story steel frame buildings with masonry non-load bearing walls. Anticipated column loads are not expected to exceed 150 to 300 kips; wall loads may be up to 4 klf. New floor slabs are anticipated to be concrete, constructed on-grade at the same elevations as existing slabs. Floor loads are not expected to be more than 250 psf in most areas, but could be higher under equipment.

1.2 OBJECTIVES

Our objectives were to determine subsurface conditions within the area of the proposed structure, evaluate these conditions with respect to the proposed construction, and present our conclusions and recommendations regarding:

- design frost depth;
- recommendations for foundation design, including discussion of alternate solutions if applicable;
- "general procedure" soil Site Class based on applicable IBC requirements;
- slab-on-grade design;
- ground water conditions and their impact on design and construction;
- removal or treatment of objectionable material;
- rock excavation, if necessary;
- discussion of potential for consolidation and/or differential settlements of substrata encountered;
- use and treatment of in-situ materials for controlled fill;
- quality assurance and field-testing and inspection during construction

2. FIELD AND LABORATORY WORK

2.1. FIELD WORK

2.1.1 Previous Subsurface Exploration

A preliminary subsurface exploration was conducted in 2004 by GeoConcepts Engineering, Inc. (GCEI) that included seventeen borings in and around the existing structures including the area(s) of proposed new construction. The boring locations are presented on the Boring Location Plan, Drawing TB-1, presented in Appendix A. The boring data from the GeoConcepts report is presented in Appendix A.

2.1.2 Current Scope

An additional 17 borings and 6 geoprobes were drilled as part of this study at the approximate locations presented on Drawing TB-1. The recent boring locations were mutually selected by Pennoni Associates Inc. (PAI) and EwingCole personnel; the locations were established in the field by PAI personnel. The borings were advanced using hollow-stem augers. Soil samples from the test borings were obtained in general accordance with ASTM D 1586 using a manually operated hammer (rope and cat-head); the standard penetration test (SPT) values reported on the logs are uncorrected. Rock samples were obtained in accordance with ASTM D 2113.

Our E. Sander, Director of Geotechnical Services directed the field work; Dennis Giustra, PE Senior Engineer observed the field exploration operations.

2.2. LABORATORY WORK

The soil samples collected during our field work were delivered to our laboratory. Representative samples were selected and tested to determine moisture contents, and gradation and volumetric characteristics of the subsoils. Laboratory testing results and a list of testing procedures are presented in Appendix B.

3. SITE CHARACTERISTICS

3.1 LOCATION AND SURFACE FEATURES

The project site is located at the Portsmouth Naval Shipyard in Kittery, ME. The new additions will encompass areas between Buildings 92 and 76 as well as an area currently within the footprint of Building 76 identified as Building 46 and within the interior of Building 92. The subject site is bordered on the north by Constitution Square, on the east by Creighton Street and then Building 75, on the south by Portsmouth Square, and an open area to the west of Building 92.

The project site currently consists of existing buildings and roadways; railway tracks traverse the surrounding roadways. The topography in the area is relatively flat. Evidence of buried utilities was observed throughout the project area.

3.2 GEOLOGY

The project site is located within Northern Appalachian Province of Maine. Available geological data indicate that the subject site is underlain by rock belonging to the Kittery Formation reportedly consisting of metamorphosed sedimentary and volcanic rocks that have been subjected to severe folding and faulting with intrusions of granitic rocks. Based on examination and identification testing (hardness, acid reaction, etc.) of the rock samples obtained a it is our professional opinion the site is underlain by phyllite.

3.3 SUBSOILS

The borings disclosed surface layers consisting of plain cement concrete and bituminous concrete pavement. At the GCEI boring locations the concrete was found to vary from 7.5 to 10 in. thick; the bituminous concrete pavement was determined to vary from 3 to 6.5 in. thick. The recent PAI borings and geoprobes revealed the bituminous concrete pavement varied from 2.5 to 5.5 in. thick; the concrete was found to vary from 6 to 12 in. thick. The underlying subsoils generally consist of a fill deposit placed to extend the original shoreline. The fill is noted to consist mostly of sand and gravel size rock fragments in varying amounts with inclusions of concrete, asphalt, wood, ash, etc.; layers of each are interbedded throughout. To remain consistent with the GCEI report and soil classifications, we have separated the soils encountered in the PAI borings into strata with designations used by GCEI, where feasible.

STRATUM	DESCRIPTION
A	FILL - Gravel and Sand in varying proportions, trace or some silt, with concrete, brick, asphalt, ash, wood, etc.
B1	Firm to hard silt and/or clay (Alluvium)
B2	Dense to very dense Sand, trace or some silt/silty clay (Alluvium)
C1	Very dense Sand, some rock fragments, trace or some silt (Decomposed Rock)
C2	Quartzite

Delineation between the fine grained soils of the fill stratum and the fine grained alluvium soils of Stratum B1 is in some instances difficult to ascertain. Where questionable, engineering judgment has been used based on the SPT values and descriptions. As indicated above, ash and other debris was encountered in the fill; petroleum odors were also noted in several borings. Environmental sampling, testing and evaluation is being conducted by Pennoni; the results and findings of that study will be presented in a separate report.

Refusal to further penetration of the drilling/sampling tools was encountered in the GCEI and PAI borings/probes at depths varying from 2 to approximately 25 ft below grade, where encountered. These depths correspond approximately to Elev. 109.5 to Elev. 84.3, respectively. Refusal is typically inferred as top of rock. Ten feet of rock was cored at Boring B-8A (GCEI) and Borings GTB 101 and GTB 102; 5 ft of rock was cored in Boring GTB-108. Core recoveries were noted to be high; thus, it is our professional opinion that the data disclosed is indicative of top of rock and not boulders. An estimated approximate top of rock contour map (Drawing TOR - 1) was developed based on our interpretation of the available data and is presented in Appendix A.

3.4 GROUND WATER

Observations for ground water were made in each boring during sampling and shortly after completion of drilling, but prior to rock coring. These readings indicate the water level varies from 8 to 12 ft below the ground surface. Water level readings obtained by GCEI indicate the water level varies from 2 to 13 ft below existing grades. These observations are for the times and locations noted and may not be indicative of seasonal and daily fluctuations in ground water levels. Since the project is adjacent to a body of water affected by tides, tidal fluctuations must be considered for any excavation.

4. ANALYSES AND RECOMMENDATIONS

4.1 GENERAL

Based on our evaluation of available field exploration data and laboratory testing results, we conclude that construction of the proposed additions/modifications is feasible. The subsurface conditions are variable throughout the project area. The existing fill (Stratum A) is mostly granular (sand and gravel with varying amounts of clay/silt), but also contains construction debris including brick, concrete, ash, and asphalt. Additionally, petroleum based products were noted in many of the borings. These soils and the soils of Stratum B1 are considered unsuitable for the support of foundations. It is our professional opinion that the proposed new structures should be founded on deep foundations bearing on/in the underlying rock formation. It is our opinion because of existing structures, utilities, etc. that the most cost effective foundations would be micro-piles socketed into the rock.

Shallow water and/or seepage should be expected in shallow excavations. The borings indicate the water could be petroleum contaminated which will require handling/treatment in accordance with appropriate regulations. Rock was encountered as shallow as 2 ft below existing grade; rock excavation should be expected for new and/or relocated utilities as well as new foundations under certain circumstances.

On-site inert soils can be re-used in compacted fills provided they meet the requirements established in section 4.2 below. The laboratory testing indicates the existing fill appears to be predominantly granular gravel and sand with construction debris. The testing results indicate the largest particle size is on the order of 1 inch. The gradation tests completed by Pennoni indicate the Stratum A soils are fairly uniform in consistency with only slight variability. If particles larger than that encountered in the borings are encountered in excavations, screening of those soils might be required.

Total settlements less than 1.0 in. and differential settlements less than 0.50 in. are expected if the recommendations presented herein are followed.

The borings disclosed subsurface conditions generally described according to the 2009 International Building Code (IBC) as having a soil-profile corresponding to Site Class C – very dense soil and/or soft rock profile.

4.2 EARTHWORK

It is our understanding that minimal general grading will occur as part of this project, with the exception of filling the below-grade area of Building 46. Most earthwork is expected to be related to backfilling of foundation elements and utility trenches. Some minor site filling may occur as part of obtaining floor subgrade elevations.

Before construction of new foundations, ground floor slabs, and paving and before the construction of any new fills, the existing bituminous concrete, concrete, and railway remnants must be removed from within the areas of proposed construction. Pavement millings (well graded with a maximum particle size of 2 in.) can be considered for use in compacted load bearing fills not exposed to precipitation provided there are no environmental hazards associated with the materials or regulatory restrictions. Since ground water was noted to be relatively shallow, a vapor barrier beneath floor slabs should be considered. If slab edge curling is not a concern, the vapor barrier can be provided immediately beneath the slab. If curling of slab edges and subsequent spalling from equipment movement might impact the performance of the slab long-term, we recommend placing the vapor barrier below a drainage layer placed immediately beneath the slab. The use of the pavement millings as a base course (in place of stone aggregate) below the slab will assist with creating a vapor barrier. The use of recycled materials will also help the project with LEED certification. The millings can also be considered in backfills in utility trenches and around foundation units. The millings should not be used where drainage is a requirement. Existing utilities located within the proposed construction areas should be abandoned and relocated outside the proposed final footprint. Any existing utility line 4 in. in diameter or larger abandoned in-place should be grouted or the line should be removed and the trench appropriately backfilled.

Exposed subgrades should be thoroughly proof-rolled (where feasible due to space constraints), in the presence of a qualified representative of a geotechnical engineering firm, using a tri-axle truck loaded with soil or aggregate, or equivalent equipment approved by the engineer in an attempt to disclose unstable surface areas. During proofrolling, any unsuitable area found should be stabilized by excavating and replacing those soils with suitable soil (adequately compacted), by adjusting the moisture content of the subgrade soils and compacting them, or by other methods (placing a geotextile and stone layer, etc.). Once localized, shallow unsuitable conditions are stabilized, exposed subgrades within building footprints should be thoroughly densified with a minimum of 6 passes (3 in each direction) of a minimum 12 ton vibratory compactor under the supervision of a geotechnical engineer. The number of passes and use of vibratory equipment should be modified by the engineer if unstable conditions are occurring due to high ground water conditions.

Protect subgrades from softening, undermining, washout, or damage by rain or water accumulation. When a subgrade for foundations or floor slab has been disturbed by water, remove disturbed material to firm undisturbed material after water is brought under control. Replace disturbed subgrade in trenches with concrete or material approved by the geotechnical engineer.

Our experience and laboratory testing results indicate that the on-site soils of Strata A, B2 and C1 can be reused in compacted fills based on particle size and geotechnical criterion. Excavated soils will need to be characterized for contamination as outlined in the environmental report prior to being reused in new fills. Fine grained soils of Stratum A and B1 are unsuitable for use in load bearing fills; these soils can be used in proposed landscaped areas, if present, or they must be removed from the premises. Frozen soils shall not be used. The Pennoni laboratory test results indicate that the near surface soils of Stratum A are generally granular with the percent passing the No. 200 sieve varying from 3 to 37% with the largest particle size being approximately 1 inch. The moisture contents of the laboratory tested soils were determined to vary approximately between 1 and 32%; the higher moisture contents correspond to those soils with a higher percentage of fines passing the No. 200 sieve. Segregating soils with different gradations or blending excavated soils to provide a more consistent fill matrix might be required. Deleterious materials (wood, slag) that might compromise the integrity of the fill must be removed. Adjusting the moisture contents of the on-site soils before use in any compacted fills and/or subgrade preparation should be expected. During warm weather periods, this can be accomplished by aerating the soils using a disc harrow, the teeth on front-end loaders, rakes, etc.; this technique may not be feasible however because of space constraints. During wet weather periods not conducive to air drying, reducing the moisture content of the soils will most likely require soil additives such as lime or cement. The contractor should prepare a submission related to the application rate and degree of moisture content and moisture-density relationship corresponding to different application rates. The proper compaction equipment and placing the soil in thin layers should be considered when preparing earthwork schedules. **Initiating earthwork during climatic periods not conducive to soil drying should be avoided, if possible.**

Imported fill material, if required, should be selected from suitable borrow sources and be approved by a qualified geotechnical engineering firm well in advance of fill construction. Granular fill should consist of well-graded material with not more than 20 percent passing the No. 200 sieve and have a plasticity index not greater than 8 percent. Excavated rock that has been crushed to a usable size (i.e. AASHTO No. 3 Aggregate) may also be used in compacted load bearing fills. Fill having USCS classifications of GW, GP, GM, GC, SW, SP, SM, and SC is considered acceptable.

Fine-grained (silt/clay) used in landscaped areas and granular fills should be placed in layers not exceeding 6 in. and 10 to 12 in. thick, respectively and at a moisture content within 2% +/- of the laboratory determined optimum moisture content. This criterion might be adjusted by a geotechnical engineer in the field depending on the conditions present at the time of construction, on the compaction equipment used, and on the fill material selected. Fills for support of foundations/floor slabs and pavements should be compacted to at least 95 percent of the laboratory determined maximum dry density, ASTM D 1557. Backfills that are compacted using small hand operated equipment may have difficulty achieving this requirement. In the

event the degree of compaction cannot be attained, a comparison of maximum dry unit weights determined in accordance with ASTM D 698 and ASTM D 1557 at variable degrees of compaction will be required to assess whether the compaction requirements can be modified accordingly. Fills should extend a minimum of 5 ft beyond the exterior edge of a loaded area and have side slopes not steeper than 2 horizontal to 1 vertical.

New fill shall not be placed on wet, soft, muddy, or frozen subgrades. Do not fill or backfill until all debris, water, unsatisfactory soil, including frozen soils, obstructions, and deleterious materials have been removed from excavations. For fill and backfill, use excavated soils and borrow meeting the criteria specified herein, as applicable. Do not use unsuitable excavated soil. Do not backfill until foundation walls have been completed above-grade and adequately braced, waterproofing or damp-proofing applied, foundation drainage, and pipes coming in contact with backfill have been installed and work inspected and approved as required by contract documents.

Specifications should indicate that the percentage of maximum dry density attained in the field is not the only criteria to be used for assessing fill compaction. Observation of the behavior of the fill under the loads of construction equipment should also be used. If the test results indicate that the percentage of compaction is being achieved, but the soil mass is moving under the equipment, placement of additional fill should not be continued until the movement is stabilized. Otherwise, settlement of the fill will occur.

Comparison of the estimated top of rock elevations to proposed foundation and floor grades indicates that rock could impact new utility construction and foundation construction.

4.3 FOUNDATIONS

The borings disclosed highly variable depths to competent natural soils and/or rock. The soils associated with the fill deposit are not suitable for support of foundations. It is our understanding that the existing structures are supported either on footings bearing on rock or by pile foundations extending through the fill. Based on the anticipated structural loads several foundation schemes can be considered.

General

It is our understanding that at locations of some existing interior walls new shear walls and foundations may be required to resist temporary pressures resulting from lateral forces. Shallow foundations can be considered for support of these new shear walls. Footings can be designed for a net allowable bearing capacity of 3,500 psf. The subgrade soils should be tested to confirm the design bearing capacity prior to placing reinforcing steel and concrete.

New Foundations

The test borings and probes disclosed the presence of uncontrolled fill and variable subsurface conditions. The borings indicate the top of rock dips down to the west/southwest with refusal to further penetration of the drilling tools encountered at depths varying from approximately 3.5 ft to 18 ft below the ground surface. The top of rock appears to be on the order of 4 to 8 ft below grade in the central portion of the footprint, on the order of 6 to 18 ft on the northern portion of the footprint, and 8 to 14 ft below grade in the southern portion of the footprint.

Because of the highly variable subsurface conditions, supporting shallow foundations on soil is not recommended. The proposed structures/additions can be supported on spread footings bearing on rock where the bearing surface is within 6 to 8 ft below the ground surface. Isolated and continuous footings should be at least 2.5 ft square and 18 in. wide, respectively. These foundations can be designed using an allowable net rock bearing capacity up to 30 tsf; however, based on the recommendations for minimum footing sizes the contact pressures may not exceed 10 tsf. Where the footing will be supported partially on soil and rock the soil should be removed and replaced with lean concrete having an unconfined compressive strength on the order of 3,000 psi. If the rock surface beneath spread footings slopes downward at an angle steeper than 4 horizontal to 1 vertical means should be provided (dowelling, benching, etc.) to resist sliding. Temporary dewatering measures will most likely be required during foundation construction.

Based on the estimated column loads and anticipated facility constraints we recommend the new structures (building frame, interior mezzanine, and any heavy pieces of settlement sensitive equipment) be supported by Type-A mini-piles consisting of 7 in. diameter permanent steel casing with a load carrying capacity of 60 tons bearing in the underlying rock. The casing should be extended to the top of competent rock; a minimum 11.5 ft rock socket should extend into competent rock. We estimate competent bedrock will be encountered at depths ranging from 8 to 25 ft below existing ground surface elevations. The above pile details are based on the mini-pile casing being filled with a neat cement grout having a 28-day compressive strength of at least 6,000 psi and design/ultimate bond strength between grout and rock of 14.5 ksf. Higher bond strengths can be considered, but the minimum number of piles per location and an industry recommended minimum pile length of 10 ft may not warrant the higher values. An uplift and lateral capacity of 40 and 3 tons/pile, respectively, can be used for design. Battered piles with an angle of batter up to 20° from the vertical can also be considered to resist lateral loads.

A minimum center to center pile spacing of 2 ft should be maintained for grouped piles. There should be no casing joint within the upper 10 ft of the pile. The pile casing should meet tensile requirements of ASTM A252, Grade 3, except the yield strength should be a minimum of 50 to 80 ksi. Threaded pipe joints should be located at least 2 casing diameters (OD) from any splice in a reinforcing bar. Grout should be introduced into the drill hole through a tremie pipe extended to the bottom of the hole. Grout should be pumped using no excess pressure until grout with similar qualities as that being pumped exits the mouth of the casing.

The final design details including allowable capacities should be determined by a specialty contractor with adequate experience in mini-pile design and construction. Factors of safety should be at least 2 for axial compression and 3 for uplift and lateral capacities. As part of the contract the design details should be submitted for review and approval.

4.3.1 Load Tests

In accordance with Building Codes the pile foundations recommended herein will require at least 1 load test in accordance with ASTM D 1143 and/or ASTM D 3689 for axial compressive and tension, respectively. The governing load application should determine which test should be conducted. The test pile should be loaded to at least 2.5 times the design capacity. The requirement for lateral load testing in accordance with ASTM D 3966 will depend on the actual design load. Each compression and tension test pile should be equipped with two telltale rods to measure deformation during load tests in accordance with ASTM D 1143. The load test location should be selected by the geotechnical engineer. Details regarding the number, the particular method of testing, etc. should be further developed as the foundation design progresses.

The load test pile should not be a production pile if the pile/rock interface is failed during testing. No construction activity transmitting vibratory or impact loads should be permitted on the project site during load testing. The load test set-up should be protected from inclement weather (wind, rain, intense heat, sunlight, etc.), provided with lights for night-time readings, and guarded on a full-time basis. Technical details (sketch, description, etc.) of the load test set-up together with certification of the loading device, etc. should be submitted to the geotechnical engineer at least 1 week in advance of load test construction. The load test must be monitored on a full-time basis and test results analyzed by a registered geotechnical engineer.

Detrimental post-construction settlements are not expected if the recommendations presented herein are followed. The subgrade of exterior foundation units (footings, pile caps, etc.) and any other foundation unit exposed to freezing temperatures, during construction and/or the life of the structure should be established at least 48 in. below adjacent exposed grades or otherwise protected against frost action. Where the subgrade consists of sound, competent rock the foundation subgrade should be established at least 2 ft below adjacent grade. Foundation subgrades should be checked by a qualified representative of a geotechnical engineering firm to confirm conditions suitable for support of the design bearing pressure. Where an area is questionable, it should be further explored and/or remedied by removal and replacement of unsuitable material.

4.4 FLOOR SLAB(S)

The proposed ground floor slab(s) can be constructed on-grade on a properly prepared subgrade. Because of the variability of the fill type and consistency, we recommend that a modulus of vertical subgrade reaction, k_v, not exceeding 125 pci be used to design the floor slabs. A 6 in. thick granular base course should be placed beneath the slab(s) to provide a uniform bearing surface and to aid in the proper curing of the slab concrete. Pavement millings (well graded with a maximum particle size of 2 in.) can be considered for use as the base course (in place of stone aggregate) provided there are no environmental hazards associated with the materials or regulatory restrictions. Since ground water was noted to be relatively shallow in some areas, a vapor barrier beneath floor slabs should be considered. If slab edge curling is not a concern, the vapor barrier can be provided immediately beneath the slab. The use of the pavement millings as a base course below the slab will assist with creating a vapor barrier in this case. If curling of slab edges and subsequent spalling from equipment movement might impact the performance of the slab long-term, we recommend placing the vapor barrier below a drainage layer placed

immediately beneath the slab. The millings should not be used where drainage is a requirement. At least 6 in. should be maintained between the bottom of the slab(s) and the tops of the foundations to minimize the potential for slab cracking at the foundation edges or the slab(s) should be designed accordingly (adequate reinforcing) to minimize cracking. The floor slab(s) should be isolated from other structural elements of the building to allow for independent movements.

4.5 GROUND AND SURFACE WATER MANAGEMENT

The ground water observations made in the borings indicate that encountering ground water in foundation and/or utility excavations as shallow as 2 ft below existing grades should be expected. Most borings/probes indicate the water is 8 ft below existing grades or deeper, but because of tidal fluctuations variations in the reported water levels need to be considered. A review of tidal data for Kittery Point, ME indicates the water height can vary from 8 to 9 ft during any tide change. Since the affect of the tide height on the ground water level away from the shoreline is dependent on distance, soil type, density, porosity, etc. the actual change in the ground water level at the project site is expected to be considerably less than the change in tidal water height. For design purposes a variation in the ground water level of 1 to 2 ft can be considered. Based on the data disclosed by the previous study and this exploration, it is our professional opinion underslab drainage is not required.

The use of sumps and high capacity pumps should be expected to maintain stable conditions within excavations. Depending on the depth of the excavation and the length of time an excavation may need to remain open, a well-point system might be required. Since the borings/probes disclosed the presence of petroleum in the soils, ground water discharge must be handled in accordance with the applicable regulations. Recommendations for specific ground water treatment/handling will be presented in an environmental report submitted under separate cover.

During construction, surface runoff should not be allowed to contact the subsoils in foundation excavations. When moisture is added to these soils they can become unstable and lose strength. Excavations for foundations should be backfilled as rapidly as possible after excavation; while exposed to precipitation the foundation excavation should be protected against infiltration.

A foundation excavation should not be used as a detention basin or sump. During construction surface runoff should be prevented from entering or ponding in the excavation by creating soil berms or diversion swales along the perimeter if the excavation will be left open for an extended period of time. Where ponding does occur, the water should be removed immediately by pumping. Grades should then be established to prevent further ponding, subject to review by the geotechnical engineer.

4.6. EXCAVATIONS/SHORING

All excavations shall be sloped or shored in accordance with applicable OSHA and/or NAVFAC Standards. The soil parameters presented on Page 11 can be used to estimate lateral earth pressures to design below-grade structures and temporary shoring. If the top of the structure is restrained from movement, thereby preventing the mobilization of active soil pressures, the structure should be designed using the at-rest pressure coefficient, k_o. The earth pressure coefficients are based on the assumption of vertical faces, horizontal backfill, no surcharges, no surface friction, and a safety factor of 1.0. A foundation drain is recommended to be placed behind walls to relieve hydrostatic pressures.

Parameter	Existing Granular Fill	Existing Fine Grained Fill, Ash & Stratum B1 Soils	Newly Compacted Structural Fill
Unit Weight	135 pcf	125 pcf	135 pcf
Angle of Internal Friction	36°	16°	38°
Friction Factor	0.4	0.3	0.45
Cohesion	0 psf	500 psf	0 psf
k_a	0.26	0.6	0.24
k_o	0.41	0.72	0.43
k_p	3.85	1.67	4.2

If the contractor is responsible for the design of temporary or permanent retaining structures, then the contract documents should clearly require that a competent registered engineer performs the design and that satisfactory earth support is solely the contractor's responsibility. Furthermore, the contract documents should require the contractor to notify the engineer immediately if differing or unforeseen subsurface conditions are encountered during construction.

5. FURTHER GEOTECHNICAL SERVICES

To determine if soils, other materials, and ground water conditions encountered during construction are similar to those encountered in the test borings, and that they have comparable engineering properties or influences on the design of the structures, we recommend that a qualified representative of a reputable geotechnical engineering firm provide field observation services during excavation; construction of compacted fill; preparation of foundation and floor slab subgrades; and construction of foundations (footings/piles) and floor slabs.

6. LIMITATIONS

This work has been done in accordance with our authorized scope of work and in accordance with generally accepted professional practice in the fields of geotechnical and foundation engineering. This warranty is in lieu of all other warranties either expressed or implied. Our conclusions and recommendations are based on the data revealed by this exploration. We are not responsible for any conclusions or opinions drawn from the data included herein, other than those specifically stated, nor are the recommendations presented in this report intended for direct use as construction specifications. This report is intended for use with regard to the specific project described herein; any changes in loads, structures, or locations should be brought to our attention so that we may determine how they may affect our conclusions. An attempt has been made to provide for normal contingencies but the possibility remains that unexpected conditions may be encountered during construction. If this should occur, or if additional or contradictory data are revealed in the future, we should be notified so that modifications to this report can be made, if necessary. If we do not review relevant construction documents and witness the relevant construction operations, then we cannot be responsible for any problems that may result from misinterpretation or misunderstanding of this report or failure to comply with our recommendations.

APPENDICES

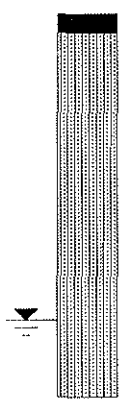
APPENDIX A

Field Data

GEOPROBE LOG
Geoprobe No.: GP-114

PROJECT STRUCTURAL SHOPS ADDITION	PROJECT NO. ECCF 1003
LOCATION	DATE 11-2-10
EXCAVATOR/OPERATOR	ELEV. 110.3
EXCAVATION METHOD HOLLOW STEM AUGERS	RECORDED BY D. GIUSTRA

DEPTH TO - Water: 8' When checked: Caving: -

ELEVATION/ DEPTH	SOIL SYMBOLS AND SAMPLERS: GRAPHIC	SAMPLE NUMBER	DESCRIPTION	REMARKS
110 – 0		S-1	6" CONCRETE 0.5	
			DRY LOOSE CONCRETE LIGHT BROWN MEDIUM TO FINE SAND SOME ROCK TO DARK COARSE TO MEDIUM SAND AND ROCK SOME GRAVEL	
105 – 5		S-2	DRY LOOSE DARK ASH FILL TO LIGHT BROWN MEDIUM SAND TO DARK COARSE SAND AND ROCK, SOME GRAVEL	
			WET LOOSE DARK COARSE SAND AND ROCK	
		S-3		
100 – 10				
95 – 15				
90 – 20				
85 – 25				
80 – 30				

Notes:

GEOPROBE LOG
Geoprobe No.: GP-115

PROJECT STRUCTURAL SHOPS ADDITION	PROJECT NO. ECCF 1003
LOCATION	DATE 11-2-10
EXCAVATOR/OPERATOR	ELEV. 110.3
EXCAVATION METHOD HOLLOW STEM AUGERS	RECORDED BY D. GIUSTRA

DEPTH TO - Water: 8' When checked: Caving: -

ELEVATION/ DEPTH	SOIL SYMBOLS AND SAMPLERS: GRAPHIC	SAMPLE NUMBER	DESCRIPTION	REMARKS
110 – 0		S-1	6" CONCRETE 0.5	
			LOOSE DRY CONCRETE LIGHT BROWN MEDIUM TO FINE SAND, SOME ROCK	
105 – 5		S-2	TOP HALF LOOSE DRY CONCRETE LIGHT BROWN MEDIUM TO FINE SAND, BOTTOM DARK COARSE SAND AND ROCK	
		S-3	WET LOOSE ROCK SOME RUNNY FINE SAND TO GRAY SILTY SAND	
100 – 10				
95 – 15				
90 – 20				
85 – 25				
80 – 30				

Notes:

GEOPROBE LOG
Geoprobe No.: GP-116

PROJECT STRUCTURAL SHOPS ADDITION	PROJECT NO. ECCF 1003
LOCATION	DATE 11-2-10
EXCAVATOR/OPERATOR	ELEV. 110.3
EXCAVATION METHOD HOLLOW STEM AUGERS	RECORDED BY D. GIUSTRA

DEPTH TO - Water: 8' When checked: Caving: -

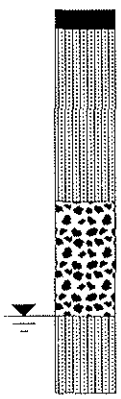
ELEVATION/ DEPTH	GRAPHIC	SAMPLE NUMBER	DESCRIPTION	REMARKS
110 – 0			12" CONCRETE	
		S-1	1 LOOSE, DRY COARSE TO MEDIUM LIGHT BROWN SAND SOME ROCK	
105 – 5		S-2	5 LOOSE, MOIST DARK SANDY FILL, GRAVEL AND ROCK	
100 – 10		S-3	10 WET LOOSE DARK COARSE TO MEDIUM SAND, SOME ROCK WET RUNNY	
95 – 15		S-4		
90 – 20				
85 – 25				
80 – 30				

Notes:

GEOPROBE LOG
Geoprobe No.: GP-119

PROJECT STRUCTURAL SHOPS ADDITION	PROJECT NO. ECCF 1003
LOCATION	DATE 11-2-10
EXCAVATOR/OPERATOR	ELEV. 110.2
EXCAVATION METHOD HOLLOW STEM AUGERS	RECORDED BY D. GIUSTRA

DEPTH TO - Water: 8' When checked: Caving: -

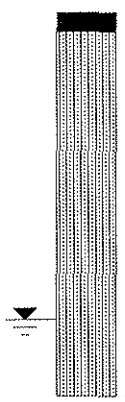
ELEVATION/ DEPTH	GRAPHIC	SAMPLE NUMBER	DESCRIPTION	REMARKS
110 – 0		S-1	6" CONCRETE 0.5 DRY, LOOSE CONCRETE, ROCK MEDIUM TO FINE SAND ROCK IN TIP	
105 – 5		S-2	5 GRAVEL, ROCK LOOSE DRY	
		S-3	8 WET, LOOSE ROCK, MEDIUM SAND	
100 – 10				
95 – 15				
90 – 20				
85 – 25				
80 – 30				

Notes:

GEOPROBE LOG
Geoprobe No.: GP-120

PROJECT STRUCTURAL SHOPS ADDITION	PROJECT NO. ECCF 1003
LOCATION	DATE 11-2-10
EXCAVATOR/OPERATOR	ELEV. 110.2
EXCAVATION METHOD HOLLOW STEM AUGERS	RECORDED BY D. GIUSTRA

DEPTH TO - Water: 8' When checked: Caving: -

ELEVATION/ DEPTH	SOIL SYMBOLS AND SAMPLERS: GRAPHIC	SAMPLE NUMBER	DESCRIPTION	REMARKS
110 – 0		S-1	6" CONCRETE 0.5	
			DRY, LOOSE CONCRETE MEDIUM TO FINE SAND LIGHT BROWN TO DARK BROWN FINE SAND AND ROCK	
105 – 5		S-2	ROCK, SOME MEDIUM LIGHT BROWN SAND, WOOD IN TIP	
		S-3	PETROLEUM ODOR MOIST TO WET WOOD, GRAY FINE SAND AND ROCK	
100 – 10				
95 – 15				
90 – 20				
85 – 25				
80 – 30				

Notes:

GEOPROBE LOG
Geoprobe No.: GP-121

PROJECT STRUCTURAL SHOPS ADDITION	PROJECT NO. ECCF 1003
LOCATION	DATE 11-3-10
EXCAVATOR/OPERATOR	ELEV. 110.2
EXCAVATION METHOD HOLLOW STEM AUGERS	RECORDED BY D. GIUSTRA

DEPTH TO - Water: 8' When checked: Caving: -

ELEVATION/ DEPTH	GRAPHIC	SAMPLE NUMBER	DESCRIPTION	REMARKS
110 – 0		S-1	6" CONCRETE 0.5	
			DRY LOOSE LIGHT BROWN MEDIUM SAND AND ROCK, SOME SILTY SAND AT END	
105 – 5		S-2	DRY LOOSE BROWN MEDIUM SAND AND ROCK	
		S-3	WET LOOSE ROCK DARK GRAY FILL, SAND, SOME SILT	
100 – 10				
95 – 15				
90 – 20				
85 – 25				
80 – 30				

Notes:

PROJECT: STRUCTURAL SHOPS ADDITION **PROJECT NO.:** ECCF 1003
PROJECT LOCATION: PORTSMOUTH NAVAL SHIPYARD; KITTERY, ME
DRILLING FIRM: MILLER ENGINEERING AND TESTING INC. **ELEVATION:** 110.0
FOREMAN: R. MARCOUX **LOGGED BY:** D. GIUSTRA
DRILLING METHOD: HOLLOW STEM AUGERS
DATE STARTED: 10-19-10 **DATE COMPLETED:** 10-19-10
DEPTH TO WATER> INITIAL: NE **AFTER 24 HOURS:** **CAVING>** C.

Pennoni

LOG OF BORING No. GTB-101

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (in.)	Blow Counts	Remarks
0	5.5" ASPHALT (0.5)						
	FILL: COARSE TO FINE GRAVEL, SOME COARSE TO MEDIUM TO FINE SAND, TRACE SILT (BRICK FRAGMENTS), MEDIUM DENSE (2)		A	S-1	10	11-8-9	DRY
	BROWN/LIGHT BROWN MEDIUM TO FINE SAND, SOME SILT, SOME COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS (SILTY SAND WITH GRAVEL - SM), MEDIUM DENSE TO VERY DENSE (6.5)		B2	S-2	12	15-11-9-4	DRY
5				S-3	10	3-6-50/6"	MOIST GRAVEL IN TIP
	GRAY HARD, HIGHLY WEATHERED, MODERATELY FRACTURED PHYLLITE		C1			REC=94% RQD=60%	
10							
15							
	Boring terminated at 16.5 ft.						
20							
25							
30							
35							

PROJECT: STRUCTURAL SHOPS ADDITION **PROJECT NO.:** ECCF 1003
PROJECT LOCATION: PORTSMOUTH NAVAL SHIPYARD; KITTERY, ME
DRILLING FIRM: MILLER ENGINEERING AND TESTING INC. **ELEVATION:** 110.0
FOREMAN: R. MARCOUX **LOGGED BY:** D. GIUSTRA
DRILLING METHOD: HOLLOW STEM AUGERS
DATE STARTED: 10-19-10 **DATE COMPLETED:** 10-19-10
DEPTH TO WATER> INITIAL: NE **AFTER 24 HOURS:** - **CAVING>** C. -

Pennoni

LOG OF BORING No. GTB-102

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (in.)	Blow Counts	Remarks
0	5" ASPHALT 0.4						
	FILL: BROWN MEDIUM TO FINE SAND, SOME COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, LITTLE SILT, MEDIUM DENSE		A	S-1	8	21-12-5	DRY
				S-2	12	8-8-5-9	MOIST
5	4.6 GRAY HARD, FRESHLY WEATHERED, SLIGHTLY FRACTURED PHYLLITE		C2	R-1		REC= 100%RQD= 67%	
10				R-2		REC= 100%RQD= 70%	
15	Boring terminated at 14.6 ft.						
20							
25							
30							
35							

PROJECT: STRUCTURAL SHOPS ADDITION **PROJECT NO.:** ECCF 1003
PROJECT LOCATION: PORTSMOUTH NAVAL SHIPYARD; KITTERY, ME
DRILLING FIRM: MILLER ENGINEERING AND TESTING INC. **ELEVATION:** 110.0
FOREMAN: R. MARCOUX **LOGGED BY:** D. GIUSTRA
DRILLING METHOD: HOLLOW STEM AUGERS
DATE STARTED: 10-19-10 **DATE COMPLETED:** 10-19-10
DEPTH TO WATER> INITIAL: 8' **AFTER 24 HOURS:** - **CAVING>** -

Pennoni

LOG OF BORING No. GTB-103

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (in.)	Blow Counts	Remarks
0	5" ASPHALT (0.4)						
	FILL: BROWN MEDIUM TO FINE SAND AND COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, MEDIUM DENSE (3)			S-1	8	25-13-14	DRY
	FILL: BROWN MEDIUM TO FINE SAND, SOME FINE TO COARSE GRAVEL SIZE ROCK FRAGMENTS, LITTLE SILT, MEDIUM DENSE TO DENSE			S-2	4	18-10-11-14	DRY
5			A	S-3	10	8-7-9-9	MOIST
				S-4	6	16-25-18-11	MOIST
	GRAY CLAY & SILT, LITTLE FINE SAND, (CLAY AND SILT - CL-ML), STIFF (9)			S-5	10	7-7-3-1	PETROLEUM ODOR WET
10			B1				
15	Boring terminated at 14 ft.						Auger refusal at 14 ft.
20							
25							
30							
35							

PROJECT: STRUCTURAL SHOPS ADDITION **PROJECT NO.:** ECCF 1003
PROJECT LOCATION: PORTSMOUTH NAVAL SHIPYARD; KITTERY, ME
DRILLING FIRM: MILLER ENGINEERING AND TESTING INC. **ELEVATION:** 110.4
FOREMAN: R. MARCOUX **LOGGED BY:** D. GIUSTRA
DRILLING METHOD: HOLLOW STEM AUGERS
DATE STARTED: 10-27-10 **DATE COMPLETED:** 10-27-10
DEPTH TO WATER> INITIAL: ▽ 12' **AFTER 24 HOURS:** ▽ - **CAVING>** C. -

Pennoni

LOG OF BORING No. GTB-104

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (in.)	Blow Counts	Remarks
0	FILL: LIGHT BROWN/BLACK MEDIUM TO FINE TO COARSE SAND, SOME FINE GRAVEL SIZE ROCK FRAGMENTS, TRACE SILT, MEDIUM DENSE TO LOOSE		A	S-1	20	11-13-10-13	DRY
				S-2	10	4-5-5-8	MOIST
5				S-3	20	4-8-10-15	MOIST
	BROWN SILT, SOME MEDIUM TO FINE SAND, (SILT - ML), VERY STIFF (5)		B1	S-4		10-15-23-25	MOIST
	BROWN/GRAY SILT, LITTLE FINE SAND (SILT - ML), VERY STIFF (7)						
	BROWN MEDIUM TO FINE SAND, SOME SILTY CLAY (CLAYEY SAND - SC), MEDIUM DENSE (8)		B2	S-5	18	9-12-13-18	MOIST
10							
	Boring terminated at 13 ft.						Auger refusal at 13 ft.
15							
20							
25							
30							
35							

PROJECT: STRUCTURAL SHOPS ADDITION **PROJECT NO.:** ECCF 1003
PROJECT LOCATION: PORTSMOUTH NAVAL SHIPYARD; KITTERY, ME
DRILLING FIRM: MILLER ENGINEERING AND TESTING INC. **ELEVATION:** 110.5
FOREMAN: R. MARCOUX **LOGGED BY:** D. GIUSTRA
DRILLING METHOD: HOLLOW STEM AUGERS
DATE STARTED: 10-27-10 **DATE COMPLETED:** 10-27-10
DEPTH TO WATER> INITIAL: NE **AFTER 24 HOURS:** - **CAVING>** C. -

Pennoni

LOG OF BORING No. GTB-105

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (in.)	Blow Counts	Remarks
0	7" CONCRETE SLAB				8		
	0.6						DRY
	FILL: BROWN/BLACK MEDIUM TO FINE TO COARSE SAND, SOME COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, LITTLE SILT, VERY DENSE		A	S-1		5-30-21	
				S-2	4	8-6-50/2"	WET ROCK IN SPOON TIP
5	Boring terminated at 3.5 ft.						Auger refusal at 3.5 ft
10							
15							
20							
25							
30							
35							

PROJECT: STRUCTURAL SHOPS ADDITION **PROJECT NO.:** ECCF 1003
PROJECT LOCATION: PORTSMOUTH NAVAL SHIPYARD; KITTERY, ME
DRILLING FIRM: MILLER ENGINEERING AND TESTING INC. **ELEVATION:** 110.6
FOREMAN: R. MARCOUX **LOGGED BY:** D. GIUSTRA
DRILLING METHOD: HOLLOW STEM AUGERS
DATE STARTED: 10-27-10 **DATE COMPLETED:** 10-27-10
DEPTH TO WATER> INITIAL: ▽ 8' **AFTER 24 HOURS:** ▼ - **CAVING>** C. -

Pennoni

LOG OF BORING No. GTB-106

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (in.)	Blow Counts	Remarks
0	6" CONCRETE						
	FILL: BROWN/ORANGE COARSE TO MEDIUM TO FINE SAND, SOME FINE GRAVEL, TRACE SILT, VERY DENSE (0.5)		A	S-1	10	10-25-31	DRY
				S-2	14	16-35-27-17	DRY
5	BROWN/GRAY SILT, SOME FINE TO MEDIUM SAND(SILT - ML), VERY STIFF (4)		B1	S-3	20	5-8-13-17	MOIST
	GRAY SILTY CLAY, LITTLE FINE SAND (CLAY - CL), HARD (6)			S-4	24	17-20-25-28	MOIST
10	BROWN/GRAY FINE TO MEDIUM SAND, SOME SILT (SILTY SAND - SM), MEDIUM DENSE (8)		B2	S-5	20	5-7-5-9	MOIST
	Boring terminated at 10 ft.						Auger refusal at 10 ft.
15							
20							
25							
30							
35							

PROJECT: STRUCTURAL SHOPS ADDITION **PROJECT NO.:** ECCF 1003
PROJECT LOCATION: PORTSMOUTH NAVAL SHIPYARD; KITTERY, ME
DRILLING FIRM: MILLER ENGINEERING AND TESTING INC. **ELEVATION:** 112.0
FOREMAN: R. MARCOUX **LOGGED BY:** D. GIUSTRA
DRILLING METHOD: HOLLOW STEM AUGERS
DATE STARTED: 10-18-10 **DATE COMPLETED:** 10-18-10
DEPTH TO WATER> INITIAL: NE **AFTER 24 HOURS:** - **CAVING>** C -

Pennoni

LOG OF BORING No. GTB-107

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (in.)	Blow Counts	Remarks
0	3" ASPHALT 0.3						
	FILL: DARK BROWN FINE TO COARSE GRAVEL SIZE ROCK FRAGMENTS, LITTLE MEDIUM TO FINE TO COARSE SAND, MEDIUM DENSE		A	S-1	6	8-8-11	DRY
				S-2	3	60/5"	DRY
	Boring terminated at 2.5 ft.						Auger refusal at 2.5 ft.
5							
10							
15							
20							
25							
30							
35							

PROJECT: STRUCTURAL SHOPS ADDITION **PROJECT NO.:** ECCF 1003
PROJECT LOCATION: PORTSMOUTH NAVAL SHIPYARD; KITTERY, ME
DRILLING FIRM: MILLER ENGINEERING AND TESTING INC. **ELEVATION:** 111.5
FOREMAN: R. MARCOUX **LOGGED BY:** D. GIUSTRA
DRILLING METHOD: HOLLOW STEM AUGERS
DATE STARTED: 10-18-10 **DATE COMPLETED:** 10-18-10
DEPTH TO WATER> INITIAL: NE **AFTER 24 HOURS:** - **CAVING>** C. -

Pennoni

LOG OF BORING No. GTB-108

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (in.)	Blow Counts	Remarks
0							
	2.5" ASPHALT 0.2						DRY
	FILL: FINE TO COARSE GRAVEL SIZE ROCK FRAGMENTS, LITTLE MEDIUM TO COARSE TO FINE SAND (WOOD FRAGMENTS), MEDIUM DENSE 2.4		A	S-1	12	10-13-16	
5	GRAY HARD, LIGHTLY WEATHERED, SLIGHTLY FRACTURED PHYLLITE		C2	R-1		REC=92% RQD=78%	
	Boring terminated at 7.4 ft.						
10							
15							
20							
25							
30							
35							

PROJECT: STRUCTURAL SHOPS ADDITION **PROJECT NO.:** ECCF 1003
PROJECT LOCATION: PORTSMOUTH NAVAL SHIPYARD; KITTERY, ME
DRILLING FIRM: MILLER ENGINEERING AND TESTING INC. **ELEVATION:** 109.7
FOREMAN: R. MARCOUX **LOGGED BY:** D. GIUSTRA
DRILLING METHOD: HOLLOW STEM AUGERS
DATE STARTED: 10-20-10 **DATE COMPLETED:** 10-20-10
DEPTH TO WATER> INITIAL: ▽ 8' **AFTER 24 HOURS:** ▼ - **CAVING>** C. -

Pennoni

LOG OF BORING No. GTB-109

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (in.)	Blow Counts	Remarks
0	4" ASPHALT (0.3)						
	FILL: DARK BROWN MEDIUM TO COARSE TO FINE SAND, SOME FINE TO COARSE GRAVEL SIZE ROCK FRAGMENTS, SOME SILT, DENSE TO MEDIUM DENSE (4)		A	S-1	6	11-20-11-12	DRY GRAVEL IN TIP
				S-2	10	10-10-7-7	DRY
5	FILL: BLACK/BROWN MEDIUM TO FINE TO COARSE SAND, SOME SILT, MEDIUM DENSE (6)			S-3	8	4-7-5-4	DRY
	FILL: BLACK/BROWN MEDIUM TO FINE TO COARSE SAND, LITTLE SILT, MEDIUM DENSE (8)			S-4	18	6-9-9-4	MOIST
10	FILL: BLACK/BROWN MEDIUM TO COARSE TO FINE SAND AND FINE TO COARSE GRAVEL SIZE ROCK FRAGMENTS, SOME SILT, LOOSE (19)			S-5	4	3-2-3-7	WET
15				S-6	1	4-1-5-6	WET WOOD IN TIP
20	BROWN/GRAY SILTY CLAY, SOME FINE SAND (CLAY - CL), FIRM		B1	S-7	20	4-4-2-4	WET
	Boring terminated at 21 ft.						
25							
30							
35							

PROJECT: STRUCTURAL SHOPS ADDITION **PROJECT NO.:** ECCF 1003
PROJECT LOCATION: PORTSMOUTH NAVAL SHIPYARD; KITTERY, ME
DRILLING FIRM: MILLER ENGINEERING AND TESTING INC. **ELEVATION:** 110.0
FOREMAN: R. MARCOUX **LOGGED BY:** D. GIUSTRA
DRILLING METHOD: HOLLOW STEM AUGERS
DATE STARTED: 10-21-10 **DATE COMPLETED:** 10-21-10
DEPTH TO WATER> INITIAL: 8' **AFTER 24 HOURS:** - **CAVING>** C. -

Pennoni

LOG OF BORING No. GTB-110

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (in.)	Blow Counts	Remarks
0							
	4" ASPHALT (0.3)						
	FILL: BLACK/BROWN FINE TO COARSE GRAVEL SIZE ROCK FRAGMENTS, SOME MEDIUM TO COARSE TO FINE SAND, LITTLE SILT, DENSE TO MEDIUM DENSE			S-1	12	18-18-113	DRY
				S-2	10	9-6-4-5	DRY
5	FILL: BROWN MEDIUM TO FINE SAND, SOME SILT, LITTLE FINE TO COARSE GRAVEL SIZE ROCK FRAGMENTS, LOOSE (4)			S-3	8	2-3-4-6	DRY
	FILL: BLACK MEDIUM TO COARSE TO FINE SAND, LITTLE FINE GRAVEL (SLAG), LOOSE (5)		A	S-4	10	6-3-7-6	MOIST
10	FILL: BLACK MEDIUM TO COARSE TO FINE SAND, LITTLE FINE GRAVEL (SLAG), VERY LOOSE (6)			S-5	4	4-1-0-2	WET GRAVEL IN TIP
	BROWN MEDIUM TO FINE TO COARSE SAND, TRACE SILT (WELL-GRADED SAND - SW), MEDIUM DENSE (12)						
15				S-6	4	7-12-7-4	WET RUNNING SAND
			B2				
	BROWN/GRAY COARSE TO FINE TO MEDIUM SAND, SOME FINE TO COARSE GRAVEL SIZE ROCK FRAGMENTS, SOME SILT (SILTY SAND WITH GRAVEL - SM), VERY DENSE (18)						
20				S-7	22	16-22-21-14	WET
	Boring terminated at 21 ft.						
25							
30							
35							

PROJECT: STRUCTURAL SHOPS ADDITION **PROJECT NO.:** ECCF 1003
PROJECT LOCATION: PORTSMOUTH NAVAL SHIPYARD; KITTERY, ME
DRILLING FIRM: MILLER ENGINEERING AND TESTING INC. **ELEVATION:** 108.5
FOREMAN: R. MARCOUX **LOGGED BY:** D. GIUSTRA
DRILLING METHOD: HOLLOW STEM AUGERS
DATE STARTED: 10-21-10 **DATE COMPLETED:** 10-21-10
DEPTH TO WATER> INITIAL: 8' **AFTER 24 HOURS:** - **CAVING>** -

Pennoni

LOG OF BORING No. GTB-111

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (in.)	Blow Counts	Remarks
0	3.5" ASPHALT (0.3)						
	FILL: GRAY/BLACK FINE TO COARSE GRAVEL SIZE ROCK FRAGMENTS, SOME COARSE TO MEDIUM TO FINE SAND, TRACE SILT, MEDIUM DENSE		A	S-1	6	11-13-15	DRY
				S-2	10	19-16-10-13	MOIST
5	FILL: BROWN/BLACK MEDIUM TO FINE TO COARSE SAND, SOME FINE GRAVEL SIZE ROCK FRAGMENTS, LITTLE SILT, MEDIUM DENSE TO DENSE (4)			S-3	16	11-13-20-12	DRY
				S-4	16	32-27-12-5	MOIST
	LIGHT BROWN/GRAY SILTY CLAY AND FINE TO MEDIUM SAND (CLAY - CL), SOFT (8)		B1	S-5	20	3-1-1-1	
10							
	GRAY FINE TO MEDIUM SAND, SOME SILT (SM) MEDIUM DENSE (13)		B2	S-6	12	6-5-7-21	WET
15							
	GRAY SILTY CLAY, LITTLE FINE SAND (CL) (17)		B1				
20	DARK GRAY MEDIUM TO FINE SAND, SOME CLAY (SC), MEDUIM DENSE (19)		B2	S-7	24	6-9-12-14	WET
	Boring terminated at 21 ft.						
25							
30							
35							

PROJECT: STRUCTURAL SHOPS ADDITION **PROJECT NO.:** ECCF 1003
PROJECT LOCATION: PORTSMOUTH NAVAL SHIPYARD; KITTERY, ME
DRILLING FIRM: MILLER ENGINEERING AND TESTING INC. **ELEVATION:** 108.0
FOREMAN: R. MARCOUX **LOGGED BY:** D. GIUSTRA
DRILLING METHOD: HOLLOW STEM AUGERS
DATE STARTED: 10-20-10 **DATE COMPLETED:** 10-20-10
DEPTH TO WATER> INITIAL: 8' **AFTER 24 HOURS:** - **CAVING>** -

Pennoni

LOG OF BORING No. TB-113

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (in.)	Blow Counts	Remarks
0	4" ASPHALT (0.3)						
	FILL: DARK BROWN MEDIUM TO FINE TO COARSE SAND, SOME FINE TO COARSE GRAVEL SIZE ROCK FRAGMENTS, TRACE SILT, DENSE TO MEDIUM DENSE (2)		A	S-1	8	X-7-25-12	DRY
				S-2	8	10-15-6-14	DRY
5	FILL: BLACK MEDIUM TO COARSE TO FINE SAND, SOME FINE GRAVEL, TRACE SILT, TRACE COAL, MEDIUM DENSE (8)			S-3	10	13-8-7-8	DRY
				S-4	10	7-4-7-7	MOIST
	BROWN MEDIUM TO FINE TO COARSE SAND, LITTLE SILT (SILTY SAND - SM), VERY DENSE		C1	S-5	6	50/0"	WET RUNNING SAND
10	Boring terminated at 9 ft.						Auger refusal at 9 ft.
15							
20							
25							
30							
35							

PROJECT: STRUCTURAL SHOPS ADDITION **PROJECT NO.:** ECCF 1003
PROJECT LOCATION: PORTSMOUTH NAVAL SHIPYARD; KITTERY, ME
DRILLING FIRM: MILLER ENGINEERING AND TESTING INC. **ELEVATION:** 106.8
FOREMAN: R. MARCOUX **LOGGED BY:** D. GIUSTRA
DRILLING METHOD: HOLLOW STEM AUGERS
DATE STARTED: 10-20-10 **DATE COMPLETED:** 10-20-10
DEPTH TO WATER> INITIAL: ▽ 10' **AFTER 24 HOURS:** ▼ - **CAVING>** C. -

Pennoni

LOG OF BORING No. TB-117

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (in.)	Blow Counts	Remarks
0	3.5" ASPHALT (0.3)						
	FILL: BLACK/BROWN FINE TO COARSE GRAVEL, SOME COARSE TO MEDIUM TO FINE SAND, TRACE SILT, DENSE (4)		A	S-1	10	8-15-16	DRY
				S-2	12	12-16-19-13	DRY
5	FILL: BLACK COARSE TO MEDIUM TO FINE SAND, SOME FINE GRAVEL SIZE ROCK FRAGMENTS, TRACE SILT, DENSE (6)			S-3	18	10-15-16-16	DRY
	FILL:BLACK COARSE TO MEDIUM SAND, SOME FINE GRAVEL SIZE ROCK FRAGMENTS (SLAG), LOOSE (8)			S-4	14	5-3-4-2	DRY
10	FILL: DARK BROWN/BLACK COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, SOME MEDIUM TO COARSE TO FINE SAND, LITTLE SILT (WOOD FRAGMENTS), LOOSE TO MEDIUM DENSE (12)			S-5	8	4-3-3-2	MOIST
				S-6	12	5-21-6-5	WET
	FILL: DARK BROWN COARSE TO MEDIUM TO FINE SAND, SOME FINE GRAVEL SIZE ROCK FRAGMENTS, LITTLE SILT, (WOOD FRAGMENTS) , LOOSE (14.5)			S-7	6	3-4-6-3	WET
15	BLACK CLAYEY SILT, SOME FINE TO MEDIUM SAND (ELASTIC SITL - MH), FIRM		B1	S-8	12	3-2-2-2	WET
	Boring terminated at 16 ft.						
20							
25							
30							
35							

PROJECT: STRUCTURAL SHOPS ADDITION **PROJECT NO.:** ECCF 1003
PROJECT LOCATION: PORTSMOUTH NAVAL SHIPYARD; KITTERY, ME
DRILLING FIRM: MILLER ENGINEERING AND TESTING INC. **ELEVATION:** 109.5
FOREMAN: R. MARCOUX **LOGGED BY:** D. GIUSTRA
DRILLING METHOD: HOLLOW STEM AUGERS
DATE STARTED: 10-20-10 **DATE COMPLETED:** 10-20-10
DEPTH TO WATER> INITIAL: 10' **AFTER 24 HOURS:** - **CAVING>** -

Pennoni

LOG OF BORING No. TB-118

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (in.)	Blow Counts	Remarks
0	5" ASPHALT (0.4)						
	FILL: GRAY COARSE TO MEDIUM TO FINE SAND AND FINE TO COARSE GRAVEL SIZE ROCK FRAGMENTS, DENSE TO MEDIUM DENSE (4)			S-1	12	28-13-18	DRY
				S-2	6	17-8-4-6	DRY
5	FILL: BROWN/BLACK MEDIUM TO FINE TO COARSE SAND, SOME SILT, DENSE TO MEDIUM DENSE		A	S-3	12	6-13-22-17	DRY
				S-4	12	17-12-12-8	DRY
10				S-5	14	20-25-51-73	WET
	Boring terminated at 10.2 ft.			S-6	2	65/2"	WET Auger refusal at 10.2 ft.
15							
20							
25							
30							
35							

PROJECT: STRUCTURAL SHOPS ADDITION **PROJECT NO.:** ECCF 1003
PROJECT LOCATION: PORTSMOUTH NAVAL SHIPYARD; KITTERY, ME
DRILLING FIRM: MILLER ENGINEERING AND TESTING INC. **ELEVATION:** 110.0
FOREMAN: R. MARCOUX **LOGGED BY:** D. GIUSTRA
DRILLING METHOD: HOLLOW STEM AUGERS
DATE STARTED: 10-19-10 **DATE COMPLETED:** 10-19-10
DEPTH TO WATER> INITIAL: NE **AFTER 24 HOURS:** - **CAVING>** C -

Pennoni

LOG OF BORING No. TB-122

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (in.)	Blow Counts	Remarks
0	5" ASPHALT (0.4)						
	FILL: DARK BROWN MEDIUM TO COARSE TO FINE SAND, SOME FINE TO COARSE GRAVEL SIZE ROCK FRAGMENTS, TRACE SILT (WOOD FRAGMENTS), MEDIUM DENSE (2)		A	S-1	12	18-13-7	DRY
	LIGHT BROWN CLAYEY SILT, SOME FINE TO MEDIUM SAND, (ELASTIC SILT - MH), STIFF (5)		B1	S-2	12	7-6-5-6	MOIST
5	BROWN CLAYEY SILT, SOME MEDIUM TO FINE SAND (ELASTIC SILT - MH), FIRM (6)			S-3	12	3-2-4-7	MOIST
	LIGHT BROWN/GRAY SILT, SOME FINE TO MEDIUM SAND (SILT - ML), VERY STIFF			S-4	24	8-9-9-15	MOIST
10	Boring terminated at 9 ft.			S-5	8	8-75/5"	MOIST
							Auger refusal at 9 ft.
15							
20							
25							
30							
35							

PROJECT: STRUCTURAL SHOPS ADDITION **PROJECT NO.:** ECCF 1003
PROJECT LOCATION: PORTSMOUTH NAVAL SHIPYARD; KITTERY, ME
DRILLING FIRM: MILLER ENGINEERING AND TESTING INC. **ELEVATION:** 111.0
FOREMAN: R. MARCOUX **LOGGED BY:** D. GIUSTRA
DRILLING METHOD: HOLLOW STEM AUGERS
DATE STARTED: 10-20-10 **DATE COMPLETED:** 10-20-10
DEPTH TO WATER> INITIAL: 10' **AFTER 24 HOURS:** - **CAVING>** -

Pennoni

LOG OF BORING No. TB-124

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (in.)	Blow Counts	Remarks
0	3.5" ASPHALT 0.3						
	FILL: GRAY MEDIUM TO FINE TO COARSE SAND, SOME FINE TO COARSE GRAVEL SIZE ROCK FRAGMENTS, DENSE TO MEDIUM DENSE		A	S-1	12	13-19-20	DRY
				S-2	18	20-24-25-31	DRY
5				S-3	18	16-21-17-17	DRY
				S-4	16	20-21-23-15	DRY
				S-5	16	13-11-13-17	MOIST
10	10						
	BROWN COARSE TO MEDIUM TO FINE SAND, SOME FINE GRAVEL, SOME SILT (SILTY SAND WITH GRAVEL - SM), DENSE		B2	S-6	14	20-19-21-50/3"	WET
	Boring terminated at 12 ft.						Auger refusal at 12 ft.
15							
20							
25							
30							
35							

PROJECT: STRUCTURAL SHOPS ADDITION **PROJECT NO.:** ECCF 1003
PROJECT LOCATION: PORTSMOUTH NAVAL SHIPYARD; KITTERY, ME
DRILLING FIRM: MILLER ENGINEERING AND TESTING INC. **ELEVATION:** 110.8
FOREMAN: R. MARCOUX **LOGGED BY:** D. GIUSTRA
DRILLING METHOD: HOLLOW STEM AUGERS
DATE STARTED: 10-19-10 **DATE COMPLETED:** 10-19-10
DEPTH TO WATER> INITIAL: NE **AFTER 24 HOURS:** - **CAVING>** C. -

Pennoni

LOG OF BORING No. TB-125

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (in.)	Blow Counts	Remarks
0	2.5" ASPHALT (0.2)						
	FILL: BLACK MEDIUM TO FINE TO COARSE SAND, SOME SILT, LITTLE FINE GRAVEL SIZE ROCK FRAGMENTS, DENSE TO VERY DENSE (1.5)		A	S-1	18	13-16-19	DRY
				S-2	8	27-30-29-16	DRY
5	FILL: DARK BROWN MEDIUM TO COARSE TO FINE SAND, SOME FINE TO COARSE GRAVEL SIZE ROCK FRAGMENTS, LITTLE SILT, DENSE (4)			S-3	10	25-19-10-10	DRY
	FILL: BROWN MEDIUM TO FINE TO COARSE SAND, SOME SILT (SM), DENSE (6)		B2	S-4	18	6-3-3-5	MOIST
				S-5	12	6-90/6"	MOIST
10	LIGHT BROWN SILT, SOME FINE TO MEDIUM SAND (SILT - ML), FIRM		C1				
	Boring terminated at 10.5 ft.						Auger refusal at 10.5 ft.
15							
20							
25							
30							
35							

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PROJECT: Portsmouth Naval Shipyard	LOGGED BY: J. Chokechaitanasin	BORING NUMBER: B-1
LOCATION: Kittery, Maine	DRILLING CONTRACTOR: New Hampshire Boring, Inc.	SHEET 1 OF 1
OWNER/CLIENT: EwingCole	DRILLER: Walter	DATE STARTED: 5/21/04
PROJECT NUMBER: 24071 / GROUND SURFACE ELEVATION (ft): 109.2	DRILLING METHOD: 2.25" I.D. HSA	DATE COMPLETED: 5/21/04

ELEV. (ft)	DEPTH (ft)	STRATUM	MATERIAL DESCRIPTION	MC (%)	SAMPLE TYPE	BLOW COUNTS	RECOV. (in)	PENETRATION RESISTANCE BLOWS/FOOT (20 40 60 80)
108.7			Asphalt = 6.5 inches					
		A	lean clay FILL, with sand and asphalt, moist, black-brown			11, 13, 10		
105.7			clayey sand FILL, with gravel, moist, brown			5, 3, 6		
	5					31, 36, 24		
100.7 ▽		C1	DISINTEGRATED QUARTZITE BEDROCK, moist, gray			56, 118		>>
99.5	10		Auger and Spoon Refusal at 9.7 ft			100/1		>>
	15							
	20							

GROUND WATER LEVELS:

▽ ENCOUNTERED: 8.5 ft ELEV. 100.7

CAVED: 7.5 ft ELEV. 101.7

SAMPLE TYPES: Split Spoon, Bulk, Shelby Tube, Rock Core, Pressuremeter, DCP

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

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PROJECT: Portsmouth Naval Shipyard	LOGGED BY: J. Chokechaitanasin	BORING NUMBER: B-2
LOCATION: Kittery, Maine	DRILLING CONTRACTOR: New Hampshire Boring, Inc.	SHEET 1 OF 1
OWNER/CLIENT: EwingCole	DRILLER: Walter	DATE STARTED: 5/21/04
PROJECT NUMBER: 24071 / GROUND SURFACE ELEVATION (ft): 109.9	DRILLING METHOD: 2.25" I.D. HSA	DATE COMPLETED: 5/21/04

ELEV. (ft)	DEPTH (ft)	STRATUM	MATERIAL DESCRIPTION	MC (%)	SAMPLE TYPE	BLOW COUNTS	RECOV. (in)
109.6			Asphalt = 3 inches				
		A	lean clay FILL, with sand and asphalt, moist, black, brown			10, 26, 100/4	
						1, 2, 1/1	
	5					3, 2, 1	
101.4		B1	LEAN CLAY (CL), moist, brown			2, 9, 7	
	10						
96.4		B2	clayey SAND (SC), with gravel, moist, brown			11, 18, 24	
94.6	15		Auger Refusal at 15.3 ft			100/4	
	20						

PENETRATION RESISTANCE BLOWS/FOOT (20, 40, 60, 80)

GROUND WATER LEVELS:
ENCOUNTERED: 11.4 ft ELEV. 98.5

SAMPLE TYPES: Split Spoon, Bulk, Shelby Tube, Rock Core, Pressuremeter, DCP

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

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PROJECT: Portsmouth Naval Shipyard	LOGGED BY: J. Chokechaitanasin	BORING NUMBER: B-3
LOCATION: Kittery, Maine	DRILLING CONTRACTOR: New Hampshire Boring, Inc.	SHEET 1 OF 1
OWNER/CLIENT: EwingCole	DRILLER: Walter	DATE STARTED: 5/26/04
PROJECT NUMBER: 24071 / GROUND SURFACE ELEVATION (ft): 109.7	DRILLING METHOD: 2.25" I.D. HSA	DATE COMPLETED: 5/26/04

ELEV. (ft)	DEPTH (ft)	STRATUM	MATERIAL DESCRIPTION	MC (%)	SAMPLE TYPE	BLOW COUNTS	RECOV. (in)	PENETRATION RESISTANCE BLOWS/FOOT (20 40 60 80)
108.9			Concrete = 10 inches					
		A	clayey sand FILL, with gravel, moist, brown and black			16 40 100/4.5 16 12 24		>>
105.4			Auger and Spoon Refusal at 4.3 ft			100/0.5		>>
	5							
	10							
	15							
	20							

GROUND WATER LEVELS:

ENCOUNTERED: None

UPON COMPLETION: Dry

SAMPLE TYPES: Split Spoon, Bulk, Shelby Tube, Rock Core, Pressuremeter, DCP

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

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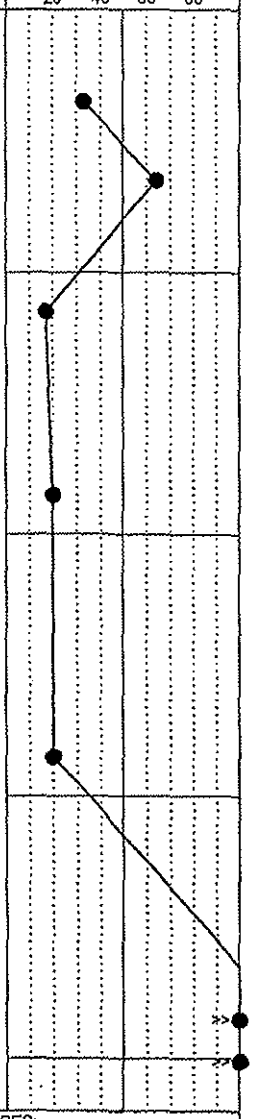
PROJECT: Portsmouth Naval Shipyard	LOGGED BY: J. Chokechaitanasin	BORING NUMBER: B-4
LOCATION: Kittery, Maine	DRILLING CONTRACTOR: New Hampshire Boring, Inc.	SHEET 1 OF 1
OWNER/CLIENT: EwingCole	DRILLER: Walter	DATE STARTED: 5/20/04
PROJECT NUMBER: 24071 / GROUND SURFACE ELEVATION (ft): 109.4	DRILLING METHOD: 2.25" I.D. HSA	DATE COMPLETED: 5/20/04

ELEV. (ft)	DEPTH (ft)	STRATUM	MATERIAL DESCRIPTION	MC (%)	SAMPLE TYPE	BLOW COUNTS	RECOV. (in)
108.6			Concrete = 9.5 inches				
		A	clayey sand FILL, with gravel, moist, brown			8, 17, 16	
						28, 30, 34	
	5					5, 7, 10	
						5, 10, 10	
	10						
95.9							
		B1	LEAN CLAY (CL), moist to wet, gray petroleum odor at 13.5 ft.			49, 13, 7	
	15						
90.9							
		B2	clayey SAND (SC), with gravel, moist, brown			7, 13, 107	
89.3	20		Auger and Spoon Refusal at 20.1 ft			100/1	

PENETRATION RESISTANCE BLOWS/FOOT (20, 40, 60, 80)



GROUND WATER LEVELS:

CAVED: 9.4 ft ELEV. 100.0

SAMPLE TYPES: Split Spoon, Bulk, Shelby Tube, Rock Core, Pressuremeter, DCP

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

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PROJECT:	LOGGED BY:	BORING NUMBER:
Portsmouth Naval Shipyard	J. Chokechaitanasin	B-5
LOCATION:	DRILLING CONTRACTOR:	
Kittery, Maine	New Hampshire Boring, Inc.	SHEET 1 OF 1
OWNER/CLIENT:	DRILLER:	DATE STARTED:
EwingCole	Walter	5/21/04
PROJECT NUMBER: / GROUND SURFACE ELEVATION (ft):	DRILLING METHOD:	DATE COMPLETED:
24071 / 109.1	2.25" I.D. HSA	5/21/04

ELEV. (ft)	DEPTH (ft)	STRATUM	MATERIAL DESCRIPTION	MC (%)	SAMPLE TYPE	BLOW COUNTS	RECOV. (in)	PENETRATION RESISTANCE BLOWS/FOOT (20 40 60 80)
108.6			Asphalt = 6 inches					
			clayey sand FILL, with gravel, moist, brown			10 5 4		
106.4			Auger and Spoon Refusal at 2.7 ft			3 3 100/2		
	5							
	10							
	15							
	20							

GROUND WATER LEVELS:

ENCOUNTERED: None

UPON COMPLETION: Dry

SAMPLE TYPES:

Split Spoon, Bulk, Shelby Tube, Rock Core, Pressuremeter, DCP

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

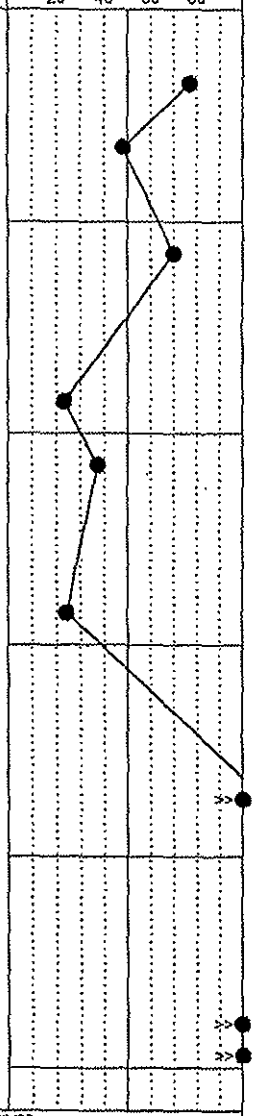
BOREHOLE/TEST PIT 24071, PORTSMOUTH NAVAL SHIPYARD.GPJ GEOCONCEPTS.GDT 7/8/04

GeoConcepts Engineering, Inc.
604 South King St., Suite 200
Leesburg, VA 20175
703 443-0309
703 589-1592 fax

PROJECT: Portsmouth Naval Shipyard	LOGGED BY: J. Chokechaitanasin	BORING NUMBER: B-5A
LOCATION: Kittery, Maine	DRILLING CONTRACTOR: New Hampshire Boring, Inc.	SHEET 1 OF 1
OWNER/CLIENT: EwingCole	DRILLER: Walter	DATE STARTED: 5/26/04
PROJECT NUMBER: 24071 / GROUND SURFACE ELEVATION (ft): 109.1	DRILLING METHOD: 2.25" I.D. HSA	DATE COMPLETED: 5/26/04

ELEV. (ft)	DEPTH (ft)	STRATUM	MATERIAL DESCRIPTION	MC (%)	SAMPLE TYPE	BLOW COUNTS	RECOV. (in)
108.8			Asphalt = 4 inches				
		A	clayey sand FILL, with gravel, moist, brown and white			20, 31, 46	
						32, 23, 25	
			brown below 4.0 ft.				
	5					73, 54, 16	
						8, 11, 12	
	10					23, 21, 16	
95.6							
		B1	LEAN CLAY (CL), with sand, moist, green-brown			13, 13, 11	
	15						
90.1						100/4.5	
		B2	clayey SAND (SC), with gravel, moist, brown				
	20						
						100/5	
84.3							
	25		Auger and Spoon Refusal at 24.8 ft			100/2	

PENETRATION RESISTANCE BLOWS/FOOT



GROUND WATER LEVELS:

ENCOUNTERED: None

UPON COMPLETION: Dry

SAMPLE TYPES: Split Spoon, Bulk, Shelby Tube, Rock Core, Pressuremeter, DCP

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

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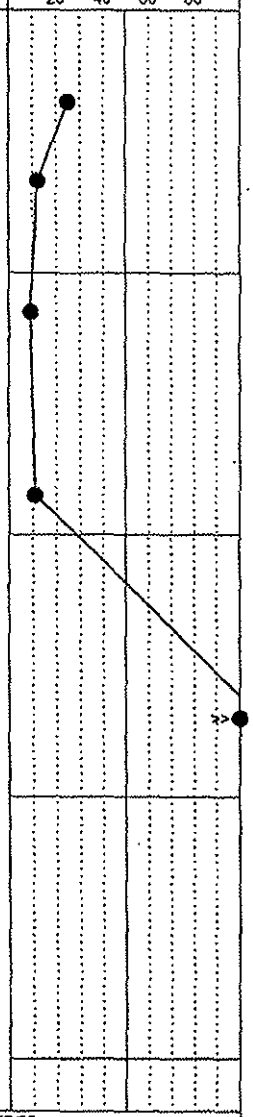
PROJECT: Portsmouth Naval Shipyard	LOGGED BY: J. Chokechaitanasin	BORING NUMBER: B-6
LOCATION: Kittery, Maine	DRILLING CONTRACTOR: New Hampshire Boring, Inc.	SHEET 1 OF 1
OWNER/CLIENT: EwingCole	DRILLER: Walter	DATE STARTED: 5/21/04
PROJECT NUMBER: 24071 / GROUND SURFACE ELEVATION (ft): 109.9	DRILLING METHOD: 2.25" I.D. HSA	DATE COMPLETED: 5/21/04

ELEV. (ft)	DEPTH (ft)	STRATUM	MATERIAL DESCRIPTION	MC (%)	SAMPLE TYPE	BLOW COUNTS	RECOV. (in)
109.4			Asphalt = 6 inches				
		A	lean clay FILL, with sand and asphalt, moist, gray-brown			14, 13, 12	
						6, 6, 6	
	5					3, 2, 7	
101.4		B1	LEAN CLAY (CL), with sand, moist, gray-green and brown			3, 5, 6	
	10						
98.4			Auger and Spoon Refusal at 13.5 ft			100/0	
	15						
	20						

PENETRATION RESISTANCE BLOWS/FOOT



GROUND WATER LEVELS:

ENCOUNTERED: None

UPON COMPLETION: Dry

CAVED: 8.3 ft ELEV. 101.6

SAMPLE TYPES:

Split Spoon, Bulk, Shelby Tube, Rock Core, Pressuremeter, DCP

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

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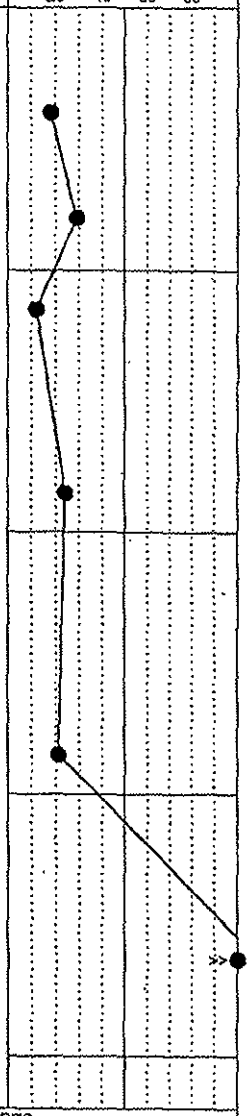
PROJECT: Portsmouth Naval Shipyard	LOGGED BY: J. Chokechaitanasin	BORING NUMBER: B-7
LOCATION: Kittery, Maine	DRILLING CONTRACTOR: New Hampshire Boring, Inc.	SHEET 1 OF 1
OWNER/CLIENT: EwingCole	DRILLER: Walter	DATE STARTED: 5/21/04
PROJECT NUMBER: 24071 / GROUND SURFACE ELEVATION (ft): 109.8	DRILLING METHOD: 2.25" I.D. HSA	DATE COMPLETED: 5/21/04

ELEV. (ft)	DEPTH (ft)	STRATUM	MATERIAL DESCRIPTION	MC (%)	SAMPLE TYPE	BLOW COUNTS	RECOV. (in)
109.3			Asphalt = 6 inches				
		A	sandy lean clay FILL, with asphalt, moist, gray-brown		Split Spoon	4, 7, 11, 22	
106.8			clayey gravel FILL, with sand and brick, moist, brown		Split Spoon	22, 18, 11, 8	
104.8	5	B2	clayey SAND (SC), moist, gray and brown		Split Spoon	3, 4, 8	
					Split Spoon	4, 12, 12	
	10						
					Split Spoon	7, 7, 14	
	15						
91.6			Auger and Spoon Refusal at 18.2 ft			100/1	
	20						



GROUND WATER LEVELS:
▽ ENCOUNTERED: 8.5 ft ELEV. 101.3

SAMPLE TYPES:
Split Spoon, Bulk, Shelby Tube, Rock Core, Pressuremeter, DCP

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT 24071, PORTSMOUTH NAVAL SHIPYARD.GPJ GEOCONCEPTS.GDT 7/8/04

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PROJECT:	LOGGED BY:	BORING NUMBER:
Portsmouth Naval Shipyard	J. Chokechaitanasin	B-8
LOCATION: Kittery, Maine	DRILLING CONTRACTOR: New Hampshire Boring, Inc.	SHEET 1 OF 1
OWNER/CLIENT: EwingCole	DRILLER: Walter	DATE STARTED: 5/19/04
PROJECT NUMBER: 24071 / GROUND SURFACE ELEVATION (ft): 109.7	DRILLING METHOD: 2.25" I.D. HSA	DATE COMPLETED: 5/19/04

ELEV. (ft)	DEPTH (ft)	STRATUM	MATERIAL DESCRIPTION	MC (%)	SAMPLE TYPE	BLOW COUNTS	RECOV. (in)	PENETRATION RESISTANCE BLOWS/FOOT (20 40 60 80)
109.2			Asphalt = 6 inches					
			sandy lean clay FILL, with asphalt, moist, gray-brown			8		
107.7						14		
		A	clayey sand FILL, moist, brown			13		
						10		
						6		
105.5						33		>>
			Auger and Spoon Refusal at 4.2 ft			100/3		>>
						100/2		
	5							
	10							
	15							
	20							

GROUND WATER LEVELS:

ENCOUNTERED: None

UPON COMPLETION: Dry

▼ 5/21/04 7.6 ft ELEV. 102.1

SAMPLE TYPES: Split Spoon, Bulk, Shelby Tube, Rock Core, Pressuremeter, DCP

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

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PROJECT: Portsmouth Naval Shipyard	LOGGED BY: J. Chokechaitanasin	BORING NUMBER: B-8A
LOCATION: Kittery, Maine	DRILLING CONTRACTOR: New Hampshire Boring, Inc.	SHEET 1 OF 1
OWNER/CLIENT: Ewing Cole	DRILLER: Walter	DATE STARTED: 5/19/04
PROJECT NUMBER: 24071 / GROUND SURFACE ELEVATION (ft): 109.7	DRILLING METHOD: 2.25" I.D. HSA	DATE COMPLETED: 5/19/04

ELEV. (ft)	DEPTH (ft)	STRATUM	MATERIAL DESCRIPTION	MC (%)	SAMPLE TYPE	BLOW COUNTS	RECOV. (in)	PENETRATION RESISTANCE BLOWS/FOOT (20 40 60 80)
			No Sampling to 4.2 ft.					
105.5	5	C2	very hard, slightly weathered, moderately spaced joints, moderately fractured, moderately open aperature, closed healing, 98% recovered, RQD = 65%, fair QUARTZITE ROCK					
100.5	10		very hard, fresh, moderately spaced joints, slightly fractured, moderately open aperature, closed healing, 100% recovered, RQD = 100%, excellent QUARTZITE ROCK					
95.5	15		Bottom of Boring at 14.2 ft					
	20							

GROUND WATER LEVELS:

ENCOUNTERED: None

UPON COMPLETION: Dry

▼ 5/21/04 7.6 ft ELEV. 102.1

SAMPLE TYPES: Split Spoon, Bulk, Shelby Tube, Rock Core, Pressuremeter, DCP

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

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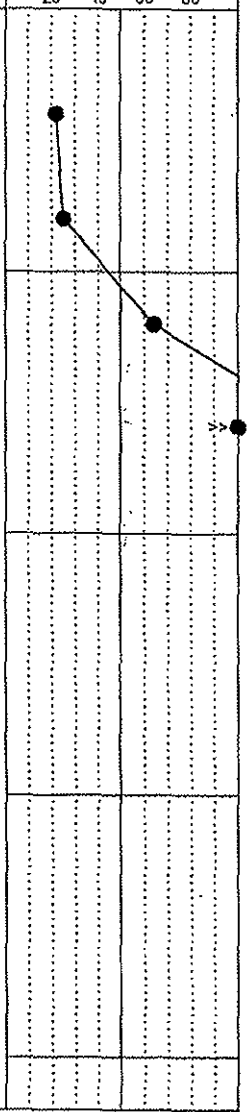
PROJECT: Portsmouth Naval Shipyard	LOGGED BY: J. Chokechaitanasin	BORING NUMBER: B-9
LOCATION: Kittery, Maine	DRILLING CONTRACTOR: New Hampshire Boring, Inc.	SHEET 1 OF 1
OWNER/CLIENT: EwingCole	DRILLER: Walter	DATE STARTED: 5/19/04
PROJECT NUMBER: 24071 / GROUND SURFACE ELEVATION (ft): 109.5	DRILLING METHOD: 2.25" I.D. HSA	DATE COMPLETED: 5/19/04

ELEV. (ft)	DEPTH (ft)	STRATUM	MATERIAL DESCRIPTION	MC (%)	SAMPLE TYPE	BLOW COUNTS	RECOV. (in)
108.9			Asphalt = 7 inches				
			clayey sand FILL, with gravel and asphalt, moist, gray-brown			9, 10, 12, 57	
106.5			lean clay FILL, with sand, moist, brown-orange			5, 9, 16, 23	
	5	A	petroleum odor at 5 ft.			12, 34, 30, 25	
						4, 50, 86, 100/4	
100.6			Auger Refusal at 8.9 ft				
	10						
	15						
	20						

PENETRATION RESISTANCE BLOWS/FOOT



GROUND WATER LEVELS:

ENCOUNTERED: 7.4 ft ELEV. 102.1

5/20/04 7.4 ft ELEV. 102.1

SAMPLE TYPES: Split Spoon, Bulk, Shelby Tube, Rock Core, Pressuremeter, DCP

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

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PROJECT: Portsmouth Naval Shipyard	LOGGED BY: J. Chokechaitanasin	BORING NUMBER: B-10
LOCATION: Kittery, Maine	DRILLING CONTRACTOR: New Hampshire Boring, Inc.	SHEET 1 OF 1
OWNER/CLIENT: EwingCole	DRILLER: Walter	DATE STARTED: 5/18/04
PROJECT NUMBER: 24071 / GROUND SURFACE ELEVATION (ft): 109.4	DRILLING METHOD: 2.25" I.D. HSA	DATE COMPLETED: 5/18/04

ELEV. (ft)	DEPTH (ft)	STRATUM	MATERIAL DESCRIPTION	MC (%)	SAMPLE TYPE	BLOW COUNTS	RECOV. (in)	PENETRATION RESISTANCE BLOWS/FOOT (20 40 60 80)
108.8			Asphalt = 7 inches					
			sandy lean clay FILL, with gravel and asphalt, moist, gray-brown					
107.3			clayey sand FILL, with gravel, moist, brown			13 46		
		A				8 15		>>
	5					87 30		
101.5			petroleum odor at 7.9 ft.					
			Auger and Spoon Refusal at 7.9 ft			100/0		>>
	10							
	15							
	20							

GROUND WATER LEVELS:

ENCOUNTERED:	None			
UPON COMPLETION:	Dry	CAVED: 7.9 ft	ELEV. 101.5	
5/19/04	Dry	CAVED: 5.8 ft	ELEV. 103.7	

SAMPLE TYPES: Split Spoon, Bulk, Shelby Tube, Rock Core, Pressuremeter, DCP

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

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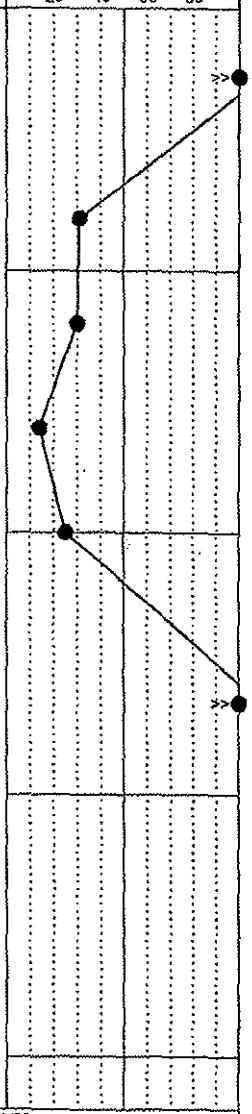
PROJECT: Portsmouth Naval Shipyard	LOGGED BY: J. Chokechaitanasin	BORING NUMBER: B-11
LOCATION: Kittery, Maine	DRILLING CONTRACTOR: New Hampshire Boring, Inc.	SHEET 1 OF 1
OWNER/CLIENT: EwingCole	DRILLER: Walter	DATE STARTED: 5/19/04
PROJECT NUMBER: 24071 / GROUND SURFACE ELEVATION (ft): 109.3	DRILLING METHOD: 2.25" I.D. HSA	DATE COMPLETED: 5/19/04

ELEV. (ft)	DEPTH (ft)	STRATUM	MATERIAL DESCRIPTION	MC (%)	SAMPLE TYPE	BLOW COUNTS	RECOV. (in)
108.8			Asphalt = 5.5 inches				
		A	clayey sand FILL, with asphalt and gravel, moist, gray-brown		Split Spoon	45, 100/1	
					Split Spoon	57, 18, 13, 11	
104.3	5	B1	LEAN CLAY (CL), moist, gray		Split Spoon	16, 18, 12, 12	
					Split Spoon	4, 7, 7, 10	
	10				Split Spoon	5, 12, 13, 13	
96.0			Auger and Spoon Refusal at 13.3 ft			100/1	
	15						
	20						

PENETRATION RESISTANCE BLOWS/FOOT (20, 40, 60, 80)



GROUND WATER LEVELS:

ENCOUNTERED: 10.8 ft ELEV. 98.5

5/20/04 8.6 ft ELEV. 100.7

SAMPLE TYPES: Split Spoon, Bulk, Shelby Tube, Rock Core, Pressuremeter, DCP

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT 24071, PORTSMOUTH NAVAL SHIPYARD.GPJ GEOCONCEPTS.GDT 7/8/04

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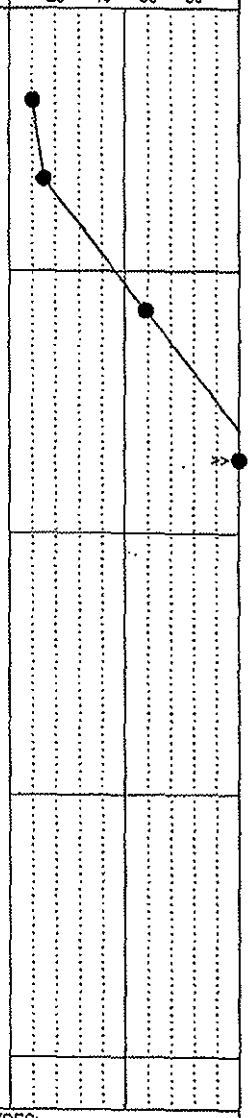
PROJECT: Portsmouth Naval Shipyard	LOGGED BY: J. Chokechaitanasin	BORING NUMBER: B-12
LOCATION: Kittery, Maine	DRILLING CONTRACTOR: New Hampshire Boring, Inc.	SHEET 1 OF 1
OWNER/CLIENT: EwingCole	DRILLER: Walter	DATE STARTED: 5/26/04
PROJECT NUMBER: 24071 / GROUND SURFACE ELEVATION (ft): 110.0	DRILLING METHOD: 2.25" I.D. HSA	DATE COMPLETED: 5/26/04

ELEV. (ft)	DEPTH (ft)	STRATUM	MATERIAL DESCRIPTION	MC (%)	SAMPLE TYPE	BLOW COUNTS	RECOV. (in)
109.7			Asphalt = 3 inches				
		A	clayey sand FILL, with gravel, moist, brown			6, 7, 3, 4, 5	
106.5		B2	clayey SAND (SC), moist, brown			10	
104.5	5	B1	LEAN CLAY (CL), with sand, moist, brown			11, 23, 36	
101.5							
101.1		C1	DISINTEGRATED QUARTZITE BEDROCK, moist, gray			100/1.5	
			Auger and Spoon Refusal at 8.9 ft				
	10						
	15						
	20						

PENETRATION RESISTANCE BLOWS/FOOT



GROUND WATER LEVELS:

ENCOUNTERED: 5.9 ft ELEV. 104.1

5/27/04 2.1 ft ELEV. 107.9

SAMPLE TYPES: Split Spoon, Bulk, Shelby Tube, Rock Core, Pressuremeter, DCP

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

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PROJECT: Portsmouth Naval Shipyard	LOGGED BY: J. Chokechaitanasin	BORING NUMBER: B-13
LOCATION: Kittery, Maine	DRILLING CONTRACTOR: New Hampshire Boring, Inc.	SHEET 1 OF 1
OWNER/CLIENT: EwingCole	DRILLER: Walter	DATE STARTED: 5/25/04
PROJECT NUMBER: 24071 / GROUND SURFACE ELEVATION (ft): 109.6	DRILLING METHOD: 2.25" I.D. HSA	DATE COMPLETED: 5/25/04

ELEV. (ft)	DEPTH (ft)	STRATUM	MATERIAL DESCRIPTION	MC (%)	SAMPLE TYPE	BLOW COUNTS	RECOV. (in)	PENETRATION RESISTANCE BLOWS/FOOT (20 40 60 80)
109.4			Asphalt = 3 inches					
		A	clayey sand FILL, with gravel, moist, black-brown			14 13 19		
						10 10 7		
105.6						100/5		
			Auger Refusal at 4.0 ft					
	5							
	10							
	15							
	20							

GROUND WATER LEVELS:

ENCOUNTERED: None

UPON COMPLETION: Dry

SAMPLE TYPES: Split Spoon, Bulk, Shelby Tube, Rock Core, Pressuremeter, DCP

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

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PROJECT: Portsmouth Naval Shipyard	LOGGED BY: J. Chokechaitanasin	BORING NUMBER: B-13a
LOCATION: Kittery, Maine	DRILLING CONTRACTOR: New Hampshire Boring, Inc.	SHEET 1 OF 1
OWNER/CLIENT: EwingCole	DRILLER: Walter	DATE STARTED: 5/19/04
PROJECT NUMBER: 24071 / GROUND SURFACE ELEVATION (ft): 109.6	DRILLING METHOD: 2.25" I.D. HSA	DATE COMPLETED: 5/19/04

ELEV. (ft)	DEPTH (ft)	STRATUM	MATERIAL DESCRIPTION	MC (%)	SAMPLE TYPE	BLOW COUNTS	RECOV. (in)	PENETRATION RESISTANCE BLOWS/FOOT (20 40 60 80)
			No Sampling to 2.5 ft.					
107.1			Auger and Spoon Refusal at 2.5 ft			100/1		>>
	5							
	10							
	15							
	20							

GROUND WATER LEVELS:

SAMPLE TYPES:
- Split Spoon
- Bulk
- Shelby Tube
- Rock Core
- Pressuremeter
- DCP

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

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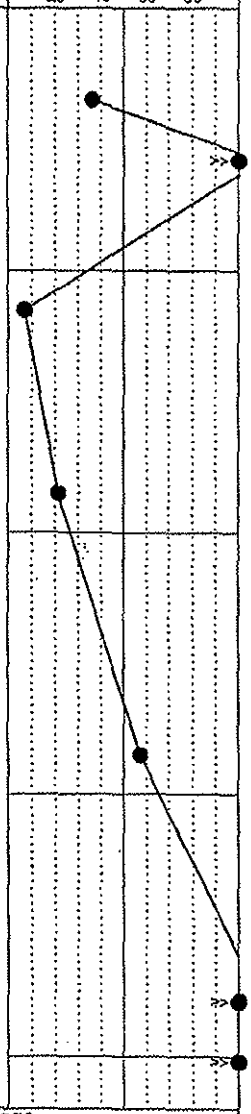
PROJECT: Portsmouth Naval Shipyard	LOGGED BY: J. Chokechaitanasin	BORING NUMBER: B-14
LOCATION: Kittery, Maine	DRILLING CONTRACTOR: New Hampshire Boring, Inc.	SHEET 1 OF 1
OWNER/CLIENT: EwingCole	DRILLER: Walter	DATE STARTED: 5/24/04
PROJECT NUMBER: 24071 / GROUND SURFACE ELEVATION (ft): 109.3	DRILLING METHOD: 2.25" I.D. HSA	DATE COMPLETED: 5/24/04

ELEV. (ft)	DEPTH (ft)	STRATUM	MATERIAL DESCRIPTION	MC (%)	SAMPLE TYPE	BLOW COUNTS	RECOV. (in)
108.8			Concrete = 6 inches				
		A	clayey sand FILL, with gravel, moist, brown			7, 8, 28, 2, 100/2.5	
	5					3, 3, 4	
100.8		B1	LEAN CLAY (CL), with sand, moist, gray-brown			3, 8, 13	
	10						
95.8		B2	clayey SAND (SC), moist, gray			6, 27, 30	
	15						
			with gravel at 18.5 ft.			50, 100/5	
89.1	20		Auger Refusal at 20.2 ft			100/2.5	



GROUND WATER LEVELS:

▽ UPON COMPLETION: 12.8 ft ELEV. 96.5 CAVED: 4.2 ft ELEV. 105.1

SAMPLE TYPES: Split Spoon, Bulk, Shelby Tube, Rock Core, Pressuremeter, DCP

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT 24071, PORTSMOUTH NAVAL SHIPYARD.GPJ GEOCONCEPTS.GDT 7/8/04

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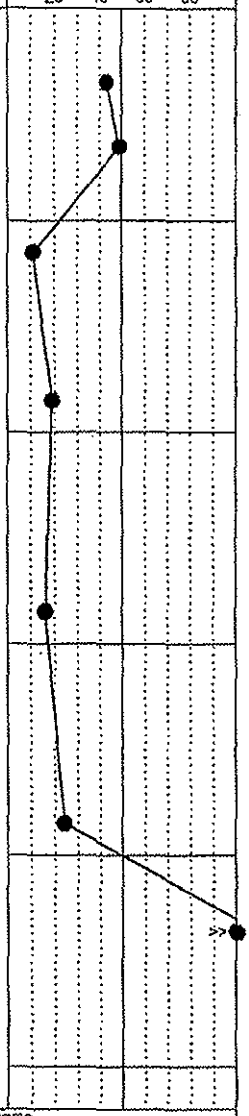
PROJECT: Portsmouth Naval Shipyard	LOGGED BY: J. Chokechaitanasin	BORING NUMBER: B-15
LOCATION: Kittery, Maine	DRILLING CONTRACTOR: New Hampshire Boring, Inc.	SHEET 1 OF 1
OWNER/CLIENT: EwingCole	DRILLER: Walter	DATE STARTED: 5/24/04
PROJECT NUMBER: 24071 / GROUND SURFACE ELEVATION (ft): 109.1	DRILLING METHOD: 2.25" I.D. HSA	DATE COMPLETED: 5/24/04

ELEV. (ft)	DEPTH (ft)	STRATUM	MATERIAL DESCRIPTION	MC (%)	SAMPLE TYPE	BLOW COUNTS	RECOV. (in)
108.6			Asphalt = 6 inches				
		A	clayey sand FILL, with asphalt and gravel, moist, black-brown			25, 22, 21, 30, 30, 19	
	5					11, 6, 5	
100.6							
		B1	LEAN CLAY (CL), with sand, moist, brown-gray			4, 8, 11	
	10						
						1, 6, 10	
	15						
90.6							
		B2	clayey SAND (SC), with gravel, moist, brown			6, 12, 12	
	20						
87.2						100/2	
			Auger and Spoon Refusal at 21.9 ft				
	25						

PENETRATION RESISTANCE BLOWS/FOOT



GROUND WATER LEVELS:

▽ ENCOUNTERED: 6.2 ft ELEV. 102.9

SAMPLE TYPES:

Split Spoon, Bulk, Shelby Tube, Rock Core, Pressuremeter, DCP

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

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Leesburg, VA 20175
703 443-0309
703 589-1592 fax

PROJECT:	LOGGED BY:	BORING NUMBER:
Portsmouth Naval Shipyard	J. Chokechaitanasin	B-16
LOCATION:	DRILLING CONTRACTOR:	
Kittery, Maine	New Hampshire Boring, Inc.	SHEET 1 OF 1
OWNER/CLIENT:	DRILLER:	DATE STARTED:
EwingCole	Walter	5/27/04
PROJECT NUMBER: / GROUND SURFACE ELEVATION (ft):	DRILLING METHOD:	DATE COMPLETED:
24071 / 109.9	2.25" I.D. HSA	5/27/04

ELEV. (ft)	DEPTH (ft)	STRATUM	MATERIAL DESCRIPTION	MC (%)	SAMPLE TYPE	BLOW COUNTS	RECOV. (in)
109.6			Asphalt = 4 inches				
		A	clayey sand FILL, with gravel, moist, brown		Split Spoon	13, 10, 12, 7, 10, 13	
104.9	5	B1	LEAN CLAY (CL), moist, gray-brown		Split Spoon	10, 11, 13	
101.4							
100.9		B2	clayey SAND (SC), with gravel, moist, brown		Split Spoon	16	
100.3		C1	DISINTEGRATED QUARTZITE BEDROCK, moist, gray		Split Spoon	100/4	
	10		Auger and Spoon Refusal at 9.6 ft		Split Spoon	100/2	
	15						
	20						

PENETRATION RESISTANCE BLOWS/FOOT: 20, 40, 60, 80

GROUND WATER LEVELS:

▽ ENCOUNTERED: 9.0 ft ELEV. 100.9

▽ UPON COMPLETION: 8.1 ft ELEV. 101.8

SAMPLE TYPES: Split Spoon, Bulk, Shelby Tube, Rock Core, Pressuremeter, DCP

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

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PROJECT: Portsmouth Naval Shipyard	LOGGED BY: J. Chokechaitanasin	BORING NUMBER: B-17
LOCATION: Kittery, Maine	DRILLING CONTRACTOR: New Hampshire Boring, Inc.	SHEET 1 OF 1
OWNER/CLIENT: EwingCole	DRILLER: Walter	DATE STARTED: 5/25/04
PROJECT NUMBER: 24071 / GROUND SURFACE ELEVATION (ft): 109.3	DRILLING METHOD: 2.25" I.D. HSA	DATE COMPLETED: 5/25/04

ELEV. (ft)	DEPTH (ft)	STRATUM	MATERIAL DESCRIPTION	MC (%)	SAMPLE TYPE	BLOW COUNTS	RECOV. (in)	PENETRATION RESISTANCE BLOWS/FOOT (20 40 60 80)
109.1			Asphalt = 2 inches					
		A	clayey sand FILL, with asphalt, moist, black-brown			13 12 13 13 16		
106.2			Auger Refusal at 3.1 ft			100/5		>>
	5							
	10							
	15							
	20							

GROUND WATER LEVELS:

ENCOUNTERED: None

UPON COMPLETION: Dry

CAVED: 4.2 ft ELEV. 105.1

SAMPLE TYPES: Split Spoon, Bulk, Shelby Tube, Rock Core, Pressuremeter, DCP

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

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PROJECT: Portsmouth Naval Shipyard	LOGGED BY: J. Chokechaitanasin	BORING NUMBER: B-17a
LOCATION: Kittery, Maine	DRILLING CONTRACTOR: New Hampshire Boring, Inc.	SHEET 1 OF 1
OWNER/CLIENT: EwingCole	DRILLER: Walter	DATE STARTED: 5/25/04
PROJECT NUMBER: 24071 / GROUND SURFACE ELEVATION (ft): 109.3	DRILLING METHOD: 2.25" I.D. HSA	DATE COMPLETED: 5/25/04

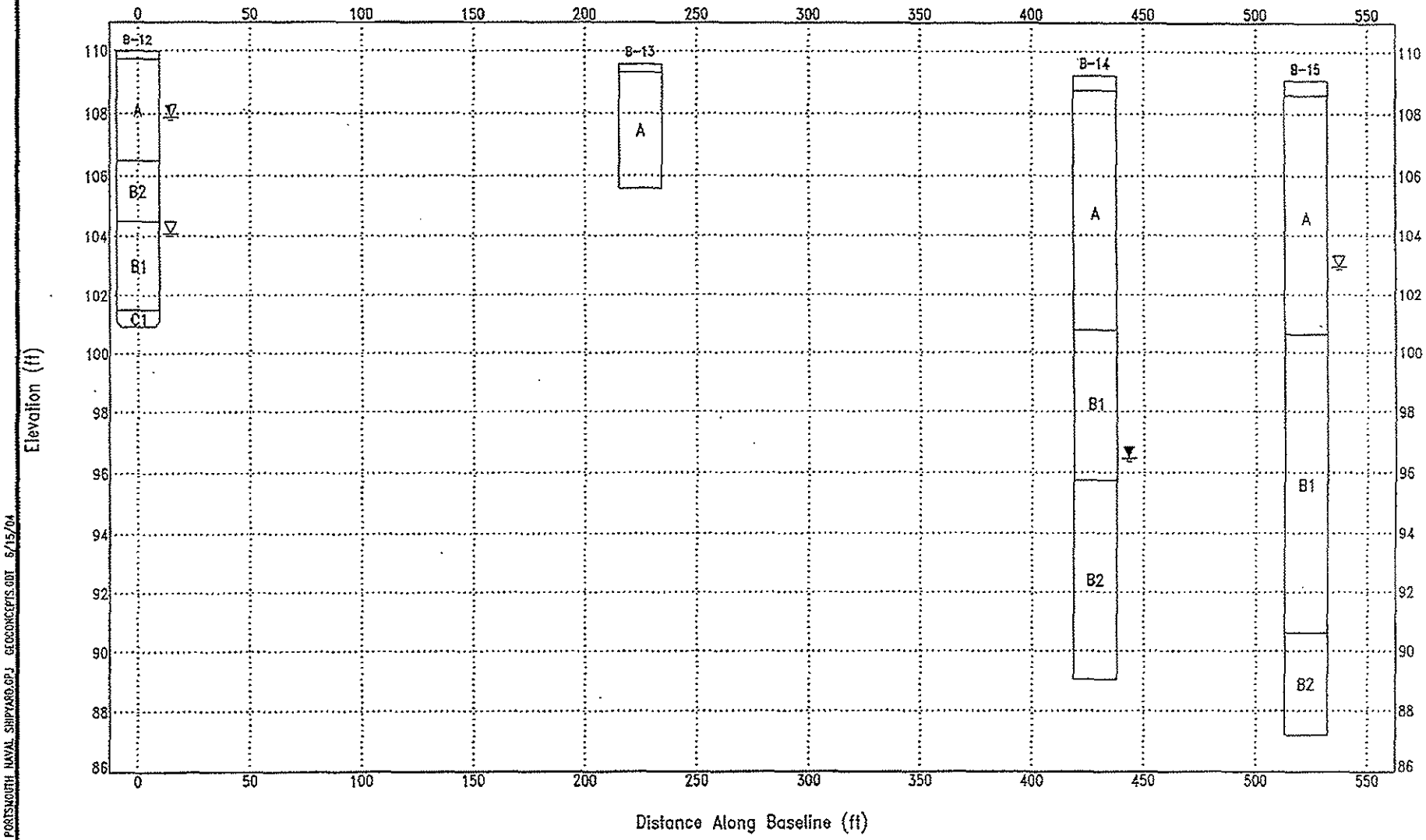
ELEV. (ft)	DEPTH (ft)	STRATUM	MATERIAL DESCRIPTION	MC (%)	SAMPLE TYPE	BLOW COUNTS	RECOV. (in)	PENETRATION RESISTANCE BLOWS/FOOT (20 40 60 80)
			No Sampling to 5 ft.					
104.3	5							
103.8		A	clayey sand FILL, with gravel, moist, brown					
		B2	clayey SAND (SC), with gravel, moist, brown			7 4 3		
101.3			Auger and Spoon Refusal at 8.0 ft			100/2		>>
	10							
	15							
	20							

GROUND WATER LEVELS:

SAMPLE TYPES: Split Spoon, Bulk, Shelby Tube, Rock Core, Pressuremeter, DCP

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.



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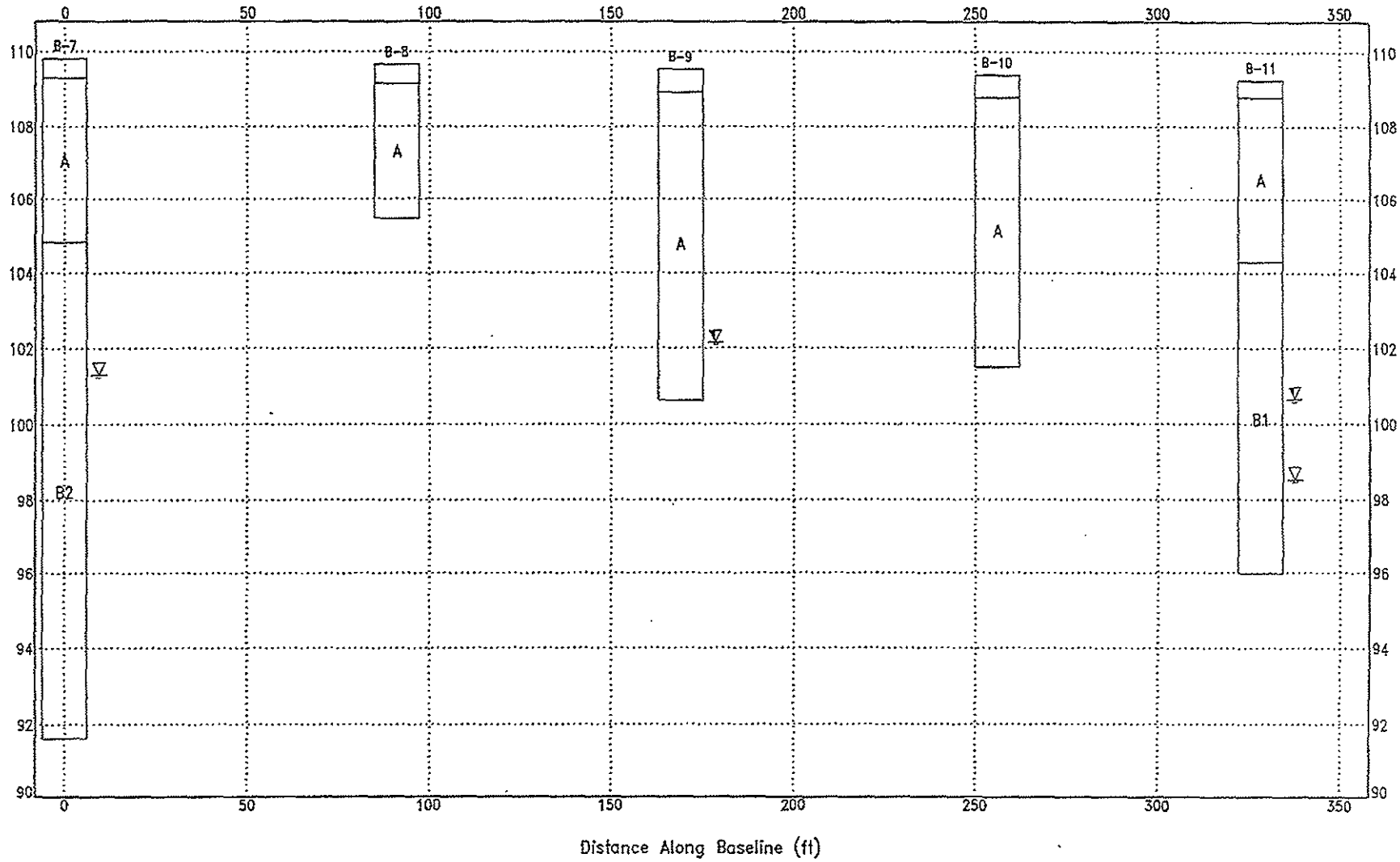
GROUND WATER LEVELS:

- ENCOUNTERED
- UPON COMPLETION
- LONG-TERM

SUBSURFACE PROFILE A-A'

Project: Portsmouth Naval Shipyard
Location: Kittery, Maine
Owner/Client: EwingCole
Project No.: 24071

STRATIGRAPHY & GW 24071, PORTSMOUTH NAVAL SHIPYARD.GPJ GEOCONCEPTS.GDT 6/15/04



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Leesburg, VA 20175

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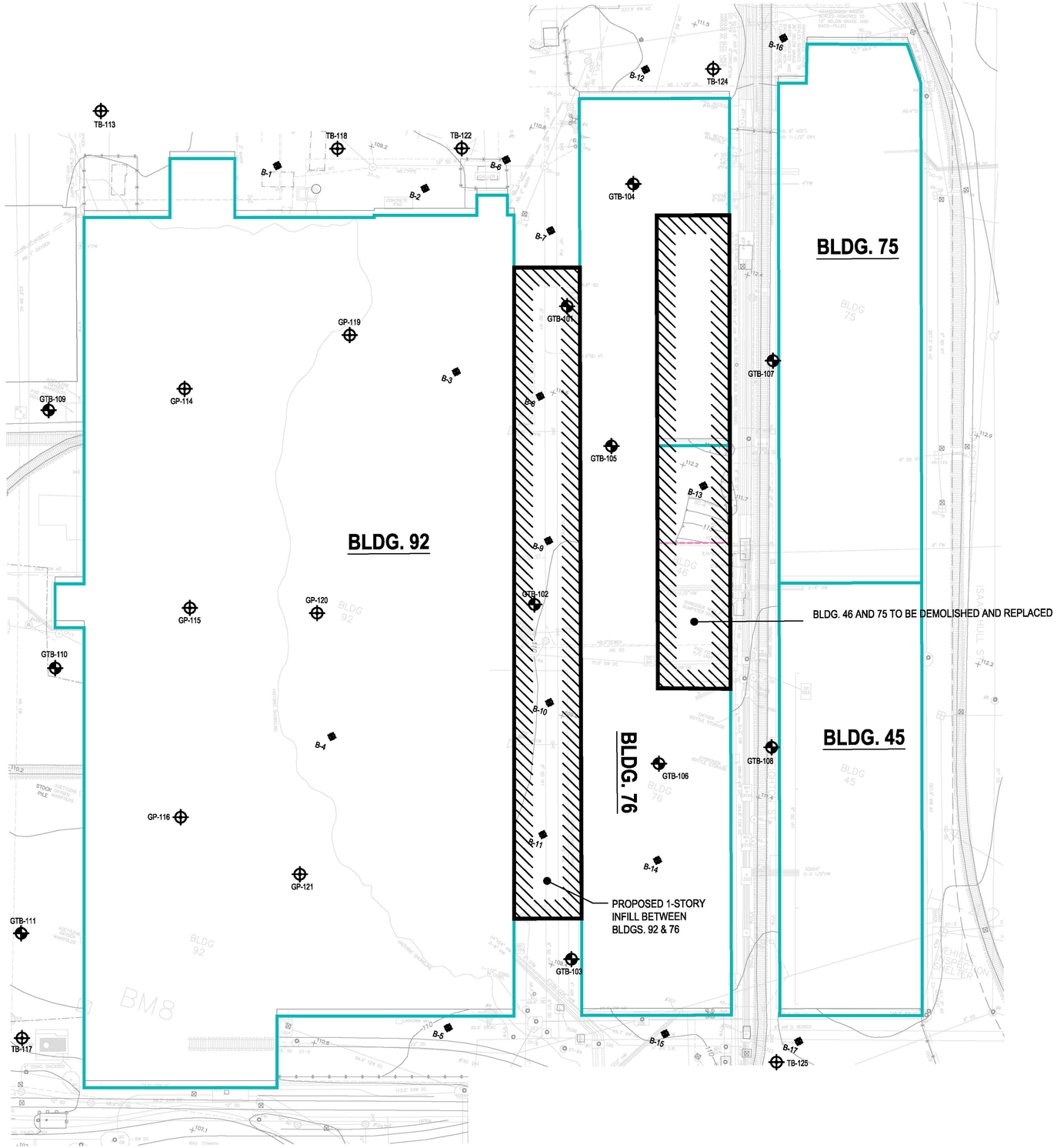
GROUND WATER LEVELS:

- ENCOUNTERED
- UPON COMPLETION
- LONG-TERM

SUBSURFACE PROFILE B-B'

Project: Portsmouth Naval Shipyard
Location: Kittery, Maine
Owner/Client: EwingCole
Project No.: 24071

STRATIGRAPHY & GW 24071, PORTSMOUTH NAVAL SHIPYARD.GPJ GEOCONCEPTS.GDT 6/15/04



1 TEST BORING PLAN
1" = 30'

TEST BORING KEY

GTB-101	GEOTECHNICAL TEST BORING LOCATION (11)
TB-113	ENVIRONMENTAL TEST BORING LOCATION (6)
GP-114	GEOPROBE TEST BORING LOCATION (6)
B-1	PREVIOUS TEST BORING LOCATIONS

WATER LEVELS, WHERE SHOWN, ARE THOSE OBSERVED AT THE TIME NOTED AND MAY NOT REFLECT DAILY OR SEASONAL VARIATIONS IN THE GROUND WATER LEVEL.

THE SUBSURFACE CONDITIONS REVEALED BY THIS STUDY REPRESENT CURRENT CONDITIONS AT THE SPECIFIED TEST LOCATIONS ONLY AND MAY NOT BE INDICATIVE OF CONDITIONS AT OTHER LOCATIONS.

Pennoni Associates Inc.
Engineers • Surveyors • Planners • Landscape Architects
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(610) 231-0600 FAX (610) 231-2033

Pennoni

DATE	NO.	REVISIONS	BY

ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK

PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

TEST BORING LOCATION PLAN
EWING COLE ARCHITECTS
FEDERAL RESERVE BANK BUILDING, 100 N 6TH STREET
PHILADELPHIA, PA 19106-4590

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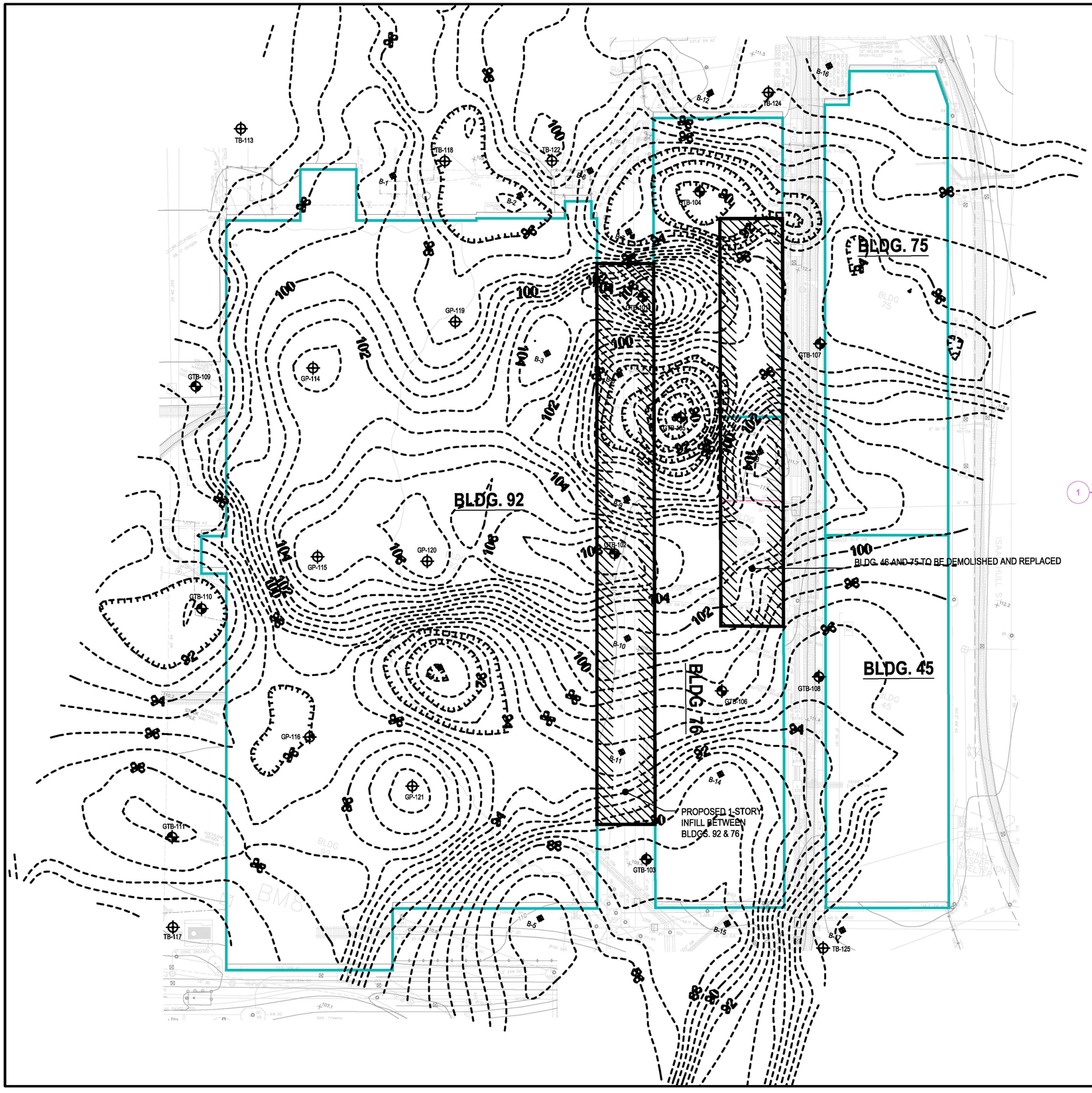
JOB NUMBER
ECCF 1003

1 OF 1

SCALE 1"=30'
DRAWN BY JDT
DATE 12/14/10
APPROVED

DRAWING NO.
TB-1



TEST BORING KEY

GTB-101	GEOTECHNICAL TEST BORING LOCATION (11)
TB-113	ENVIRONMENTAL TEST BORING LOCATION (6)
GP-114	GEOPROBE TEST BORING LOCATION (6)
B-1	PREVIOUS TEST BORING LOCATIONS

TOP OF ROCK CONTOURS SHOWN ARE EXTRAPOLATED FROM ELEVATIONS AT SPECIFIC LOCATIONS (BORINGS, PROBES, ETC.) USING ALGORITHMIC SOFTWARE AND MAY VARY BY A COUPLE OF FEET IN SOME AREAS. REFER TO THE INDIVIDUAL TEST BORING LOGS FOR MORE DEFINITIVE DEPTHS/ELEVATIONS AT SPECIFIC LOCATIONS.

GROUND SURFACE ELEVATIONS AT THE BORING LOCATIONS WERE DEVELOPED FROM TOPOGRAPHIC DATA PROVIDED BY OTHERS.

1 TEST BORING PLAN
1" = 30'

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Pennoni

DATE	NO.	REVISIONS	BY

ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK

PORTSMOUTH NAVAL SHIPYARD

KITTERY, MAINE

TOP OF ROCK CONTOUR PLAN

EWING COLE ARCHITECTS

FEDERAL RESERVE BANK BUILDING, 100 N 6TH STREET
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JOB NUMBER	ECCF 1003
	1 OF 1
SCALE	1"=30'
DRAWN BY	JDT
DATE	01/04/11
APPROVED	
DRAWING NO.	TOR-1

APPENDIX B

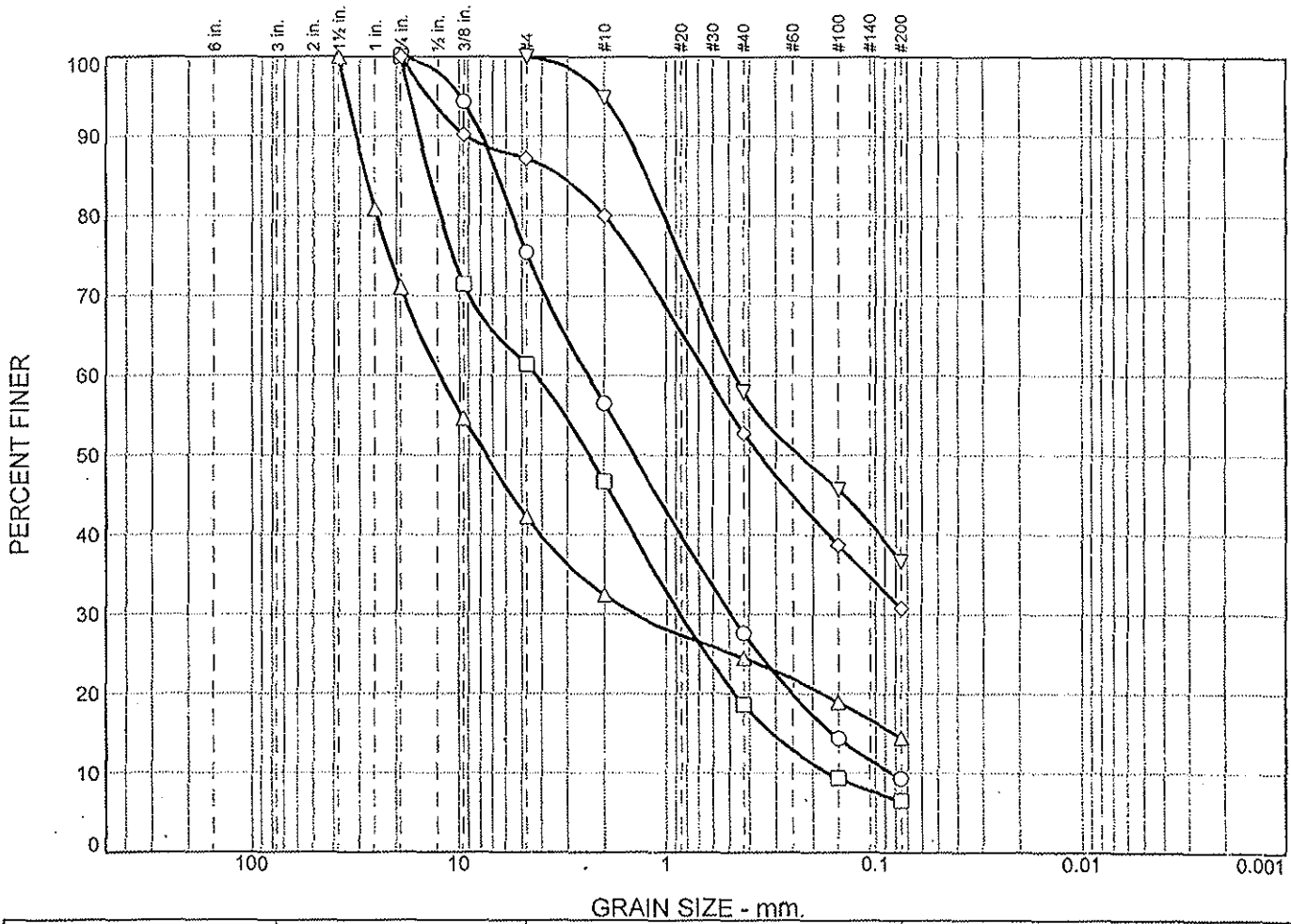
Laboratory Data

SUMMARY OF LABORATORY DATA

BORING NUMBER	SAMPLE NUMBER	DEPTH (ft)	SOIL GROUP SYMBOL	GRAIN SIZE DISTRIBUTION			PLASTICITY				MOISTURE CONTENT w %	VOLUMETRIC				COMPACTION DATA			PERMEABILITY (E-6 CM/SEC)	FALLING/CONSTANT HEAD	CALIFORNIA BEARING RATIO (CBR) %	SHEAR STRENGTH		
				GRAVEL %	SAND %	SILT/CLAY %	LIQUID LIMIT w_l	PLASTIC LIMIT w_p	PLASTICITY INDEX I_p	LIQUIDITY INDEX I_L		SPECIFIC GRAVITY (G)	DRY UNIT WEIGHT (pcf)	VOID RATIO (e)	DEGREE OF SATURATION %	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE CONTENT %	STANDARD/MODIFIED				UNCONFINED COMPRESSIVE STRENGTH (tsf)	COHESION (tsf)	AXIAL STRAIN (%)
GTB-101	S-1	0.5-2'	SW-SM	25	66	9					7.8													
GTB-103	S-2	2-4'	SW-SM	39	55	6					4.0													
	S-4	6-8'	GM	58	28	14					9.6													
GTB-104	S-2	2-4'	SM	13	56	31					31.8													
	S-3	4-6'	SM		63	37					21.3	~2.73	106.9	0.59	98									
GTB-106	S-2	2-4'	SP-SM	12	79	9					7.0													
	S-3	4-6'	ML				33	24	9	-0.6	24.0	~2.73	108.0	0.58	88									
	S-4	6-8'	CL-ML				29	22	7	0.0	22.0													
	S-5	8-10'	SM	4	75	21					18.7													
GTB-109	S-1	0.5-2'	GW	70	27	3					1.4													
	S-3	4-6'	SM	23	62	15					10.6													
	S-7	19-21'			11	89					31.4													
GTB-110	S4&5	6-10'	SM	40	44	16					21.2													
GTB-111	S-5	8-10'	SM	9	70	21					23.6													
	S-6	14-16'	GM	55	33	12					13.1													

PENNONI ASSOCIATES INC.	DRAWN BY: RJR CHECKED BY:	DATE: 11/11/2010 DATE:	PROJECT: STRUCTURAL SHOPS ADD'N-PNSY LOCATION: KITTERY, ME.
			JOB No.: ECCF 1003.01 TABLE No.: L 1

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

MATERIAL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	GTB-101	S-1	0.5-2'	MCF SAND, SOME F GRAVEL, TRACE SILT	SW-SM
□	GTB-103	S-2	2-4'	MCF SAND AND F GRAVEL, TRACE SILT	SW-SM
△	GTB-103	S-4	6-8'	CF GRAVEL, SOME CFM SAND, LITTLE SILT	GM
◇	GTB-104	S-2	2-4'	FMC SAND, SOME SILT, LITTLE F GRAVEL	SM
▽	GTB-104	S-3	4-6'	FM SAND AND SILT	SM

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Bethlehem, PA

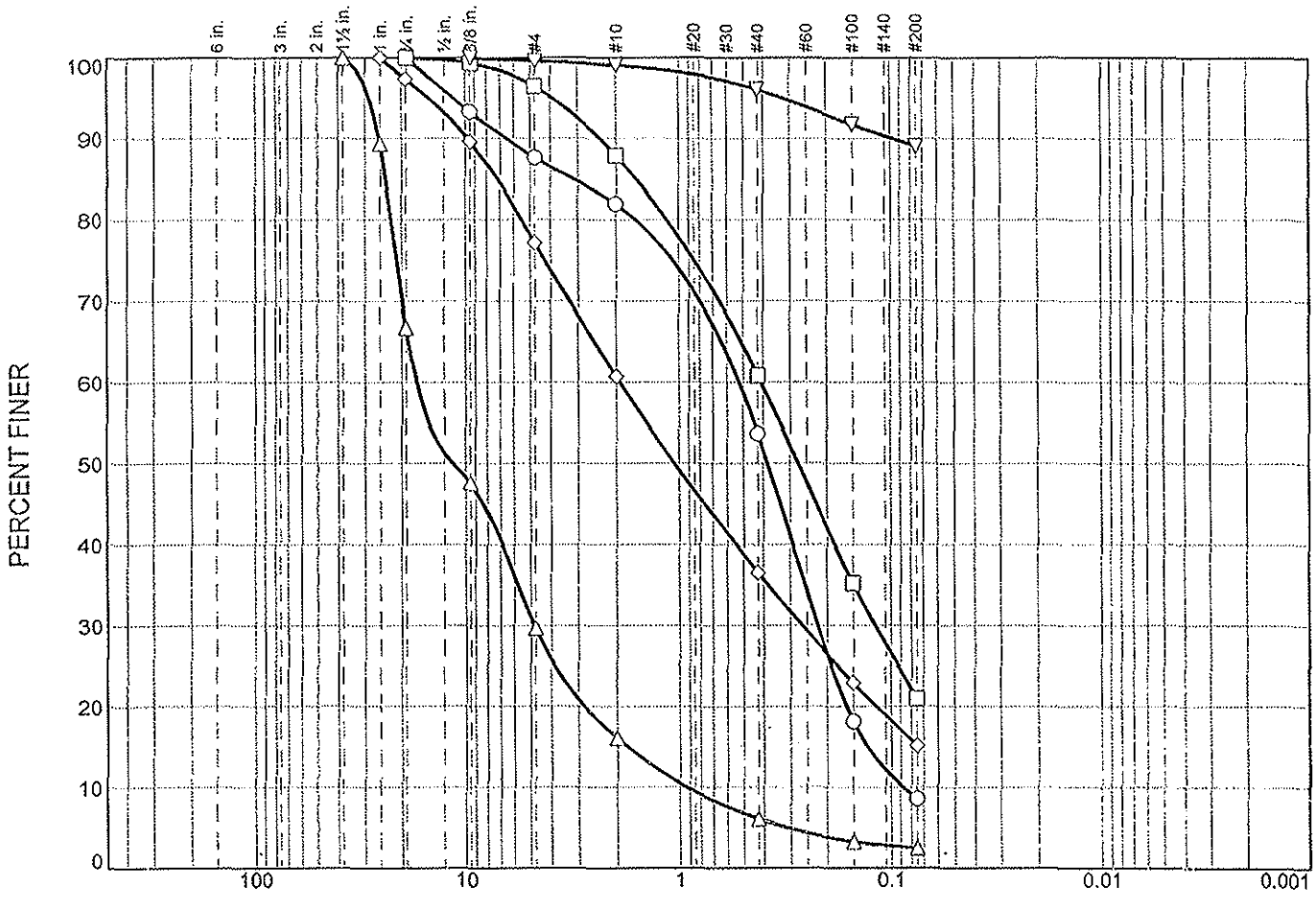
Client: Ewing Cole Architects

Project: Structral Shops Add'n PNSY Kittery ME

Project No.: ECCF 1003.01

Figure S-1

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

MATERIAL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	GTB-106	S-2	2-4'	FM SAND, LITTLE F GRAVEL, TRACE SILT	SP-SM
□	GTB-106	S-5	8-10'	FNC SAND, SOME SILT, TRACE F GRAVEL	SM
△	GTB-109	S-1	0.5-2'	FC GRAVEL, SOME CMF SAND, TRACE SILT	GW
◇	GTB-109	S-3	4-6'	MFC SAND, SOME FC GRAVEL, LITTLE SILT	SM
▽	GTB-109	S-7	19-21'	SILT, LITTLE FM SAND	

PENNONI ASSOCIATES INC.

Bethlehem, PA

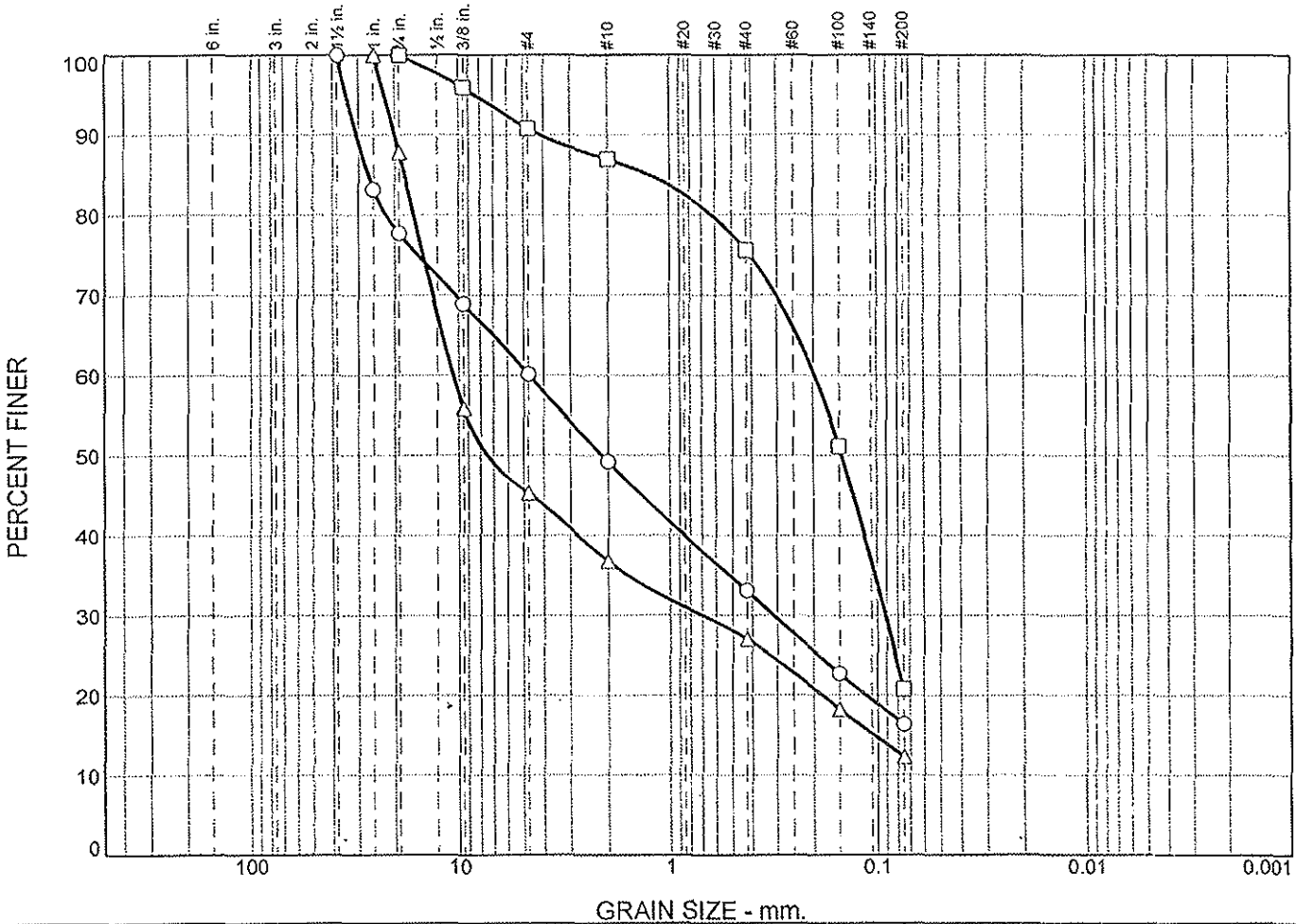
Client: Ewing Cole Architects

Project: Structral Shops Add'n PNSY Kittery ME

Project No.: ECCF 1003.01

Figure S-2

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

MATERIAL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	GTB-110	S-4&5	6-10'	FMC SAND AND CF GRAVEL, LITTLE SILT	SM
□	GTB-111	S-5	8-10'	FM SAND, SOME SILT, TRACE F GRAVEL	SM
△	GTB-111	S-6	14-16'	FC GRAVEL, SOME FMC SAND, LITTLE SILT	GM

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Bethlehem, PA

Client: Ewing Cole Architects

Project: Structral Shops Add'n PNSY Kittery ME

Project No.: ECCF 1003.01

Figure S-3

LABORATORY TESTING PROCEDURES

All testing is either done in accordance with the indicated ASTM Designation-latest edition, or with other standard or generally accepted engineering practice as described:

1. Consolidation Test of Soils
   Preparation of samples and testing procedures generally follow the methods described in Lambe, op. Cit. In addition, the time of loading may be selected on the basis of:

   a. Controlled rate of percent of consolidation
   b. Controlled pore pressure gradient
   c. Controlled strain

   The method of test is selected to suit the soil type in question and the test is conducted in accordance with generally accepted engineering practice.

2. Atterberg Limits – Plasticity Indices
   a. Liquid limit of soils, ASTM D 4318
   b. Plastic limit and plasticity index of soils, ASTM D 4318
   c. Shrinkage factors of soils, ASTM D 427

   (Moisture content is also determined with the Atterberg Limit test, and liquidity index is also computed)

3. Moisture Content of Soil
   ASTM D 2216

4. Particle Size Analysis of Soils
   ASTM D 421, Dry preparation of soil samples; ASTM D 422, Sieve and/or hydrometer analysis.

5. Triaxial Compression Test of Soils
   Sample preparation, apparatus, and testing generally follow the procedures outlined in Soil Testing for Engineers, T.W. Lambe, John Wiley & Sons, Inc., New York, 1951 and in The Measurement of Soil Properties in the Triaxial Test, Alan W. Bishop & D.J. Henkel, 2nd Edition, St. Martin's Press, New York, 1962

6. Unconfined Compression Strength of Cohesive Soil
   ASTM D 2166

7. Specific Gravity of Soils
   ASTM D 854

8. Unit Weight Determination of Soils
   See ASTM D 2166 for preparation of specimen except that sample size may differ. For moisture content see ASTM D 2216.

9. Visual Identification of Soil Samples
   All soil samples are visually identified and/or classified. The classification system used is shown in Table L-1.

10. Identification of Rock
    Rock core samples are identified by the character and appearance of newly fractured surfaces of unweathered pieces, by core conditions and characteristics, and by the determination of simple physical and chemical properties.

11. Compaction Test of Soils
    a. Moisture-density relations of soils using 5.5 lb. hammer and 12 in. drop, ASTM D 698
    b. Moisture-density relations of soils using 10 lb. hammer and 18 in. drop, ASTM D 1557

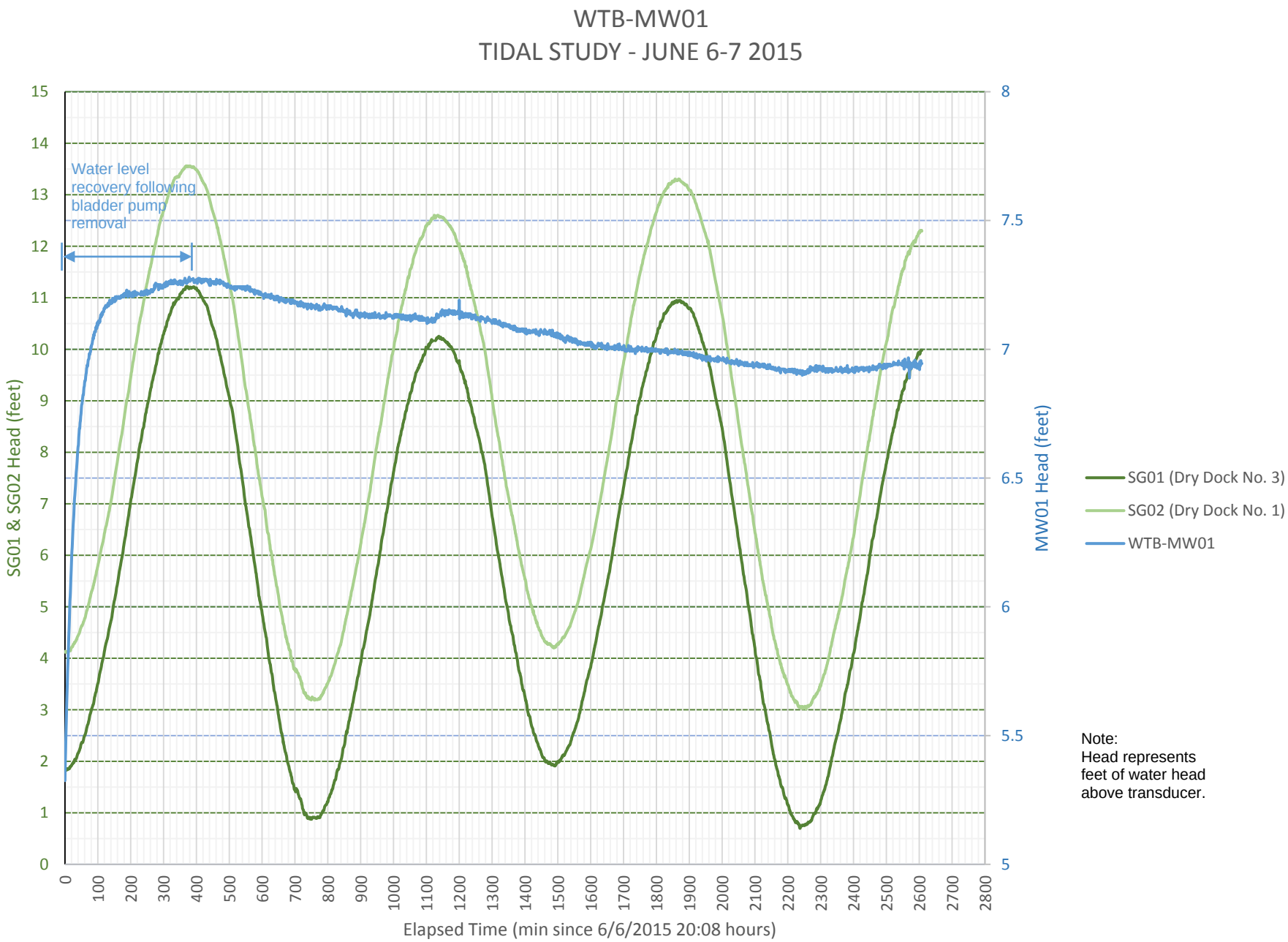
12. Maximum and Minimum Densities of Granular Soils
    Testing procedures follow D.M. Burmeister, "Suggested Method of Test for Maximum and Minimum Densities of Granular Soils" cited in Proceedings for Testing Soils, Fourth Edition, ASTM, Philadelphia. 1964, pp 175-177.

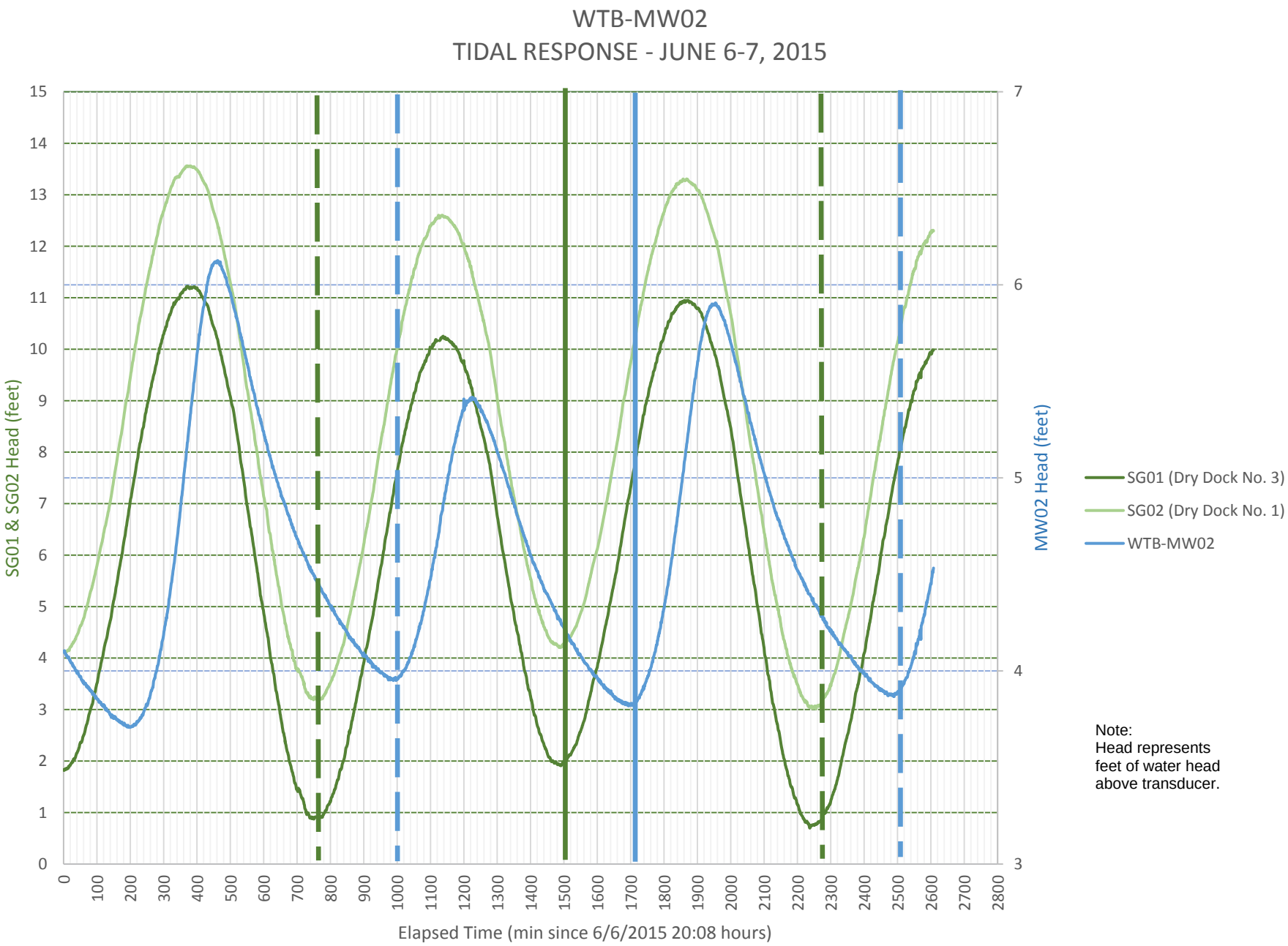
13. Bearing Ratio of Laboratory Compacted Soils
    ASTM D 1883 (Sometimes called California Bearing Ratio or CBR)

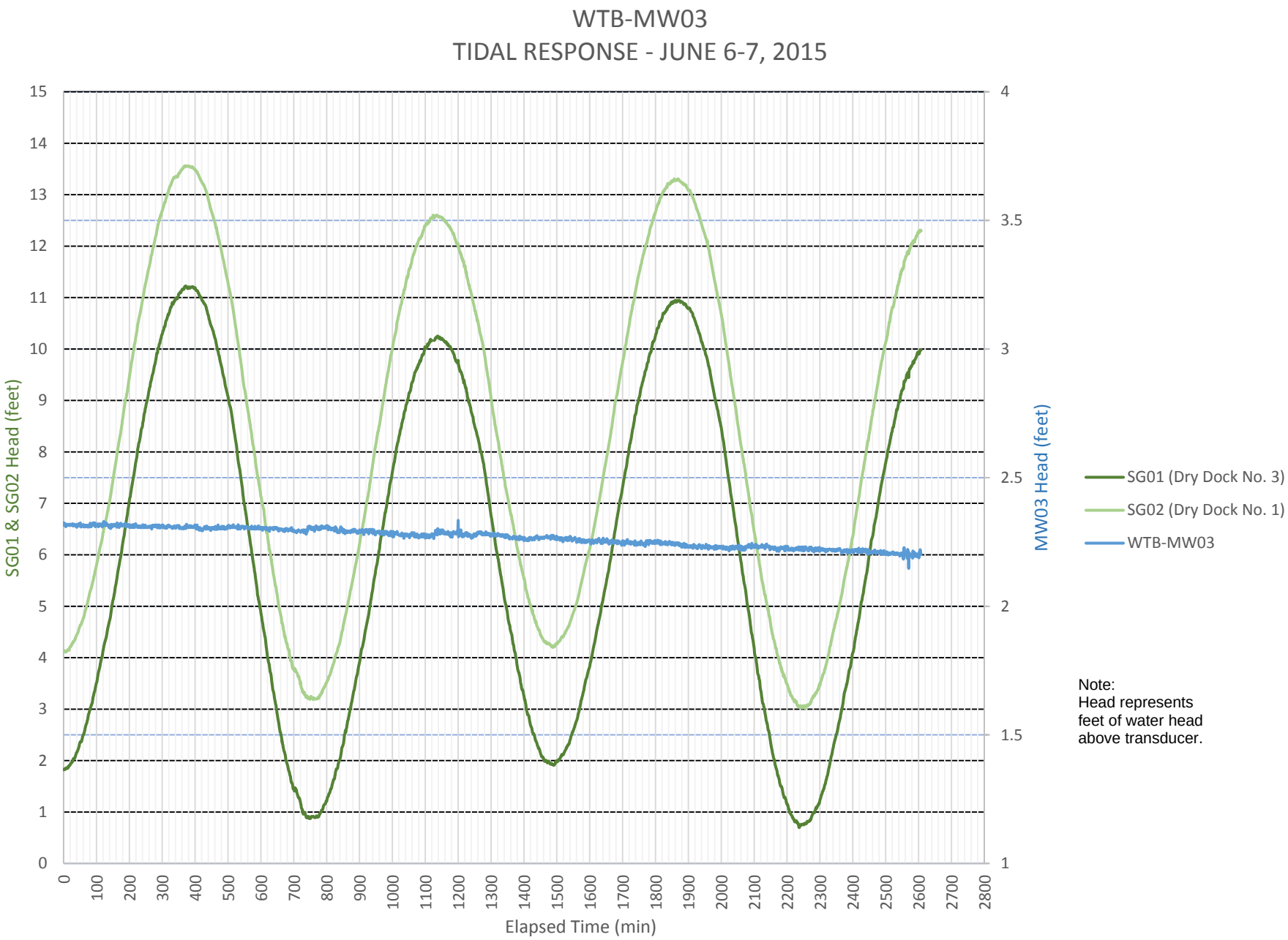
14. Organic Content
    A modified dichromate oxidation method using ferrous ammonium sulfate is employed in determining the percent of organic matter in soil.

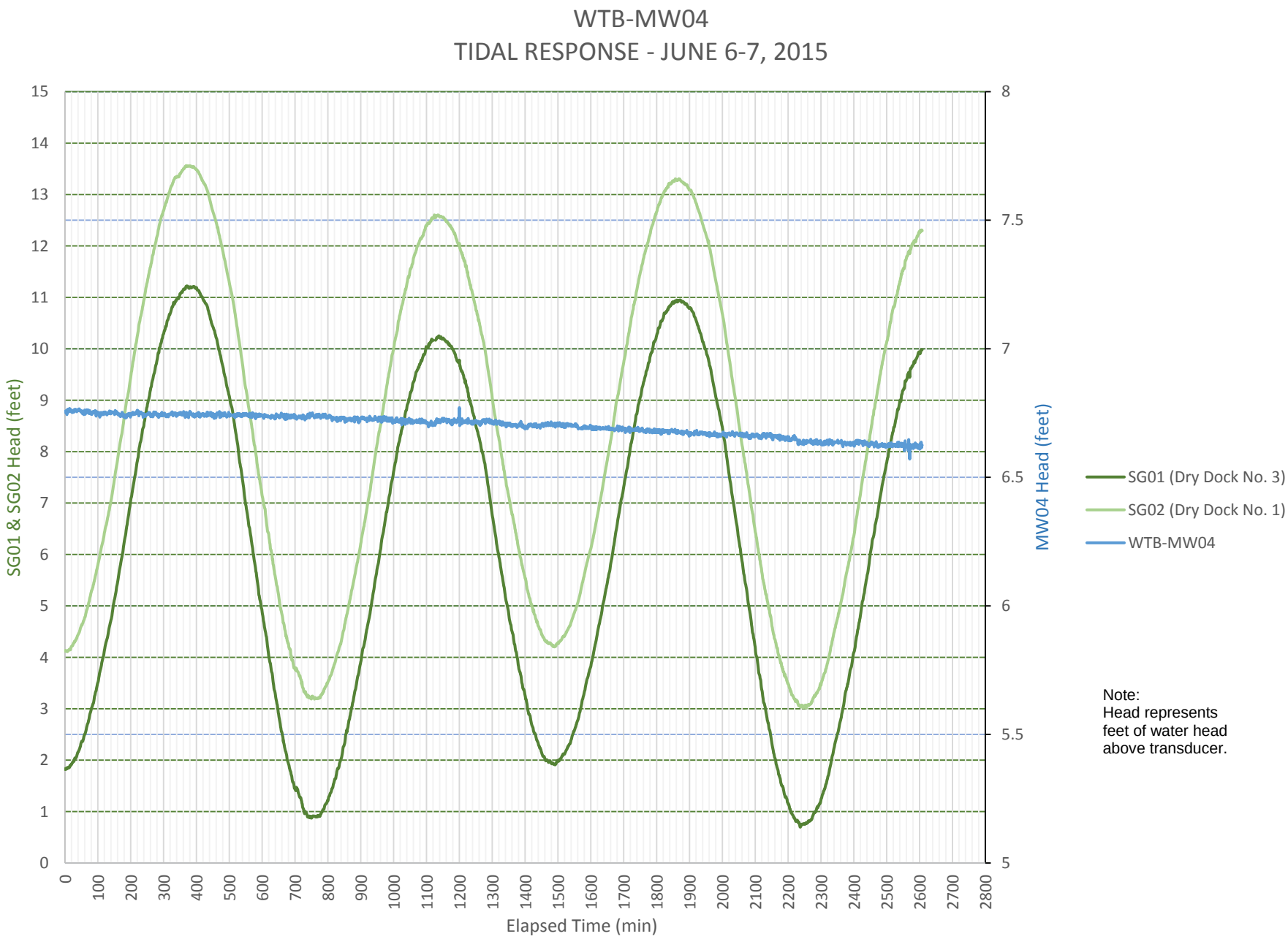
A.3 TIDAL LAG STUDY

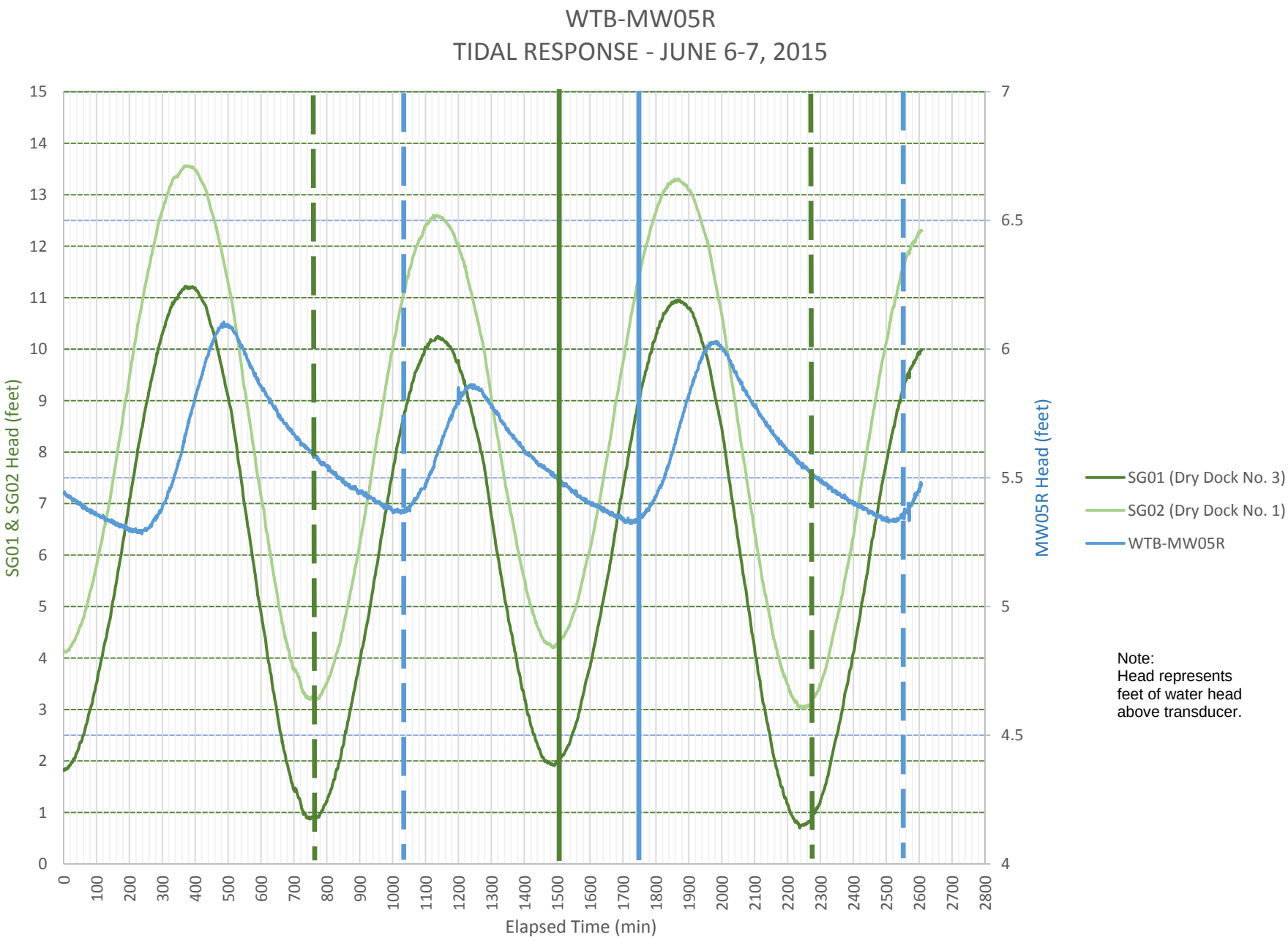
(ON CD)

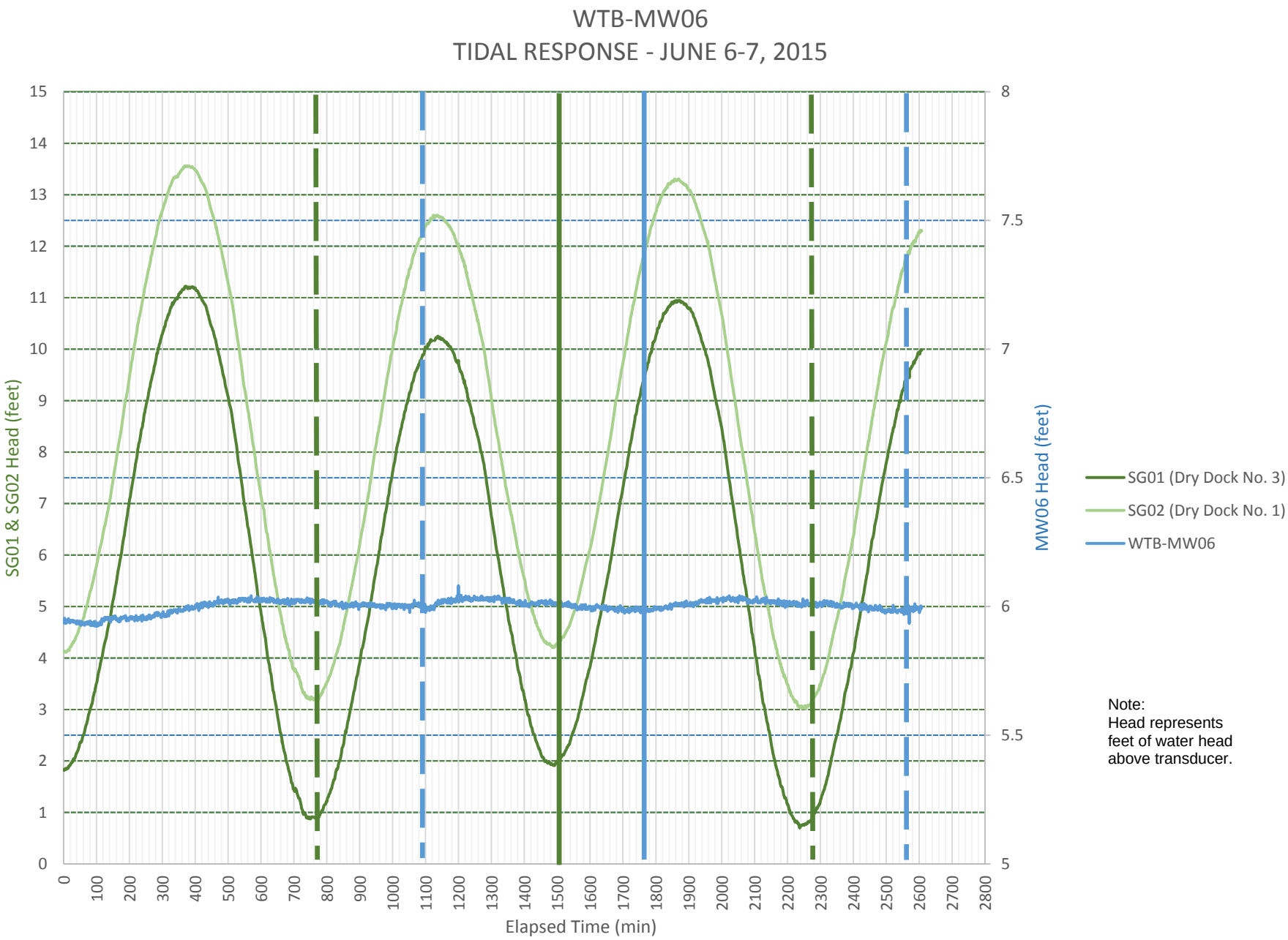

WTB-MW01
TIDAL STUDY - JUNE 6-7 2015
Water level recovery following bladder pump removal
SG01 & SG02 Head (feet)
MW01 Head (feet)
Elapsed Time (min since 6/6/2015 20:08 hours)
SG01 (Dry Dock No. 3)
SG02 (Dry Dock No. 1)
WTB-MW01
Note:
Head represents feet of water head above transducer.

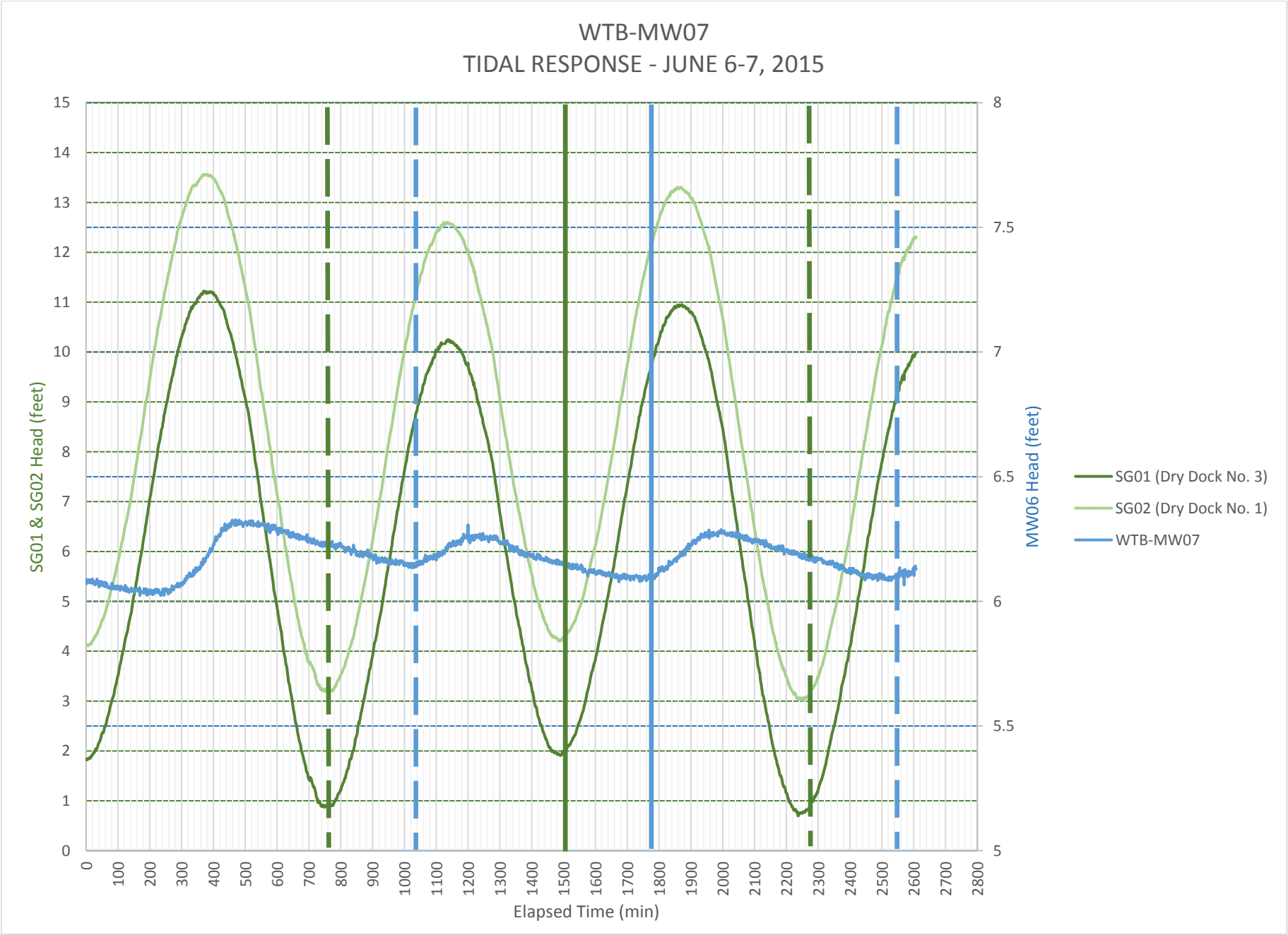

WTB-MW02
TIDAL RESPONSE - JUNE 6-7, 2015
SG01 & SG02 Head (feet)
MW02 Head (feet)
Elapsed Time (min since 6/6/2015 20:08 hours)
SG01 (Dry Dock No. 3)
SG02 (Dry Dock No. 1)
WTB-MW02
Note:
Head represents
feet of water head
above transducer.


WTB-MW03
TIDAL RESPONSE - JUNE 6-7, 2015
SG01 & SG02 Head (feet)
MW03 Head (feet)
Elapsed Time (min)
SG01 (Dry Dock No. 3)
SG02 (Dry Dock No. 1)
WTB-MW03
Note:
Head represents
feet of water head
above transducer.


WTB-MW04
TIDAL RESPONSE - JUNE 6-7, 2015
SG01 & SG02 Head (feet)
MW04 Head (feet)
Elapsed Time (min)
SG01 (Dry Dock No. 3)
SG02 (Dry Dock No. 1)
WTB-MW04
Note:
Head represents
feet of water head
above transducer.


WTB-MW05R
TIDAL RESPONSE - JUNE 6-7, 2015
SG01 & SG02 Head (feet)
MW05R Head (feet)
Elapsed Time (min)
SG01 (Dry Dock No. 3)
SG02 (Dry Dock No. 1)
WTB-MW05R
Note:
Head represents
feet of water head
above transducer.


WTB-MW06
TIDAL RESPONSE - JUNE 6-7, 2015
SG01 & SG02 Head (feet)
MW06 Head (feet)
Elapsed Time (min)
SG01 (Dry Dock No. 3)
SG02 (Dry Dock No. 1)
WTB-MW06
Note:
Head represents
feet of water head
above transducer.


WTB-MW07
TIDAL RESPONSE - JUNE 6-7, 2015
SG01 & SG02 Head (feet)
MW06 Head (feet)
Elapsed Time (min)
SG01 (Dry Dock No. 3)
SG02 (Dry Dock No. 1)
WTB-MW07

TIDAL STUDY SUMMARY
OU8 RI
PORTSMOUTH NSY
KITTERY ME

Well	Tidal Influence	Tidal Range (feet)	Tidal Lag (min)			
			Cycle 1	Cycle 2	Cycle 3	Average
WTB-MW01	N	N/A	N/A	N/A	N/A	N/A
WTB-MW02	Y	2.0	240	230	230	230
WTB-MW03	N	N/A	N/A	N/A	N/A	N/A
WTB-MW04	N	N/A	N/A	N/A	N/A	N/A
WTB-MW05R	Y	0.7	250	240	290	260
WTB-MW06	Y	0.1	350	260	290	300
WTB-MW07	Y	0.2	290	280	280	280

N/A =not applicable

A.4 SLUG TESTS

(ON CD)

TETRA TECH

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: OU8 RI WELL/BORING NO.: WTB-MW02

PROJECT NO.: 112G03270 GEOLOGIST: T. Evans

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: Rising01

STATIC WATER LEVEL (Depth/Elevation): 8.42' @ 1443 DATE: 6-9-15

TEST TYPE (Rising/Falling/Constant Head): Rising CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: Slug (2.72' x 0.125'ø) PAGE 1 OF

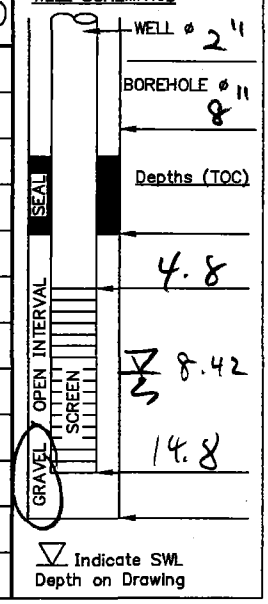
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOVL

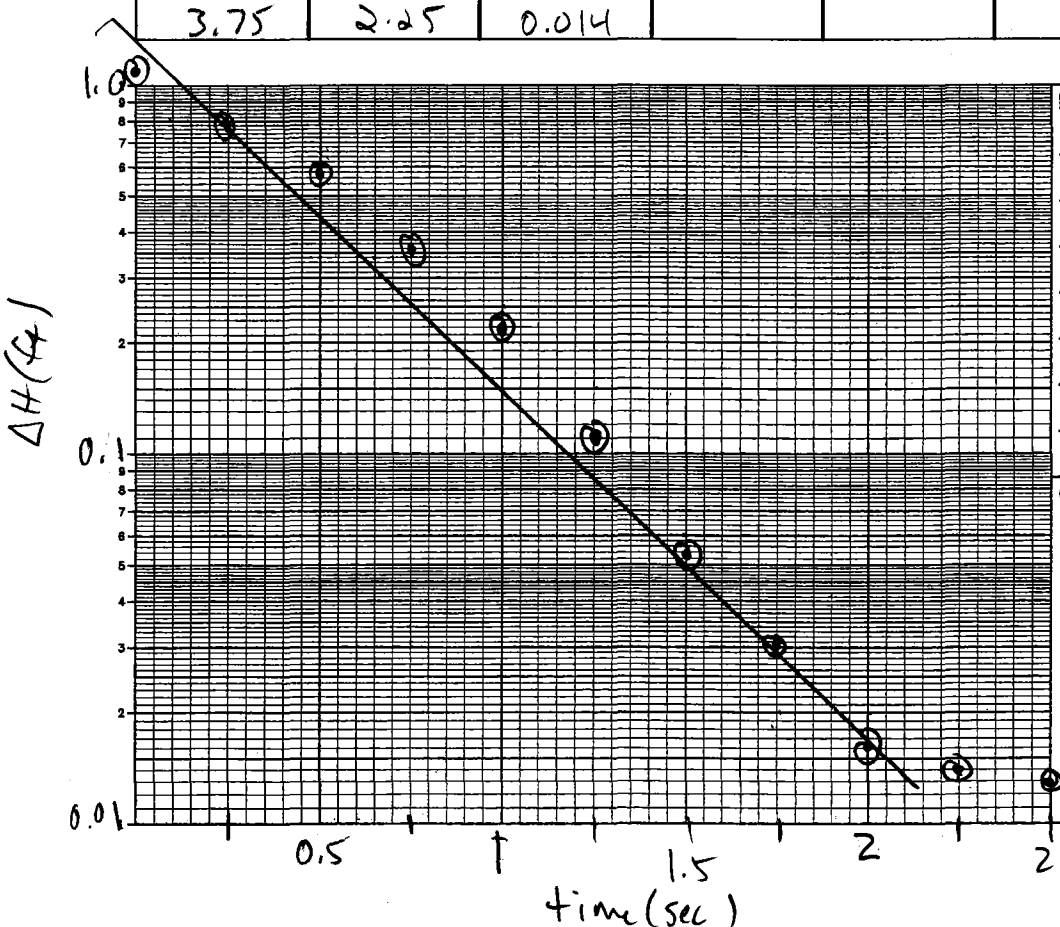
ACAD: FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	~~MEASURED WATER LEVEL (feet)~~	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	~~MEASURED WATER LEVEL (feet)~~	DRAWDOWN OR HEAD (ΔH) (feet)
0	ET t_0	0.002	4.00	2.50	0.013
1.5	0	1.077	4.25	2.75	0.008
			4.50		
1.75	0.25	0.776	4.75		
2.00	0.50	0.584	5.00		
2.25	0.75	0.360	5.25		
2.50	1.00	0.214	5.50		
2.75	1.25	0.106			
3.00	1.50	0.053			
3.25	1.75	0.031			
3.50	2.00	0.016			
3.75	2.25	0.014			

$t_0 \rightarrow$

WELL SCHEMATIC





REMARKS:
XD = InSitu Level Troll 700
S/N 383781
Vented / 69' Range
WL = 8.42 @ 1453
XD @ 5.77' H2O
Start @ 1458
End @ 1502
WL = 8.51' @ 1500

CALCS, SKETCH MAPS, ETC.:
Slug ≈ Δ 1.5' H2O

TETRA TECH

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: OU8 RI WELL/BORING NO.: WTR-MW02

PROJECT NO.: 112G03270 GEOLOGIST: T. Evans

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 4.8-14.8' TEST NO.: Rising 02

STATIC WATER LEVEL (Depth/Elevation): 8.41 @ 1514 DATE: 6-9-15

TEST TYPE (Rising/Falling/Constant Head): Rising CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: Slug 2.72' x 0.125'ϕ PAGE 1 OF

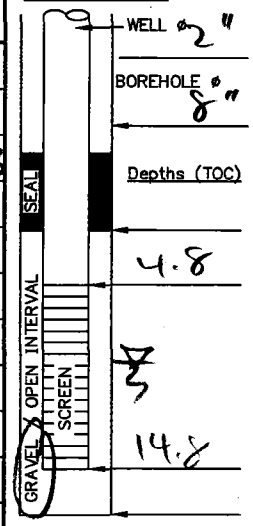
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ACAD: FORM_HYDCONTST.dwg 07/06/99 INL

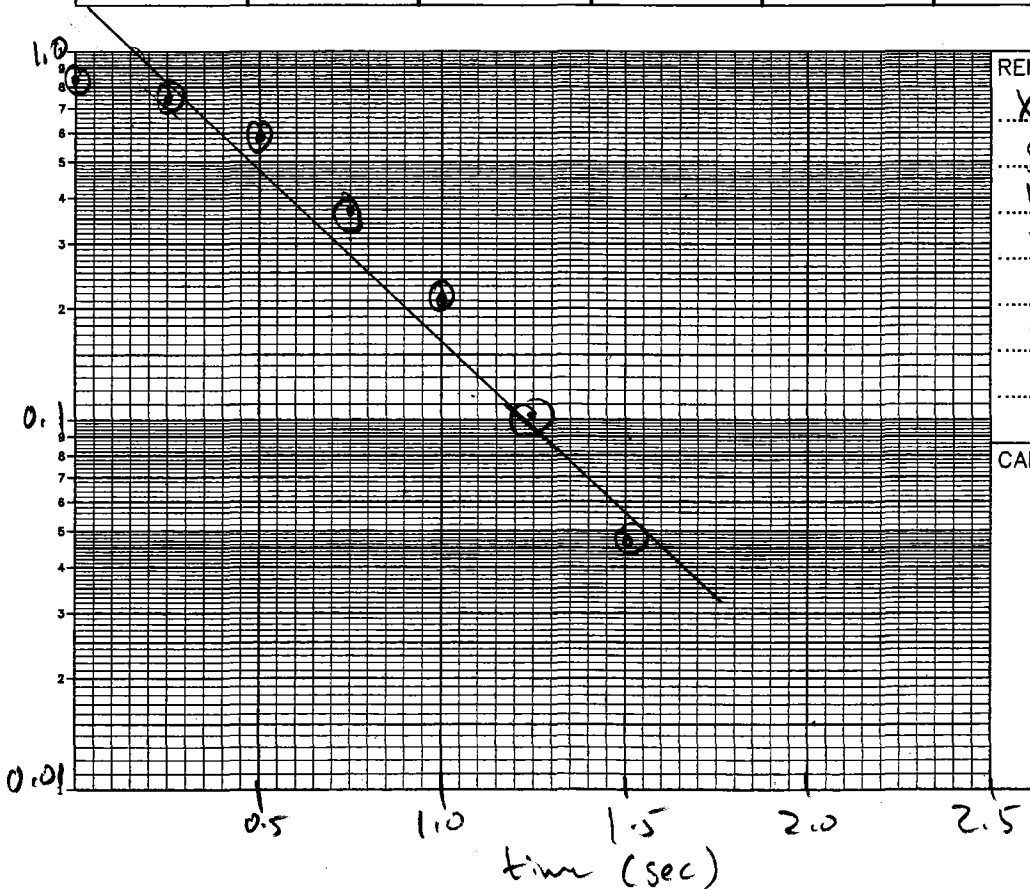
ELAPSED TIME (min. or sec.)	~~MEASURED WATER LEVEL (feet)~~	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	~~MEASURED WATER LEVEL (feet)~~	DRAWDOWN OR HEAD (ΔH) (feet)
0	ET_{t_0}	0.001			
1.0	0	0.833	1.25	0.25	0.749
1.5	0.5	0.599	1.75	0.75	0.373
2.0	1.0	0.212	2.25	1.25	0.102
2.5	1.5	0.046			
3.0	2.0	0.006			
3.5	2.5	-0.001			
4.0					
4.5					
5.0					

t_0 →

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

XD

S/N

WL = 8.41' @ 1514

XD @ 5.77' H_2O

Start @ 1518

End @ 1525

WL = 8.48'

CALCS, SKETCH MAPS, ETC.:

TETRA TECH

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: OU8 RI PNSY WELL/BORING NO.: WTB-MW03

PROJECT NO.: 112G03270 GEOLOGIST: T. EVANS

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 5.8-15.8' TEST NO.: Rising 02

STATIC WATER LEVEL (Depth/Elevation): 9.92' DATE: 6-10-15

TEST TYPE (Rising/Falling/Constant Head): Rising CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: PVC, slug 2.72' X 0.125'ø PAGE 1 OF

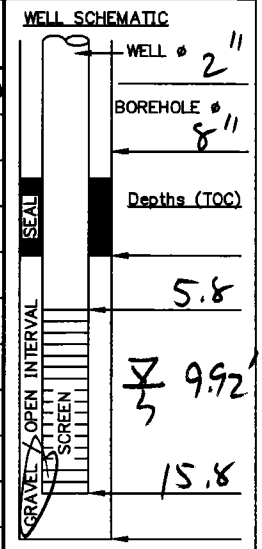
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TPVC

ACAD: FORM_HYDCONTST.dwg 07/06/99 INL

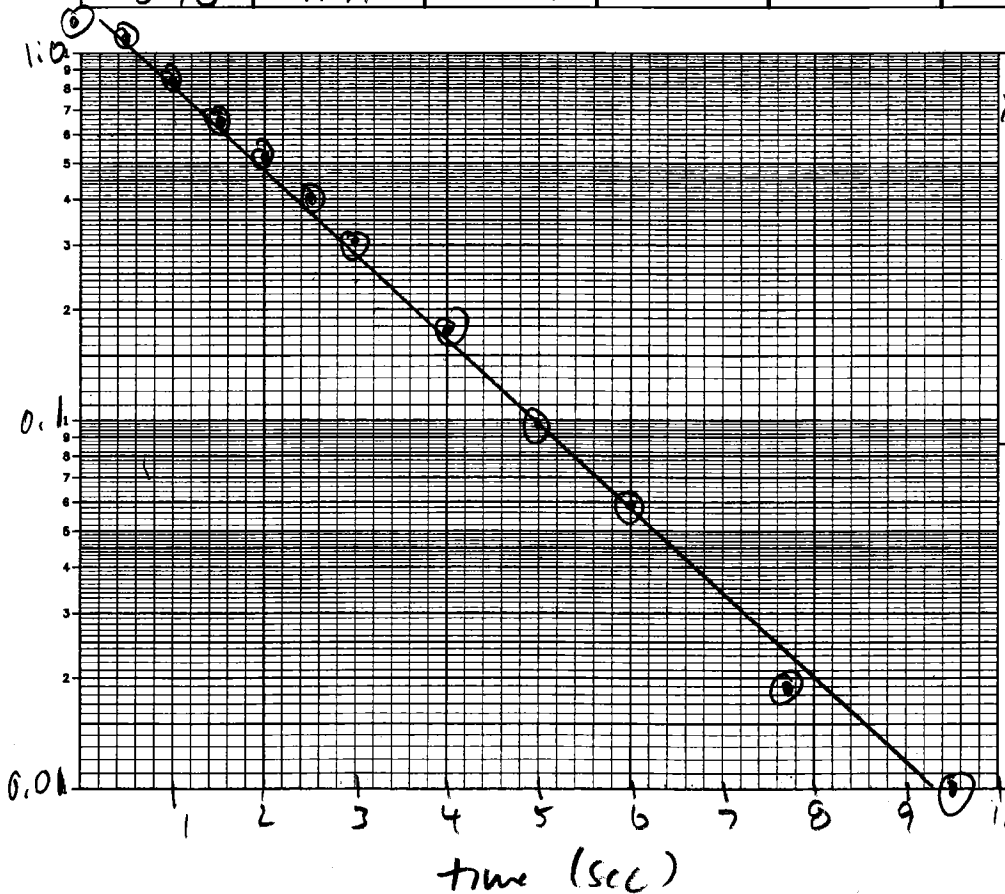
ELAPSED TIME (min. or sec.)	~~MEASURED WATER LEVEL (feet)~~	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	~~MEASURED WATER LEVEL (feet)~~	DRAWDOWN OR HEAD (ΔH) (feet)
0	ET_{t_0}	-0.006	9.48	8.73	0.010
0.75	0.0	1.298			
1.25	0.5	1.04			
1.75	1.0	0.828			
2.25	1.5	0.656			
2.75	2.0	0.511			
3.25	2.5	0.401			
3.75	3.0	0.310			
4.75	4.0	0.175			
5.75	5.0	0.098			
6.72	5.98	0.059			
8.46	7.71	0.019			

t_0 →

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

XD = In Situ Level Troll 700
S/N 383781
WL = 9.92' @ 1127
XD @ 5.3' H_2O
Start @ 1130
End @ 1134
WL = 9.92 @ 1134

CALCS, SKETCH MAPS, ETC.:

Slug ≈ Δ1.5' H_2O

TETRA TECH

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: OU8 RI PNSY WELL/BORING NO.: WTB-MW03

PROJECT NO.: 112G03270 GEOLOGIST: T. Evans

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 5.8-15.8' TEST NO.: Rising 01

STATIC WATER LEVEL (Depth/Elevation): 9.92' DATE: 6-10-15

TEST TYPE (Rising/Falling/Constant Head): Rising CHECKED:

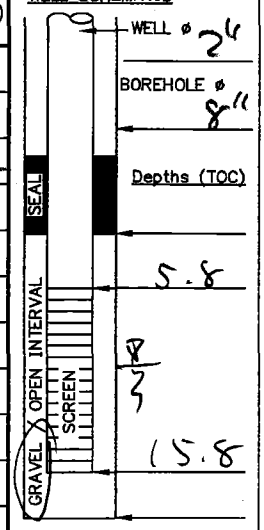
METHOD OF INDUCING WATER LEVEL CHANGE: PVC Slug 2.72' x 0.125' ø PAGE 1 OF 1

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TPVC

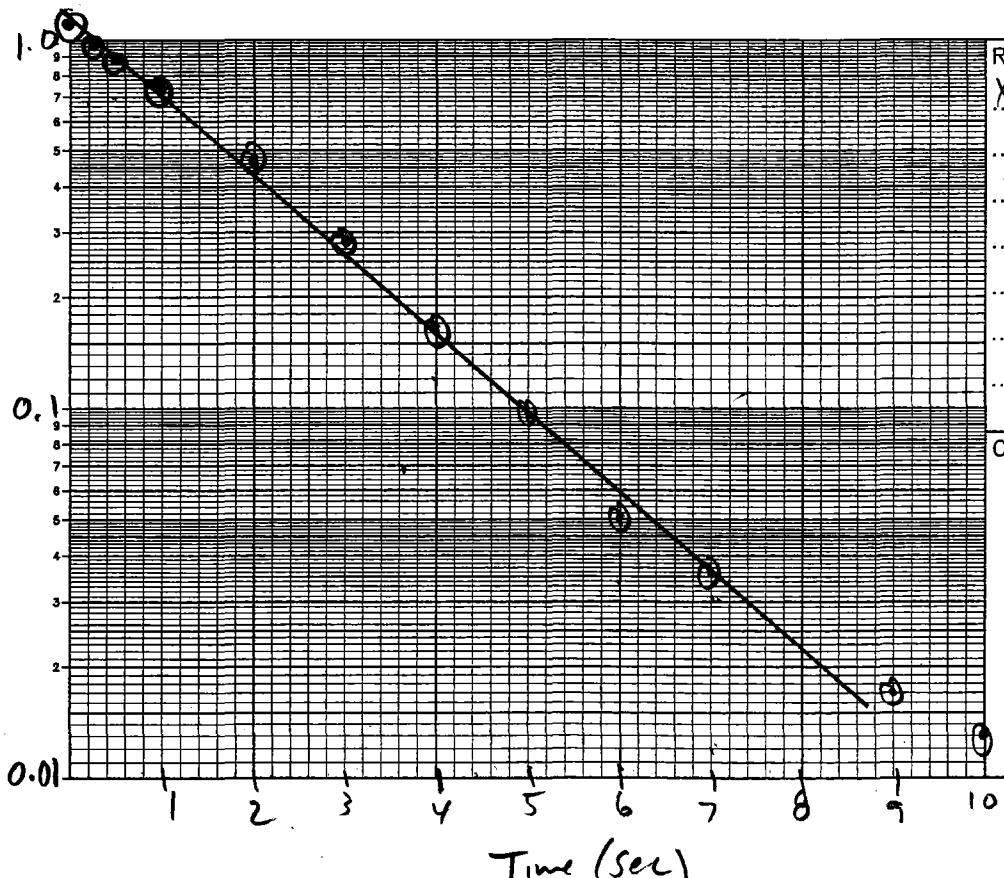
ACAD: FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.0		1.108	4.50		0.123
0.25		0.999	5.00		0.095
0.50		0.898	6.00		0.052
0.75		0.812	7.14		0.036
1.00		0.723	9.00		0.017
1.50		0.581	10.02		0.013
1.75		0.515			
2.00		0.458			
2.50		0.355			
3.00		0.282			
3.50		0.211			
4.00		0.162			

WELL SCHEMATIC



Indicate SWL Depth on Drawing



REMARKS:

XD = In Situ Level Troll 700
S/N 383781
vented / 30 psi
WL = 9.93' @ 1110
XD @ 5.29' H2O
Start @ 1112
End 1116
WL = 9.93' @ 1116

CALCS, SKETCH MAPS, ETC.:

Slug ≈ Δ 1.5' H2O

TETRA TECH

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: OU8 RI WELL/BORING NO.: WTB-MW04

PROJECT NO.: 112G03270 GEOLOGIST:

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / TEST NO.: RISING 01

STATIC WATER LEVEL (Depth/Elevation): 8.85' TOVC @ 1144 DATE: 6-9-15

TEST TYPE (Rising/Falling/Constant Head): Rising CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: Slug 2.72' x 0.125' ø PAGE 1 OF 1

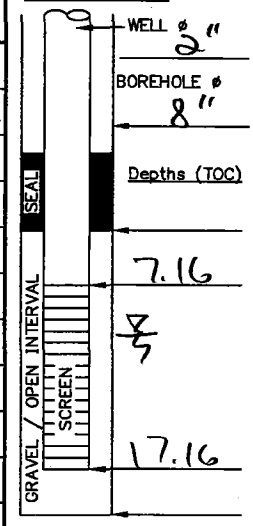
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOVC

ACAD: FORM_HYDCONTST.dwg 07/06/99 INL

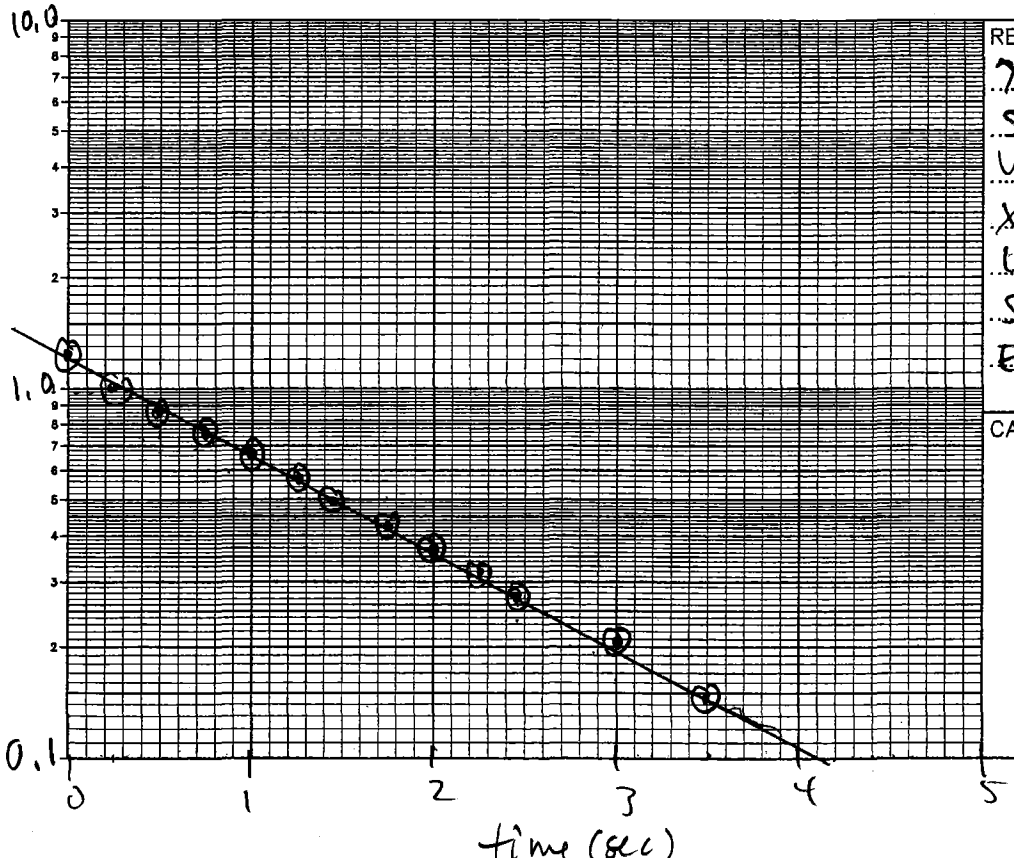
ELAPSED TIME (min. or sec.)	~~MEASURED WATER LEVEL (feet)~~	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	~~MEASURED WATER LEVEL (feet)~~	DRAWDOWN OR HEAD (ΔH) (feet)
0.0	ET t_0	0.0	5.50	3.0	0.206
2.50	0	1.220	6.00	3.5	0.146
2.75	0.25	1.020	6.30	3.9	0.124
3.00	0.50	0.865	7.141	4.6	0.087
3.25	0.75	0.758	7.980	5.48	0.058
3.50	1.0	0.662	9.00		0.037
3.75	1.25	0.574	10.08		0.027
4.00	1.50	0.497	11.28		0.023
4.25	1.75	0.432	11.94		0.025
4.50	2.00	0.370			
4.75	2.25	0.319			
5.00	2.50	0.275			

t_0 →

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

XD = In Situ Level Troll 200
S/N 383781
Vented / Range = 69 ft
XD @ 7.17' H2O
WL = 8.85' TOVC @ 1200
Start @ 1205
End @ 1234

CALCS, SKETCH MAPS, ETC.:

TETRA TECH

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: OU8 RI WELL/BORING NO.: WTB-MW04

PROJECT NO.: 112G03270 GEOLOGIST: T. EVANS

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: Rising 02

STATIC WATER LEVEL (Depth/Elevation): 8.85' TPVC DATE: 6-9-15

TEST TYPE (Rising/Falling/Constant Head): Rising CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: Slug 2.72' X 0.125' Ø PAGE 1 OF 1

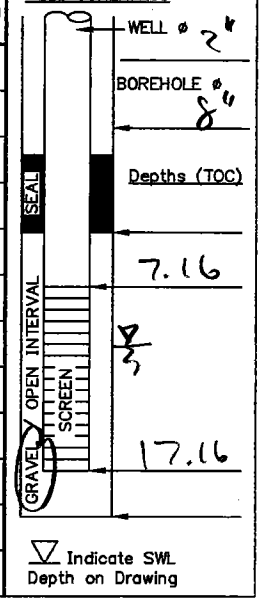
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TPVC

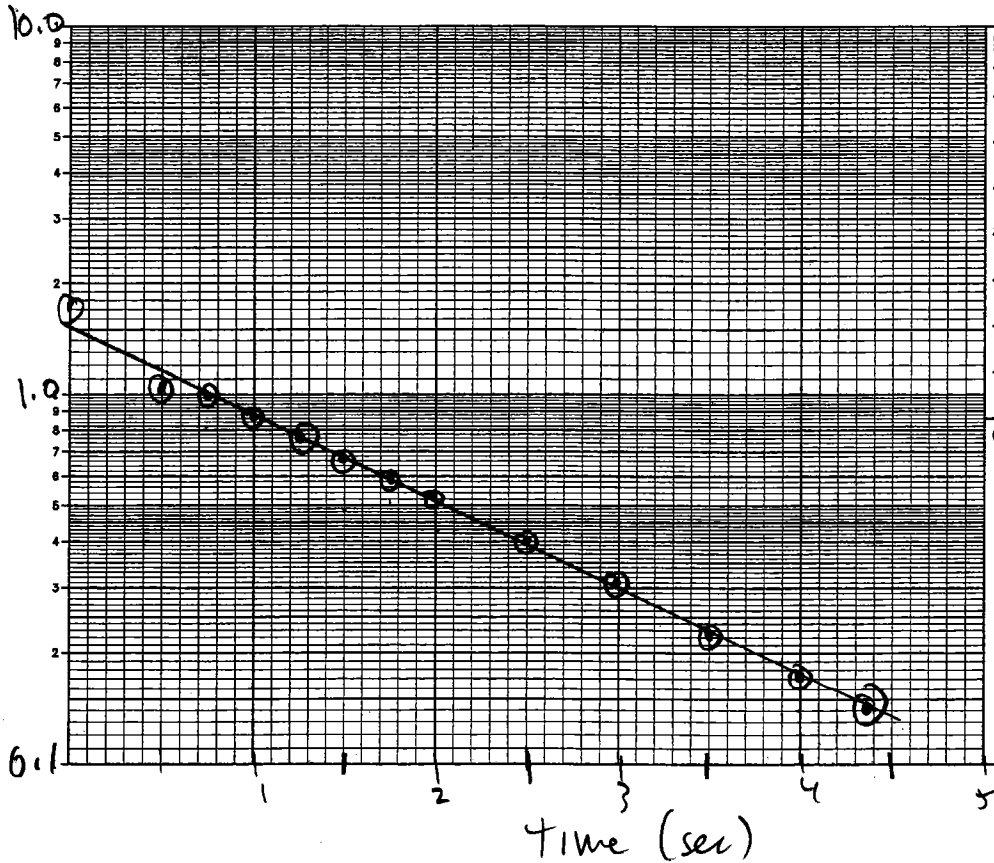
ACAD: FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	ET t_{20}	-0.001	5.00	3.00	0.311
2.0	0	1.687	5.25	3.25	0.270
2.5	0.5	1.051	5.50	3.50	0.225
2.75	0.75	0.998	5.75	3.75	0.198
3.0	1.00	0.886	6.00	4.00	0.173
3.25	1.25	0.774	6.36	4.36	0.143
3.50	1.50	0.678	6.72	4.72	0.120
3.75	1.75	0.594	7.14	5.14	0.097
4.00	2.00	0.527	8.46	6.14	0.074
4.25	2.25	0.460	9.00	7.00	0.052
4.50	2.50	0.405	10.08	8.08	0.034
4.75	2.75	0.345			

t_0

WELL SCHEMATIC





REMARKS:

XD = In Situ level Troll 700
S/N 383781
Vented / Range = 69 ft
XD @ 7.18' H2O
WL = 8.85 @ 12:23
Start @ 12:25
End @ 12:33

CALCS, SKETCH MAPS, ETC.:

~0.75-1 before low trend

MW 06 - 0.1
MW 07 - 0.2

(2), ~~X~~, (7)

TETRA TECH

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: OU8 RI WELL/BORING NO.: WTB-MW06

PROJECT NO.: 112G03270 GEOLOGIST:

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 5.3-15.3 TEST NO.: Rising 02

STATIC WATER LEVEL (Depth/Elevation): 6.24' @ 1054 DATE: 6-9-15

TEST TYPE (Rising/Falling/Constant Head): Rising CHECKED:

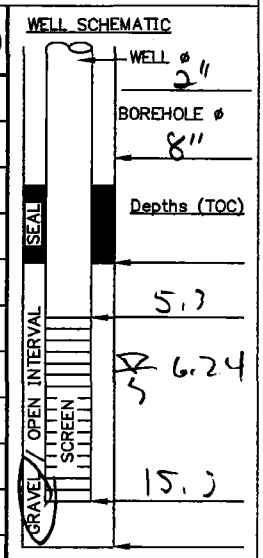
METHOD OF INDUCING WATER LEVEL CHANGE: Slug 2.72' x 0.125' ϕ PAGE 1 OF 1

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TPVC

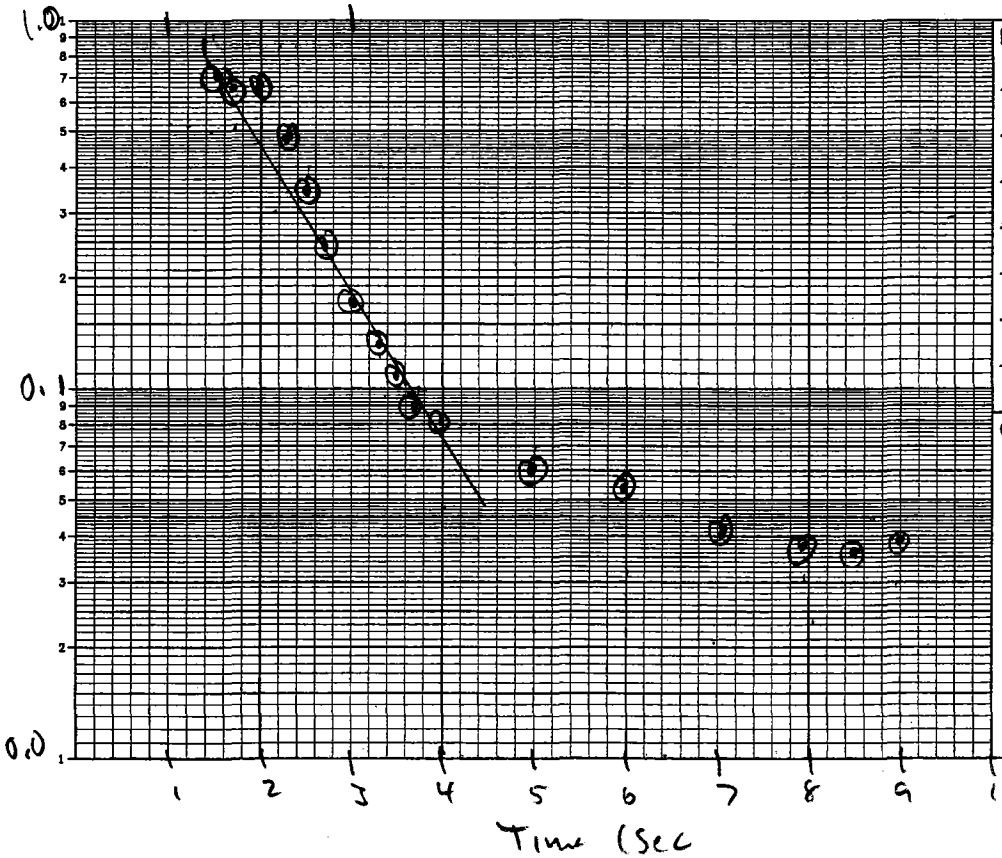
ACAD: FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.0		0.004	5.00		0.061
1.50		0.720	6.00		0.051
1.75		0.662	7.14		0.042
2.00		0.671	7.98		0.038
2.25		0.490	8.46		0.037
2.50		0.345	9.00		0.039
2.75		0.241	10.08		0.032
3.00		0.171			
3.25		0.132			
3.50		0.109			
3.75		0.090			
4.00		0.082			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

XD = In Situ Level Troll 700
S/N 383 781
Vented / Range = 69 ft
XD @ 8.9' H_2O
WL = 6.24' TPVC
Start @ 11:05
End @ 11:10

CALCS, SKETCH MAPS, ETC.:

Slug ≈ Δ 1.5' H_2O

WL = 6.24' @ 1115

TETRA TECH

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: OU8 RI WELL/BORING NO.: WTB-MW06

PROJECT NO.: 112G03270 GEOLOGIST: T. Evans

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10'/ TEST NO.: Rising 01R

STATIC WATER LEVEL (Depth/Elevation): 6.19' @ 0939 hrs DATE: 6/9/15

TEST TYPE (Rising/Falling/Constant Head): Rising CHECKED:

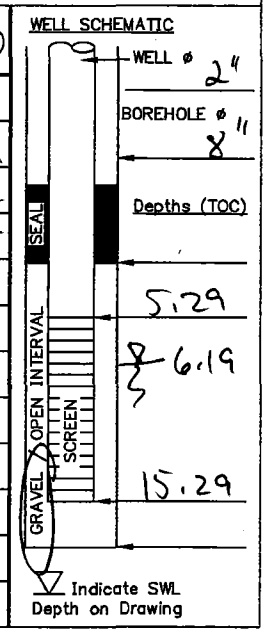
METHOD OF INDUCING WATER LEVEL CHANGE: Slug 2.72' x 0.125'Ø PAGE 1 OF 1

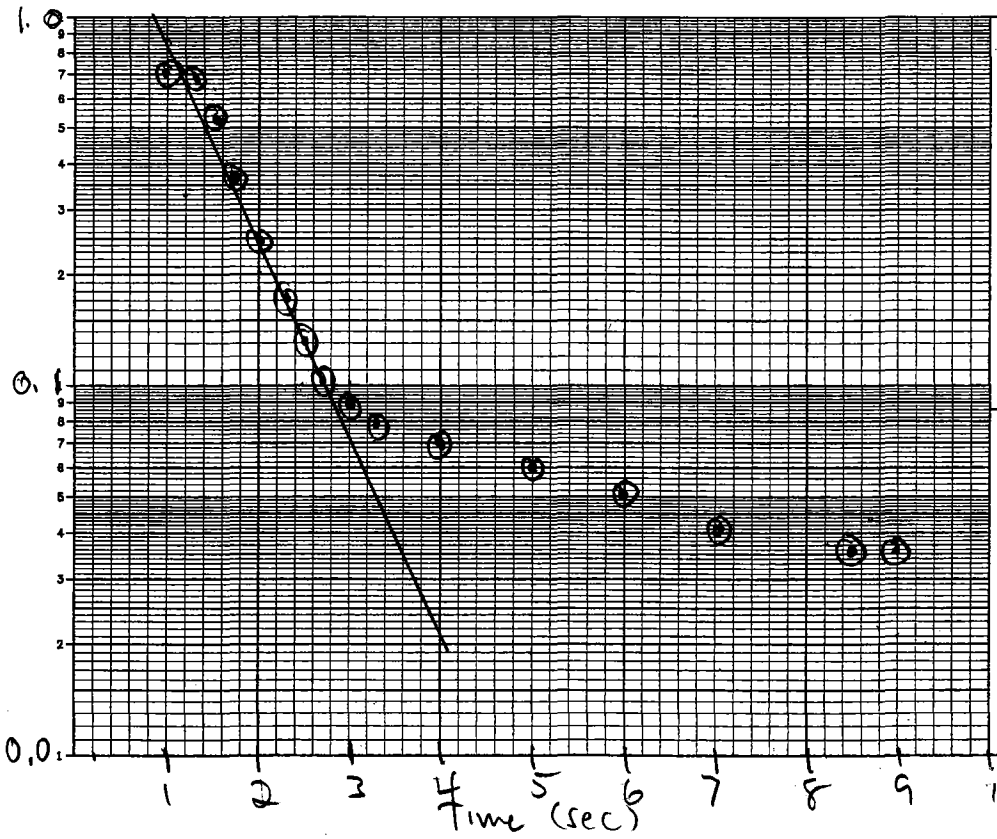
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TPVC

ACAD: FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.0		-0.001	5.0		0.060
1.0		0.705	6.0		0.052
1.25		0.693	7.14		0.042
1.50		0.518	8.46		0.035
1.75		0.371	9.00		0.036
2.0		0.248	10.08		0.023
2.25		0.173	12.66		0.02
2.50		0.132	15.06		0.02
2.75		0.104			
3.00		0.090			
3.25		0.084			
4.0		0.072			

WELL SCHEMATIC





REMARKS:

XD = In Situ Level Troll 700
S/N 383781
Vented / Range = 69ft
XD = 8.0' H_2O
WL = 6.23' TPVC
Start @ 10:40
End @ 10:44

CALCS, SKETCH MAPS, ETC.:

Slug ≈ Δ1.5' H_2O

Test No. @ 10:25
WTB-MW01_Rising01
Falling Head / Not Valid Test

TETRA TECH

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: OU8 RI WELL/BORING NO.: WTB-MW07

PROJECT NO.: 112G03270 GEOLOGIST: T. Evans

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: Rising 02

STATIC WATER LEVEL (Depth/Elevation): 6.20' TPVC @ 1320 DATE: 6-9-18

TEST TYPE (Rising/Falling/Constant Head): Rising CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: Slug (2.72' x 0.125' ϕ) PAGE 1 OF 1

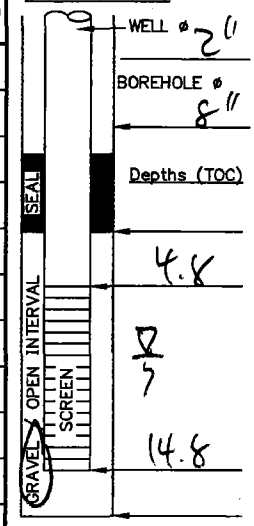
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TPVC

ACAD: FORM_HYDCONTST.dwg 07/06/99 INL

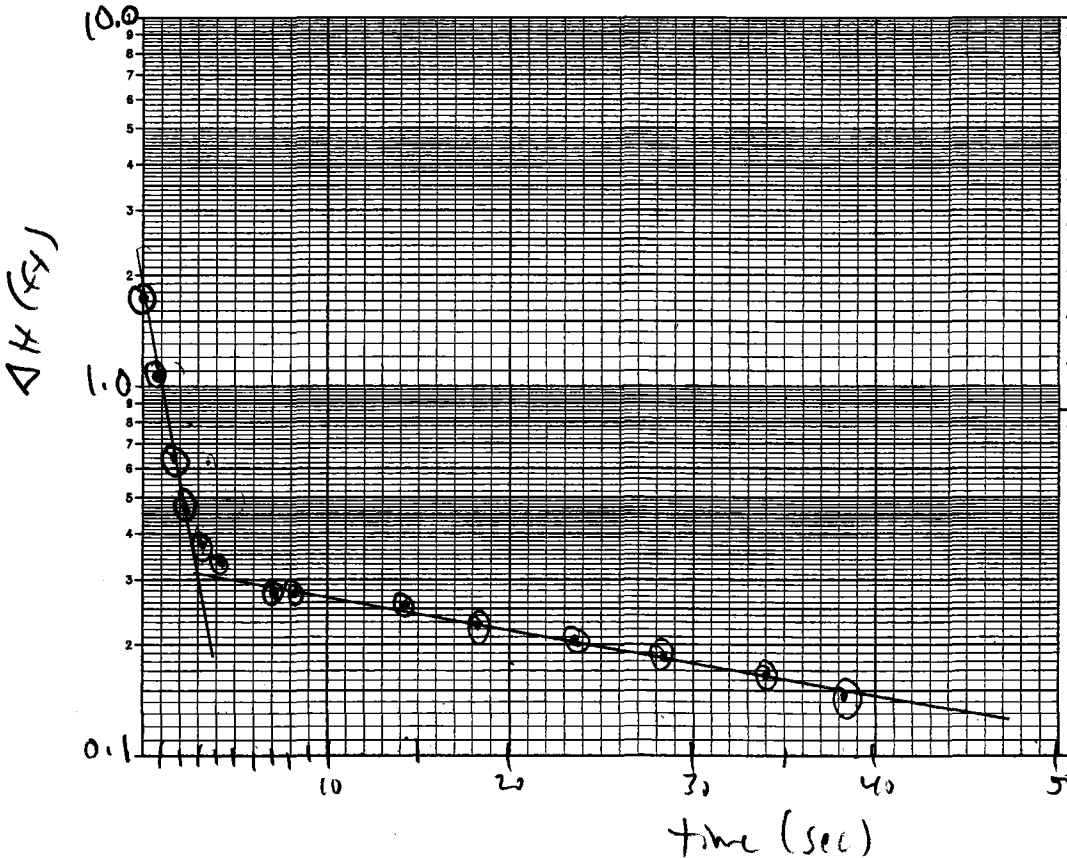
ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	ET$_{t_0}$	0.032	11.94	10.19	0.278
1.75	0	1.807	14.22	12.47	0.259
2.00	0.25	1.342	15.96	14.21	0.248
2.50	0.75	1.070	20.1	18.35	0.226
3.00	1.25	0.792	25.32	23.57	0.208
3.50	1.75	0.618	30.06	28.31	0.189
4.00	2.25	0.468	35.76	34.01	0.166
5.00	3.25	0.375	40.08	38.33	0.144
6.00	4.25	0.331	50.46	48.71	0.099
7.98	6.23	0.302	60	58.25	0.059
9.00	7.25	0.285	75.6	73.85	0.034
10.08	8.33	0.285	100.8	99.05	0.018

t_0 →

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:
XD=Instrument Troll 700
S/N 383781
WL= 6.20' @ 1402
XD@
Start @ 1405
End @ 1416
WL= 6.22' TPVC

CALCS, SKETCH MAPS, ETC.:

TETRA TECH

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: 048 RI WELL/BORING NO.: WTB-MW07

PROJECT NO.: 112G03270 GEOLOGIST: T. EVANS

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 4.8-14.8 TEST NO.: Rising 01

STATIC WATER LEVEL (Depth/Elevation): 6.20' TPVC @ 1320 DATE: 6-9-05

TEST TYPE (Rising/Falling/Constant Head): Rising CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: Slug 2.72' x 0.125' PAGE 1 OF 1

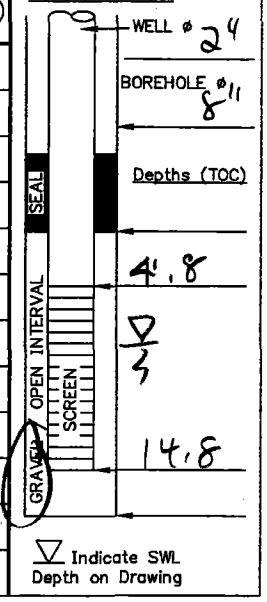
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TPVC

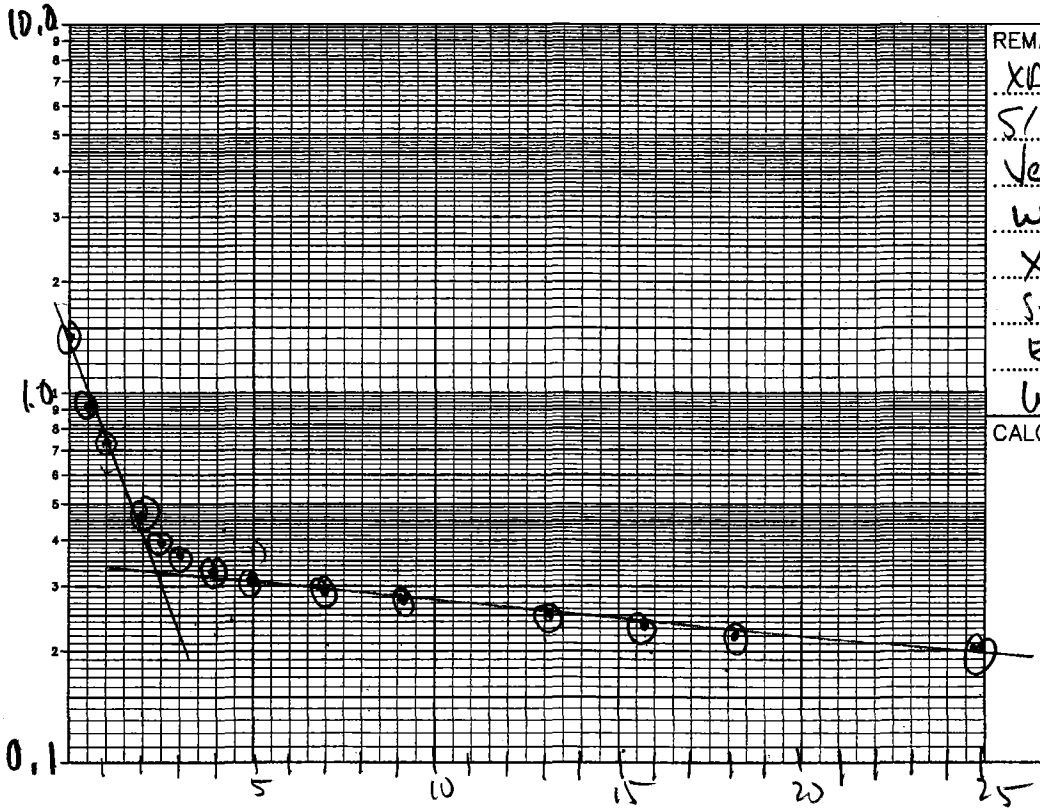
ACAD: FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	~~MEASURED WATER LEVEL (feet)~~	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	~~MEASURED WATER LEVEL (feet)~~	DRAWDOWN OR HEAD (ΔH) (feet)
0	ET t_0	0.018	4.75	2.75	0.380
2.0	0	1.372	5.00	3.00	0.370
2.25	0.25	1.098	5.25	3.25	0.360
2.50	0.50	0.916	6.00	4.00	0.336
2.75	0.75	0.853	7.14	5.14	0.312
3.00	1.00	0.736	9.00	7.00	0.294
3.25	1.25	0.661	11.28	9.28	0.281
3.50	1.50	0.573	15.1	13.1	0.258
3.75	1.75	0.518	17.88	15.88	0.238
4.0	2.0	0.463	20.1	18.1	0.228
4.25	2.25	0.433	26.8	24.8	0.205
4.50	2.50	0.401	45	43	0.115

t_0 →

WELL SCHEMATIC





REMARKS:

XD = In Situ Level Troll 700

S/N 383781

Vented / Range 69 ft

WL = 6.18 @ 1340

XD = 7.43' H_2O

Start @ 1343

End @ 1352

WL = 6.21 @ 1352

CALCS, SKETCH MAPS, ETC.:

A.5 SAMPLE LIST

TABLE A-5
SAMPLE LIST
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY MAINE

LOCATION	SAMPLE	SAMPLE DATE	INVESTIGATION	PEST/PCB	VOCs	SVOCs	M	MF	MISC	PAH	EPH/PET
			SOIL								
WTB-MW01	WTB-SS01-0001-98	19980713	SSI	X	X	X	X		X	X	X
	WTB-SB01-0305-98	19980713	SSI	X	X	X	X		X	X	X
WTB-MW05	WTB-SS05-0001-98	19980707	SSI	X	X	X	X		X	X	X
	WTB-SB05-0305-98	19980707	SSI	X	X	X	X		X	X	X
	WTB-SB05-0709-98	19980707	SSI	X	X	X	X		X	X	X
	WTB-SB05-1315-98	19980707	SSI	X	X	X	X		X	X	X
WTB-MW02	WTB-SS02-0001-98	19980708	SSI	X	X	X	X		X	X	X
	WTB-SB02-0305-98	19980708	SSI	X	X	X	X		X	X	X
	WTB-SB02-0709-98	19980708	SSI	X	X	X	X		X	X	X
	WTB-SB02-1517-98	19980708	SSI	X	X	X	X		X	X	X
WTB-SB06	WTB-SS06-0001-98	19980715	SSI	X	X	X	X		X	X	X
	WTB-SB06-0305-98	19980715	SSI	X	X	X	X		X	X	X
	WTB-SB06-0507-98	19980715	SSI	X	X	X	X		X	X	X
	WTB-SB06-1820-98	19980715	SSI	X	X	X	X		X	X	X
	WTB-SB06-1820-98-D	19980715	SSI	X	X	X	X		X	X	X
WTB-SB07	WTB-SS07-0001-98	19980711	SSI	X	X	X	X		X	X	X
	WTB-SB07-0305-98	19980711	SSI	X	X	X	X		X	X	X
	WTB-SB07-0709-98	19980711	SSI	X	X	X	X		X	X	X
	WTB-SB07-1315-98	19980711	SSI	X	X	X	X		X	X	X
WTB-SB08	WTB-SS-08-0002	20150604	RI				X			X	X
	WTB-SB-08-0206	20150604	RI				X			X	X
	WTB-SB-08-0610	20150604	RI				X			X	X
	WTB-SS-08-0002-D	20150604	RI				X			X	X
WTB-SB09	WTB-SS-09-0002	20150604	RI				X			X	X
	WTB-SB-09-0206	20150604	RI				X			X	X
	WTB-SB-09-0610	20150604	RI				X			X	X
WTB-SB10	WTB-SS-10-0002	20150605	RI				X			X	X

TABLE A-5
SAMPLE LIST
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY MAINE

LOCATION	SAMPLE	SAMPLE DATE	INVESTIGATION	PEST/PCB	VOCs	SVOCs	M	MF	MISC	PAH	EPH/PET
	WTB-SB-10-0206	20150605	RI				X			X	X
	WTB-SB-10-0610	20150605	RI				X			X	X
WTB-SB11	WTB-SS-11-0002	20150601	RI				X			X	X
	WTB-SB-11-0206	20150601	RI				X			X	X
	WTB-SB-11-0610	20150601	RI				X			X	X
WTB-SB12	WTB-SS-12-0002	20150604	RI				X			X	X
	WTB-SB-12-0206	20150604	RI				X			X	X
	WTB-SB-12-0610	20150604	RI				X			X	X
WTB-SB13	WTB-SS-13-0002	20150605	RI				X			X	X
	WTB-SB-13-0206	20150605	RI				X			X	X
	WTB-SB-13-0610	20150605	RI				X			X	X
WTB-SB14	WTB-SS-14-0002	20150603	RI				X			X	X
	WTB-SB-14-0206	20150603	RI				X			X	X
	WTB-SB-14-0206-D	20150603	RI				X			X	X
	WTB-SB-14-0607	20150603	RI				X			X	X
WTB-SB15	WTB-SS-15-0002	20150604	RI				X			X	X
	WTB-SB-15-0206	20150604	RI				X			X	X
	WTB-SB-15-0206-D	20150604	RI				X			X	X
	WTB-SB-15-0610	20150604	RI				X			X	X
WTB-SB16	WTB-SS-16-0002	20150604	RI				X			X	X
	WTB-SB-16-0206	20150604	RI				X			X	X
	WTB-SB-16-0610	20150604	RI				X			X	X
WTB-SB17	WTB-SS-17-0002	20150603	RI				X			X	X
	WTB-SB-17-0206	20150603	RI				X			X	X
	WTB-SB-17-0610	20150603	RI				X			X	X
WTB-SB18	WTB-SS-18-0002	20150604	RI				X			X	X
	WTB-SB-18-0206	20150604	RI				X			X	X
	WTB-SB-18-0610	20150604	RI				X			X	X

TABLE A-5
SAMPLE LIST
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY MAINE

LOCATION	SAMPLE	SAMPLE DATE	INVESTIGATION	PEST/PCB	VOCs	SVOCs	M	MF	MISC	PAH	EPH/PET
WTB-SB19	WTB-SS-19-0002	20150603	RI				X			X	X
	WTB-SB-19-0206	20150603	RI				X			X	X
	WTB-SB-19-0610	20150603	RI				X			X	X
WTB-SB20	WTB-SS-20-0002	20150604	RI				X			X	X
	WTB-SS-20-0002-D	20150604	RI				X			X	X
	WTB-SB-20-0206	20150604	RI				X			X	X
	WTB-SB-20-0610	20150604	RI				X			X	X
WTB-SB21	WTB-SS-21-0002	20150604	RI				X			X	X
	WTB-SB-21-0206	20150604	RI				X			X	X
	WTB-SB-21-0610	20150604	RI				X			X	X
WTB-SB22	WTB-SS-22-0002	20150603	RI				X			X	X
	WTB-SB-22-0206	20150603	RI				X			X	X
	WTB-SB-22-0610	20150603	RI				X			X	X
	WTB-SB-22-0610-D	20150603	RI				X			X	X
WTB-SB23	WTB-SS-23-0002	20150603	RI				X			X	X
	WTB-SB-23-0206	20150603	RI				X			X	X
	WTB-SB-23-0610	20150603	RI				X			X	X
WTB-SB24	WTB-SS-24-0002	20150603	RI				X			X	X
	WTB-SB-24-0206	20150603	RI				X			X	X
	WTB-SB-24-069.7	20150603	RI				X			X	X
WTB-MW03	WTB-SB03-0305-98	19980711	SSI	X	X	X	X		X	X	X
	WTB-SB03-0911-98	19980711	SSI	X	X	X	X		X	X	X
	WTB-SB03-1820-98	19980711	SSI	X	X	X	X		X	X	X
WTB-MW04	WTB-SB04-0305-98	19980708	SSI	X	X	X	X		X	X	X
	WTB-SB04-0709-98	19980708	SSI	X	X	X	X		X	X	X
	WTB-SB04-0911-98	19980708	SSI	X	X	X	X		X	X	X
GROUNDWATER											

TABLE A-5
SAMPLE LIST
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY MAINE

LOCATION	SAMPLE	SAMPLE DATE	INVESTIGATION	PEST/PCB	VOCs	SVOCs	M	MF	MISC	PAH	EPH/PET
WTB-MW01	WTB-MW-01-11	19980803	SSI	X	X	X	X		X	X	X
	WTB-GW-MW01-0615	20150609	RI				X			X	X
WTB-MW05	WTB-MW-05-11	19980802	SSI	X	X	X	X		X	X	X
WTB-MW05R	WTB-GW-MW05R-0615	20150609	RI				X			X	X
WTB-MW02	WTB-MW-02-11	19980802	SSI	X	X	X	X		X	X	X
WTB-MW03	WTB-MW-03-11	19980803	SSI	X	X	X	X		X	X	X
	WTB-GW-MW03-0615	20150610	RI				X			X	X
	WTB-GW-MW03-0615-D	20150610	RI				X			X	X
WTB-MW04	WTB-MW-04-11	19980803	SSI	X	X	X	X	X	X	X	X
	WTB-GW-MW04-0615	20150610	RI				X			X	X
WTB-MW06	WTB-GW-MW06-0615	20150612	RI				X			X	X
WTB-MW07	WTB-GW-MW07-0615	20150611	RI				X			X	X

PEST - Pesticides
PCBs - Polychlorinated biphenyls
VOCs - Volatile organic compounds
M - Metals
MF - Filtered metals
MISC - Miscellaneous parameters
PAH - Polycyclic aromatic hydrocarbon
EPH/PET - Extractable petroleum hydrocarbons/petroleum
RI - Remedial Investigation
SSI - Site Screening Investigation

A.6 2015 FIELD INFORMATION

SAMPLE LOG SHEETS

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

Sample ID No.: WTB-SS-08-0002
Sample Location: WTB-SB08
Sampled By: TE / KJ
C.O.C. No.: 4909

[X] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/4/15 Time: 0820 Method: DPT Monitor Reading (ppm): —	0 – 2'	Brown to DK Brown	F Sand Some C Sand tr Rock Dry

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: WTB-FD01-060415 @0000 hrs

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-08-0206
Sample Location: WTB-SB08
Sampled By: TE/KJ
C.O.C. No.: 4909

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/4/15 Time: 0825 Method: DPT Monitor Reading (ppm): –	2-6'	Brown to Black	Silty FSand Some Rock to Slag Dry to Moist

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

Sample ID No.: WTB-SB-08-0610
Sample Location: WTB-SB08
Sampled By: TE / KJ
C.O.C. No.: 4910

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/4/15 Time: 0830 Method: DPT Monitor Reading (ppm): -	6-10'	Brown	F-M Sand to Rock Chips Some Silt Trash (?) moist to wet

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

Sample ID No.: WTB-SS-09-0002
Sample Location: WTB-SB09
Sampled By: TF / KT
C.O.C. No.: 4912

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/4/15 Time: 0842 Method: PPT Monitor Reading (ppm): —	0 - 2	Tan Brown	Silty F Sand Dry to Damp

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N/A	

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-09-0206
Sample Location: WTB-SB09
Sampled By: TE/KJ
C.O.C. No.: 4910

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/4/15 Time: 0845 Method: DPT Monitor Reading (ppm): —	2-6'	Brown to Black	Broken Rock Frags & Silty F sand to Cinders Dry

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): [illegible]

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-09-0610
Sample Location: WTB-SB09
Sampled By: TE/KJ
C.O.C. No.: 4910

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/4/15 Time: 0850 Method: DPT Monitor Reading (ppm): —	6-10'	Red Brown/ Black/ Lt Brn	Cinders & Slag wet & Silt Some C Sand

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

Sample ID No.: WTB-SS-10-0002
Sample Location: WTB-SB10
Sampled By: JE/KJ
C.O.C. No.: 4913

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/5/15 Time: 0850 Method: DPT Monitor Reading (ppm): –	0-2'	Tan	F-M Sand Dry-Damp

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N/A	

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-10-0206
Sample Location: WTB-SB10
Sampled By: TE/KJ
C.O.C. No.: 4913

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/5/15 Time: 0855 Method: DPT Monitor Reading (ppm): —	2-6	Tan to Black	→ F. to Sand → cinders/slag Dry-Damp

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N/A	

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-10-0610
Sample Location: WTB-SB10
Sampled By: TE / KJ
C.O.C. No.: 493

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/5/15 Time: 1000 Method: DPT Monitor Reading (ppm): —	6-10'	Dark Brown/ Black	Sandy Silt Some Br Rock wet

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar		

OBSERVATIONS / NOTES:

Collected from re-advance DPT borehole ~18" North of original due to poor recovery in initial borehole

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): [signature]

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

Sample ID No.: WTB-SS-11-0002
Sample Location: WTB-SB11
Sampled By: TE/KJ
C.O.C. No.: 4908

[X] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/1/15 Time: 1100 Method: SPT Monitor Reading (ppm): —	0-2'	Brn-Tan	F-M Sand & F Gravel Dry

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N/A	

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-11-0206
Sample Location: WTB-SB11
Sampled By: TE/KJ
C.O.C. No.: 4908

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:	N/A		
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date: 6/1/15	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	1105	2-2½	Blk Brn	F-M Sand Some Sand Dry
Method: SPT	1115	3-5	Brn	F-M Sand Some C Sand Dry
			Blk+White	F Sand
Monitor Readings			Red Brn	Sand & C Sand Dry
(Range in ppm):	1120	5-6	Red Brn	M-C Sand & Slag Moist to wet
—				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

Sample time @ 1115

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-11-0610
Sample Location: WTB-SB-11
Sampled By: TE/KJ
C.O.C. No.: 4908

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date:	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time:	N/A		
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date: 6/1/15	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	1125	6-8	Brn	M-C Sand & F Gravel (wet)
Method: SPT			Red-Brn	Same as above
			W/White	Ash?
Monitor Readings		8-10	—	No recovery
(Range in ppm):				
—				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

Sample ID No.: WTB-SS-12-0002
Sample Location: WTB-SB12
Sampled By: TE/KJ
C.O.C. No.: 4910

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [ ] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6-4-15 Time: 1005 Method: DPT Monitor Reading (ppm):	0-2	Gray	Broken rock w/ F-C Sand Dry

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-12-0206
Sample Location: WTB-SB12
Sampled By: TE/KJ
C.O.C. No.: 4910

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6-4-15	3-4'	Blk to LtBrn	Cinders, Slag
Time: 1008	4-6'	Tan Brn	F Sand
Method: PPT			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar		

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-12-0610
Sample Location: WTB-SB12
Sampled By: TE / KJ
C.O.C. No.: 4910

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6-4-15 Time: 1015 Method: DPT Monitor Reading (ppm): –	6-10'	Blk to Lt. Brn	Cinders Tr Slag, Brick, Ash silt Some F Sand @ 9.7-10'

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

Sample ID No.: WTB-SS-13-0002
Sample Location: WTB-SB13
Sampled By: JE/KJ
C.O.C. No.: 4911

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/5/15 Time: 0830 Method: DPT Monitor Reading (ppm): —	0-2'	Tan Brn	F-M Sand Tr F Gravel (Damp)

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-13-0206
Sample Location: WTB-SB13
Sampled By: TE/KJ
C.O.C. No.: 4913

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/5/15	2-3.6'	Tan Brn	F-M Sand Tr f Gravel Damp
Time: 0833	3.6-5.2	Dk Brn	Silt & Slag Moist
Method: DPT	5.2-6	Blk	Cinders, Slag Tr Coal (Dry)
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-13-0610
Sample Location: WTB-SB13
Sampled By: TE/KJ
C.O.C. No.: 4913

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/5/15 Time: 0840 Method: DPT Monitor Reading (ppm): —	6-10'	Blk	Cinders Slag tr coal Dry wet Silt & Sand (8.4-10') @9'

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

Sample ID No.: WTB-SS-14-0002
Sample Location: WTB-SB14
Sampled By: TE/KJ
C.O.C. No.: 4908

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6-3-15 Time: 0915 Method: DPT Monitor Reading (ppm): —	0-2'	Brn	F-M Sand Tr CSand & F&C Gravel Dry

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N/A	

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-14-0206
Sample Location: WTB-SB14
Sampled By: TE/KJ
C.O.C. No.: 4908

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6-3-15 Time: 0925 Method: DPT Monitor Reading (ppm): —	2-6'	Brn	F-M Sand Tr C Sand Dry & F&C Gravel; Blk-Brn C Sand Some Silt

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
	WTB-FD01-060315@0000

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-14-0607
Sample Location: WTB-SB14
Sampled By: TE/KJ
C.O.C. No.: 4908

Type of Sample:
[✓] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6-7-15 Time: 0930 Method: DPT Monitor Reading (ppm): —	6-7'	Brn	F-C Sand Some F Gravel Dry to Wet (6.7')

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

N/A

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

Three attempts made to collect sample @ 6-10'. Refusal @ 7' in second & third attempts. Rock & wood @ 7-10' in first borehole

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

Sample ID No.: WTB-SS-15-0002
Sample Location: WTB-SB15
Sampled By: TE/KJ
C.O.C. No.: 4910

[X] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6-4-15 Time: 1025 Method: DPT Monitor Reading (ppm): —	0-2'	Gray & Brown	Broken Rock & F-C Sand (GW) Dry

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N/A	

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-15-0206
Sample Location: WTB SB15
Sampled By: TE / KJ
C.O.C. No.: 4910

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/4/15	2-6'	Gray —	Broken Rock (GW)
Time: 1030		Tan Brown —	Silty F Sand Tr Clay (SM) Moist
Method: DPT		Dk Brown —	Rock Frags & Silty Sand (GW) w/ Cinders
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N/A	

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: WTB- FD02-060415

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-15-0610
Sample Location: WTB-SB15
Sampled By: TE/KS
C.O.C. No.: 4610

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/4/15	6-10'	Brown & Gray –	Broken Rock & F-C Sand (GW) Dry
Time: 1035		Black –	Cinders & Slag (SW) Moist-Wet
Method: DPT			
Monitor Reading (ppm): –			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

Sample ID No.: WTB-SS-16-0002
Sample Location: WTB-SB16
Sampled By: TF / KJ
C.O.C. No.: 4910

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/4/15 Time: 1105 Method: DPT Monitor Reading (ppm): –	0-2'	Brown	Silty F Sand Some Co Sand & Rock (GM) Dry-Damp

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	3 / 1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD: Yes

Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-16-0206
Sample Location: WTB-SB16
Sampled By: TE/KJ
C.O.C. No.: 4910

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/4/15	2-6'	Brown —	Silty F Sand Some Co Sand & Rock (GM) moist
Time: 1110		Black —	Cinders & Slag (SW)
Method: DPT			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-16-0610
Sample Location: WTB-SB16
Sampled By: TE / KJ
C.O.C. No.: 4911

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/4/15	6-10'	Black –	Cinder & Slag (SW) moist
Time: 1115		Lt Brown & Gray –	Silty F-M Sand & Rock Frags (GM) wet
Method: DPT			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

Sample ID No.: WTB-SS-17-0002
Sample Location: WTB-SB17
Sampled By: TE / KJ
C.O.C. No.: 4908

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/3/15 Time: 1035 Method: DPT Monitor Reading (ppm): -	0-2'	Brown to Dk Brown	F-C Sand Tr F Grand (SW) Dry

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N/A	

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTR-SB-17-0206
Sample Location: WTR-SB17
Sampled By: TE/KJ
C.O.C. No.: 4908

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/3/15	2-6'	Brown	F-M Sand & C Sand/F Gravel (SW)
Time: 1040		Black	Cinders/Slag Tr Ash, Red Dog (GW)
Method: DPT		Brown	Silt & Rock (GM) Dry
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-17-0610
Sample Location: WTB-SB17
Sampled By: TE/KT
C.O.C. No.: 4908

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/3/15	6-10'	Tan Brown	F-M Sand Tr (Sand) (SP)
Time: 1045		Black/Red	Brown Slag, Coal (SW) wet
Method: DPT			
Monitor Reading (ppm): -			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

Sample ID No.: WTB-SS-18-0002
Sample Location: WTB-SB18
Sampled By: TE / KJ
C.O.C. No.: 4911

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/4/15 Time: 1310 Method: DPT Monitor Reading (ppm): —	0-2'	Brown	Silty Sand (SM) Dry to Damp

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-18-0206
Sample Location: WTB-SB18
Sampled By: TR / KJ
C.O.C. No.: 491

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/4/15 Time: 1315 Method: DPT Monitor Reading (ppm): —	2-6'	Gray	Broken Rock & (GW) Silty Sand w/ Clay (GM)

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-18-0610
Sample Location: WTB-SB1X
Sampled By: TE / KJ
C.O.C. No.: 4911

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/4/15	6-10'	Black –	Cinders (SW)
Time: 1320		Brown –	Silty F Sand Tr Clay (SM) Wet @ 9'
Method: DPT			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

Sample ID No.: WTB-SS-19-0002
Sample Location: WTB-SR19
Sampled By: TE/KJ
C.O.C. No.: 4908

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/3/15	0-2'	Brown –	F-C Sand & Rock (SW) Dry
Time: 1100		Dk Brown –	Silty F Sand & C Sand (SW) Dry
Method: DPT			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-19-0206
Sample Location: WTB-SB19
Sampled By: TE/KJ
C.O.C. No.: 4908

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/3/15	2-6'	Black/Brown -	F-C Sand & Rock Chips (SW) Dry
Time: 1105		Tan Brown -	F Sand, Tr Charcoal (SP) D
Method: DPT		Brown -	Silt + F Sand (SM) Damp
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[✓] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-14-0610
Sample Location: WTB-SB14
Sampled By: TF / KT
C.O.C. No.: 4908

Type of Sample:
[✓] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/3/15 Time: 1115 Method: DPT Monitor Reading (ppm): —	6-10'	Dark Brown to Black Brown	Silt & Sand (SM/SW) Some Clay Moist to wet

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N/A	

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

Sample ID No.: WTB-SS-20-0002
Sample Location: WTB-SB20
Sampled By: TE/KJ
C.O.C. No.: 4911

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/4/15	0-2'	Brown –	F-C Sand Tr Clay, Silt (SW)
Time: 1335		Tan –	Clay Tr C Sand, Silt (CL)
Method: DPT			
Monitor Reading (ppm): –			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings			N/A	
(Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: WTB-FD03_060415

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-20-0206
Sample Location: WTB-SB20
Sampled By: TE / ICJ
C.O.C. No.: 4911

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/4/15			
Time: 1340	2-6'	Brown –	Silt Tr F Sand Trv F Gravel (ML)
Method: DPT		Black –	Cinders (SW)
Monitor Reading (ppm): –		Tan Brown –	F Sand Tr rock (SP)

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	3 / 1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD Yes

Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-20-0610
Sample Location: WTB-SB20
Sampled By: JE/KJ
C.O.C. No.: 4911

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/4/15	6-10'	DK Brown	Silt some M Sand (SM)
Time: 1345		Tan/cream	F Sand Tr Silt / Slag (SP/SW) ← wet
Method: DPT		Tan	F Sand (SP)
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA: DK Brown — Silt some F Sand / C Sand (SM)

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): [signature]

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

Sample ID No.: WTB-SS-21-0002
Sample Location: WTB-SB21
Sampled By: TE / KJ
C.O.C. No.: 4921

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/4/15 Time: 1405 Method: DPT Monitor Reading (ppm): —	0-2'	Tan	F-M Sand & Rock Chips (SW) Dry

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[x] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-21-0206
Sample Location: WTB-SB21
Sampled By: TE/KJ
C.O.C. No.: 4911

Type of Sample:
[x] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/4/15	2-6'	Tan	F-M Sand & Rock Chips (SW)
Time: 1410		Gray-Brown	Silt Some F Sand (GM)
Method: DPT		Black/orange	Cinders (SW)
Monitor Reading (ppm): –			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: NTB-SB-21-0610
Sample Location: 6-4-15
Sampled By: TE / KJ
C.O.C. No.: 4911

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/4/15 Time: 1415 Method: DPT Monitor Reading (ppm): —	6-10'	Dk Brown - Brown & Black -	F Sand / Silty F Sand (SP/SM) wet Cinder & Slag (SW)

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

Sample ID No.: WTB-SS-22-0002
Sample Location: WTB-SB22
Sampled By: TE / KJ
C.O.C. No.: 4911

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6-3-15 Time: 1310 Method: DPT Monitor Reading (ppm): –	0-2'	Gray & Brown	Rock Frag Dry Some Silt + Some M-C Sand (GW)

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, ~~etc.~~)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

Sample ID No.: WTB-SB-22-0206
Sample Location: WTB-SB22
Sampled By: TE / KT
C.O.C. No.: 4909

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6-3-15	2-6'	Gray & Brown	Rock Frags Some Silt + M-C Sand (GW)
Time: 1405		Black	Cinders/Slag (SW) Dry
Method: DPT			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[x] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-22-0610
Sample Location: WTB-SB22
Sampled By: TE / KJ
C.O.C. No.: 4909

Type of Sample:
[x] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6-3-15 Time: 1410 Method: DPT Monitor Reading (ppm): —	6-10'	Black to Lt Brown/Black	Cinders/Slag (SW) wet @ 9'

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

Sample ID No.: WTB-SS-23-0002
Sample Location: WTB-SB23
Sampled By: TE / KJ
C.O.C. No.: 4909

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/3/15 Time: 1430 Method: DPT Monitor Reading (ppm): —	0-2'	Dk Brown	F-C Sand Tr Rock Chips Tr Coal, Brick, Slag (SW) Dry - Damp

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTR-SB-23-0206
Sample Location: WTR-SB23
Sampled By: TE/KJ
C.O.C. No.: 4909

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6-3-15	2-6'	Brown & Gray -	Broken Rock & Slag/Cinders (Gw/Sw) wet
Time: 1435		Brown -	F Sand Some Silt Tr Clay (SM) most-wet
Method: DPT			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N/A	

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-23-0610
Sample Location: WTB-SB23
Sampled By: TE / KJ
C.O.C. No.: 4509

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6-3-15	6-10'	Black	Rock Chips & Slag (GW/SW)
Time: 1440		Black/brown	Organic Silt (OL)
Method: DPT			
Monitor Reading (ppm): –			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

Sample ID No.: WTB-SS-24-0002
Sample Location: WTB-SB24
Sampled By: JE / KJ
C.O.C. No.: 4959

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6-3-15 Time: 1325 Method: DPT Monitor Reading (ppm): —	0-2'	Brown	F Sand (SP) Dry

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings				
(Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-24-0206
Sample Location: WTB-SB24
Sampled By: EJ / KJ
C.O.C. No.: 4909

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6-3-15 Time: 1330 Method: DPT Monitor Reading (ppm): —	2-6'	Brown	F Sand (SP) Dry

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TETRA TECH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: OU8 RI, Portsnouth NSY
Project No.: 112G03270

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: WTB-SB-24-069.7
Sample Location: WTB-SB24
Sampled By: TE/KJ
C.O.C. No.: 4909

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6-3-15 Time: 1335 Method: DPT Monitor Reading (ppm): –	6-9.7	Brown	F Sand Tr Clay (SP) Moist

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N/A	

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs (SIM), EPH, Metals	3 / 1 x 8 oz. glass jar	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD: Yes

Duplicate ID No.:

Signature(s):

TETRA TECH

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: OU8, Portsmouth NSY **Event:** RI
Project No.: 112G03270

Sample ID: WTB-GW-MW01-0615	**Sampled By:** K. JALKUT
QA/QC Duplicate ID: N/A	**Sample Date:** 6/9/15
MS/MSD Collected: YES (NO)	**Sample Time:** 1208

WELL INFORMATION:

Well ID: WTB-MW01	**Purge Date:** 6/9/15
Well Diameter (in): 2	**Static Water Level (ft-BTOR):** 5.63
Top of Screen (ft-BTOR): ~8.4	**PID Monitor Reading:** N/A
Bottom of Screen (ft-BTOR): ~18.4	**Purge Method:** Peristaltic Pump / Low Stress
Total Well Depth (ft-BTOR): 18.41	**Sample Method:** ↓

EQUIPMENT INFORMATION:

Water Quality Instrument: YSI 556 MPS S/N 0681787 AO	**Pump Controller:**
Turbidity Meter: LaMotte Nephelometer 2020 we S/N 31674-381.3	Pegasus Peristaltic Pump - Electra S/N U73466X

PURGE DATA:

Time (Hrs)	H_2O Level (ft-BTOR)	Flow mL / min.	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temp. (C°)	ORP (mV)	Salinity (% or ppt)	Other
1010 ~~0950~~	5.63	80	Colorless	Pump on; check drawdown; adjust flow rate; connect to cell							
1020	6.48	80	Colorless	Fill flow cell							
1030	7.11	80	Colorless	7.02	29.74	7.43	7.00	16.07	82.9	18.46	Clear
1037	7.48	80	Colorless	7.53	29.65	6.46	6.57	16.31	87.8	18.41	Clear
1044	7.82	80	Colorless	7.29	29.80	6.01	6.60	16.14	92.9	18.48	Clear
1100 ~~1055~~	8.08	80	Colorless	6.79	29.54	5.23	4.88	15.85	98.2	18.40	Clear
1115	8.14	80	Colorless	6.41	29.64	4.43	3.96	15.80	98.7	18.39	Clear
1130	8.20	80	Colorless	6.35	29.53	4.33	3.02	15.70	99.4	18.32	Clear
1145	8.31	80	Colorless	6.40	29.53	4.01	2.64	15.54	99.3	18.33	Clear
11582	8.34	80	Colorless	6.37	29.55	3.57	2.50	15.53	99.0	18.33	Clear
11589	8.39	80	Colorless	6.41	29.61	3.55	2.18	15.63	97.2	18.39	Clear
1206	8.42	80	Colorless	6.34	29.66	3.58	1.98	15.85	96.4	18.41	Clear

FINAL PURGE / SAMPLE DATA:

Start Purge	End Purge	Total (min.)	Total Vol. (gal. / L.)	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temp. (C°)	ORP (mV)	Salinity (% or ppt)	Other
1020	1206	106	~3 gals	6.34	29.66	3.58	1.98	15.85	96.4	18.44	clear colorless

ANALYSIS, PRESERVATION AND BOTTLE REQUIRMENTS

Analysis	Method	Preservative	Quantity	Vol.	Bottle Type	Collected
PAHs (SIM)	8270D	4°C	2	1L	amber glass	(Y) / N
EPH	MADEP	HCl, 4°C	2	1L	amber glass	(Y) / N
TAL Metals	6010C/7470A	HNO_3, 4°C	1	250 mL	PE	(Y) / N
						Y / N
						Y / N
						Y / N
						Y / N
						Y / N
						Y / N

OBSERVATIONS / NOTES:

Evacuated WTB-MW01 3X previous day w/recovery each time
Shading flow thru cell and tubing to reduce impact of sunlight on temperature
~7 min to exchange water in flow cell Non-tidal Intake @ midpt of sat. screen

1 hr 7 min to fill bottles.
WL @ end was 8.08' btor

Signature(s): K Jalkut

TETRA TECH

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: OU8, Portsmouth NSY **Event:** RI
Project No.: 112G03270

Sample ID: WTB-GW-MW02-0615	**Sampled By:** K. JACKUT
QA/QC Duplicate ID: N/A	**Sample Date:** 6/10/15
MS/MSD Collected: YES (NO)	**Sample Time:** 1625

WELL INFORMATION:

Well ID :	**Purge Date:** 6/10/15
Well Diameter (in): 2	**Static Water Level (ft-BTOR):** 8.47
Top of Screen (ft-BTOR): ~4.7	**PID Monitor Reading:** N/A
Bottom of Screen (ft-BTOR): ~14.7	**Purge Method:** Peristaltic Pump / Low Stress
Total Well Depth (ft-BTOR): 14.73	**Sample Method:** ↓

EQUIPMENT INFORMATION:

Water Quality Instrument: YSI 556 MPS S/N 0681787 A0	**Pump Controller:**
Turbidity Meter: LaMotte 2020WE S/N 3674-3813 nephelometer	Pegasus Electra Peristaltic Pump S/N UL73466X

PURGE DATA:

Time (Hrs)	H_2O Level (ft-BTOR)	Flow mL / min.	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temp. (C°)	ORP (mV)	Salinity (% or (ppt))	Other
1535	8.46	100	Pump on; adjust flow rate; check drawdown								
1540	8.46	180	Fill flow through cell / monitor parameters								
1545	8.46	180	Colorless	6.87	17.73	5.82	0.16	15.98	-4.7	10.58	Clear
1550	8.46	180	Colorless	6.89	18.18	5.56	0.21	15.86	-0.4	10.91	Clear
1555	8.46	180	Colorless	6.98	18.87	5.49	0.18	15.46	2.3	11.26	Clear
1600	8.46	180	Colorless	6.98	19.46	5.33	0.17	15.27	4.6	11.67	Clear
1605	8.50	180	Colorless	7.04	19.91	5.27	0.11	15.85	1.0	11.97	Clear
1610	8.50	180	Colorless	7.01	20.49	4.91	0.13	15.15	2.2	12.31	Clear
1615	8.50	180	Colorless	7.03	20.69	4.77	0.14	15.00	2.4	12.47	Clear
1620	8.50	180	Colorless	7.09	20.96	4.64	0.12	14.66	2.4	12.65	Clear
1623	8.50	180	Colorless	7.09	21.16	4.36	0.11	14.74	2.7	12.75	Clear
End purge to sample @ low tide (1625 hrs [4hr lag estimated]). by 6/10/15 @ MW02											

FINAL PURGE / SAMPLE DATA:

Start Purge	End Purge	Total (min.)	Total Vol. (gal. / L.)	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temp. (C°)	ORP (mV)	Salinity (% or ppt)	Other
1540	1623	43	~2.5	7.09	21.16	4.36	0.11	14.74	2.7	12.75	Clear+ Colorless

ANALYSIS, PRESERVATION AND BOTTLE REQUIRMENTS

Analysis	Method	Preservative	Quantity	Vol.	Bottle Type	Collected
PAHs (SIM)	8270D	4°C	2	1L	amber glass	(Y) / N
EPH	MADEP	HCl, 4°C	2	1L	amber glass	(Y) / N
TAL Metals	6010C/7470A	HNO_3, 4°C	1	250 mL	PE	(Y) / N
						Y / N
						Y / N
						Y / N
						Y / N
						Y / N
						Y / N

OBSERVATIONS / NOTES:

Tidally influenced per results of tidal study
Low tide (w/ 4 hr lag) @ 1630 (25) hrs by 6/10/15
Purge for ~45 min prior to sampling @ low tide

Pump intake (tubing intake) @ midpt. of sat. screen = ~11.5' btor
Purge readings stabilize for sampling per SAP criteria

WL @ end = 8.45' btor
~25 min to fill containers

Signature(s): K Jackut

TETRA TECH

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: OU8, Portsmouth NSY **Event:** RI
Project No.: 112G03270

Sample ID:	WTB-GW-MW03-0615	**Sampled By:**	TE
QA/QC Duplicate ID:	WTB-FD01-061015	**Sample Date:**	6-10-15
MS/MSD Collected:	YES (NO)	**Sample Time:**	1000

WELL INFORMATION:

Well ID:	WTB-MW03	**Purge Date:**	6-10-15
Well Diameter (in):	2"	**Static Water Level (ft-BTOR):**	9.89
Top of Screen (ft-BTOR):	5.79	**PID Monitor Reading:**	—
Bottom of Screen (ft-BTOR):	15.79	**Purge Method:**	peri. pump
Total Well Depth (ft-BTOR):	15.79	**Sample Method:**	peri pump

EQUIPMENT INFORMATION:

Water Quality Instrument:	YSI 556	**Pump Controller:**	N/A
Turbidity Meter:	La Motte 2020 we		

PURGE DATA:

Time (Hrs)	H_2O Level (ft-BTOR)	Flow mL / min.	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temp. (C°)	ORP (mV)	Salinity (% or ppt)	Other
0917	9.91	150	Clear	—	—	—	—	—	—	—	Start
0925	9.92	180		6.71	2.03	1.24	19.0	19.74	19.0	1.04	
0930	9.91	220		6.74	2.03	0.56	12.3	19.70	6.1	1.04	
0935	9.91			6.78	2.05	0.36	9.91	19.70	-14.4	1.05	
0940	9.92			6.82	2.06	0.30	4.71	19.71	-17.4	1.06	
0945	9.92			6.85	2.08	0.24	4.99	19.75	-44.9	1.07	
0950	9.9			6.87	2.09	0.05	3.54	19.74	-52.2	1.07	
0955	9.9			6.89	2.09	0.08	3.10	19.88	-53.9	1.08	
	Stab. Criteria			+/-0.1	+/- 3%	<0.5	<5	+/- 3%	+/- 10	N/A	

FINAL PURGE / SAMPLE DATA:

Start Purge	End Purge	Total (min.)	Total Vol. (gal. / L)	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temp. (C°)	ORP (mV)	Salinity (% or ppt)	Other
0917	0955	38	8.4	6.89	2.09	0.08	3.10	19.88	-53.9	1.08	

ANALYSIS, PRESERVATION AND BOTTLE REQUIRMENTS

Analysis	Method	Preservative	Quantity	Vol.	Bottle Type	Collected
PAHs (SIM)	8270D	4°C	2	1L	amber glass	Y / N
EPH	MADEP	HCl, 4°C	2	1L	amber glass	Y / N
TAL Metals	6010C/7470A	HNO_3, 4°C	1	250 mL	PE	Y / N
						Y / N
						Y / N
						Y / N
						Y / N
						Y / N
						Y / N

OBSERVATIONS / NOTES:

15.79 − 9.89 = 5.90 ; 2) 5.90 = 2.95 ; 9.89 + 2.95 = 12.84

Pump intake @ 13'

Signature(s):

TETRA TECH

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: OU8, Portsmouth NSY **Event:** RI
Project No.: 112G03270

Sample ID: WTB-GW-MW04-6615	**Sampled By:** K. Jackut
QA/QC Duplicate ID: N/A	**Sample Date:** 6/10/15
MS/MSD Collected: (YES) NO	**Sample Time:** 1100

WELL INFORMATION:

Well ID: WTB-MW04	**Purge Date:** 6/10/15
Well Diameter (in): 2	**Static Water Level (ft-BTOR):** 8.88
Top of Screen (ft-BTOR): ~7	**PID Monitor Reading:** N/A
Bottom of Screen (ft-BTOR): ~17	**Purge Method:** Peristaltic Pump / Low Stress
Total Well Depth (ft-BTOR): 17.08	**Sample Method:** ↓

EQUIPMENT INFORMATION:

Water Quality Instrument: YSI 556 MPS S/N 06B1787A0	**Pump Controller:** Pegasus Electra Peristaltic Pump - S/N U7346 6X
Turbidity Meter: LaMotte 2020WE S/N 3674-3813	

PURGE DATA:

Time (Hrs)	H_2O Level (ft-BTOR)	Flow mL / min.	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temp. (C°)	ORP (mV)	Salinity (% or (ppt))	Other
0910	8.86	150	Pump on; adjust flow rate; check drawdown								
0920	8.86	200	Fill flow thru cell / monitor parameters								
0930	8.86	200	Colorless	6.55	0.795	2.40	38.3	13.66	-44.2	0.39	Sl. Cloudy
0945	8.86	200	Colorless	6.89	0.831	0.78	17.1	13.47	-51.9	0.41	Cleaning
1000	8.86	200	Colorless	7.02	0.859	0.44	8.58	13.48	-61.0	0.42	Clear
1015	8.86	200	Colorless	7.08	0.888	0.34	5.51	13.51	-64.8	0.44	Clear
1020	8.86	200	Colorless	7.09	0.899	0.34	5.07	13.55	-59.3	0.45	Clear
1025	8.86	200	Colorless	7.27	0.860	0.61	4.79	13.57	-71.8	0.42	Clear
1030	8.86	200	Colorless	7.28	0.816	0.75	3.88	13.53	-73.3	0.40	Clear
1035	8.86	200	Colorless	7.28	0.825	0.69	3.25	13.58	-71.7	0.41	Clear
1040	8.86	200	Colorless	7.26	0.831	0.47	3.15	13.56	-72.1	0.41	Clear
End purge - parameters stable for sampling per criteria in SAP											

FINAL PURGE / SAMPLE DATA:

Start Purge	End Purge	Total (min.)	Total Vol. (gal. / L.)	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temp. (C°)	ORP (mV)	Salinity (% or (ppt))	Other
0920	1040	80	~5	7.26	0.831	0.47	3.15	13.56	-72.1	0.41	Clear + colorless

ANALYSIS, PRESERVATION AND BOTTLE REQUIRMENTS

Analysis	Method	Preservative	Quantity	Vol.	Bottle Type	Collected
PAHs (SIM)	8270D	4°C	2 6	1L	amber glass	(Y) N
EPH	MADEP	HCl, 4°C	2 6	1L	amber glass	(Y) / N
TAL Metals	6010C/7470A	HNO_3, 4°C	1 3	250 mL	PE	(Y) / N
						Y / N
						Y / N
						Y / N
						Y / N
						Y / N
						Y / N

OBSERVATIONS / NOTES:

Non-tidal per results of tidal study
Intake @ midpt of saturated screen - ~13' btor
1 hr 10 min to fill containers
WL @ end of sampling @ 8.86' btor

Signature(s): K Jackut

TETRA TECH

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: OU8, Portsmouth NSY **Event:** RI
Project No.: 112G03270

Sample ID: WTB-GW-MW05R-0615	**Sampled By:** K. JAHRUT
QA/QC Duplicate ID: N/A	**Sample Date:** 6/9/15
MS/MSD Collected: YES (NO)	**Sample Time:** ~~1400~~ 1600 6/9/15

WELL INFORMATION:

Well ID: MW05R	**Purge Date:** 6/9/15
Well Diameter (in): 2	**Static Water Level (ft-BTOR):**
Top of Screen (ft-BTOR): ~4.3	**PID Monitor Reading:** N/A
Bottom of Screen (ft-BTOR): ~14.3	**Purge Method:** Peristaltic Pump / Low Stress
Total Well Depth (ft-BTOR): 14.31	**Sample Method:** ↓

EQUIPMENT INFORMATION:

Water Quality Instrument: YSI 556 MPS S/N 0681787A0	**Pump Controller:**
Turbidity Meter: LaMotte 2020WE nephelometer S/N 3674-3813	Pegasus Electra Peristaltic Pump S/N 473466X

PURGE DATA:

Time (Hrs)	H_2O Level (ft-BTOR)	Flow mL / min.	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temp. (C°)	ORP (mV)	Salinity (% or ppt)	Other
1500	7.19	100	Adjust flow rate; check drawdown								
1510	7.19	100	Fill cell					~~16.60~~			
1515	7.19	100	colorless	7.68	36.94	0.98	2.08	16.61	87.5	23.44	clear
1520	7.19	100	colorless	7.65	36.87	0.89	1.68	16.79	89.7	23.38	clear
1525	7.19	165	colorless	7.68	37.20	0.78	1.72	16.01	89.0	23.58	clear
1530	7.19	165	colorless	7.73	37.04	0.54	1.56	15.82	90.6	23.51	clear
1535	7.19	165	colorless	7.74	37.10	0.49	1.17	15.69	92.8	23.54	clear
1540	7.19	165	colorless	7.73	37.07	0.45	0.95	15.67	94.5	23.52	clear
1545	7.19	165	colorless	7.73	37.10	0.41	0.91	15.66	95.9	23.54	clear
1550	7.19	165	colorless	7.83	37.12	0.37	0.84	15.49	95.3	23.55	clear
1555	7.19	165	colorless	7.84	37.15	0.35	0.82	15.45	93.9	23.58	clear
End purge / sample @ low tide (parameters also stable for sampling for criteria in SAP)											

FINAL PURGE / SAMPLE DATA:

Start Purge	End Purge	Total (min.)	Total Vol. (gal / L.)	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temp. (C°)	ORP (mV)	Salinity (% or ppt)	Other
1510	1555	45	2-2½	7.84	37.15	0.35	0.82	15.45	93.9	23.58	clear/ colorless

ANALYSIS, PRESERVATION AND BOTTLE REQUIRMENTS

Analysis	Method	Preservative	Quantity	Vol.	Bottle Type	Collected
PAHs (SIM)	8270D	4°C	2	1L	amber glass	(Y) N
EPH	MADEP	HCl, 4°C	2	1L	amber glass	(Y) / N
TAL Metals	6010C/7470A	HNO_3, 4°C	1	250 mL	PE	(Y) / N
						Y / N
						Y / N
						Y / N
						Y / N
						Y / N
						Y / N

OBSERVATIONS / NOTES:

4.5 hr lag per results of tidal study
Low tide @ 1126 + 4.5 hrs = ~4PM
Start purge ~45 min prior to low tide, then sample

Intake @ midpt of sat. screen = ~10' btor
WL @ end of sampling = 7.13' btor
~32 minutes to fill all containers

Signature(s): K Jahrut

TETRA TECH

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: OU8, Portsmouth NSY **Event:** RI
Project No.: 112G03270

Sample ID: WTB-GW-MW06-0615	**Sampled By:** K. JALKUT
QA/QC Duplicate ID: N/A	**Sample Date:** 6/12/15
MS/MSD Collected: YES (NO)	**Sample Time:** 1425

WELL INFORMATION:

Well ID: WTB-MW06	**Purge Date:** 6/12/15
Well Diameter (in): 2	**Static Water Level (ft-BTOR):** 6.28
Top of Screen (ft-BTOR): ~5.3	**PID Monitor Reading:** N/A
Bottom of Screen (ft-BTOR): ~15.3	**Purge Method:** Peristaltic Pump / Low Stress
Total Well Depth (ft-BTOR): ~15.3	**Sample Method:** ↓

EQUIPMENT INFORMATION:

Water Quality Instrument: YSI 556 MPS S/N 06B1787A0	**Pump Controller:** Pegasus Electra Peristaltic Pump S/N U73460X
Turbidity Meter: LaMotte 2020 WE nephelometer S/N 21674-3813	

PURGE DATA:

Time (Hrs)	H_2O Level (ft-BTOR)	Flow mL / min.	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temp. (C°)	ORP (mV)	Salinity (% or ppt)	Other
1335	6.28	120	Pump on; adjust flow rate; check for drawdown								
1340	6.28	210	Fill flow-through cell								
1345	6.28	210	Colorless	8.09	4.910	1.04	7.88	14.24	-155.6	2.65	Clear
1350	6.28	210	Colorless	8.21	4.802	0.49	7.02	14.00	-139.9	2.59	Clear
1355	6.28	210	Colorless	8.24	4.739	0.37	5.71	14.04	-148.7	2.55	Clear
1400	6.28	210	Colorless	8.52	4.721	0.30	5.54	13.87	-146.3	2.54	Clear
1405	6.28	210	Colorless	8.36	4.689	0.28	3.86	14.01	-152.8	2.52	Clear
1410	6.28	210	Colorless	8.80	4.709	0.43	3.53	14.01	-162.7	2.54	Clear
1415	6.28	210	Colorless	8.79	4.708	0.29	3.10	13.86	-149.4	2.53	Clear
1420	6.28	210	Colorless	8.85	4.704	0.28	3.07	13.76	-149.0	2.53	Clear
1425	6.28	210	Colorless	8.87	4.701	0.25	3.02	13.64	-155.5	2.53	Clear
End purge to sample @ low tide (1425 hrs, no lag time considered)											

FINAL PURGE / SAMPLE DATA:

Start Purge	End Purge	Total (min.)	Total Vol. (gal / L.)	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temp. (C°)	ORP (mV)	Salinity (% or ppt)	Other
1340	1425	45	~3	8.87	4.701	0.25	3.02	13.64	-155.5	2.53	Clear + colorless

ANALYSIS, PRESERVATION AND BOTTLE REQUIRMENTS

Analysis	Method	Preservative	Quantity	Vol.	Bottle Type	Collected
PAHs (SIM)	8270D	4°C	2	1L	amber glass	(Y) / N
EPH	MADEP	HCl, 4°C	2	1L	amber glass	(Y) / N
TAL Metals	6010C/7470A	HNO_3, 4°C	1	250 mL	PE	(Y) / N
						Y / N
						Y / N
						Y / N
						Y / N
						Y / N
						Y / N

OBSERVATIONS / NOTES:

Not considered to be significantly influenced by tides per tidal study results + conversation w/ C. Evans (NE DEP)
Sample @ low tide – no need to consider lag time
Purge ~45 min prior to sampling
Tubing intake @ midpt of saturated screen = ~10.8' btor

Purge readings stabilized prior to sampling
Water level @ end of purge = 6.28' btor (no change)

~20-25 minutes to fill all containers

Signature(s): K Jalkut

TETRA TECH

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: OU8, Portsmouth NSY **Event:** RI
Project No.: 112G03270

Sample ID: WTB-GW-MW07-0615	**Sampled By:** K. Jaykut
QA/QC Duplicate ID: N/A	**Sample Date:** 6/11/15
MS/MSD Collected: YES (NO)	**Sample Time:** 1755

WELL INFORMATION:

Well ID : WTB-MW07	**Purge Date:** 6/11/15
Well Diameter (in): 2	**Static Water Level (ft-BTOR):** 6.25
Top of Screen (ft-BTOR): ~4.7	**PID Monitor Reading:** N/A
Bottom of Screen (ft-BTOR): ~14.7	**Purge Method:** Peristaltic Pump / Low Stress
Total Well Depth (ft-BTOR): 14.70 (sl. soft bottom)	**Sample Method:** ↓

EQUIPMENT INFORMATION:

Water Quality Instrument: YSI 556 MPS S/N 06B1787 A0	**Pump Controller:**
Turbidity Meter: LaMotte 2020WE nephelometer S/N - 3674L-3813	Pegasus Electra-Peristaltic Pump S/N W73466X

PURGE DATA:

Time (Hrs)	H_2O Level (ft-BTOR)	Flow mL / min.	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temp. (C°)	ORP (mV)	Salinity (% or ppt)	Other
~~15~~ 1700	6.25	120	Pump on; adjust flow rate; check drawdown								
1705	6.25	170	Fill flow through cell / monitor parameters								
1710	6.25	170	Colorless	6.78	7.820	1.11	21.8	19.49	-58.8	4.36	Sl. Cloudy
*1720	6.25	170	Colorless	6.77	7.815	0.82	20.9	19.10	-52.2	4.34	
1725	6.25	170	Colorless	6.81	7.816	0.70	17.8	19.20	-52.0	4.35	
1730	6.25	170	Colorless	6.90	7.813	0.55	11.8	18.92	-53.4	4.34	cleaning
1735	6.25	170	Colorless	6.99	7.832	0.65	11.20	19.00	-53.6	4.35	
1740	6.25	170	Colorless	7.06	7.812	0.51	10.17	19.14	-53.8	4.34	
1745	6.25	170	Colorless	7.10	7.818	0.44	9.90	19.15	-53.9	4.35	Clear
1750	6.25	170	Colorless	7.15	7.810	0.37	9.75	19.03	-54.3	4.34	↓
1755	6.25	170	Colorless	7.15	7.812	0.39	9.60	19.04	-55.1	4.34	↓

End purge for sampling @ low tide (w/ lag for well). Parameters stabilize w/in criteria acceptability for sampling per SAP

FINAL PURGE / SAMPLE DATA:

Start Purge	End Purge	Total (min.)	Total Vol. (gal / L.)	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temp. (C°)	ORP (mV)	Salinity (% or ppt)	Other
1705	1755	50	~3	7.15	7.812	0.39	9.60	19.04	-55.1	4.34	Clear & Colorless

ANALYSIS, PRESERVATION AND BOTTLE REQUIRMENTS

Analysis	Method	Preservative	Quantity	Vol.	Bottle Type	Collected
PAHs (SIM)	8270D	4°C	2	1L	amber glass	(Y) / N
EPH	MADEP	HCl, 4°C	2	1L	amber glass	(Y) / N
TAL Metals	6010C/7470A	HNO_3, 4°C	1	250 mL	PE	(Y) / N
						Y / N
						Y / N
						Y / N
						Y / N
						Y / N
						Y / N

Note - Tubing wrapped w/ foam insulation + flow cell wrapped to diminish effect of direct sunlight. Temperature in upper 80s to near 90°F today

OBSERVATIONS / NOTES:

*missed reading - onlookers asking questions
Low tide w/ 4.5 lag @ MW07 per results of tidal study
Purge ~45 min + then sample @ low tide = 1755 hrs

Tubing intake @ ~midpt of sat. screen = ~10.5' btor
Well is tidally influenced
WL @ end of sampling = 6.25' btor

~25 min to fill containers

Signature(s): K Jaykut

TETRA TECH

QA SAMPLE LOG SHEET

Project Site Name: OU8, Portsmouth NSY
Project Number: 112G03270
Sample Location: —
QA Sample Type:

Sample ID Number: WTB - RB01 - 060415
Sampled By: TE / KJ
C.O.C. Number:

[] Trip Blank
[] Source Water Blank
[X] Rinsate Blank
[] Other Blank

SAMPLING DATA:

Date: 6-4-15
Time: 1600
Method: Direct Pour

WATER SOURCE:

[X] Laboratory Prepared
[] Purchased
[] Other
[] Tap
[] Fire Hydrant

PURCHASED WATER INFORMATION (If Applicable as Source or Rinsate Water):

Product Name:
Supplier: N/A
Manufacturer:
Order Number:
Lot Number:
Expiration Date:

RINSATE INFORMATION (If Applicable):

Media Type: Soil
Equipment Used: DPT cutting shoe
Equipment Type:
[] Dedicated
[X] Reusable

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
PAHs (SIM)	4°C	2 x 1L amber glass	YES / NO
EPH	4°C, HCl	2 x 1L amber glass	YES / NO
TAL Metals	4°C, HNO_3	1 x 250 mL PE	YES / NO

OBSERVATIONS / NOTES:

Signature(s):

CHAIN-OF-CUSTODY FORMS

TETRA TECH NUS, INC.

CHAIN OF CUSTODY

NUMBER 4908

PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
112G03270	OU8 / PNSY	Megan Ved	412 921-7271	Katahdin Analytical / Jennifer Ubrin
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER: Tim Evans	PHONE NUMBER: 412 921 7281	ADDRESS: 600 Technology Way
		CARRIER/WAYBILL NUMBER		CITY, STATE: Scarborough ME 04074

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: /

TYPE OF ANALYSIS: PAHs (SIM), EPH, TAL Metals

DATE YEAR 2015	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS									COMMENTS
6/1	1100	WTB-SS-11-0002	SB11	0	2	SO	G	1	1								
	1115	WTB-SB-11-0206	SB11	2	6	SO	G	1	1								
	1125	WTB-SB-11-0610	SB11	6	10	SO	G	1	1								
6/3	0915	WTB-~~SB~~ SS-14-0002	SB14	0	2	SO	G	1	1								
	0925	WTB-SB-14-0206	SB14	2	6	SO	G	1	1								
	0000	WTB-FD01-060315	—	—	—	QC	G	1	1								
	1020	WTB-SB-14-0607	SB14	6	7	SO	G	1	1								
	1035	WTB-SS-17-0002	SB17	0	2	SO	G	1	1								
	1040	WTB-SB-17-0206	SB17	2	6	SO	G	1	1								
	1045	WTB-SB-17-0610	SB17	6	10	SO	G	1	1								
	1100	WTB-SS-19-0002	SB19	0	2	SO	G	1	1								
	1105	WTB-SB-19-0206	SB19	2	6	SO	G	1	1								
	1115	WTB-SB-19-0610	SB19	6	10	SO	G	1	1								

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	6/3/15	12:45	1. RECEIVED BY		
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 4909 | PAGE 1 OF 4

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
112G03270	048 / PNSY	Megan Ved	412 921 7271	Katahdin Analytical / Jennifer obrin
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		Tim Evans	412 921 7281	600 Technology Way
		CARRIER/WAYBILL NUMBER		CITY, STATE
				Scarborough ME 04074

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: -

DATE YEAR 2015	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: PAHs(SIM), EPH, TAL metals								COMMENTS
6/3	1310	WTB-SS-22-0002	SB22	0	2	SO	G	1	1								
	1325	WTB-SS-24-0002	SB24	0	2	SO	G	1	1								
	1330	WTB-SB-24-0206	SB24	2	6	SO	G	1	1								
	1335	WTB-SB-24-06~~10~~ 9.7 (TC)	SB24	6	9.7	SO	G	3	3								+ (TC) MS/MSD
	1405	WTB-SB-22-0206	SB22	2	6	SO	G	1	1								
	1410	WTB-SB-22-0610	SB22	6	10	SO	G	1	1								
	0000	WTB-FD02-060315	—	—	—	QC	G	1	1								
	1430	WTB-SS-23-0002	SB23	0	2	SO	G	1	1								
	1435	WTB-SB-23-0206	SB23	2	6	SO	G	1	1								
	1440	WTB-SB-23-0610	SB23	6	10	SO	G	1	1								
6/4	0820	WTB-SS-08-0002	SB08	0	2	SO	G	1	1								
	0000	WTB-FD01-060415	—	—	—	QC	G	1	1								
	0825	WTB-SB-08-0206	SB08	2	6	SO	G	1	1								

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	6/5/15	1250	1. RECEIVED BY	6/5/15	~~1250~~ 1300
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4910 | PAGE 2 OF 4

PROJECT NO: 112G03270	FACILITY: OU8 / PNSY	PROJECT MANAGER Megan Ved	PHONE NUMBER 412-921 7271
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER Tim Evans	PHONE NUMBER 412 921 7281
		CARRIER/WAYBILL NUMBER	

LABORATORY NAME AND CONTACT: Katahdin Analytical / Jennifer O'brin
ADDRESS: 600 Technology Way
CITY, STATE: Scarborough ME 04074

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: /

DATE YEAR 2015	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: PAHs(SIM), EPH, TAL metals	COMMENTS
6/4	0830	WTB-SB-08-0610	SB08	6	10	SO	G	1	1	
	0840	WTB-SBSS-09-0002	SB09	0	2	SO	G	1	1	
	0845	WTB-SB-09-0206	SB09	2	6	SO	G	1	1	
	0850	WTB-SB-09-0610	SB09	6	10	SO	G	1	1	
	1005	WTB-SS-12-0002	SB12	0	2	SO	G	1	1	
	1008	WTB-SB-12-0206	↓	2	6	↓	↓	1	1	
	1015	WTB-SB-12-0610	↓	6	10	↓	↓	1	1	
	1025	WTB-SS-15-0002	SB15	0	2	SO	G	1	1	
	1030	WTB-SB-15-0206	SB15	2	6	↓	↓	1	1	
	0000	WTB-FD02-060415	—	—	—	QC	G	1	1	
	1035	WTB-SB-15-0610	SB15	6	10	SO	G	1	1	
	1105	WTB-SS-16-0002	SB16	0	2	SO	G	3	3	+ MS/MSD
	1110	WTB-SB-16-0206	SB16	2	6	SO	G	1	1	

1. RELINQUISHED BY	DATE 6/5/15	TIME 1250	1. RECEIVED BY	DATE 6/5/15	TIME ~~1250~~ 1300
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4911 | PAGE 3 OF 4

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
112G03270	OU8 / PNSY	Megan Ved	412-921-7281	Katahdin Analytical / Jennifer Obrin
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER: Jim Evans	PHONE NUMBER: 412 921-7281	ADDRESS: 600 Technology Way
		CARRIER/WAYBILL NUMBER		CITY, STATE: Scarborough ME 04074

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2015	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	PAHs (SIM), EPH, TAL metals	PAHs (SIM)	EPH	TAL metals					COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									G	G	G	P					
PRESERVATIVE USED									-	-	HCl	HNO_3					
6/4	1115	WTB-SB-16-0610	SB16	6	10	SO	G	1	1								
	1310	WTB-SB-18-0002	SB18	0	2	SO	G	1	1								
	1315	WTB-SB-18-0206	SB18	2	6	SO	G	1	1								
	1320	WTB-SB-18-0610	SB18	6	10	SO	G	1	1								
	1335	WTB-SS-20-0002	SB20	0	2	SO	G	1	1								
	0000	WTB-FD03-060415	—	—	—	QC	G	1	1								
	1340	WTB-SB-20-0206	SB20	2	6	SO	G	3	3								+ MS/MSD
	1345	WTB-SB-20-0610	SB20	6	10	SO	G	1	1								
	1405	WTB-SS-21-0002	SB21	0	2	SO	G	1	1								
	1410	WTB-SB-21-0206	SB21	2	6	SO	G	1	1								
	1415	WTB-SB-21-0610	SB21	6	10	SO	G	1	1								
	1600	WTB-RB01-060415	Rinsate	—	—	QC	G	5		2	2	1					
6/5	0830	WTB-SS-13-0002	SB13	0	2	SO	G	1	1								

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	6/5/15	1300	1. RECEIVED BY	6/5/15	1300
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4913 | PAGE 4 OF 4

PROJECT NO: 112G03270	FACILITY: OU8/PNSY	PROJECT MANAGER Megan Ved	PHONE NUMBER 412 921 7271	LABORATORY NAME AND CONTACT: Katahdin Analytical / Jennifer Obrin
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER Tim Evans	PHONE NUMBER 412 921 7281	ADDRESS 600 Technology Way
		CARRIER/WAYBILL NUMBER		CITY, STATE Scarborough ME 04074

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): CK
PRESERVATIVE USED: -

DATE YEAR 2015	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: PAHs (SIM), EPH, TPH, Metals	COMMENTS
6/5	0833	WTB-SB-13-0206	SB13	2	6	SO	G	1	1	
	0840	WTB-SB-13-0610	SB13	6	10	SO	G	1	1	
	0850	WTB-SB-10-0002	SB10	0	2	SO	G	1	1	
	0855	WTB-SB-10-0206	SB10	2	6	SO	G	1	1	
	1000	WTB-SB-10-0610	SB10	6	10	SO	G	1	1	

1. RELINQUISHED BY	DATE 6/5/15	TIME 1300	1. RECEIVED BY	DATE 6/5/15	TIME 1300
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4915 | PAGE 1 OF 1

PROJECT NO: 112G03270	FACILITY: OU8 Portsmouth NSY	PROJECT MANAGER Megan Ved	PHONE NUMBER 412 921 7271	LABORATORY NAME AND CONTACT: Katahdin Analytical / Jennifer Obrin
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER Tim Evans	PHONE NUMBER 412 921 7281	ADDRESS 600 Technology Way
		CARRIER/WAYBILL NUMBER		CITY, STATE Scarborough ME 04074

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G P
PRESERVATIVE USED: – HCl HNO_3

DATE YEAR 2015	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	PAHs (SIM)	EPH	TAL metals					COMMENTS
6/9	1208	WTB-GW-MW01-0615	WTB-MW01	–	–	GW	G	5	2	2	1					Sample Salinity = 18.44 ppt
↓	1600	WTB-GW-MW05R-0615	WTB-MW05R	–	–	GW	G	5	2	2	1					= 23.58 ppt
6/10	1000	WTB-GW-MW03-0615	WTB MW03	–	–	GW	G	5	2	2	1					= 1.08 ppt
↓	0000	WTB-~~GW~~ TB FD01-061015	–	–	–	QC	G	5	2	2	1					–
↓	1100	WTB-GW-MW04-0615	WTB MW04	–	–	GW	G	15	6	6	3					MS/MSD = 0.41 ppt

1. RELINQUISHED BY	DATE 6/10/15	TIME 1300	1. RECEIVED BY	DATE 6-10-15	TIME 1300
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4916 | PAGE 1 OF 1

PROJECT NO: 112G03270	FACILITY: OU8 Portsmouth NSY	PROJECT MANAGER: Megan Ved	PHONE NUMBER: 412 921 7271	LABORATORY NAME AND CONTACT: Katahdin Analytical Services / Jen Obrin
SAMPLERS (SIGNATURE): K Joelkut		FIELD OPERATIONS LEADER: Tim Evans	PHONE NUMBER: 412 921 7281	ADDRESS: 600 Technology Way
		CARRIER/WAYBILL NUMBER: Hand deliver @ lab		CITY, STATE: Scarborough, ME 04074

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G P
PRESERVATIVE USED: – HCL HNO3

DATE YEAR 2015	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	PAHs (SIM) 1 liter amber	EPH 1 liter amber	TAL metals 250 ml				COMMENTS
6/10	1625	WTB-GW-MW02-0615	WTB-MW02	–	–	GW	G	5	2	2	1				Note- Sample Salinity = 12.75ppt
6/11	1755	WTB-GW-MW07-0615	WTB-MW07	–	–	GW	G	5	2	2	1				Sample Salinity = 4.34ppt
6/12	1425	WTB-GW-MW06-0615	WTB-MW06	–	–	GW	G	5	2	2	1				Sample Salinity = 2.53ppt

K Joelkut 6/12/15

1. RELINQUISHED BY: K Joelkut	DATE: 6/13/15	TIME: 10:47	1. RECEIVED BY: [signature]	DATE: 06/13/15	TIME: 10:47
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

EQUIPMENT CALIBRATION FORMS

TETRA TECH

YSI MULTIPARAMETER WATER QUALITY METER CALIBRATION LOG

Project: OU8 RI
Project No: 112G03270
Location: Portsmouth NSY, Kittery ME

Model No: YSI 556 MPS
Serial No: 06A3673 AF
Rental No: 451353 X
Decal Letter:

Date 2015		Conductivity ~~1000~~ 1.409 µS/cm	Conductivity DI check	pH 4.0	pH 7.0	pH 10.0	Dissolved Oxygen 100% % Sat.	Dissolved Oxygen 100% mg/L	Dissolved Oxygen 100% Temp in Cell	ORP mV	ORP @ Temp	Solution Temp °C	Barometric Pressure, mm of Hg	Signature
6/5	am	1.409		4.0	7.0	9.99	N/A - used for well development					12.78	NA	TSC
	pm													
	am													
	pm													
	am													
	pm													
	am													
	pm													
	am													
	pm													
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	am													
	pm													
	am													
	pm													

Calibration Standards

Lot Number:					NA		NA	NA
Expires:								

Instrument calibrated in accordance with manufacturers instructions

TETRA TECH

YSI MULTIPARAMETER WATER QUALITY METER CALIBRATION LOG

Project: OU8 RI
Project No: 112G03270
Location: Portsmouth NSY, Kittery ME

Model No: 556 MPS
Serial No: 06D1746AK / W52240X
Rental No:
Decal Letter:

Date 2015		Conductivity ~~1000~~ 1409 µS/cm	Conductivity DI check	pH 4.0	pH 7.0	pH 10.0	Dissolved Oxygen 100% % Sat.	Dissolved Oxygen 100% mg/L	Dissolved Oxygen 100% Temp in Cell	ORP mV	ORP @ Temp	Solution Temp ° C	Barometric Pressure, mm of Hg	Signature
6/5	am	1405	5	4.00	7.00	~~10.01~~	N/A	— Well Development			→	19.52	N/A	KJalbert
	pm	1344	3	3.94	6.50	~~9.95~~ 9.35	←		↓		→	13.66	↓	KJalbert
	am													
	pm													
	am													
	pm													
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	am													
	pm													

Calibration Standards

Lot Number:	E033-14	D356-06	E037-14	E035-21	NA	NA	NA
Expires:	2/16/17	12/29/16	2/13/17	2/4/16			

Instrument calibrated in accordance with manufacturers instructions

TETRA TECH

YSI MULTIPARAMETER WATER QUALITY METER CALIBRATION LOG

Project: OU8 RI
Project No: 112G03270
Location: Portsmouth NSY, Kittery ME

Model No: YSI 556
Serial No: 05H2352
Rental No: 450225X
Decal Letter:

Date 2015		Conductivity 1409 ~~1000~~ µS/cm	Conductivity DI check	pH 4.0	pH 7.0	pH 10.0	Dissolved Oxygen 100% % Sat.	Dissolved Oxygen 100% mg/L	Dissolved Oxygen 100% Temp in Cell	ORP mV	ORP @ Temp	Solution Temp ° C	Barometric Pressure, mm of Hg	Signature
6/8	am	1409	–	4.00	7.00	10.0	N/A	→				15.78	789.1	TSE
	pm													
6/9	am	1409	–	4.00	7.06	9.98	102.3	9.40	19.3	236.2	20.5	20.02	783	TSE
	pm													
6/10	am	1409		4.00	7.00	9.98	103.3	9.43	19.77	238.8	18.24	18.62	785.2	TSE
	pm													
	am													
	pm													
	am													
	pm													
	am													
	pm													
	am													
	pm													
	am													
	pm													
	am													
	pm													
	am													
	pm													

Calibration Standards

Lot Number:	E033-14	D356-06	E105-21	E035-21	E125-14		
Expires:	2-6-17	12-29-16	4-16-17	2-9-16	5-8-16	NA	NA

Instrument calibrated in accordance with manufacturers instructions

TETRA TECH

YSI MULTIPARAMETER WATER QUALITY METER CALIBRATION LOG

Project: OU8 RI
Project No: 112G03270
Location: Portsmouth NSY, Kittery ME

Model No: 556 MPS
Serial No: 06H2787 AO / u73041X (bar code)
Rental No:
Decal Letter:

Date 2015		Conductivity 1000 µS/cm	Conductivity DI check	pH 4.0	pH 7.0	pH 10.0	Dissolved Oxygen 100% % Sat.	Dissolved Oxygen 100% mg/L	Dissolved Oxygen 100% Temp in Cell	ORP mV	ORP @ Temp	Solution Temp ° C	Barometric Pressure, mm of Hg	Signature
6/8	am	1.409	2	4.00	7.00	9.97	N/A - For well dev.					14.11	765.8	K Jackert
	pm	1.402	5	4.11	7.26	10.09						22.30	758.4	K Jackert
6/9	am	1.409	3	4.00	7.00	9.94	99.7	9.14	19.64	237.5	19.88	18.63	757.8	K Jackert
	pm	1.395	3	4.69*	7.75*	10.52*	96.3	8.61	20.82	228.5	21.71	21.82	754.0	K Jackert
6/10	am	1.409	2	4.00	7.00	9.98	100.2	9.32	18.881	240.2	18.00	17.99	760.3	K Jackert
	pm	1.383	2	3.88	6.87	9.74	96.9	7.89	25.89	225.9	26.25	25.87	757.5	K Jackert
6/11	am	1.409	2	3.98	7.00	9.98	99.1	6.95	34.52	211.0	32.95	30.14	752.8	K Jackert
	pm	1.403	2	4.15	6.96	10.16	99.0	8.02	26.16	218.9	30.12	29.09	755.9	K Jackert
6/12	am	1.409	2	4.01	7.00	10.09	103.1	8.84	21.62	235.5	~~23.20~~	21.27	763.4	K Jackert
	pm	1.402	2	4.20	7.12	9.95	99.7	8.37	24.11	228.7	21.53 25.22	24.43	758.5	K Jackert
	am													
	pm													
	am													
	pm													
	am													
	pm													
	am													
	pm													
	am													
	pm													

*Note - pH probes reading high @ cal check

Calibration Standards

Lot Number:	E033-14	D356-06	E105-21	E035-21	NA	E125-14	NA	NA
Expires:	2-6-17	12-29-16	4-16-17	2-9-16		5-8-16		

Instrument calibrated in accordance with manufacturers instructions

TETRA TECH

FIELD INSTRUMENT CALIBRATION LOG

SITE NAME: OU8 LOCATION: Portsmouth NSY, Kittery ME EVENT: RI

INSTRUMENT NAME: La Motte MODEL: 2020 we

SERIAL No.: 535-0111 ~~DECAL~~ FEI No.: 463613X TETRA TECH PROJECT No. 112G03270

DATE 2015	CALIBRATED READING (AM)				CHECK CAL READING (PM)				STANDARDS	SIGNATURE
	0 NTU	10 NTU	100 NTU	___ NTU	0 NTU	10 NTU	100 NTU	___ NTU		
6/5	0.14	9.97	—	—	0.01	9.77	—	—	0 NTU 10 NTU	AM: 1420 hrs/TSE PM: 1700 hrs/TSE
6/8	0.02	10.00	—	—	0.02	10.00	—	—		AM: TSE PM: TSE
6/9	0.02	10.06	—	—	—	—	—	—		AM: TSE PM: —
6/10	0.07	9.97	—	—						AM: PM:
										AM: PM:
										AM: PM:
										AM: PM:
										AM: PM:

Procedure – as per Manufacturer's Instruction

TETRA TECH

FIELD INSTRUMENT CALIBRATION LOG

SITE NAME: OU8 LOCATION: Portsmouth NSY, Kittery ME EVENT: RI

INSTRUMENT NAME: LaMotte Turbidimeter MODEL: 2020 WE

SERIAL No.: 3674 - 3813 DECAL No.: TETRA TECH PROJECT No. 112G03270

DATE 2015	CALIBRATED READING (AM)				CHECK CAL READING (PM)				STANDARDS	SIGNATURE
	0 NTU	10 NTU	100 NTU	___ NTU	0 NTU	10 NTU	100 NTU	___ NTU		
6/5	-0.05	9.98	—	—	0.06	10.25	—	—	0.0 NTU = Lot # C475822 Exp. Dec 2015	AM: K Jarkut PM: K Jarkut
6/8	-0.05	10.02	—	—	0.07	9.99	—	—	10 NTU: Lot C471805 Exp. Dec 2015	AM: K Jarkut PM: K Jarkut
6/9	-0.01	10.00	—	—	0.12	10.01	—	—	↓	AM: K Jarkut PM: K Jarkut
6/10	-0.05	10.01	—	—	0.00	9.99	—	—	↓	AM: K Jarkut PM: K Jarkut
6/11	-0.04	10.01	—	—	0.03	10.15	—	—	↓	AM: K Jarkut PM: K Jarkut
6/12	-0.03	10.01	—	—	0.04	10.06	—	—	↓	AM: K Jarkut PM: K Jarkut
										AM: PM:
										AM: PM:

Procedure – as per Manufacturer's Instruction

MONITORING WELL INSPECTION AND DEVELOPMENT FORMS

TETRA TECH

MONITORING WELL DEVELOPMENT RECORD

Well: MW01
Site: 32 WTB
Date Installed: 7/13/98
Date Developed: 6/8/15
Dev. Method: Surge & Pump
Pump Type: Proactive Waterspout

Static Water Level Before (ft.): 5.40' btpvc
Depth to Bottom Before (ft.): 18.41' btpvc
Static Water Level After (ft.): 5.35'
Depth to Bottom (ft.): 18.41
Screen Length (ft.): ~10
Casing ID (in.): 2

Responsible Personnel: K. Jalkut
Drilling Co.: Maxim Tech
Project Name: OU8 RI WTB
Project Number: 112603270
Specific Capacity:

Time	Est. Sediment Thickness (ft.)	Cumulative Water Volume (gal.)	Water Level Readings (ft. below TOC)	pH	Temp (degrees C)	Specific Cond. (Units µS/cm)	Turbidity (NTU)	ORP (mV)	Remarks (odor, color, etc.)
1350			5.40						
1400-1420				Surging w/o pumping					
1430		3	10.98	7.42	16.34	25,866	2503 AU	N/A	DK brown/turbid/@ bottom
1435		7	16.90	6.86	16.57	29,616	33		Recharging/ clearing
~~1445~~		8	5.93	7.57	16.83	31,900	3.14		— 1st purge —
~~1825~~		Note:	1' recharge per	~11½ minutes	(1st measurement)			avg = 1'/12min	13' water column ≈ 2½-3hrs
			1' recharge per	11 minutes	(2nd measurement)				of recharge
			1' recharge per	13½ "	(3rd measurement)				
~~1630~~		Longer recharge time w/each 1-foot of recovery now							
1830		10	12.21	7.58	14.79	29,970	1143 AU		@ bottom 2nd purge
1835		11	14.08	7.50	14.07	30,706	98.1		clearing
1840		12	16.60	7.65	14.11	29,384	61.0		
1845		14	17.74	7.55	14.00	29,484	29.5		↓ well recharging after reading
2000		15	5.35	7.26	14.34	30,162	46.1		3rd purge
2210		17	12.90	7.21	14.05	29,802	87		
2215		18	15.74	7.31	13.31	29,824	42.6		
2220		20	16.80	7.38	13.50	29,860	27.2		
Additional Comments:		~~Set screen~~ Well vol = ~2.1 gals			—	—	—		
2240		21	16.53	7.31	14.18	29,610	11.2		clearing
2300		22	14.20	7.16	14.48	29,556	5.69		clear

TETRA TECH

MONITORING WELL DEVELOPMENT RECORD

Well: WTB-MW02
Site: OU8
Date Installed: 7-8-98
Date Developed: 6-8-15
Dev. Method: Pump/Surge
Pump Type: Spout

Static Water Level Before (ft.): 8.01 TPVC
Depth to Bottom Before (ft.): 14.83' (solid)
Static Water Level After (ft.): 8.01
Depth to Bottom (ft.): 14.83 (solid)
Screen Length (ft.): 10'
Casing ID (in.): 2"

Responsible Personnel: T. Evans
Drilling Co.: Maxim Tech
Project Name: OU8 RI PNSV
Project Number: 112G03240
Specific Capacity: —

Time	Est. Sediment Thickness (ft.)	Cumulative Water Volume (gal.)	Water Level Readings (ft. below TOC)	pH	Temp (degrees C)	Specific Cond. (Units mS/cm)	Turbidity (NTU)	Salinity ~~ORP (mV)~~ ppt	Remarks (odor, color, etc.)
1017	Ø	0	8.01						Start, Turbid, Brn
1022	↓	10	8.05	7.39	13.67	26.61	8.06	16.34	Clear
1032	↓	20	8.10	7.04	13.38	26.40	3.01	16.20	↓
1038	↓	25	8.08	6.93	13.14	26.44	4.50	16.19	↓ End

Additional Comments: Well 6.82' H_2O = 1.1 gal standing water
Borehole 8" Ø @ 30% porosity = 5.0 gal standing water
} ~6.1 gal standing water

TETRA TECH

MONITORING WELL DEVELOPMENT RECORD

Well: WTB- MW03
Site: OU8 - Site 31
Date Installed: 7-11-98
Date Developed: 6-8-15
Dev. Method: Pump/Surge
Pump Type: Spout

Static Water Level Before (ft.): 9.79
Depth to Bottom Before (ft.): 15.38 (Soft)
Static Water Level After (ft.): 9.79
Depth to Bottom (ft.): 15.79
Screen Length (ft.): 10'
Casing ID (in.): 2"

Responsible Personnel: TSE
Drilling Co.: Maxim Tech
Project Name: OU8 RI, PNSY
Project Number: 112G03270
Specific Capacity: —

Time	Est. Sediment Thickness (ft.)	Cumulative Water Volume (gal.)	Water Level Readings (ft. below TOC)	pH	Temp (degrees C)	Specific Cond. (Units mS/cm)	Turbidity (NTU)	Salinity ~~ORP (mV)~~ ppt	Remarks (odor, color, etc.)
1255	0.40	0							Start / Black, Turbid
1300	Ø	8	9.81						sl. cloudy sl odor
1310	↓	16	9.80	7.12	19.94	2.309	37.4	1.19	sl. Cloudy sl odor
1325		25	9.79	7.03	19.84	2.021	19.6	1.03	Clear
1335		30	9.79	7.04	19.81	1.894	8.49	0.97	Clear End

Additional Comments: Well 5.59' H_2O = 0.91 gal standing water
Borehole 8" @ 30% porosity = 4.1 gal
} 5.0 gal standing water

TETRA TECH

MONITORING WELL DEVELOPMENT RECORD

Well: MW04
Site: 32 WTB
Date Installed:
Date Developed: 6/8/15
Dev. Method: Surger Pump
Pump Type: Proactive water spout

Static Water Level Before (ft.): 8.75
Depth to Bottom Before (ft.): 17.07
Static Water Level After (ft.): 8.75
Depth to Bottom (ft.): 17.07
Screen Length (ft.): ~10'
Casing ID (in.): 2

Responsible Personnel: K. JALKUT
Drilling Co.:
Project Name: OUB
Project Number: 1126
Specific Capacity:

Time	Est. Sediment Thickness (ft.)	Cumulative Water Volume (gal.)	Water Level Readings (ft. below TOC)	pH	Temp (degrees C)	Specific Cond. (Units µS/cm)	Turbidity (NTU)	ORP (mV)	Remarks (odor, color, etc.)
1025	Firm bottom		8.75	Surge sat screen - no pumping					
1045		~5	8.75	End surge only - start surge + pump					DK gray, v. turbid - silty
1050		~7	8.75	6.94	13.61	1719	OFFSCALE		Intake @ bottom
1055		~10	8.75	6.70	12.87	1425	4031		Clearing
1105		~17	8.90	6.~~42~~77	12.76	1293	1197		↓
1115		~25	8.78	6.41	12.54	1395	85		clearing, intake @ midpt
1120		~30	8.80	6.70	12.49	1423	52		
1125		~35	8.83	6.74	12.54	1497	33.5		intake @ top
1130		~40	8.60	6.95	12.76	1419	23		intake @ bottom
1135		~45	8.55	7.71	12.71	1481	40		wait for drum
1223		~55	9.42	7.42	13.29	1447	29.4		Resume pumping / bottom
1230		~62	8.85	7.60	12.65	1453	13.6		clearing
1235		~70	8.85	7.28	12.60	1485	11.49		clear / bottom
1245		~90	8.85	7.25	12.98	1440	11.00		clear / midpt of sat screen
	End development								

Additional Comments: Sat screen vol = ~1.4 gals

TETRA TECH

MONITORING WELL DEVELOPMENT RECORD

Well: WTB-MW05R
Site: OU8
Date Installed: 6-2-15
Date Developed: 6-5-15
Dev. Method: Pump/Surge
Pump Type: Spout

Static Water Level Before (ft.): 6.89
Depth to Bottom Before (ft.): 14.43
Static Water Level After (ft.): 6.75
Depth to Bottom (ft.): 14.43
Screen Length (ft.): 10
Casing ID (in.): 2"

Responsible Personnel: TE
Drilling Co.: TDS
Project Name: OU8 RI, PNSY
Project Number: 112G0327 70
Specific Capacity: —

Time	Est. Sediment Thickness (ft.)	Cumulative Water Volume (gal.)	Water Level Readings (ft. below TOC)	pH	Temp (degrees C)	Specific Cond. (Units mS/cm)	Turbidity (NTU)	Salinity ~~ORP (mV)~~ ppt	Remarks (odor, color, etc.)
1505	Ø	Ø	6.89	—	—	—	—		Brown, Turbid
1506		5	6.79	—	—	—	—		Surge/recharge
1514		15	6.79	—	—	—	—		Brown, Turbid
1517		22	6.78	7.43	13.3	37.44	715	23.78	Cloudy
1530		38	—	—	—	—	—	—	Surge
1535		41	6.76	7.46	12.9	38.5	35	24.51	
1552		55	6.72	7.47	12.7	25.0	71	24.98	Sl cloudy
1605		67	6.70	7.47	12.6	39.17	28	24.94	clear
1615		77	6.72	7.46	12.8	39.08	12.6	24.91	clear
1630		78	6.76	7.45	12.9	36.67	7.52	24.60	clear End

Additional Comments: High Tide (Predicted) @ 1410
Well = 7.54' H_2O = 1.23 gal
Borehole 8" @ 30% porosity = 5.5 gal
} ~ 6.7 gal standing water

TETRA TECH

MONITORING WELL DEVELOPMENT RECORD

Well: MW06
Site: OU8
Date Installed: 6/ /15
Date Developed: 6/5/15
Dev. Method: Surge + Pump
Pump Type: Proactive Waterspout I

Static Water Level Before (ft.): 6.25' btpvc
Depth to Bottom Before (ft.): 15.20' btpvc
Static Water Level After (ft.): 6.30
Depth to Bottom (ft.):
Screen Length (ft.): 10'
Casing ID (in.): 2

Responsible Personnel: K. JALKUT
Drilling Co.: TDS
Project Name: ~~H26~~ OU8 WTB PNSY
Project Number: 112G03270 FI. WI
Specific Capacity:

Time	Est. Sediment Thickness (ft.)	Cumulative Water Volume (gal.)	Water Level Readings (ft. below TOC)	pH	Temp (degrees C)	Specific Cond. (Units µS/cm)	Turbidity (NTU)	ORP (mV)	Remarks (odor, color, etc.)
1045-1100	Surging well; no pumping								
1110			6.30	7.67	13.84	4606	OFFSCALE	N/A	DK brown/V. turbid
1125		~12 gals	6.30	7.66	13.57	4691	↓		Surge + Pump entire screen
1135		~25 gal	6.30	7.76	12.42	4822	1115 AU		↓
1148		~30 gals	6.30	7.55	13.72	4625	OFFSCALE		
1157		~32 gals	6.30	7.65	13.35	4726	1074 AU		Pump only
1205		~34 gals	6.30	7.66	12.55	4777	865 AU		Starting to clear - @ bottom
1210		~36 gals	6.30	7.61	12.70	4666	40.2		
1215		~38 gals	6.30	7.58	13.04	4705	41.3		pump @ mdpt sat. screen
1220		~39 gals	6.30	7.65	13.16	4656	26.4		↓
1230		~40 gals	6.30	7.73	14.12	4780	32.4		@ top of sat. screen
			Need another drum						
1415		~45 gals	6.25	7.81	13.26	4802	18.4	cleaning up	Pump @ bottom
1425		~65 gals	6.30	7.76	12.52	4636	18.1	↓	Pump @ mid screen
1435		~75 gals	6.30	7.64	12.25	4613	9.26		Pump @ top of sat. screen
1440		~80 gals	6.30	7.64	12.40	4672	18.3		Pump @ bottom
1445		~85 gals	6.30	7.67	12.68	4596	13.7		Pump @ mid screen

Additional Comments: ~0.59' to top PVC; ~1.5 gal/well vol w/initial WL reading

End dev. - 2 hrs

TETRA TECH

MONITORING WELL DEVELOPMENT RECORD

Well: MW07
Site: OU8 PNSY WTB
Date Installed:
Date Developed: 6/5/15
Dev. Method: Surget Pump
Pump Type: Proactive waterspout

Static Water Level Before (ft.): 6.05' btpvc
Depth to Bottom Before (ft.): 14.3' btpvc
Static Water Level After (ft.):
Depth to Bottom (ft.):
Screen Length (ft.): 10'
Casing ID (in.): 2 in

Responsible Personnel: K. Jalkut
Drilling Co.: TDS
Project Name: OU8 WTB PNSY
Project Number: 112G03270 FI. WI
Specific Capacity:

Time	Est. Sediment Thickness (ft.)	Cumulative Water Volume (gal.)	Water Level Readings (ft. below TOC)	pH	Temp (degrees C)	Specific Cond. (Units uS/cm)	Turbidity (NTU)	ORP (mV)	Remarks (odor, color, etc.)
1600			6.05	Surging only (1610 hrs)				N/A	
1610			6.09	Post pump install					
1625			6.41	Complete surge @ (1625 hrs)					
1632		3 gals	6.13	7.53	18.73	7734	OFFSCALE		V. Turbid / Dk brown
1645		15 gals	6.62	7.30	17.75	9421	↓		Pump/Surge - pump on bottom
1650		19 gal	6.61	7.23	17.06	10540	↓		↓
1655		24 gals	6.43	7.16	17.25	10329	↓		↓
1700		28 gals	7.00	7.17	16.77	11709	↓		↓
1705		30 gals	6.49	7.10	17.12	11789	↓		Lighter brown/Sl. less turbid
1710		34 gals	6.83	7.20	17.47	13235	1053 AU		
1730		40 gals	6.83	7.12	16.82	13593	829 AU		Starting to clean up
1740		55 gals	6.83	7.12	16.51	13592	659 AU		
1750		60 gals	6.75	7.10	16.15	13254	103		Move pump to mid screen (sat.)
1755		65 gals	6.80	7.04	16.15	13374	70		
1800		70 gals	6.66	7.06	15.93	13187	71.3		Move pump to bottom
1805		75 gals	6.82	7.03	16.02	13156	87		
1810		80 gals	7.20	7.04	16.03	13563	2029		Sudden drop in WL to 8' then it came back to 7.20

Additional Comments: Sat. screen volume = ~1.3 gals
End development @ 2 hrs per WP

TETRA TECH

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name: OU8 RI, Portsmouth NSY **Project No.:** 112G03270
Location: Kittery, ME **Personnel:** T. Evans
Weather Conditions: AM overcast 50s; PM Sunny 70s **Measuring Device:** Heron Dipper T
Tidally Influenced: Yes ✓ No ___ **Remarks:**

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
Low Tide	2015	Predicted Tide Time: 0843						
WTB-MW01	6/6	0906	110.29		5.02		105.27	
WTB-MW02		0833	106.59		7.82		98.77	
WTB-MW03		0828	109.75		9.63		100.12	
WTB-MW04		0821	108.56		8.58		99.98	
WTB-MW05 R		0811	106.02		6.83		99.19	
WTB-MW06		0848	105.67		6.22		99.45	
WTB-MW07		0838	105.55		6.08		99.47	
WTB-SG01		0842	108.03		16.54		91.49	DD#3 TPVC
WTB-SG02		0853	106.61		15.10		91.51	DD#1 TPVC
High Tide	6/6	Predicted Tide Time: 1458						
WTB-MW01		1506	110.29		5.16		105.13	
WTB-MW02		1438	106.59		7.78		98.81	
WTB-MW03		1434	109.75		9.65		100.10	
WTB-MW04		1429	108.56		8.59		99.97	
WTB-MW05 R		1419	106.02		7.01		99.01	
WTB-MW06		1423	105.67		6.23		99.44	
WTB-MW07		1442	105.55		6.11		99.44	
WTB-SG01		1448	108.03		7.50		100.53	DD#3 TPVC
WTB-SG02		1459	106.61		5.90		100.71	DD#1 TPVC

* All measurements to the nearest 0.01 foot

TETRA TECH

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name: OU8 RI, Portsmouth NSY **Project No.:** 112G03270
Location: Kittery, ME **Personnel:** T. Evans
Weather Conditions: AM Sunny 60s; PM Sunny 70s **Measuring Device:** Heron Dipper-T
Tidally Influenced: Yes ✓ No ___ **Remarks:**

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
Low Tide	2015	Predicted Tide Time: 0933						
WTB-MW01	6/7	0954	110.29		5.34		104.95	
WTB-MW02		0921	106.59		7.99		98.60	
WTB-MW03		0919	109.75		9.74		100.01	
WTB-MW04		0913	108.56		8.71		99.85	
WTB-MW05R		0938	106.02		6.97		99.05	
WTB-MW06		0941	105.67		6.23		99.44	
WTB-MW07		0925	105.55		6.11		99.44	
WTB-SG01		0932	108.03		16.68		91.35	DD#3 TPVC
WTB-SG02		0946	106.61		15.23		91.38	DD#1 TPVC
High Tide		Predicted Tide Time: 1550						
WTB-MW01	6/7	1630	110.29		5.38		104.91	
WTB-MW02		1555	106.59		7.64		98.95	
WTB-MW03		1543	109.75		9.76		99.99	
WTB-MW04		1536	108.56		8.69		99.87	
WTB-MW05R		1613	106.02		6.89		99.13	
WTB-MW06		1617	105.67		6.25		99.42	
WTB-MW07		1601	105.55		6.14		99.41	
WTB-SG01		1606	108.03		7.57		100.46	
WTB-SG02		1622	106.61		6.14		100.47	

* All measurements to the nearest 0.01 foot

FIELD LOG BOOK

OU8 RI
PORTSMOUTH NSY
CTO WE 32

2728

112G03270

Start : June 1, 2015
End :

TITLE PNSY

PROJECT NO. 112G03270

BOOK NO. 2728

MON JUN 1, 2015

Work continued from Page

WEATHER AM OVERCAST COOL (40s-50s) RAIN
PM OVERCAST COOL (40s-50s) occ. drizzle

07'15 T. EVANS (T+) @ PASS & ID OFFICE. OBTAIN
- "GREEN" CIA BADGE
- VEHICLE PASS
- COMPUTER PERMIT

0800 TOs (Damian & Ar.) @ Site - Obtain passes

0910 Vehicle Inspection

0930 Meet Matt Thyng (PNSY) @ OUS - review MW & SB locations

1000 Setup VB @ WTB-MW06 / SB004

1015-1045 review H&S

Work continued to Page 2

SIGNATURE

DATE 6/1/15

WITNESS

DATE

TITLE PNSY PROJECT NO. 112G03270
MON JUNE 1, 2015 BOOK NO. 2728

Work continued from Page 1

1100-1225 Advance WTB-SB011/MW06

Collect Soil Samples @ 0-2', 2-6', & 6-10'

1230 Install well
Hollister Sand 5-16'
2" PVC Screen (0.010") 6-16'
Bentonite 2-5'
Grout 1-2'

1400-1440 Cut pad for flush-mount & install flush-mount well cover

1440 Demob for day & secure rig. Per Carl Beal (PNSY) rig can stay on site (in CIA)

1500 Drillers offsite

1530 TF off-site after prepping soil samples

Work continued to Page

SIGNATURE [signature] DATE 6/1/15
WITNESS DATE

TITLE PNSY PROJECT NO. 112G03270
TUE JUNE 2 2015 BOOK NO. 2728

Work continued from Page

Weather AM Overcast cool (40s), rain
PM Overcast cool (40-50) rain then none

0720 T. Evans (TF) @ PNSY

0725 TDS (Darwin & Ari) @ PNSY
- TDS obtains day passes & vehicle pass
- TF obtains vehicle pass

0800 In CIA - move drilling rig to WTB-MW07

0850 Begin drilling @ MW07

0855 M. Thyng (NAVFAC) @ MW07

0900 Mike McCann (NAVFAC) @ MW07
→ drilling near 450 psi air line
→ stop work until determine location of line

Work continued to Page 4

SIGNATURE [signature] DATE 6/2/15
WITNESS DATE

TITLE PNSY PROJECT NO. 112G03270

TUE JUNE 2 2015 BOOK NO. 2728

Work continued from Page 3

1045 Keith Pollock (PNSY) informs that 12" water line @ location cannot be accurately located. Need to stop drilling & either a) relocate boring/well or b) have Dig Safe clear water

1050 M. Thyng (NAVFAC) to work on getting Dig Safe to clear MW07 location (& SB-3, -6, & -16)

1105 Demob & move to WTB-MW05R

Advance boring @ MW05R to 16'

Set well (2" PVC 10-slot) 6-16'
Hollistan Sand 4-16'
Bentonite 2-4'

1330 Dig Smart @ site to clear MW07 & SB-3, -6, & -16

Work continued to Page 5

SIGNATURE [signature] DATE 6/2/15

WITNESS DATE

TITLE PNSY PROJECT NO. 112G03270

TUE June 2, 2015 BOOK NO. 2728

Work continued from Page 4

1400 NSY & NAVFAC clear MW07 to drill
Mike McCann Matt Thyng

1425 Continue drilling @ MW07

1505 EOB @ 15'

1515 Set well @ WTB MW07

2" PVC screen (10-slot) 5-15'
Hollistan 2S Sand 4-15'
Bentonite 2-4'

1530 Grout 1-2' & demob for day

1550 Move drums to near WTB-MW05R

1600 TDS off-site for day
TT off-site for day

Work continued to Page

SIGNATURE [signature] DATE 6/2/15

WITNESS DATE

TITLE PNSY
WED JUN 3, 2015

PROJECT NO. 112403270
BOOK NO. 2728

Work continued from Page

Weather AM Pcloudy 50s
PM Psunny 50-60s

0815 T+ @ PNSY
- K. Jallnut @ Pass office @ 7:00 hrs
- T. Evans @ Pass office @ 08:15 hrs

0820 @ B357
- Load equipment
- Meet w/ Steve (PNSY - Haz Waste office)
  - T+ can use B349 for storage
  - Will leave gate open for access
  - Can bring IDW over to Haz Waste

0845 @ CIA
- TDS @ site

Work continued to Page 7

SIGNATURE
WITNESS
DATE 6/3/15
DATE

TITLE PNSY
WED JUN 3, 2015

PROJECT NO. 112403270
BOOK NO. 2728

Work continued from Page 6

- Prep for DPT soil sampling
- K. Jallnut review H2S
- Tailgate H2S w/ drillers

0915 Begin boring SB14

<0940 Mi Thyng (NAVFAC) & C. Evans (MESDP) @ site>

1000 Refusal @ 7' @ SB14 after three attempts

1030 Begin boring SB17

1045 EOB @ 10'

1100 - 1115 Advance boring SB14

1145 - T+ off-site to meet lab courier
- TDS finishes & loads drums to move to B357

Work continued to Page

SIGNATURE
WITNESS
DATE 6/3/15
DATE

TITLE PNSY
WED JUN 3, 2015

PROJECT NO. 112G03270
BOOK NO. 2728

Work continued from Page

1220 TDS moves 2 soil drums to B357

1245 Ret. ing VOA samples to lab

1310 Begin advancing WTB-SB22

1315 Due to crane painting prep beginning @ locations WTB-SB24 & -SB25 move to those location to complete

1325-1335 Advance WTB-SB24 refusal @ 9.7'

1345 Attempt to advance WTB-SB25 @ 2 locations w/in cleared marbout area - refusal @ 5" (below asphalt) Cannot move anywhere else due to electric line in marbout area

Work continued to Page 9

SIGNATURE [signature] DATE 6/3/15

WITNESS DATE

TITLE PNSY
WED JUN 3, 2015

PROJECT NO. 112G03270
BOOK NO. 2728

Work continued from Page

1350 Discuss w/ D. Cohen (T+) - no further attempts for WTB-SB25

1405 Continue @ WTB-SB22

1410 Finish @ WTB-SB22

1430-1440 Advance WTB-SB23

<1445 MEDEX off-site >

1450- Drillers finish patching boreholes

1540 - Drillers off-site
- T+ recon locations for tidal study & staff gauges

1645 T+ off-site (24 lines)

Work continued to Page

SIGNATURE [signature] DATE 6/3/15

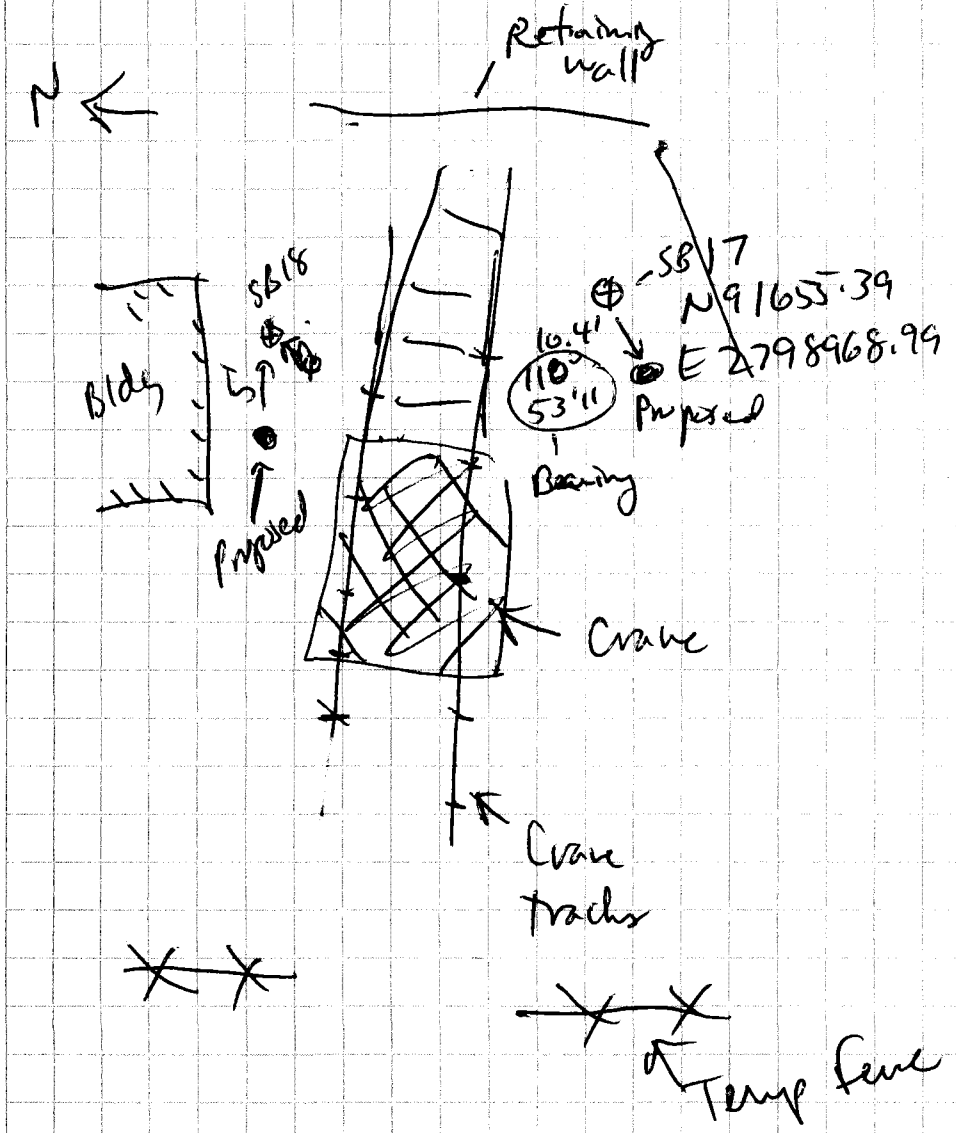
WITNESS DATE

TITLE

PROJECT NO.

BOOK NO.

Work continued from Page



Work continued to Page

SIGNATURE

DATE

WITNESS

DATE

TITLE PNSY

THU JUN 4, 2015

PROJECT NO. 112G03270

BOOK NO. 27205

Work continued from Page

Weather AM overcast, 50s
PM

0730 TH (T. Evans & K. Jolliff)
@ OUS

0745 TDS (A. Natsis) @ OUS

- Prep to DPT
- Tailgate H&S

0820 - Begin WTB-SB05
0830 End @ 10'

0840 - Advance WTB-SB05 to 9'
0850

0855 - Matt Thyng @ site -
0930 (NAVFAC)
Review locations for staff gauges

0930 TDS sets well cover @ WTB-MWSR

Work continued to Page 12

SIGNATURE

DATE 6/4/15

WITNESS

DATE

TITLE PNSY PROJECT NO. 112G03270

THU JUNE 4 2015 BOOK NO. 2728

Work continued from Page 11

1005-1015 Advance WTB-SB12 to 10'

1025-1035 Advance WTB-SB15 to 10'

1105-1115 Advance WTB-SB16 to 10'

1310-1320 Advance WTB-SB18 to 10'

1335-1345 Advance WTB-SB20 to 10'

1405-1415 Advance WTB-SB21 to 10'

1430 TDS plugs & patches DPT holes

(27 liters)

1555 TDS off site

Work continued to Page 13

SIGNATURE [signature] DATE 6/4/15

WITNESS DATE

TITLE PNSY PROJECT NO. 112G03270

THU JUNE 4, 2015 BOOK NO. 2728

Work continued from Page

1600 TT collects rinsate blank WTB-RB01-060415 over ~~split spoon~~ TE DPT cutting shoe

1615 TT off-site

Work continued to Page

SIGNATURE [signature] DATE 6/4/15

WITNESS DATE

TITLE PNSY PROJECT NO. 112G03270

FRI JUN 5, 2015 BOOK NO. 2728

Work continued from Page

Weather AM psunny 50s
PM psunny 60s - 70s

0740 TT (T. Evans & K. Jalbert) @ site
TDS @ site

0745 - Set well pad @ WTB - MW07
0810

0815 - Mob to DPT @ SB10 & SB13
- K. Jalbert prep to develop wells

0830 - Advance WTB-SB13 to 10'
0840

0850 - Advance WTB-SB10
0900

1000 - Collect additional volume @ 6-10 from SB10

Work continued to Page 15

SIGNATURE [signature] DATE 6/5/15

WITNESS DATE

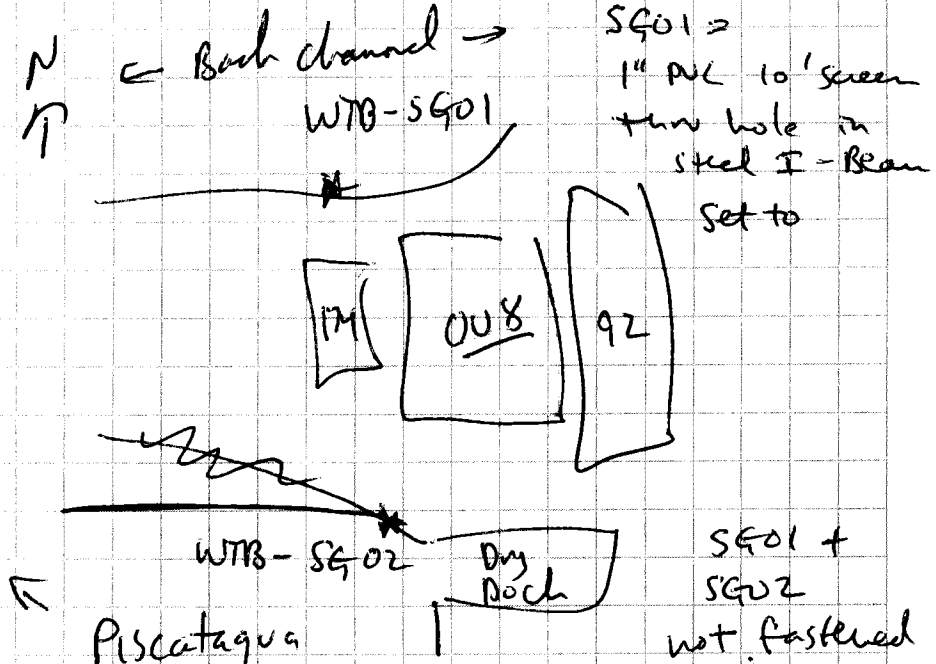
TITLE PNSY PROJECT NO. 112G03270

FRI JUN 5, 2015 BOOK NO. 2728

Work continued from Page

- K. Jalbert sets up to develop WTB-MW06

1040 T. Evans installs staff gauges at SG-1 & SG-2



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SIGNATURE [signature] DATE 6/15/15

WITNESS DATE

TITLE PNSY PROJECT NO. 112503270
FRI JUN 5, 2015 BOOK NO. 2728

Work continued from Page 15

1145 - TDS off-site
- TEvans off-site to meet lab courier

1215 - Courier not to be in Kittery until 1240!
- T. Evans to B357 to talk to Steve Mitchell (Haz Bldg) & get drums

1300 off-site & relinquish samples to lab

1315 Store GW sample bottles @ 6349

1330 @ CIA
- T. Evans calibrate YSI / turbidity
- K. Jalbert finishes developing MW06

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SIGNATURE [illegible] DATE 6/5/15
WITNESS DATE

TITLE PNSY PROJECT NO. 112503270
FRI JUN 5, 2015 BOOK NO. 2728

Work continued from Page 16

1205 T. Evans begin development @ WTB-MW05R

1550 K. Jalbert ~~st~~ sets up to develop ~~MW~~ WTB-MW07

1630 End development @ WTB-MW05R

1705 Install diver pressure transducers in wells & SGs (See ~~pp~~ pp 18-20)

1920 K. Jalbert off-site

1950 T. Evans out of CIA

2020 T. Evans off-site

Work continued to Page

SIGNATURE [illegible] DATE 6/5/15
WITNESS DATE

TITLE: PNSY

Fri Jun 5, 2015

PROJECT NO. 1126G0327a

BOOK NO. 2728

Work continued from Page 17

Well	SWL ~~ft~~ TPVC	Time hr	XD	Line length ft	Install Time hrs	well TD ft TPVC
MW05R	6.79	1708	S4245	12.5'	~~15:13~~ 17:13	14.4
MW06	6.21	1733	L4804	12.0'	17:40	15.3
SG02	11.50	1755	S4257	18.0'	18:04	21.86'
	11.25' ← I-Beam					
MW04	8.55'	1812	N2163	15.0'	18:21	17.2'
MW03	→ Covered w/ pallet of Iron unable to move pallet by hand					
MW03	9.62	1843	S4821	12.0'	18:44	15.3'
MW02	7.93	1904	S4240	12.0'	17:10	14.8'
SG01	15.28	1925	S4835	17.0	17:37	18.19'
	14.11' ← meas pt					
Bard PNSY			P5348	4.0' (IN SG01)		
MW07	6.21	1943	J5677	12.0'	17:47	14.8
MW01	7.23	2000	P9761	12.0'	20:05	18.5

SIGNATURE

WITNESS

DATE 6/5/15

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TITLE: PNSY

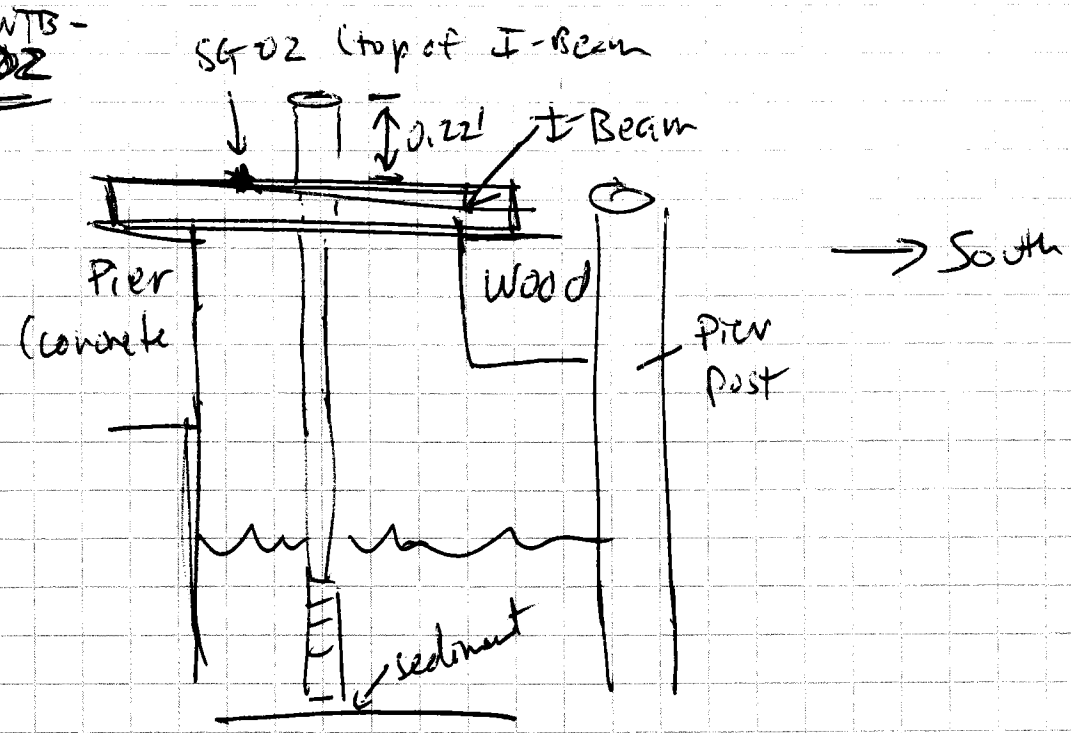
Fri Jun 5, 2015

PROJECT NO. 1126G0327a

BOOK NO. 2728

Work continued from Page 18

~~WT~~ WTS - SG02



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SIGNATURE

WITNESS

DATE 6/5/15

TITLE PNSY PROJECT NO. 112G03270

FRI JUN 5, 2015 BOOK NO. 2728

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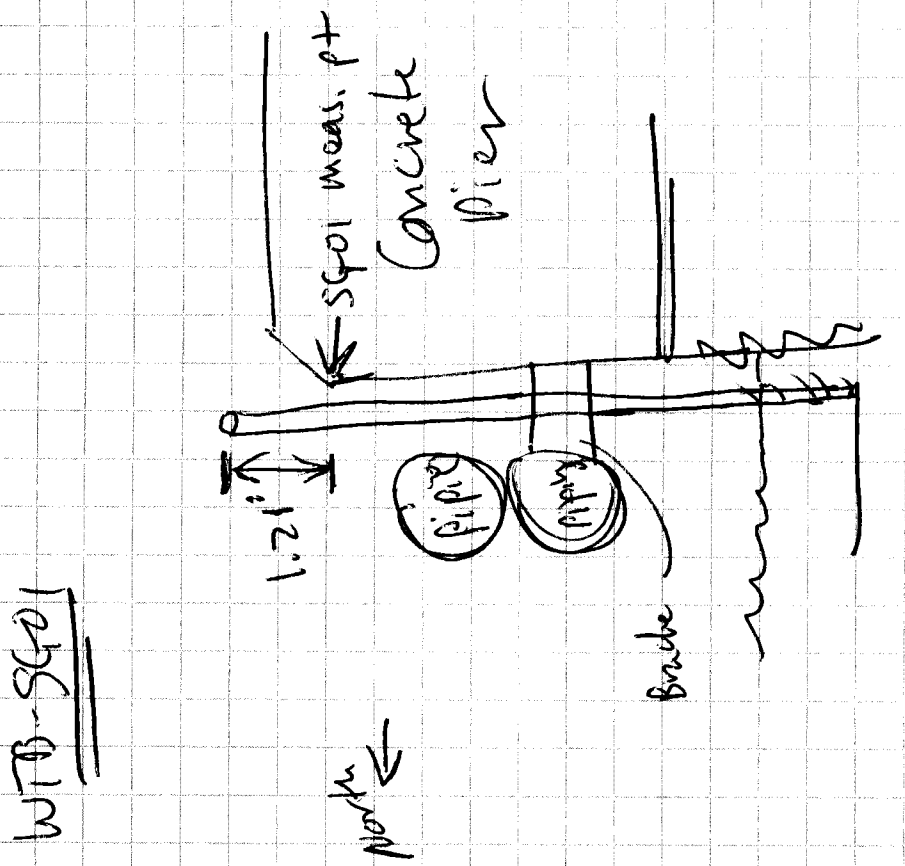

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SIGNATURE [signature] DATE 6/5/15

WITNESS DATE

TITLE PNSY PROJECT NO. 112G03270

SAT JUN 6, 2015 BOOK NO. 2728

Work continued from Page

WEATHER AM Overcast 50s
PM Sunny 70s

0800 T. Evans (TE) @ PNSY for water levels

Time	Well (~~ft TPVC~~) (ft)	WL (ft TPVC)
0811	MW05R	6.83
0821	MW04	8.58
0828	MW03	9.63
0833	MW02	7.82
0838	MW07	6.08
0842	SG01	15.34 ← pier meas. pt
<0843	Predicted Low Tide - Seavey Island>	
0844	SG01	16.54 ← TPVC
	SG01	Δ meas pt - TPVC = 1.20'
0848	MW06	6.22
0852	SG02	14.89 ← I Beam meas. pt
0853	SG02	15.10 ← TPVC
	SG02	Δ meas pt - TPVC = 0.23'
0906	MW01	5.02
0910	T. Evans off PNSY	

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SIGNATURE [signature] DATE 6/6/15

WITNESS DATE

TITLE PNSY PROJECT NO. 112G0320
BOOK NO. 2724

SAT JUN 6, 2015

Work continued from Page 21

1410 T. Evans (TF) @ PNSY for water levels

Time	Well	WL (ft TPVC)
* 1419	MW05R	7.01
1423	MW06	6.23
1429	MW04	8.59
1434	MW03	9.65
1438	MW02	7.78
1442	MW07	6.11
1446	SG01	6.30 ← pier meas pt.
* 1448	SG01	7.50 ← TPVC
	SG01	Δ meas pt - TPVC = 1.20'
1458	SG02	5.70 ← I Beam meas pt
<1458	Predicted High Tide - Seavey Island>	
1459	SG02	5.90 ← TPVC
		Δ meas pt - TPVC = 0.23
1506	MW01	5.16
* 1515	off-PNSY for day	

* Downloaded data + Baro Diver)

Work continued to Page

SIGNATURE [signature] DATE 6/6/15
WITNESS DATE

TITLE PNSY PROJECT NO. 112G0327
BOOK NO. 2725

SUN JUN 7, 2015

Work continued from Page

Weather AM Clear, sunny 60's
PM p sunny 70s

09:00 T. Evans (TF) @ PNSY

09:10 @ OUS measure water levels

Time	Well	WL (ft TPVC)
0913	MW04	8.71
0917	MW03	9.74
0921	MW02	7.99
0925	MW07	6.11
0929	SG01	15.53 ← concrete meas pt
0930	SG01	16.68 ← TPVC
		Δ meas pt - TPVC = 1.20'
<0933	Predicted Low Tide - Seavey Island>	
0938	MW05R	6.97
0941	MW06	6.23
0945	SG02	15.04 ← I-beam meas pt.
0946	SG02	15.23 ← TPVC
		Δ meas pt - TPVC = 0.23'
0954	MW01	5.34
1005	Off PNSY	

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SIGNATURE [signature] DATE 6/7/15
WITNESS DATE

TITLE PNSY PROJECT NO. 112G03270
SUN JUN 7 2015 BOOK NO. 2728

Work continued from Page 23

1530 @ OUS - water levels & pull XDs

Time	Well	WL (ft TPVC)
1536	MW04	8.69
1543	MW03	9.76
<1550	Predicted High Tide - Seavey Island>	
1555	MW02	7.64
1601	MW07	6.14
1605	SG-01	6.38 ← concrete meas pt
1606	SG-01	7.57 ← TPVC
		Δ meas pt - TPVC = 1.20'
1613	MW05R	6.89
1617	MW06	6.25
(TE) ~~1422~~ 1621	SG-02	5.93 - I-Beam meas pt
(TE) ~~1427~~ 1622	SG-02	6.14
		Δ meas pt - TPVC = 0.23'
(TE) ~~1430~~ 1630	MW01	5.38

1650 off PNSY

Work continued to Page

SIGNATURE [signature] DATE 6/7/15
WITNESS DATE

TITLE PNSY PROJECT NO. 112G03270
MON JUN 8, 2015 BOOK NO. 2728

Work continued from Page

Weather AM overcast, 60s
PM overcast 60s occ. drizzle

0745 TE @ PNSY
- T. Evans gets CIA inspection
- K. Talbut gets badge/pass

0805 @ B357 - Steve Mitchell not in today. Talk w/ Steve?
- He may pick up drums today, otherwise will tomorrow
- Get 2 drums for re-development of MW02, MW03, MW04 & MW01

0825 K. Talbut @ B357
- ~~do~~ (TE) Calibrate YSIs
- Prep for development

0950 @ OUS - set up to develop @ MW02 + MW04

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SIGNATURE [signature] DATE 6/8/15
WITNESS DATE

TITLE PNSY PROJECT NO. 112G03270
MON JUN 8, 2015 BOOK NO. 2728

Work continued from Page 25

1038 T. Evans finished development @ MW02

1110 T. Evans goes to meet surveyors @ ~~pass~~ office

1200 Pick up more drum @ B357

1230 Contact Carl Bean (NSY) to get material moved from MW03

1240 T. Evans Setup @ MW03 to develop

1345 - Demob from MW03
- K Jalbut sets up @ MW01 to develop
- Site lines Survey (Matt + Curtis) on PNSY → get Controls from Dan Allen (PNSY) @ B59

Work continued to Page 27

SIGNATURE [signature] DATE 6/8/15
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TITLE PNSY PROJECT NO. 112G03270
MON JUN 8, 2015 BOOK NO. 2728

Work continued from Page

1400 Site lines @ OUS.
TT shows crew survey locations

1445 T.E to B357

1530 - TE off-site to FedEx

1900 K. Jalbut off site

2145 - K. Jalbut return to finish
2330 development of MW01

Work continued to Page

SIGNATURE [signature] DATE 6/8/15
WITNESS DATE

TITLE PNSY PROJECT NO. 112G03270
BOOK NO. 2728

TUE JUN 9, 2015

Work continued from Page

Weather AM Overcast H.Wm 50s
PM

0745 T7 @ site - Get ~~pass~~ passes

0805 @ 0357 - Talk w/ Steve Mitchell (Haz Waste-NSY) re: pickup of drums in CIA

0815 Prep
- Calibrate YSIs / LaMotte
- prep bottle sets
- review H&S

0930 T. Evans @ CIA - setup @ MW06 to slug test

K. Sullivan @ MW01 to purge & sample

Work continued to Page

SIGNATURE [signature] DATE 6/9/15

WITNESS DATE

TITLE PNSY PROJECT NO. 112G03270
BOOK NO. 2728

TUE JUN 9, 2015

Work continued from Page 28

1125 T. Evans demobs from MW06
Setup @ MW04

1310 T. Evans mobs to MW07

1400 K. Sullivan sets @ MW05R to purge & sample
< Predicted Low Tide = 11:26
Est Tidal Lag = 4.5 hrs

Est Start Purge Time ~ 4:15 pm

1435 T. Evans sets up @ MW02 to slug test
- ~~K. Sullivan sets up @ MW05R to purge~~

1545 T. Evans demob, from MW02
1605 T. Evans ~~to 0357~~ pulls SG-01 & SG-02
K. Sullivan sampling MW05R
1630 T7 off site

Work continued to Page

SIGNATURE [signature] DATE 6/9/15

WITNESS DATE

TITLE PNSY PROJECT NO. 112G03270
BOOK NO. 2728
WED JUN 10, 2015

Work continued from Page 29

Weather AM clear, sunny 60-70s
PM

0630 K. Jalkut (TL) @ PNSY

0720 T. Evans (TL) @ PNSY

0740 @ B357 - calibrate instruments

0835 To CIA
- K. Jalkut to MW04 to purge/sample
+ T. Evans returns life vest to Matt Thyng's brother-in-law @ B55

0850 T. Evans @ MW03 to purge/sample
↓
1000 hrs

1100 T. Evans Conducts Slug test @ MW03

1145 Demob from MW03

Work continued to Page 31

SIGNATURE [signature] DATE 6/10/15
WITNESS DATE

TITLE PNSY PROJECT NO. 112G03270
BOOK NO. 2728
WED JUN 10 2015

Work continued from Page 30

1240 TL off-site
- K. Jalkut to lunch & to get ice / field supplies
- T. Evans to relinquish samples to labs / lunch

1320 T. Evans @ B357 w/ K. Jalkut
- Pack equipment to return Ship
- review plan for MW02, MW06, + MW07

1500 K. Jalkut to CIA to set-up @ MW02

1510 Call Tim - Difficult time finding MW02

1515 Located MW02

1520 Set up for purge @ MW02
Low tide @ MW02 = 4:25 pm
(4 hr lag per tidal study results)

1540 Initiate purge @ MW02 - fill flow through cell

Work continued to Page

SIGNATURE K Jalkut DATE 6/10/15
WITNESS DATE

TITLE PNSY PROJECT NO. 112603270
BOOK NO. 2728

Wed June 10, 2015

Work continued from Page

1545 - 1623 Collect purge data @ MW02
Refer to separate GW sample log sheet for details
1623 End purge @ MW02 / parameters stabilized prior to sampling
1625 Initiate sampling - MW02
1650 Complete sampling - MW02
Minimal drawdown @ MW02
Tubing intake @ midpt of sat. screen - ~11.5' btor (MW02)

1700-1800 Breakdown work area; cal check YSI + turbidity meter (see separate cal logs for details); return to B357 to put purge water in drum
1805 TE personnel offsite for the day
1810 p/u ice for samples / store in locked vehicle overnight

1815 Return to hotel - charge battery and LaMotte turbidity meter
Update to Megan Ved

KJ 6/10/15

Work continued to Page

SIGNATURE K Jackut DATE 6/10/15
WITNESS DATE

TITLE PNSY PROJECT NO. 112603270
BOOK NO. 2728

Thurs. June 11, 2015

Work continued from Page

Weather
AM - Clear, sunny, 70s
PM - Cloudy, mid to upper 80s, breezy (from W)

Objective today - Purge and sample MW07
Low tide @ 1325 hrs
Lag time @ MW07 = 4.5 hrs
Need to initiate purge @ MW07 @ 1710 hrs

TE personnel: K. JACKUT
Note: T. Evans (TE) demobilized from PNSY today - travel day to Pittsburgh, PA

K. JACKUT works on other projects until 1215 hrs

1215 KJ (TE) performs sample management - reice samples collected 6/10/15
1300 KJ @ PNSY - p/u day pass get CIA inspection
1400 KJ departs pass office; breaks for lunch and picks up more ice/supplies
1500 KJ moves to B357; check-in w/ Steve Mitchell re IDW
Begin reorganization of rental vehicle contents

Work continued to Page

SIGNATURE K Jackut DATE 6/11/15
WITNESS DATE

Thurs June 11, 2015

Work continued from Page

1600 Complete reorganization of rental vehicle contents
Store some supplies in B343

- Prep for purging / sampling @ MW07
- Calibrate field instruments - see separate Cal logs for details
- Prep bottleware set; review H&S

1630 KJ (ft) moves to CIA; sets up @ MW07 to purge and sample

1650 Answer questions from passer-by

1700 Pump on @ MW07 - checking drawdown / flow rate

1705 Initiate purge @ MW07 - low stress purging and sampling using a peristaltic pump. Refer to separate gw sample log sheet for purge data.
Wrapped tubing and flow through cell to diminish effect of sunlight. Trying to keep temperature w/i normal limits

1720 Answering more questions from passer-by.

1730 GW temp too high - is impact from ambient temp? Could it be that this well is being influenced by leaks from underground

Work continued to Page

SIGNATURE K Jarlent DATE 6/11/15
WITNESS DATE

Thurs June 11, 2015

Work continued from Page

utilities? 19°C is roughly 66°F. GW temps should be about 13-14°C or 55-57°F. Many utility lines in this area.

MW07 - tubing intake @ midpt of saturated screen or ~ 10.5' bfor.
No drop in water level during purge
Tidal range @ MW07 estimated @ 0.2' - based on results of tidal study

1755 End purge and start sampling MW07 @ predicted low tide w/ estimated tidal lag of 4.5 hrs @ MW07. Refer to separate gw sample log sheet for details
GW Samples to be analyzed for: PAHs (SIM), EPH, and TAL metals
No field duplicate or MS/MSD volume collected from MW07.

Even though objective was to end purge and sample @ predicted low tide w/ estimate lag, MW07 parameter readings did stabilize w/i criteria acceptability per EPA Region 1 guidance for low stress purging + sampling of monitoring wells.

Work continued to Page

SIGNATURE K Jarlent DATE 6/11/15
WITNESS DATE

TITLE PNSY PROJECT NO. 112603270
BOOK NO. 2728

Thurs June 11, 2015

Work continued from Page

1820 Complete sampling @ MW07

1830-1931 - Break down work area
- Cal check instruments - see separate cal logs for details
- Sample management duties

1930 KJ demobs from MW07, depart CIA and move to B357/B343
- Dispose of purge water from MW07 into drum in B343 (IDW)

2000 KJ demobs from the site for the day
All samples for analysis on ice in cooler. TZ offsite

2030 KJ @ hotel - follow-up w/ PNSY email and change equipment overnight
New task added

2145 End of day (8 hrs today to PNSY)
Purge data to Megan, Debbie + Tim

K Jarbert 6/11/15

Work continued to Page

SIGNATURE K Jarbert DATE 6/11/15
WITNESS DATE

TITLE PNSY PROJECT NO. 112603270
BOOK NO. 2728

Fri June 12, 2015

Work continued from Page

Notes -

New task @ request of Megan Veid (TZ PM) and Debbie Cohen (TZ PM)
- Measure salinity in tidal wells @ high tide to find out if there is a significant difference from low tide
Check MW06, MW02, MW07, and MW05R

MW06 - Only a 0.1' tidal range based on tidal study. Conversation w/ ME DEP resulted in allowance for this well to be sampled @ predicted low tide (w/o estimated tidal lag applied).

- If low tide on 6/12/15 is @ 2:25pm, assume high tide @ MW06 to be 6 hrs earlier ~ 0825 hrs.

MW02 - 2' tidal range based on results of tidal study. 4 hr estimated lag time
Low tide @ 2:25 pm + 4 hr lag = 6:25pm
Assume same est. lag time applies to high tide
High tide @ MW02 = 6:25pm less 6 hrs ~ 12:25 pm

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MW07 - 0.2' tidal range per results of tidal study. 4.5 hr estimated lag time
Low tide @ 2:25 pm + 4.5 hrs = 1855 hrs
Assume same lag time applies to high tide
High tide @ MW07 = 1855 hrs less 6 hrs or ~1255 hrs

MW05R - 0.7' tidal range per results of tidal study. 4.5 hr estimated lag time
Similar results to MW07 high tide w/ est. lag time @ MW05R = ~1255 hrs

Summary for High Tides w/ est. lag time on 6/12/15
MW06 (no lag time) - 0825 hrs
MW02 - 1225 hrs
MW07, MW05R > 1255 hrs

Weather -
AM: Mostly cloudy, ~70°F, light wind from SW
PM: Partly sunny/cloudy, mid 80s, light wind from W

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Today's objectives -
- Collect salinity measurements from MW06, MW02, MW07, and MW05R @ or near high tides for each well.
- Purge and sample gw @ MW06 @ low tide (predicted). No lag time to be applied. Low tide @ 2:25 pm today. Need to initiate purge @ ~1340 hrs prior to sampling

TT personnel today - K. Jalkut
Note - T. Evans (FOL) previously demobilized from PNSY on 6/11/15.

0715 K. Jalkut arrives PNSY pass office to pick up daily pass and to get CIA inspection
0840 Long wait @ pass office. Conclude pass pick up and inspection
0850 Move directly to CIA to MW06 for salinity check @ high tide → already after high tide. Cal instrument - see separate cal logs for details. Salinity cal is same as S/conductivity - same cal solution/std used. Also cal D.O.
0855 Set up @ MW06 in CIA - here

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0900 Initiate purge for salinity measurement @ high tide
1 well volume = ~1.6 gals
Removed 2 gallons

0920 Salinity measurement stable @ 2.53 ppt

MW06 - Depth to water = ~6.28' btor
Total depth = ~15.30' btor
Temp = ~13.21°C
S. Cond = 4.662 mS/cm
DO = 0.37 mg/L

purge rate ~350 ml/min

Send salinity result (text) to Megan Ved

Salinity measurement @ MW06 was taken approx. 3/4 hr (0.75 hrs) past predicted high tide - unavoidable delay @ pass office

0930 K. Jalkut calibrates other probes on YSI 556 MPS unit

0945 K. Jalkut breaks down work area
- Call Katahdin Analytical Services lab to let them know I will not be dropping samples off today - VM w/ Jen Obrin

1015 Depart CIA for B357/B343 area

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for IDW disposal (purge water from salinity check @ MW06)
- Tide on its way out of the remediated area across from B357

1100 KJ departs PNSY for errands / prep bottles; review HTS

1125 KJ returns to PNSY; move to CIA and set up @ MW02 for salinity check
High tide @ 1225 hrs BUT need to perform salinity check ahead of high tide in order to do same at MW07, MW05R, and purge/sample @ MW06 (main objective) on time

1130 Initiate purge @ MW02 for salinity check
1 well vol = ~1.2 gals

1155 End purge @ MW02; remove ~2 gals
Salinity measurement pretty stable @ 17.46 ppt
Measurement taken approx. 1/2 hr ahead of predicted high tide w/ est. lag.

MW02 - Depth to water = ~7.63' btor
Total Depth = ~14.73' btor
Temp = ~13.54°C
S. Cond = 28.28 mS/cm
D.O. = 5.30 mg/L
pH = 7.88 S.U.
ORP = 1 mV

purge rate = ~350 ml/min

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1200 Break down @ MW02 and move over to MW07 for salinity check

1210 Initiate purge @ MW07
1 well vol = ~1.4 gals

1235 End purge @ MW07; remove ~2 gals
Salinity measurement fairly stable @ 4.25 ppt
Measurement taken approx. 20 minutes ahead of high tide (predicted) w/ est. lag time.

MW07 - Depth to water = ~6.18' btor
Total depth = ~14.69' btor
Temp = ~18.04°C (warm — gw temp potentially influenced by something else)
S. Cond = 7.569 mS/cm
D.O. = 0.38 mg/L
pH = 7.51 S.U.
ORP = 67.7 mV
Purge rate = ~350 ml/min

1240 Break down @ MW07 and move to MW05R for salinity check

1245 Setup @ MW05R

1257 Initiate purge @ MW05R

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1312 End purge @ MW05R; remove approx. 2 gals
1 well vol = ~1.2 gals
Salinity measurement stable @ 23.87 ppt @ MW05R. Measurement taken approx 17 min post high tide (predicted) w/ estimated lag time

MW05R - Depth to water = ~7' btor
Total depth = ~14.32' btor
Temp = ~15.26°C
S. Cond = 37.57 mS/cm
D.O. = 0.30 mg/L
pH = 8.27 S.U.
ORP = 45.7 mV
Purge rate = ~380 ml/min

Summary of Salinity Measurements:

	Low tide	High Tide
MW02	12.75 ppt (6/10/15)	17.46 ppt (6/12/15)
MW07	4.34 ppt (6/11/15)	4.25 ppt (6/12/15)
MW05R	23.58 ppt (6/9/15)	23.87 ppt (6/12/15)
MW06	TBD (2.53 @ 1425 hrs 6/12/15)	2.53 ppt

1315 Break down @ MW05R and hustle over to MW06 for purging and sampling @ low tide

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1322 Set up @ MW06; answer questions for passer-by

1335 Pump on @ MW06 to check drawdown and adjust flow rate

1340 Initiate purge @ MW06 - low stress purging and sampling with a peristaltic pump refer to separate gw sample log sheet for purge data

- Wrapped tubing w/ foam insulation to keep gw temp representative of natural conditions; wrapped flow cell w/ reflective cover to lessen impact of any sunlight on cell. Wall thickness to cell is not that great.
- Tubing intake @ midpt of saturated screen = ~10.8' btoc
- No drop in water level during purge @ MW06
- Well exhibited minimal tidal range during tidal study. No lag time applied to predicted low tide.

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1425 End purge @ MW06 and start sampling @ predicted low tide. Refer to separate gw sample log sheet for sampling details. Purge readings stabilized per criteria in Region 1 (EPA) low stress guidance prior to sampling well.
No change in salinity reading @ high versus low tide.

1450 Complete sampling @ MW06 @ predicted low tide

1515 Break down work area; cal check field instruments - refer to separate cal logs for details; load vehicle; walk down to the USS Annapolis - observe submarine w/permission from Navy

1615 Move to B357/343 from CIA; empty all purge water into drum in B343. Drum was previously emptied. Steve Mitchell mentioned he was going to leave it alone until I completed work but his plan obviously changed. Added ~15 gallons of purge H_2O, used buffer solns, DIUF water, etc.

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1630-1730 Pack vehicle / boxes for rental equipment, supplies, consumables; Wash out buckets; reduce supplies; keep samples in 3 coolers; plce ice for samples; discard refuse

1745 Demobilize from site; plan to relinquish samples to Katahdin Analytical Services by hand on Sat. June 13, 2015.

K Jarkut 6/12/15

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Sat June 13, 2015

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0800 Sample management duties

0915 Purchase ice for samples; complete chain-of-custody; pack rest of materials

0955 Travel to Katahdin Analytical Services Lab in Scarborough, ME

1040 Arrive Scarborough and lab. Call lab per Jen Obrin's direction

1045 Meet George Brewer (chemist) @ loading dock - unload coolers

1047 Relinquish samples to KAS representative. Refer to COC for details - 3 coolers: gw samples collected Wed June 10 - Fri June 12, 2015 - OU8 RI West Timber Basin, Portsmouth NSY.

1100 Return to Massachusetts after stop @ Salem, NH office ~ noon

Weather —

AM - Mixed sun w/ clouds, mid 70s, light wind from SW

PM - Similar to above w/ temps in mid 80s

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Mon June 15, 2015

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TT personnel - K. Jalkut

- Continue w/ demobilization activities from Salem, NH office.
  - Send data to Megan Ved
  - Pack and ship rental equipment back to FEI for delivery on Tues June 16

FedEx Tracking numbers (2 pkgs.)
- 625530917393
- 627664525692

- Request pkg of rental vehicle rental stops as of 4:45 pm - Enterprise. Rental period approx. 15 days - Minivan

- Return supplies to Salem, NH storage unit
- Start expenses (continue on 6/16/15 too)

Additional anticipated activities -
- Pack/ship TT Pittsburgh-owned preactive pumps, magnetic signs, APP
- Complete logbook entries
- Complete expenses

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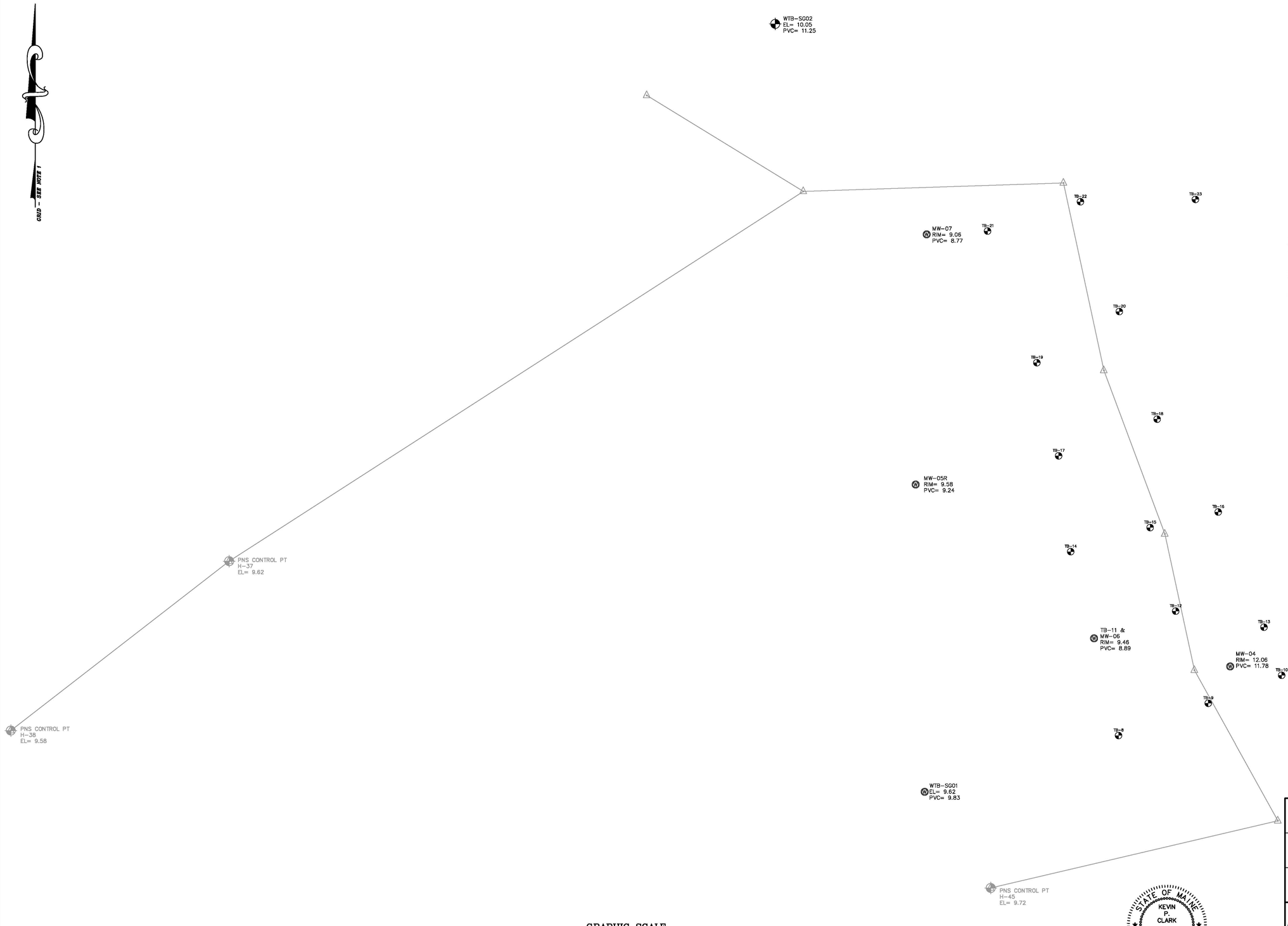
A.7 2015 SURVEY INFORMATION



NOTES:

1. HORIZONTAL & VERTICAL CONTROL:

HORIZONTAL COORDINATES ARE BASED ON THE MAINE STATE PLANE COORDINATE SYSTEM, WEST ZONE, AS PROVIDED BY THE PORTSMOUTH NAVAL SHIPYARD PUBLIC WORKS DEPARTMENT.

ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988, AS PROVIDED BY THE PORTSMOUTH NAVAL SHIPYARD PUBLIC WORKS DEPARTMENT.

STATE OF MAINE
KEVIN P. CLARK
#2245
PROFESSIONAL LAND SURVEYOR

LOCATION WORKSHEET
MONITORING WELLS & TEST BORINGS

OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD

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FIELD WK: MC/CH	SCALE: 1"=40'	SHEET:
DRN BY: KPC	JOB #: 2338.02	
CH'D BY: KPC	MAP/LOT:	
DATE: 06-16-2015	FILE: 2338.02 SV	

Survey Pt #	Northing	Easting	Elevation	Raw Desc	PNS Desc
1	91025.1241	2798013.449	9.58	TRAV H-38	PNS H-38
2	91174.5102	2798206.105	9.62	TRAV H-37	PNS H-37
3	91500.6347	2798712.753	9.54	TRAV TEMP	
4	91508.0682	2798942.261	10.98	PK	
5	91342.7069	2798977.921	12.9	PK	
6	91198.5083	2799031.721	12.86	PK	
7	91078.3515	2799057.792	11.93	PK	
8	90945.7572	2799131.422	9.89	PK	
9	90886.4881	2798878.055	9.76	TRAV H-45	PNS H-45
30	91585.268	2798574.605	10.13	TRAV TEMP	
200	91465.6436	2798875.24	9.92	EL SOILBORING21	TB-21
201	91462.7187	2798821.738	9.06	EL MONWELLRIM	MW-07
204	91648.3597	2798687.903	10.05	EL PAINTMARK	WTB-SG-02
205	91491.4994	2798957.179	11.16	EL SOILBORING22	TB-22
206	91493.5601	2799058.636	12.21	EL SOILBORING23	TB-23
207	91394.6506	2798991.491	12.22	EL SOILBORING20	TB-20
208	91349.5696	2798918.717	10.78	EL SOILBORING19	TB-29
209	91299.7518	2799024.88	13.19	EL SOILBORING18	TB-28
211	91217.8765	2799078.738	13.06	EL SOILBORING16	TB-26
212	91204.1412	2799018.683	12.9	EL SOILBORING15	TB-15
213	91182.9102	2798948.592	9.4	EL SOILBORING14	TB-14
214	91267.3974	2798937.944	10.35	EL SOILBORING17	TB-17
215	91242.0897	2798811.807	9.58	EL MONWELLRIM	MW-05R
218	91106.2935	2798968.93	9.46	EL MONWELLRIM	MW-06
219	91020.737	2798990.799	9.7	EL SOILBORING8	TB-8
220	91049.1864	2799069.954	11.13	EL SOILBORING9	TB-9
221	91073.866	2799134.723	11.64	EL SOILBORING10	TB-10
222	91116.2864	2799119.116	12.99	EL SOILBORING13	TB-13
223	91130.4469	2799041.223	13.19	EL SOILBORING12	TB-12
225	91081.7122	2799088.995	12.05	EL MONWELLRIM	MW-04
226	90971.2732	2798819.743	9.83	EL WTBSG02PVC	WTB-SG-01

A.8 CONSTRUCTION WORKER SCREENING LEVEL DEVELOPMENT FOR GROUNDWATER

RISK-BASED SCREENING LEVEL DEVELOPMENT FOR THE CONSTRUCTION WORKER EXPOSED TO GROUNDWATER AT PORTSMOUTH NAVAL SHIPYARD SEPTEMBER 2014

Facility-specific risk-based screening levels for construction workers exposed to groundwater are used to screen groundwater data at sites at Portsmouth Naval Shipyard (PNS), Kittery, Maine. Development of the screening levels provided herein is based on the methodology provided in Appendix D.5.3 of the Remedial Investigation Report for Operable Unit 7 (Tetra Tech, July 2011) and the 2005 Technical Memorandum for Derivation of Lead Screening Levels provided in Appendix C.2, Attachment 2 of the Supplemental Remedial Investigation for Operable Unit 2 (Tetra Tech, March 2010). The construction worker screening levels were developed based on incidental ingestion of and dermal exposure to chemicals in groundwater and were calculated using current United States Environmental Protection Agency (USEPA) methods, input parameters, and models, as appropriate. Attachment 1 provides the 2005 Technical Memorandum and Attachment 2 provides screening level summary tables and calculation worksheets.

Developing risk-based concentrations (RBCs) was accomplished by calculating a theoretical risk based on an assumed chemical concentration and then back-calculating a RBC utilizing the ratio of the assumed chemical concentration multiplied by a target risk to the calculated theoretical risk. The assumed concentration of chemical in groundwater was 1.0 μg/L (0.001 mg/L). The models and parameters used to estimate intakes, risks, and RBCs are described in the following sections.

Incidental Ingestion of Groundwater

Incidental ingestion groundwater was evaluated by methods and equations provided in Risk Assessment for Superfund, Volume I, Human Health Evaluation Manual Part A, (Interim Final RAGS Part A, USEPA, December 1989, 2010 updates).

The following equation is used to assess exposures resulting from incidental ingestion of groundwater:

Incidental Ingestion Intake = (IwR)(CF)(EF)(ED)/(BW)(AT)

where:

IwR	=	ingestion rate of groundwater 0.01 (L/day)
CF	=	conversion factor 0.001 (mg/μg)
EF	=	outdoor worker exposure frequency (150 days/yr)
ED	=	exposure duration (year)
BW	=	body weight (80 kg)
AT	=	averaging time (days)

for noncarcinogens, AT = ED x 365 days/yr

for carcinogens, AT = 70 yrs x 365 days/yr

Dermal Contact with Groundwater

Dermal contact with groundwater was evaluated by methods and equations provided in Risk Assessment for Superfund, Volume I, Human Health Evaluation Manual Part E, Supplemental Guidance for Dermal Risk Assessment (RAGS Part E, USEPA, July 2004).

The following equation is used to assess exposures resulting from dermal contact with groundwater (USEPA, July 2004):

$$DAD_{wi} = (DA_{event})(EV)(ED)(EF)(A) / (BW)(AT)$$

where:

DAD_{wi}	=	dermally absorbed dose of chemical "i" from water (mg/kg/day)
DA_{event}	=	absorbed dose per event (mg/cm^2-event)
EV	=	event frequency (1 event/day)
ED	=	exposure duration (year)
EF	=	exposure frequency (150 days/yr)
A	=	skin surface area available for contact (3,470cm^2)
BW	=	body weight (80 kg)
AT	=	averaging time (days)
		for noncarcinogens, AT = ED x 365 days/yr
		for carcinogens, AT = 70 yrs x 365 days/yr

The absorbed dose per event (DA_{event}) was estimated using a nonsteady-state approach for organic compounds and a traditional steady-state approach for inorganics. For organics, the following equations apply:

$$\text{If } t_{event} < t^*, \text{ then: } DA_{event} = (2FA)(K_p)(C_{wi})(CF)\left(\sqrt{\frac{6\,\tau\, tevent}{\pi}}\right)$$

$$\text{If } t_{event} > t^*, \text{ then: } DA_{event} = (FA)(K_p)(C_{wi})(CF)\left(\frac{t_{event}}{1+B} + 2\tau\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right)$$

where:

t_{event}	=	duration of event (hours/event)
FA	=	fraction absorbed (dimensionless)

t^*	=	time it takes to reach steady-state conditions (hr)
K_p	=	permeability coefficient from water through skin (cm/hr)
C_{wi}	=	concentration of chemical "i" in water (0.001 mg/L)
T	=	lag time (hr)
π	=	constant (dimensionless; equal to 3.1416)
CF	=	conversion factor ($1x10^{-3}$ L/cm^3)
B	=	partitioning constant derived by Bunge Model (dimensionless)

Values for the chemical-specific parameters (t^*, K_p, T, and B) were obtained from the current dermal guidance (USEPA, July 2004). The following steady-state equation is used to estimate DA_{event} for inorganics:

$$DA_{event} = (K_p)\ (C_{wi})\ (t_{event})\ (CF)$$

The recommended dermal permeability value for inorganic constituents of 1×10^{-3} cm/hour was provided in the USEPA guidance. For most metals, dermal absorption is not a significant pathway because penetration through the skin is minimal. The parameters and calculations used to estimate DA_{event} are presented in the attached example calculations.

Toxicity Criteria

Oral Reference Doses (RfDs) and Cancer Slope Factors (CSFs) were obtained from the USEPA Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites (RSL table for May 2014), which lists the toxicity values from a hierarchy of toxicological sources as follows:

1) USEPA's Integrated Risk Information System (IRIS) (http://www.epa.gov/iris/)
2) USEPA's Provisional Peer Reviewed Toxicity Values (PPRTVs)
3) Other toxicity sources such as:
   - California Environmental Protection Agency (http://www.oehha.ca.gov/risk/chemicalDB//index.asp)
   - Agency for Toxic Substances and Disease Registry Minimal Risk Levels (http://www.atsdr.cdc.gov/mrls.htm)
   - Annual Health Effects Assessment Summary Tables

Under the guidelines established by the Superfund program, exposures to construction workers of one year or less are classified as subchronic exposures. Therefore, subchronic RfDs were used when available, and chronic RfDs were used if no subchronic RfD was available.

Toxicity Criteria for Dermal Exposure

RfDs and CSFs found in literature may be expressed as administered doses; therefore, these values are considered to be inappropriate for estimating the risks associated with dermal routes of exposure. Oral dose-response parameters based on administered doses must be adjusted to absorbed doses before the comparison to estimated dermal exposure intakes is made. Because this information is not always readily available, oral dose-response parameters are adjusted to an absorbed dose using chemical-specific absorption efficiencies published in available guidance (USEPA, July 2004) and the following equations:

$$RfD_{dermal} = (RfD_{oral})(ABS_{GI})$$

$$CSF_{dermal} = (CSF_{oral}) / (ABS_{GI})$$

where:

ABS_{GI} = absorption efficiency in the gastrointestinal tract

<u>Exposure Assumptions</u>

The assumptions used to develop the construction worker screening levels are as follows:

- Skin Surface Area Available for Contact – 3,470 cm^2
- Exposure Duration – 1 year
- Exposure Frequency – 150 days/year
- Duration of Event – 2 hours/day
- Body Weight – 80 kg
- Averaging Time (Cancer) – 25,550 days
- Averaging Time (Non-Cancer) – 365 days

<u>Theoretical Risk Calculations</u>

Quantitative estimates of risk based on a groundwater concentration of 0.001 mg/L were calculated according to risk assessment methods outlined in USEPA guidance (USEPA, 1989). Incremental lifetime cancer risks are expressed in the form of dimensionless probabilities, referred to as incremental lifetime carcinogenic risks (ILCRs), based on CSFs. Noncarcinogenic risk estimates are presented in the form of Hazard Quotients (HQs) that are determined through a comparison of intakes with published RfDs.

Carcinogenic risk estimates were generated for each chemical using estimated exposure intakes and published CSFs, as follows:

$$ILCR = (Intake_{ing} \times CSF_{oral}) + ((Intake_{derm} \times DA_{event}) \times CSF_{dermal})$$

where:

CSF_{oral}	=	oral cancer slope factor
CSF_{dermal}	=	dermal cancer slope factor
$Intake_{ing}$	=	ingestion intake
$Intake_{derm}$	=	dermal intake
DA_{event}	=	absorbed dose per event

Noncarcinogenic risks were assessed using the concept of HQs and Hazard Indices (HIs). The HQ for a COPC is the ratio of the estimated intake to the RfD, as follows:

$$HQ = (Intake_{ing} / RfD_{oral}) + ((Intake_{derm} \times DA_{event}) / RfD_{dermal})$$

where:

RfD_{oral}	=	oral reference dose
RfD_{dermal}	=	dermal reference dose
$Intake_{ing}$	=	ingestion intake
$Intake_{derm}$	=	dermal intake
DA_{event}	=	absorbed dose per event

<u>Calculation of Risk-Based Screening Levels</u>

The risk assessment equation for incidental ingestion and dermal exposure to water is linear in the concentration term; therefore, a risk-based groundwater concentration can be calculated by a ratio of an assumed example concentration (0.001 mg/L) and the theoretical risks calculated from this concentration. A target cancer risk (TCR) of 1×10^{-6} and a target hazard index (THI) of unity (1) were used for calculating screening levels using the following equation.

$$SL = \frac{C\,(TCR\,or\,THI)}{ILCR\,or\,HQ}$$

where:

SL	=	screening level (mg/L).
C	=	assumed water concentration on which theoretical risks were calculated.
TCR	=	Target Cancer Risk = 1×10^{-6}
THI	=	Target Hazard Index = 1
ILCR	=	Calculated cancer risk
HQ	=	Calculated noncancer risk

The screening level was then adjusted to represent the lower of noncarcinogenic value divided by 10 to represent an HQ of 0.1 or carcinogenic or ILCR of 1 $x10^{-6}$, as shown in the summary tables for inorganics and organics in Attachment 2.

Lead Screening Level Development Update Calculation of Risk-Based Screening Levels

Lead screening levels were calculated for groundwater using the methodology provided in the 2005 Technical Memorandum (see Attachment 1). The Adult Lead Model (ALM) was used to calculate a screening level for the construction worker exposed to groundwater. The ALM uses an equation to calculate lead screening levels for soil exposures which was manipulated as described in Attachment 1 to calculate construction worker screening levels to groundwater exposure via the dermal and incidental ingestion pathways. In 2009, USEPA issued an update to the ALM that changed the values of two constants in the ALM equation including the geometric standard deviation and the baseline lead concentration in blood. The updated groundwater lead screening level presented in this report accounts for the 2009 updates to the geometric standard deviation and baseline lead blood concentration values used in the ALM. The updated lead groundwater screening level calculation is presented in Attachment 2.

ATTACHMENT 1

2005 TECHNICAL MEMORANDUM FOR LEAD SCREENING LEVEL DERIVATION

TECHNICAL MEMORANDUM

DERIVATION OF LEAD SCREENING LEVELS FOR RECREATIONAL USERS EXPOSED TO INTERTIDAL SURFACE WATER AND CONSTRUCTION WORKERS EXPOSED TO SHALLOW GROUNDWATER AT PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

This technical memorandum presents the approaches used to develop aqueous lead screening levels for recreational users and construction workers to use in assessing potential human health risks from lead at Installation Restoration Program (IRP) sites at Portsmouth Naval Shipyard (PNS) that have brackish/saline groundwater and the intertidal surface water is saline. The human health screening level for groundwater and intertidal surface water that has been used previously for evaluation of lead at the PNS IRP sites is the Federal Safe Drinking Water Act (SDWA) action level of 15 ug/L. However, many of the IRP sites at PNS have brackish/saline groundwater and the intertidal surface water is saline so a screening level based on a drinking water level is not appropriate for risk screening. This technical memorandum presents alternative screening levels for two receptors hypothetically exposed to lead in aqueous media: 1) a child recreational user exposed to lead in water along the shoreline of a site (intertidal area), and 2) a construction worker exposed to lead in shallow groundwater at a site. The screening levels presented are based on the incidental ingestion route of exposure and dermal contact. Exposure to lead by dermal contact was considered in the calculations even though dermal uptake of lead is typically not considered significant for lead (USEPA, July 2004, ATSDR, online, March 2004). The screening levels presented herein were derived to facilitate human health risk assessment and risk management decisions at PNS. The screening levels were identified based on information developed using the two approaches as described below. Per USEPA guidelines, the screening levels presented in this technical memorandum incorporate exposure factor assumptions reflective of a reasonable maximum exposure (RME) case. The RME case is generally "defined as the highest exposure that is reasonably expected to occur at a site." The intent of the RME is to estimate an exposure that is well above the average but is still within the range of possible exposure possibilities.

1.0 Approach No. 1: Derivation of a Screening Level for a Construction Worker Exposed to Shallow Groundwater Using the Adult Lead Model (ALM)

A screening level for construction workers exposed to lead in water may be developed by estimating an acceptable daily intake based on the Adult Lead Model (ALM) equations. The ALM was developed to estimate blood-lead levels for adults exposed to lead in soil in non-residential exposure scenarios (i.e., industrial and recreational). An industrial soil remediation goal of 800 mg/kg based on the ALM has already been published by the USEPA. This value is expected to be protective of workers who work primarily indoors (i.e., work is not soil contact intensive) and the fetuses of workers. The 800 mg/kg value was based on an ingestion rate of 50 mg-soil per day, 219 days/year (ALM Frequently Asked Questions [FAQs] online at http://www.epa.gov/superfund/programs/lead/almfaq.htm; last updated April 29, 2004).
The ALM makes use of the following equation for calculating screening levels for soil:

General Adult Lead Model (ALM) Equation for Soil Exposures:

$$\textbf{Screening Level(soil)} = \frac{([PbB_{95}fetal/(R*(GSD_i^{1.645}))]-PbB_0)*AT_{S,D}}{BKSF*(IR_{S+D}*AF_{S,D}*EF_{S,D})}$$

where:

$PbB_{fetal,\,0.95}$	95th percentile blood lead concentration (PbB) in fetus (Goal is 10 ug/dL)
$R_{fetal/maternal}$	Fetal/maternal PbB ratio = 0.9
BKSF	Biokinetic Slope Factor = 0.4 ug/dL per ug/day
GSD_i	Geometric standard deviation PbB = 2
PbB_0	Baseline PbB = 2 ug/dL
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust
$AF_{S,D}$	Absorption fraction (same for soil and dust) = 0.12
$EF_{S,D}$	Exposure frequency = 150 days/yr
$AT_{S,D}$	Averaging time = 365 days/yr

The ALM approach for developing lead screening levels for soil may be used to develop a screening level for construction worker exposures to groundwater by modifying the basic equation for soil presented above, as follows:

Equation for Calculating a Construction Worker Screening Level Based on Incidental Ingestion of Lead in Water:

$$\textbf{Screening Level (iw)} = \frac{([PbB_{95}fetal/(R*(GSD_i^{1.645}))]-PbB_0)*AT_w}{BKSF*(IR_w*AF_w*EF_{constw})}$$

where:

$PbB_{fetal,\,0.95}$	95th percentile blood lead concentration (PbB) in fetus (Goal is 10 ug/dL)
$R_{fetal/maternal}$	Fetal/maternal PbB ratio = 0.9
BKSF	Biokinetic Slope Factor = 0.4 ug/dL per ug/day
GSD_i	Geometric standard deviation PbB = 2
PbB_0	Baseline PbB = 2 ug/dL
IRw	Water ingestion rate = 0.02 L/day (0.01 L/hour x 2 hours)
AF_w	Absorption fraction for adults (water) = 0.60**
EF_{constw}	Exposure frequency for construction workers = 150 days/yr
AT_w	Averaging time for exposure to water = 365 days/yr

** Bowers, S.B., Beck, B.D., Karam, H.S. Assessing the Relationship Between Environmental Lead Concentrations and Adult Blood Lead Levels, Risk Analysis Vol. 14, No. 2, 1994.

Some of the suggested exposure factors presented above are default values suggested in the ALM model. However, the recommended receptor exposure time (2 hours per day), exposure frequency (150 days/year), and water ingestion rate (0.01 L/hour) are based on professional judgment to a certain extent. The following items provide the rationale for the exposure factor values suggested for these parameters:

- The 2-hour per day groundwater exposure time suggested for the construction worker reflects the fact that the anticipated exposure is expected to be limited. The

recommended value is less than the 4-hour per day exposure time listed for recreational activities in Section 2 of this memorandum and in the *December 2002 Technical Memorandum titled, Human Health Risk Screening Levels for Intertidal Surface Water and Sediment* because the exposure incurred by a construction worker is likely to be sporadic and truly incidental when compared to exposure occurring during recreational activities. For example, receptors often desire/seek exposure to both surface waters and sediments during recreational activities. In contrast, the construction worker contacts the shallow groundwater in an excavation pit on an incidental basis only (e.g., while he/she is retrieving a piece of equipment out of the pit).

- The suggested ingestion rate for the construction worker exposed to groundwater in the excavation pit (0.01L per hour) is less than that suggested for recreational activities (0.05 L per hour) in Section 2 of this memorandum and in the aforementioned December 2002 Technical Memorandum because of the nature of receptor activities. Although relatively constant, direct contact with surface water (and thus incidental ingestion of surface water) while swimming is very likely; constant, direct contact with the shallow groundwater in an excavation pit is very unlikely.

- The construction worker is not anticipated to be exposed to the groundwater in the excavation pit on a daily basis. As indicated in the preceding bullets, it was assumed that exposure would occur *occasionally only* as work tasks require the construction worker to enter the excavation pit. Please note that the 150 days per year exposure frequency is the exposure frequency typically assumed for construction worker exposure to both groundwater and soils for PNS risk assessments conducted in the recent past.

The 2 ug/dL baseline adult blood level selected to compute the screening level for the construction worker is within the summary default parameter value range presented in the January 2003 version of the *Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil (OSWER Directive #9285.7-54).* More importantly, the value is in agreement with data presented for the Northeast Region of the United States in the USEPA document titled, *Blood Lead Concentrations of U.S. Adult Females: Summary Statistics from the Phases 1 and 2 of the National Health and Nutrition Evaluation Survey (NHANES III)* (OSWER #9285.7-52, March 2002, Tables 3a and 3c).

<u>Calculation of Construction Worker Screening Level for Incidental Ingestion of Lead in Water:</u>

$$\textbf{Screening Level (iw)} = \frac{([10\text{ug/dL}/(0.9*(2.0^{1.645}))]-2.0\text{ ug/dL})*365\text{ days/yr}}{0.4\text{ ug/dL per ug/day }*(0.02\text{L/day}*0.6*150\text{ days/yr})}$$

Screening Level (iw) = 800 ug/L

Equation for Calculating a Construction Worker Screening Level Based on Dermal Contact with Lead in Water:

$$\textbf{Screening Level (dw)} = \frac{([PbB_{95}fetal/(R*(GSD_i^{1.645}))]-PbB_0)*AT_w}{BKSF*(Kp*ET*CF*A_s*EF_{constw})}$$

where:

$PbB_{fetal,\ 0.95}$	95th percentile blood lead concentration (PbB) in fetus (Goal is 10 ug/dL)
$R_{fetal/maternal}$	Fetal/maternal PbB ratio = 0.9
BKSF	Biokinetic Slope Factor = 0.4 ug/dL per ug/day
GSD_i	Geometric standard deviation PbB = 2
PbB_0	Baseline PbB = 2 ug/dL
Kp	permeability coefficient = 0.0001 cm/hour
ET	Exposure Time = 2 hr/day
CF	conversion factor (0.001 L/cm^3)
A	skin surface area available for contact = 3,300 cm^2
EF_{constw}	Exposure frequency for construction workers = 150 days/yr
AT_w	Averaging time for exposure to water = 365 days/yr

Most of the exposure factors values presented above are default values presented in the ALM model or were defined in the preceding evaluation of the ingestion route of exposure. The skin surface available for contact (3,300 cm^2) is the recommended value presented in the current version of *USEPA RAGS Part E, Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Supplemental Guidance for Dermal Risk Assessment*, for the evaluation of worker exposure to soils (USEPA, July 2004).

Calculation of Construction Worker Screening Level for Dermal Contact with Lead in Water:

$$\textbf{Screening Level (dw)} = \frac{([10ug/dL/(0.9*(2.0^{1.645}))]-2.0\ ug/dL)*365\ days/yr}{0.4ug/dL/ug/day*(0.0001cm/hr*2hr/day*0.001L/cm^3*3{,}300cm^2*150\ days/yr)}$$

Screening Level (dw) = 14,500 ug/L

The preceding calculations and screening levels suggest that receptor intake for the ingestion route of exposure is greater than receptor intake for the dermal contact route of exposure by a factor of approximately 18. A screening level derived assuming receptor contact by *both* the ingestion and dermal routes of exposure would be approximately **750 ug/L** (i.e., a screening level slightly less than the 800 ug/L value derived for the ingestion route of exposure). The calculation of the combined screening level is attached.

2.0 Approach No. 2.0. Derivation of a Screening level for Child Recreational User Exposed to Intertidal Surface Water, Based on the USEPA Integrated Exposure Uptake Biokinetic Model (IEUBK) for Lead in Children

A lead screening level for a child recreational user can be derived using the IEUBK model by use of the Model's Alternate Source Data option. The ***Alternate Source Data option*** allows the user to input lead concentrations from atypical sources (i.e., *alternative lead intakes* not addressed by the Model's main menu options). Examples include the direct ingestion of lead-based paint and the use of cosmetics or home remedies. In the case of PNS, the alternate source would be exposure to lead in river water or seep water by a child recreating in the intertidal area. The child (3 to 7 years of age) is expected to be exposed 4 hours/day, 26 days/year and to incidentally ingest 0.05 L of the saline water per hour. The exposure time (4 hours per day), exposure frequency (26 days per year), and incidental surface water ingestion rate (0.05 Lper hour) factors used to develop the screening level for the recreational-type of exposure are those specified in the aforementioned *December 2002 Human Health Risk Screening Levels for Intertidal Surface Water and Sediment Technical Memorandum.* The exposure time/frequency factors suggested for this analysis and the State of Maine default exposure time/frequency factors for recreational activities (2.6 hours per day and 40 days per year) yield the same overall exposure time when receptor exposure is presented in terms of exposure hours per year (i.e., both sets of time factors yield 104 exposure hours per year).

Depending on the averaging time selected (i.e., 90 days, 180 days, and 365 days) the preceding recommended exposure factors yield screening levels that range from 300 to 700 ug/L as discussed below. The averaging time is the period over which exposure is averaged. (Dermal contact is not included in these calculations because the IEUBK model does not consider dermal contact.)

The ***alternate lead intake value*** input into the Model is calculated as follows:

Step 1. Calculate liters of surface water ingested per year.

0.05 L/hour x 4 hours/day x 26 days/year = 5.2 L/year

Step 2. Calculate the amount of lead ingested per year by assuming a range of possible lead concentrations. If the concentration of lead is assumed to be 300 ug/L, the amount of lead ingested is as follows:

5.2 L/year x 300 ug/L = 1,560 ug/year

Step 3. Calculate the amount of lead ingested per day (the Model requires that the units of Alternate Source Data variable have units of ug/day). This value is calculated by dividing the amount ingested per year by an averaging time. Assumptions concerning averaging time (the period over which exposure is averaged) can vary. A typical averaging time used for lead is 365 days, as shown in Section 3. If 365 days is selected as the averaging time, the alternate lead intake value is:

1,560 ug/year / 365 days/year = 4.3 ug/day

Assuming a shorter averaging time would increase the intake value. For example, if the exposure is assumed to occur during the summer months (as is assumed for the PNS recreational exposure scenario), the averaging time may be 90 days/year and the alternate lead intake value input value becomes:

1,560 ug/year / 90 days/year = 17 ug/day

As demonstrated above, the shorter the averaging time, the larger the daily intake of lead, and, consequently, the smaller the screening level. The effects of averaging time on the value of the screening level are presented in Section 5.0. It should be noted that 180 and 365 days per year averaging times were included in this analysis for purposes of discussion only. As indicated in Section 6, the 90-day averaging time is the basis for the screening level recommended for the recreational user in this technical memorandum because the 90-day averaging time frame most likely reflects how exposure may occur at PNS (i.e., most recreational exposures involving direct contact with surface waters are likely to occur in the warm summer months).

The ***lead screening level*** for a child recreational user's exposure to intertidal surface water is calculated as follows:

Step 1. Enter the alternate lead intake value into the Model and run the Model.

Step 2. Check the Model output to see whether the projected child blood lead level is less than the USEPA goal of 10 ug/dL and the probability of exceeding 10 ug/dL is less than the USEPA goal of 5 percent. Determining the final screening level is a trial and error process which requires several repetitions of process outlined above First, an intertidal surface water concentration must be assumed and a daily intake be derived, as shown above. The daily intake is then entered in the Alternate Source Option menu, the Model run, and the output is compared to the USEPA benchmarks. If the projected blood lead levels or probabilities are not acceptable, a different intertidal surface water concentration is assumed and the process is repeated. The repetitions are continued until acceptable blood lead levels and probabilities are predicted by the model. The intertidal surface water concentration which generates acceptable results is selected as the recommended screening level.

The intertidal surface water screening level developed by this approach has the advantage of being derived directly from the IEUBK model and site-specific assumptions. All of the model's default background levels are used. Thus, background contributions from air, soil, drinking water, diet, and maternal contributions are considered and reflected in the alternate water screening level. In addition, the screening level is not based on sources and extrapolations which may not be completely defensible.

Although the screening level is specific to the child recreational user, it would also be protective of dermal contact by a construction worker, because dermal contact with lead in water is not likely to be an important exposure route due to the low permeabilities of lead from water.

5.0 Uncertainty Analysis

The screening levels presented in this technical memorandum are subject various sources of uncertainty, including the following:

- *The screening level calculated for the recreational receptor did not consider exposures incurred by very young children (i.e., 0 to 3 year old children).* However, exposure to very young children is likely to be very limited because of the physical nature of much of the shoreline and intertidal areas at PNS. In many areas, the shoreline at the facility is

rocky and would be physically hazardous for very young children; very young children would rarely play unsupervised along this type of shoreline due to safety considerations. The mudflat areas of the shoreline are also not conducive to recreational activities or not safe for very young children. Consequently, exposure time and exposure frequency for the very young child are anticipated to be very limited when compared to the older-child age group (3 to 7 years old) considered for the development of the screening level for recreational user. Because of the anticipated significant differences in exposure times and frequencies, the screening level derived for the 3 to 7 year older child would be protective for the very young child who, on a rare occasion, might walk/crawl in the intertidal area of the PNS.

- *The screening levels presented in this memorandum are based on the USEPA's goal of controlling lead exposure in children/fetuses so that no more that 5 percent of receptors experience a blood lead level exceeding 10 ug/dL. However, all health-based goals, standards, or criteria are subject to change over time as new toxicity information becomes available.* The toxicity of lead continues to be actively investigated by the scientific and regulatory community and is the subject of much debate. Both USEPA and State of Maine goals regarding lead exposure may change in the future as more definitive toxicity information becomes available for lead.

- *Standard exposure factors guidelines and recommendations (e.g., recommendations for appropriate exposure frequencies) are limited for the risk evaluation/screening level development for the recreational land use scenario.* A consideration of site-specific conditions and professional judgment is often necessary in the determination of appropriate exposure factors. For example, the screening levels presented in this technical memorandum for the recreational user assume that the receptor in exposed two days per week during the warm weather months (i.e., 26 days over the course of the summer [90 days]). This assumption is based on climatic conditions for the northeast region of the United States and on the fact that much of the shoreline at PNS is not attractive for recreational use. The recommended screening levels would be lower if it was assumed that exposure were to occur more frequently. However, assuming that lead concentrations in the surface water equal the recommended screening level for the recreational user (300 ug/L), lead intakes predicted for the recreational user would only exceed the lead intake associated with routine domestic use of a water supply containing 15 ug/L if it were assumed that the recreational receptor were exposed four days per week during the warm weather months.

6.0 Summary and Recommendations

This technical memorandum presents the approaches used to develop aqueous lead screening levels for recreational users and construction workers to use in assessing potential human health risks from lead at PNS IRP sites which have brackish/saline groundwater and the intertidal surface water is saline. The methods involved the use of the USEPA Adult or Child Lead Models. Screening levels developed by the approaches are presented in the following table. The Navy recommends the lead screening level based on the 90-day averaging time (300 ug/L)) for the recreational user because the 90-day averaging time frame most likely reflects how exposure may occur at PNS (i.e., most recreational exposures involving direct contact with surface waters are likely to occur in the warm summer months). The aqueous lead screening level recommended for construction worker exposure is 750 ug/L.

SUMMARY OF POTENTIAL LEAD SCREENING LEVELS

Approach 1 – Calculation of Screening Levels for Construction Workers Using Equations and Input Parameters from the Adult Lead Model (ALM)		
Incidental Ingestion	Dermal Contact	Incidental Ingestion plus Dermal Contact
800 ug/L	14,500 ug/L	**750 ug/L**
Approach 2 – Calculation of Screening Levels for Incidental Ingestion of Water by Child Recreational Users Using the Child Lead Model (IEUBK)		
Averaging time of 90 days	Averaging time of 180 days	Averaging time of 365 days
300 ug/L	500 ug/L	700 ug/L

References

Agency for Toxic Substances and Disease Registry (ATSDR), accessed on-line March 2004. Toxicological Profile for Lead, U.S. Department of Health and Human Services, Public Health Services (http://www.atsdr. cdc.gov/toxpro2.html).

USEPA, July 2004. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final, EPA/540/R/99/005, OSWER 9285.7-02EP, PB99-963312.

USEPA, March 2002. Blood Lead Concentrations of U.S. Adult Females: Summary Statistics from the Phases 1 and 2 of the National Health and Nutrition Evaluation Survey (NHANES III) (OSWER #9285.7-52).

Attachments

Check Calculation for Screening Level for Construction Worker.

Responses to Comments on the Technical Memorandum on Derivation of Aqueous Lead Screening Levels, Portsmouth Naval Shipyard (PNS), Kittery, Maine.

Conference Call Notes from the February 3, 2005 Discussion of the Technical Memorandum on Derivation of Aqueous Lead Screening Levels, Portsmouth Naval Shipyard (PNS), Kittery, Maine.

Responses to Follow-up Comments on the Technical Memoradum on Derivation of Aqueous Lead Screening Levels, Portsmouth Naval Shipyard, Kittery, Maine.

ATTACHMENT 2

CALCULATION WORKSHEETS FOR CONSTRUCTION WORKER GROUNDWATER SCREENING LEVELS

SUMMARY TABLE

SCREENING LEVELS FOR INGESTION OF AND DERMAL CONTACT WITH GROUNDWATER
CONSTRUCTION WORKER EXPOSURE - INORGANICS
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	RBC (noncancer) mg/L	RBC (cancer) mg/L	RBC (lower) µg/L		Adjusted RBC[1] µg/L	
Aluminum	1.15E+04	NA	11500000	n	1150000	n
Antimony	1.38E+00	NA	1380	n	138	n
Arsenic	3.45E+00	5.36E-01	536	c	345	n[2]
Barium	3.57E+02	NA	357000	n	35700	n
Beryllium	9.72E-01	NA	972	n	97.2	n
Cadmium	6.54E-01	NA	654	n	65.4	n
Chromium[3]	2.71E+02	NA	271000	n	27100	n
Cobalt	4.57E+01	NA	45700	n	4570	n
Copper	4.60E+02	NA	460000	n	46000	n
Iron	8.04E+03	NA	8040000	n	804000	n
Manganese	2.55E+01	NA	25500	n	2550	n
Mercury[4]	3.57E+00	NA	3570	n	357	n
Nickel	8.71E+01	NA	87100	n	8710	n
Selenium	5.75E+01	NA	57500	n	5750	n
Silver	8.53E+00	NA	8530	n	853	n
Thallium[5]	4.60E-01	NA	460	n	46.0	n
Vanadium	7.03E+00	NA	7030	n	703	n
Zinc	4.12E+03	NA	4120000	n	412000	n
Hexavalent Chromium	2.45E+01	1.14E+00	1140	c	1140	c
Nitrate	3.11E+04	NA	31100000	n	3110000	n
Cyanide	1.17E+01	NA	11700	n	1170	n

1 - The adjusted RBC is the lower of noncarcinogenic and carcinogenic RBCs with RBCs for noncarcinogens divided by 10 to represent a hazard quotient of 0.1. RBCs for carcinogens are not adjusted and represent an incremental lifetime cancer risk of $1x10^{-6}$.

2 - One-tenth the noncarcinogenic RBC is less than the carcinogenic RBC; therefore, the noncarcinogenic RBC is presented.

3 - Values are for trivalent chromium.

4 - Values are for mercuric chloride.

5 - Toxicity criterion used is only suitable for screening and is not to be used for quantifying risks.

NA = Not applicable

RBC = Risk-based concentration

VALUES USED FOR DAILY INTAKE CALCULATIONS
INGESTION AND DERMAL EXPOSURES OF CONSTRUCTION WORKERS TO WATER

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	Values	Intake Equation/ Model Name
Ingestion	CGW	Chemical Concentration in Groundwater	ug/L		Ingestion Dose (mg/kg/day) =
	CF	Conversion Factor	mg/ug	0.001	Cwater x IwR x CF x EF x EV x ED / BW x AT
	IwR	Ingestion Rate of Groundwater	L/day	0.01	
	EF	Exposure Frequency	days/year	150	
	ED	Exposure Duration	years	1	USEPA, December 1989
	BW	Body Weight	kg	80	
	AT-C	Averaging Time (Cancer)	days	25550	
	AT-N	Averaging Time (Non-Cancer)	days	365	
Dermal Contact	Cwater	Chemical Concentration in Water	mg/L		The equations and parameters for estimating DAevent and the chemical-specific dermally absorbed dose from water (DAD) are provided in USEPA, July 2004.
	A	Skin Surface Area Available for Contact	cm^2	3,470	
	DAevent	Absorbed Dose per Event	mg/cm^2-event	chemical-specific	
	EV	Event Frequency	event/day	1	
	ED	Exposure Duration	years	1	
	EF	Exposure Frequency	days/year	150	
	t_{event}	Duration of Event	hour/event	2.0	
	t*	Time to reach steady state	hour/event	chemical-specific	
	T	Lag Time	hour/event	chemical-specific	
	B	Bunge Model Constant	dimensionless	chemical-specific	
	Kp	Permeability Coefficient from Water	cm/hour	chemical-specific	
	BW	Body Weight	kg	80	
	AT-C	Averaging Time (Cancer)	days	25,550	
	AT-N	Averaging Time (Non-Cancer)	days	365	

Daily Intake Calculations

Ingestion Intake = (IwR x CF x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 7.34E-10
Noncancer Ingestion Intake(RME) = 5.14E-08

Cancer Dermal Intake(RME) = 2.55E-01
Noncancer Dermal Intake(RME) = 1.78E+01

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH WATER
EXPOSURE OF CONSTRUCTION WORKERS TO WATER

REFERENCES: USEPA, July 2004

DERMAL CONTACT:

DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE:

DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2 x FA x Kp x C x CF x (6T x tevent/3.141592654)$^{0.5}$

IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2))

WHERE:

Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
Cwater = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)
FA = FRACTION ABSORBED WATER (DIMENSIONLESS)

CHEMICAL	Cwater (mg/L)		ORGANIC OR INORGANIC?		t* (HR)	tevent	T (HR)		Kp (CM/HR)		B	FA	DAevent
Aluminum	1.00E-03		i		NA	2.00E+00	NA		1.00E-03		NA	1.00E+00	2.00E-09
Antimony	1.00E-03		i		NA	2.00E+00	NA		1.00E-03		NA	1.00E+00	2.00E-09
Arsenic	1.00E-03		i		NA	2.00E+00	NA		1.00E-03		NA	1.00E+00	2.00E-09
Barium	1.00E-03		i		NA	2.00E+00	NA		1.00E-03		NA	1.00E+00	2.00E-09
Beryllium	1.00E-03		i		NA	2.00E+00	NA		1.00E-03		NA	1.00E+00	2.00E-09
Cadmium	1.00E-03		i		NA	2.00E+00	NA		1.00E-03		NA	1.00E+00	2.00E-09
Chromium(1)	1.00E-03		i		NA	2.00E+00	NA		2.00E-03		NA	1.00E+00	4.00E-09
Cobalt	1.00E-03		i		NA	2.00E+00	NA		4.00E-04		NA	1.00E+00	8.00E-10
Copper	1.00E-03		i		NA	2.00E+00	NA		1.00E-03		NA	1.00E+00	2.00E-09
Iron	1.00E-03		i		NA	2.00E+00	NA		1.00E-03		NA	1.00E+00	2.00E-09
Manganese	1.00E-03		i		NA	2.00E+00	NA		1.00E-03		NA	1.00E+00	2.00E-09
Mercury(2)	1.00E-03		i		NA	2.00E+00	NA		1.00E-03		NA	1.00E+00	2.00E-09
Nickel	1.00E-03		i		NA	2.00E+00	NA		2.00E-04		NA	1.00E+00	4.00E-10
Selenium	1.00E-03		i		NA	2.00E+00	NA		1.00E-03		NA	1.00E+00	2.00E-09
Silver	1.00E-03		i		NA	2.00E+00	NA		6.00E-04		NA	1.00E+00	1.20E-09
Thallium	1.00E-03		i		NA	2.00E+00	NA		1.00E-03		NA	1.00E+00	2.00E-09
Vanadium	1.00E-03		i		NA	2.00E+00	NA		1.00E-03		NA	1.00E+00	2.00E-09
Zinc	1.00E-03		i		NA	2.00E+00	NA		6.00E-04		NA	1.00E+00	1.20E-09
Hexavalent Chromium	1.00E-03		i		NA	2.00E+00	NA		2.00E-03		NA	1.00E+00	4.00E-09
Nitrate	1.00E-03		i		NA	2.00E+00	NA		1.00E-04		NA	1.00E+00	2.00E-10
Cyanide	1.00E-03		i		NA	2.00E+00	NA		1.00E-03		NA	1.00E+00	2.00E-09

1 - Values are for trivalent chromium.
2 - Values are for mercuric chloride.

CALCULATION OF SCREENING LEVELS BASED ON NONCARCINOGENIC EFFECTS
INGESTION AND DERMAL EXPOSURES OF CONSTRUCTION WORKERS TO WATER

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Assumed Water Concentration	Intake (Non-Cancer)[4]	Reference Dose[5]	Hazard Quotient Based on Assumed Water Concentration	**Calculated RBC (noncancer)**	**Calculated RBC (noncancer)**
		mg/L	mg/kg-day	mg/kg-day		**mg/L**	**µg/L**
Ingestion	Aluminum	1.00E-03	5.14E-08	1.00E+00	5.1E-08	1.9E+04	1.9E+07
	Antimony	1.00E-03	5.14E-08	4.00E-04	1.3E-04	7.8E+00	7.8E+03
	Arsenic	1.00E-03	5.14E-08	3.00E-04	1.7E-04	5.8E+00	5.8E+03
	Barium	1.00E-03	5.14E-08	2.00E-01	2.6E-07	3.9E+03	3.9E+06
	Beryllium	1.00E-03	5.14E-08	5.00E-03	1.0E-05	9.7E+01	9.7E+04
	Cadmium	1.00E-03	5.14E-08	5.00E-04	1.0E-04	9.7E+00	9.7E+03
	Chromium[1]	1.00E-03	5.14E-08	1.50E+00	3.4E-08	2.9E+04	2.9E+07
	Cobalt	1.00E-03	5.14E-08	3.00E-03	1.7E-05	5.8E+01	5.8E+04
	Copper	1.00E-03	5.14E-08	4.00E-02	1.3E-06	7.8E+02	7.8E+05
	Iron	1.00E-03	5.14E-08	7.00E-01	7.3E-08	1.4E+04	1.4E+07
	Manganese	1.00E-03	5.14E-08	2.40E-02	2.1E-06	4.7E+02	4.7E+05
	Mercury[2]	1.00E-03	5.14E-08	2.00E-03	2.6E-05	3.9E+01	3.9E+04
	Nickel	1.00E-03	5.14E-08	2.00E-02	2.6E-06	3.9E+02	3.9E+05
	Selenium	1.00E-03	5.14E-08	5.00E-03	1.0E-05	9.7E+01	9.7E+04
	Silver	1.00E-03	5.14E-08	5.00E-03	1.0E-05	9.7E+01	9.7E+04
	Thallium[3]	1.00E-03	5.14E-08	4.00E-05	1.3E-03	7.8E-01	7.8E+02
	Vanadium	1.00E-03	5.14E-08	1.00E-02	5.1E-06	1.9E+02	1.9E+05
	Zinc	1.00E-03	5.14E-08	3.00E-01	1.7E-07	5.8E+03	5.8E+06
	Hexavalent Chromium	1.00E-03	5.14E-08	3.00E-03	1.7E-05	5.8E+01	5.8E+04
	Nitrate	1.00E-03	5.14E-08	1.60E+00	3.2E-08	3.1E+04	3.1E+07
	Cyanide	1.00E-03	5.14E-08	6.00E-04	8.6E-05	1.2E+01	1.2E+04
Dermal Contact	Aluminum	1.00E-03	3.6E-08	1.00E+00	3.6E-08	2.8E+04	2.8E+07
	Antimony	1.00E-03	3.6E-08	6.00E-05	5.9E-04	1.7E+00	1.7E+03
	Arsenic	1.00E-03	3.6E-08	3.00E-04	1.2E-04	8.4E+00	8.4E+03
	Barium	1.00E-03	3.6E-08	1.40E-02	2.5E-06	3.9E+02	3.9E+05
	Beryllium	1.00E-03	3.6E-08	3.50E-05	1.0E-03	9.8E-01	9.8E+02
	Cadmium	1.00E-03	3.6E-08	2.50E-05	1.4E-03	7.0E-01	7.0E+02
	Chromium[1]	1.00E-03	7.1E-08	1.95E-02	3.7E-06	2.7E+02	2.7E+05
	Cobalt	1.00E-03	1.4E-08	3.00E-03	4.8E-06	2.1E+02	2.1E+05
	Copper	1.00E-03	3.6E-08	4.00E-02	8.9E-07	1.1E+03	1.1E+06
	Iron	1.00E-03	3.6E-08	7.00E-01	5.1E-08	2.0E+04	2.0E+07
	Manganese	1.00E-03	3.6E-08	9.60E-04	3.7E-05	2.7E+01	2.7E+04
	Mercury[2]	1.00E-03	3.6E-08	1.40E-04	2.5E-04	3.9E+00	3.9E+03
	Nickel	1.00E-03	7.1E-09	8.00E-04	8.9E-06	1.1E+02	1.1E+05
	Selenium	1.00E-03	3.6E-08	5.00E-03	7.1E-06	1.4E+02	1.4E+05
	Silver	1.00E-03	2.1E-08	2.00E-04	1.1E-04	9.3E+00	9.3E+03
	Thallium[3]	1.00E-03	3.6E-08	4.00E-05	8.9E-04	1.1E+00	1.1E+03
	Vanadium	1.00E-03	3.6E-08	2.60E-04	1.4E-04	7.3E+00	7.3E+03
	Zinc	1.00E-03	2.1E-08	3.00E-01	7.1E-08	1.4E+04	1.4E+07
	Hexavalent Chromium	1.00E-03	7.1E-08	3.00E-03	2.4E-05	4.2E+01	4.2E+04
	Nitrate	1.00E-03	3.6E-09	1.60E+00	2.2E-09	4.5E+05	4.5E+08
	Cyanide	1.00E-03	3.6E-08	2.00E-02	1.8E-06	5.6E+02	5.6E+05

1 - Values are for trivalent chromium.

2 - Values are for mercuric chloride.

3 - Toxicity criterion used is only suitable for screening and is not to be used for quantifying risks.

4 - For ingestion, Intake = Ingestion Intake; for dermal contact, Intake = Dermal Intake x DAevent.

5 - Subchronic reference doses were presented if available. If no subchronic reference dose was available, the chronic reference dose is presented.

CALCULATION OF SCREENING LEVELS BASED ON 1.0E-06 CANCER RISKS
INGESTION AND DERMAL EXPOSURES OF CONSTRUCTION WORKERS TO WATER

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value mg/L	Intake (Cancer)[3] mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Incremental Lifetime Cancer Risk Based on Assumed Water Concentration	Calculated RBC (cancer) mg/L	Calculated RBC (cancer) µg/L
Ingestion	Aluminum	1.00E-03	7.3E-10	NA	NA	NA	NA
	Antimony	1.00E-03	7.3E-10	NA	NA	NA	NA
	Arsenic	1.00E-03	7.3E-10	1.50E+00	1.10E-09	9.1E-01	9.1E+02
	Barium	1.00E-03	7.3E-10	NA	NA	NA	NA
	Beryllium	1.00E-03	7.3E-10	NA	NA	NA	NA
	Cadmium	1.00E-03	7.3E-10	NA	NA	NA	NA
	Chromium[1]	1.00E-03	7.3E-10	NA	NA	NA	NA
	Cobalt	1.00E-03	7.3E-10	NA	NA	NA	NA
	Copper	1.00E-03	7.3E-10	NA	NA	NA	NA
	Iron	1.00E-03	7.3E-10	NA	NA	NA	NA
	Manganese	1.00E-03	7.3E-10	NA	NA	NA	NA
	Mercury[2]	1.00E-03	7.3E-10	NA	NA	NA	NA
	Nickel	1.00E-03	7.3E-10	NA	NA	NA	NA
	Selenium	1.00E-03	7.3E-10	NA	NA	NA	NA
	Silver	1.00E-03	7.3E-10	NA	NA	NA	NA
	Thallium	1.00E-03	7.3E-10	NA	NA	NA	NA
	Vanadium	1.00E-03	7.3E-10	NA	NA	NA	NA
	Zinc	1.00E-03	7.3E-10	NA	NA	NA	NA
	Hexavalent Chromium	1.00E-03	7.3E-10	5.00E-01	3.67E-10	2.7E+00	2.7E+03
	Nitrate	1.00E-03	7.3E-10	NA	NA	NA	NA
	Cyanide	1.00E-03	7.3E-10	NA	NA	NA	NA
Dermal Contact	Aluminum	1.00E-03	5.1E-10	NA	NA	NA	NA
	Antimony	1.00E-03	5.1E-10	NA	NA	NA	NA
	Arsenic	1.00E-03	5.1E-10	1.50E+00	7.64E-10	1.3E+00	1.3E+03
	Barium	1.00E-03	5.1E-10	NA	NA	NA	NA
	Beryllium	1.00E-03	5.1E-10	NA	NA	NA	NA
	Cadmium	1.00E-03	5.1E-10	NA	NA	NA	NA
	Chromium[1]	1.00E-03	1.0E-09	NA	NA	NA	NA
	Cobalt	1.00E-03	2.0E-10	NA	NA	NA	NA
	Copper	1.00E-03	5.1E-10	NA	NA	NA	NA
	Iron	1.00E-03	5.1E-10	NA	NA	NA	NA
	Manganese	1.00E-03	5.1E-10	NA	NA	NA	NA
	Mercury[2]	1.00E-03	5.1E-10	NA	NA	NA	NA
	Nickel	1.00E-03	1.0E-10	NA	NA	NA	NA
	Selenium	1.00E-03	5.1E-10	NA	NA	NA	NA
	Silver	1.00E-03	3.1E-10	NA	NA	NA	NA
	Thallium	1.00E-03	5.1E-10	NA	NA	NA	NA
	Vanadium	1.00E-03	5.1E-10	NA	NA	NA	NA
	Zinc	1.00E-03	3.1E-10	NA	NA	NA	NA
	Hexavalent Chromium	1.00E-03	1.0E-09	5.00E-01	5.09E-10	2.0E+00	2.0E+03
	Nitrate	1.00E-03	5.1E-11	NA	NA	NA	NA
	Cyanide	1.00E-03	5.1E-10	NA	NA	NA	NA

1 - Values are for trivalent chromium.
2 - Values are for mercuric chloride.
3 - For ingestion, Intake = Ingestion Intake; for dermal contact, Intake = Dermal Intake x DAevent.

SUMMARY TABLE

SCREENING LEVELS FOR INGESTION OF AND DERMAL CONTACT WITH GROUNDWATER
CONSTRUCTION WORKER EXPOSURE - ORGANICS
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	RBC (noncancer) mg/L	RBC (cancer) mg/L	RBC (lower) µg/L		Adjusted RBC[1] µg/L	
4,4'-DDD	NA[2]	9.04E-03	9.04	c	9.04	c
4,4'-DDE	NA[2]	4.01E+00	4010	c	4010	c
4,4'-DDT	9.73E+00	4.01E+00	4010	c	973	n[4]
Aldrin	7.79E-01	8.02E-02	80.2	c	77.9	n[4]
alpha-Chlordane	6.53E-02	2.61E-02	26.1	c	6.53	n[4]
Dieldrin	3.76E-02	1.65E-03	1.65	c	1.65	c
Endrin	7.53E-01	NA[3]	753	n	75.3	n
gamma-BHC (Lindane)	6.66E-03	4.24E-02	6.66	n	0.666	n
gamma-Chlordane	6.53E-02	2.61E-02	26.1	c	6.53	n[4]
Heptachlor	5.54E-02	8.61E-03	8.61	c	5.54	n[4]
PCB-hexachlorobiphenyl[5]	NA[2]	3.09E-03	3.09	c	3.09	c
1,2,4-Trichlorobenzene	1.83E+01	4.91E-01	491	c	491	c
1,2-Dichlorobenzene	2.37E+02	NA[3]	237000	n	23700	n
1,3-Dichlorobenzene	5.68E+00	3.68E+00	3680	c	568	n[4]
1,4-Dichlorobenzene	2.72E+01	5.05E+00	5050	c	2720	n[4]
2,4,6-Trichlorophenol	3.49E-01	2.22E+00	349	n	34.9	n
2,4-Dichlorophenol	1.44E+01	NA[3]	14400	n	1440	n
2,4-Dimethylphenol	7.90E+01	NA[3]	79000	n	7900	n
2,4-Dinitrophenol	1.21E+02	NA[3]	121000	n	12100	n
2,4-Dinitrotoluene	7.18E+00	8.11E-01	811	c	718	n[4]
2,6-Dinitrotoluene	1.47E+01	2.29E-01	229	c	229	c
2-Chlorophenol	1.63E+01	NA[3]	16300	n	1630	n
2-Ethoxy ethanol(Cellosolve)	1.95E+03	NA[3]	1950000	n	195000	n
2-Nitrophenol	NA[2]	NA[3]	NA[2,3]		NA[2,3]	
3-Nitrophenol	NA[2]	NA[3]	NA[2,3]		NA[2,3]	
4-Chlorophenol	NA[2]	NA[3]	NA[2,3]		NA[2,3]	
4-Nitrophenol	NA[2]	NA[3]	NA[2,3]		NA[2,3]	
Acetaldehyde	NA[2]	NA[3]	NA[2,3]		NA[2,3]	
BaPEQ	NA[2]	1.87E-01	187	c	187	c
Benzo(a)anthracene	NA[2]	1.87E+00	1870	c	1870	c
Benzo(a)pyrene	NA[2]	1.87E-01	187	c	187	c
Benzo(b)fluoranthene	NA[2]	1.87E+00	1870	c	1870	c
Benzoic acid	1.13E+04	NA[3]	11300000	n	1130000	n
Benzyl chloride	3.27E+00	6.74E-01	674	c	327	n[4]
Bis(2-chloroethyl)ether	NA[2]	4.04E-01	404	c	404	c
Chrysene	NA[2]	1.87E+02	187000	c	187000	c
Dibenzo(a,h)anthracene	NA[2]	1.87E-01	187	c	187	c
Dibutyl phthalate	3.33E+02	NA[3]	333000	n	33300	n
Dichlorobenzidine, 3,3'	NA[2]	1.01E-01	101	c	101	c
Diethyl phthalate	1.42E+04	NA[3]	14200000	n	1420000	n
Dioxane, 1,4-	7.45E+03	1.04E+01	10400	c	10400	c
Fluoranthene	7.79E+03	NA[3]	7790000	n	779000	n
Hexachlorobenzene	5.80E-04	2.54E-03	0.580	n	0.0580	n

SUMMARY TABLE

SCREENING LEVELS FOR INGESTION OF AND DERMAL CONTACT WITH GROUNDWATER
CONSTRUCTION WORKER EXPOSURE - ORGANICS
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	RBC (noncancer) mg/L	RBC (cancer) mg/L	RBC (lower) µg/L		Adjusted RBC[1] µg/L	
Hexachlorobutadiene	1.11E-01	1.00E-01	100.0	c	11.1	n[4]
Hexachloroethane	3.12E+00	5.46E-01	546	c	312	n[4]
Indeno(1,2,3-CD)pyrene	NA[2]	1.87E+00	1870	c	1870	c
Isophorone	1.21E+04	2.97E+02	297000	c	297000	c
m-Cresol	1.13E+03	NA[3]	1130000	n	113000	n
Naphthalene	2.36E+02	NA[3]	236000	n	23600	n
o-Cresol	1.14E+03	NA[3]	1140000	n	114000	n
p-Cresol	4.57E+01	NA[3]	45700	n	4570	n
Pentachlorophenol	1.95E+01	3.41E+00	3410	c	1950	n[4]
Phenanthrene[7]	5.84E+02	NA[3]	584000	n	58400	n
Phenol	2.31E+03	NA[3]	2310000	n	231000	n
Phenol,4,6-dinitro-2-methyl-	2.61E+00	NA[3]	2610	n	261	n
TCDD	1.36E-05	1.05E-05	0.0105	c	0.00136	n[4]
1,1,1-Trichloroethane	9.20E+03	NA[3]	9200000	n	920000	n
1,1,2,2-Tetrachloroethane	9.66E+02	6.76E-01	676	c	676	c
1,1,2-Trichloroethane	9.63E+00	2.96E+00	2960	c	963	n[4]
1,1,2-Trichlorotrifluoroethane	2.22E+04	NA[3]	22200000	n	2220000	n
1,1-Dichloroethane	5.26E+03	3.23E+01	32300	c	32300	c
1,1-Dichloroethene	1.47E+01	NA[3]	14700	n	1470	n
1,2-Dichloroethane	7.79E+01	3.00E+00	3000	c	3000	c
1,2-Dichloropropane	1.55E+02	4.32E+00	4320	c	4320	c
2,2'-Oxybis(1-Chloropropane)	7.07E+01	1.77E+00	1770	c	1770	c
2,4,5-Trichlorophenol	1.03E+02	NA[3]	103000	n	10300	n
2-Butanone	2.11E+04	NA[3]	21100000	n	2110000	n
2-Chloronaphthalene	3.73E+01	NA[3]	37300	n	3730	n
2-Hexanone	2.22E+01	NA[3]	22200	n	2220	n
2-Methylnaphthalene	7.71E-01	NA[3]	771	n	77.1	n
2-Nitroaniline	3.25E+02	NA[3]	325000	n	32500	n
3-Nitroaniline	5.71E+00	NA[3]	5710	n	571	n
4-Bromophenyl Phenyl Ether	NA[2]	NA[3]	NA[2,3]		NA[2,3]	
4-Chloro-3-Methylphenol	5.81E+01	NA[3]	58100	n	5810	n
4-Chloroaniline	1.56E+00	1.09E+00	1090	c	156	n[4]
4-Chlorophenyl Phenyl Ether	NA[2]	NA[3]	NA[2,3]		NA[2,3]	
4-Methyl-2-Pentanone	4.39E+03	NA[3]	4390000	n	439000	n
4-Nitroaniline	5.59E+01	1.96E+01	19600	c	5590	n[4]
Acenaphthene	3.76E+01	NA[3]	37600	n	3760	n
Acenaphthylene[6]	3.60E+01	NA[3]	36000	n	3600	n
Acetone	2.70E+04	NA[3]	27000000	n	2700000	n
Alpha-BHC	2.65E+00	3.69E-03	3.69	c	3.69	c
Anthracene	1.01E+02	NA[3]	101000	n	10100	n
Aroclor-1016	1.36E+00	1.95E+01	1360	n	136	n
Aroclor-1221	NA[2]	3.36E-03	3.36	c	3.36	c
Aroclor-1232	NA[2]	3.36E-03	3.36	c	3.36	c

SUMMARY TABLE

SCREENING LEVELS FOR INGESTION OF AND DERMAL CONTACT WITH GROUNDWATER
CONSTRUCTION WORKER EXPOSURE - ORGANICS
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	RBC (noncancer) mg/L	RBC (cancer) mg/L	RBC (lower) µg/L		Adjusted RBC[1] µg/L	
Aroclor-1242	NA[2]	6.81E-01	681	c	681	c
Aroclor-1248	NA[2]	6.81E-01	681	c	681	c
Aroclor-1254	5.84E-01	6.81E-01	584	n	58.4	n
Aroclor-1260	NA[2]	6.81E-01	681	c	681	c
Benzene	1.39E+01	1.77E+00	1770	c	1390	n[4]
Benzo(g,h,i)perylene[7]	2.10E-01	NA[3]	210	n	21.0	n
Benzo(k)fluoranthene	NA[2]	1.87E+01	18700	c	18700	c
Beta-BHC	NA[2]	1.29E-02	12.9	c	12.9	c
Bis(2-Chloroethoxy)Methane	2.21E+02	NA[3]	221000	n	22100	n
Bis(2-Ethylhexyl)Phthalate	1.95E+03	9.73E+01	97300	c	97300	c
Bromodichloromethane	2.26E+01	3.19E+00	3190	c	2260	n[4]
Bromoform	9.59E+01	2.83E+01	28300	c	9590	n[4]
Bromomethane	2.65E+01	NA[3]	26500	n	2650	n
Butyl Benzyl Phthalate	3.14E+02	5.78E+00	5780	c	5780	c
Carbazole	NA[2]	NA[3]	NA[2,3]		NA[2,3]	
Carbon Disulfide	1.21E+02	NA[3]	121000	n	12100	n
Carbon Tetrachloride	6.50E+00	9.28E-01	928	c	650	n[4]
Chlorobenzene	4.78E+01	NA[3]	47800	n	4780	n
Chlorodibromomethane	2.10E+02	2.51E+00	2510	c	2510	c
Chloroethane	3.15E+02	NA[3]	315000	n	31500	n
Chloroform	2.42E+02	5.47E+00	5470	c	5470	c
Chloromethane	NA[2]	NA[3]	NA[2,3]		NA[2,3]	
Cis-1,3-Dichloropropene[8]	6.63E+01	1.55E+00	1550	c	1550	c
Delta-BHC[9]	2.65E+00	3.69E-03	3.69	c	3.69	c
Dibenzofuran	6.26E-01	NA[3]	626	n	62.6	n
Dimethyl Phthalate	NA[2]	NA[3]	NA[2,3]		NA[2,3]	
Di-n-octyl Phthalate	1.56E-01	NA[3]	156	n	15.6	n
Endosulfan I[10]	9.63E+00	NA[3]	9630	n	963	n
Endosulfan II[10]	8.73E+00	NA[3]	8730	n	873	n
Endosulfan Sulfate[10]	4.54E+00	NA[3]	4540	n	454	n
Endrin Aldehyde[11]	1.78E+00	NA[3]	1780	n	178	n
Endrin Ketone[11]	4.10E-01	NA[3]	410	n	41.0	n
Ethylbenzene	4.17E+01	2.65E+00	2650	c	2650	c
Fluorene	5.65E+01	NA[3]	56500	n	5650	n
Heptachlor Epoxide	2.29E-03	1.35E-03	1.35	c	0.229	n[4]
Hexachlorocyclopentadiene	7.62E+00	NA[3]	7620	n	762	n
Methoxychlor	5.73E-01	NA[3]	573	n	57.3	n
Methylene Chloride	2.77E+02	1.61E+02	161000	c	27700	n[4]
Nitrobenzene	1.47E+01	NA[3]	14700	n	1470	n
N-Nitroso-di-n-Propylamine	NA[2]	5.50E-02	55.0	c	55.0	c
N-Nitrosodiphenylamine	NA[2]	1.15E+01	11500	c	11500	c
Pyrene	1.85E+01	NA[3]	18500	n	1850	n
Styrene	1.09E+02	NA[3]	109000	n	10900	n

SUMMARY TABLE

SCREENING LEVELS FOR INGESTION OF AND DERMAL CONTACT WITH GROUNDWATER
CONSTRUCTION WORKER EXPOSURE - ORGANICS
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Parameter	RBC (noncancer) mg/L	RBC (cancer) mg/L	RBC (lower) µg/L		Adjusted RBC[1] µg/L	
Tetrachloroethene	4.41E+01	1.47E+01	14700	c	4410	n[4]
Toluene	5.42E+02	NA[3]	542000	n	54200	n
Total 1,2-Dichloroethene	2.12E+01	NA[3]	21200	n	2120	n
Total Xylenes	1.78E+02	NA[3]	178000	n	17800	n
Toxaphene	NA[2]	2.00E-02	20.0	c	20.0	c
Trans-1,3-Dichloropropene[8]	6.63E+01	1.55E+00	1550	c	1550	c
Trichloroethene	7.15E-01	2.18E+00	715	n	71.5	n
Vinyl Chloride	1.01E+01	3.28E-01	328	c	328	c

1 - The adjusted RBC is the lower of noncarcinogenic and carcinogenic RBCs with RBCs for noncarcinogens divided by 10 to represent a hazard quotient of 0.1. RBCs for carcinogens are not adjusted and represent an incremental lifetime cancer risk of $1x10^{-6}$.

2 - No reference dose is available.

3 - No cancer slope factor is available.

4 - One-tenth the noncarcinogenic RBC is less than the carcinogenic RBC; therefore, the noncarcinogenic RBC is presented.

5 - Toxicity values are for polychlorinated biphenyls - low risk.

6 - Toxicity values are for acenaphthene.

7 - Toxicity values are for pyrene.

8 - Toxicity values are for 1,3-dichloropropene.

9 - Toxicity values are for alpha-BHC.

10 - Toxicity values are for endosulfan.

11 - Toxicity values are for endrin.

NA = Not applicable

RBC = Risk-based concentration

VALUES USED FOR DAILY INTAKE CALCULATIONS
INGESTION AND DERMAL EXPOSURE OF CONSTRUCTION WORKERS TO WATER

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Water
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	Values	Intake Equation/ Model Name
Ingestion	CGW	Chemical Concentration in Groundwater	ug/L		Ingestion Dose (mg/kg/day) =
	CF	Conversion Factor	mg/ug	0.001	Cwater x CF x IwR x EF x ED / BW x AT
	IwR	Ingestion Rate of Groundwater	L/day	0.01	
	EF	Exposure Frequency	days/year	150	USEPA, December 1989
	ED	Exposure Duration	years	1	
	BW	Body Weight	kg	80	
	AT-C	Averaging Time (Cancer)	days	25550	
	AT-N	Averaging Time (Non-Cancer)	days	365	
Dermal	Cwater	Chemical Concentration in Water	mg/L		The equations and parameters for
	A	Skin Surface Area Available for Contact	cm^2	3,470	estimating DAevent and the chemical-specific dermally absorbed dose from
	DAevent	Absorbed Dose per Event	mg/cm^2-event	chemical-specific	water (DAD) are provided in USEPA, September 2000.
	EV	Event Frequency	event/day	1	
	ED	Exposure Duration	years	1	
	EF	Exposure Frequency	days/year	150	
	t_{event}	Duration of Event	hour/event	2.0	
	t*	Time to reach steady state	hour/event	chemical-specific	
	T	Lag Time	hour/event	chemical-specific	
	B	Bunge Model Constant	dimensionless	chemical-specific	
	Kp	Permeability Coefficient from Water	cm/hour	chemical-specific	
	BW	Body Weight	kg	80	
	AT-C	Averaging Time (Cancer)	days	25,550	
	AT-N	Averaging Time (Non-Cancer)	days	365	

Daily Intake Calculations
Ingestion Intake = (IwR x CF x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 7.34E-10
Noncancer Ingestion Intake(RME) = 5.14E-08

Cancer Dermal Intake(RME) = 2.55E-01
Noncancer Dermal Intake(RME) = 1.78E+01

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH WATER
EXPOSURE OF CONSTRUCTION WORKERS TO WATER

REFERENCES: USEPA, July 2004

DERMAL CONTACT:

DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE:

DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = $2 \times FA \times Kp \times C \times CF \times (6T \times tevent/3.141592654)^{0.5}$

IF tevent > t*, DAevent = $FA \times Kp \times C \times CF \times ((tevent/(1 + B)) + (2T \times ((1+3B+3B^2)/(1 + B)^2)$

WHERE:

Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
Cwater = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)
FA = FRACTION ABSORBED WATER (DIMENSIONLESS)

CHEMICAL	CAS #	Cwater (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
4,4'-DDD	72-54-8	1.00E-03	o	2.60E+01	2.00E+00	6.65E+00	1.79E-01	1.23E+00	1.00E+00	NA(2)
4,4'-DDE	72-55-9	1.00E-03	o	2.51E+01	2.00E+00	6.48E+00	1.56E-01	1.07E+00	0.00E+00	NA(2)
4,4'-DDT	50-29-3	1.00E-03	o	4.25E+01	2.00E+00	1.04E+01	2.69E-01	1.95E+00	0.00E+00	NA(2)
Aldrin	309-00-2	1.00E-03	o	2.85E+01	2.00E+00	1.19E+01	1.40E-03	1.03E-02	0.00E+00	NA(2)
alpha-Chlordane	5103-71-9	1.00E-03	o	5.10E+01	2.00E+00	2.13E+01	3.38E-02	2.64E-01	7.00E-01	4.27E-07
Dieldrin	60-57-1	1.00E-03	o	3.51E+01	2.00E+00	1.46E+01	1.22E-02	9.18E-02	8.00E-01	1.46E-07
Endrin	72-20-8	1.00E-03	o	3.51E+01	2.00E+00	1.46E+01	1.22E-02	9.18E-02	8.00E-01	1.46E-07
gamma-BHC (Lindane)	58-89-9	1.00E-03	o	1.10E+01	2.00E+00	4.57E+00	1.08E-02	7.10E-02	9.00E-01	8.14E-08
gamma-Chlordane	5103-74-2	1.00E-03	o	5.10E+01	2.00E+00	2.13E+01	3.38E-02	2.64E-01	7.00E-01	4.27E-07
Heptachlor	76-44-8	1.00E-03	o	3.19E+01	2.00E+00	1.33E+01	8.64E-03	6.43E-02	8.00E-01	9.85E-08
PCB-hexachlorobiphenyl(1)	1336-36-3	1.00E-03	o	1.94E+01	2.00E+00	4.54E+00	5.45E-01	3.58E+00	7.00E-01	NA(2)
1,2,4-Trichlorobenzene	120-82-1	1.00E-03	o	2.66E+00	2.00E+00	1.11E+00	6.63E-02	3.43E-01	1.00E+00	2.73E-07
1,2-Dichlorobenzene	95-50-1	1.00E-03	o	1.71E+00	2.00E+00	7.11E-01	4.13E-02	1.93E-01	1.00E+00	1.39E-07
1,3-Dichlorobenzene	541-73-1	1.00E-03	o	1.71E+00	2.00E+00	7.11E-01	5.79E-02	2.70E-01	1.00E+00	1.95E-07
1,4-Dichlorobenzene	106-46-7	1.00E-03	o	1.71E+00	2.00E+00	7.11E-01	4.20E-02	1.96E-01	1.00E+00	1.41E-07
2,4,6-Trichlorophenol	88-06-2	1.00E-03	o	3.27E+00	2.00E+00	1.36E+00	3.46E-02	1.87E-01	1.00E+00	1.58E-07
2,4-Dichlorophenol	120-83-2	1.00E-03	o	2.10E+00	2.00E+00	8.74E-01	2.06E-02	1.01E-01	1.00E+00	7.53E-08
2,4-Dimethylphenol	105-67-9	1.00E-03	o	1.24E+00	2.00E+00	5.16E-01	1.09E-02	4.64E-02	1.00E+00	3.26E-08
2,4-Dinitrophenol	51-28-5	1.00E-03	o	2.76E+00	2.00E+00	1.15E+00	1.53E-03	8.00E-03	1.00E+00	6.42E-09
2,4-Dinitrotoluene	121-14-2	1.00E-03	o	2.69E+00	2.00E+00	1.12E+00	3.08E-03	1.60E-02	1.00E+00	1.27E-08
2,6-Dinitrotoluene	606-20-2	1.00E-03	o	2.69E+00	2.00E+00	1.12E+00	2.07E-03	1.07E-02	1.00E+00	8.56E-09
2-Chlorophenol	95-57-8	1.00E-03	o	1.34E+00	2.00E+00	5.60E-01	7.99E-03	3.48E-02	1.00E+00	2.47E-08
2-Ethoxy ethanol(Cellosolve)	110-80-5	1.00E-03	o	1.10E-03	2.00E+00	1.00E+00	3.00E-04	3.36E-01	3.00E-04	3.71E-13
2-Nitrophenol	88-75-5	1.00E-03	o	1.54E+00	2.00E+00	6.42E-01	4.02E-03	1.82E-02	1.00E+00	1.31E-08
3-Nitrophenol	554-84-7	1.00E-03	o	1.54E+00	2.00E+00	6.42E-01	5.54E-03	2.51E-02	1.00E+00	1.81E-08
4-Chlorophenol	106-48-9	1.00E-03	o	1.34E+00	2.00E+00	5.60E-01	1.15E-02	5.03E-02	1.00E+00	3.55E-08
4-Nitrophenol	100-02-7	1.00E-03	o	1.54E+00	2.00E+00	6.42E-01	4.83E-03	2.19E-02	1.00E+00	1.58E-08
Acetaldehyde	75-07-0	1.00E-03	o	4.51E-01	2.00E+00	1.88E-01	6.33E-04	1.62E-03	1.00E+00	1.50E-09
BaPEQ	50-32-8	1.00E-03	o	1.17E+01	2.00E+00	2.69E+00	7.01E-01	4.27E+00	0.00E+00	NA(2)

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH WATER
EXPOSURE OF CONSTRUCTION WORKERS TO WATER

REFERENCES: USEPA, July 2004

DERMAL CONTACT:

DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE:

DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
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T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)
FA = FRACTION ABSORBED WATER (DIMENSIONLESS)

CHEMICAL	CAS #	Cwater (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
Benzo(a)anthracene	56-55-3	1.00E-03	o	8.53E+00	2.00E+00	2.03E+00	4.74E-01	2.75E+00	0.00E+00	NA(2)
Benzo(a)pyrene	50-32-8	1.00E-03	o	1.17E+01	2.00E+00	2.69E+00	7.01E-01	4.27E+00	0.00E+00	NA(2)
Benzo(b)fluoranthene	205-99-2	1.00E-03	o	1.20E+01	2.00E+00	2.77E+00	7.02E-01	4.29E+00	0.00E+00	NA(2)
Benzoic acid	65-85-0	1.00E-03	o	1.24E+00	2.00E+00	5.15E-01	5.66E-03	2.41E-02	1.00E+00	1.70E-08
Benzyl chloride	100-44-7	1.00E-03	o	1.32E+00	2.00E+00	5.49E-01	1.03E-02	4.44E-02	1.00E+00	3.14E-08
Bis(2-chloroethyl)ether	111-44-4	1.00E-03	o	1.62E+00	2.00E+00	6.75E-01	1.78E-03	8.17E-03	1.00E+00	5.95E-09
Chrysene	218-01-9	1.00E-03	o	8.53E+00	2.00E+00	2.03E+00	4.74E-01	2.75E+00	0.00E+00	NA(2)
Di-2-ethylhexylphthalate	117-81-7	1.00E-03	o	3.99E+01	2.00E+00	1.66E+01	2.49E-02	1.90E-01	0.00E+00	0.00E+00
Dibenzo(a,h)anthracene	53-70-3	1.00E-03	o	1.76E+01	2.00E+00	3.88E+00	1.51E+00	9.68E+00	0.00E+00	NA(2)
Dibutyl phthalate	84-74-2	1.00E-03	o	9.27E+00	2.00E+00	3.86E+00	2.40E-02	1.54E-01	9.00E-01	1.66E-07
Dichlorobenzidine, 3,3'	91-94-1	1.00E-03	o	6.72E+00	2.00E+00	2.80E+00	1.28E-02	7.83E-02	1.00E+00	8.37E-08
Diethyl phthalate	84-66-2	1.00E-03	o	4.50E+00	2.00E+00	1.87E+00	3.90E-03	2.23E-02	1.00E+00	2.08E-08
Dioxane, 1,4-	123-91-1	1.00E-03	o	7.97E-01	2.00E+00	3.32E-01	3.32E-04	1.20E-03	1.00E+00	8.84E-10
Fluoranthene	206-44-0	1.00E-03	o	5.68E+00	2.00E+00	1.45E+00	2.24E-01	1.22E+00	0.00E+00	NA(2)
Hexachlorobenzene	118-74-1	1.00E-03	o	1.62E+01	2.00E+00	4.22E+00	1.34E-01	8.67E-01	9.00E-01	NA(2)
Hexachlorobutadiene	87-68-3	1.00E-03	o	7.42E+00	2.00E+00	3.09E+00	8.09E-02	5.03E-01	9.00E-01	5.01E-07
Hexachloroethane	67-72-1	1.00E-03	o	5.44E+00	2.00E+00	2.27E+00	3.01E-02	1.78E-01	1.00E+00	1.77E-07
Indeno(1,2,3-CD)pyrene	193-39-5	1.00E-03	o	1.68E+01	2.00E+00	3.78E+00	1.04E+00	6.65E+00	0.00E+00	NA(2)
Isophorone	78-59-1	1.00E-03	o	1.52E+00	2.00E+00	6.35E-01	3.38E-03	1.53E-02	1.00E+00	1.10E-08
m-Cresol	108-39-4	1.00E-03	o	1.03E+00	2.00E+00	4.30E-01	7.77E-03	3.11E-02	1.00E+00	2.20E-08
Naphthalene	91-20-3	1.00E-03	o	1.34E+00	2.00E+00	5.58E-01	4.66E-02	2.03E-01	1.00E+00	1.40E-07
o-Cresol	95-48-7	1.00E-03	o	1.03E+00	2.00E+00	4.30E-01	7.66E-03	3.06E-02	1.00E+00	2.16E-08
p-Cresol	106-44-5	1.00E-03	o	1.03E+00	2.00E+00	4.30E-01	7.66E-03	3.06E-02	1.00E+00	2.16E-08
Pentachlorophenol	87-86-5	1.00E-03	o	1.38E+01	2.00E+00	3.33E+00	3.93E-01	2.47E+00	0.00E+00	NA(2)
Phenanthrene	85-01-8	1.00E-03	o	4.11E+00	2.00E+00	1.06E+00	1.44E-01	7.40E-01	0.00E+00	NA(2)
Phenol	108-95-2	1.00E-03	o	8.61E-01	2.00E+00	3.59E-01	4.34E-03	1.62E-02	1.00E+00	1.17E-08
Phenol,4,6-dinitro-2-methyl-	534-52-1	1.00E-03	o	3.25E+00	2.00E+00	1.35E+00	3.15E-03	1.71E-02	1.00E+00	1.43E-08
TCDD	1746-01-6	1.00E-03	o	3.01E+01	2.00E+00	6.82E+00	8.07E-01	5.57E+00	0.00E+00	NA(2)
1,1,1-Trichloroethane	71-55-6	1.00E-03	o	1.43E+00	2.00E+00	5.96E-01	1.26E-02	5.61E-02	1.00E+00	3.98E-08

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH WATER
EXPOSURE OF CONSTRUCTION WORKERS TO WATER

REFERENCES: USEPA, July 2004

DERMAL CONTACT:

DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE:

DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
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A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
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FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = $2 \times FA \times Kp \times C \times CF \times (6T \times tevent/3.141592654)^{0.5}$

IF tevent > t*, DAevent = $FA \times Kp \times C \times CF \times ((tevent/(1 + B)) + (2T \times ((1+3B+3B^2)/(1 + B)^2)$

WHERE:

Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
Cwater = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)
FA = FRACTION ABSORBED WATER (DIMENSIONLESS)

CHEMICAL	CAS #	Cwater (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
1,1,2,2-Tetrachloroethane	79-34-5	1.00E-03	o	2.24E+00	2.00E+00	9.31E-01	6.94E-03	3.46E-02	1.00E+00	2.62E-08
1,1,2-Trichloroethane	79-00-5	1.00E-03	o	1.43E+00	2.00E+00	5.96E-01	6.44E-03	2.86E-02	1.00E+00	2.04E-08
1,1,2-Trichlorotrifluoroethane	76-13-1	1.00E-03	o	2.82E+00	2.00E+00	1.18E+00	1.72E-02	9.07E-02	1.00E+00	7.30E-08
1,1-Dichloroethane	75-34-3	1.00E-03	o	9.18E-01	2.00E+00	3.82E-01	6.74E-03	2.58E-02	1.00E+00	1.84E-08
1,1-Dichloroethene	75-35-4	1.00E-03	o	8.93E-01	2.00E+00	3.72E-01	1.17E-02	4.41E-02	1.00E+00	3.14E-08
1,2-Dichloroethane	107-06-2	1.00E-03	o	9.18E-01	2.00E+00	3.82E-01	4.20E-03	1.61E-02	1.00E+00	1.15E-08
1,2-Dichloropropane	78-87-5	1.00E-03	o	1.10E+00	2.00E+00	4.58E-01	7.76E-03	3.17E-02	1.00E+00	2.24E-08
2,2'-Oxybis(1-Chloropropane)	108-60-1	1.00E-03	o	2.29E+00	2.00E+00	9.53E-01	7.56E-03	3.81E-02	1.00E+00	2.89E-08
2,4,5-Trichlorophenol	95-95-4	1.00E-03	o	3.21E+00	2.00E+00	1.34E+00	3.54E-02	1.92E-01	1.00E+00	1.60E-07
2-Butanone	78-93-3	1.00E-03	o	6.47E-01	2.00E+00	2.70E-01	9.63E-04	3.14E-03	1.00E+00	2.44E-09
2-Chloronaphthalene	91-58-7	1.00E-03	o	2.05E+00	2.00E+00	8.55E-01	8.24E-02	4.04E-01	1.00E+00	2.98E-07
2-Hexanone	591-78-6	1.00E-03	o	9.17E-01	2.00E+00	3.82E-01	3.55E-03	1.37E-02	1.00E+00	9.75E-09
2-Methylnaphthalene	91-57-6	1.00E-03	o	1.58E+00	2.00E+00	6.57E-01	8.94E-02	4.10E-01	1.00E+00	2.88E-07
2-Nitroaniline	88-74-4	1.00E-03	o	1.50E+00	2.00E+00	6.23E-01	4.44E-03	2.01E-02	1.00E+00	1.44E-08
3-Nitroaniline	99-09-2	1.00E-03	o	1.50E+00	2.00E+00	6.23E-01	2.14E-03	9.68E-03	1.00E+00	6.94E-09
4-Bromophenyl Phenyl Ether	101-55-3	1.00E-03	o	1.01E+01	2.00E+00	2.61E+00	1.16E-01	7.06E-01	1.00E+00	7.34E-07
4-Chloro-3-Methylphenol	59-50-7	1.00E-03	o	1.61E+00	2.00E+00	6.71E-01	2.85E-02	1.31E-01	1.00E+00	9.37E-08
4-Chloroaniline	106-47-8	1.00E-03	o	1.31E+00	2.00E+00	5.44E-01	4.94E-03	2.14E-02	1.00E+00	1.52E-08
4-Chlorophenyl Phenyl Ether	7005-72-3	1.00E-03	o	5.72E+00	2.00E+00	1.47E+00	2.09E-01	1.15E+00	1.00E+00	9.92E-07
4-Methyl-2-Pentanone	108-10-1	1.00E-03	o	9.30E-01	2.00E+00	3.87E-01	2.66E-03	1.02E-02	1.00E+00	7.34E-09
4-Nitroaniline	100-01-6	1.00E-03	o	1.50E+00	2.00E+00	6.23E-01	2.21E-03	9.98E-03	1.00E+00	7.15E-09
Acenaphthene	83-32-9	1.00E-03	o	1.84E+00	2.00E+00	7.67E-01	8.39E-02	4.01E-01	1.00E+00	2.96E-07
Acenaphthylene	208-96-8	1.00E-03	o	1.79E+00	2.00E+00	7.47E-01	8.87E-02	4.21E-01	1.00E+00	3.08E-07
Acetone	67-64-1	1.00E-03	o	5.33E-01	2.00E+00	2.22E-01	5.20E-04	1.53E-03	1.00E+00	1.27E-09
Alpha-BHC	319-84-6	1.00E-03	o	1.07E+01	2.00E+00	4.47E+00	2.01E-02	1.32E-01	1.00E+00	1.66E-07
Anthracene	120-12-7	1.00E-03	o	4.06E+00	2.00E+00	1.05E+00	1.38E-01	7.07E-01	1.00E+00	5.50E-07
Aroclor-1016	12674-11-2	1.00E-03	o	1.17E+01	2.00E+00	2.91E+00	2.93E-01	1.81E+00	0.00E+00	NA(2)
Aroclor-1221	11104-28-2	1.00E-03	o	4.63E+00	2.00E+00	1.20E+00	1.36E-01	7.18E-01	1.00E+00	NA(2)
Aroclor-1232	11141-16-5	1.00E-03	o	4.63E+00	2.00E+00	1.20E+00	1.36E-01	7.18E-01	1.00E+00	NA(2)

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH WATER
EXPOSURE OF CONSTRUCTION WORKERS TO WATER

REFERENCES: USEPA, July 2004

DERMAL CONTACT:

DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE:

DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = $2 \times FA \times Kp \times C \times CF \times (6T \times tevent/3.141592654)^{0.5}$

IF tevent > t*, DAevent = $FA \times Kp \times C \times CF \times ((tevent/(1 + B)) + (2T \times ((1+3B+3B^2)/(1 + B)^2)$

WHERE:

Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
Cwater = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)
FA = FRACTION ABSORBED WATER (DIMENSIONLESS)

CHEMICAL	CAS #	Cwater (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
Aroclor-1242	53469-21-9	1.00E-03	o	1.93E+01	2.00E+00	4.53E+00	5.20E-01	3.42E+00	0.00E+00	NA(2)
Aroclor-1248	12672-29-6	1.00E-03	o	1.95E+01	2.00E+00	4.53E+00	5.61E-01	3.69E+00	0.00E+00	NA(2)
Aroclor-1254	11097-69-1	1.00E-03	o	3.10E+01	2.00E+00	7.07E+00	7.13E-01	4.96E+00	0.00E+00	NA(2)
Aroclor-1260	11096-82-5	1.00E-03	o	7.94E+01	2.00E+00	1.72E+01	2.78E+00	2.13E+01	0.00E+00	NA(2)
Benzene	71-43-2	1.00E-03	o	7.00E-01	2.00E+00	2.92E-01	1.49E-02	5.05E-02	1.00E+00	3.74E-08
Benzo(g,h,i)perylene	191-24-2	1.00E-03	o	1.65E+01	2.00E+00	3.70E+00	1.07E+00	6.82E+00	1.00E+00	8.03E-06
Benzo(k)fluoranthene	207-08-9	1.00E-03	o	1.17E+01	2.00E+00	2.72E+00	6.60E-01	4.03E+00	0.00E+00	NA(2)
Beta-BHC	319-85-7	1.00E-03	o	1.07E+01	2.00E+00	4.47E+00	2.01E-02	1.32E-01	1.00E+00	1.66E-07
Bis(2-Chloroethoxy)Methane	111-91-1	1.00E-03	o	2.35E+00	2.00E+00	9.78E-01	1.23E-03	6.21E-03	1.00E+00	4.74E-09
Bis(2-Ethylhexyl)Phthalate	117-81-7	1.00E-03	o	3.99E+01	2.00E+00	1.66E+01	2.49E-02	1.90E-01	0.00E+00	0.00E+00
Bromodichloromethane	75-27-4	1.00E-03	o	2.12E+00	2.00E+00	8.83E-01	4.62E-03	2.27E-02	1.00E+00	1.70E-08
Bromoform	75-25-2	1.00E-03	o	6.70E+00	2.00E+00	2.79E+00	2.25E-03	1.37E-02	1.00E+00	1.47E-08
Bromomethane	74-83-9	1.00E-03	o	8.71E-01	2.00E+00	3.63E-01	2.84E-03	1.06E-02	1.00E+00	7.69E-09
Butyl Benzyl Phthalate	85-68-7	1.00E-03	o	1.41E+01	2.00E+00	5.89E+00	3.74E-02	2.54E-01	1.00E+00	3.55E-07
Carbazole	86-74-8	1.00E-03	o	2.18E+00	2.00E+00	9.07E-01	5.23E-02	2.60E-01	1.00E+00	1.95E-07
Carbon Disulfide	75-15-0	1.00E-03	o	7.18E-01	2.00E+00	2.99E-01	1.72E-02	5.91E-02	1.00E+00	4.33E-08
Carbon Tetrachloride	56-23-5	1.00E-03	o	1.86E+00	2.00E+00	7.76E-01	1.63E-02	7.78E-02	1.00E+00	5.76E-08
Chlorobenzene	108-90-7	1.00E-03	o	1.09E+00	2.00E+00	4.56E-01	2.82E-02	1.15E-01	1.00E+00	7.93E-08
Chlorodibromomethane	124-48-1	1.00E-03	o	3.77E+00	2.00E+00	1.57E+00	3.22E-03	1.79E-02	1.00E+00	1.58E-08
Chloroethane	75-00-3	1.00E-03	o	5.88E-01	2.00E+00	2.45E-01	6.07E-03	1.88E-02	1.00E+00	1.49E-08
Chloroform	67-66-3	1.00E-03	o	1.19E+00	2.00E+00	4.98E-01	6.83E-03	2.87E-02	1.00E+00	2.03E-08
Chloromethane	74-87-3	1.00E-03	o	4.90E-01	2.00E+00	2.04E-01	3.28E-03	8.97E-03	1.00E+00	7.86E-09
Cis-1,3-Dichloropropene	10061-01-5	1.00E-03	o	1.05E+00	2.00E+00	4.39E-01	7.92E-03	3.21E-02	1.00E+00	2.25E-08
Delta-BHC	319-86-8	1.00E-03	o	1.07E+01	2.00E+00	4.47E+00	2.01E-02	1.32E-01	1.00E+00	1.66E-07
Dibenzofuran	132-64-9	1.00E-03	o	2.20E+00	2.00E+00	9.19E-01	9.49E-02	4.73E-01	1.00E+00	3.56E-07
Dimethyl Phthalate	131-11-3	1.00E-03	o	3.13E+00	2.00E+00	1.30E+00	1.39E-03	7.45E-03	1.00E+00	6.21E-09
Di-n-octyl Phthalate	117-84-0	1.00E-03	o	7.44E+01	2.00E+00	1.62E+01	2.28E+00	1.74E+01	1.00E+00	3.59E-05
Endosulfan I	959-98-8	1.00E-03	o	4.79E+01	2.00E+00	1.99E+01	1.84E-03	1.43E-02	1.00E+00	3.21E-08
Endosulfan II	33213-65-9	1.00E-03	o	4.79E+01	2.00E+00	1.99E+01	2.04E-03	1.59E-02	1.00E+00	3.57E-08

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH WATER
EXPOSURE OF CONSTRUCTION WORKERS TO WATER

REFERENCES: USEPA, July 2004

DERMAL CONTACT:

DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE:

DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2 x FA x Kp x C x CF x $(6T \times tevent/3.141592654)^{0.5}$

IF tevent > t*, DAevent = FA x Kp x C x CF x $((tevent/(1 + B)) + (2T \times ((1+3B+3B^2)/(1 + B)^2)$

WHERE:

Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
Cwater = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)
FA = FRACTION ABSORBED WATER (DIMENSIONLESS)

CHEMICAL	CAS #	Cwater (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
Endosulfan Sulfate	1031-07-8	1.00E-03	o	5.89E+01	2.00E+00	2.45E+01	1.77E-03	1.40E-02	1.00E+00	3.42E-08
Endrin Aldehyde	7421-93-4	1.00E-03	o	3.42E+01	2.00E+00	1.43E+01	5.09E-03	3.82E-02	8.00E-01	6.01E-08
Endrin Ketone	53494-70-5	1.00E-03	o	3.43E+01	2.00E+00	1.43E+01	2.29E-02	1.72E-01	8.00E-01	2.71E-07
Ethylbenzene	100-41-4	1.00E-03	o	1.01E+00	2.00E+00	4.20E-01	4.93E-02	1.95E-01	1.00E+00	1.32E-07
Fluorene	86-73-7	1.00E-03	o	2.15E+00	2.00E+00	8.95E-01	1.07E-01	5.29E-01	1.00E+00	3.94E-07
Heptachlor Epoxide	1024-57-3	1.00E-03	o	3.82E+01	2.00E+00	1.59E+01	2.03E-02	1.54E-01	1.00E+00	3.16E-07
Hexachlorocyclopentadiene	77-47-4	1.00E-03	o	1.40E+01	2.00E+00	3.54E+00	9.97E-02	6.34E-01	1.00E+00	7.33E-07
Methoxychlor	72-43-5	1.00E-03	o	2.17E+01	2.00E+00	9.05E+00	4.14E-02	2.96E-01	1.00E+00	4.87E-07
Methylene Chloride	75-09-2	1.00E-03	o	7.65E-01	2.00E+00	3.19E-01	3.54E-03	1.26E-02	1.00E+00	9.28E-09
Nitrobenzene	98-95-3	1.00E-03	o	1.23E+00	2.00E+00	5.14E-01	5.39E-03	2.30E-02	1.00E+00	1.62E-08
N-Nitroso-di-n-Propylamine	621-64-7	1.00E-03	o	1.37E+00	2.00E+00	5.72E-01	2.33E-03	1.02E-02	1.00E+00	7.32E-09
N-Nitrosodiphenylamine	86-30-6	1.00E-03	o	3.31E+00	2.00E+00	1.38E+00	1.45E-02	7.88E-02	1.00E+00	6.68E-08
Pyrene	129-00-0	1.00E-03	o	5.52E+00	2.00E+00	1.43E+00	1.94E-01	1.06E+00	1.00E+00	9.06E-07
Styrene	100-42-5	1.00E-03	o	9.80E-01	2.00E+00	4.08E-01	3.73E-02	1.46E-01	1.00E+00	9.98E-08
Tetrachloroethene	127-18-4	1.00E-03	o	2.18E+00	2.00E+00	9.06E-01	3.34E-02	1.66E-01	1.00E+00	1.24E-07
Toluene	108-88-3	1.00E-03	o	8.39E-01	2.00E+00	3.50E-01	3.11E-02	1.15E-01	1.00E+00	8.00E-08
Total 1,2-Dichloroethene	540-59-0	1.00E-03	o	8.93E-01	2.00E+00	3.72E-01	7.71E-03	2.92E-02	1.00E+00	2.09E-08
Total Xylenes	1330-20-7	1.00E-03	o	9.91E-01	2.00E+00	4.13E-01	4.62E-02	1.83E-01	1.00E+00	1.23E-07
Toxaphene	8001-35-2	1.00E-03	o	5.38E+01	2.00E+00	2.24E+01	1.19E-02	9.30E-02	8.00E-01	1.76E-07
Trans-1,3-Dichloropropene	10061-02-6	1.00E-03	o	1.05E+00	2.00E+00	4.39E-01	7.92E-03	3.21E-02	1.00E+00	2.25E-08
Trichloroethene	79-01-6	1.00E-03	o	1.39E+00	2.00E+00	5.81E-01	1.16E-02	5.13E-02	1.00E+00	3.64E-08
Vinyl Chloride	75-01-4	1.00E-03	o	5.73E-01	2.00E+00	2.39E-01	5.60E-03	1.70E-02	1.00E+00	1.37E-08

1 - Values are for polychlorinated biphenyls - low risk.
2 - Chemical is outside of the effective predictive domain.

CALCULATION OF SCREENING LEVELS BASED NONCARCINOGENIC EFFECTS
INGESTION AND DERMAL EXPOSURE OF CONSTRUCTION WORKERS TO WATER

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Water
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Assumed Water Concentration	Intake (Non-Cancer)[8]	Reference Dose[9]	Hazard Quotient Based on Assumed Water Concentration	**RBC (noncancer)**	**RBC (noncancer)**
		mg/L	mg/kg-day	mg/kg-day		mg/L	µg/L
Ingestion and Dermal	4,4'-DDD	1.00E-03	3.2E-05	NA	NA	NA	NA
	4,4'-DDE	1.00E-03	5.1E-08	NA	NA	NA	NA
	4,4'-DDT	1.00E-03	5.1E-08	5.00E-04	1.0E-04	9.73E+00	9.73E+03
	Aldrin	1.00E-03	5.1E-08	4.00E-05	1.3E-03	7.79E-01	7.79E+02
	alpha-Chlordane	1.00E-03	7.7E-06	5.00E-04	1.5E-02	6.53E-02	6.53E+01
	Dieldrin	1.00E-03	2.7E-06	1.00E-04	2.7E-02	3.76E-02	3.76E+01
	Endrin	1.00E-03	2.7E-06	2.00E-03	1.3E-03	7.53E-01	7.53E+02
	gamma-BHC (Lindane)	1.00E-03	1.5E-06	1.00E-05	1.5E-01	6.66E-03	6.66E+00
	gamma-Chlordane	1.00E-03	7.7E-06	5.00E-04	1.5E-02	6.53E-02	6.53E+01
	Heptachlor	1.00E-03	1.8E-06	1.00E-04	1.8E-02	5.54E-02	5.54E+01
	PCB-hexachlorobiphenyl[1]	1.00E-03	5.7E-05	NA	NA	NA	NA
	1,2,4-Trichlorobenzene	1.00E-03	4.9E-06	9.00E-02	5.5E-05	1.83E+01	1.83E+04
	1,2-Dichlorobenzene	1.00E-03	2.5E-06	6.00E-01	4.2E-06	2.37E+02	2.37E+05
	1,3-Dichlorobenzene	1.00E-03	3.5E-06	2.00E-02	1.8E-04	5.68E+00	5.68E+03
	1,4-Dichlorobenzene	1.00E-03	2.6E-06	7.00E-02	3.7E-05	2.72E+01	2.72E+04
	2,4,6-Trichlorophenol	1.00E-03	2.9E-06	1.00E-03	2.9E-03	3.49E-01	3.49E+02
	2,4-Dichlorophenol	1.00E-03	1.4E-06	2.00E-02	7.0E-05	1.44E+01	1.44E+04
	2,4-Dimethylphenol	1.00E-03	6.3E-07	5.00E-02	1.3E-05	7.90E+01	7.90E+04
	2,4-Dinitrophenol	1.00E-03	1.7E-07	2.00E-02	8.3E-06	1.21E+02	1.21E+05
	2,4-Dinitrotoluene	1.00E-03	2.8E-07	2.00E-03	1.4E-04	7.18E+00	7.18E+03
	2,6-Dinitrotoluene	1.00E-03	2.0E-07	3.00E-03	6.8E-05	1.47E+01	1.47E+04
	2-Chlorophenol	1.00E-03	4.9E-07	8.00E-03	6.1E-05	1.63E+01	1.63E+04
	2-Ethoxy ethanol(Cellosolve)	1.00E-03	5.1E-08	1.00E-01	5.1E-07	1.95E+03	1.95E+06
	2-Nitrophenol	1.00E-03	2.9E-07	NA	NA	NA	NA
	3-Nitrophenol	1.00E-03	3.7E-07	NA	NA	NA	NA
	4-Chlorophenol	1.00E-03	6.8E-07	NA	NA	NA	NA
	4-Nitrophenol	1.00E-03	3.3E-07	NA	NA	NA	NA
	Acetaldehyde	1.00E-03	7.8E-08	NA	NA	NA	NA
	BaPEQ	1.00E-03	5.1E-08	NA	NA	NA	NA
	Benzo(a)anthracene	1.00E-03	5.1E-08	NA	NA	NA	NA
	Benzo(a)pyrene	1.00E-03	5.1E-08	NA	NA	NA	NA
	Benzo(b)fluoranthene	1.00E-03	5.1E-08	NA	NA	NA	NA
	Benzoic acid	1.00E-03	3.5E-07	4.00E+00	8.9E-08	1.13E+04	1.13E+07
	Benzyl chloride	1.00E-03	6.1E-07	2.00E-03	3.1E-04	3.27E+00	3.27E+03
	Bis(2-chloroethyl)ether	1.00E-03	1.6E-07	NA	NA	NA	NA
	Chrysene	1.00E-03	5.1E-08	NA	NA	NA	NA
	Dibenzo(a,h)anthracene	1.00E-03	5.1E-08	NA	NA	NA	NA
	Dibutyl phthalate	1.00E-03	3.0E-06	1.00E+00	3.0E-06	3.33E+02	3.33E+05
	Dichlorobenzidine, 3,3'	1.00E-03	1.5E-06	NA	NA	NA	NA
	Diethyl phthalate	1.00E-03	4.2E-07	6.00E+00	7.0E-08	1.42E+04	1.42E+07
	Dioxane, 1,4-	1.00E-03	6.7E-08	5.00E-01	1.3E-07	7.45E+03	7.45E+06
	Fluoranthene	1.00E-03	5.1E-08	4.00E-01	1.3E-07	7.79E+03	7.79E+06
Ingestion and	Hexachlorobenzene	1.00E-03	1.7E-05	1.00E-05	1.7E+00	5.80E-04	5.80E-01

CALCULATION OF SCREENING LEVELS BASED NONCARCINOGENIC EFFECTS
INGESTION AND DERMAL EXPOSURE OF CONSTRUCTION WORKERS TO WATER

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Water
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Assumed Water Concentration	Intake (Non-Cancer)[8]	Reference Dose[9]	Hazard Quotient Based on Assumed Water Concentration	**RBC (noncancer)**	**RBC (noncancer)**
		mg/L	mg/kg-day	mg/kg-day		mg/L	µg/L
Dermal	Hexachlorobutadiene	1.00E-03	9.0E-06	1.00E-03	9.0E-03	1.11E-01	1.11E+02
	Hexachloroethane	1.00E-03	3.2E-06	1.00E-02	3.2E-04	3.12E+00	3.12E+03
	Indeno(1,2,3-CD)pyrene	1.00E-03	5.1E-08	NA	NA	NA	NA
	Isophorone	1.00E-03	2.5E-07	3.00E+00	8.3E-08	1.21E+04	1.21E+07
	m-Cresol	1.00E-03	4.4E-07	5.00E-01	8.9E-07	1.13E+03	1.13E+06
	Naphthalene	1.00E-03	2.5E-06	6.00E-01	4.2E-06	2.36E+02	2.36E+05
	o-Cresol	1.00E-03	4.4E-07	5.00E-01	8.7E-07	1.14E+03	1.14E+06
	p-Cresol	1.00E-03	4.4E-07	2.00E-02	2.2E-05	4.57E+01	4.57E+04
	Pentachlorophenol	1.00E-03	5.1E-08	1.00E-03	5.1E-05	1.95E+01	1.95E+04
	Phenanthrene[3]	1.00E-03	5.1E-08	3.00E-02	1.7E-06	5.84E+02	5.84E+05
	Phenol	1.00E-03	2.6E-07	6.00E-01	4.3E-07	2.31E+03	2.31E+06
	Phenol,4,6-dinitro-2-methyl-	1.00E-03	3.1E-07	8.00E-04	3.8E-04	2.61E+00	2.61E+03
	TCDD	1.00E-03	5.1E-08	7.00E-10	7.3E+01	1.36E-05	1.36E-02
	1,1,1-Trichloroethane	1.00E-03	7.6E-07	7.00E+00	1.1E-07	9.20E+03	9.20E+06
	1,1,2,2-Tetrachloroethane	1.00E-03	5.2E-07	5.00E-01	1.0E-06	9.66E+02	9.66E+05
	1,1,2-Trichloroethane	1.00E-03	4.2E-07	4.00E-03	1.0E-04	9.63E+00	9.63E+03
	1,1,2-Trichlorotrifluoroethane	1.00E-03	1.4E-06	3.00E+01	4.5E-08	2.22E+04	2.22E+07
	1,1-Dichloroethane	1.00E-03	3.8E-07	2.00E+00	1.9E-07	5.26E+03	5.26E+06
	1,1-Dichloroethene	1.00E-03	6.1E-07	9.00E-03	6.8E-05	1.47E+01	1.47E+04
	1,2-Dichloroethane	1.00E-03	2.6E-07	2.00E-02	1.3E-05	7.79E+01	7.79E+04
	1,2-Dichloropropane	1.00E-03	4.5E-07	7.00E-02	6.4E-06	1.55E+02	1.55E+05
	2,2'-Oxybis(1-Chloropropane)	1.00E-03	5.7E-07	4.00E-02	1.4E-05	7.07E+01	7.07E+04
	2,4,5-Trichlorophenol	1.00E-03	2.9E-06	3.00E-01	9.7E-06	1.03E+02	1.03E+05
	2-Butanone	1.00E-03	9.5E-08	2.00E+00	4.7E-08	2.11E+04	2.11E+07
	2-Chloronaphthalene	1.00E-03	5.4E-06	2.00E-01	2.7E-05	3.73E+01	3.73E+04
	2-Hexanone	1.00E-03	2.3E-07	5.00E-03	4.5E-05	2.22E+01	2.22E+04
	2-Methylnaphthalene	1.00E-03	5.2E-06	4.00E-03	1.3E-03	7.71E-01	7.71E+02
	2-Nitroaniline	1.00E-03	3.1E-07	1.00E-01	3.1E-06	3.25E+02	3.25E+05
	3-Nitroaniline	1.00E-03	1.8E-07	1.00E-03	1.8E-04	5.71E+00	5.71E+03
	4-Bromophenyl Phenyl Ether	1.00E-03	1.3E-05	NA	NA	NA	NA
	4-Chloro-3-Methylphenol	1.00E-03	1.7E-06	1.00E-01	1.7E-05	5.81E+01	5.81E+04
	4-Chloroaniline	1.00E-03	3.2E-07	5.00E-04	6.4E-04	1.56E+00	1.56E+03
	4-Chlorophenyl Phenyl Ether	1.00E-03	1.8E-05	NA	NA	NA	NA
	4-Methyl-2-Pentanone	1.00E-03	1.8E-07	8.00E-01	2.3E-07	4.39E+03	4.39E+06
	4-Nitroaniline	1.00E-03	1.8E-07	1.00E-02	1.8E-05	5.59E+01	5.59E+04
	Acenaphthene	1.00E-03	5.3E-06	2.00E-01	2.7E-05	3.76E+01	3.76E+04
	Acenaphthylene[2]	1.00E-03	5.5E-06	2.00E-01	2.8E-05	3.60E+01	3.60E+04
Ingestion and	Acetone	1.00E-03	7.4E-08	2.00E+00	3.7E-08	2.70E+04	2.70E+07
Dermal	Alpha-BHC	1.00E-03	3.0E-06	8.00E-03	3.8E-04	2.65E+00	2.65E+03

CALCULATION OF SCREENING LEVELS BASED NONCARCINOGENIC EFFECTS
INGESTION AND DERMAL EXPOSURE OF CONSTRUCTION WORKERS TO WATER

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Water
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Assumed Water Concentration mg/L	Intake (Non-Cancer)[8] mg/kg-day	Reference Dose[9] mg/kg-day	Hazard Quotient Based on Assumed Water Concentration	**RBC (noncancer)** mg/L	**RBC (noncancer)** µg/L
	Anthracene	1.00E-03	9.9E-06	1.00E+00	9.9E-06	1.01E+02	1.01E+05
	Aroclor-1016	1.00E-03	5.1E-08	7.00E-05	7.3E-04	1.36E+00	1.36E+03
	Aroclor-1221	1.00E-03	1.0E-05	NA	NA	NA	NA
	Aroclor-1232	1.00E-03	1.0E-05	NA	NA	NA	NA
	Aroclor-1242	1.00E-03	5.1E-08	NA	NA	NA	NA
	Aroclor-1248	1.00E-03	5.1E-08	NA	NA	NA	NA
	Aroclor-1254	1.00E-03	5.1E-08	3.00E-05	1.7E-03	5.84E-01	5.84E+02
	Aroclor-1260	1.00E-03	5.1E-08	NA	NA	NA	NA
	Benzene	1.00E-03	7.2E-07	1.00E-02	7.2E-05	1.39E+01	1.39E+04
	Benzo(g,h,i)perylene[3]	1.00E-03	1.4E-04	3.00E-02	4.8E-03	2.10E-01	2.10E+02
	Benzo(k)fluoranthene	1.00E-03	5.1E-08	NA	NA	NA	NA
	Beta-BHC	1.00E-03	3.0E-06	NA	NA	NA	NA
	Bis(2-Chloroethoxy)Methane	1.00E-03	1.4E-07	3.00E-02	4.5E-06	2.21E+02	2.21E+05
	Bis(2-Ethylhexyl)Phthalate	1.00E-03	5.1E-08	1.00E-01	5.1E-07	1.95E+03	1.95E+06
	Bromodichloromethane	1.00E-03	3.5E-07	8.00E-03	4.4E-05	2.26E+01	2.26E+04
	Bromoform	1.00E-03	3.1E-07	3.00E-02	1.0E-05	9.59E+01	9.59E+04
	Bromomethane	1.00E-03	1.9E-07	5.00E-03	3.8E-05	2.65E+01	2.65E+04
	Butyl Benzyl Phthalate	1.00E-03	6.4E-06	2.00E+00	3.2E-06	3.14E+02	3.14E+05
	Carbazole	1.00E-03	3.5E-06	NA	NA	NA	NA
	Carbon Disulfide	1.00E-03	8.2E-07	1.00E-01	8.2E-06	1.21E+02	1.21E+05
	Carbon Tetrachloride	1.00E-03	1.1E-06	7.00E-03	1.5E-04	6.50E+00	6.50E+03
	Chlorobenzene	1.00E-03	1.5E-06	7.00E-02	2.1E-05	4.78E+01	4.78E+04
	Chlorodibromomethane	1.00E-03	3.3E-07	7.00E-02	4.8E-06	2.10E+02	2.10E+05
	Chloroethane	1.00E-03	3.2E-07	1.00E-01	3.2E-06	3.15E+02	3.15E+05
	Chloroform	1.00E-03	4.1E-07	1.00E-01	4.1E-06	2.42E+02	2.42E+05
	Chloromethane	1.00E-03	1.9E-07	NA	NA	NA	NA
	Cis-1,3-Dichloropropene[4]	1.00E-03	4.5E-07	3.00E-02	1.5E-05	6.63E+01	6.63E+04
	Delta-BHC[5]	1.00E-03	3.0E-06	8.00E-03	3.8E-04	2.65E+00	2.65E+03
	Dibenzofuran	1.00E-03	6.4E-06	4.00E-03	1.6E-03	6.26E-01	6.26E+02
	Dimethyl Phthalate	1.00E-03	1.6E-07	NA	NA	NA	NA
	Di-n-octyl Phthalate	1.00E-03	6.4E-04	1.00E-01	6.4E-03	1.56E-01	1.56E+02
	Endosulfan I[6]	1.00E-03	6.2E-07	6.00E-03	1.0E-04	9.63E+00	9.63E+03
	Endosulfan II[6]	1.00E-03	6.9E-07	6.00E-03	1.1E-04	8.73E+00	8.73E+03
	Endosulfan Sulfate[6]	1.00E-03	6.6E-07	3.00E-03	2.2E-04	4.54E+00	4.54E+03
	Endrin Aldehyde[7]	1.00E-03	1.1E-06	2.00E-03	5.6E-04	1.78E+00	1.78E+03
	Endrin Ketone[7]	1.00E-03	4.9E-06	2.00E-03	2.4E-03	4.10E-01	4.10E+02
Ingestion and	Ethylbenzene	1.00E-03	2.4E-06	1.00E-01	2.4E-05	4.17E+01	4.17E+04
Dermal	Fluorene	1.00E-03	7.1E-06	4.00E-01	1.8E-05	5.65E+01	5.65E+04
	Heptachlor Epoxide	1.00E-03	5.7E-06	1.30E-05	4.4E-01	2.29E-03	2.29E+00

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE 1 OF 1

CLIENT PNS		JOB NUMBER	
SUBJECT Lead Screening Level, GW Dermal Contact with GW			
BASED ON		DRAWING NUMBER	
BY L.C.	CHECKED BY MDIL	APPROVED BY	DATE

$$\text{Screening level (dw)} = \frac{\left(\left[PbB_{95}\ \text{fetal}/\left(R \times \left(GSD_i^{1.645}\right)\right)\right] - PbB_0\right) \times AT_w}{BKSF \times \left(KP \times ET \times CF \times A \times EF_{constw}\right)}$$

$PbB_{fetal,0.95} = 10$ ug/dL
$R = 0.9$
$BKSF = 0.4$ ug/dL per ug/day
$GSD_i = 1.8$
$PbB_0 = 1$ ug/dL
$K_p = 0.0001$ cm/hr
$ET = 8$ hr/day or 2 hr/day
$CF = 0.001$ L/cm^3
$EF_{constw} = 150$ days/yr.
$AT_w = 365$

$$= \frac{\left(\left[10\ \text{ug/dL}/\left(0.9 \times \left(1.8^{1.645}\right)\right)\right] - 1.0\ \text{ug/dL}\right) \times 365}{0.4 \times \left(0.0001 \times \underline{8}\ \text{hr/day} \times 0.001 \times 3300 \times 150\right)}$$

$= 7430$ (assuming 8 hr. ET)

$= 29{,}700$ (assuming 2 hr. ET)

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE 1 OF 1

CLIENT PNS		JOB NUMBER	
SUBJECT Lead Screening Level, CW Ingestion of GW			
BASED ON		DRAWING NUMBER	
BY L.C.	CHECKED BY MDK	APPROVED BY	DATE

$$\text{Screening Level}_{(iw)} = \frac{[(PbB_{95\,fetal}/(R \times (GSD_i^{1.645})))] - PbB_0) \times AT_w}{BKSF \times (IR_w \times AF_w \times EF_{const\,w})}$$

$PbB_{fetal} = 10$ ug/dL
$R = 0.9$
$BKSF = 0.4$ ug/dL per ug/day
$GSD_i = 1.8$
$PbB_0 = 1.0$ ug/dL
$IR_w = 0.02$ L/day
$AF_w = 0.60$
$EF_{const\,w} = 150$ days/yr
$AT_w = 365$ days/yr

$$= \frac{[((10\text{ ug/dL}/(0.9 \times (1.8^{1.645})))] - 1.0\text{ ug/dL}) \times 365\text{ days/yr}}{(0.4\text{ ug/dL per ug/day} \times (0.02\text{ L/day} \times 0.60 \times 150\text{ days/yr}))}$$

$$= \frac{\cancel{8.12}\ 1177}{0.72} = \cancel{11.3}\ \underline{1630}\text{ ug/L}$$

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE 1 OF 1

CLIENT PNS		JOB NUMBER	
SUBJECT Lead Screening Level, CW Ing. + Dermal w/ GW			
BASED ON		DRAWING NUMBER	
BY L.C.	CHECKED BY MDK	APPROVED BY	DATE

Screening Level (combined ingestion and dermal)

$$= \frac{\left(\left[10\ \mu g/dL/(0.9) \times \left(1.8^{1.645}\right)\right] - 1.0\ \mu g/dL\right) \times 365}{\underbrace{\left(0.4\ \mu g/dL \cdot \times \left(0.02\ L/day \times 0.6 \times 150\ day/yr\right)\right)}_{0.72} + \underbrace{\left(0.4 \times \left(0.0001 \times 8 \times 0.001 \times 3300 \times 150\right)\right)}_{0.1584}}$$

per µg/day

$= 1340.$ (assuming 8-hr ET)

CALCULATION OF SCREENING LEVELS BASED NONCARCINOGENIC EFFECTS
INGESTION AND DERMAL EXPOSURE OF CONSTRUCTION WORKERS TO WATER

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Water
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Assumed Water Concentration mg/L	Intake (Non-Cancer)[8] mg/kg-day	Reference Dose[9] mg/kg-day	Hazard Quotient Based on Assumed Water Concentration	**RBC (noncancer)** mg/L	**RBC (noncancer)** µg/L
	Hexachlorocyclopentadiene	1.00E-03	1.3E-05	1.00E-01	1.3E-04	7.62E+00	7.62E+03
	Methoxychlor	1.00E-03	8.7E-06	5.00E-03	1.7E-03	5.73E-01	5.73E+02
	Methylene Chloride	1.00E-03	2.2E-07	6.00E-02	3.6E-06	2.77E+02	2.77E+05
	Nitrobenzene	1.00E-03	3.4E-07	5.00E-03	6.8E-05	1.47E+01	1.47E+04
	N-Nitroso-di-n-Propylamine	1.00E-03	1.8E-07	NA	NA	NA	NA
	N-Nitrosodiphenylamine	1.00E-03	1.2E-06	NA	NA	NA	NA
	Pyrene	1.00E-03	1.6E-05	3.00E-01	5.4E-05	1.85E+01	1.85E+04
	Styrene	1.00E-03	1.8E-06	2.00E-01	9.2E-06	1.09E+02	1.09E+05
	Tetrachloroethene	1.00E-03	2.3E-06	1.00E-01	2.3E-05	4.41E+01	4.41E+04
	Toluene	1.00E-03	1.5E-06	8.00E-01	1.8E-06	5.42E+02	5.42E+05
	Total 1,2-Dichloroethene	1.00E-03	4.2E-07	9.00E-03	4.7E-05	2.12E+01	2.12E+04
	Total Xylenes	1.00E-03	2.2E-06	4.00E-01	5.6E-06	1.78E+02	1.78E+05
	Toxaphene	1.00E-03	3.2E-06	NA	NA	NA	NA
	Trans-1,3-Dichloropropene[4]	1.00E-03	4.5E-07	3.00E-02	1.5E-05	6.63E+01	6.63E+04
	Trichloroethene	1.00E-03	7.0E-07	5.00E-04	1.4E-03	7.15E-01	7.15E+02
	Vinyl Chloride	1.00E-03	3.0E-07	3.00E-03	9.9E-05	1.01E+01	1.01E+04

1 - Values are for polychlorinated biphenyls - low risk.

2 - Toxicity values are for acenaphthene.

3 - Toxicity values are for pyrene.

4 - Toxicity values are for 1,3-dichloropropene.

5 - Toxicity values are for alpha-BHC.

6 - Toxicity values are for endosulfan.

7 - Toxicity values are for endrin.

8 - Intake = Ingestion Intake + (Dermal Intake x DAevent).

9 - Subchronic reference doses were presented if available. If no subchronic reference dose was available, the chronic reference dose is presented.

CALCULATION OF SCREENING LEVELS BASED ON A TARGET CANCER RISK OF 1E-6
INGESTION AND DERMAL EXPOSURE OF CONSTRUCTION WORKERS TO WATER

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Water
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value mg/L	Intake (Cancer)[8] mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Incremental Lifetime Cancer Risk	**RBC (cancer)** mg/L	**RBC (cancer)** µg/L
Ingestion and Dermal	4,4'-DDD	1.00E-03	4.6E-07	2.40E-01	1.11E-07	9.04E-03	9.04E+00
	4,4'-DDE	1.00E-03	7.3E-10	3.40E-01	2.50E-10	4.01E+00	4.01E+03
	4,4'-DDT	1.00E-03	7.3E-10	3.40E-01	2.50E-10	4.01E+00	4.01E+03
	Aldrin	1.00E-03	7.3E-10	1.70E+01	1.25E-08	8.02E-02	8.02E+01
	alpha-Chlordane	1.00E-03	1.1E-07	3.50E-01	3.83E-08	2.61E-02	2.61E+01
	Dieldrin	1.00E-03	3.8E-08	1.60E+01	6.07E-07	1.65E-03	1.65E+00
	Endrin	1.00E-03	3.8E-08	NA	NA	NA	NA
	gamma-BHC (Lindane)	1.00E-03	2.1E-08	1.10E+00	2.36E-08	4.24E-02	4.24E+01
	gamma-Chlordane	1.00E-03	1.1E-07	3.50E-01	3.83E-08	2.61E-02	2.61E+01
	Heptachlor	1.00E-03	2.6E-08	4.50E+00	1.16E-07	8.61E-03	8.61E+00
	PCB-hexachlorobiphenyl[1]	1.00E-03	8.1E-07	4.00E-01	3.24E-07	3.09E-03	3.09E+00
	1,2,4-Trichlorobenzene	1.00E-03	7.0E-08	2.90E-02	2.04E-09	4.91E-01	4.91E+02
	1,2-Dichlorobenzene	1.00E-03	3.6E-08	NA	NA	NA	NA
	1,3-Dichlorobenzene	1.00E-03	5.0E-08	5.40E-03	2.72E-10	3.68E+00	3.68E+03
	1,4-Dichlorobenzene	1.00E-03	3.7E-08	5.40E-03	1.98E-10	5.05E+00	5.05E+03
	2,4,6-Trichlorophenol	1.00E-03	4.1E-08	1.10E-02	4.51E-10	2.22E+00	2.22E+03
	2,4-Dichlorophenol	1.00E-03	2.0E-08	NA	NA	NA	NA
	2,4-Dimethylphenol	1.00E-03	9.0E-09	NA	NA	NA	NA
	2,4-Dinitrophenol	1.00E-03	2.4E-09	NA	NA	NA	NA
	2,4-Dinitrotoluene	1.00E-03	4.0E-09	3.10E-01	1.23E-09	8.11E-01	8.11E+02
	2,6-Dinitrotoluene	1.00E-03	2.9E-09	1.50E+00	4.37E-09	2.29E-01	2.29E+02
	2-Chlorophenol	1.00E-03	7.0E-09	NA	NA	NA	NA
	2-Ethoxy ethanol(Cellosolve)	1.00E-03	7.3E-10	NA	NA	NA	NA
	2-Nitrophenol	1.00E-03	4.1E-09	NA	NA	NA	NA
	3-Nitrophenol	1.00E-03	5.3E-09	NA	NA	NA	NA
	4-Chlorophenol	1.00E-03	9.8E-09	NA	NA	NA	NA
	4-Nitrophenol	1.00E-03	4.8E-09	NA	NA	NA	NA
	Acetaldehyde	1.00E-03	1.1E-09	NA	NA	NA	NA
	BaPEQ	1.00E-03	7.3E-10	7.30E+00	5.36E-09	1.87E-01	1.87E+02
	Benzo(a)anthracene	1.00E-03	7.3E-10	7.30E-01	5.36E-10	1.87E+00	1.87E+03
	Benzo(a)pyrene	1.00E-03	7.3E-10	7.30E+00	5.36E-09	1.87E-01	1.87E+02
	Benzo(b)fluoranthene	1.00E-03	7.3E-10	7.30E-01	5.36E-10	1.87E+00	1.87E+03
	Benzoic acid	1.00E-03	5.1E-09	NA	NA	NA	NA
	Benzyl chloride	1.00E-03	8.7E-09	1.70E-01	1.48E-09	6.74E-01	6.74E+02
	Bis(2-chloroethyl)ether	1.00E-03	2.2E-09	1.10E+00	2.47E-09	4.04E-01	4.04E+02
	Chrysene	1.00E-03	7.3E-10	7.30E-03	5.36E-12	1.87E+02	1.87E+05
	Dibenzo(a,h)anthracene	1.00E-03	7.3E-10	7.30E+00	5.36E-09	1.87E-01	1.87E+02

CALCULATION OF SCREENING LEVELS BASED ON A TARGET CANCER RISK OF 1E-6
INGESTION AND DERMAL EXPOSURE OF CONSTRUCTION WORKERS TO WATER

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Water
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value mg/L	Intake (Cancer)[8] mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Incremental Lifetime Cancer Risk	**RBC (cancer)** mg/L	**RBC (cancer)** µg/L
Ingestion and Dermal	Dibutyl phthalate	1.00E-03	4.3E-08	NA	NA	NA	NA
	Dichlorobenzidine, 3,3'	1.00E-03	2.2E-08	4.50E-01	9.93E-09	1.01E-01	1.01E+02
	Diethyl phthalate	1.00E-03	6.0E-09	NA	NA	NA	NA
	Dioxane, 1,4-	1.00E-03	9.6E-10	1.00E-01	9.59E-11	1.04E+01	1.04E+04
	Fluoranthene	1.00E-03	7.3E-10	NA	NA	NA	NA
	Hexachlorobenzene	1.00E-03	2.5E-07	1.60E+00	3.94E-07	2.54E-03	2.54E+00
	Hexachlorobutadiene	1.00E-03	1.3E-07	7.80E-02	1.00E-08	1.00E-01	1.00E+02
	Hexachloroethane	1.00E-03	4.6E-08	4.00E-02	1.83E-09	5.46E-01	5.46E+02
	Indeno(1,2,3-CD)pyrene	1.00E-03	7.3E-10	7.30E-01	5.36E-10	1.87E+00	1.87E+03
	Isophorone	1.00E-03	3.5E-09	9.50E-04	3.36E-12	2.97E+02	2.97E+05
	m-Cresol	1.00E-03	6.3E-09	NA	NA	NA	NA
	Naphthalene	1.00E-03	3.6E-08	NA	NA	NA	NA
	o-Cresol	1.00E-03	6.2E-09	NA	NA	NA	NA
	p-Cresol	1.00E-03	6.2E-09	NA	NA	NA	NA
	Pentachlorophenol	1.00E-03	7.3E-10	4.00E-01	2.94E-10	3.41E+00	3.41E+03
	Phenanthrene[3]	1.00E-03	7.3E-10	NA	NA	NA	NA
	Phenol	1.00E-03	3.7E-09	NA	NA	NA	NA
	Phenol,4,6-dinitro-2-methyl-	1.00E-03	4.4E-09	NA	NA	NA	NA
	TCDD	1.00E-03	7.3E-10	1.30E+05	9.54E-05	1.05E-05	1.05E-02
	1,1,1-Trichloroethane	1.00E-03	1.1E-08	NA	NA	NA	NA
	1,1,2,2-Tetrachloroethane	1.00E-03	7.4E-09	2.00E-01	1.48E-09	6.76E-01	6.76E+02
	1,1,2-Trichloroethane	1.00E-03	5.9E-09	5.70E-02	3.38E-10	2.96E+00	2.96E+03
	1,1,2-Trichlorotrifluoroethane	1.00E-03	1.9E-08	NA	NA	NA	NA
	1,1-Dichloroethane	1.00E-03	5.4E-09	5.70E-03	3.10E-11	3.23E+01	3.23E+04
	1,1-Dichloroethene	1.00E-03	8.7E-09	NA	NA	NA	NA
	1,2-Dichloroethane	1.00E-03	3.7E-09	9.10E-02	3.34E-10	3.00E+00	3.00E+03
	1,2-Dichloropropane	1.00E-03	6.4E-09	3.60E-02	2.32E-10	4.32E+00	4.32E+03
	2,2'-Oxybis(1-Chloropropane)	1.00E-03	8.1E-09	7.00E-02	5.66E-10	1.77E+00	1.77E+03
	2,4,5-Trichlorophenol	1.00E-03	4.2E-08	NA	NA	NA	NA
	2-Butanone	1.00E-03	1.4E-09	NA	NA	NA	NA
	2-Chloronaphthalene	1.00E-03	7.7E-08	NA	NA	NA	NA
	2-Hexanone	1.00E-03	3.2E-09	NA	NA	NA	NA
Ingestion and	2-Methylnaphthalene	1.00E-03	7.4E-08	NA	NA	NA	NA

CALCULATION OF SCREENING LEVELS BASED ON A TARGET CANCER RISK OF 1E-6
INGESTION AND DERMAL EXPOSURE OF CONSTRUCTION WORKERS TO WATER

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Water
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value mg/L	Intake (Cancer)[8] mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Incremental Lifetime Cancer Risk	**RBC (cancer)** mg/L	**RBC (cancer)** µg/L
Dermal	2-Nitroaniline	1.00E-03	4.4E-09	NA	NA	NA	NA
	3-Nitroaniline	1.00E-03	2.5E-09	NA	NA	NA	NA
	4-Bromophenyl Phenyl Ether	1.00E-03	1.9E-07	NA	NA	NA	NA
	4-Chloro-3-Methylphenol	1.00E-03	2.5E-08	NA	NA	NA	NA
	4-Chloroaniline	1.00E-03	4.6E-09	2.00E-01	9.18E-10	1.09E+00	1.09E+03
	4-Chlorophenyl Phenyl Ether	1.00E-03	2.5E-07	NA	NA	NA	NA
	4-Methyl-2-Pentanone	1.00E-03	2.6E-09	NA	NA	NA	NA
	4-Nitroaniline	1.00E-03	2.6E-09	2.00E-02	5.11E-11	1.96E+01	1.96E+04
	Acenaphthene	1.00E-03	7.6E-08	NA	NA	NA	NA
	Acenaphthylene[2]	1.00E-03	7.9E-08	NA	NA	NA	NA
	Acetone	1.00E-03	1.1E-09	NA	NA	NA	NA
	Alpha-BHC	1.00E-03	4.3E-08	6.30E+00	2.71E-07	3.69E-03	3.69E+00
	Anthracene	1.00E-03	1.4E-07	NA	NA	NA	NA
	Aroclor-1016	1.00E-03	7.3E-10	7.00E-02	5.14E-11	1.95E+01	1.95E+04
	Aroclor-1221	1.00E-03	1.5E-07	2.00E+00	2.97E-07	3.36E-03	3.36E+00
	Aroclor-1232	1.00E-03	1.5E-07	2.00E+00	2.97E-07	3.36E-03	3.36E+00
	Aroclor-1242	1.00E-03	7.3E-10	2.00E+00	1.47E-09	6.81E-01	6.81E+02
	Aroclor-1248	1.00E-03	7.3E-10	2.00E+00	1.47E-09	6.81E-01	6.81E+02
	Aroclor-1254	1.00E-03	7.3E-10	2.00E+00	1.47E-09	6.81E-01	6.81E+02
	Aroclor-1260	1.00E-03	7.3E-10	2.00E+00	1.47E-09	6.81E-01	6.81E+02
	Benzene	1.00E-03	1.0E-08	5.50E-02	5.64E-10	1.77E+00	1.77E+03
	Benzo(g,h,i)perylene[3]	1.00E-03	2.0E-06	NA	NA	NA	NA
	Benzo(k)fluoranthene	1.00E-03	7.3E-10	7.30E-02	5.36E-11	1.87E+01	1.87E+04
	Beta-BHC	1.00E-03	4.3E-08	1.80E+00	7.75E-08	1.29E-02	1.29E+01
	Bis(2-Chloroethoxy)Methane	1.00E-03	1.9E-09	NA	NA	NA	NA
	Bis(2-Ethylhexyl)Phthalate	1.00E-03	7.3E-10	1.40E-02	1.03E-11	9.73E+01	9.73E+04
	Bromodichloromethane	1.00E-03	5.1E-09	6.20E-02	3.14E-10	3.19E+00	3.19E+03
	Bromoform	1.00E-03	4.5E-09	7.90E-03	3.53E-11	2.83E+01	2.83E+04
	Bromomethane	1.00E-03	2.7E-09	NA	NA	NA	NA
	Butyl Benzyl Phthalate	1.00E-03	9.1E-08	1.90E-03	1.73E-10	5.78E+00	5.78E+03
	Carbazole	1.00E-03	5.0E-08	NA	NA	NA	NA
Ingestion and	Carbon Disulfide	1.00E-03	1.2E-08	NA	NA	NA	NA

CALCULATION OF SCREENING LEVELS BASED ON A TARGET CANCER RISK OF 1E-6
INGESTION AND DERMAL EXPOSURE OF CONSTRUCTION WORKERS TO WATER

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Water
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value mg/L	Intake (Cancer)[8] mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Incremental Lifetime Cancer Risk	**RBC (cancer)** mg/L	**RBC (cancer)** µg/L
Dermal	Carbon Tetrachloride	1.00E-03	1.5E-08	7.00E-02	1.08E-09	9.28E-01	9.28E+02
	Chlorobenzene	1.00E-03	2.1E-08	NA	NA	NA	NA
	Chlorodibromomethane	1.00E-03	4.8E-09	8.40E-02	3.99E-10	2.51E+00	2.51E+03
	Chloroethane	1.00E-03	4.5E-09	NA	NA	NA	NA
	Chloroform	1.00E-03	5.9E-09	3.10E-02	1.83E-10	5.47E+00	5.47E+03
	Chloromethane	1.00E-03	2.7E-09	NA	NA	NA	NA
	Cis-1,3-Dichloropropene[4]	1.00E-03	6.5E-09	1.00E-01	6.47E-10	1.55E+00	1.55E+03
	Delta-BHC[5]	1.00E-03	4.3E-08	6.30E+00	2.71E-07	3.69E-03	3.69E+00
	Dibenzofuran	1.00E-03	9.1E-08	NA	NA	NA	NA
	Dimethyl Phthalate	1.00E-03	2.3E-09	NA	NA	NA	NA
	Di-n-octyl Phthalate	1.00E-03	9.1E-06	NA	NA	NA	NA
	Endosulfan I[6]	1.00E-03	8.9E-09	NA	NA	NA	NA
	Endosulfan II[6]	1.00E-03	9.8E-09	NA	NA	NA	NA
	Endosulfan Sulfate[6]	1.00E-03	9.4E-09	NA	NA	NA	NA
	Endrin Aldehyde[7]	1.00E-03	1.6E-08	NA	NA	NA	NA
	Endrin Ketone[7]	1.00E-03	7.0E-08	NA	NA	NA	NA
	Ethylbenzene	1.00E-03	3.4E-08	1.10E-02	3.77E-10	2.65E+00	2.65E+03
	Fluorene	1.00E-03	1.0E-07	NA	NA	NA	NA
	Heptachlor Epoxide	1.00E-03	8.1E-08	9.10E+00	7.38E-07	1.35E-03	1.35E+00
	Hexachlorocyclopentadiene	1.00E-03	1.9E-07	NA	NA	NA	NA
	Methoxychlor	1.00E-03	1.2E-07	NA	NA	NA	NA
	Methylene Chloride	1.00E-03	3.1E-09	2.00E-03	6.19E-12	1.61E+02	1.61E+05
	Nitrobenzene	1.00E-03	4.9E-09	NA	NA	NA	NA
	N-Nitroso-di-n-Propylamine	1.00E-03	2.6E-09	7.00E+00	1.82E-08	5.50E-02	5.50E+01
	N-Nitrosodiphenylamine	1.00E-03	1.8E-08	4.90E-03	8.69E-11	1.15E+01	1.15E+04
	Pyrene	1.00E-03	2.3E-07	NA	NA	NA	NA
	Styrene	1.00E-03	2.6E-08	NA	NA	NA	NA
	Tetrachloroethene	1.00E-03	3.2E-08	2.10E-03	6.81E-11	1.47E+01	1.47E+04
	Toluene	1.00E-03	2.1E-08	NA	NA	NA	NA
	Total 1,2-Dichloroethene	1.00E-03	6.1E-09	NA	NA	NA	NA
	Total Xylenes	1.00E-03	3.2E-08	NA	NA	NA	NA
Ingestion and	Toxaphene	1.00E-03	4.6E-08	1.10E+00	5.01E-08	2.00E-02	2.00E+01

CALCULATION OF SCREENING LEVELS BASED ON A TARGET CANCER RISK OF 1E-6
INGESTION AND DERMAL EXPOSURE OF CONSTRUCTION WORKERS TO WATER

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Water
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value mg/L	Intake (Cancer)[8] mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Incremental Lifetime Cancer Risk	**RBC (cancer)** mg/L	**RBC (cancer)** µg/L
Dermal	Trans-1,3-Dichloropropene[4]	1.00E-03	6.5E-09	1.00E-01	6.47E-10	1.55E+00	1.55E+03
	Trichloroethene	1.00E-03	1.0E-08	4.60E-02	4.60E-10	2.18E+00	2.18E+03
	Vinyl Chloride	1.00E-03	4.2E-09	7.20E-01	3.04E-09	3.28E-01	3.28E+02

1 - Toxicity values are for polychlorinated biphenyls - low risk.

2 - Toxicity values are for acenaphthene.

3 - Toxicity values are for pyrene.

4 - Toxicity values are for 1,3-dichloropropene.

5 - Toxicity values are for alpha-BHC.

6 - Toxicity values are for endosulfan.

7 - Toxicity values are for endrin.

8 - Intake = Ingestion Intake + (Dermal Intake x DAevent).

APPENDIX B

ANALYTICAL RESULTS

B.1 OU8 DATABASE PRINTOUT (ON CD)

B.2 BACKGROUND EVALUATION

B.3 2015 DATA VALIDATION REPORTS (ON CD)

B.4 2015 DATA QUALITY REVIEW

B.1 OU8 DATABASE PRINTOUT (ON CD)

ANALYTICAL RESULTS FOR SURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	**WTB-MW01**	**WTB-MW05**	**WTB-MW02**	**WTB-SB06**	**WTB-SB07**	**WTB-SB08**
SAMPLE ID	**WTB-SS01-0001-98**	**WTB-SS05-0001-98**	**WTB-SS02-0001-98**	**WTB-SS06-0001-98**	**WTB-SS07-0001-98**	**WTB-SS-08-0002**
SAMPLE DATE	**19980713**	**19980707**	**19980708**	**19980715**	**19980711**	**20150604**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**
TOP DEPTH (feet)	**0**	**0**	**0**	**0**	**0**	**0**
BOTTOM DEPTH (feet)	**1**	**1**	**1**	**1**	**1**	**2**
EPH MADEP (MG/KG)						
C11-C22 AROMATICS	--	--	--	--	--	10 J
C19-C36 ALIPHATICS	--	--	--	--	--	19
C9-C18 ALIPHATICS	--	--	--	--	--	14 U
METALS (MG/KG)						
ALUMINUM	10000	11100	8170	8520	15700	6330
ANTIMONY	0.39 UR	0.3 UR	3.2 J	0.62 U	0.91 U	0.965 J
ARSENIC	15.3 J	10.6 J	9 J	9.7	5.6 J	18
BARIUM	76.8	50.3 J	56 J	52.5	97.2	46 J
BERYLLIUM	0.29	0.43 J	0.38 U	0.37	0.6	0.34 J
CADMIUM	0.45 U	0.45 J	0.42 J	1.9 J	0.8 U	0.805 U
CALCIUM	5820 J	4580 J	2260 J	3440	13000 J	1950 J
CHROMIUM	40.2 J	43.3 J	60.8 J	146	82.5 J	76 J
COBALT	10.1	11.3	13	10.7	19.5	8.94
COPPER	155 J	37.6 J	257 J	182 J	152 J	159 J
IRON	23700	24000	38100	22100	40700	28200
LEAD	293 J	46.4	154	147 J	124 J	268 J
MAGNESIUM	6970	6800	5470	5280	12400	3650
MANGANESE	224 J	346	516	271	598 J	316 J-
MERCURY	0.18 J	109	0.45 J	1.4 J	0.22 J	0.786
NICKEL	40.4	31.5 J	53.7 J	78	65.1	83.9
POTASSIUM	3360	3040	2270	2200	5610	1140 J
SELENIUM	0.63 UJ	0.48 UJ	0.49 UJ	0.53 U	0.52 UJ	1.2 U
SILVER	0.52 U	0.6 J	0.41 U	0.31 U	0.44 U	0.44 J
SODIUM	340 U	397	146	116 U	266 U	158 J
THALLIUM	1.2 U	0.51 U	0.5 U	0.53 UJ	1 U	0.111
VANADIUM	34.9	34.1	40.8	26.9 J	58.5	23
ZINC	152 J	84.5 J	323 J	900 J	276 J	278 J
MISCELLANEOUS PARAMETERS (%)						
TOTAL SOLIDS	--	--	--	--	--	93
MISCELLANEOUS PARAMETERS (MG/KG)						
CYANIDE	2 UJ	2 U	2 U	2 U	2 UJ	--
HEXAVALENT CHROMIUM	0.52 U	0.5 UJ	0.5 UJ	7.9 UJ	0.51 UJ	--
TOTAL ORGANIC CARBON	27000	15000	20000	48000	17000	--
MISCELLANEOUS PARAMETERS (S.U.)						
PH	8.3	8.7	7.3	7.9	8	--
PESTICIDES/PCBS (UG/KG)						
4,4'-DDD	3.5 U	4.3	3.5 U	3.5 U	3.4 U	--
4,4'-DDE	3.5 U	3.4 U	3.5 U	3.5 U	3.4 U	--
4,4'-DDT	3.5 U	3.4 U	3.5 U	3.5 U	3.4 U	--
ALDRIN	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	--
ALPHA-BHC	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	--
ALPHA-CHLORDANE	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	--
AROCLOR-1016	35 U	34 U	35 U	35 U	34 U	--
AROCLOR-1221	72 U	70 U	71 U	72 U	69 U	--
AROCLOR-1232	35 U	34 U	35 U	35 U	34 U	--
AROCLOR-1242	35 U	34 U	35 U	35 U	34 U	--
AROCLOR-1248	35 U	34 U	35 U	35 U	34 U	--
AROCLOR-1254	35 U	34 U	35 U	35 U	34 U	--
AROCLOR-1260	35 U	34 U	35 U	35 U	34 U	--
BETA-BHC	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	--
DELTA-BHC	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	--
DIELDRIN	3.5 U	3.4 U	3.5 U	3.5 U	3.4 U	--
ENDOSULFAN I	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	--
ENDOSULFAN II	3.5 U	3.4 U	3.5 U	3.5 U	3.4 U	--
ENDOSULFAN SULFATE	3.5 U	3.4 U	3.5 U	3.5 U	3.4 U	--
ENDRIN	3.5 U	3.4 U	3.5 U	3.5 U	3.4 U	--
ENDRIN ALDEHYDE	3.5 U	3.4 U	3.5 U	3.5 U	3.4 U	--
ENDRIN KETONE	3.5 U	3.4 U	3.5 U	3.5 U	3.4 U	--
GAMMA-BHC (LINDANE)	1.8 U	1.8 UJ	1.8 UJ	1.8 U	1.8 U	--
GAMMA-CHLORDANE	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	--
HEPTACHLOR	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	--

ANALYTICAL RESULTS FOR SURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	**WTB-MW01**	**WTB-MW05**	**WTB-MW02**	**WTB-SB06**	**WTB-SB07**	**WTB-SB08**
SAMPLE ID	**WTB-SS01-0001-98**	**WTB-SS05-0001-98**	**WTB-SS02-0001-98**	**WTB-SS06-0001-98**	**WTB-SS07-0001-98**	**WTB-SS-08-0002**
SAMPLE DATE	**19980713**	**19980707**	**19980708**	**19980715**	**19980711**	**20150604**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**
TOP DEPTH (feet)	**0**	**0**	**0**	**0**	**0**	**0**
BOTTOM DEPTH (feet)	**1**	**1**	**1**	**1**	**1**	**2**
HEPTACHLOR EPOXIDE	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	--
METHOXYCHLOR	18 U	18 U	18 U	18 U	18 U	--
TOXAPHENE	180 U	180 U	180 U	180 U	180 U	--
PETROLEUM HYDROCARBONS (MG/KG)						
DIESEL RANGE ORGANICS	440 U	120 J	160 J	170	84 U	--
GASOLINE RANGE ORGANICS	2.5 U	2.5 U	3.1	2.5 U	2.5 U	--
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)						
ACENAPHTHENE	360 U	1700 U	330 U	25 J	330 U	5.6 J
ACENAPHTHYLENE	360 U	1700 U	19 J	360 U	330 U	10 U
ANTHRACENE	360 U	1700 U	29 J	50 J	330 U	17 J
BENZO(A)ANTHRACENE	57 J	600 J	120 J	140 J	55 J	93
BENZO(A)PYRENE	51 J	610 J	360	130 J	55 J	82
BENZO(B)FLUORANTHENE	110 J	950 J	210 J	150 J	64 J	120
BENZO(G,H,I)PERYLENE	92 J	1700 UJ	49 J	270 J	63 J	54
BENZO(K)FLUORANTHENE	51 J	730 J	168 J	100 J	52 J	53
CHRYSENE	120 J	710 J	210 J	210 J	75 J	120
DIBENZO(A,H)ANTHRACENE	360 U	200 J	55 J	61 J	36 J	24
DIBENZOFURAN	360 U	1700 U	330 U	28 J	330 U	--
FLUORANTHENE	48 J	600 J	200 J	250 J	74 J	140
FLUORENE	19 J	1700 U	20 J	28 J	330 U	6.1 J
INDENO(1,2,3-CD)PYRENE	53 J	330 J	120 J	93 J	53 J	56
NAPHTHALENE	38 J	1700 U	23 J	32 J	330 U	10 U
PHENANTHRENE	84 J	140 J	120 J	230 J	22 J	87 J
PYRENE	120 J	660 J	540	380	79 J	190
BAP EQUIVALENT-HALFND	253.63	1006.01	461.89	230.51	108.795	133.55
BAP EQUIVALENT-POS	73.63	1006.01	461.89	230.51	108.795	133.55
SEMIVOLATILES (UG/KG)						
1,2,4-TRICHLOROBENZENE	360 U	1700 U	330 U	360 U	330 U	--
1,2-DICHLOROBENZENE	360 U	1700 U	330 U	360 U	330 U	--
1,3-DICHLOROBENZENE	360 U	1700 U	330 U	360 U	330 U	--
1,4-DICHLOROBENZENE	360 U	1700 U	330 U	360 U	330 U	--
2,2'-OXYBIS(1-CHLOROPROPANE)	360 U	1700 U	330 U	360 U	330 U	--
2,4,5-TRICHLOROPHENOL	910 U	4300 U	830 U	910 U	830 U	--
2,4,6-TRICHLOROPHENOL	360 U	1700 U	330 U	360 U	330 U	--
2,4-DICHLOROPHENOL	360 U	1700 U	330 U	360 U	330 U	--
2,4-DIMETHYLPHENOL	360 U	1700 U	330 U	360 U	330 U	--
2,4-DINITROPHENOL	910 U	4300 UJ	830 UJ	910 UJ	830 U	--
2,4-DINITROTOLUENE	360 U	1700 U	330 U	360 U	330 U	--
2,6-DINITROTOLUENE	360 U	1700 U	330 U	360 U	330 U	--
2-CHLORONAPHTHALENE	360 U	1700 U	330 U	360 U	330 U	--
2-CHLOROPHENOL	360 U	1700 U	330 U	360 U	330 U	--
2-METHYLNAPHTHALENE	78 J	1700 U	38 J	25 J	330 U	--
2-METHYLPHENOL	360 U	1700 U	330 U	360 U	330 U	--
2-NITROANILINE	910 U	4300 U	830 U	910 UJ	830 U	--
2-NITROPHENOL	360 U	1700 U	330 U	360 U	330 U	--
3,3'-DICHLOROBENZIDINE	360 U	1700 U	330 U	360 U	330 U	--
3-NITROANILINE	910 U	4300 U	830 U	910 U	830 U	--
4,6-DINITRO-2-METHYLPHENOL	910 U	4300 U	830 U	910 U	830 U	--
4-BROMOPHENYL PHENYL ETHER	360 U	1700 U	330 U	360 U	330 U	--
4-CHLORO-3-METHYLPHENOL	360 U	1700 U	330 U	360 U	330 U	--
4-CHLOROANILINE	360 U	1700 U	330 U	360 U	330 U	--
4-CHLOROPHENYL PHENYL ETHER	360 U	1700 U	330 U	360 U	330 U	--
4-METHYLPHENOL	360 U	1700 U	330 U	360 U	330 U	--
4-NITROANILINE	910 U	4300 U	830 U	910 U	830 U	--
4-NITROPHENOL	910 U	4300 UJ	830 U	910 UJ	830 U	--
BIS(2-CHLOROETHOXY)METHANE	360 U	1700 U	330 U	360 U	330 U	--
BIS(2-CHLOROETHYL)ETHER	360 U	1700 U	330 U	360 U	330 U	--
BIS(2-ETHYLHEXYL)PHTHALATE	360 U	1700 U	330 U	160 U	330 U	--
BUTYL BENZYL PHTHALATE	360 U	1700 U	330 U	36 J	330 U	--
CARBAZOLE	360 U	1700 U	76 J	28 J	330 U	--
DIETHYL PHTHALATE	360 U	1700 U	330 U	360 U	330 U	--
DIMETHYL PHTHALATE	360 U	1700 U	330 U	360 U	330 U	--

ANALYTICAL RESULTS FOR SURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	**WTB-MW01**	**WTB-MW05**	**WTB-MW02**	**WTB-SB06**	**WTB-SB07**	**WTB-SB08**
SAMPLE ID	**WTB-SS01-0001-98**	**WTB-SS05-0001-98**	**WTB-SS02-0001-98**	**WTB-SS06-0001-98**	**WTB-SS07-0001-98**	**WTB-SS-08-0002**
SAMPLE DATE	**19980713**	**19980707**	**19980708**	**19980715**	**19980711**	**20150604**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**
TOP DEPTH (feet)	**0**	**0**	**0**	**0**	**0**	**0**
BOTTOM DEPTH (feet)	**1**	**1**	**1**	**1**	**1**	**2**
DI-N-BUTYL PHTHALATE	360 U	1700 U	330 U	24 J	330 U	--
DI-N-OCTYL PHTHALATE	360 U	1700 UJ	330 UJ	360 U	330 U	--
HEXACHLOROBENZENE	360 U	1700 U	330 U	360 U	330 U	--
HEXACHLOROBUTADIENE	360 U	1700 UJ	330 U	360 U	330 U	--
HEXACHLOROCYCLOPENTADIENE	360 U	1700 U	330 UJ	360 U	330 U	--
HEXACHLOROETHANE	360 U	1700 U	330 U	360 U	330 U	--
ISOPHORONE	360 U	1700 U	330 U	360 U	330 U	--
NITROBENZENE	360 U	1700 U	330 U	360 U	330 U	--
N-NITROSO-DI-N-PROPYLAMINE	360 U	1700 U	330 U	360 U	330 U	--
N-NITROSODIPHENYLAMINE	360 U	1700 U	330 U	360 U	330 U	--
PENTACHLOROPHENOL	910 UJ	4300 U	830 U	910 UJ	830 UJ	--
PHENOL	360 U	1700 U	330 U	360 U	330 U	--
VOLATILES (UG/KG)						
1,1,1-TRICHLOROETHANE	11 UJ	11 U	11 U	11 UJ	10 U	--
1,1,2,2-TETRACHLOROETHANE	11 UR	11 UJ	11 UJ	11 UJ	10 U	--
1,1,2-TRICHLOROETHANE	11 UJ	11 U	11 U	11 UJ	10 U	--
1,1,2-TRICHLOROTRIFLUOROETHANE	11 UJ	11 U	11 U	11 U	10 U	--
1,1-DICHLOROETHANE	11 UJ	11 U	11 U	11 U	10 U	--
1,1-DICHLOROETHENE	11 UJ	11 U	11 U	11 U	10 U	--
1,2-DICHLOROETHANE	11 UJ	11 U	11 U	11 U	10 U	--
1,2-DICHLOROPROPANE	11 UJ	11 U	11 U	11 UJ	10 U	--
2-BUTANONE	11 U	11 U	11 U	11 U	10 U	--
2-HEXANONE	11 UR	11 UJ	11 UJ	11 UJ	10 U	--
4-METHYL-2-PENTANONE	11 UR	11 UJ	11 UJ	11 UJ	10 U	--
ACETONE	26 U	11 U	11 U	11 U	11 U	--
BENZENE	11 UJ	11 U	11 U	11 UJ	10 U	--
BROMODICHLOROMETHANE	11 UJ	11 U	11 U	11 UJ	10 U	--
BROMOFORM	11 UJ	11 U	11 U	11 UJ	10 U	--
BROMOMETHANE	11 UJ	11 U	11 U	1 J	10 U	--
CARBON DISULFIDE	11 UJ	11 U	11 U	11 U	10 U	--
CARBON TETRACHLORIDE	11 UJ	11 U	11 U	11 UJ	10 U	--
CHLOROBENZENE	11 UR	11 UJ	11 UJ	11 UJ	10 U	--
CHLORODIBROMOMETHANE	11 UJ	11 U	11 U	11 UJ	10 U	--
CHLOROETHANE	11 UJ	11 U	11 U	11 U	10 U	--
CHLOROFORM	1 J	11 U	11 U	11 U	10 U	--
CHLOROMETHANE	11 UJ	11 U	11 U	11 U	10 U	--
CIS-1,3-DICHLOROPROPENE	11 UJ	11 U	11 U	11 UJ	10 U	--
ETHYLBENZENE	11 UR	11 UJ	11 UJ	11 UJ	10 U	--
METHYLENE CHLORIDE	14 U	18 U	18 U	28 U	77 U	--
STYRENE	11 UR	11 UJ	11 UJ	11 UJ	10 U	--
TETRACHLOROETHENE	11 UR	11 UJ	11 UJ	11 UJ	10 U	--
TOLUENE	11 UR	11 UJ	11 UJ	11 UJ	10 U	--
TOTAL 1,2-DICHLOROETHENE	11 UJ	11 U	11 U	11 U	10 U	--
TOTAL XYLENES	11 UR	5 J	11 UJ	11 UJ	10 U	--
TRANS-1,3-DICHLOROPROPENE	11 UJ	11 U	11 U	11 UJ	10 U	--
TRICHLOROETHENE	11 UJ	11 U	11 U	11 UJ	10 U	--
VINYL CHLORIDE	11 UJ	11 U	11 U	11 U	10 U	--

ANALYTICAL RESULTS FOR SURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB08	WTB-SB09	WTB-SB10	WTB-SB11	WTB-SB12	WTB-SB13	WTB-SB14
SAMPLE ID	WTB-SS-08-0002-D	WTB-SS-09-0002	WTB-SS-10-0002	WTB-SS-11-0002	WTB-SS-12-0002	WTB-SS-13-0002	WTB-SS-14-0002
SAMPLE DATE	20150604	20150604	20150605	20150601	20150604	20150605	20150603
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH (feet)	0	0	0	0	0	0	0
BOTTOM DEPTH (feet)	2	2	2	2	2	2	2
EPH MADEP (MG/KG)							
C11-C22 AROMATICS	13 J	50	15 U	180	150 J	12 J	23 U
C19-C36 ALIPHATICS	20	29 J	15 U	140	120 J	15 U	23 U
C9-C18 ALIPHATICS	13 U	30 U	15 U	32 U	61 UJ	15 U	23 U
METALS (MG/KG)							
ALUMINUM	6270	12300	7180	9840	16300	8310	5550
ANTIMONY	0.499 J	0.25 J	0.1 J	0.913	0.574	0.07 U	0.12
ARSENIC	17.1	12.4	18 J	13.6	7.84	18 J	18.6
BARIUM	40.2 J	78.2 J	31 J	64.2	117	33.5 J	23.8
BERYLLIUM	0.339 J	0.517	0.36 J	0.568 U	0.267 U	0.467 J	0.374
CADMIUM	0.407 J	0.202 J	0.108 J	0.803 J	0.775 U	0.062 J	0.303 J
CALCIUM	1700 J	3550 J	809	6030	6670	1140	818
CHROMIUM	46.3 J	63.8 J	17.9 J	234	138 J	18.6 J	34.3
COBALT	8.46	11.6	9.36	12.7	14.4	7.49	5.01
COPPER	89.7 J	105	30.1 J	232 J	181 J	14.1 J	18.1 J
IRON	19800	25900	16300	48200 J	32400	16700	15600 J
LEAD	127 J	74.4	29 J	216	204	7.86 J	10.8
MAGNESIUM	3840	6970	3480	6970	11400	3720	3210
MANGANESE	286 J-	455 J-	303	672 J	472	254	196 J
MERCURY	1.24	0.303 J	0.01 J	0.602 J	0.511 J	0.018 U	0.026 J
NICKEL	51.2	46	23.9	260	87.6 J	22.6	16.6
POTASSIUM	1260 J	4050 J	1400 J	1370 J	6040 J	1790 J	1850 J
SELENIUM	0.68 U	0.7 J	0.69 U	2.2 U	1.1 U	0.33 J	0.19 J
SILVER	0.14 J	0.64 U	0.39 UJ	1.3 U	0.952 U	0.049 J	0.13 J
SODIUM	177	973 J	86.3 J	134 J	847 J	161 J	140
THALLIUM	0.115	0.281	0.122	0.115	0.259	0.14	0.181
VANADIUM	20.8	42	17.8	32.3 J	69.3	17.3	14.4 J
ZINC	161 J	112	58 J	585	338 J	32.7	72.6
MISCELLANEOUS PARAMETERS (%)							
TOTAL SOLIDS	93	91	93	92	92	89	97
MISCELLANEOUS PARAMETERS (MG/KG)							
CYANIDE	--	--	--	--	--	--	--
HEXAVALENT CHROMIUM	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON	--	--	--	--	--	--	--
MISCELLANEOUS PARAMETERS (S.U.)							
PH	--	--	--	--	--	--	--
PESTICIDES/PCBS (UG/KG)							
4,4'-DDD	--	--	--	--	--	--	--
4,4'-DDE	--	--	--	--	--	--	--
4,4'-DDT	--	--	--	--	--	--	--
ALDRIN	--	--	--	--	--	--	--
ALPHA-BHC	--	--	--	--	--	--	--
ALPHA-CHLORDANE	--	--	--	--	--	--	--
AROCLOR-1016	--	--	--	--	--	--	--
AROCLOR-1221	--	--	--	--	--	--	--
AROCLOR-1232	--	--	--	--	--	--	--
AROCLOR-1242	--	--	--	--	--	--	--
AROCLOR-1248	--	--	--	--	--	--	--
AROCLOR-1254	--	--	--	--	--	--	--
AROCLOR-1260	--	--	--	--	--	--	--
BETA-BHC	--	--	--	--	--	--	--
DELTA-BHC	--	--	--	--	--	--	--
DIELDRIN	--	--	--	--	--	--	--
ENDOSULFAN I	--	--	--	--	--	--	--
ENDOSULFAN II	--	--	--	--	--	--	--
ENDOSULFAN SULFATE	--	--	--	--	--	--	--
ENDRIN	--	--	--	--	--	--	--
ENDRIN ALDEHYDE	--	--	--	--	--	--	--
ENDRIN KETONE	--	--	--	--	--	--	--
GAMMA-BHC (LINDANE)	--	--	--	--	--	--	--
GAMMA-CHLORDANE	--	--	--	--	--	--	--
HEPTACHLOR	--	--	--	--	--	--	--

ANALYTICAL RESULTS FOR SURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB08	WTB-SB09	WTB-SB10	WTB-SB11	WTB-SB12	WTB-SB13	WTB-SB14
SAMPLE ID	WTB-SS-08-0002-D	WTB-SS-09-0002	WTB-SS-10-0002	WTB-SS-11-0002	WTB-SS-12-0002	WTB-SS-13-0002	WTB-SS-14-0002
SAMPLE DATE	20150604	20150604	20150605	20150601	20150604	20150605	20150603
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH (feet)	0	0	0	0	0	0	0
BOTTOM DEPTH (feet)	2	2	2	2	2	2	2
HEPTACHLOR EPOXIDE	--	--	--	--	--	--	--
METHOXYCHLOR	--	--	--	--	--	--	--
TOXAPHENE	--	--	--	--	--	--	--
PETROLEUM HYDROCARBONS (MG/KG)							
DIESEL RANGE ORGANICS	--	--	--	--	--	--	--
GASOLINE RANGE ORGANICS	--	--	--	--	--	--	--
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)							
ACENAPHTHENE	15 J	5.1 J	10 U	13 J	540	10 U	8.9 U
ACENAPHTHYLENE	11 U	23	10 U	11 J	260	10 U	8.9 U
ANTHRACENE	45	39	3.9 J	50	2500	10 U	8.9 U
BENZO(A)ANTHRACENE	140	440	13 J	270	7300 J	10 U	4.7 J
BENZO(A)PYRENE	120 J	630	13 J	300 J	5500	10 U	6.3 J
BENZO(B)FLUORANTHENE	170 J	890	17 J	470	9100	4.4 J	9.8 J
BENZO(G,H,I)PERYLENE	66 J	490	8.4 J	170 J	2600	10 U	5.4 J
BENZO(K)FLUORANTHENE	88 J	400	3.6 J	180 J	4200 J	10 U	8.9 U
CHRYSENE	170	500	11 J	420	9400 J	10 U	8.9 U
DIBENZO(A,H)ANTHRACENE	21 J	120 J	10 U	49 J	1400 J	10 U	8.9 U
DIBENZOFURAN	--	--	--	--	--	--	--
FLUORANTHENE	220	310	22	450	15000 J	10 U	8.5 J
FLUORENE	15 J	5.5 J	10 U	21 J	640	10 U	8.9 U
INDENO(1,2,3-CD)PYRENE	77 J	480	8.8 J	170	3100	10 U	5.2 J
NAPHTHALENE	8.1 J	11 J	10 U	22 J	110	10 U	8.9 U
PHENANTHRENE	180 J	100	14 J	290	6000	2.1 J	4 J
PYRENE	290	640	23	630	14000 J	10 U	9.2 J
BAP EQUIVALENT-HALFND	180.75	935.5	21.927	442.22	8901.4	11.495	12.76895
BAP EQUIVALENT-POS	180.75	935.5	16.927	442.22	8901.4	0.44	8.27
SEMIVOLATILES (UG/KG)							
1,2,4-TRICHLOROBENZENE	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	--	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	--	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	--	--	--	--	--	--	--
2,4-DICHLOROPHENOL	--	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	--	--	--	--	--	--	--
2,4-DINITROPHENOL	--	--	--	--	--	--	--
2,4-DINITROTOLUENE	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	--	--	--	--	--	--	--
2-CHLOROPHENOL	--	--	--	--	--	--	--
2-METHYLNAPHTHALENE	--	--	--	--	--	--	--
2-METHYLPHENOL	--	--	--	--	--	--	--
2-NITROANILINE	--	--	--	--	--	--	--
2-NITROPHENOL	--	--	--	--	--	--	--
3,3'-DICHLOROBENZIDINE	--	--	--	--	--	--	--
3-NITROANILINE	--	--	--	--	--	--	--
4,6-DINITRO-2-METHYLPHENOL	--	--	--	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	--	--	--	--	--	--	--
4-CHLORO-3-METHYLPHENOL	--	--	--	--	--	--	--
4-CHLOROANILINE	--	--	--	--	--	--	--
4-CHLOROPHENYL PHENYL ETHER	--	--	--	--	--	--	--
4-METHYLPHENOL	--	--	--	--	--	--	--
4-NITROANILINE	--	--	--	--	--	--	--
4-NITROPHENOL	--	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	--	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	--	--	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--	--	--	--	--
CARBAZOLE	--	--	--	--	--	--	--
DIETHYL PHTHALATE	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	--	--	--	--	--	--	--

ANALYTICAL RESULTS FOR SURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB08	WTB-SB09	WTB-SB10	WTB-SB11	WTB-SB12	WTB-SB13	WTB-SB14
SAMPLE ID	WTB-SS-08-0002-D	WTB-SS-09-0002	WTB-SS-10-0002	WTB-SS-11-0002	WTB-SS-12-0002	WTB-SS-13-0002	WTB-SS-14-0002
SAMPLE DATE	20150604	20150604	20150605	20150601	20150604	20150605	20150603
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH (feet)	0	0	0	0	0	0	0
BOTTOM DEPTH (feet)	2	2	2	2	2	2	2
DI-N-BUTYL PHTHALATE	--	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--	--	--	--	--
HEXACHLOROBENZENE	--	--	--	--	--	--	--
HEXACHLOROBUTADIENE	--	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	--	--	--	--	--	--	--
HEXACHLOROETHANE	--	--	--	--	--	--	--
ISOPHORONE	--	--	--	--	--	--	--
NITROBENZENE	--	--	--	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	--	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	--	--	--	--	--	--	--
PENTACHLOROPHENOL	--	--	--	--	--	--	--
PHENOL	--	--	--	--	--	--	--
VOLATILES (UG/KG)							
1,1,1-TRICHLOROETHANE	--	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	--	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	--	--	--	--	--	--	--
1,1,2-TRICHLOROTRIFLUOROETHANE	--	--	--	--	--	--	--
1,1-DICHLOROETHANE	--	--	--	--	--	--	--
1,1-DICHLOROETHENE	--	--	--	--	--	--	--
1,2-DICHLOROETHANE	--	--	--	--	--	--	--
1,2-DICHLOROPROPANE	--	--	--	--	--	--	--
2-BUTANONE	--	--	--	--	--	--	--
2-HEXANONE	--	--	--	--	--	--	--
4-METHYL-2-PENTANONE	--	--	--	--	--	--	--
ACETONE	--	--	--	--	--	--	--
BENZENE	--	--	--	--	--	--	--
BROMODICHLOROMETHANE	--	--	--	--	--	--	--
BROMOFORM	--	--	--	--	--	--	--
BROMOMETHANE	--	--	--	--	--	--	--
CARBON DISULFIDE	--	--	--	--	--	--	--
CARBON TETRACHLORIDE	--	--	--	--	--	--	--
CHLOROBENZENE	--	--	--	--	--	--	--
CHLORODIBROMOMETHANE	--	--	--	--	--	--	--
CHLOROETHANE	--	--	--	--	--	--	--
CHLOROFORM	--	--	--	--	--	--	--
CHLOROMETHANE	--	--	--	--	--	--	--
CIS-1,3-DICHLOROPROPENE	--	--	--	--	--	--	--
ETHYLBENZENE	--	--	--	--	--	--	--
METHYLENE CHLORIDE	--	--	--	--	--	--	--
STYRENE	--	--	--	--	--	--	--
TETRACHLOROETHENE	--	--	--	--	--	--	--
TOLUENE	--	--	--	--	--	--	--
TOTAL 1,2-DICHLOROETHENE	--	--	--	--	--	--	--
TOTAL XYLENES	--	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	--	--	--	--	--	--	--
TRICHLOROETHENE	--	--	--	--	--	--	--
VINYL CHLORIDE	--	--	--	--	--	--	--

ANALYTICAL RESULTS FOR SURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB15	WTB-SB16	WTB-SB17	WTB-SB18	WTB-SB19	WTB-SB20
SAMPLE ID	WTB-SS-15-0002	WTB-SS-16-0002	WTB-SS-17-0002	WTB-SS-18-0002	WTB-SS-19-0002	WTB-SS-20-0002
SAMPLE DATE	20150604	20150604	20150603	20150604	20150603	20150604
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
TOP DEPTH (feet)	0	0	0	0	0	0
BOTTOM DEPTH (feet)	2	2	2	2	2	2
EPH MADEP (MG/KG)						
C11-C22 AROMATICS	120	240	58	50	1800	20
C19-C36 ALIPHATICS	44	65	45	31 U	25 J	15 J
C9-C18 ALIPHATICS	29 U	32 U	29 U	31 U	26 U	15 U
METALS (MG/KG)						
ALUMINUM	15400	14700	3240	15600	2810	18600
ANTIMONY	0.938	0.356	0.461	0.16 J	0.638	0.31 J
ARSENIC	12	12.3	10.7	15.6 J	4.09	13.3 J
BARIUM	276	83.4	26.8	91.7 J	24	239 J
BERYLLIUM	0.602 J	0.729 J	0.682	0.803 J	0.767	1.09 J
CADMIUM	0.747 J	0.371 U	0.364 J	0.278 J	0.235 J	0.636
CALCIUM	7710	3450	898	2670	2060	2480
CHROMIUM	76.7 J	46.6 J	23.7	41.4 J	8.48	47.1 J
COBALT	14.3	9.43	3.99	11	2.72	11.7
COPPER	630 J	310 J	175 J	121 J	149 J	291 J
IRON	38600	21000	14700 J	25200	8120 J	30200
LEAD	611	178	175	320 J	176	703 J
MAGNESIUM	10600	6370	1270	7840	1030	7600
MANGANESE	533	345	376 J	376	340 J	457
MERCURY	0.347 J	0.242 J	0.156 J	1.45 J	0.163 J	0.42 J
NICKEL	89.3 J	43.6 J	52.5	36.6	7.59	65.9
POTASSIUM	3690 J	3050 J	813 J	2550 J	672 J	4560 J
SELENIUM	2.5 U	0.78 U	0.54 U	0.75 J	0.46 U	0.52 J
SILVER	0.8 J	0.45 U	0.22 J	0.42 UJ	0.09 J	0.438 J
SODIUM	1470 J	160 J	167	753 J	280	750 J
THALLIUM	0.206	0.204	0.0938	0.21	0.0759	0.32
VANADIUM	45.2	31.6	8.65 J	37.7	6.98 J	41.6
ZINC	757 J	143 J	173	154 J	104	519 J
MISCELLANEOUS PARAMETERS (%)						
TOTAL SOLIDS	92	89	95	86	96	83
MISCELLANEOUS PARAMETERS (MG/KG)						
CYANIDE	--	--	--	--	--	--
HEXAVALENT CHROMIUM	--	--	--	--	--	--
TOTAL ORGANIC CARBON	--	--	--	--	--	--
MISCELLANEOUS PARAMETERS (S.U.)						
PH	--	--	--	--	--	--
PESTICIDES/PCBS (UG/KG)						
4,4'-DDD	--	--	--	--	--	--
4,4'-DDE	--	--	--	--	--	--
4,4'-DDT	--	--	--	--	--	--
ALDRIN	--	--	--	--	--	--
ALPHA-BHC	--	--	--	--	--	--
ALPHA-CHLORDANE	--	--	--	--	--	--
AROCLOR-1016	--	--	--	--	--	--
AROCLOR-1221	--	--	--	--	--	--
AROCLOR-1232	--	--	--	--	--	--
AROCLOR-1242	--	--	--	--	--	--
AROCLOR-1248	--	--	--	--	--	--
AROCLOR-1254	--	--	--	--	--	--
AROCLOR-1260	--	--	--	--	--	--
BETA-BHC	--	--	--	--	--	--
DELTA-BHC	--	--	--	--	--	--
DIELDRIN	--	--	--	--	--	--
ENDOSULFAN I	--	--	--	--	--	--
ENDOSULFAN II	--	--	--	--	--	--
ENDOSULFAN SULFATE	--	--	--	--	--	--
ENDRIN	--	--	--	--	--	--
ENDRIN ALDEHYDE	--	--	--	--	--	--
ENDRIN KETONE	--	--	--	--	--	--
GAMMA-BHC (LINDANE)	--	--	--	--	--	--
GAMMA-CHLORDANE	--	--	--	--	--	--
HEPTACHLOR	--	--	--	--	--	--

ANALYTICAL RESULTS FOR SURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB15	WTB-SB16	WTB-SB17	WTB-SB18	WTB-SB19	WTB-SB20
SAMPLE ID	WTB-SS-15-0002	WTB-SS-16-0002	WTB-SS-17-0002	WTB-SS-18-0002	WTB-SS-19-0002	WTB-SS-20-0002
SAMPLE DATE	20150604	20150604	20150603	20150604	20150603	20150604
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
TOP DEPTH (feet)	0	0	0	0	0	0
BOTTOM DEPTH (feet)	2	2	2	2	2	2
HEPTACHLOR EPOXIDE	--	--	--	--	--	--
METHOXYCHLOR	--	--	--	--	--	--
TOXAPHENE	--	--	--	--	--	--
PETROLEUM HYDROCARBONS (MG/KG)						
DIESEL RANGE ORGANICS	--	--	--	--	--	--
GASOLINE RANGE ORGANICS	--	--	--	--	--	--
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)						
ACENAPHTHENE	750	1600 J	6.9 J	11 U	10 U	11 U
ACENAPHTHYLENE	10 J	17 J	9.1 U	5 J	10 U	11 U
ANTHRACENE	1500	3900	43	11 J	21	18 J
BENZO(A)ANTHRACENE	3200	13000	290	90	75	110
BENZO(A)PYRENE	2500	8600	290 J	89	65	100 J
BENZO(B)FLUORANTHENE	4000	14000	490 J	130	86	150 J
BENZO(G,H,I)PERYLENE	1300	6000	190 J	63	41	56 J
BENZO(K)FLUORANTHENE	1300	4400	160 J	55 J	42	48 J
CHRYSENE	3400	12000 J	300	130	84	120
DIBENZO(A,H)ANTHRACENE	320	1600 J	81 J	22 J	12 J	27 J
DIBENZOFURAN	--	--	--	--	--	--
FLUORANTHENE	6300	24000	300	140	120	120
FLUORENE	820	1400 J	8.8 J	4.5 J	10 U	5.4 J
INDENO(1,2,3-CD)PYRENE	1500	6200	210	68	39	67 J
NAPHTHALENE	120	55	8.3 J	11 U	10 U	11 U
PHENANTHRENE	6700	13000	120	68	93	91
PYRENE	6400 J	19000	460	140	120	190 J
BAP EQUIVALENT-HALFND	3706.4	13576	471.9	140.48	97.504	160.3
BAP EQUIVALENT-POS	3706.4	13576	471.9	140.48	97.504	160.3
SEMIVOLATILES (UG/KG)						
1,2,4-TRICHLOROBENZENE	--	--	--	--	--	--
1,2-DICHLOROBENZENE	--	--	--	--	--	--
1,3-DICHLOROBENZENE	--	--	--	--	--	--
1,4-DICHLOROBENZENE	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	--	--	--	--	--	--
2,4-DICHLOROPHENOL	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	--	--	--	--	--	--
2,4-DINITROPHENOL	--	--	--	--	--	--
2,4-DINITROTOLUENE	--	--	--	--	--	--
2,6-DINITROTOLUENE	--	--	--	--	--	--
2-CHLORONAPHTHALENE	--	--	--	--	--	--
2-CHLOROPHENOL	--	--	--	--	--	--
2-METHYLNAPHTHALENE	--	--	--	--	--	--
2-METHYLPHENOL	--	--	--	--	--	--
2-NITROANILINE	--	--	--	--	--	--
2-NITROPHENOL	--	--	--	--	--	--
3,3'-DICHLOROBENZIDINE	--	--	--	--	--	--
3-NITROANILINE	--	--	--	--	--	--
4,6-DINITRO-2-METHYLPHENOL	--	--	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	--	--	--	--	--	--
4-CHLORO-3-METHYLPHENOL	--	--	--	--	--	--
4-CHLOROANILINE	--	--	--	--	--	--
4-CHLOROPHENYL PHENYL ETHER	--	--	--	--	--	--
4-METHYLPHENOL	--	--	--	--	--	--
4-NITROANILINE	--	--	--	--	--	--
4-NITROPHENOL	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	--	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--	--	--	--
CARBAZOLE	--	--	--	--	--	--
DIETHYL PHTHALATE	--	--	--	--	--	--
DIMETHYL PHTHALATE	--	--	--	--	--	--

ANALYTICAL RESULTS FOR SURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB15	WTB-SB16	WTB-SB17	WTB-SB18	WTB-SB19	WTB-SB20
SAMPLE ID	WTB-SS-15-0002	WTB-SS-16-0002	WTB-SS-17-0002	WTB-SS-18-0002	WTB-SS-19-0002	WTB-SS-20-0002
SAMPLE DATE	20150604	20150604	20150603	20150604	20150603	20150604
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
TOP DEPTH (feet)	0	0	0	0	0	0
BOTTOM DEPTH (feet)	2	2	2	2	2	2
DI-N-BUTYL PHTHALATE	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--	--	--	--
HEXACHLOROBENZENE	--	--	--	--	--	--
HEXACHLOROBUTADIENE	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	--	--	--	--	--	--
HEXACHLOROETHANE	--	--	--	--	--	--
ISOPHORONE	--	--	--	--	--	--
NITROBENZENE	--	--	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	--	--	--	--	--	--
PENTACHLOROPHENOL	--	--	--	--	--	--
PHENOL	--	--	--	--	--	--
VOLATILES (UG/KG)						
1,1,1-TRICHLOROETHANE	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	--	--	--	--	--	--
1,1,2-TRICHLOROTRIFLUOROETHANE	--	--	--	--	--	--
1,1-DICHLOROETHANE	--	--	--	--	--	--
1,1-DICHLOROETHENE	--	--	--	--	--	--
1,2-DICHLOROETHANE	--	--	--	--	--	--
1,2-DICHLOROPROPANE	--	--	--	--	--	--
2-BUTANONE	--	--	--	--	--	--
2-HEXANONE	--	--	--	--	--	--
4-METHYL-2-PENTANONE	--	--	--	--	--	--
ACETONE	--	--	--	--	--	--
BENZENE	--	--	--	--	--	--
BROMODICHLOROMETHANE	--	--	--	--	--	--
BROMOFORM	--	--	--	--	--	--
BROMOMETHANE	--	--	--	--	--	--
CARBON DISULFIDE	--	--	--	--	--	--
CARBON TETRACHLORIDE	--	--	--	--	--	--
CHLOROBENZENE	--	--	--	--	--	--
CHLORODIBROMOMETHANE	--	--	--	--	--	--
CHLOROETHANE	--	--	--	--	--	--
CHLOROFORM	--	--	--	--	--	--
CHLOROMETHANE	--	--	--	--	--	--
CIS-1,3-DICHLOROPROPENE	--	--	--	--	--	--
ETHYLBENZENE	--	--	--	--	--	--
METHYLENE CHLORIDE	--	--	--	--	--	--
STYRENE	--	--	--	--	--	--
TETRACHLOROETHENE	--	--	--	--	--	--
TOLUENE	--	--	--	--	--	--
TOTAL 1,2-DICHLOROETHENE	--	--	--	--	--	--
TOTAL XYLENES	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	--	--	--	--	--	--
TRICHLOROETHENE	--	--	--	--	--	--
VINYL CHLORIDE	--	--	--	--	--	--

ANALYTICAL RESULTS FOR SURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	**WTB-SB20**	**WTB-SB21**	**WTB-SB22**	**WTB-SB23**	**WTB-SB24**
SAMPLE ID	**WTB-SS-20-0002-D**	**WTB-SS-21-0002**	**WTB-SS-22-0002**	**WTB-SS-23-0002**	**WTB-SS-24-0002**
SAMPLE DATE	**20150604**	**20150604**	**20150603**	**20150603**	**20150603**
SAMPLE CODE	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
TOP DEPTH (feet)	**0**	**0**	**0**	**0**	**0**
BOTTOM DEPTH (feet)	**2**	**2**	**2**	**2**	**2**
EPH MADEP (MG/KG)					
C11-C22 AROMATICS	20 J	14 U	120	300	14 U
C19-C36 ALIPHATICS	12 J	14 U	30 J	120	14 U
C9-C18 ALIPHATICS	17 U	14 U	32 U	70 U	14 U
METALS (MG/KG)					
ALUMINUM	17400	1730	14900	11400	5360
ANTIMONY	0.276 J	0.048 U	0.22 J	1.94 J	0.047 U
ARSENIC	13.6 J	1.64 J	13.6	11.9	11.6
BARIUM	114 J	8.02 J	97.2 J	149 J	16.4 J
BERYLLIUM	1.06 J	0.662 J	0.56	0.526	0.269 J
CADMIUM	0.752	0.057 J	0.39 U	1.43	0.038 J
CALCIUM	2490	448	13200 J	9670 J	584 J
CHROMIUM	51.8 J	3.33 J	55 J	53.1 J	16.9 J
COBALT	11.4	1.62	10.8	15.7	4.85
COPPER	231 J	4.68 J	57	769	10.5
IRON	27500	5280	25600	48500	9530
LEAD	363 J	45 J	190	858	13.5
MAGNESIUM	7560	587	9570	8580	2600
MANGANESE	375	365	404 J-	419 J-	162 J-
MERCURY	0.38 J	0.014 U	0.192	0.715	0.0082 J
NICKEL	64.8	3.18	41.3	65.4	15.7
POTASSIUM	3700 J	591 J	5160 J	3480 J	747 J
SELENIUM	0.62 U	0.68 U	0.9 U	1.4 U	0.65 U
SILVER	0.47 J	0.054 J	0.52 U	0.87 U	0.061 J
SODIUM	749 J	203 J	1400 J	279 J	62.2 J
THALLIUM	0.281	0.072 U	0.251	0.183	0.079 U
VANADIUM	39.4	4.08	37.6	39.8	11.4
ZINC	416 J	22.7 J	104	620	32.4
MISCELLANEOUS PARAMETERS (%)					
TOTAL SOLIDS	83	96	90	91	93
MISCELLANEOUS PARAMETERS (MG/KG)					
CYANIDE	--	--	--	--	--
HEXAVALENT CHROMIUM	--	--	--	--	--
TOTAL ORGANIC CARBON	--	--	--	--	--
MISCELLANEOUS PARAMETERS (S.U.)					
PH	--	--	--	--	--
PESTICIDES/PCBS (UG/KG)					
4,4'-DDD	--	--	--	--	--
4,4'-DDE	--	--	--	--	--
4,4'-DDT	--	--	--	--	--
ALDRIN	--	--	--	--	--
ALPHA-BHC	--	--	--	--	--
ALPHA-CHLORDANE	--	--	--	--	--
AROCLOR-1016	--	--	--	--	--
AROCLOR-1221	--	--	--	--	--
AROCLOR-1232	--	--	--	--	--
AROCLOR-1242	--	--	--	--	--
AROCLOR-1248	--	--	--	--	--
AROCLOR-1254	--	--	--	--	--
AROCLOR-1260	--	--	--	--	--
BETA-BHC	--	--	--	--	--
DELTA-BHC	--	--	--	--	--
DIELDRIN	--	--	--	--	--
ENDOSULFAN I	--	--	--	--	--
ENDOSULFAN II	--	--	--	--	--
ENDOSULFAN SULFATE	--	--	--	--	--
ENDRIN	--	--	--	--	--
ENDRIN ALDEHYDE	--	--	--	--	--
ENDRIN KETONE	--	--	--	--	--
GAMMA-BHC (LINDANE)	--	--	--	--	--
GAMMA-CHLORDANE	--	--	--	--	--
HEPTACHLOR	--	--	--	--	--

ANALYTICAL RESULTS FOR SURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	**WTB-SB20**	**WTB-SB21**	**WTB-SB22**	**WTB-SB23**	**WTB-SB24**
SAMPLE ID	**WTB-SS-20-0002-D**	**WTB-SS-21-0002**	**WTB-SS-22-0002**	**WTB-SS-23-0002**	**WTB-SS-24-0002**
SAMPLE DATE	**20150604**	**20150604**	**20150603**	**20150603**	**20150603**
SAMPLE CODE	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
TOP DEPTH (feet)	**0**	**0**	**0**	**0**	**0**
BOTTOM DEPTH (feet)	**2**	**2**	**2**	**2**	**2**
HEPTACHLOR EPOXIDE	--	--	--	--	--
METHOXYCHLOR	--	--	--	--	--
TOXAPHENE	--	--	--	--	--
PETROLEUM HYDROCARBONS (MG/KG)					
DIESEL RANGE ORGANICS	--	--	--	--	--
GASOLINE RANGE ORGANICS	--	--	--	--	--
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)					
ACENAPHTHENE	11 J	10 U	10 U	680	9.9 U
ACENAPHTHYLENE	2.3 J	10 U	10 U	100 J	9.9 U
ANTHRACENE	30	10 U	11 J	2100	9.9 U
BENZO(A)ANTHRACENE	130	10 U	73	12000	9.9 U
BENZO(A)PYRENE	120	10 U	78 J	10000	9.9 U
BENZO(B)FLUORANTHENE	170	5 J	110 J	15000	9.9 U
BENZO(G,H,I)PERYLENE	58	10 U	50 J	6100	9.9 U
BENZO(K)FLUORANTHENE	58	10 U	49 J	4700	9.9 U
CHRYSENE	150	10 U	91	12000	9.9 U
DIBENZO(A,H)ANTHRACENE	23	10 U	18 J	1700	9.9 U
DIBENZOFURAN	--	--	--	--	--
FLUORANTHENE	160	10 U	81	23000	9.9 U
FLUORENE	11 J	10 U	10 U	510	9.9 U
INDENO(1,2,3-CD)PYRENE	67	10 U	50 J	6700	9.9 U
NAPHTHALENE	11 U	10 U	10 U	100 J	9.9 U
PHENANTHRENE	140	2.8 J	56	5600	9.9 U
PYRENE	230 J	10 U	110	27000 J	9.9 U
BAP EQUIVALENT-HALFND	180.43	11.555	119.881	15129	9.9 U
BAP EQUIVALENT-POS	180.43	0.5	119.881	15129	9.9 U
SEMIVOLATILES (UG/KG)					
1,2,4-TRICHLOROBENZENE	--	--	--	--	--
1,2-DICHLOROBENZENE	--	--	--	--	--
1,3-DICHLOROBENZENE	--	--	--	--	--
1,4-DICHLOROBENZENE	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	--	--	--	--	--
2,4-DICHLOROPHENOL	--	--	--	--	--
2,4-DIMETHYLPHENOL	--	--	--	--	--
2,4-DINITROPHENOL	--	--	--	--	--
2,4-DINITROTOLUENE	--	--	--	--	--
2,6-DINITROTOLUENE	--	--	--	--	--
2-CHLORONAPHTHALENE	--	--	--	--	--
2-CHLOROPHENOL	--	--	--	--	--
2-METHYLNAPHTHALENE	--	--	--	--	--
2-METHYLPHENOL	--	--	--	--	--
2-NITROANILINE	--	--	--	--	--
2-NITROPHENOL	--	--	--	--	--
3,3'-DICHLOROBENZIDINE	--	--	--	--	--
3-NITROANILINE	--	--	--	--	--
4,6-DINITRO-2-METHYLPHENOL	--	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	--	--	--	--	--
4-CHLORO-3-METHYLPHENOL	--	--	--	--	--
4-CHLOROANILINE	--	--	--	--	--
4-CHLOROPHENYL PHENYL ETHER	--	--	--	--	--
4-METHYLPHENOL	--	--	--	--	--
4-NITROANILINE	--	--	--	--	--
4-NITROPHENOL	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--	--	--
CARBAZOLE	--	--	--	--	--
DIETHYL PHTHALATE	--	--	--	--	--
DIMETHYL PHTHALATE	--	--	--	--	--

ANALYTICAL RESULTS FOR SURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	**WTB-SB20**	**WTB-SB21**	**WTB-SB22**	**WTB-SB23**	**WTB-SB24**
SAMPLE ID	**WTB-SS-20-0002-D**	**WTB-SS-21-0002**	**WTB-SS-22-0002**	**WTB-SS-23-0002**	**WTB-SS-24-0002**
SAMPLE DATE	**20150604**	**20150604**	**20150603**	**20150603**	**20150603**
SAMPLE CODE	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
TOP DEPTH (feet)	**0**	**0**	**0**	**0**	**0**
BOTTOM DEPTH (feet)	**2**	**2**	**2**	**2**	**2**
DI-N-BUTYL PHTHALATE	--	--	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--	--	--
HEXACHLOROBENZENE	--	--	--	--	--
HEXACHLOROBUTADIENE	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	--	--	--	--	--
HEXACHLOROETHANE	--	--	--	--	--
ISOPHORONE	--	--	--	--	--
NITROBENZENE	--	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	--	--	--	--	--
N-NITROSODIPHENYLAMINE	--	--	--	--	--
PENTACHLOROPHENOL	--	--	--	--	--
PHENOL	--	--	--	--	--
VOLATILES (UG/KG)					
1,1,1-TRICHLOROETHANE	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	--	--	--	--	--
1,1,2-TRICHLOROETHANE	--	--	--	--	--
1,1,2-TRICHLOROTRIFLUOROETHANE	--	--	--	--	--
1,1-DICHLOROETHANE	--	--	--	--	--
1,1-DICHLOROETHENE	--	--	--	--	--
1,2-DICHLOROETHANE	--	--	--	--	--
1,2-DICHLOROPROPANE	--	--	--	--	--
2-BUTANONE	--	--	--	--	--
2-HEXANONE	--	--	--	--	--
4-METHYL-2-PENTANONE	--	--	--	--	--
ACETONE	--	--	--	--	--
BENZENE	--	--	--	--	--
BROMODICHLOROMETHANE	--	--	--	--	--
BROMOFORM	--	--	--	--	--
BROMOMETHANE	--	--	--	--	--
CARBON DISULFIDE	--	--	--	--	--
CARBON TETRACHLORIDE	--	--	--	--	--
CHLOROBENZENE	--	--	--	--	--
CHLORODIBROMOMETHANE	--	--	--	--	--
CHLOROETHANE	--	--	--	--	--
CHLOROFORM	--	--	--	--	--
CHLOROMETHANE	--	--	--	--	--
CIS-1,3-DICHLOROPROPENE	--	--	--	--	--
ETHYLBENZENE	--	--	--	--	--
METHYLENE CHLORIDE	--	--	--	--	--
STYRENE	--	--	--	--	--
TETRACHLOROETHENE	--	--	--	--	--
TOLUENE	--	--	--	--	--
TOTAL 1,2-DICHLOROETHENE	--	--	--	--	--
TOTAL XYLENES	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	--	--	--	--	--
TRICHLOROETHENE	--	--	--	--	--
VINYL CHLORIDE	--	--	--	--	--

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	**WTB-MW01**	**WTB-MW05**	**WTB-MW05**	**WTB-MW05**	**WTB-MW02**	**WTB-MW02**
SAMPLE ID	**WTB-SB01-0305-98**	**WTB-SB05-0305-98**	**WTB-SB05-0709-98**	**WTB-SB05-1315-98**	**WTB-SB02-0305-98**	**WTB-SB02-0709-98**
SAMPLE DATE	**19980713**	**19980707**	**19980707**	**19980707**	**19980708**	**19980708**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
TOP DEPTH (feet)	**3**	**3**	**7**	**13**	**3**	**7**
BOTTOM DEPTH (feet)	**5**	**5**	**9**	**15**	**5**	**9**
EPH MADEP (MG/KG)						
C11-C22 AROMATICS	--	--	--	--	--	--
C19-C36 ALIPHATICS	--	--	--	--	--	--
C9-C18 ALIPHATICS	--	--	--	--	--	--
METALS (MG/KG)						
ALUMINUM	13100	8650	11600	15400	4940	4660
ANTIMONY	0.46 UR	0.41 UR	0.43 UR	0.53 UR	0.34 U	0.6 UR
ARSENIC	13.2 J	10.5 J	14.3 J	30.9 J	45.6 J	26.3 J
BARIUM	56	41.7 J	74.2 J	148 J	364 J	148 J
BERYLLIUM	0.74	0.32	0.42 J	0.87 J	0.59 J	0.69
CADMIUM	0.53 U	0.48 U	0.49 U	0.61 U	0.4 U	0.69 U
CALCIUM	2470 J	2810 J	2250 J	8790 J	20800 J	2660 J
CHROMIUM	27.8 J	41.5 J	218 J	52.8 J	20.8 J	14.7 J
COBALT	12.6	10.5	8.5	7.1	4	4.4
COPPER	21.3 J	17.2 J	392 J	4090 J	361 J	324 J
IRON	21400	19000	42400	31400	28000	25400
LEAD	14.6 U	8.4	98.7	1020	9080	773
MAGNESIUM	4880	5610	8910	8820	2260	690
MANGANESE	488 J	291	363	362	143	252
MERCURY	0.01 UJ	0.01 UJ	0.22 J	2.4 J	0.28 J	8.1 J
NICKEL	29.2	33.7 J	34.7 J	24.8 J	16.5 J	9.1 J
POTASSIUM	2600	2340	4240	4610	1920	634
SELENIUM	0.74 UJ	0.67 UJ	1.1 U	0.86 UJ	3.6 U	2.7 U
SILVER	0.61 U	0.56 U	0.84 J	1.2 J	0.81 J	0.81 U
SODIUM	480	429	2060	6750	754	1050
THALLIUM	1.6 U	0.67 U	0.69 U	0.86 U	0.56 U	0.98 U
VANADIUM	29.1	25.8	36.6	46.4	32.8	25.7
ZINC	54.8 J	38.3 J	158 J	317 J	130 J	212 J
MISCELLANEOUS PARAMETERS (%)						
TOTAL SOLIDS	--	--	--	--	--	--
MISCELLANEOUS PARAMETERS (MG/KG)						
CYANIDE	2 UJ	2 U	2 U	2 U	34	2 U
HEXAVALENT CHROMIUM	0.56 U	0.5 UJ	0.5 UJ	1 UJ	0.5 UJ	0.5 UJ
TOTAL ORGANIC CARBON	3200	3100	8100	33000	--	69000
MISCELLANEOUS PARAMETERS (S.U.)						
PH	4.9	8.2	7.8	8.8	10.1	7.9
PESTICIDES/PCBS (UG/KG)						
4,4'-DDD	3.9 U	3.6 U	3.8 U	5 U	3.8 U	5.3 U
4,4'-DDE	3.9 U	3.6 U	3.8 U	5 U	3.8 U	5.3 U
4,4'-DDT	3.9 U	3.6 U	3.8 U	5 U	3.8 U	5.3 U
ALDRIN	2 U	1.9 U	2 U	2.6 U	2 U	2.7 U
ALPHA-BHC	2 U	1.9 U	2 U	2.6 U	2 U	2.7 U
ALPHA-CHLORDANE	2 U	1.9 U	2 U	2.6 U	2 U	2.7 U
AROCLOR-1016	39 U	36 U	38 U	50 U	38 U	53 U
AROCLOR-1221	80 U	74 U	78 U	100 U	77 U	110 U
AROCLOR-1232	39 U	36 U	38 U	50 U	38 U	53 U
AROCLOR-1242	39 U	36 U	38 U	50 U	38 U	53 U
AROCLOR-1248	39 U	36 U	38 U	50 U	38 U	53 U
AROCLOR-1254	39 U	36 U	38 U	50 U	38 U	53 U
AROCLOR-1260	39 U	36 U	38 U	50 U	38 U	53 U
BETA-BHC	2 U	1.9 U	2 U	2.6 U	2.4 R	2.7 U
DELTA-BHC	2 U	1.9 U	2 U	2.6 U	2 U	2.7 U
DIELDRIN	3.9 U	3.6 U	3.8 U	5 U	3.8 U	5.3 U
ENDOSULFAN I	2 U	1.9 U	2 U	2.6 U	2 U	2.7 U
ENDOSULFAN II	3.9 U	3.6 U	3.8 U	5 U	3.8 U	5.3 U
ENDOSULFAN SULFATE	3.9 U	3.6 U	3.8 U	5 U	3.8 U	5.3 U
ENDRIN	3.9 U	3.6 U	3.8 U	5 U	3.8 U	5.3 U
ENDRIN ALDEHYDE	3.9 U	3.6 U	3.8 U	5 U	3.8 U	5.3 U
ENDRIN KETONE	3.9 U	3.6 U	3.8 U	5 U	3.8 U	5.3 U
GAMMA-BHC (LINDANE)	2 U	1.9 UJ	2 UJ	2.6 UJ	4.8 UJ	2.7 UJ
GAMMA-CHLORDANE	2 U	1.9 U	2 U	2.6 U	2 U	2.7 U

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-MW01	WTB-MW05	WTB-MW05	WTB-MW05	WTB-MW02	WTB-MW02
SAMPLE ID	WTB-SB01-0305-98	WTB-SB05-0305-98	WTB-SB05-0709-98	WTB-SB05-1315-98	WTB-SB02-0305-98	WTB-SB02-0709-98
SAMPLE DATE	19980713	19980707	19980707	19980707	19980708	19980708
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH (feet)	3	3	7	13	3	7
BOTTOM DEPTH (feet)	5	5	9	15	5	9
HEPTACHLOR	2 U	1.9 U	2 U	2.6 U	2 U	2.7 U
HEPTACHLOR EPOXIDE	2 U	1.9 U	2 U	2.6 U	2 U	2.7 U
METHOXYCHLOR	20 U	19 U	20 U	26 U	20 U	27 U
TOXAPHENE	200 U	190 U	200 U	260 U	200 U	270 U
PETROLEUM HYDROCARBONS (MG/KG)						
DIESEL RANGE ORGANICS	6 U	20	100 J	740 J	340 J	160 J
GASOLINE RANGE ORGANICS	2.5 U	2.5 U	2.5 U	4.2	13	4.8 U
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)						
ACENAPHTHENE	400 U	360 U	400 U	500 U	130 J	530 U
ACENAPHTHYLENE	400 U	360 U	400 U	500 U	360 U	530 U
ANTHRACENE	400 U	360 U	400 U	500 U	580	530 U
BENZO(A)ANTHRACENE	400 U	360 U	63 J	66 J	1600	110 J
BENZO(A)PYRENE	400 U	360 U	65 J	65 J	1000	59 J
BENZO(B)FLUORANTHENE	400 U	360 U	77 J	65 J	1900	110 J
BENZO(G,H,I)PERYLENE	400 U	360 U	400 UJ	34 J	360 UJ	55 J
BENZO(K)FLUORANTHENE	400 U	360 U	61 J	54 J	870	530 U
CHRYSENE	400 U	360 U	61 J	59 J	1700	310 J
DIBENZO(A,H)ANTHRACENE	400 U	360 U	400 UJ	26 J	280 J	53 J
DIBENZOFURAN	400 U	360 U	400 U	500 U	160 J	530 U
FLUORANTHENE	400 U	360 U	100 J	120 J	2900	50 J
FLUORENE	400 U	360 U	400 U	500 U	190 J	530 U
INDENO(1,2,3-CD)PYRENE	400 U	360 U	39 J	41 J	500 J	37 J
NAPHTHALENE	400 U	360 U	400 U	500 U	150 J	68 J
PHENANTHRENE	400 U	360 U	42 J	66 J	2200	310 J
PYRENE	400 U	360 U	110 J	130 J	2100	100 J
BAP EQUIVALENT-HALFND	400 U	360 U	283.571	108.799	1690.4	140.66
BAP EQUIVALENT-POS	400 U	360 U	83.571	108.799	1690.4	138.01
SEMIVOLATILES (UG/KG)						
1,2,4-TRICHLOROBENZENE	400 U	360 U	400 U	500 U	360 U	530 U
1,2-DICHLOROBENZENE	400 U	360 U	400 U	500 U	360 U	530 U
1,3-DICHLOROBENZENE	400 U	360 U	400 U	500 U	360 U	530 U
1,4-DICHLOROBENZENE	400 U	360 U	400 U	500 U	360 U	530 U
2,2'-OXYBIS(1-CHLOROPROPANE)	400 U	360 U	400 U	500 U	360 U	530 U
2,4,5-TRICHLOROPHENOL	1000 U	910 U	1000 U	1200 U	910 U	1300 U
2,4,6-TRICHLOROPHENOL	400 U	360 U	400 U	500 U	360 U	530 U
2,4-DICHLOROPHENOL	400 U	360 U	400 U	500 U	360 U	530 U
2,4-DIMETHYLPHENOL	400 U	360 U	400 U	500 U	360 U	530 U
2,4-DINITROPHENOL	1000 U	910 UJ	1000 UJ	1200 UJ	910 UJ	1300 UJ
2,4-DINITROTOLUENE	400 U	360 U	400 U	500 U	360 U	530 U
2,6-DINITROTOLUENE	400 U	360 U	400 U	500 U	360 U	530 U
2-CHLORONAPHTHALENE	400 U	360 U	400 U	500 U	360 U	530 U
2-CHLOROPHENOL	400 U	360 U	400 U	500 U	360 U	530 U
2-METHYLNAPHTHALENE	400 U	360 U	400 U	500 U	130 J	180 J
2-METHYLPHENOL	400 U	360 U	400 U	500 U	360 U	530 U
2-NITROANILINE	1000 U	910 U	1000 U	1200 U	910 U	1300 U
2-NITROPHENOL	400 U	360 U	400 U	500 U	360 U	530 U
3,3'-DICHLOROBENZIDINE	400 U	360 U	400 U	500 U	360 U	530 U
3-NITROANILINE	1000 U	910 U	1000 U	1200 U	910 U	1300 U
4,6-DINITRO-2-METHYLPHENOL	1000 U	910 UJ	1000 U	1200 U	910 U	1300 UJ
4-BROMOPHENYL PHENYL ETHER	400 U	360 U	400 U	500 U	360 U	530 U
4-CHLORO-3-METHYLPHENOL	400 U	360 U	400 U	500 U	360 U	530 U
4-CHLOROANILINE	400 U	360 U	400 U	500 U	360 U	530 U
4-CHLOROPHENYL PHENYL ETHER	400 U	360 U	400 U	500 U	360 U	530 U
4-METHYLPHENOL	400 U	360 U	400 U	500 U	360 U	530 U
4-NITROANILINE	1000 U	910 U	1000 U	1200 U	910 U	1300 U
4-NITROPHENOL	1000 U	910 U	1000 UJ	1200 UJ	910 UJ	1300 U
BIS(2-CHLOROETHOXY)METHANE	400 U	360 U	400 U	500 U	360 U	530 U
BIS(2-CHLOROETHYL)ETHER	400 U	360 U	400 U	500 U	360 U	530 U
BIS(2-ETHYLHEXYL)PHTHALATE	400 U	400 U	910	550	360 U	530 U
BUTYL BENZYL PHTHALATE	400 U	360 U	21 J	27 J	360 U	530 U
CARBAZOLE	400 U	360 U	400 U	500 U	220 J	32 J

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	**WTB-MW01**	**WTB-MW05**	**WTB-MW05**	**WTB-MW05**	**WTB-MW02**	**WTB-MW02**
SAMPLE ID	**WTB-SB01-0305-98**	**WTB-SB05-0305-98**	**WTB-SB05-0709-98**	**WTB-SB05-1315-98**	**WTB-SB02-0305-98**	**WTB-SB02-0709-98**
SAMPLE DATE	**19980713**	**19980707**	**19980707**	**19980707**	**19980708**	**19980708**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
TOP DEPTH (feet)	**3**	**3**	**7**	**13**	**3**	**7**
BOTTOM DEPTH (feet)	**5**	**5**	**9**	**15**	**5**	**9**
DIETHYL PHTHALATE	400 U	360 U	21 J	500 U	360 U	530 U
DIMETHYL PHTHALATE	400 U	360 U	400 U	500 U	360 U	530 U
DI-N-BUTYL PHTHALATE	400 U	360 U	400 U	500 U	360 U	530 U
DI-N-OCTYL PHTHALATE	400 U	360 U	400 UJ	500 UJ	360 UJ	530 U
HEXACHLOROBENZENE	400 U	360 U	400 U	500 U	360 U	530 U
HEXACHLOROBUTADIENE	400 U	360 U	400 UJ	500 UJ	360 UJ	530 U
HEXACHLOROCYCLOPENTADIENE	400 U	360 UJ	400 U	500 U	360 U	530 UJ
HEXACHLOROETHANE	400 U	360 U	400 U	500 U	360 U	530 U
ISOPHORONE	400 U	360 U	400 U	500 U	360 U	530 U
NITROBENZENE	400 U	360 U	400 U	500 U	360 U	530 U
N-NITROSO-DI-N-PROPYLAMINE	400 U	360 U	400 U	500 U	360 U	530 U
N-NITROSODIPHENYLAMINE	400 U	360 U	400 U	500 U	360 U	530 U
PENTACHLOROPHENOL	1000 UJ	910 U	1000 U	1200 U	910 U	1300 U
PHENOL	400 U	360 U	400 U	500 U	360 U	530 U
VOLATILES (UG/KG)						
1,1,1-TRICHLOROETHANE	12 U	11 U	12 U	15 U	12 UJ	16 UJ
1,1,2,2-TETRACHLOROETHANE	12 U	11 U	12 U	15 UJ	12 UJ	16 UR
1,1,2-TRICHLOROETHANE	12 U	11 U	12 U	15 U	12 UJ	16 UJ
1,1,2-TRICHLOROTRIFLUOROETHANE	12 U	11 U	12 U	15 U	12 U	16 UJ
1,1-DICHLOROETHANE	12 U	11 U	12 U	15 U	12 U	16 UJ
1,1-DICHLOROETHENE	12 U	11 U	12 U	15 U	12 U	16 UJ
1,2-DICHLOROETHANE	12 U	11 U	12 U	15 U	12 U	16 UJ
1,2-DICHLOROPROPANE	12 U	11 U	12 U	15 U	12 UJ	16 UJ
2-BUTANONE	12 U	11 U	4 J	13	8 J	16 UJ
2-HEXANONE	12 U	11 U	12 U	15 UJ	12 UJ	16 UR
4-METHYL-2-PENTANONE	12 U	11 U	12 U	15 UJ	12 UJ	16 UR
ACETONE	12 U	12 U	48 U	230	40 U	54 U
BENZENE	12 U	11 U	12 U	15 U	12 UJ	16 UJ
BROMODICHLOROMETHANE	12 U	11 U	12 U	15 U	12 UJ	16 UJ
BROMOFORM	12 U	11 U	12 U	15 U	12 UJ	16 UJ
BROMOMETHANE	12 U	11 U	12 U	15 U	12 U	16 UJ
CARBON DISULFIDE	12 U	11 U	2 J	4 J	12 U	16 UJ
CARBON TETRACHLORIDE	12 U	11 U	12 U	15 U	12 UJ	16 UJ
CHLOROBENZENE	12 U	11 U	12 U	15 UJ	12 UJ	16 UR
CHLORODIBROMOMETHANE	12 U	11 U	12 U	15 U	12 UJ	16 UJ
CHLOROETHANE	12 U	11 U	12 U	15 U	12 U	16 UJ
CHLOROFORM	1 J	11 U	12 U	15 U	12 U	16 UJ
CHLOROMETHANE	12 U	11 U	12 U	15 U	12 U	16 UJ
CIS-1,3-DICHLOROPROPENE	12 U	11 U	12 U	15 U	12 UJ	16 UJ
ETHYLBENZENE	12 U	11 U	12 U	15 UJ	12 UJ	16 UR
METHYLENE CHLORIDE	12 U	18 U	14 U	15 U	38 U	32 U
STYRENE	12 U	11 U	12 U	15 UJ	12 UJ	16 UR
TETRACHLOROETHENE	12 U	11 U	12 U	15 UJ	12 UJ	16 UR
TOLUENE	12 U	11 U	12 U	15 UJ	12 UJ	6 J
TOTAL 1,2-DICHLOROETHENE	12 U	11 U	12 U	15 U	12 U	16 UJ
TOTAL XYLENES	12 U	11 U	12 U	15 UJ	12 UJ	2 UR
TRANS-1,3-DICHLOROPROPENE	12 U	11 U	12 U	15 U	12 UJ	16 UJ
TRICHLOROETHENE	12 U	11 U	12 U	25	12 UJ	3 UJ
VINYL CHLORIDE	12 U	11 U	12 U	15 U	12 U	16 UJ

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-MW02	WTB-MW03	WTB-MW03	WTB-MW03	WTB-MW04	WTB-MW04
SAMPLE ID	WTB-SB02-1517-98	WTB-SB03-0305-98	WTB-SB03-0911-98	WTB-SB03-1820-98	WTB-SB04-0305-98	WTB-SB04-0709-98
SAMPLE DATE	19980708	19980711	19980711	19980711	19980708	19980708
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH (feet)	15	3	9	18	3	7
BOTTOM DEPTH (feet)	17	5	11	20	5	9
EPH MADEP (MG/KG)						
C11-C22 AROMATICS	--	--	--	--	--	--
C19-C36 ALIPHATICS	--	--	--	--	--	--
C9-C18 ALIPHATICS	--	--	--	--	--	--
METALS (MG/KG)						
ALUMINUM	13500	16300	14600	22100	14800	10300
ANTIMONY	0.52 UR	0.35 UR	0.47 UR	0.41 UR	0.36 UR	0.55 U
ARSENIC	9.7 J	8.8 J	17.5 J	8 J	11.5 J	11.2 J
BARIUM	81 J	84.3	76	78.1	60.8	54
BERYLLIUM	0.76	0.77	0.58	1.6	0.63	0.58
CADMIUM	0.61 U	0.4 U	0.55 U	0.53 U	0.42 U	0.48 U
CALCIUM	2670 J	8930 J	1860 J	2490 J	3110 J	1890 J
CHROMIUM	36.5 J	55.6 J	52.4 J	40.3 J	54 J	27.7 J
COBALT	5.6	15.6	13.3	14	11.4	8.8
COPPER	127 J	42.9 J	45.4 J	29.4 J	19.1 J	88.7 J
IRON	26200	26400	23700	34000	20900	19200
LEAD	413	52.2 J	36.9 U	17.9 U	21.9 U	265 J
MAGNESIUM	6210	9960	7060	8510	6690	4220
MANGANESE	193	482 J	475 J	325 J	307 J	224 J
MERCURY	0.39 J	0.1 J	0.17 J	0.01 U	0.16 J	3.6 J
NICKEL	19.1 J	45.7	49.5	28.4 J	32.8	29.9
POTASSIUM	3710	4640	2260	8350	1960	1440
SELENIUM	1.1 U	0.56 UJ	0.76 UJ	0.65 UJ	0.78 U	0.68 UJ
SILVER	0.71 U	0.47 U	0.64 U	0.54 U	0.49 U	0.56 U
SODIUM	3690	274 U	189 U	1360	369	195 U
THALLIUM	0.86 U	0.95 U	0.77 U	0.66 U	0.62 U	0.68 U
VANADIUM	37.8	45.7	31.9	55.6	36.1	25.7
ZINC	261 J	88.1 J	73.2 J	91.7 J	49.3 J	233 J
MISCELLANEOUS PARAMETERS (%)						
TOTAL SOLIDS	--	--	--	--	--	--
MISCELLANEOUS PARAMETERS (MG/KG)						
CYANIDE	2 U	2 UJ	2 UJ	2 UJ	2 U	2 U
HEXAVALENT CHROMIUM	2 UJ	0.53 UJ	0.56 UJ	0.64 UJ	0.58 U	0.62 U
TOTAL ORGANIC CARBON	--	13000	25000	7900	41000	18000
MISCELLANEOUS PARAMETERS (S.U.)						
PH	8.2	8.4	7.8	8.7	8.2	7.7
PESTICIDES/PCBS (UG/KG)						
4,4'-DDD	4.9 U	3.6 U	4 U	4.9 U	3.7 U	3.9 U
4,4'-DDE	4.9 U	3.6 U	4 U	4.9 U	3.7 U	3.9 U
4,4'-DDT	4.9 U	3.6 U	4 U	4.9 U	3.7 U	3.9 U
ALDRIN	2.5 U	1.8 U	3 J	2.5 U	1.9 U	2 U
ALPHA-BHC	2.5 U	1.8 U	2 U	2.5 U	1.9 U	2 U
ALPHA-CHLORDANE	2.5 U	1.8 U	2 U	2.5 U	1.9 U	2 U
AROCLOR-1016	49 U	36 U	40 U	49 U	37 U	39 U
AROCLOR-1221	100 U	73 U	80 U	100 U	74 U	80 U
AROCLOR-1232	49 U	36 U	40 U	49 U	37 U	39 U
AROCLOR-1242	49 U	36 U	40 U	49 U	37 U	39 U
AROCLOR-1248	49 U	36 U	40 U	49 U	37 U	39 U
AROCLOR-1254	49 U	36 U	40 U	49 U	37 U	39 U
AROCLOR-1260	49 U	36 U	40 U	49 U	37 U	39 U
BETA-BHC	2.5 U	1.8 U	2 U	2.5 U	1.9 U	2 U
DELTA-BHC	2.5 U	1.8 U	2 U	2.5 U	1.9 U	2 U
DIELDRIN	4.9 U	3.6 U	4 U	4.9 U	3.7 U	3.9 U
ENDOSULFAN I	2.5 U	1.8 U	2 U	2.5 U	1.9 U	2 U
ENDOSULFAN II	4.9 U	3.6 U	4 U	4.9 U	3.7 U	3.9 U
ENDOSULFAN SULFATE	4.9 U	3.6 U	4 U	4.9 U	3.7 U	3.9 U
ENDRIN	4.9 U	3.6 U	4 U	4.9 U	3.7 U	3.9 U
ENDRIN ALDEHYDE	4.9 U	3.6 U	4 U	4.9 U	3.7 U	3.9 U
ENDRIN KETONE	54	3.6 U	4 U	4.9 U	3.7 U	3.9 U
GAMMA-BHC (LINDANE)	2.5 UJ	1.8 U	2 U	2.5 U	1.9 U	2 U
GAMMA-CHLORDANE	2.5 U	1.8 U	2 U	2.5 U	1.9 U	2 U

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	**WTB-MW02**	**WTB-MW03**	**WTB-MW03**	**WTB-MW03**	**WTB-MW04**	**WTB-MW04**
SAMPLE ID	**WTB-SB02-1517-98**	**WTB-SB03-0305-98**	**WTB-SB03-0911-98**	**WTB-SB03-1820-98**	**WTB-SB04-0305-98**	**WTB-SB04-0709-98**
SAMPLE DATE	**19980708**	**19980711**	**19980711**	**19980711**	**19980708**	**19980708**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
TOP DEPTH (feet)	**15**	**3**	**9**	**18**	**3**	**7**
BOTTOM DEPTH (feet)	**17**	**5**	**11**	**20**	**5**	**9**
HEPTACHLOR	2.5 U	1.8 U	2 U	2.5 U	1.9 U	2 U
HEPTACHLOR EPOXIDE	2.5 U	1.8 U	2 U	2.5 U	1.9 U	2 U
METHOXYCHLOR	25 U	18 U	20 U	25 U	19 U	20 U
TOXAPHENE	250 U	180 U	200 U	250 U	190 U	200 U
PETROLEUM HYDROCARBONS (MG/KG)						
DIESEL RANGE ORGANICS	1000 J	170 U	150 U	9.9 U	28 U	330 U
GASOLINE RANGE ORGANICS	4.3	2.5 U	2.5 U	3 U	3 U	2.8 U
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)						
ACENAPHTHENE	3800	27 J	400 U	430 U	150 J	400 U
ACENAPHTHYLENE	2500 U	140 J	400 U	430 U	360 U	400 U
ANTHRACENE	8900	74 J	32 J	41 J	340 J	51 J
BENZO(A)ANTHRACENE	10000	310 J	170 J	180 J	460	170 J
BENZO(A)PYRENE	8600	590	190 J	180 J	400	160 J
BENZO(B)FLUORANTHENE	9800	810	250 J	180 J	400	130 J
BENZO(G,H,I)PERYLENE	2500 UJ	220 J	82 J	120 J	360 U	81 J
BENZO(K)FLUORANTHENE	5300	340 J	110 J	150 J	290 J	140 J
CHRYSENE	11000	380	250 J	200 J	490	180 J
DIBENZO(A,H)ANTHRACENE	1600 J	120 J	71 J	44 J	86 J	43 J
DIBENZOFURAN	3200	360 U	400 U	430 U	100 J	400 U
FLUORANTHENE	30000	630	200 J	270 J	1100	280 J
FLUORENE	4100	37 J	23 J	30 J	150 J	400 U
INDENO(1,2,3-CD)PYRENE	4200 J	230 J	87 J	100 J	200 J	81 J
NAPHTHALENE	1600 J	360 U	66 J	23 J	100 J	400 U
PHENANTHRENE	26000	220 J	160 J	150 J	1100	48 J
PYRENE	18000	1100	270 J	320 J	860	260 J
BAP EQUIVALENT-HALFND	12664	848.78	313.05	271.7	595.39	242.68
BAP EQUIVALENT-POS	12664	848.78	313.05	271.7	595.39	242.68
SEMIVOLATILES (UG/KG)						
1,2,4-TRICHLOROBENZENE	2500 U	360 U	400 U	430 U	360 U	400 U
1,2-DICHLOROBENZENE	2500 U	360 U	400 U	430 U	360 U	400 U
1,3-DICHLOROBENZENE	2500 U	360 U	400 U	430 U	360 U	400 U
1,4-DICHLOROBENZENE	2500 U	360 U	400 U	430 U	360 U	400 U
2,2'-OXYBIS(1-CHLOROPROPANE)	2500 U	360 U	400 U	430 UJ	360 U	400 U
2,4,5-TRICHLOROPHENOL	6300 U	910 U	1000 U	1100 U	910 U	1000 U
2,4,6-TRICHLOROPHENOL	2500 U	360 U	400 U	430 U	360 U	400 U
2,4-DICHLOROPHENOL	2500 U	360 U	400 U	430 U	360 U	400 U
2,4-DIMETHYLPHENOL	2500 U	360 U	400 U	430 U	360 U	400 U
2,4-DINITROPHENOL	6300 UJ	910 UJ	1000 UJ	1100 UJ	910 UJ	1000 UJ
2,4-DINITROTOLUENE	2500 U	360 U	400 U	430 U	360 U	400 U
2,6-DINITROTOLUENE	2500 U	360 U	400 U	430 U	360 U	400 U
2-CHLORONAPHTHALENE	2500 U	360 U	400 U	430 U	360 U	400 U
2-CHLOROPHENOL	2500 U	360 U	400 U	430 U	360 U	400 U
2-METHYLNAPHTHALENE	890 J	360 U	28 J	430 U	51 J	400 U
2-METHYLPHENOL	2500 U	360 U	400 U	430 U	360 U	400 U
2-NITROANILINE	6300 U	910 U	1000 U	1100 UJ	910 U	1000 U
2-NITROPHENOL	2500 U	360 U	400 U	430 U	360 U	400 U
3,3'-DICHLOROBENZIDINE	2500 U	360 UJ	400 UJ	430 U	360 U	400 U
3-NITROANILINE	6300 U	910 U	1000 U	1100 U	910 U	1000 U
4,6-DINITRO-2-METHYLPHENOL	6300 U	910 U	1000 U	1100 U	910 U	1000 U
4-BROMOPHENYL PHENYL ETHER	2500 U	360 U	400 U	430 U	360 U	400 U
4-CHLORO-3-METHYLPHENOL	2500 U	360 U	400 U	430 U	360 U	400 U
4-CHLOROANILINE	2500 U	360 UJ	400 UJ	430 U	360 U	400 U
4-CHLOROPHENYL PHENYL ETHER	2500 U	360 U	400 U	430 U	360 U	400 U
4-METHYLPHENOL	2500 U	360 U	400 U	430 U	360 U	400 U
4-NITROANILINE	6300 U	910 U	1000 U	1100 UJ	910 U	1000 U
4-NITROPHENOL	6300 UJ	910 U	1000 U	1100 UJ	910 U	1000 U
BIS(2-CHLOROETHOXY)METHANE	2500 U	360 U	400 U	430 U	360 U	400 U
BIS(2-CHLOROETHYL)ETHER	2500 U	360 UJ	400 UJ	430 U	360 UJ	400 UJ
BIS(2-ETHYLHEXYL)PHTHALATE	2500 U	2000	420 U	430 U	390 U	400 U
BUTYL BENZYL PHTHALATE	2500 U	360 U	400 U	430 UJ	360 U	400 U
CARBAZOLE	4000	41 J	400 U	430 U	190 J	400 U

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-MW02	WTB-MW03	WTB-MW03	WTB-MW03	WTB-MW04	WTB-MW04
SAMPLE ID	WTB-SB02-1517-98	WTB-SB03-0305-98	WTB-SB03-0911-98	WTB-SB03-1820-98	WTB-SB04-0305-98	WTB-SB04-0709-98
SAMPLE DATE	19980708	19980711	19980711	19980711	19980708	19980708
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH (feet)	15	3	9	18	3	7
BOTTOM DEPTH (feet)	17	5	11	20	5	9
DIETHYL PHTHALATE	2500 U	360 U	400 U	430 U	360 U	400 U
DIMETHYL PHTHALATE	2500 U	360 U	400 U	430 U	360 U	400 U
DI-N-BUTYL PHTHALATE	2500 U	360 U	400 U	430 U	360 U	400 U
DI-N-OCTYL PHTHALATE	2500 UJ	360 U	400 U	430 UJ	360 U	400 U
HEXACHLOROBENZENE	2500 U	360 U	400 U	430 U	360 U	400 U
HEXACHLOROBUTADIENE	2500 UJ	360 U	400 U	430 U	360 U	400 U
HEXACHLOROCYCLOPENTADIENE	2500 U	360 U	400 U	430 U	360 U	400 U
HEXACHLOROETHANE	2500 U	360 U	400 U	430 U	360 U	400 U
ISOPHORONE	2500 U	360 U	400 U	430 UJ	360 U	400 U
NITROBENZENE	2500 U	360 U	400 U	430 U	360 U	400 U
N-NITROSO-DI-N-PROPYLAMINE	2500 U	360 U	400 U	430 UJ	360 U	400 U
N-NITROSODIPHENYLAMINE	2500 U	360 U	400 U	430 U	360 U	400 U
PENTACHLOROPHENOL	6300 U	910 UJ	1000 UJ	1100 UJ	910 UJ	1000 UJ
PHENOL	2500 U	360 UJ	400 UJ	430 U	360 UJ	400 UJ
VOLATILES (UG/KG)						
1,1,1-TRICHLOROETHANE	15 U	11 U	12 U	13 UJ	11 UJ	11 U
1,1,2,2-TETRACHLOROETHANE	15 U	11 U	12 U	13 UJ	11 UR	11 U
1,1,2-TRICHLOROETHANE	15 U	11 U	12 U	13 UJ	11 UJ	11 U
1,1,2-TRICHLOROTRIFLUOROETHANE	15 U	6 J	12 U	13 UJ	2 J	11 U
1,1-DICHLOROETHANE	15 U	11 U	12 U	13 U	11 UJ	11 U
1,1-DICHLOROETHENE	15 U	11 U	12 U	13 U	11 UJ	11 U
1,2-DICHLOROETHANE	15 U	11 U	12 U	13 U	11 UJ	11 U
1,2-DICHLOROPROPANE	15 U	11 U	12 U	13 U	11 UJ	11 U
2-BUTANONE	16 U	11 U	12 U	13 U	11 UJ	11 U
2-HEXANONE	15 U	11 U	12 U	13 UJ	11 UR	11 U
4-METHYL-2-PENTANONE	15 U	11 U	12 U	13 UJ	11 UR	11 U
ACETONE	290	1900 U	52 U	600 U	30 U	11 U
BENZENE	15 U	11 U	12 U	13 UJ	11 UJ	11 U
BROMODICHLOROMETHANE	15 U	11 U	12 U	13 UJ	11 UJ	11 U
BROMOFORM	15 U	11 U	12 U	13 UJ	11 UJ	11 U
BROMOMETHANE	15 U	11 U	12 U	13 U	11 UJ	11 U
CARBON DISULFIDE	35 U	11 U	12 U	4 J	11 UJ	11 U
CARBON TETRACHLORIDE	15 U	11 U	12 U	13 UJ	11 UJ	11 U
CHLOROBENZENE	15 U	11 U	12 U	13 UJ	11 UR	11 U
CHLORODIBROMOMETHANE	15 U	11 U	12 U	13 UJ	11 UJ	11 U
CHLOROETHANE	15 U	11 U	12 U	13 U	11 UJ	11 U
CHLOROFORM	15 U	11 U	1 J	2 J	11 UJ	11 U
CHLOROMETHANE	15 U	11 U	12 U	13 U	11 UJ	11 U
CIS-1,3-DICHLOROPROPENE	15 U	11 U	12 U	13 UJ	11 UJ	11 U
ETHYLBENZENE	15 U	11 U	12 U	13 UJ	11 UR	11 U
METHYLENE CHLORIDE	46 U	2500 U	12 U	13 U	43 U	16 U
STYRENE	15 U	11 U	12 U	13 UJ	11 UR	11 U
TETRACHLOROETHENE	15 U	11 U	12 U	13 UJ	11 UR	11 U
TOLUENE	15 J	11 U	12 U	13 UJ	11 UR	11 U
TOTAL 1,2-DICHLOROETHENE	15 U	11 U	12 U	13 U	11 UJ	11 U
TOTAL XYLENES	2 U	11 U	12 U	13 UJ	11 UR	11 U
TRANS-1,3-DICHLOROPROPENE	15 U	11 U	12 U	13 UJ	11 UJ	11 U
TRICHLOROETHENE	15 U	11 U	12 U	13 UJ	11 UJ	11 U
VINYL CHLORIDE	15 U	11 U	12 U	13 U	11 UJ	11 U

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-MW04	WTB-SB06	WTB-SB06	WTB-SB06	WTB-SB06	WTB-SB07
SAMPLE ID	WTB-SB04-0911-98	WTB-SB06-0305-98	WTB-SB06-0507-98	WTB-SB06-1820-98	WTB-SB06-1820-98-D	WTB-SB07-0305-98
SAMPLE DATE	19980708	19980715	19980715	19980715	19980715	19980711
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
TOP DEPTH (feet)	9	3	5	18	18	3
BOTTOM DEPTH (feet)	11	5	7	20	20	5
EPH MADEP (MG/KG)						
C11-C22 AROMATICS	--	--	--	--	--	--
C19-C36 ALIPHATICS	--	--	--	--	--	--
C9-C18 ALIPHATICS	--	--	--	--	--	--
METALS (MG/KG)						
ALUMINUM	11100	8220	6870	19400	18400	2300
ANTIMONY	0.74 U	0.32 UJ	1.1 U	0.44 UJ	0.36 UJ	0.5 U
ARSENIC	18.7 J	13.8	5.6	8.2	8.5	5.9 J
BARIUM	86.3	80.2	71.2	74.6	71.1	295
BERYLLIUM	0.78	0.57	0.47	1.4	1.3	0.54
CADMIUM	1.6 U	0.76 J	5.1 J	0.9 J	0.79 J	0.56 U
CALCIUM	10000 J	10900	11800	1790	1780	3610 J
CHROMIUM	146 J	25	17.3	40.5	38.8	7 U
COBALT	20.3	6.6	7.7	11.4	11.7	6.5
COPPER	3170 J	357 J	1820 J	39.5 J	28 J	124 J
IRON	133000	16700	22500	34900	32900	27300
LEAD	197 J	390 J	750 J	33.2 J	21.2 J	3610 J
MAGNESIUM	5260	2970	3480	8190	8100	406
MANGANESE	1150 J	213	338	366	352	59.3 J
MERCURY	0.17 J	0.44 J	0.07 U	0.02 U	0.06 U	2.4 J
NICKEL	342	37.4	88	27.8	27.9	10.3 U
POTASSIUM	1380	1320	838	7390	7200	1870
SELENIUM	1.8 U	0.52 U	0.53 U	0.71 U	0.58 U	1.6 U
SILVER	2.3 U	0.26 U	0.42 U	0.17 U	0.14 U	1 U
SODIUM	290 U	315	259 U	2140	2090	1860
THALLIUM	0.67 U	0.54 U	0.68 U	0.72 UJ	0.93 U	0.73 U
VANADIUM	79.7	19.6 J	17.5 J	50.3 J	49.6 J	9.8
ZINC	657 J	335 J	2040 J	117 J	91.7 J	64.5 J
MISCELLANEOUS PARAMETERS (%)						
TOTAL SOLIDS	--	--	--	--	--	--
MISCELLANEOUS PARAMETERS (MG/KG)						
CYANIDE	2 U	2 U	2 U	2 U	2 U	2 UJ
HEXAVALENT CHROMIUM	0.63 U	0.71 UJ	0.72 UJ	0.55 UJ	0.57 UJ	1.2 UJ
TOTAL ORGANIC CARBON	9600	19000	9700	4600	3200	220000
MISCELLANEOUS PARAMETERS (S.U.)						
PH	7.8	10.4	8.2	8.4	8.3	8.4
PESTICIDES/PCBS (UG/KG)						
4,4'-DDD	4 U	3.6 U	3.8 U	4.1 U	4.1 U	4 U
4,4'-DDE	4 U	3.6 U	3.8 U	4.1 U	4.1 U	4 U
4,4'-DDT	4 U	3.6 U	3.8 U	4.1 U	4.1 U	4 U
ALDRIN	2.1 U	1.9 U	1.9 J	2.1 U	2.1 U	5.3 J
ALPHA-BHC	2.1 U	1.9 U	2 U	2.1 U	2.1 U	2.1 U
ALPHA-CHLORDANE	2.1 U	1.9 U	2 U	2.1 U	2.1 U	2.1 U
AROCLOR-1016	40 U	36 U	38 U	41 U	41 U	40 U
AROCLOR-1221	81 U	73 U	77 U	82 U	84 U	81 U
AROCLOR-1232	40 U	36 U	38 U	41 U	41 U	40 U
AROCLOR-1242	40 U	36 U	38 U	41 U	41 U	40 U
AROCLOR-1248	40 U	36 U	38 U	41 U	41 U	40 U
AROCLOR-1254	40 U	36 U	38 U	41 U	41 U	40 U
AROCLOR-1260	40 U	36 U	38 U	41 U	41 U	40 U
BETA-BHC	2.1 U	1.9 U	2 U	2.1 U	2.1 U	2.1 U
DELTA-BHC	2.1 U	1.9 U	2 U	2.1 U	2.1 U	2.1 U
DIELDRIN	4 U	3.6 U	3.8 U	4.1 U	4.1 U	4 U
ENDOSULFAN I	2.1 U	1.9 U	2 U	2.1 U	2.1 U	2.1 U
ENDOSULFAN II	4 U	3.6 U	3.8 U	4.1 U	4.1 U	4 U
ENDOSULFAN SULFATE	4 U	3.6 U	3.8 U	4.1 U	4.1 U	4 U
ENDRIN	4 U	3.6 U	3.8 U	4.1 U	4.1 U	4 U
ENDRIN ALDEHYDE	4 U	3.6 U	3.8 U	4.1 U	4.1 U	4 U
ENDRIN KETONE	4 U	3.6 U	3.8 U	4.1 U	4.1 U	4 U
GAMMA-BHC (LINDANE)	2.1 U	1.9 U	2 U	2.1 U	2.1 U	2.1 U
GAMMA-CHLORDANE	2.1 U	1.9 U	2 U	2.1 U	2.1 U	2.1 U

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-MW04	WTB-SB06	WTB-SB06	WTB-SB06	WTB-SB06	WTB-SB07
SAMPLE ID	WTB-SB04-0911-98	WTB-SB06-0305-98	WTB-SB06-0507-98	WTB-SB06-1820-98	WTB-SB06-1820-98-D	WTB-SB07-0305-98
SAMPLE DATE	19980708	19980715	19980715	19980715	19980715	19980711
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
TOP DEPTH (feet)	9	3	5	18	18	3
BOTTOM DEPTH (feet)	11	5	7	20	20	5
HEPTACHLOR	2.1 U	1.9 U	2 U	2.1 U	2.1 U	2.1 U
HEPTACHLOR EPOXIDE	2.1 U	1.9 U	2 U	2.1 U	2.1 U	2.1 U
METHOXYCHLOR	21 U	19 U	20 U	21 U	21 U	21 U
TOXAPHENE	210 U	190 U	200 U	210 U	210 U	210 U
PETROLEUM HYDROCARBONS (MG/KG)						
DIESEL RANGE ORGANICS	260 U	57	330	11	7.6	140 U
GASOLINE RANGE ORGANICS	2.5 U	2.8 U	2.8 U	3 U	3 U	4.3 U
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)						
ACENAPHTHENE	400 U	360 U	400	430 U	430 U	400 U
ACENAPHTHYLENE	400 U	19 J	400 U	430 U	430 U	400 U
ANTHRACENE	46 J	50 J	1400	430 U	430 U	24 J
BENZO(A)ANTHRACENE	130 J	240 J	5700	430 U	430 U	210 J
BENZO(A)PYRENE	100 J	220 J	4300	430 U	430 U	220 J
BENZO(B)FLUORANTHENE	120 J	370	5400	430 U	430 U	310 J
BENZO(G,H,I)PERYLENE	42 J	36 J	400 U	430 U	430 U	150 J
BENZO(K)FLUORANTHENE	77 J	170 J	3900	430 U	430 U	140 J
CHRYSENE	150 J	300 J	6000	430 U	430 U	330 J
DIBENZO(A,H)ANTHRACENE	41 J	79 J	1100	430 U	430 U	78 J
DIBENZOFURAN	400 U	23 J	320 J	430 U	430 U	400 U
FLUORANTHENE	200 J	350 J	9400	23 J	430 U	240 J
FLUORENE	400 U	360 U	380 J	430 U	430 U	400 U
INDENO(1,2,3-CD)PYRENE	60 J	140 J	1800	21 J	430 U	140 J
NAPHTHALENE	23 J	42 J	250 J	430 U	430 U	24 J
PHENANTHRENE	140 J	200 J	6100	430 U	430 U	170 J
PYRENE	180 J	370	7800	24 J	430 U	260 J
BAP EQUIVALENT-HALFND	172.92	376	6735	477.465	430 U	365.73
BAP EQUIVALENT-POS	172.92	376	6735	2.1	430 U	365.73
SEMIVOLATILES (UG/KG)						
1,2,4-TRICHLOROBENZENE	400 U	360 U	400 U	430 U	430 U	400 U
1,2-DICHLOROBENZENE	400 U	360 U	400 U	430 U	430 U	400 U
1,3-DICHLOROBENZENE	400 U	360 U	400 U	430 U	430 U	400 U
1,4-DICHLOROBENZENE	400 U	360 U	400 U	430 U	430 U	400 U
2,2'-OXYBIS(1-CHLOROPROPANE)	400 U	360 U	400 U	430 U	430 U	400 UJ
2,4,5-TRICHLOROPHENOL	1000 U	910 U	1000 U	1100 U	1100 U	1000 U
2,4,6-TRICHLOROPHENOL	400 U	360 U	400 U	430 U	430 U	400 U
2,4-DICHLOROPHENOL	400 U	360 U	400 U	430 U	430 U	400 U
2,4-DIMETHYLPHENOL	400 U	360 U	400 U	430 U	430 U	400 U
2,4-DINITROPHENOL	1000 UJ	910 UJ	1000 UJ	1100 UJ	1100 UJ	1000 UJ
2,4-DINITROTOLUENE	400 U	360 U	400 U	430 U	430 U	400 U
2,6-DINITROTOLUENE	400 U	360 U	400 U	430 U	430 U	400 U
2-CHLORONAPHTHALENE	400 U	360 U	400 U	430 U	430 U	400 U
2-CHLOROPHENOL	400 U	360 U	400 U	430 U	430 U	400 U
2-METHYLNAPHTHALENE	26 J	360 U	300 J	430 U	430 U	35 J
2-METHYLPHENOL	400 U	360 U	400 U	430 U	430 U	400 U
2-NITROANILINE	1000 U	910 U	1000 U	1100 U	1100 U	1000 UJ
2-NITROPHENOL	400 U	360 U	400 U	430 U	430 U	400 U
3,3'-DICHLOROBENZIDINE	400 U	360 U	400 U	430 U	430 U	400 U
3-NITROANILINE	1000 U	910 U	1000 U	1100 U	1100 U	1000 U
4,6-DINITRO-2-METHYLPHENOL	1000 U	910 U	1000 U	1100 U	1100 U	1000 U
4-BROMOPHENYL PHENYL ETHER	400 U	360 U	400 U	430 U	430 U	400 U
4-CHLORO-3-METHYLPHENOL	400 U	360 U	400 U	430 U	430 U	400 U
4-CHLOROANILINE	400 U	360 U	400 U	430 U	430 U	400 U
4-CHLOROPHENYL PHENYL ETHER	400 U	360 U	400 U	430 U	430 U	400 U
4-METHYLPHENOL	400 U	360 U	400 U	430 U	430 U	400 U
4-NITROANILINE	1000 U	910 U	1000 U	1100 U	1100 U	1000 UJ
4-NITROPHENOL	1000 U	910 U	1000 U	1100 U	1100 U	1000 UJ
BIS(2-CHLOROETHOXY)METHANE	400 U	360 U	400 U	430 U	430 U	400 U
BIS(2-CHLOROETHYL)ETHER	400 UJ	360 U	400 U	430 U	430 U	400 U
BIS(2-ETHYLHEXYL)PHTHALATE	610	510 U	210 U	150 U	150 U	400 U
BUTYL BENZYL PHTHALATE	400 U	38 J	400 U	26 J	30 J	400 UJ
CARBAZOLE	400 U	24 J	380 J	430 U	430 U	400 U

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-MW04	WTB-SB06	WTB-SB06	WTB-SB06	WTB-SB06	WTB-SB07
SAMPLE ID	WTB-SB04-0911-98	WTB-SB06-0305-98	WTB-SB06-0507-98	WTB-SB06-1820-98	WTB-SB06-1820-98-D	WTB-SB07-0305-98
SAMPLE DATE	19980708	19980715	19980715	19980715	19980715	19980711
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
TOP DEPTH (feet)	9	3	5	18	18	3
BOTTOM DEPTH (feet)	11	5	7	20	20	5
DIETHYL PHTHALATE	400 U	360 U	400 U	430 U	430 U	400 U
DIMETHYL PHTHALATE	400 U	360 U	400 U	430 U	430 U	400 U
DI-N-BUTYL PHTHALATE	400 U	22 J	400 U	430 U	26 J	400 U
DI-N-OCTYL PHTHALATE	400 U	360 U	400 U	430 U	430 U	400 UJ
HEXACHLOROBENZENE	400 U	360 U	400 U	430 U	430 U	400 U
HEXACHLOROBUTADIENE	400 U	360 U	400 U	430 U	430 U	400 U
HEXACHLOROCYCLOPENTADIENE	400 U	360 UJ	400 UJ	430 UJ	430 UJ	400 U
HEXACHLOROETHANE	400 U	360 U	400 U	430 U	430 U	400 U
ISOPHORONE	400 U	360 U	400 U	430 U	430 U	400 UJ
NITROBENZENE	400 U	360 U	400 U	430 U	430 U	400 U
N-NITROSO-DI-N-PROPYLAMINE	400 U	360 U	400 U	430 U	430 U	400 UJ
N-NITROSODIPHENYLAMINE	400 U	360 U	400 U	430 U	430 U	400 U
PENTACHLOROPHENOL	1000 UJ	910 UJ	1000 UJ	1100 UJ	1100 UJ	1000 UJ
PHENOL	400 UJ	360 U	400 U	430 U	430 U	400 U
VOLATILES (UG/KG)						
1,1,1-TRICHLOROETHANE	12 U	11 UJ	12 UJ	13 U	13 U	12 UR
1,1,2,2-TETRACHLOROETHANE	12 U	11 UJ	12 UJ	13 U	13 U	12 UR
1,1,2-TRICHLOROETHANE	12 U	11 UJ	12 UJ	13 U	13 U	12 UR
1,1,2-TRICHLOROTRIFLUOROETHANE	12 U	11 U	12 U	13 U	13 U	12 UJ
1,1-DICHLOROETHANE	12 U	11 U	12 U	13 U	13 U	12 UJ
1,1-DICHLOROETHENE	12 U	11 U	12 U	13 U	13 U	12 UJ
1,2-DICHLOROETHANE	12 U	11 U	12 U	13 U	13 U	12 UJ
1,2-DICHLOROPROPANE	12 U	11 UJ	12 UJ	13 U	13 U	12 UR
2-BUTANONE	16 U	11 U	12 U	13 U	13 U	12 UJ
2-HEXANONE	12 U	11 UJ	12 UJ	13 U	13 U	12 UR
4-METHYL-2-PENTANONE	12 U	11 UJ	12 UJ	13 U	13 U	12 UR
ACETONE	240	2500 J	58 U	120	180	65 U
BENZENE	12 U	11 UJ	12 UJ	13 U	13 U	12 UR
BROMODICHLOROMETHANE	12 U	11 UJ	12 UJ	13 U	13 U	12 UR
BROMOFORM	12 U	11 UJ	12 UJ	13 U	13 U	12 UJ
BROMOMETHANE	12 U	11 U	12 U	13 U	13 U	12 UJ
CARBON DISULFIDE	4 J	11 U	12 U	11 J	6 J	12 UJ
CARBON TETRACHLORIDE	12 U	11 UJ	12 UJ	13 U	13 U	12 UR
CHLOROBENZENE	12 U	11 UJ	12 UJ	13 U	13 U	12 UJ
CHLORODIBROMOMETHANE	12 U	11 UJ	12 UJ	13 U	13 U	12 UR
CHLOROETHANE	12 U	11 U	12 U	13 U	13 U	12 UJ
CHLOROFORM	12 U	11 U	12 U	13 U	13 U	2 J
CHLOROMETHANE	12 U	11 U	12 U	13 U	13 U	12 UJ
CIS-1,3-DICHLOROPROPENE	12 U	11 UJ	12 UJ	13 U	13 U	12 UR
ETHYLBENZENE	12 U	11 UJ	12 UJ	13 U	13 U	12 UJ
METHYLENE CHLORIDE	12 U	22 U	42 U	25 U	19 U	27 U
STYRENE	12 U	11 UJ	12 UJ	13 U	13 U	12 UJ
TETRACHLOROETHENE	12 U	11 UJ	12 UJ	13 U	13 U	12 UJ
TOLUENE	12 U	11 UJ	12 UJ	13 U	13 U	12 UR
TOTAL 1,2-DICHLOROETHENE	12 U	11 U	12 U	13 U	13 U	12 UJ
TOTAL XYLENES	12 U	11 UJ	12 UJ	13 U	13 U	12 U
TRANS-1,3-DICHLOROPROPENE	12 U	11 UJ	12 UJ	13 U	13 U	12 UR
TRICHLOROETHENE	12 U	11 UJ	12 UJ	13 U	13 U	12 UR
VINYL CHLORIDE	12 U	11 U	12 U	13 U	13 U	12 UJ

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB07	WTB-SB07	WTB-SB08	WTB-SB08	WTB-SB09	WTB-SB09
SAMPLE ID	WTB-SB07-0709-98	WTB-SB07-1315-98	WTB-SB-08-0206	WTB-SB-08-0610	WTB-SB-09-0206	WTB-SB-09-0610
SAMPLE DATE	19980711	19980711	20150604	20150604	20150604	20150604
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH (feet)	7	13	2	6	2	6
BOTTOM DEPTH (feet)	9	15	6	10	6	10
EPH MADEP (MG/KG)						
C11-C22 AROMATICS	--	--	1100	530	26	680
C19-C36 ALIPHATICS	--	--	2500	840	15 U	1200
C9-C18 ALIPHATICS	--	--	140	73	15 U	91
METALS (MG/KG)						
ALUMINUM	1910	14700	7220	6720	5170	5610
ANTIMONY	0.68 U	0.83 U	3.1 J	8.46 J	1610 J	616
ARSENIC	6.8 J	8.3 J	61.9	34	35.1	30.9
BARIUM	302	55.9	115 J	370 J	237 J	276
BERYLLIUM	0.46	0.98	0.416 J	0.618 J	0.262 J	1 UJ
CADMIUM	0.55 U	1.1 U	5.41 J	7.29 J	6.81 J	7.63
CALCIUM	3760 J	4900 J	3030 J	22400 J	2660 J	3490
CHROMIUM	6.7 U	66.6 J	142 J	149 J	103 J	116 J
COBALT	4.4	9.4	15.2	26.3	17.1	19.5
COPPER	102 J	91.8 J	21300	23900	23100	39600 J
IRON	20700	28900	208000	203000	208000	172000
LEAD	492 J	278 J	1140	1980	20100	16900
MAGNESIUM	794	6940	5440	2200	4230	3800
MANGANESE	33.3 J	224 J	1480 J-	1000 J-	701 J-	738
MERCURY	1 J	4.6 J	1.38	9.53 J	0.332 J	3.74 J
NICKEL	8.7 U	22.7 U	1370	2810	735	1100 J
POTASSIUM	821	4300	1660 J	897 J	1910 J	1560 J
SELENIUM	1.3 U	1.2 UJ	19 U	17 U	16 U	7 U
SILVER	0.64 U	0.96 U	3.6 J	5.4 J	6.86 J	5.38 U
SODIUM	593	5720	349 J	722 J	642 J	761 U
THALLIUM	0.77 U	1.2 U	0.134	0.15	0.122	0.143
VANADIUM	11.6	43.9	33.8	22.3 U	35.6	47.8
ZINC	31.3 J	155 J	3290	3020	7350	5060 J
MISCELLANEOUS PARAMETERS (%)						
TOTAL SOLIDS	--	--	84	69	89	84
MISCELLANEOUS PARAMETERS (MG/KG)						
CYANIDE	2 UJ	2 UJ	--	--	--	--
HEXAVALENT CHROMIUM	1.2 UJ	1.9 UJ	--	--	--	--
TOTAL ORGANIC CARBON	--	51000	--	--	--	--
MISCELLANEOUS PARAMETERS (S.U.)						
PH	9	8.2	--	--	--	--
PESTICIDES/PCBS (UG/KG)						
4,4'-DDD	4.4 U	6.1 U	--	--	--	--
4,4'-DDE	4.4 U	6.1 U	--	--	--	--
4,4'-DDT	4.4 U	6.1 U	--	--	--	--
ALDRIN	7.2 R	3.1 U	--	--	--	--
ALPHA-BHC	2.3 U	3.1 U	--	--	--	--
ALPHA-CHLORDANE	2.3 U	3.1 U	--	--	--	--
AROCLOR-1016	44 U	61 U	--	--	--	--
AROCLOR-1221	89 U	120 U	--	--	--	--
AROCLOR-1232	44 U	61 U	--	--	--	--
AROCLOR-1242	44 U	61 U	--	--	--	--
AROCLOR-1248	44 U	61 U	--	--	--	--
AROCLOR-1254	44 U	61 U	--	--	--	--
AROCLOR-1260	44 U	61 U	--	--	--	--
BETA-BHC	2.3 U	3.1 U	--	--	--	--
DELTA-BHC	2.3 U	3.1 U	--	--	--	--
DIELDRIN	4.4 U	6.1 U	--	--	--	--
ENDOSULFAN I	2.3 U	3.1 U	--	--	--	--
ENDOSULFAN II	5 J	6.1 U	--	--	--	--
ENDOSULFAN SULFATE	4.4 U	6.1 U	--	--	--	--
ENDRIN	4.4 U	6.1 U	--	--	--	--
ENDRIN ALDEHYDE	4.4 U	6.1 U	--	--	--	--
ENDRIN KETONE	4.4 U	6.1 U	--	--	--	--
GAMMA-BHC (LINDANE)	2.3 U	3.1 U	--	--	--	--
GAMMA-CHLORDANE	2.3 U	3.1 U	--	--	--	--

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB07	WTB-SB07	WTB-SB08	WTB-SB08	WTB-SB09	WTB-SB09
SAMPLE ID	WTB-SB07-0709-98	WTB-SB07-1315-98	WTB-SB-08-0206	WTB-SB-08-0610	WTB-SB-09-0206	WTB-SB-09-0610
SAMPLE DATE	19980711	19980711	20150604	20150604	20150604	20150604
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH (feet)	7	13	2	6	2	6
BOTTOM DEPTH (feet)	9	15	6	10	6	10
HEPTACHLOR	2.3 U	3.1 U	--	--	--	--
HEPTACHLOR EPOXIDE	2.3 U	3.1 U	--	--	--	--
METHOXYCHLOR	23 U	31 U	--	--	--	--
TOXAPHENE	230 U	310 U	--	--	--	--
PETROLEUM HYDROCARBONS (MG/KG)						
DIESEL RANGE ORGANICS	190 U	100 U	--	--	--	--
GASOLINE RANGE ORGANICS	4.5 U	5.3 U	--	--	--	--
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)						
ACENAPHTHENE	430 U	52 J	9.7 J	18 J	11 J	320
ACENAPHTHYLENE	430 U	34 J	24	13 U	11 U	21 J
ANTHRACENE	430 U	88 J	65	26 J	36	790
BENZO(A)ANTHRACENE	89 J	390 J	290 J	260 J	120	1800
BENZO(A)PYRENE	64 J	290 J	300 J	220 J	87	1500
BENZO(B)FLUORANTHENE	110 J	390 J	380	390	130	2100
BENZO(G,H,I)PERYLENE	68 J	200 J	160 J	150 J	42	730
BENZO(K)FLUORANTHENE	52 J	220 J	170 J	150 J	50	820
CHRYSENE	240 J	390 J	530	460	160	2100
DIBENZO(A,H)ANTHRACENE	69 J	89 J	68 J	50 J	17 J	370 J
DIBENZOFURAN	430 U	48 J	--	--	--	--
FLUORANTHENE	61 J	650	220 J	400 J	230	2400
FLUORENE	430 U	75 J	19 J	11 J	12 J	280
INDENO(1,2,3-CD)PYRENE	50 J	170 J	190 J	170 J	46	830
NAPHTHALENE	25 J	96 J	64	13 J	9.7 J	190
PHENANTHRENE	160 J	330 J	230	68	190	3300
PYRENE	93 J	610 J	550	570	240	3200
BAP EQUIVALENT-HALFND	158.66	476.59	456.23	353.96	134.26	2353.3
BAP EQUIVALENT-POS	158.66	476.59	456.23	353.96	134.26	2353.3
SEMIVOLATILES (UG/KG)						
1,2,4-TRICHLOROBENZENE	430 U	590 U	--	--	--	--
1,2-DICHLOROBENZENE	430 U	590 U	--	--	--	--
1,3-DICHLOROBENZENE	430 U	590 U	--	--	--	--
1,4-DICHLOROBENZENE	430 U	590 U	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	430 UJ	590 U	--	--	--	--
2,4,5-TRICHLOROPHENOL	1100 U	1500 U	--	--	--	--
2,4,6-TRICHLOROPHENOL	430 U	590 U	--	--	--	--
2,4-DICHLOROPHENOL	430 U	590 U	--	--	--	--
2,4-DIMETHYLPHENOL	430 U	590 U	--	--	--	--
2,4-DINITROPHENOL	1100 UJ	1500 U	--	--	--	--
2,4-DINITROTOLUENE	430 U	590 U	--	--	--	--
2,6-DINITROTOLUENE	430 U	590 U	--	--	--	--
2-CHLORONAPHTHALENE	430 U	590 U	--	--	--	--
2-CHLOROPHENOL	430 U	590 U	--	--	--	--
2-METHYLNAPHTHALENE	40 J	58 J	--	--	--	--
2-METHYLPHENOL	430 U	590 U	--	--	--	--
2-NITROANILINE	1100 UJ	1500 U	--	--	--	--
2-NITROPHENOL	430 U	590 U	--	--	--	--
3,3'-DICHLOROBENZIDINE	430 U	590 U	--	--	--	--
3-NITROANILINE	1100 U	1500 U	--	--	--	--
4,6-DINITRO-2-METHYLPHENOL	1100 U	1500 U	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	430 U	590 U	--	--	--	--
4-CHLORO-3-METHYLPHENOL	430 U	590 U	--	--	--	--
4-CHLOROANILINE	430 U	590 U	--	--	--	--
4-CHLOROPHENYL PHENYL ETHER	430 U	590 U	--	--	--	--
4-METHYLPHENOL	430 U	590 U	--	--	--	--
4-NITROANILINE	1100 UJ	1500 U	--	--	--	--
4-NITROPHENOL	1100 UJ	1500 U	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	430 U	590 U	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	430 U	590 U	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	430 U	590 U	--	--	--	--
BUTYL BENZYL PHTHALATE	430 UJ	590 U	--	--	--	--
CARBAZOLE	430 U	71 J	--	--	--	--

LOCATION	WTB-SB07	WTB-SB07	WTB-SB08	WTB-SB08	WTB-SB09	WTB-SB09
SAMPLE ID	WTB-SB07-0709-98	WTB-SB07-1315-98	WTB-SB-08-0206	WTB-SB-08-0610	WTB-SB-09-0206	WTB-SB-09-0610
SAMPLE DATE	19980711	19980711	20150604	20150604	20150604	20150604
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH (feet)	7	13	2	6	2	6
BOTTOM DEPTH (feet)	9	15	6	10	6	10
DIETHYL PHTHALATE	430 U	590 U	--	--	--	--
DIMETHYL PHTHALATE	430 U	590 U	--	--	--	--
DI-N-BUTYL PHTHALATE	430 U	590 U	--	--	--	--
DI-N-OCTYL PHTHALATE	430 UJ	590 U	--	--	--	--
HEXACHLOROBENZENE	430 U	590 U	--	--	--	--
HEXACHLOROBUTADIENE	430 U	590 U	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	430 U	590 U	--	--	--	--
HEXACHLOROETHANE	430 U	590 U	--	--	--	--
ISOPHORONE	430 UJ	590 U	--	--	--	--
NITROBENZENE	430 U	590 U	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	430 UJ	590 U	--	--	--	--
N-NITROSODIPHENYLAMINE	430 U	590 U	--	--	--	--
PENTACHLOROPHENOL	1100 UJ	1500 UJ	--	--	--	--
PHENOL	430 U	590 U	--	--	--	--
VOLATILES (UG/KG)						
1,1,1-TRICHLOROETHANE	13 UJ	92 U	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	13 UJ	92 U	--	--	--	--
1,1,2-TRICHLOROETHANE	13 UJ	92 U	--	--	--	--
1,1,2-TRICHLOROTRIFLUOROETHANE	1 J	92 U	--	--	--	--
1,1-DICHLOROETHANE	13 UJ	92 U	--	--	--	--
1,1-DICHLOROETHENE	13 UJ	92 U	--	--	--	--
1,2-DICHLOROETHANE	13 UJ	92 U	--	--	--	--
1,2-DICHLOROPROPANE	13 UJ	92 U	--	--	--	--
2-BUTANONE	13 UJ	92 U	--	--	--	--
2-HEXANONE	13 UJ	92 U	--	--	--	--
4-METHYL-2-PENTANONE	13 UJ	92 U	--	--	--	--
ACETONE	330 U	5600 U	--	--	--	--
BENZENE	2 J	92 U	--	--	--	--
BROMODICHLOROMETHANE	13 UJ	92 U	--	--	--	--
BROMOFORM	13 UJ	92 U	--	--	--	--
BROMOMETHANE	13 UJ	92 U	--	--	--	--
CARBON DISULFIDE	13 UJ	20 J	--	--	--	--
CARBON TETRACHLORIDE	13 UJ	92 U	--	--	--	--
CHLOROBENZENE	13 UJ	92 U	--	--	--	--
CHLORODIBROMOMETHANE	13 UJ	92 U	--	--	--	--
CHLOROETHANE	13 UJ	92 U	--	--	--	--
CHLOROFORM	4 J	92 U	--	--	--	--
CHLOROMETHANE	13 UJ	92 U	--	--	--	--
CIS-1,3-DICHLOROPROPENE	13 UJ	92 U	--	--	--	--
ETHYLBENZENE	2 J	92 U	--	--	--	--
METHYLENE CHLORIDE	710 U	920 J	--	--	--	--
STYRENE	13 UJ	92 U	--	--	--	--
TETRACHLOROETHENE	6 J	92 U	--	--	--	--
TOLUENE	6 J	92 U	--	--	--	--
TOTAL 1,2-DICHLOROETHENE	13 UJ	92 U	--	--	--	--
TOTAL XYLENES	13 UJ	92 U	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	13 UJ	92 U	--	--	--	--
TRICHLOROETHENE	7 J	92 U	--	--	--	--
VINYL CHLORIDE	13 UJ	92 U	--	--	--	--

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB10	WTB-SB10	WTB-SB11	WTB-SB11	WTB-SB12	WTB-SB12
SAMPLE ID	WTB-SB-10-0206	WTB-SB-10-0610	WTB-SB-11-0206	WTB-SB-11-0610	WTB-SB-12-0206	WTB-SB-12-0610
SAMPLE DATE	20150605	20150605	20150601	20150601	20150604	20150604
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH (feet)	2	6	2	6	2	6
BOTTOM DEPTH (feet)	6	10	6	10	6	10
EPH MADEP (MG/KG)						
C11-C22 AROMATICS	89	82 J	570	620	49	100
C19-C36 ALIPHATICS	60	72 J	1000	1100	34 J	55
C9-C18 ALIPHATICS	14 J	17 J	170	140	34 U	33 U
METALS (MG/KG)						
ALUMINUM	7450	10300	5560	8540	8440	5030
ANTIMONY	1 J	3.27 J	1340	52.5	1.13	11.4
ARSENIC	9.26 J	19.4 J	29.7	46.2	22.7	8.57
BARIUM	114 J	141 J	286	207	418	134
BERYLLIUM	0.593 J	0.591 J	0.41 J	4.94 U	0.507 U	0.735 U
CADMIUM	1.1 J	0.423 J	7.64	5.22 U	0.697	1.51
CALCIUM	5700	1950	7550	20500	2230	9010
CHROMIUM	31.8 J	31.5 J	1890	5780	21.8 J	24.6 J
COBALT	8.8	9.39	40.7	39	7.16	9.9
COPPER	502 J	123 J	9840	8100 J	818 J	958 J
IRON	23900	27600	269000	239000 J	25500	33900
LEAD	781 J	430 J	5760	18700	1580	401
MAGNESIUM	4630	5300	2800	3020	2670	5760
MANGANESE	254	324	1430	12600 J	356	440
MERCURY	0.604 J	1.92 J	18.6 J	2.89 J	1.66 J	0.548 J
NICKEL	32.6	28.7	944	3260	27.8 J	127 J
POTASSIUM	1880 J	1690 J	1690 J	1390 J	1270 J	1200 J
SELENIUM	5.8 U	1.3	8.8 U	8.2 U	0.35 J	0.68 J
SILVER	0.58 J	0.35 UJ	9.23 U	6.72 U	0.549 J	0.54 J
SODIUM	302 J	154 J	599 U	281 J	2080 J	1020
THALLIUM	0.183	0.254	0.099 U	0.118 U	0.111	0.126
VANADIUM	26.2	26.6	18.5	49 J	21.2	24
ZINC	846 J	198 J	6850	3210	898 J	1050 J
MISCELLANEOUS PARAMETERS (%)						
TOTAL SOLIDS	82	87	79	79	85	81
MISCELLANEOUS PARAMETERS (MG/KG)						
CYANIDE	--	--	--	--	--	--
HEXAVALENT CHROMIUM	--	--	--	--	--	--
TOTAL ORGANIC CARBON	--	--	--	--	--	--
MISCELLANEOUS PARAMETERS (S.U.)						
PH	--	--	--	--	--	--
PESTICIDES/PCBS (UG/KG)						
4,4'-DDD	--	--	--	--	--	--
4,4'-DDE	--	--	--	--	--	--
4,4'-DDT	--	--	--	--	--	--
ALDRIN	--	--	--	--	--	--
ALPHA-BHC	--	--	--	--	--	--
ALPHA-CHLORDANE	--	--	--	--	--	--
AROCLOR-1016	--	--	--	--	--	--
AROCLOR-1221	--	--	--	--	--	--
AROCLOR-1232	--	--	--	--	--	--
AROCLOR-1242	--	--	--	--	--	--
AROCLOR-1248	--	--	--	--	--	--
AROCLOR-1254	--	--	--	--	--	--
AROCLOR-1260	--	--	--	--	--	--
BETA-BHC	--	--	--	--	--	--
DELTA-BHC	--	--	--	--	--	--
DIELDRIN	--	--	--	--	--	--
ENDOSULFAN I	--	--	--	--	--	--
ENDOSULFAN II	--	--	--	--	--	--
ENDOSULFAN SULFATE	--	--	--	--	--	--
ENDRIN	--	--	--	--	--	--
ENDRIN ALDEHYDE	--	--	--	--	--	--
ENDRIN KETONE	--	--	--	--	--	--
GAMMA-BHC (LINDANE)	--	--	--	--	--	--
GAMMA-CHLORDANE	--	--	--	--	--	--

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB10	WTB-SB10	WTB-SB11	WTB-SB11	WTB-SB12	WTB-SB12
SAMPLE ID	WTB-SB-10-0206	WTB-SB-10-0610	WTB-SB-11-0206	WTB-SB-11-0610	WTB-SB-12-0206	WTB-SB-12-0610
SAMPLE DATE	20150605	20150605	20150601	20150601	20150604	20150604
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH (feet)	2	6	2	6	2	6
BOTTOM DEPTH (feet)	6	10	6	10	6	10
HEPTACHLOR	--	--	--	--	--	--
HEPTACHLOR EPOXIDE	--	--	--	--	--	--
METHOXYCHLOR	--	--	--	--	--	--
TOXAPHENE	--	--	--	--	--	--
PETROLEUM HYDROCARBONS (MG/KG)						
DIESEL RANGE ORGANICS	--	--	--	--	--	--
GASOLINE RANGE ORGANICS	--	--	--	--	--	--
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)						
ACENAPHTHENE	120	130	21 J	7.8 J	23	81
ACENAPHTHYLENE	12 U	6 J	8.3 J	5.8 J	12 U	14 J
ANTHRACENE	210	240	140	39	51	520
BENZO(A)ANTHRACENE	570	620	780	610	230	1600
BENZO(A)PYRENE	600	450 J	750 J	580 J	200	1100
BENZO(B)FLUORANTHENE	880	650 J	1100 J	960 J	280	1500
BENZO(G,H,I)PERYLENE	220	240 J	350 J	250 J	120	430
BENZO(K)FLUORANTHENE	170	260 J	290 J	320 J	110	540
CHRYSENE	730	610	890	720	260	1600
DIBENZO(A,H)ANTHRACENE	82	78 J	110 J	120 J	34	170
DIBENZOFURAN	--	--	--	--	--	--
FLUORANTHENE	540	940	970	340 J	290	2700
FLUORENE	120	120	33	16 J	17 J	62
INDENO(1,2,3-CD)PYRENE	250	260 J	360 J	310 J	120	540
NAPHTHALENE	24 J	26	60	13 J	10 J	74
PHENANTHRENE	400	1000	620	200	250	1500
PYRENE	720	1100	1200	660	530	2600
BAP EQUIVALENT-HALFND	854.43	684.21	1087.79	891.92	298.36	1641
BAP EQUIVALENT-POS	854.43	684.21	1087.79	891.92	298.36	1641
SEMIVOLATILES (UG/KG)						
1,2,4-TRICHLOROBENZENE	--	--	--	--	--	--
1,2-DICHLOROBENZENE	--	--	--	--	--	--
1,3-DICHLOROBENZENE	--	--	--	--	--	--
1,4-DICHLOROBENZENE	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	--	--	--	--	--	--
2,4-DICHLOROPHENOL	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	--	--	--	--	--	--
2,4-DINITROPHENOL	--	--	--	--	--	--
2,4-DINITROTOLUENE	--	--	--	--	--	--
2,6-DINITROTOLUENE	--	--	--	--	--	--
2-CHLORONAPHTHALENE	--	--	--	--	--	--
2-CHLOROPHENOL	--	--	--	--	--	--
2-METHYLNAPHTHALENE	--	--	--	--	--	--
2-METHYLPHENOL	--	--	--	--	--	--
2-NITROANILINE	--	--	--	--	--	--
2-NITROPHENOL	--	--	--	--	--	--
3,3'-DICHLOROBENZIDINE	--	--	--	--	--	--
3-NITROANILINE	--	--	--	--	--	--
4,6-DINITRO-2-METHYLPHENOL	--	--	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	--	--	--	--	--	--
4-CHLORO-3-METHYLPHENOL	--	--	--	--	--	--
4-CHLOROANILINE	--	--	--	--	--	--
4-CHLOROPHENYL PHENYL ETHER	--	--	--	--	--	--
4-METHYLPHENOL	--	--	--	--	--	--
4-NITROANILINE	--	--	--	--	--	--
4-NITROPHENOL	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	--	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--	--	--	--
CARBAZOLE	--	--	--	--	--	--

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB10	WTB-SB10	WTB-SB11	WTB-SB11	WTB-SB12	WTB-SB12
SAMPLE ID	WTB-SB-10-0206	WTB-SB-10-0610	WTB-SB-11-0206	WTB-SB-11-0610	WTB-SB-12-0206	WTB-SB-12-0610
SAMPLE DATE	20150605	20150605	20150601	20150601	20150604	20150604
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH (feet)	2	6	2	6	2	6
BOTTOM DEPTH (feet)	6	10	6	10	6	10
DIETHYL PHTHALATE	--	--	--	--	--	--
DIMETHYL PHTHALATE	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--	--	--	--
HEXACHLOROBENZENE	--	--	--	--	--	--
HEXACHLOROBUTADIENE	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	--	--	--	--	--	--
HEXACHLOROETHANE	--	--	--	--	--	--
ISOPHORONE	--	--	--	--	--	--
NITROBENZENE	--	--	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	--	--	--	--	--	--
PENTACHLOROPHENOL	--	--	--	--	--	--
PHENOL	--	--	--	--	--	--
VOLATILES (UG/KG)						
1,1,1-TRICHLOROETHANE	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	--	--	--	--	--	--
1,1,2-TRICHLOROTRIFLUOROETHANE	--	--	--	--	--	--
1,1-DICHLOROETHANE	--	--	--	--	--	--
1,1-DICHLOROETHENE	--	--	--	--	--	--
1,2-DICHLOROETHANE	--	--	--	--	--	--
1,2-DICHLOROPROPANE	--	--	--	--	--	--
2-BUTANONE	--	--	--	--	--	--
2-HEXANONE	--	--	--	--	--	--
4-METHYL-2-PENTANONE	--	--	--	--	--	--
ACETONE	--	--	--	--	--	--
BENZENE	--	--	--	--	--	--
BROMODICHLOROMETHANE	--	--	--	--	--	--
BROMOFORM	--	--	--	--	--	--
BROMOMETHANE	--	--	--	--	--	--
CARBON DISULFIDE	--	--	--	--	--	--
CARBON TETRACHLORIDE	--	--	--	--	--	--
CHLOROBENZENE	--	--	--	--	--	--
CHLORODIBROMOMETHANE	--	--	--	--	--	--
CHLOROETHANE	--	--	--	--	--	--
CHLOROFORM	--	--	--	--	--	--
CHLOROMETHANE	--	--	--	--	--	--
CIS-1,3-DICHLOROPROPENE	--	--	--	--	--	--
ETHYLBENZENE	--	--	--	--	--	--
METHYLENE CHLORIDE	--	--	--	--	--	--
STYRENE	--	--	--	--	--	--
TETRACHLOROETHENE	--	--	--	--	--	--
TOLUENE	--	--	--	--	--	--
TOTAL 1,2-DICHLOROETHENE	--	--	--	--	--	--
TOTAL XYLENES	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	--	--	--	--	--	--
TRICHLOROETHENE	--	--	--	--	--	--
VINYL CHLORIDE	--	--	--	--	--	--

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB13	WTB-SB13	WTB-SB14	WTB-SB14	WTB-SB14	WTB-SB15
SAMPLE ID	WTB-SB-13-0206	WTB-SB-13-0610	WTB-SB-14-0206	WTB-SB-14-0206-D	WTB-SB-14-0607	WTB-SB-15-0206
SAMPLE DATE	20150605	20150605	20150603	20150603	20150603	20150604
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	ORIG
TOP DEPTH (feet)	2	6	2	2	6	2
BOTTOM DEPTH (feet)	6	10	6	6	7	6
EPH MADEP (MG/KG)						
C11-C22 AROMATICS	270	180	22 J	29 J	79	12 J
C19-C36 ALIPHATICS	190 J	180	37	30 J	190	15 U
C9-C18 ALIPHATICS	74 UJ	78 U	26 U	27 U	43	15 U
METALS (MG/KG)						
ALUMINUM	12200	10500	7090	8300	5830	11600
ANTIMONY	0.527 J	0.2 J	0.35	0.11	0.551	0.11
ARSENIC	12.1 J	12.2 J	10.9	12.4	2.48	11.5
BARIUM	98.7 J	60.4 J	34.3	41.5	21.6	43.9
BERYLLIUM	0.69 J	0.508 J	0.348 U	0.379 U	0.18 U	0.49 J
CADMIUM	0.814 U	0.647	0.254 J	0.416 J	0.276 J	0.263 U
CALCIUM	5710	20600	1450	1290	2220	2200
CHROMIUM	54 J	57.8 J	50.9	52.2	247	38.9 J
COBALT	10.7	7.7	5.64	6.33	6.28	9.51
COPPER	141 J	163 J	19.2 J	21.4 J	36.8 J	45.1 J
IRON	34600	18200	14200 J	16200 J	15800 J	17500
LEAD	341 J	520 J	18.5	17.9	48.6	41.3
MAGNESIUM	7130	7140	3530	4890	4350	6160
MANGANESE	537	320	202 J	225 J	210 J	315
MERCURY	1.19 J	1.07 J	0.012 J	0.014 J	0.286 J	0.209 J
NICKEL	40.8	32.2	22.1	25.3	26.7	35.1 J
POTASSIUM	3520 J	2000 J	1530 J	1830 J	1830 J	1430 J
SELENIUM	1.2 U	0.63 J	0.37 J	0.32 J	0.22 J	0.54 U
SILVER	0.727 U	0.07 J	0.368 J	0.1 J	0.063 J	0.31 U
SODIUM	203 J	182 J	283	277	346	637 J
THALLIUM	0.232	0.149	0.121	0.129	0.152	0.138
VANADIUM	41.4	31.7	15.6 J	18.8 J	20.9 J	27.1
ZINC	283 J	365 J	151	204	464	65.8 J
MISCELLANEOUS PARAMETERS (%)						
TOTAL SOLIDS	89	87	95	95	94	85
MISCELLANEOUS PARAMETERS (MG/KG)						
CYANIDE	--	--	--	--	--	--
HEXAVALENT CHROMIUM	--	--	--	--	--	--
TOTAL ORGANIC CARBON	--	--	--	--	--	--
MISCELLANEOUS PARAMETERS (S.U.)						
PH	--	--	--	--	--	--
PESTICIDES/PCBS (UG/KG)						
4,4'-DDD	--	--	--	--	--	--
4,4'-DDE	--	--	--	--	--	--
4,4'-DDT	--	--	--	--	--	--
ALDRIN	--	--	--	--	--	--
ALPHA-BHC	--	--	--	--	--	--
ALPHA-CHLORDANE	--	--	--	--	--	--
AROCLOR-1016	--	--	--	--	--	--
AROCLOR-1221	--	--	--	--	--	--
AROCLOR-1232	--	--	--	--	--	--
AROCLOR-1242	--	--	--	--	--	--
AROCLOR-1248	--	--	--	--	--	--
AROCLOR-1254	--	--	--	--	--	--
AROCLOR-1260	--	--	--	--	--	--
BETA-BHC	--	--	--	--	--	--
DELTA-BHC	--	--	--	--	--	--
DIELDRIN	--	--	--	--	--	--
ENDOSULFAN I	--	--	--	--	--	--
ENDOSULFAN II	--	--	--	--	--	--
ENDOSULFAN SULFATE	--	--	--	--	--	--
ENDRIN	--	--	--	--	--	--
ENDRIN ALDEHYDE	--	--	--	--	--	--
ENDRIN KETONE	--	--	--	--	--	--
GAMMA-BHC (LINDANE)	--	--	--	--	--	--
GAMMA-CHLORDANE	--	--	--	--	--	--

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB13	WTB-SB13	WTB-SB14	WTB-SB14	WTB-SB14	WTB-SB15
SAMPLE ID	WTB-SB-13-0206	WTB-SB-13-0610	WTB-SB-14-0206	WTB-SB-14-0206-D	WTB-SB-14-0607	WTB-SB-15-0206
SAMPLE DATE	20150605	20150605	20150603	20150603	20150603	20150604
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	ORIG
TOP DEPTH (feet)	2	6	2	2	6	2
BOTTOM DEPTH (feet)	6	10	6	6	7	6
HEPTACHLOR	--	--	--	--	--	--
HEPTACHLOR EPOXIDE	--	--	--	--	--	--
METHOXYCHLOR	--	--	--	--	--	--
TOXAPHENE	--	--	--	--	--	--
PETROLEUM HYDROCARBONS (MG/KG)						
DIESEL RANGE ORGANICS	--	--	--	--	--	--
GASOLINE RANGE ORGANICS	--	--	--	--	--	--
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)						
ACENAPHTHENE	1800	3.6 J	10 U	10 U	28	7.4 J
ACENAPHTHYLENE	36 J	6.3 J	10 U	10 U	10 U	6.1 J
ANTHRACENE	3200	23	10 U	10 U	16 J	22
BENZO(A)ANTHRACENE	5400	130 J	4.4 J	7.2 J	24	110
BENZO(A)PYRENE	3500	170 J	4.8 J	9.2 J	20 J	120
BENZO(B)FLUORANTHENE	4800	250 J	8.1 J	15 J	38 J	140
BENZO(G,H,I)PERYLENE	1900	110 J	10 UJ	11 J	13 J	92
BENZO(K)FLUORANTHENE	1400 J	64 J	10 UJ	10 U	11 J	58 J
CHRYSENE	4800	170 J	10 U	10 U	69	140
DIBENZO(A,H)ANTHRACENE	630 J	48 J	10 UJ	10 U	10 UJ	36
DIBENZOFURAN	--	--	--	--	--	--
FLUORANTHENE	11000	130 J	7.9 J	13 J	53	160
FLUORENE	1800	6.1 J	10 U	10 U	8 J	6.9 J
INDENO(1,2,3-CD)PYRENE	2100	110 J	10 UJ	8.7 J	12 J	91
NAPHTHALENE	350 J	9.9 U	10 U	10 U	10 U	10 U
PHENANTHRENE	11000	100	5.1 J	7.4 J	35	120
PYRENE	8800	260 J	8.9 J	15 J	64	180
BAP EQUIVALENT-HALFND	5378.8	267.81	11.605	17.345	32.579	190.82
BAP EQUIVALENT-POS	5378.8	267.81	6.05	12.29	27.579	190.82
SEMIVOLATILES (UG/KG)						
1,2,4-TRICHLOROBENZENE	--	--	--	--	--	--
1,2-DICHLOROBENZENE	--	--	--	--	--	--
1,3-DICHLOROBENZENE	--	--	--	--	--	--
1,4-DICHLOROBENZENE	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	--	--	--	--	--	--
2,4-DICHLOROPHENOL	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	--	--	--	--	--	--
2,4-DINITROPHENOL	--	--	--	--	--	--
2,4-DINITROTOLUENE	--	--	--	--	--	--
2,6-DINITROTOLUENE	--	--	--	--	--	--
2-CHLORONAPHTHALENE	--	--	--	--	--	--
2-CHLOROPHENOL	--	--	--	--	--	--
2-METHYLNAPHTHALENE	--	--	--	--	--	--
2-METHYLPHENOL	--	--	--	--	--	--
2-NITROANILINE	--	--	--	--	--	--
2-NITROPHENOL	--	--	--	--	--	--
3,3'-DICHLOROBENZIDINE	--	--	--	--	--	--
3-NITROANILINE	--	--	--	--	--	--
4,6-DINITRO-2-METHYLPHENOL	--	--	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	--	--	--	--	--	--
4-CHLORO-3-METHYLPHENOL	--	--	--	--	--	--
4-CHLOROANILINE	--	--	--	--	--	--
4-CHLOROPHENYL PHENYL ETHER	--	--	--	--	--	--
4-METHYLPHENOL	--	--	--	--	--	--
4-NITROANILINE	--	--	--	--	--	--
4-NITROPHENOL	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	--	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--	--	--	--
CARBAZOLE	--	--	--	--	--	--

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB13	WTB-SB13	WTB-SB14	WTB-SB14	WTB-SB14	WTB-SB15
SAMPLE ID	WTB-SB-13-0206	WTB-SB-13-0610	WTB-SB-14-0206	WTB-SB-14-0206-D	WTB-SB-14-0607	WTB-SB-15-0206
SAMPLE DATE	20150605	20150605	20150603	20150603	20150603	20150604
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	ORIG
TOP DEPTH (feet)	2	6	2	2	6	2
BOTTOM DEPTH (feet)	6	10	6	6	7	6
DIETHYL PHTHALATE	--	--	--	--	--	--
DIMETHYL PHTHALATE	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--	--	--	--
HEXACHLOROBENZENE	--	--	--	--	--	--
HEXACHLOROBUTADIENE	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	--	--	--	--	--	--
HEXACHLOROETHANE	--	--	--	--	--	--
ISOPHORONE	--	--	--	--	--	--
NITROBENZENE	--	--	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	--	--	--	--	--	--
PENTACHLOROPHENOL	--	--	--	--	--	--
PHENOL	--	--	--	--	--	--
VOLATILES (UG/KG)						
1,1,1-TRICHLOROETHANE	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	--	--	--	--	--	--
1,1,2-TRICHLOROTRIFLUOROETHANE	--	--	--	--	--	--
1,1-DICHLOROETHANE	--	--	--	--	--	--
1,1-DICHLOROETHENE	--	--	--	--	--	--
1,2-DICHLOROETHANE	--	--	--	--	--	--
1,2-DICHLOROPROPANE	--	--	--	--	--	--
2-BUTANONE	--	--	--	--	--	--
2-HEXANONE	--	--	--	--	--	--
4-METHYL-2-PENTANONE	--	--	--	--	--	--
ACETONE	--	--	--	--	--	--
BENZENE	--	--	--	--	--	--
BROMODICHLOROMETHANE	--	--	--	--	--	--
BROMOFORM	--	--	--	--	--	--
BROMOMETHANE	--	--	--	--	--	--
CARBON DISULFIDE	--	--	--	--	--	--
CARBON TETRACHLORIDE	--	--	--	--	--	--
CHLOROBENZENE	--	--	--	--	--	--
CHLORODIBROMOMETHANE	--	--	--	--	--	--
CHLOROETHANE	--	--	--	--	--	--
CHLOROFORM	--	--	--	--	--	--
CHLOROMETHANE	--	--	--	--	--	--
CIS-1,3-DICHLOROPROPENE	--	--	--	--	--	--
ETHYLBENZENE	--	--	--	--	--	--
METHYLENE CHLORIDE	--	--	--	--	--	--
STYRENE	--	--	--	--	--	--
TETRACHLOROETHENE	--	--	--	--	--	--
TOLUENE	--	--	--	--	--	--
TOTAL 1,2-DICHLOROETHENE	--	--	--	--	--	--
TOTAL XYLENES	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	--	--	--	--	--	--
TRICHLOROETHENE	--	--	--	--	--	--
VINYL CHLORIDE	--	--	--	--	--	--

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB15	WTB-SB15	WTB-SB16	WTB-SB16	WTB-SB17	WTB-SB17
SAMPLE ID	WTB-SB-15-0206-D	WTB-SB-15-0610	WTB-SB-16-0206	WTB-SB-16-0610	WTB-SB-17-0206	WTB-SB-17-0610
SAMPLE DATE	20150604	20150604	20150604	20150604	20150603	20150603
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH (feet)	2	6	2	6	2	6
BOTTOM DEPTH (feet)	6	10	6	10	6	10
EPH MADEP (MG/KG)						
C11-C22 AROMATICS	22	110	130	100	73	2200
C19-C36 ALIPHATICS	16 U	100	67	32	44	410
C9-C18 ALIPHATICS	16 U	34 U	32 U	25	30 U	74
METALS (MG/KG)						
ALUMINUM	10400	5580	18100	10300	4440	4040
ANTIMONY	0.12	2.76	0.297	4.37 J	0.255	8.26
ARSENIC	12.5	10.2	16.6	14 J	10.8	26.5
BARIUM	47.7	57.2	107	85 J	51.6	249
BERYLLIUM	0.498 J	0.523 U	1 J	0.805 J	0.558	0.36 U
CADMIUM	0.153 U	0.856	0.54 U	0.729 U	0.429 J	4.41
CALCIUM	1920	3040	3130	2580	2500	3850
CHROMIUM	29 J	28.1 J	51.2 J	31.1 J	18.1	31
COBALT	7.09	6.45	12.2	8.09	4.28	10.2
COPPER	30.4 J	373 J	118 J	254 J	224 J	2360 J
IRON	16300	15700	25200	8300	9810 J	102000 J
LEAD	40.1	270	173	1230 J	122	3080
MAGNESIUM	4540	3230	8880	4600	1940	2480
MANGANESE	272	194	391	282	259 J	139 J
MERCURY	0.254 J	0.726 J	0.751 J	0.339 J	0.213 J	0.484 J
NICKEL	25.7 J	27.2 J	48.2 J	47	21.2	194
POTASSIUM	1670 J	1450 J	2680 J	1900 J	980 J	909 J
SELENIUM	0.6 U	0.34 J	0.66 J	1.5 U	0.31 J	5 U
SILVER	0.22 J	0.518 J	0.13 J	0.931 U	0.12 J	2.9 U
SODIUM	696 J	711 J	155 U	200 J	188	413 U
THALLIUM	0.146	0.095 U	0.212	0.167	0.0888 U	0.065 U
VANADIUM	23	17.8	39.7	29.6	11.2 J	84.4 J
ZINC	64.6	371 J	120 J	344 J	205	2060
MISCELLANEOUS PARAMETERS (%)						
TOTAL SOLIDS	85	85	90	83	91	82
MISCELLANEOUS PARAMETERS (MG/KG)						
CYANIDE	--	--	--	--	--	--
HEXAVALENT CHROMIUM	--	--	--	--	--	--
TOTAL ORGANIC CARBON	--	--	--	--	--	--
MISCELLANEOUS PARAMETERS (S.U.)						
PH	--	--	--	--	--	--
PESTICIDES/PCBS (UG/KG)						
4,4'-DDD	--	--	--	--	--	--
4,4'-DDE	--	--	--	--	--	--
4,4'-DDT	--	--	--	--	--	--
ALDRIN	--	--	--	--	--	--
ALPHA-BHC	--	--	--	--	--	--
ALPHA-CHLORDANE	--	--	--	--	--	--
AROCLOR-1016	--	--	--	--	--	--
AROCLOR-1221	--	--	--	--	--	--
AROCLOR-1232	--	--	--	--	--	--
AROCLOR-1242	--	--	--	--	--	--
AROCLOR-1248	--	--	--	--	--	--
AROCLOR-1254	--	--	--	--	--	--
AROCLOR-1260	--	--	--	--	--	--
BETA-BHC	--	--	--	--	--	--
DELTA-BHC	--	--	--	--	--	--
DIELDRIN	--	--	--	--	--	--
ENDOSULFAN I	--	--	--	--	--	--
ENDOSULFAN II	--	--	--	--	--	--
ENDOSULFAN SULFATE	--	--	--	--	--	--
ENDRIN	--	--	--	--	--	--
ENDRIN ALDEHYDE	--	--	--	--	--	--
ENDRIN KETONE	--	--	--	--	--	--
GAMMA-BHC (LINDANE)	--	--	--	--	--	--
GAMMA-CHLORDANE	--	--	--	--	--	--

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB15	WTB-SB15	WTB-SB16	WTB-SB16	WTB-SB17	WTB-SB17
SAMPLE ID	WTB-SB-15-0206-D	WTB-SB-15-0610	WTB-SB-16-0206	WTB-SB-16-0610	WTB-SB-17-0206	WTB-SB-17-0610
SAMPLE DATE	20150604	20150604	20150604	20150604	20150603	20150603
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH (feet)	2	6	2	6	2	6
BOTTOM DEPTH (feet)	6	10	6	10	6	10
HEPTACHLOR	--	--	--	--	--	--
HEPTACHLOR EPOXIDE	--	--	--	--	--	--
METHOXYCHLOR	--	--	--	--	--	--
TOXAPHENE	--	--	--	--	--	--
PETROLEUM HYDROCARBONS (MG/KG)						
DIESEL RANGE ORGANICS	--	--	--	--	--	--
GASOLINE RANGE ORGANICS	--	--	--	--	--	--
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)						
ACENAPHTHENE	11 U	12 J	21	1.9 J	11 U	67 J
ACENAPHTHYLENE	6.1 J	13 J	13 J	5.4 J	11 U	48 J
ANTHRACENE	19 J	79	120	23 J	7.1 J	95 J
BENZO(A)ANTHRACENE	100	410	880	240	40	200 J
BENZO(A)PYRENE	120	360 J	1000	250	30	370 J
BENZO(B)FLUORANTHENE	140	570 J	1500	350	51	510 J
BENZO(G,H,I)PERYLENE	100	210 J	720	140	17 J	240 J
BENZO(K)FLUORANTHENE	60 J	220 J	510	120 J	14 J	160 J
CHRYSENE	130	520	1000	320	60	230 J
DIBENZO(A,H)ANTHRACENE	42	72 J	210	62	11 U	98 J
DIBENZOFURAN	--	--	--	--	--	--
FLUORANTHENE	140	440	1100	190	46	270 J
FLUORENE	5.8 J	19 J	11 J	7.4 J	11 U	47 J
INDENO(1,2,3-CD)PYRENE	100	230 J	800	170	16 J	230 J
NAPHTHALENE	11 U	23	21	13 J	11 U	160
PHENANTHRENE	90	340	730	120	40	540
PYRENE	160	690 J	1400 J	240	55	400 J
BAP EQUIVALENT-HALFND	196.73	555.72	1534.1	389.52	46.4	563.83
BAP EQUIVALENT-POS	196.73	555.72	1534.1	389.52	40.9	563.83
SEMIVOLATILES (UG/KG)						
1,2,4-TRICHLOROBENZENE	--	--	--	--	--	--
1,2-DICHLOROBENZENE	--	--	--	--	--	--
1,3-DICHLOROBENZENE	--	--	--	--	--	--
1,4-DICHLOROBENZENE	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	--	--	--	--	--	--
2,4-DICHLOROPHENOL	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	--	--	--	--	--	--
2,4-DINITROPHENOL	--	--	--	--	--	--
2,4-DINITROTOLUENE	--	--	--	--	--	--
2,6-DINITROTOLUENE	--	--	--	--	--	--
2-CHLORONAPHTHALENE	--	--	--	--	--	--
2-CHLOROPHENOL	--	--	--	--	--	--
2-METHYLNAPHTHALENE	--	--	--	--	--	--
2-METHYLPHENOL	--	--	--	--	--	--
2-NITROANILINE	--	--	--	--	--	--
2-NITROPHENOL	--	--	--	--	--	--
3,3'-DICHLOROBENZIDINE	--	--	--	--	--	--
3-NITROANILINE	--	--	--	--	--	--
4,6-DINITRO-2-METHYLPHENOL	--	--	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	--	--	--	--	--	--
4-CHLORO-3-METHYLPHENOL	--	--	--	--	--	--
4-CHLOROANILINE	--	--	--	--	--	--
4-CHLOROPHENYL PHENYL ETHER	--	--	--	--	--	--
4-METHYLPHENOL	--	--	--	--	--	--
4-NITROANILINE	--	--	--	--	--	--
4-NITROPHENOL	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	--	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--	--	--	--
CARBAZOLE	--	--	--	--	--	--

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB15	WTB-SB15	WTB-SB16	WTB-SB16	WTB-SB17	WTB-SB17
SAMPLE ID	WTB-SB-15-0206-D	WTB-SB-15-0610	WTB-SB-16-0206	WTB-SB-16-0610	WTB-SB-17-0206	WTB-SB-17-0610
SAMPLE DATE	20150604	20150604	20150604	20150604	20150603	20150603
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH (feet)	2	6	2	6	2	6
BOTTOM DEPTH (feet)	6	10	6	10	6	10
DIETHYL PHTHALATE	--	--	--	--	--	--
DIMETHYL PHTHALATE	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--	--	--	--
HEXACHLOROBENZENE	--	--	--	--	--	--
HEXACHLOROBUTADIENE	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	--	--	--	--	--	--
HEXACHLOROETHANE	--	--	--	--	--	--
ISOPHORONE	--	--	--	--	--	--
NITROBENZENE	--	--	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	--	--	--	--	--	--
PENTACHLOROPHENOL	--	--	--	--	--	--
PHENOL	--	--	--	--	--	--
VOLATILES (UG/KG)						
1,1,1-TRICHLOROETHANE	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	--	--	--	--	--	--
1,1,2-TRICHLOROTRIFLUOROETHANE	--	--	--	--	--	--
1,1-DICHLOROETHANE	--	--	--	--	--	--
1,1-DICHLOROETHENE	--	--	--	--	--	--
1,2-DICHLOROETHANE	--	--	--	--	--	--
1,2-DICHLOROPROPANE	--	--	--	--	--	--
2-BUTANONE	--	--	--	--	--	--
2-HEXANONE	--	--	--	--	--	--
4-METHYL-2-PENTANONE	--	--	--	--	--	--
ACETONE	--	--	--	--	--	--
BENZENE	--	--	--	--	--	--
BROMODICHLOROMETHANE	--	--	--	--	--	--
BROMOFORM	--	--	--	--	--	--
BROMOMETHANE	--	--	--	--	--	--
CARBON DISULFIDE	--	--	--	--	--	--
CARBON TETRACHLORIDE	--	--	--	--	--	--
CHLOROBENZENE	--	--	--	--	--	--
CHLORODIBROMOMETHANE	--	--	--	--	--	--
CHLOROETHANE	--	--	--	--	--	--
CHLOROFORM	--	--	--	--	--	--
CHLOROMETHANE	--	--	--	--	--	--
CIS-1,3-DICHLOROPROPENE	--	--	--	--	--	--
ETHYLBENZENE	--	--	--	--	--	--
METHYLENE CHLORIDE	--	--	--	--	--	--
STYRENE	--	--	--	--	--	--
TETRACHLOROETHENE	--	--	--	--	--	--
TOLUENE	--	--	--	--	--	--
TOTAL 1,2-DICHLOROETHENE	--	--	--	--	--	--
TOTAL XYLENES	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	--	--	--	--	--	--
TRICHLOROETHENE	--	--	--	--	--	--
VINYL CHLORIDE	--	--	--	--	--	--

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB18	WTB-SB18	WTB-SB19	WTB-SB19	WTB-SB20	WTB-SB20
SAMPLE ID	WTB-SB-18-0206	WTB-SB-18-0610	WTB-SB-19-0206	WTB-SB-19-0610	WTB-SB-20-0206	WTB-SB-20-0610
SAMPLE DATE	20150604	20150604	20150603	20150603	20150604	20150604
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH (feet)	2	6	2	6	2	6
BOTTOM DEPTH (feet)	6	10	6	10	6	10
EPH MADEP (MG/KG)						
C11-C22 AROMATICS	17 J	49	410	78	24	25
C19-C36 ALIPHATICS	16 U	37	83	23 J	16 U	14 J
C9-C18 ALIPHATICS	16 U	11 J	32 U	29 U	16 U	17 U
METALS (MG/KG)						
ALUMINUM	15100	14900	9150	12700	12300	11900
ANTIMONY	0.12 J	0.918 J	0.301	1.29	0.937 J	0.077 U
ARSENIC	13 J	9.71 J	11.8	14.9	11.1 J	12.7 J
BARIUM	71 J	95 J	57.3	69	72.7 J	93.9 J
BERYLLIUM	0.773 J	0.864 J	0.677	0.621	0.64 J	0.77
CADMIUM	0.284 J	1.31	0.299 J	0.305 J	0.32 U	0.197 J
CALCIUM	2210	8320	2420	2710	2380	1780
CHROMIUM	47.8 J	36.6 J	35.4	46.6	38.5 J	29 J
COBALT	12.5	10	7.49	9.98	8.48	12.4
COPPER	74.8 J	306 J	303 J	130 J	64.2 J	70.2 J
IRON	23000	21100	17800 J	20300 J	16500	18600
LEAD	151 J	375 J	176	280	85.9 J	131 J
MAGNESIUM	7020	4940	4140	7670	5110	4060
MANGANESE	344	589	301 J	349 J	313	1220
MERCURY	0.17 J	0.211 J	0.245 J	1.95 J	0.0707 J	0.655 J
NICKEL	48.1	28.1	26.5	41.3	30.3	23.6
POTASSIUM	1810 J	2210 J	1610 J	1690 J	2020 J	1730 J
SELENIUM	0.71 J	0.58 J	0.64 U	0.78 J	0.76 U	0.8 J
SILVER	0.39 UJ	0.41 UJ	0.328 J	0.543 J	0.43 UJ	0.18 J
SODIUM	796 J	674 J	519	392	450 J	345
THALLIUM	0.168	0.217	0.128	0.145	0.161	0.182
VANADIUM	32.5	29.1	26.1 J	30.9 J	26.9	23.9
ZINC	108 J	764 J	173	217	90.2 J	87.7 J
MISCELLANEOUS PARAMETERS (%)						
TOTAL SOLIDS	84	83	87	89	84	82
MISCELLANEOUS PARAMETERS (MG/KG)						
CYANIDE	--	--	--	--	--	--
HEXAVALENT CHROMIUM	--	--	--	--	--	--
TOTAL ORGANIC CARBON	--	--	--	--	--	--
MISCELLANEOUS PARAMETERS (S.U.)						
PH	--	--	--	--	--	--
PESTICIDES/PCBS (UG/KG)						
4,4'-DDD	--	--	--	--	--	--
4,4'-DDE	--	--	--	--	--	--
4,4'-DDT	--	--	--	--	--	--
ALDRIN	--	--	--	--	--	--
ALPHA-BHC	--	--	--	--	--	--
ALPHA-CHLORDANE	--	--	--	--	--	--
AROCLOR-1016	--	--	--	--	--	--
AROCLOR-1221	--	--	--	--	--	--
AROCLOR-1232	--	--	--	--	--	--
AROCLOR-1242	--	--	--	--	--	--
AROCLOR-1248	--	--	--	--	--	--
AROCLOR-1254	--	--	--	--	--	--
AROCLOR-1260	--	--	--	--	--	--
BETA-BHC	--	--	--	--	--	--
DELTA-BHC	--	--	--	--	--	--
DIELDRIN	--	--	--	--	--	--
ENDOSULFAN I	--	--	--	--	--	--
ENDOSULFAN II	--	--	--	--	--	--
ENDOSULFAN SULFATE	--	--	--	--	--	--
ENDRIN	--	--	--	--	--	--
ENDRIN ALDEHYDE	--	--	--	--	--	--
ENDRIN KETONE	--	--	--	--	--	--
GAMMA-BHC (LINDANE)	--	--	--	--	--	--
GAMMA-CHLORDANE	--	--	--	--	--	--

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB18	WTB-SB18	WTB-SB19	WTB-SB19	WTB-SB20	WTB-SB20
SAMPLE ID	WTB-SB-18-0206	WTB-SB-18-0610	WTB-SB-19-0206	WTB-SB-19-0610	WTB-SB-20-0206	WTB-SB-20-0610
SAMPLE DATE	20150604	20150604	20150603	20150603	20150604	20150604
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH (feet)	2	6	2	6	2	6
BOTTOM DEPTH (feet)	6	10	6	10	6	10
HEPTACHLOR	--	--	--	--	--	--
HEPTACHLOR EPOXIDE	--	--	--	--	--	--
METHOXYCHLOR	--	--	--	--	--	--
TOXAPHENE	--	--	--	--	--	--
PETROLEUM HYDROCARBONS (MG/KG)						
DIESEL RANGE ORGANICS	--	--	--	--	--	--
GASOLINE RANGE ORGANICS	--	--	--	--	--	--
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)						
ACENAPHTHENE	14 J	12 U	14 J	11 U	12 U	12 U
ACENAPHTHYLENE	11 U	12 U	10 U	11 U	12 U	12 U
ANTHRACENE	66	21 J	44	22 J	6.4 J	20 J
BENZO(A)ANTHRACENE	150	130	170	130	38 J	80
BENZO(A)PYRENE	120	120	140 J	110	32 J	68
BENZO(B)FLUORANTHENE	150	150	230 J	150	58 J	92
BENZO(G,H,I)PERYLENE	70	93	76 J	64	27 J	39
BENZO(K)FLUORANTHENE	69 J	70 J	69 J	62	12 J	29
CHRYSENE	180	170	210	140	69 J	79
DIBENZO(A,H)ANTHRACENE	30	29	31 J	20 J	11 J	19 J
DIBENZOFURAN	--	--	--	--	--	--
FLUORANTHENE	250	160	210	180	48 J	99
FLUORENE	16 J	5.6 J	18 J	11 U	3.9 J	8.5 J
INDENO(1,2,3-CD)PYRENE	76	96	84 J	64	28 J	44
NAPHTHALENE	11 U	12 U	10 U	11 U	12 U	12 U
PHENANTHRENE	230	110	210	91	61 J	120
PYRENE	300	190	340	180	84 J	150 J
BAP EQUIVALENT-HALFND	188.47	187.47	220.3	165.16	55.589	108.969
BAP EQUIVALENT-POS	188.47	187.47	220.3	165.16	55.589	108.969
SEMIVOLATILES (UG/KG)						
1,2,4-TRICHLOROBENZENE	--	--	--	--	--	--
1,2-DICHLOROBENZENE	--	--	--	--	--	--
1,3-DICHLOROBENZENE	--	--	--	--	--	--
1,4-DICHLOROBENZENE	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	--	--	--	--	--	--
2,4-DICHLOROPHENOL	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	--	--	--	--	--	--
2,4-DINITROPHENOL	--	--	--	--	--	--
2,4-DINITROTOLUENE	--	--	--	--	--	--
2,6-DINITROTOLUENE	--	--	--	--	--	--
2-CHLORONAPHTHALENE	--	--	--	--	--	--
2-CHLOROPHENOL	--	--	--	--	--	--
2-METHYLNAPHTHALENE	--	--	--	--	--	--
2-METHYLPHENOL	--	--	--	--	--	--
2-NITROANILINE	--	--	--	--	--	--
2-NITROPHENOL	--	--	--	--	--	--
3,3'-DICHLOROBENZIDINE	--	--	--	--	--	--
3-NITROANILINE	--	--	--	--	--	--
4,6-DINITRO-2-METHYLPHENOL	--	--	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	--	--	--	--	--	--
4-CHLORO-3-METHYLPHENOL	--	--	--	--	--	--
4-CHLOROANILINE	--	--	--	--	--	--
4-CHLOROPHENYL PHENYL ETHER	--	--	--	--	--	--
4-METHYLPHENOL	--	--	--	--	--	--
4-NITROANILINE	--	--	--	--	--	--
4-NITROPHENOL	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	--	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--	--	--	--
CARBAZOLE	--	--	--	--	--	--

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB18	WTB-SB18	WTB-SB19	WTB-SB19	WTB-SB20	WTB-SB20
SAMPLE ID	WTB-SB-18-0206	WTB-SB-18-0610	WTB-SB-19-0206	WTB-SB-19-0610	WTB-SB-20-0206	WTB-SB-20-0610
SAMPLE DATE	20150604	20150604	20150603	20150603	20150604	20150604
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH (feet)	2	6	2	6	2	6
BOTTOM DEPTH (feet)	6	10	6	10	6	10
DIETHYL PHTHALATE	--	--	--	--	--	--
DIMETHYL PHTHALATE	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--	--	--	--
HEXACHLOROBENZENE	--	--	--	--	--	--
HEXACHLOROBUTADIENE	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	--	--	--	--	--	--
HEXACHLOROETHANE	--	--	--	--	--	--
ISOPHORONE	--	--	--	--	--	--
NITROBENZENE	--	--	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	--	--	--	--	--	--
PENTACHLOROPHENOL	--	--	--	--	--	--
PHENOL	--	--	--	--	--	--
VOLATILES (UG/KG)						
1,1,1-TRICHLOROETHANE	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	--	--	--	--	--	--
1,1,2-TRICHLOROTRIFLUOROETHANE	--	--	--	--	--	--
1,1-DICHLOROETHANE	--	--	--	--	--	--
1,1-DICHLOROETHENE	--	--	--	--	--	--
1,2-DICHLOROETHANE	--	--	--	--	--	--
1,2-DICHLOROPROPANE	--	--	--	--	--	--
2-BUTANONE	--	--	--	--	--	--
2-HEXANONE	--	--	--	--	--	--
4-METHYL-2-PENTANONE	--	--	--	--	--	--
ACETONE	--	--	--	--	--	--
BENZENE	--	--	--	--	--	--
BROMODICHLOROMETHANE	--	--	--	--	--	--
BROMOFORM	--	--	--	--	--	--
BROMOMETHANE	--	--	--	--	--	--
CARBON DISULFIDE	--	--	--	--	--	--
CARBON TETRACHLORIDE	--	--	--	--	--	--
CHLOROBENZENE	--	--	--	--	--	--
CHLORODIBROMOMETHANE	--	--	--	--	--	--
CHLOROETHANE	--	--	--	--	--	--
CHLOROFORM	--	--	--	--	--	--
CHLOROMETHANE	--	--	--	--	--	--
CIS-1,3-DICHLOROPROPENE	--	--	--	--	--	--
ETHYLBENZENE	--	--	--	--	--	--
METHYLENE CHLORIDE	--	--	--	--	--	--
STYRENE	--	--	--	--	--	--
TETRACHLOROETHENE	--	--	--	--	--	--
TOLUENE	--	--	--	--	--	--
TOTAL 1,2-DICHLOROETHENE	--	--	--	--	--	--
TOTAL XYLENES	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	--	--	--	--	--	--
TRICHLOROETHENE	--	--	--	--	--	--
VINYL CHLORIDE	--	--	--	--	--	--

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB21	WTB-SB21	WTB-SB22	WTB-SB22	WTB-SB22	WTB-SB23
SAMPLE ID	WTB-SB-21-0206	WTB-SB-21-0610	WTB-SB-22-0206	WTB-SB-22-0610	WTB-SB-22-0610-D	WTB-SB-23-0206
SAMPLE DATE	20150604	20150604	20150603	20150603	20150603	20150603
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
TOP DEPTH (feet)	2	6	2	6	6	2
BOTTOM DEPTH (feet)	6	10	6	10	10	6
EPH MADEP (MG/KG)						
C11-C22 AROMATICS	370	370	280	470	520	540
C19-C36 ALIPHATICS	570	450	25	97	66	230
C9-C18 ALIPHATICS	58	84	44	67	85	83 U
METALS (MG/KG)						
ALUMINUM	7490	6320	2030	2150 J	5360 J	12800
ANTIMONY	40.8 J	5.87 J	0.509 J	0.632 J	0.55 J	0.654 J
ARSENIC	19.7 J	15.1 J	8.44	14.9	15.9	20.8
BARIUM	959 J	74.7 J	226 J	231 J	274 J	119 J
BERYLLIUM	0.52 U	0.53 U	0.764 J	0.646	0.642 J	0.616
CADMIUM	3.64 U	5.88	0.053 J	0.199 J	0.204 J	0.776
CALCIUM	71900	1580	3290 J	3700 J	9120 J	6120 J
CHROMIUM	50.1 J	37 J	19.2 J	10.7 J	27.4 J	59.4 J
COBALT	10.6	16.6	5.46	5.11	7.95	10.6
COPPER	22900 J	4070 J	72.5	173 J	190 J	129
IRON	109000	140000	16700	23500	27900	21100
LEAD	2350 J	1060 J	2530	406 J	438 J	315
MAGNESIUM	4880	2950	328	1170	3460	8090
MANGANESE	773	548	49 J-	149 J	239 J	273 J-
MERCURY	1.47 J	0.627 J	0.462	0.818	0.485	0.628
NICKEL	52.4	80.4	10.4	12.6	24.5	42.6
POTASSIUM	4720 J	1150 J	838 J	683 J	2030 J	4360 J
SELENIUM	5.4 U	7.4 U	1.6	0.9 U	0.88 U	0.78 U
SILVER	4.34 U	4.2 U	0.24 J	0.358 J	0.2 J	0.24 J
SODIUM	2300 J	1050 J	1160 J	895 J	890	467 J
THALLIUM	0.108	0.098 U	0.145	0.12 U	0.149	0.219
VANADIUM	23.4	26.4	8.92	17.1	27.8	40.6
ZINC	2220 J	3320 J	45.3	106 J	158 J	407
MISCELLANEOUS PARAMETERS (%)						
TOTAL SOLIDS	92	75	84	75	75	87
MISCELLANEOUS PARAMETERS (MG/KG)						
CYANIDE	--	--	--	--	--	--
HEXAVALENT CHROMIUM	--	--	--	--	--	--
TOTAL ORGANIC CARBON	--	--	--	--	--	--
MISCELLANEOUS PARAMETERS (S.U.)						
PH	--	--	--	--	--	--
PESTICIDES/PCBS (UG/KG)						
4,4'-DDD	--	--	--	--	--	--
4,4'-DDE	--	--	--	--	--	--
4,4'-DDT	--	--	--	--	--	--
ALDRIN	--	--	--	--	--	--
ALPHA-BHC	--	--	--	--	--	--
ALPHA-CHLORDANE	--	--	--	--	--	--
AROCLOR-1016	--	--	--	--	--	--
AROCLOR-1221	--	--	--	--	--	--
AROCLOR-1232	--	--	--	--	--	--
AROCLOR-1242	--	--	--	--	--	--
AROCLOR-1248	--	--	--	--	--	--
AROCLOR-1254	--	--	--	--	--	--
AROCLOR-1260	--	--	--	--	--	--
BETA-BHC	--	--	--	--	--	--
DELTA-BHC	--	--	--	--	--	--
DIELDRIN	--	--	--	--	--	--
ENDOSULFAN I	--	--	--	--	--	--
ENDOSULFAN II	--	--	--	--	--	--
ENDOSULFAN SULFATE	--	--	--	--	--	--
ENDRIN	--	--	--	--	--	--
ENDRIN ALDEHYDE	--	--	--	--	--	--
ENDRIN KETONE	--	--	--	--	--	--
GAMMA-BHC (LINDANE)	--	--	--	--	--	--
GAMMA-CHLORDANE	--	--	--	--	--	--

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB21	WTB-SB21	WTB-SB22	WTB-SB22	WTB-SB22	WTB-SB23
SAMPLE ID	WTB-SB-21-0206	WTB-SB-21-0610	WTB-SB-22-0206	WTB-SB-22-0610	WTB-SB-22-0610-D	WTB-SB-23-0206
SAMPLE DATE	20150604	20150604	20150603	20150603	20150603	20150603
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
TOP DEPTH (feet)	2	6	2	6	6	2
BOTTOM DEPTH (feet)	6	10	6	10	10	6
HEPTACHLOR	--	--	--	--	--	--
HEPTACHLOR EPOXIDE	--	--	--	--	--	--
METHOXYCHLOR	--	--	--	--	--	--
TOXAPHENE	--	--	--	--	--	--
PETROLEUM HYDROCARBONS (MG/KG)						
DIESEL RANGE ORGANICS	--	--	--	--	--	--
GASOLINE RANGE ORGANICS	--	--	--	--	--	--
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)						
ACENAPHTHENE	4.4 J	54	4.7 J	23 J	13 U	2200
ACENAPHTHYLENE	7.9 J	8.1 J	2.3 J	13 U	13 U	290
ANTHRACENE	30	190	62	57 J	13 UJ	5100
BENZO(A)ANTHRACENE	250 J	410	1400	230 J	58 J	14000
BENZO(A)PYRENE	210 J	360	1200	200 J	62 J	12000
BENZO(B)FLUORANTHENE	310 J	380	1800	330 J	95 J	17000
BENZO(G,H,I)PERYLENE	95 J	150	610	140 J	39 J	6100
BENZO(K)FLUORANTHENE	120 J	170	840	100 J	31 J	6700
CHRYSENE	290 J	370 J	1500	300 J	100 J	13000
DIBENZO(A,H)ANTHRACENE	44 J	60	220	55 J	13 UJ	1600
DIBENZOFURAN	--	--	--	--	--	--
FLUORANTHENE	220 J	630	1600	280 J	63 J	33000
FLUORENE	7.2 J	58	8.7 J	23 J	4.1 J	2200
INDENO(1,2,3-CD)PYRENE	120 J	180	670	150 J	39 J	6500
NAPHTHALENE	10 J	20 J	12 J	9.1 J	6.9 J	470
PHENANTHRENE	150	610	230	250 J	71 J	13000
PYRENE	310 J	610	1500	420 J	82 J	25000
BAP EQUIVALENT-HALFND	323.49	519.07	1816.9	327.3	88.11	17430
BAP EQUIVALENT-POS	323.49	519.07	1816.9	327.3	81.61	17430
SEMIVOLATILES (UG/KG)						
1,2,4-TRICHLOROBENZENE	--	--	--	--	--	--
1,2-DICHLOROBENZENE	--	--	--	--	--	--
1,3-DICHLOROBENZENE	--	--	--	--	--	--
1,4-DICHLOROBENZENE	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	--	--	--	--	--	--
2,4-DICHLOROPHENOL	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	--	--	--	--	--	--
2,4-DINITROPHENOL	--	--	--	--	--	--
2,4-DINITROTOLUENE	--	--	--	--	--	--
2,6-DINITROTOLUENE	--	--	--	--	--	--
2-CHLORONAPHTHALENE	--	--	--	--	--	--
2-CHLOROPHENOL	--	--	--	--	--	--
2-METHYLNAPHTHALENE	--	--	--	--	--	--
2-METHYLPHENOL	--	--	--	--	--	--
2-NITROANILINE	--	--	--	--	--	--
2-NITROPHENOL	--	--	--	--	--	--
3,3'-DICHLOROBENZIDINE	--	--	--	--	--	--
3-NITROANILINE	--	--	--	--	--	--
4,6-DINITRO-2-METHYLPHENOL	--	--	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	--	--	--	--	--	--
4-CHLORO-3-METHYLPHENOL	--	--	--	--	--	--
4-CHLOROANILINE	--	--	--	--	--	--
4-CHLOROPHENYL PHENYL ETHER	--	--	--	--	--	--
4-METHYLPHENOL	--	--	--	--	--	--
4-NITROANILINE	--	--	--	--	--	--
4-NITROPHENOL	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	--	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--	--	--	--
CARBAZOLE	--	--	--	--	--	--

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-SB21	WTB-SB21	WTB-SB22	WTB-SB22	WTB-SB22	WTB-SB23
SAMPLE ID	WTB-SB-21-0206	WTB-SB-21-0610	WTB-SB-22-0206	WTB-SB-22-0610	WTB-SB-22-0610-D	WTB-SB-23-0206
SAMPLE DATE	20150604	20150604	20150603	20150603	20150603	20150603
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
TOP DEPTH (feet)	2	6	2	6	6	2
BOTTOM DEPTH (feet)	6	10	6	10	10	6
DIETHYL PHTHALATE	--	--	--	--	--	--
DIMETHYL PHTHALATE	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--	--	--	--
HEXACHLOROBENZENE	--	--	--	--	--	--
HEXACHLOROBUTADIENE	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	--	--	--	--	--	--
HEXACHLOROETHANE	--	--	--	--	--	--
ISOPHORONE	--	--	--	--	--	--
NITROBENZENE	--	--	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	--	--	--	--	--	--
PENTACHLOROPHENOL	--	--	--	--	--	--
PHENOL	--	--	--	--	--	--
VOLATILES (UG/KG)						
1,1,1-TRICHLOROETHANE	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	--	--	--	--	--	--
1,1,2-TRICHLOROTRIFLUOROETHANE	--	--	--	--	--	--
1,1-DICHLOROETHANE	--	--	--	--	--	--
1,1-DICHLOROETHENE	--	--	--	--	--	--
1,2-DICHLOROETHANE	--	--	--	--	--	--
1,2-DICHLOROPROPANE	--	--	--	--	--	--
2-BUTANONE	--	--	--	--	--	--
2-HEXANONE	--	--	--	--	--	--
4-METHYL-2-PENTANONE	--	--	--	--	--	--
ACETONE	--	--	--	--	--	--
BENZENE	--	--	--	--	--	--
BROMODICHLOROMETHANE	--	--	--	--	--	--
BROMOFORM	--	--	--	--	--	--
BROMOMETHANE	--	--	--	--	--	--
CARBON DISULFIDE	--	--	--	--	--	--
CARBON TETRACHLORIDE	--	--	--	--	--	--
CHLOROBENZENE	--	--	--	--	--	--
CHLORODIBROMOMETHANE	--	--	--	--	--	--
CHLOROETHANE	--	--	--	--	--	--
CHLOROFORM	--	--	--	--	--	--
CHLOROMETHANE	--	--	--	--	--	--
CIS-1,3-DICHLOROPROPENE	--	--	--	--	--	--
ETHYLBENZENE	--	--	--	--	--	--
METHYLENE CHLORIDE	--	--	--	--	--	--
STYRENE	--	--	--	--	--	--
TETRACHLOROETHENE	--	--	--	--	--	--
TOLUENE	--	--	--	--	--	--
TOTAL 1,2-DICHLOROETHENE	--	--	--	--	--	--
TOTAL XYLENES	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	--	--	--	--	--	--
TRICHLOROETHENE	--	--	--	--	--	--
VINYL CHLORIDE	--	--	--	--	--	--

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	**WTB-SB23**	**WTB-SB24**	**WTB-SB24**
SAMPLE ID	**WTB-SB-23-0610**	**WTB-SB-24-0206**	**WTB-SB-24-069.7**
SAMPLE DATE	**20150603**	**20150603**	**20150603**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**
TOP DEPTH (feet)	**6**	**2**	**6**
BOTTOM DEPTH (feet)	**10**	**6**	**9.7**
EPH MADEP (MG/KG)			
C11-C22 AROMATICS	480 J	16 U	76
C19-C36 ALIPHATICS	83 J	16 U	28 U
C9-C18 ALIPHATICS	120 UJ	16 U	28 U
METALS (MG/KG)			
ALUMINUM	8470	7550	6260
ANTIMONY	1.4 J	0.047 U	0.049 U
ARSENIC	10.5	11.6	12.8
BARIUM	442 J	33.1 J	14.1 J
BERYLLIUM	0.373 J	0.447 J	0.278 J
CADMIUM	0.482 J	0.0869 J	0.059 J
CALCIUM	6250 J	1110 J	652 J
CHROMIUM	35.3 J	25.4 J	15.8 J
COBALT	8.67	7.57	5.27
COPPER	1260	17.2	15.2
IRON	25900	14200	10300
LEAD	2180	4.79	21.2
MAGNESIUM	5630	4370	2910
MANGANESE	186 J-	285 J-	157 J-
MERCURY	0.516	0.014 U	0.014 U
NICKEL	31	26.6	16.5
POTASSIUM	2590 J	1450 J	1000 J
SELENIUM	1 U	0.66 U	0.68 U
SILVER	0.72 J	0.38 U	0.063 J
SODIUM	157 J	286 J	865 J
THALLIUM	0.152	0.108	0.078 U
VANADIUM	27.7	22.9	12.8
ZINC	220	33	30.6
MISCELLANEOUS PARAMETERS (%)			
TOTAL SOLIDS	63	93	86
MISCELLANEOUS PARAMETERS (MG/KG)			
CYANIDE	--	--	--
HEXAVALENT CHROMIUM	--	--	--
TOTAL ORGANIC CARBON	--	--	--
MISCELLANEOUS PARAMETERS (S.U.)			
PH	--	--	--
PESTICIDES/PCBS (UG/KG)			
4,4'-DDD	--	--	--
4,4'-DDE	--	--	--
4,4'-DDT	--	--	--
ALDRIN	--	--	--
ALPHA-BHC	--	--	--
ALPHA-CHLORDANE	--	--	--
AROCLOR-1016	--	--	--
AROCLOR-1221	--	--	--
AROCLOR-1232	--	--	--
AROCLOR-1242	--	--	--
AROCLOR-1248	--	--	--
AROCLOR-1254	--	--	--
AROCLOR-1260	--	--	--
BETA-BHC	--	--	--
DELTA-BHC	--	--	--
DIELDRIN	--	--	--
ENDOSULFAN I	--	--	--
ENDOSULFAN II	--	--	--
ENDOSULFAN SULFATE	--	--	--
ENDRIN	--	--	--
ENDRIN ALDEHYDE	--	--	--
ENDRIN KETONE	--	--	--
GAMMA-BHC (LINDANE)	--	--	--
GAMMA-CHLORDANE	--	--	--

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	**WTB-SB23**	**WTB-SB24**	**WTB-SB24**
SAMPLE ID	**WTB-SB-23-0610**	**WTB-SB-24-0206**	**WTB-SB-24-069.7**
SAMPLE DATE	**20150603**	**20150603**	**20150603**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**
TOP DEPTH (feet)	**6**	**2**	**6**
BOTTOM DEPTH (feet)	**10**	**6**	**9.7**
HEPTACHLOR	--	--	--
HEPTACHLOR EPOXIDE	--	--	--
METHOXYCHLOR	--	--	--
TOXAPHENE	--	--	--
PETROLEUM HYDROCARBONS (MG/KG)			
DIESEL RANGE ORGANICS	--	--	--
GASOLINE RANGE ORGANICS	--	--	--
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)			
ACENAPHTHENE	1400	9.1 U	9.8 U
ACENAPHTHYLENE	160 J	9.1 U	9.8 U
ANTHRACENE	3000	9.1 U	1.9 J
BENZO(A)ANTHRACENE	7400	9.1 U	9.8 U
BENZO(A)PYRENE	6400	9.1 U	9.8 UJ
BENZO(B)FLUORANTHENE	9000	9.1 U	9.8 UJ
BENZO(G,H,I)PERYLENE	3600	9.1 U	9.8 UJ
BENZO(K)FLUORANTHENE	3900	9.1 U	9.8 UJ
CHRYSENE	7200	9.1 U	9.8 U
DIBENZO(A,H)ANTHRACENE	1600	9.1 U	9.8 UJ
DIBENZOFURAN	--	--	--
FLUORANTHENE	17000	9.1 U	9.8 U
FLUORENE	1500	9.1 U	9.8 U
INDENO(1,2,3-CD)PYRENE	4000	9.1 U	9.8 UJ
NAPHTHALENE	190 J	9.1 U	9.8 U
PHENANTHRENE	7900	9.1 U	16 J
PYRENE	14000	9.1 U	10 U
BAP EQUIVALENT-HALFND	10086.2	9.1 U	9.8 U
BAP EQUIVALENT-POS	10086.2	9.1 U	9.8 U
SEMIVOLATILES (UG/KG)			
1,2,4-TRICHLOROBENZENE	--	--	--
1,2-DICHLOROBENZENE	--	--	--
1,3-DICHLOROBENZENE	--	--	--
1,4-DICHLOROBENZENE	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	--	--	--
2,4,5-TRICHLOROPHENOL	--	--	--
2,4,6-TRICHLOROPHENOL	--	--	--
2,4-DICHLOROPHENOL	--	--	--
2,4-DIMETHYLPHENOL	--	--	--
2,4-DINITROPHENOL	--	--	--
2,4-DINITROTOLUENE	--	--	--
2,6-DINITROTOLUENE	--	--	--
2-CHLORONAPHTHALENE	--	--	--
2-CHLOROPHENOL	--	--	--
2-METHYLNAPHTHALENE	--	--	--
2-METHYLPHENOL	--	--	--
2-NITROANILINE	--	--	--
2-NITROPHENOL	--	--	--
3,3'-DICHLOROBENZIDINE	--	--	--
3-NITROANILINE	--	--	--
4,6-DINITRO-2-METHYLPHENOL	--	--	--
4-BROMOPHENYL PHENYL ETHER	--	--	--
4-CHLORO-3-METHYLPHENOL	--	--	--
4-CHLOROANILINE	--	--	--
4-CHLOROPHENYL PHENYL ETHER	--	--	--
4-METHYLPHENOL	--	--	--
4-NITROANILINE	--	--	--
4-NITROPHENOL	--	--	--
BIS(2-CHLOROETHOXY)METHANE	--	--	--
BIS(2-CHLOROETHYL)ETHER	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--
CARBAZOLE	--	--	--

ANALYTICAL RESULTS FOR SUBSURFACE SOIL
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	**WTB-SB23**	**WTB-SB24**	**WTB-SB24**
SAMPLE ID	**WTB-SB-23-0610**	**WTB-SB-24-0206**	**WTB-SB-24-069.7**
SAMPLE DATE	**20150603**	**20150603**	**20150603**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**
TOP DEPTH (feet)	**6**	**2**	**6**
BOTTOM DEPTH (feet)	**10**	**6**	**9.7**
DIETHYL PHTHALATE	--	--	--
DIMETHYL PHTHALATE	--	--	--
DI-N-BUTYL PHTHALATE	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--
HEXACHLOROBENZENE	--	--	--
HEXACHLOROBUTADIENE	--	--	--
HEXACHLOROCYCLOPENTADIENE	--	--	--
HEXACHLOROETHANE	--	--	--
ISOPHORONE	--	--	--
NITROBENZENE	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	--	--	--
N-NITROSODIPHENYLAMINE	--	--	--
PENTACHLOROPHENOL	--	--	--
PHENOL	--	--	--
VOLATILES (UG/KG)			
1,1,1-TRICHLOROETHANE	--	--	--
1,1,2,2-TETRACHLOROETHANE	--	--	--
1,1,2-TRICHLOROETHANE	--	--	--
1,1,2-TRICHLOROTRIFLUOROETHANE	--	--	--
1,1-DICHLOROETHANE	--	--	--
1,1-DICHLOROETHENE	--	--	--
1,2-DICHLOROETHANE	--	--	--
1,2-DICHLOROPROPANE	--	--	--
2-BUTANONE	--	--	--
2-HEXANONE	--	--	--
4-METHYL-2-PENTANONE	--	--	--
ACETONE	--	--	--
BENZENE	--	--	--
BROMODICHLOROMETHANE	--	--	--
BROMOFORM	--	--	--
BROMOMETHANE	--	--	--
CARBON DISULFIDE	--	--	--
CARBON TETRACHLORIDE	--	--	--
CHLOROBENZENE	--	--	--
CHLORODIBROMOMETHANE	--	--	--
CHLOROETHANE	--	--	--
CHLOROFORM	--	--	--
CHLOROMETHANE	--	--	--
CIS-1,3-DICHLOROPROPENE	--	--	--
ETHYLBENZENE	--	--	--
METHYLENE CHLORIDE	--	--	--
STYRENE	--	--	--
TETRACHLOROETHENE	--	--	--
TOLUENE	--	--	--
TOTAL 1,2-DICHLOROETHENE	--	--	--
TOTAL XYLENES	--	--	--
TRANS-1,3-DICHLOROPROPENE	--	--	--
TRICHLOROETHENE	--	--	--
VINYL CHLORIDE	--	--	--

ANALYTICAL RESULTS FOR GROUNDWATER
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-MW01	WTB-MW01	WTB-MW05	WTB-MW05R	WTB-MW02
SAMPLE ID	WTB-MW-01-11	WTB-GW-MW01-0615	WTB-MW-05-11	WTB-GW-MW05R-0615	WTB-MW-02-11
SAMPLE DATE	19980803	20150609	19980802	20150609	19980802
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DISSOLVED METALS (UG/L)					
ALUMINUM	--	--	--	--	--
ANTIMONY	--	--	--	--	--
ARSENIC	--	--	--	--	--
BARIUM	--	--	--	--	--
BERYLLIUM	--	--	--	--	--
CADMIUM	--	--	--	--	--
CALCIUM	--	--	--	--	--
CHROMIUM	--	--	--	--	--
COBALT	--	--	--	--	--
COPPER	--	--	--	--	--
IRON	--	--	--	--	--
LEAD	--	--	--	--	--
MAGNESIUM	--	--	--	--	--
MANGANESE	--	--	--	--	--
MERCURY	--	--	--	--	--
NICKEL	--	--	--	--	--
POTASSIUM	--	--	--	--	--
SELENIUM	--	--	--	--	--
SILVER	--	--	--	--	--
SODIUM	--	--	--	--	--
THALLIUM	--	--	--	--	--
VANADIUM	--	--	--	--	--
ZINC	--	--	--	--	--
EPH MADEP (UG/L)					
C11-C22 AROMATICS	--	71 U	--	71 U	--
C19-C36 ALIPHATICS	--	71 U	--	71 U	--
C9-C18 ALIPHATICS	--	71 U	--	71 U	--
METALS (UG/L)					
ALUMINUM	4950 J	89 U	72.6 U	120 U	65.9 U
ANTIMONY	2 U	1 U	19.8 U	0.71 U	19.8 U
ARSENIC	12.2 U	17 J	48.6 J	20 J	42.5 J
BARIUM	164 J	1100	279 J	293	90.8 J
BERYLLIUM	0.21 U	1 U	0.85 U	1 U	0.69 U
CADMIUM	2.3 U	14.5 U	2.5 U	1 U	2.3 U
CALCIUM	136000	862000	291000 U	330000	195000
CHROMIUM	27.2 U	25.1 U	4.1 U	14 U	3.4 U
COBALT	14.1 U	48.1	2.7 U	4.22 U	2.7 U
COPPER	7.8 U	22 J	1.8 U	7.3 U	51.1 U
IRON	9930 J	12300	5000 J	417 U	266 U
LEAD	6.1 U	20 U	13.1 UJ	20 U	64.7 U
MAGNESIUM	22400	54500	971000	820000	495000
MANGANESE	9730 J	22700	1190 J	2630	0.59 UJ
MERCURY	0.01 J	0.1 U	0.01 UJ	0.1 U	0.12 J
NICKEL	55.8 U	421	37.1 U	8 U	18.4 U
POTASSIUM	11100	41200	334000	337000	158000
SELENIUM	4.3 J	15 U	31.9 U	3.1 U	31.9 U
SILVER	2.7 U	1 U	2.7 U	2 U	2.7 U
SODIUM	227000	6450000	7470000	7270000	3780000
THALLIUM	14 U	2 U	32.2 UJ	2 U	48.4 J
VANADIUM	9.9 U	20 U	3.2 U	20 U	3.2 U
ZINC	42.2 U	514	2.9 UJ	14 J	178 U
MISCELLANEOUS PARAMETERS (MG/L)					

ANALYTICAL RESULTS FOR GROUNDWATER
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	**WTB-MW01**	**WTB-MW01**	**WTB-MW05**	**WTB-MW05R**	**WTB-MW02**
SAMPLE ID	**WTB-MW-01-11**	**WTB-GW-MW01-0615**	**WTB-MW-05-11**	**WTB-GW-MW05R-0615**	**WTB-MW-02-11**
SAMPLE DATE	**19980803**	**20150609**	**19980802**	**20150609**	**19980802**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
BROMIDE	2 U	--	46	--	23
CARBONATE ALKALINITY	270	--	350	--	140
CHLORIDE	270 J	--	--	--	--
HEXAVALENT CHROMIUM	0.025 J	--	0.01 U	--	0.01 U
NITRATE	0.29	--	0.05 UJ	--	0.12
SULFATE	84	--	1800	--	1000
TOTAL ORGANIC CARBON	5.2	--	5.1	--	2.4
MISCELLANEOUS PARAMETERS (PPT)					
SALINITY	1.1	--	26	--	11
MISCELLANEOUS PARAMETERS (S.U.)					
PH	6.9	--	7.5	--	7
MISCELLANEOUS PARAMETERS (UG/L)					
CYANIDE	20 U	--	20 U	--	20 U
PESTICIDES/PCBS (UG/L)					
4,4'-DDD	0.1 U	--	0.12 U	--	0.1 U
4,4'-DDE	0.1 U	--	0.12 U	--	0.1 U
4,4'-DDT	0.1 U	--	0.12 U	--	0.1 U
ALDRIN	0.051 U	--	0.058 U	--	0.052 U
ALPHA-BHC	0.051 U	--	0.058 U	--	0.052 U
ALPHA-CHLORDANE	0.051 U	--	0.058 U	--	0.052 U
AROCLOR-1016	1 U	--	1.2 U	--	1 U
AROCLOR-1221	2 U	--	2.3 U	--	2.1 U
AROCLOR-1232	1 U	--	1.2 U	--	1 U
AROCLOR-1242	1 U	--	1.2 U	--	1 U
AROCLOR-1248	1 U	--	1.2 U	--	1 U
AROCLOR-1254	1 U	--	1.2 U	--	1 U
AROCLOR-1260	1 U	--	1.2 U	--	1 U
BETA-BHC	0.051 U	--	0.058 U	--	0.052 U
DELTA-BHC	0.051 U	--	0.058 U	--	0.052 U
DIELDRIN	0.1 U	--	0.12 U	--	0.1 U
ENDOSULFAN I	0.051 U	--	0.058 U	--	0.052 U
ENDOSULFAN II	0.1 U	--	0.12 U	--	0.1 U
ENDOSULFAN SULFATE	0.1 U	--	0.12 U	--	0.1 U
ENDRIN	0.1 U	--	0.12 U	--	0.1 U
ENDRIN ALDEHYDE	0.1 U	--	0.12 U	--	0.1 U
ENDRIN KETONE	0.1 U	--	0.12 U	--	0.1 U
GAMMA-BHC (LINDANE)	0.051 U	--	0.058 U	--	0.052 U
GAMMA-CHLORDANE	0.051 U	--	0.058 U	--	0.052 U
HEPTACHLOR	0.051 U	--	0.058 U	--	0.052 U
HEPTACHLOR EPOXIDE	0.051 U	--	0.058 U	--	0.052 U
METHOXYCHLOR	0.51 U	--	0.58 U	--	0.52 U
TOXAPHENE	5.1 U	--	5.8 U	--	5.2 U
PETROLEUM HYDROCARBONS (UG/L)					
DIESEL RANGE ORGANICS	630	--	170	--	62
GASOLINE RANGE ORGANICS	18	--	10 U	--	10 U
POLYCYCLIC AROMATIC HYDROCARBONS (UG/L)					
ACENAPHTHENE	10 U	0.094 U	11 U	0.26	11 U
ACENAPHTHYLENE	10 U	0.094 U	11 U	0.094 U	11 U
ANTHRACENE	10 U	0.094 U	11 U	0.13 J	11 U
BENZO(A)ANTHRACENE	10 U	0.094 U	11 U	0.094 U	11 U
BENZO(A)PYRENE	10 U	0.094 U	11 U	0.094 U	11 U
BENZO(B)FLUORANTHENE	10 U	0.094 U	11 U	0.094 U	11 U
BENZO(G,H,I)PERYLENE	10 U	0.094 U	11 U	0.094 U	11 U

LOCATION	WTB-MW01	WTB-MW01	WTB-MW05	WTB-MW05R	WTB-MW02
SAMPLE ID	WTB-MW-01-11	WTB-GW-MW01-0615	WTB-MW-05-11	WTB-GW-MW05R-0615	WTB-MW-02-11
SAMPLE DATE	19980803	20150609	19980802	20150609	19980802
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
BENZO(K)FLUORANTHENE	10 U	0.094 U	11 U	0.094 U	11 U
CHRYSENE	10 U	0.094 U	11 U	0.094 U	11 U
DIBENZO(A,H)ANTHRACENE	10 U	0.094 U	11 U	0.094 U	11 U
DIBENZOFURAN	10 U	--	11 U	--	11 U
FLUORANTHENE	10 U	0.094 U	11 U	0.15 J	11 U
FLUORENE	10 U	0.094 U	11 U	0.18 J	11 U
INDENO(1,2,3-CD)PYRENE	10 U	0.094 U	11 U	0.094 U	11 U
NAPHTHALENE	10 U	0.11 J	11 U	0.13 J	11 U
PHENANTHRENE	10 U	0.094 U	11 U	0.69	11 U
PYRENE	10 UJ	0.094 U	11 UJ	0.12 J	11 UJ
BAP EQUIVALENT-HALFND	10 U	0.094 U	11 U	0.094 U	11 U
BAP EQUIVALENT-POS	10 U	0.094 U	11 U	0.094 U	11 U
SEMIVOLATILES (UG/L)					
1,2,4-TRICHLOROBENZENE	10 UJ	--	11 UJ	--	11 UJ
1,2-DICHLOROBENZENE	10 U	--	11 U	--	11 U
1,3-DICHLOROBENZENE	10 U	--	11 U	--	11 U
1,4-DICHLOROBENZENE	10 U	--	11 U	--	11 U
2,2'-OXYBIS(1-CHLOROPROPANE)	10 U	--	11 U	--	11 U
2,4,5-TRICHLOROPHENOL	25 U	--	28 U	--	28 U
2,4,6-TRICHLOROPHENOL	10 U	--	11 U	--	11 U
2,4-DICHLOROPHENOL	10 U	--	11 U	--	11 U
2,4-DIMETHYLPHENOL	10 U	--	11 U	--	11 U
2,4-DINITROPHENOL	25 UJ	--	28 UJ	--	28 UJ
2,4-DINITROTOLUENE	10 U	--	11 U	--	11 U
2,6-DINITROTOLUENE	10 U	--	11 U	--	11 U
2-CHLORONAPHTHALENE	10 U	--	11 U	--	11 U
2-CHLOROPHENOL	10 U	--	11 U	--	11 U
2-METHYLNAPHTHALENE	10 U	--	11 U	--	11 U
2-METHYLPHENOL	10 U	--	11 U	--	11 U
2-NITROANILINE	25 U	--	28 U	--	28 U
2-NITROPHENOL	10 U	--	11 U	--	11 U
3,3'-DICHLOROBENZIDINE	10 U	--	11 U	--	11 U
3-NITROANILINE	25 U	--	28 U	--	28 U
4,6-DINITRO-2-METHYLPHENOL	25 U	--	28 U	--	28 U
4-BROMOPHENYL PHENYL ETHER	10 U	--	11 U	--	11 U
4-CHLORO-3-METHYLPHENOL	10 U	--	11 U	--	11 U
4-CHLOROANILINE	10 U	--	11 U	--	11 U
4-CHLOROPHENYL PHENYL ETHER	10 U	--	11 U	--	11 U
4-METHYLPHENOL	10 U	--	11 U	--	11 U
4-NITROANILINE	25 U	--	28 U	--	28 U
4-NITROPHENOL	25 U	--	28 U	--	28 U
BIS(2-CHLOROETHOXY)METHANE	10 U	--	11 U	--	11 U
BIS(2-CHLOROETHYL)ETHER	10 U	--	11 U	--	11 U
BIS(2-ETHYLHEXYL)PHTHALATE	10 U	--	11 U	--	11 U
BUTYL BENZYL PHTHALATE	1 J	--	11 U	--	11 U
CARBAZOLE	10 U	--	11 U	--	11 U
DIETHYL PHTHALATE	10 U	--	11 U	--	11 U
DIMETHYL PHTHALATE	10 U	--	11 U	--	11 U
DI-N-BUTYL PHTHALATE	10 U	--	11 U	--	11 U
DI-N-OCTYL PHTHALATE	10 U	--	11 U	--	11 U
HEXACHLOROBENZENE	10 U	--	11 U	--	11 U
HEXACHLOROBUTADIENE	10 U	--	11 U	--	11 U
HEXACHLOROCYCLOPENTADIENE	10 UJ	--	11 UJ	--	11 UJ

ANALYTICAL RESULTS FOR GROUNDWATER
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	**WTB-MW01**	**WTB-MW01**	**WTB-MW05**	**WTB-MW05R**	**WTB-MW02**
SAMPLE ID	**WTB-MW-01-11**	**WTB-GW-MW01-0615**	**WTB-MW-05-11**	**WTB-GW-MW05R-0615**	**WTB-MW-02-11**
SAMPLE DATE	**19980803**	**20150609**	**19980802**	**20150609**	**19980802**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
HEXACHLOROETHANE	10 U	--	11 U	--	11 U
ISOPHORONE	10 U	--	11 U	--	11 U
NITROBENZENE	10 U	--	11 U	--	11 U
N-NITROSO-DI-N-PROPYLAMINE	10 U	--	11 U	--	11 U
N-NITROSODIPHENYLAMINE	10 U	--	11 U	--	11 U
PENTACHLOROPHENOL	25 UJ	--	28 UJ	--	28 UJ
PHENOL	10 U	--	11 U	--	11 U
VOLATILES (UG/L)					
1,1,1-TRICHLOROETHANE	10 U	--	10 U	--	10 U
1,1,2,2-TETRACHLOROETHANE	10 U	--	10 U	--	10 U
1,1,2-TRICHLOROETHANE	10 U	--	10 U	--	10 U
1,1,2-TRICHLOROTRIFLUOROETHANE	10 U	--	10 U	--	10 U
1,1-DICHLOROETHANE	10 U	--	10 U	--	10 U
1,1-DICHLOROETHENE	10 U	--	10 U	--	10 U
1,2-DICHLOROETHANE	10 U	--	10 U	--	10 U
1,2-DICHLOROPROPANE	10 U	--	10 U	--	10 U
2-BUTANONE	10 U	--	10 U	--	10 U
2-HEXANONE	10 U	--	10 U	--	10 U
4-METHYL-2-PENTANONE	10 U	--	10 U	--	10 U
ACETONE	10 UJ	--	10 U	--	18 U
BENZENE	10 UJ	--	10 U	--	10 U
BROMODICHLOROMETHANE	10 U	--	10 U	--	10 U
BROMOFORM	10 U	--	10 U	--	10 U
BROMOMETHANE	10 U	--	10 U	--	10 U
CARBON DISULFIDE	10 U	--	10 U	--	10 U
CARBON TETRACHLORIDE	10 U	--	10 U	--	10 U
CHLOROBENZENE	10 U	--	10 U	--	10 U
CHLORODIBROMOMETHANE	10 U	--	10 U	--	10 U
CHLOROETHANE	10 U	--	10 U	--	10 U
CHLOROFORM	10 U	--	10 U	--	10 U
CHLOROMETHANE	10 UJ	--	10 U	--	10 U
CIS-1,3-DICHLOROPROPENE	10 U	--	10 U	--	10 U
ETHYLBENZENE	10 U	--	10 U	--	10 U
METHYLENE CHLORIDE	10 U	--	10 U	--	10 U
STYRENE	10 U	--	10 U	--	10 U
TETRACHLOROETHENE	10 U	--	10 U	--	10 U
TOLUENE	10 U	--	10 U	--	10 U
TOTAL 1,2-DICHLOROETHENE	10 U	--	10 U	--	10 U
TOTAL XYLENES	10 U	--	10 U	--	10 U
TRANS-1,3-DICHLOROPROPENE	10 U	--	10 U	--	10 U
TRICHLOROETHENE	10 U	--	10 U	--	10 U
VINYL CHLORIDE	10 UJ	--	10 U	--	10 U

ANALYTICAL RESULTS FOR GROUNDWATER
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-MW02	WTB-MW03	WTB-MW03	WTB-MW03
SAMPLE ID	WTB-GW-MW02-0615	WTB-MW-03-11	WTB-GW-MW03-0615	WTB-GW-MW03-0615-D
SAMPLE DATE	20150610	19980803	20150610	20150610
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP
DISSOLVED METALS (UG/L)				
ALUMINUM	--	--	--	--
ANTIMONY	--	--	--	--
ARSENIC	--	--	--	--
BARIUM	--	--	--	--
BERYLLIUM	--	--	--	--
CADMIUM	--	--	--	--
CALCIUM	--	--	--	--
CHROMIUM	--	--	--	--
COBALT	--	--	--	--
COPPER	--	--	--	--
IRON	--	--	--	--
LEAD	--	--	--	--
MAGNESIUM	--	--	--	--
MANGANESE	--	--	--	--
MERCURY	--	--	--	--
NICKEL	--	--	--	--
POTASSIUM	--	--	--	--
SELENIUM	--	--	--	--
SILVER	--	--	--	--
SODIUM	--	--	--	--
THALLIUM	--	--	--	--
VANADIUM	--	--	--	--
ZINC	--	--	--	--
EPH MADEP (UG/L)				
C11-C22 AROMATICS	71 U	--	74 U	74 U
C19-C36 ALIPHATICS	71 U	--	74 U	74 U
C9-C18 ALIPHATICS	71 U	--	74 U	74 U
METALS (UG/L)				
ALUMINUM	46 U	202 U	92 U	83 U
ANTIMONY	0.48 U	2.6 U	0.696 U	0.653 U
ARSENIC	12 J	5.6 U	4.7 J	5.3
BARIUM	44.3	25.3 U	181	181
BERYLLIUM	1 U	0.25 U	0.2 U	0.2 U
CADMIUM	0.47 U	2.3 U	0.065 U	0.07 U
CALCIUM	219000	28800	63100	63600
CHROMIUM	2.9 U	12.5 U	1.2 J	1.2 U
COBALT	0.62 U	2.7 U	0.604 U	0.59 U
COPPER	12 J	2.6 U	3 U	2.6 U
IRON	15 U	589 U	6130	5980
LEAD	23.9	7.6 U	1.5 J	4 U
MAGNESIUM	537000	7970	15300	15000
MANGANESE	4 U	459 J	546	492
MERCURY	0.152 J	0.01 UJ	0.1 U	0.1 U
NICKEL	1.4 J	17.4 U	6.06 J	5.64 U
POTASSIUM	177000	6200	10000	10400
SELENIUM	15 U	3.2 U	0.31 U	3 U
SILVER	2 U	2.7 U	0.4 U	0.4 U
SODIUM	4620000	98800	306000	290000
THALLIUM	2 U	3.2 UJ	0.4 U	0.4 U
VANADIUM	20 U	3.2 U	4 U	4 U
ZINC	126	14.1 U	7.69 J	7.1 J
MISCELLANEOUS PARAMETERS (MG/L)				

ANALYTICAL RESULTS FOR GROUNDWATER
OPERABLE UNIT 8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION SAMPLE ID SAMPLE DATE SAMPLE CODE	**WTB-MW02** **WTB-GW-MW02-0615** **20150610** **NORMAL**	**WTB-MW03** **WTB-MW-03-11** **19980803** **NORMAL**	**WTB-MW03** **WTB-GW-MW03-0615** **20150610** **ORIG**	**WTB-MW03** **WTB-GW-MW03-0615-D** **20150610** **DUP**
BROMIDE	--	2 U	--	--
CARBONATE ALKALINITY	--	110	--	--
CHLORIDE	--	85 J	--	--
HEXAVALENT CHROMIUM	--	0.01 UJ	--	--
NITRATE	--	0.05 U	--	--
SULFATE	--	10	--	--
TOTAL ORGANIC CARBON	--	2.2	--	--
MISCELLANEOUS PARAMETERS (PPT)				
SALINITY	--	0.23	--	--
MISCELLANEOUS PARAMETERS (S.U.)				
PH	--	7.5	--	--
MISCELLANEOUS PARAMETERS (UG/L)				
CYANIDE	--	20 U	--	--
PESTICIDES/PCBS (UG/L)				
4,4'-DDD	--	0.23 U	--	--
4,4'-DDE	--	0.23 U	--	--
4,4'-DDT	--	0.23 U	--	--
ALDRIN	--	0.12 U	--	--
ALPHA-BHC	--	0.12 U	--	--
ALPHA-CHLORDANE	--	0.12 U	--	--
AROCLOR-1016	--	2.3 U	--	--
AROCLOR-1221	--	4.7 U	--	--
AROCLOR-1232	--	2.3 U	--	--
AROCLOR-1242	--	2.3 U	--	--
AROCLOR-1248	--	2.3 U	--	--
AROCLOR-1254	--	2.3 U	--	--
AROCLOR-1260	--	2.3 U	--	--
BETA-BHC	--	0.12 U	--	--
DELTA-BHC	--	0.12 U	--	--
DIELDRIN	--	0.23 U	--	--
ENDOSULFAN I	--	0.12 U	--	--
ENDOSULFAN II	--	0.23 U	--	--
ENDOSULFAN SULFATE	--	0.23 U	--	--
ENDRIN	--	0.23 U	--	--
ENDRIN ALDEHYDE	--	0.23 U	--	--
ENDRIN KETONE	--	0.23 U	--	--
GAMMA-BHC (LINDANE)	--	0.12 U	--	--
GAMMA-CHLORDANE	--	0.12 U	--	--
HEPTACHLOR	--	0.12 U	--	--
HEPTACHLOR EPOXIDE	--	0.12 U	--	--
METHOXYCHLOR	--	1.2 U	--	--
TOXAPHENE	--	12 U	--	--
PETROLEUM HYDROCARBONS (UG/L)				
DIESEL RANGE ORGANICS	--	210	--	--
GASOLINE RANGE ORGANICS	--	10 U	--	--
POLYCYCLIC AROMATIC HYDROCARBONS (UG/L)				
ACENAPHTHENE	0.094 U	11 U	0.098 U	0.097 U
ACENAPHTHYLENE	0.094 U	11 U	0.098 U	0.097 U
ANTHRACENE	0.094 U	11 U	0.098 U	0.097 U
BENZO(A)ANTHRACENE	0.094 U	11 U	0.098 U	0.097 U
BENZO(A)PYRENE	0.094 U	11 U	0.098 U	0.097 U
BENZO(B)FLUORANTHENE	0.094 U	11 U	0.098 U	0.097 U
BENZO(G,H,I)PERYLENE	0.094 U	11 U	0.098 U	0.097 U

LOCATION	WTB-MW02	WTB-MW03	WTB-MW03	WTB-MW03
SAMPLE ID	WTB-GW-MW02-0615	WTB-MW-03-11	WTB-GW-MW03-0615	WTB-GW-MW03-0615-D
SAMPLE DATE	20150610	19980803	20150610	20150610
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP
BENZO(K)FLUORANTHENE	0.094 U	11 U	0.098 U	0.097 U
CHRYSENE	0.094 U	11 U	0.098 U	0.097 U
DIBENZO(A,H)ANTHRACENE	0.094 U	11 U	0.098 U	0.097 U
DIBENZOFURAN	--	11 U	--	--
FLUORANTHENE	0.094 U	11 U	0.098 U	0.097 U
FLUORENE	0.094 U	11 U	0.098 U	0.097 U
INDENO(1,2,3-CD)PYRENE	0.094 U	11 U	0.14 J	0.13 J
NAPHTHALENE	0.088 J	11 U	0.11 J	0.12 J
PHENANTHRENE	0.094 U	11 U	0.098 U	0.097 U
PYRENE	0.094 U	11 UJ	0.098 U	0.097 U
BAP EQUIVALENT-HALFND	0.094 U	11 U	0.122339	0.120233
BAP EQUIVALENT-POS	0.094 U	11 U	0.014	0.013
SEMIVOLATILES (UG/L)				
1,2,4-TRICHLOROBENZENE	--	11 UJ	--	--
1,2-DICHLOROBENZENE	--	11 U	--	--
1,3-DICHLOROBENZENE	--	11 U	--	--
1,4-DICHLOROBENZENE	--	11 U	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	--	11 U	--	--
2,4,5-TRICHLOROPHENOL	--	28 U	--	--
2,4,6-TRICHLOROPHENOL	--	11 U	--	--
2,4-DICHLOROPHENOL	--	11 U	--	--
2,4-DIMETHYLPHENOL	--	11 U	--	--
2,4-DINITROPHENOL	--	28 UJ	--	--
2,4-DINITROTOLUENE	--	11 U	--	--
2,6-DINITROTOLUENE	--	11 U	--	--
2-CHLORONAPHTHALENE	--	11 U	--	--
2-CHLOROPHENOL	--	11 U	--	--
2-METHYLNAPHTHALENE	--	11 U	--	--
2-METHYLPHENOL	--	11 U	--	--
2-NITROANILINE	--	28 U	--	--
2-NITROPHENOL	--	11 U	--	--
3,3'-DICHLOROBENZIDINE	--	11 U	--	--
3-NITROANILINE	--	28 U	--	--
4,6-DINITRO-2-METHYLPHENOL	--	28 U	--	--
4-BROMOPHENYL PHENYL ETHER	--	11 U	--	--
4-CHLORO-3-METHYLPHENOL	--	11 U	--	--
4-CHLOROANILINE	--	11 U	--	--
4-CHLOROPHENYL PHENYL ETHER	--	11 U	--	--
4-METHYLPHENOL	--	11 U	--	--
4-NITROANILINE	--	28 U	--	--
4-NITROPHENOL	--	28 U	--	--
BIS(2-CHLOROETHOXY)METHANE	--	11 U	--	--
BIS(2-CHLOROETHYL)ETHER	--	11 U	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	--	11 U	--	--
BUTYL BENZYL PHTHALATE	--	11 U	--	--
CARBAZOLE	--	11 U	--	--
DIETHYL PHTHALATE	--	11 U	--	--
DIMETHYL PHTHALATE	--	11 U	--	--
DI-N-BUTYL PHTHALATE	--	11 U	--	--
DI-N-OCTYL PHTHALATE	--	11 U	--	--
HEXACHLOROBENZENE	--	11 U	--	--
HEXACHLOROBUTADIENE	--	11 U	--	--
HEXACHLOROCYCLOPENTADIENE	--	11 UJ	--	--

LOCATION	WTB-MW02	WTB-MW03	WTB-MW03	WTB-MW03
SAMPLE ID	WTB-GW-MW02-0615	WTB-MW-03-11	WTB-GW-MW03-0615	WTB-GW-MW03-0615-D
SAMPLE DATE	20150610	19980803	20150610	20150610
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP
HEXACHLOROETHANE	--	11 U	--	--
ISOPHORONE	--	11 U	--	--
NITROBENZENE	--	11 U	--	--
N-NITROSO-DI-N-PROPYLAMINE	--	11 U	--	--
N-NITROSODIPHENYLAMINE	--	11 U	--	--
PENTACHLOROPHENOL	--	28 UJ	--	--
PHENOL	--	11 U	--	--
VOLATILES (UG/L)				
1,1,1-TRICHLOROETHANE	--	10 U	--	--
1,1,2,2-TETRACHLOROETHANE	--	10 U	--	--
1,1,2-TRICHLOROETHANE	--	10 U	--	--
1,1,2-TRICHLOROTRIFLUOROETHANE	--	10 U	--	--
1,1-DICHLOROETHANE	--	10 U	--	--
1,1-DICHLOROETHENE	--	10 U	--	--
1,2-DICHLOROETHANE	--	10 U	--	--
1,2-DICHLOROPROPANE	--	10 U	--	--
2-BUTANONE	--	10 U	--	--
2-HEXANONE	--	10 U	--	--
4-METHYL-2-PENTANONE	--	10 U	--	--
ACETONE	--	10 U	--	--
BENZENE	--	10 U	--	--
BROMODICHLOROMETHANE	--	10 U	--	--
BROMOFORM	--	10 U	--	--
BROMOMETHANE	--	10 U	--	--
CARBON DISULFIDE	--	10 U	--	--
CARBON TETRACHLORIDE	--	10 U	--	--
CHLOROBENZENE	--	10 U	--	--
CHLORODIBROMOMETHANE	--	10 U	--	--
CHLOROETHANE	--	10 U	--	--
CHLOROFORM	--	10 U	--	--
CHLOROMETHANE	--	10 U	--	--
CIS-1,3-DICHLOROPROPENE	--	10 U	--	--
ETHYLBENZENE	--	10 U	--	--
METHYLENE CHLORIDE	--	10 U	--	--
STYRENE	--	10 U	--	--
TETRACHLOROETHENE	--	10 U	--	--
TOLUENE	--	10 U	--	--
TOTAL 1,2-DICHLOROETHENE	--	10 U	--	--
TOTAL XYLENES	--	10 U	--	--
TRANS-1,3-DICHLOROPROPENE	--	10 U	--	--
TRICHLOROETHENE	--	10 U	--	--
VINYL CHLORIDE	--	10 U	--	--

LOCATION	WTB-MW04	WTB-MW04	WTB-MW06	WTB-MW07
SAMPLE ID	WTB-MW-04-11	WTB-GW-MW04-0615	WTB-GW-MW06-0615	WTB-GW-MW07-0615
SAMPLE DATE	19980803	20150610	20150612	20150611
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL
DISSOLVED METALS (UG/L)				
ALUMINUM	47 U	--	--	--
ANTIMONY	2.1 U	--	--	--
ARSENIC	4.5 U	--	--	--
BARIUM	109 J	--	--	--
BERYLLIUM	0.17 UJ	--	--	--
CADMIUM	2.3 U	--	--	--
CALCIUM	44000 U	--	--	--
CHROMIUM	3.4 U	--	--	--
COBALT	2.7 U	--	--	--
COPPER	2.2 U	--	--	--
IRON	82.7 U	--	--	--
LEAD	1.4 J	--	--	--
MAGNESIUM	7290 U	--	--	--
MANGANESE	664 J	--	--	--
MERCURY	0.01 UJ	--	--	--
NICKEL	5.8 U	--	--	--
POTASSIUM	6440	--	--	--
SELENIUM	3.2 U	--	--	--
SILVER	2.7 U	--	--	--
SODIUM	110000	--	--	--
THALLIUM	3.2 UJ	--	--	--
VANADIUM	3.2 U	--	--	--
ZINC	4.2 U	--	--	--
EPH MADEP (UG/L)				
C11-C22 AROMATICS	--	71 U	71 U	71 U
C19-C36 ALIPHATICS	--	71 U	71 U	71 U
C9-C18 ALIPHATICS	--	71 U	71 U	71 U
METALS (UG/L)				
ALUMINUM	1300 U	69 U	62 U	287 U
ANTIMONY	2 U	0.14 U	0.43 U	0.17 U
ARSENIC	6.7 U	3.6 J	3.6 J	15
BARIUM	120 J	210	1620	198
BERYLLIUM	0.24 U	0.2 U	0.2 U	0.041 U
CADMIUM	2.3 U	0.2 U	0.063 U	0.12 U
CALCIUM	40400	68100	111000	61800
CHROMIUM	11.9 U	1 J	2.9 J	1.6 J
COBALT	3.1 U	0.55 U	0.918 U	3.96
COPPER	38.2 U	4.3 U	10.7 U	2.2 U
IRON	4600 J	6990	6180	8050
LEAD	35.7 J	1.5 J	13.1	2.3 J
MAGNESIUM	7460 U	14100	51400	89000
MANGANESE	600 J	455	697	2260
MERCURY	0.45 J	0.1 U	0.059 J	0.1 U
NICKEL	19.2 U	69.5	9.5 J	2.5 J
POTASSIUM	6340	8800	28600	45500
SELENIUM	3.2 U	0.29 U	1.2 J	2.77 J
SILVER	2.7 U	0.4 U	0.4 U	0.4 U
SODIUM	104000	210000	725000	1510000
THALLIUM	3.2 U	0.4 U	0.4 U	0.4 U
VANADIUM	3.7 U	4 U	0.53 J	4 U
ZINC	49.6 U	24.6	26.2	17.1 J
MISCELLANEOUS PARAMETERS (MG/L)				

LOCATION	WTB-MW04	WTB-MW04	WTB-MW06	WTB-MW07
SAMPLE ID	WTB-MW-04-11	WTB-GW-MW04-0615	WTB-GW-MW06-0615	WTB-GW-MW07-0615
SAMPLE DATE	19980803	20150610	20150612	20150611
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL
BROMIDE	2 U	--	--	--
CARBONATE ALKALINITY	140	--	--	--
CHLORIDE	110 J	--	--	--
HEXAVALENT CHROMIUM	0.012	--	--	--
NITRATE	0.05 UJ	--	--	--
SULFATE	2.1	--	--	--
TOTAL ORGANIC CARBON	4.1	--	--	--
MISCELLANEOUS PARAMETERS (PPT)				
SALINITY	0.33	--	--	--
MISCELLANEOUS PARAMETERS (S.U.)				
PH	7.4	--	--	--
MISCELLANEOUS PARAMETERS (UG/L)				
CYANIDE	20 U	--	--	--
PESTICIDES/PCBS (UG/L)				
4,4'-DDD	0.11 U	--	--	--
4,4'-DDE	0.11 U	--	--	--
4,4'-DDT	0.11 U	--	--	--
ALDRIN	0.054 U	--	--	--
ALPHA-BHC	0.054 U	--	--	--
ALPHA-CHLORDANE	0.054 U	--	--	--
AROCLOR-1016	1.1 U	--	--	--
AROCLOR-1221	2.2 U	--	--	--
AROCLOR-1232	1.1 U	--	--	--
AROCLOR-1242	1.1 U	--	--	--
AROCLOR-1248	1.1 U	--	--	--
AROCLOR-1254	1.1 U	--	--	--
AROCLOR-1260	1.1 U	--	--	--
BETA-BHC	0.054 U	--	--	--
DELTA-BHC	0.054 U	--	--	--
DIELDRIN	0.11 U	--	--	--
ENDOSULFAN I	0.054 U	--	--	--
ENDOSULFAN II	0.11 U	--	--	--
ENDOSULFAN SULFATE	0.11 U	--	--	--
ENDRIN	0.11 U	--	--	--
ENDRIN ALDEHYDE	0.11 U	--	--	--
ENDRIN KETONE	0.11 U	--	--	--
GAMMA-BHC (LINDANE)	0.054 U	--	--	--
GAMMA-CHLORDANE	0.054 U	--	--	--
HEPTACHLOR	0.054 U	--	--	--
HEPTACHLOR EPOXIDE	0.054 U	--	--	--
METHOXYCHLOR	0.54 U	--	--	--
TOXAPHENE	5.4 U	--	--	--
PETROLEUM HYDROCARBONS (UG/L)				
DIESEL RANGE ORGANICS	190	--	--	--
GASOLINE RANGE ORGANICS	10 U	--	--	--
POLYCYCLIC AROMATIC HYDROCARBONS (UG/L)				
ACENAPHTHENE	11 U	0.095 U	0.39	0.094 U
ACENAPHTHYLENE	11 U	0.095 U	0.095 U	0.094 U
ANTHRACENE	11 U	0.095 U	0.095 U	0.094 U
BENZO(A)ANTHRACENE	11 U	0.095 U	0.095 U	0.094 U
BENZO(A)PYRENE	11 U	0.095 U	0.095 U	0.094 U
BENZO(B)FLUORANTHENE	11 U	0.095 U	0.095 U	0.094 U
BENZO(G,H,I)PERYLENE	11 U	0.095 U	0.095 U	0.094 U

LOCATION	WTB-MW04	WTB-MW04	WTB-MW06	WTB-MW07
SAMPLE ID	WTB-MW-04-11	WTB-GW-MW04-0615	WTB-GW-MW06-0615	WTB-GW-MW07-0615
SAMPLE DATE	19980803	20150610	20150612	20150611
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL
BENZO(K)FLUORANTHENE	11 U	0.095 U	0.095 U	0.094 U
CHRYSENE	11 U	0.095 U	0.095 U	0.094 U
DIBENZO(A,H)ANTHRACENE	11 U	0.095 U	0.095 U	0.094 U
DIBENZOFURAN	11 U	--	--	--
FLUORANTHENE	11 U	0.095 U	0.095 U	0.094 U
FLUORENE	11 U	0.095 U	0.14 J	0.094 U
INDENO(1,2,3-CD)PYRENE	11 U	0.095 U	0.095 U	0.094 U
NAPHTHALENE	11 U	0.13 J	0.38	0.085 J
PHENANTHRENE	11 U	0.095 U	0.12 J	0.094 U
PYRENE	11 UJ	0.095 U	0.095 U	0.094 U
BAP EQUIVALENT-HALFND	11 U	0.095 U	0.095 U	0.094 U
BAP EQUIVALENT-POS	11 U	0.095 U	0.095 U	0.094 U
SEMIVOLATILES (UG/L)				
1,2,4-TRICHLOROBENZENE	11 UJ	--	--	--
1,2-DICHLOROBENZENE	11 U	--	--	--
1,3-DICHLOROBENZENE	11 U	--	--	--
1,4-DICHLOROBENZENE	11 U	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	11 U	--	--	--
2,4,5-TRICHLOROPHENOL	28 U	--	--	--
2,4,6-TRICHLOROPHENOL	11 U	--	--	--
2,4-DICHLOROPHENOL	11 U	--	--	--
2,4-DIMETHYLPHENOL	11 U	--	--	--
2,4-DINITROPHENOL	28 UJ	--	--	--
2,4-DINITROTOLUENE	11 U	--	--	--
2,6-DINITROTOLUENE	11 U	--	--	--
2-CHLORONAPHTHALENE	11 U	--	--	--
2-CHLOROPHENOL	11 U	--	--	--
2-METHYLNAPHTHALENE	11 U	--	--	--
2-METHYLPHENOL	11 U	--	--	--
2-NITROANILINE	28 U	--	--	--
2-NITROPHENOL	11 U	--	--	--
3,3'-DICHLOROBENZIDINE	11 U	--	--	--
3-NITROANILINE	28 U	--	--	--
4,6-DINITRO-2-METHYLPHENOL	28 U	--	--	--
4-BROMOPHENYL PHENYL ETHER	11 U	--	--	--
4-CHLORO-3-METHYLPHENOL	11 U	--	--	--
4-CHLOROANILINE	11 U	--	--	--
4-CHLOROPHENYL PHENYL ETHER	11 U	--	--	--
4-METHYLPHENOL	11 U	--	--	--
4-NITROANILINE	28 U	--	--	--
4-NITROPHENOL	28 U	--	--	--
BIS(2-CHLOROETHOXY)METHANE	11 U	--	--	--
BIS(2-CHLOROETHYL)ETHER	11 U	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	11 U	--	--	--
BUTYL BENZYL PHTHALATE	1 J	--	--	--
CARBAZOLE	11 U	--	--	--
DIETHYL PHTHALATE	11 U	--	--	--
DIMETHYL PHTHALATE	11 U	--	--	--
DI-N-BUTYL PHTHALATE	11 U	--	--	--
DI-N-OCTYL PHTHALATE	11 U	--	--	--
HEXACHLOROBENZENE	11 U	--	--	--
HEXACHLOROBUTADIENE	11 U	--	--	--
HEXACHLOROCYCLOPENTADIENE	11 UJ	--	--	--

LOCATION	WTB-MW04	WTB-MW04	WTB-MW06	WTB-MW07
SAMPLE ID	WTB-MW-04-11	WTB-GW-MW04-0615	WTB-GW-MW06-0615	WTB-GW-MW07-0615
SAMPLE DATE	19980803	20150610	20150612	20150611
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL
HEXACHLOROETHANE	11 U	--	--	--
ISOPHORONE	11 U	--	--	--
NITROBENZENE	11 U	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	11 U	--	--	--
N-NITROSODIPHENYLAMINE	11 U	--	--	--
PENTACHLOROPHENOL	28 UJ	--	--	--
PHENOL	11 U	--	--	--
VOLATILES (UG/L)				
1,1,1-TRICHLOROETHANE	10 U	--	--	--
1,1,2,2-TETRACHLOROETHANE	10 U	--	--	--
1,1,2-TRICHLOROETHANE	10 U	--	--	--
1,1,2-TRICHLOROTRIFLUOROETHANE	10 U	--	--	--
1,1-DICHLOROETHANE	10 U	--	--	--
1,1-DICHLOROETHENE	10 U	--	--	--
1,2-DICHLOROETHANE	10 U	--	--	--
1,2-DICHLOROPROPANE	10 U	--	--	--
2-BUTANONE	10 U	--	--	--
2-HEXANONE	2 J	--	--	--
4-METHYL-2-PENTANONE	10 U	--	--	--
ACETONE	10 U	--	--	--
BENZENE	10 U	--	--	--
BROMODICHLOROMETHANE	10 U	--	--	--
BROMOFORM	10 U	--	--	--
BROMOMETHANE	10 U	--	--	--
CARBON DISULFIDE	10 U	--	--	--
CARBON TETRACHLORIDE	10 U	--	--	--
CHLOROBENZENE	10 U	--	--	--
CHLORODIBROMOMETHANE	10 U	--	--	--
CHLOROETHANE	10 U	--	--	--
CHLOROFORM	10 U	--	--	--
CHLOROMETHANE	10 UJ	--	--	--
CIS-1,3-DICHLOROPROPENE	10 U	--	--	--
ETHYLBENZENE	10 U	--	--	--
METHYLENE CHLORIDE	10 U	--	--	--
STYRENE	10 U	--	--	--
TETRACHLOROETHENE	10 U	--	--	--
TOLUENE	10 U	--	--	--
TOTAL 1,2-DICHLOROETHENE	10 U	--	--	--
TOTAL XYLENES	10 U	--	--	--
TRANS-1,3-DICHLOROPROPENE	10 U	--	--	--
TRICHLOROETHENE	10 U	--	--	--
VINYL CHLORIDE	10 UJ	--	--	--

APPENDIX B.1 TABLE 1

OU8 SURFACE SOIL DATA - SELECTED PARAMETERS[1]

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION SAMPLE ID SAMPLE DATE SAMPLE CODE TOP DEPTH (FEET) BOTTOM DEPTH (FEET)	**USEPA Industrial Soil RSL**	**PNS Facility Background Range of Detected Concentrations**	**WTB-MW01[2] WTB-SS01-0001-98 19980713 NORMAL 0 1**	**WTB-MW05[2] WTB-SS05-0001-98 19980707 NORMAL 0 1**	**WTB-MW02 WTB-SS02-0001-98 19980708 NORMAL 0 1**	**WTB-SB06 WTB-SS06-0001-98 19980715 NORMAL 0 1**	**WTB-SB07 WTB-SS07-0001-98 19980711 NORMAL 0 1**	**WTB-SB08 WTB-SS-08-0002 20150604 ORIG 0 2**
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)								
BENZO(A)ANTHRACENE	2900 C	37 - 640	57 J	600 J	120 J	140 J	55 J	93
BENZO(A)PYRENE	290 C	36 - 1100	51 J	610 J	360	130 J	55 J	82
BENZO(B)FLUORANTHENE	2900 C	41 - 1700	110 J	950 J	210 J	150 J	64 J	120
BENZO(K)FLUORANTHENE	29000 C	38 - 1100	51 J	730 J	168 J	100 J	52 J	53
DIBENZO(A,H)ANTHRACENE	290 C	180 - 190	360 U	200 J	55 J	61 J	36 J	24
INDENO(1,2,3-CD)PYRENE	2900 C	38 - 440	53 J	330 J	120 J	93 J	53 J	56
BAP TEQ-HALFND	290 C	243 - 1575	254	1006	462	231	109	134
BAP TEQ-POS	290 C	0 - 1575	74	1006	462	231	109	134
METALS (MG/KG)								
ALUMINUM	110000 N	4,930 - 33500	10000	11100	8170	8520	15700	6330
ANTIMONY	47 N	7 - 9.4	0.39 UR	0.3 UR	3.2 J	0.62 U	0.91 U	0.965 J
ARSENIC	3 C	4.4 - 58.6	15.3 J	10.6 J	9 J	9.7	5.6 J	18
COBALT	35 N	3.1 - 24.2	10.1	11.3	13	10.7	19.5	8.94
COPPER	4700 N	8.5 - 316	155 J	37.6 J	257 J	182 J	152 J	159 J
IRON	82000 N	8730 - 45000	23700	24000	38100	22100	40700	28200
LEAD	800	9.5 - 1100	293 J	46.4	154	147 J	124 J	268 J
MANGANESE	2600 N	110 - 611	224 J	346	516	271	598 J	316 J-
MERCURY	35 N[3]	0.0825 - 1.8	0.18 J	**109**	0.45 J	1.4 J	0.22 J	0.786
NICKEL	2200 N	8.1 - 73.2	40.4	31.5 J	53.7 J	78	65.1	83.9
THALLIUM	1.2 N	0.22 - 0.23	1.2 U	0.51 U	0.5 U	0.53 UJ	1 U	0.111
VANADIUM	580 N	13.5 - 89.5	34.9	34.1	40.8	26.9 J	58.5	23

APPENDIX B.1 TABLE 1

OU8 SURFACE SOIL DATA - SELECTED PARAMETERS[1]

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION SAMPLE ID SAMPLE DATE SAMPLE CODE TOP DEPTH (FEET) BOTTOM DEPTH (FEET)	**USEPA Industrial Soil RSL**	**PNS Facility Background Range of Detected Concentrations**	**WTB-SB08 WTB-SS-08-0002-AVG 20150604 AVG 0 2**	**WTB-SB08 WTB-SS-08-0002-D 20150604 DUP 0 2**	**WTB-SB09 WTB-SS-09-0002 20150604 NORMAL 0 2**	**WTB-SB10 WTB-SS-10-0002 20150605 NORMAL 0 2**	**WTB-SB11 WTB-SS-11-0002 20150601 NORMAL 0 2**	**WTB-SB12 WTB-SS-12-0002 20150604 NORMAL 0 2**
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)								
BENZO(A)ANTHRACENE	2900 C	37 - 640	116.5	140	440	13 J	270	**7300 J**
BENZO(A)PYRENE	290 C	36 - 1100	101	120 J	630	13 J	300 J	**5500**
BENZO(B)FLUORANTHENE	2900 C	41 - 1700	145	170 J	890	17 J	470	**9100**
BENZO(K)FLUORANTHENE	29000 C	38 - 1100	70.5	88 J	400	3.6 J	180 J	4200 J
DIBENZO(A,H)ANTHRACENE	290 C	180 - 190	22.5	21 J	120 J	10 U	49 J	**1400 J**
INDENO(1,2,3-CD)PYRENE	2900 C	38 - 440	66.5	77 J	480	8.8 J	170	**3100**
BAP TEQ-HALFND	290 C	243 - 1575	157	181	936	22	442	**8901**
BAP TEQ-POS	290 C	0 - 1575	157	181	936	17	442	**8901**
METALS (MG/KG)								
ALUMINUM	110000 N	4,930 - 33500	6300	6270	12300	7180	9840	16300
ANTIMONY	47 N	7 - 9.4	0.732	0.499 J	0.25 J	0.1 J	0.913	0.574
ARSENIC	3 C	4.4 - 58.6	17.55	17.1	12.4	18 J	13.6	7.84
COBALT	35 N	3.1 - 24.2	8.7	8.46	11.6	9.36	12.7	14.4
COPPER	4700 N	8.5 - 316	124.35	89.7 J	105	30.1 J	232 J	181 J
IRON	82000 N	8730 - 45000	24000	19800	25900	16300	48200 J	32400
LEAD	800	9.5 - 1100	197.5	127 J	74.4	29 J	216	204
MANGANESE	2600 N	110 - 611	301	286 J-	455 J-	303	672 J	472
MERCURY	35 N[3]	0.0825 - 1.8	1.013	1.24	0.303 J	0.01 J	0.602 J	0.511 J
NICKEL	2200 N	8.1 - 73.2	67.55	51.2	46	23.9	260	87.6 J
THALLIUM	1.2 N	0.22 - 0.23	0.113	0.115	0.281	0.122	0.115	0.259
VANADIUM	580 N	13.5 - 89.5	21.9	20.8	42	17.8	32.3 J	69.3

APPENDIX B.1 TABLE 1

OU8 SURFACE SOIL DATA - SELECTED PARAMETERS[1]

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION SAMPLE ID SAMPLE DATE SAMPLE CODE TOP DEPTH (FEET) BOTTOM DEPTH (FEET)	**USEPA Industrial Soil RSL**	**PNS Facility Background Range of Detected Concentrations**	**WTB-SB13 WTB-SS-13-0002 20150605 NORMAL 0 2**	**WTB-SB14 WTB-SS-14-0002 20150603 NORMAL 0 2**	**WTB-SB15 WTB-SS-15-0002 20150604 NORMAL 0 2**	**WTB-SB16 WTB-SS-16-0002 20150604 NORMAL 0 2**	**WTB-SB17 WTB-SS-17-0002 20150603 NORMAL 0 2**	**WTB-SB18 WTB-SS-18-0002 20150604 NORMAL 0 2**
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)								
BENZO(A)ANTHRACENE	2900 C	37 - 640	10 U	4.7 J	**3200**	**13000**	290	90
BENZO(A)PYRENE	290 C	36 - 1100	10 U	6.3 J	**2500**	**8600**	290 J	89
BENZO(B)FLUORANTHENE	2900 C	41 - 1700	4.4 J	9.8 J	**4000**	**14000**	490 J	130
BENZO(K)FLUORANTHENE	29000 C	38 - 1100	10 U	8.9 U	1300	4400	160 J	55 J
DIBENZO(A,H)ANTHRACENE	290 C	180 - 190	10 U	8.9 U	**320**	**1600 J**	81 J	22 J
INDENO(1,2,3-CD)PYRENE	2900 C	38 - 440	10 U	5.2 J	1500	**6200**	210	68
BAP TEQ-HALFND	290 C	243 - 1575	11	13	**3706**	**13576**	472	140
BAP TEQ-POS	290 C	0 - 1575	0.44	8.3	**3706**	**13576**	472	140
METALS (MG/KG)								
ALUMINUM	110000 N	4,930 - 33500	8310	5550	15400	14700	3240	15600
ANTIMONY	47 N	7 - 9.4	0.07 U	0.12	0.938	0.356	0.461	0.16 J
ARSENIC	3 C	4.4 - 58.6	18 J	18.6	12	12.3	10.7	15.6 J
COBALT	35 N	3.1 - 24.2	7.49	5.01	14.3	9.43	3.99	11
COPPER	4700 N	8.5 - 316	14.1 J	18.1 J	630 J	310 J	175 J	121 J
IRON	82000 N	8730 - 45000	16700	15600 J	38600	21000	14700 J	25200
LEAD	800	9.5 - 1100	7.86 J	10.8	611	178	175	320 J
MANGANESE	2600 N	110 - 611	254	196 J	533	345	376 J	376
MERCURY	35 N[3]	0.0825 - 1.8	0.018 U	0.026 J	0.347 J	0.242 J	0.156 J	1.45 J
NICKEL	2200 N	8.1 - 73.2	22.6	16.6	89.3 J	43.6 J	52.5	36.6
THALLIUM	1.2 N	0.22 - 0.23	0.14	0.181	0.206	0.204	0.0938	0.21
VANADIUM	580 N	13.5 - 89.5	17.3	14.4 J	45.2	31.6	8.65 J	37.7

APPENDIX B.1 TABLE 1

OU8 SURFACE SOIL DATA - SELECTED PARAMETERS[1]

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION SAMPLE ID SAMPLE DATE SAMPLE CODE TOP DEPTH (FEET) BOTTOM DEPTH (FEET)	**USEPA Industrial Soil RSL**	**PNS Facility Background Range of Detected Concentrations**	**WTB-SB19 WTB-SS-19-0002 20150603 NORMAL 0 2**	**WTB-SB20 WTB-SS-20-0002 20150604 ORIG 0 2**	**WTB-SB20 WTB-SS-20-0002-AVG 20150604 AVG 0 2**	**WTB-SB20 WTB-SS-20-0002-D 20150604 DUP 0 2**	**WTB-SB21 WTB-SS-21-0002 20150604 NORMAL 0 2**	**WTB-SB22 WTB-SS-22-0002 20150603 NORMAL 0 2**
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)								
BENZO(A)ANTHRACENE	2900 C	37 - 640	75	110	120	130	10 U	73
BENZO(A)PYRENE	290 C	36 - 1100	65	100 J	110	120	10 U	78 J
BENZO(B)FLUORANTHENE	2900 C	41 - 1700	86	150 J	160	170	5 J	110 J
BENZO(K)FLUORANTHENE	29000 C	38 - 1100	42	48 J	53	58	10 U	49 J
DIBENZO(A,H)ANTHRACENE	290 C	180 - 190	12 J	27 J	25	23	10 U	18 J
INDENO(1,2,3-CD)PYRENE	2900 C	38 - 440	39	67 J	67	67	10 U	50 J
BAP TEQ-HALFND	290 C	243 - 1575	98	160	170	180	12	120
BAP TEQ-POS	290 C	0 - 1575	98	160	170	180	0.5	120
METALS (MG/KG)								
ALUMINUM	110000 N	4,930 - 33500	2810	18600	18000	17400	1730	14900
ANTIMONY	47 N	7 - 9.4	0.638	0.31 J	0.293	0.276 J	0.048 U	0.22 J
ARSENIC	3 C	4.4 - 58.6	4.09	13.3 J	13.45	13.6 J	1.64 J	13.6
COBALT	35 N	3.1 - 24.2	2.72	11.7	11.55	11.4	1.62	10.8
COPPER	4700 N	8.5 - 316	149 J	291 J	261	231 J	4.68 J	57
IRON	82000 N	8730 - 45000	8120 J	30200	28850	27500	5280	25600
LEAD	800	9.5 - 1100	176	703 J	533	363 J	45 J	190
MANGANESE	2600 N	110 - 611	340 J	457	416	375	365	404 J-
MERCURY	35 N[3]	0.0825 - 1.8	0.163 J	0.42 J	0.4	0.38 J	0.014 U	0.192
NICKEL	2200 N	8.1 - 73.2	7.59	65.9	65.35	64.8	3.18	41.3
THALLIUM	1.2 N	0.22 - 0.23	0.0759	0.32	0.3005	0.281	0.072 U	0.251
VANADIUM	580 N	13.5 - 89.5	6.98 J	41.6	40.5	39.4	4.08	37.6

APPENDIX B.1 TABLE 1
OU8 SURFACE SOIL DATA - SELECTED PARAMETERS[1]
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION SAMPLE ID SAMPLE DATE SAMPLE CODE TOP DEPTH (FEET) BOTTOM DEPTH (FEET)	**USEPA Industrial Soil RSL**	**PNS Facility Background Range of Detected Concentrations**	**WTB-SB23 WTB-SS-23-0002 20150603 NORMAL 0 2**	**WTB-SB24 WTB-SS-24-0002 20150603 NORMAL 0 2**
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)				
BENZO(A)ANTHRACENE	2900 C	37 - 640	**12000**	9.9 U
BENZO(A)PYRENE	290 C	36 - 1100	**10000**	9.9 U
BENZO(B)FLUORANTHENE	2900 C	41 - 1700	**15000**	9.9 U
BENZO(K)FLUORANTHENE	29000 C	38 - 1100	4700	9.9 U
DIBENZO(A,H)ANTHRACENE	290 C	180 - 190	**1700**	9.9 U
INDENO(1,2,3-CD)PYRENE	2900 C	38 - 440	**6700**	9.9 U
BAP TEQ-HALFND	290 C	243 - 1575	**15129**	9.9 U
BAP TEQ-POS	290 C	0 - 1575	**15129**	9.9 U
METALS (MG/KG)				
ALUMINUM	110000 N	4,930 - 33500	11400	5360
ANTIMONY	47 N	7 - 9.4	1.94 J	0.047 U
ARSENIC	3 C	4.4 - 58.6	11.9	11.6
COBALT	35 N	3.1 - 24.2	15.7	4.85
COPPER	4700 N	8.5 - 316	769	10.5
IRON	82000 N	8730 - 45000	48500	9530
LEAD	800	9.5 - 1100	858	13.5
MANGANESE	2600 N	110 - 611	419 J-	162 J-
MERCURY	35 N[3]	0.0825 - 1.8	0.715	0.0082 J
NICKEL	2200 N	8.1 - 73.2	65.4	15.7
THALLIUM	1.2 N	0.22 - 0.23	0.183	0.079 U
VANADIUM	580 N	13.5 - 89.5	39.8	11.4

USEPA RSLs (June 2015) are based on ILCR = 1x10-6 (C) and HI = 0.1 (N). C = carcinogen; N = Non-carcinogen.
Shaded values indicate the industrial RSL and maximum background value were exceeded.

1 - Only chemicals exceeding residential RSLs are presented.
2 - WTB-MW01 and WTB-MW05 are located outside boundary of OU8 and may not represent site data.
3 - Value for mercuric chloride and other mercury salts.

Data Qualifiers:
J = Estimated value
J - = Estimated value, biased low
U = Not detected
R = Rejected

NA - No value available.

APPENDIX B.1 TABLE 2

OU8 SUBSURFACE SOIL DATA - SELECTED PARAMETERS[1]

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	USEPA Industrial Soil RSL	PNS Facility Background Range of Detected Concentrations	WTB-MW01[2]	WTB-MW05[2]	WTB-MW05[2]	WTB-MW05[2]	WTB-MW02	WTB-MW02	WTB-MW02	WTB-MW03	WTB-MW03
SAMPLE ID			WTB-SB01-0305-98	WTB-SB05-0305-98	WTB-SB05-0709-98	WTB-SB05-1315-98	WTB-SB02-0305-98	WTB-SB02-0709-98	WTB-SB02-1517-98	WTB-SB03-0305-98	WTB-SB03-0911-98
SAMPLE DATE			19980713	19980707	19980707	19980707	19980708	19980708	19980708	19980711	19980711
SAMPLE CODE			NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATERIAL OBSERVED IN SAMPLE INTERVAL			NO	NO	NO	NO	COAL, ASH	COAL, ASH	NO	ASH, CINDERS, COAL FRAGMENTS	NO
TOP DEPTH (FEET)			3	3	7	13	3	7	15	3	9
BOTTOM DEPTH (FEET)			5	5	9	15	5	9	17	5	11
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)											
BENZO(A)ANTHRACENE	2900 C	37 - 640	400 U	360 U	63 J	66 J	1600	110 J	**10000**	310 J	170 J
BENZO(A)PYRENE	290 C	36 - 1100	400 U	360 U	65 J	65 J	1000	59 J	**8600**	590	190 J
BENZO(B)FLUORANTHENE	2900 C	41 - 1700	400 U	360 U	77 J	65 J	1900	110 J	**9800**	810	250 J
BENZO(K)FLUORANTHENE	29000 C	38 - 1100	400 U	360 U	61 J	54 J	870	530 U	5300	340 J	110 J
DIBENZO(A,H)ANTHRACENE	290 C	180 - 190	400 U	360 U	400 UJ	26 J	280 J	53 J	**1600 J**	120 J	71 J
INDENO(1,2,3-CD)PYRENE	2900 C	38 - 440	400 U	360 U	39 J	41 J	500 J	37 J	**4200 J**	230 J	87 J
BAP TEQ-HALFND	290 C	243 - 1575	400 U	360 U	284	109	**1690**	141	**12664**	849	313
BAP TEQ-POS	290 C	0 - 1575	400 U	360 U	84	109	**1690**	138	**12664**	849	313
METALS (MG/KG)											
ALUMINUM	110000 N	4,930 - 33500	13100	8650	11600	15400	4940	4660	13500	16300	14600
ANTIMONY	47 N	7 - 9.4	0.46 UR	0.41 UR	0.43 UR	0.53 UR	0.34 U	0.6 UR	0.52 UR	0.35 UR	0.47 UR
ARSENIC	3 C	4.4 - 58.6	13.2 J	10.5 J	14.3 J	30.9 J	45.6 J	26.3 J	9.7 J	8.8 J	17.5 J
CADMIUM	98 N	0.82 - 3.4	0.53 U	0.48 U	0.49 U	0.61 U	0.4 U	0.69 U	0.61 U	0.4 U	0.55 U
COBALT	35 N	3.1 - 24.2	12.6	10.5	8.5	7.1	4	4.4	5.6	15.6	13.3
COPPER	4700 N	8.5 - 316	21.3 J	17.2 J	392 J	4090 J	361 J	324 J	127 J	42.9 J	45.4 J
IRON	82000 N	8730 - 45000	21400	19000	42400	31400	28000	25400	26200	26400	23700
LEAD	800	9.5 - 1100	14.6 U	8.4	98.7	1020	**9080**	773	413	52.2 J	36.9 U
MANGANESE	2600 N	110 - 611	488 J	291	363	362	143	252	193	482 J	475 J
MERCURY	35 N[3]	0.0825 - 1.8	0.01 UJ	0.01 UJ	0.22 J	2.4 J	0.28 J	8.1 J	0.39 J	0.1 J	0.17 J
NICKEL	2200 N	8.1 - 73.2	29.2	33.7 J	34.7 J	24.8 J	16.5 J	9.1 J	19.1 J	45.7	49.5
THALLIUM	1.2 N	0.22 - 0.23	1.6 U	0.67 U	0.69 U	0.86 U	0.56 U	0.98 U	0.86 U	0.95 U	0.77 U
VANADIUM	580 N	13.5 - 89.5	29.1	25.8	36.6	46.4	32.8	25.7	37.8	45.7	31.9
ZINC	35000 N	23.1 - 1390	54.8 J	38.3 J	158 J	317 J	130 J	212 J	261 J	88.1 J	73.2 J
MISCELLANEOUS PARAMETERS (MG/KG)											
CYANIDE	1.2 N	NA	2 UJ	2 U	2 U	2 U	**34**	2 U	2 U	2 UJ	2 UJ

APPENDIX B.1 TABLE 2

OU8 SUBSURFACE SOIL DATA - SELECTED PARAMETERS[1]

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	USEPA Industrial Soil RSL	PNS Facility Background Range of Detected Concentrations	WTB-MW03	WTB-MW04	WTB-MW04	WTB-MW04	WTB-SB06	WTB-SB06	WTB-SB06	WTB-SB06	WTB-SB07
SAMPLE ID			WTB-SB03-1820-98	WTB-SB04-0305-98	WTB-SB04-0709-98	WTB-SB04-0911-98	WTB-SB06-0305-98	WTB-SB06-0507-98	WTB-SB06-1820-98	WTB-SB06-1820-98-	WTB-SB07-0305-98
SAMPLE DATE			19980711	19980708	19980708	19980708	19980715	19980715	19980715	19980715	19980711
SAMPLE CODE			NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
MATERIAL OBSERVED IN SAMPLE INTERVAL			NO	NO	NO	NO	CINDERS, COAL FRAGMENTS, WHITE ASH	CINDERS, COAL FRAGMENTS, WHITE ASH	NO	NO	CRANULAR CINDERS, ASH, TRACE COAL, RUST STAINED CINDERS
TOP DEPTH (FEET)			18	3	7	9	3	5	18	18	3
BOTTOM DEPTH (FEET)			20	5	9	11	5	7	20	20	5
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)											
BENZO(A)ANTHRACENE	2900 C	37 - 640	180 J	460	170 J	130 J	240 J	**5700**	430 U	430 U	210 J
BENZO(A)PYRENE	290 C	36 - 1100	180 J	400	160 J	100 J	220 J	**4300**	430 U	430 U	220 J
BENZO(B)FLUORANTHENE	2900 C	41 - 1700	180 J	400	130 J	120 J	370	**5400**	430 U	430 U	310 J
BENZO(K)FLUORANTHENE	29000 C	38 - 1100	150 J	290 J	140 J	77 J	170 J	3900	430 U	430 U	140 J
DIBENZO(A,H)ANTHRACENE	290 C	180 - 190	44 J	86 J	43 J	41 J	79 J	**1100**	430 U	430 U	78 J
INDENO(1,2,3-CD)PYRENE	2900 C	38 - 440	100 J	200 J	81 J	60 J	140 J	1800	21 J	430 U	140 J
BAP TEQ-HALFND	290 C	243 - 1575	272	595	243	173	376	**6735**	477	430 U	366
BAP TEQ-POS	290 C	0 - 1575	272	595	243	173	376	**6735**	2	430 U	366
METALS (MG/KG)											
ALUMINUM	110000 N	4,930 - 33500	22100	14800	10300	11100	8220	6870	19400	18400	2300
ANTIMONY	47 N	7 - 9.4	0.41 UR	0.36 UR	0.55 U	0.74 U	0.32 UJ	1.1 U	0.44 UJ	0.36 UJ	0.5 U
ARSENIC	3 C	4.4 - 58.6	8 J	11.5 J	11.2 J	18.7 J	13.8	5.6	8.2	8.5	5.9 J
CADMIUM	98 N	0.82 - 3.4	0.53 U	0.42 U	0.48 U	1.6 U	0.76 J	5.1 J	0.9 J	0.79 J	0.56 U
COBALT	35 N	3.1 - 24.2	14	11.4	8.8	20.3	6.6	7.7	11.4	11.7	6.5
COPPER	4700 N	8.5 - 316	29.4 J	19.1 J	88.7 J	3170 J	357 J	1820 J	39.5 J	28 J	124 J
IRON	82000 N	8730 - 45000	34000	20900	19200	**133000**	16700	22500	34900	32900	27300
LEAD	800	9.5 - 1100	17.9 U	21.9 U	265 J	197 J	390 J	750 J	33.2 J	21.2 J	**3610 J**
MANGANESE	2600 N	110 - 611	325 J	307 J	224 J	1150 J	213	338	366	352	59.3 J
MERCURY	35 N[3]	0.0825 - 1.8	0.01 U	0.16 J	3.6 J	0.17 J	0.44 J	0.07 U	0.02 U	0.06 U	2.4 J
NICKEL	2200 N	8.1 - 73.2	28.4 J	32.8	29.9	342	37.4	88	27.8	27.9	10.3 U
THALLIUM	1.2 N	0.22 - 0.23	0.66 U	0.62 U	0.68 U	0.67 U	0.54 U	0.68 U	0.72 UJ	0.93 U	0.73 U
VANADIUM	580 N	13.5 - 89.5	55.6	36.1	25.7	79.7	19.6 J	17.5 J	50.3 J	49.6 J	9.8
ZINC	35000 N	23.1 - 1390	91.7 J	49.3 J	233 J	657 J	335 J	2040 J	117 J	91.7 J	64.5 J
MISCELLANEOUS PARAMETERS (MG/KG)											
CYANIDE	1.2 N	NA	2 UJ	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 UJ

APPENDIX B.1 TABLE 2

OU8 SUBSURFACE SOIL DATA - SELECTED PARAMETERS[1]

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	USEPA Industrial Soil RSL	PNS Facility Background Range of Detected Concentrations	WTB-SB07	WTB-SB07	WTB-SB08	WTB-SB08	WTB-SB09	WTB-SB09	WTB-SB10	WTB-SB10	WTB-SB11
SAMPLE ID			WTB-SB07-0709-98	WTB-SB07-1315-98	WTB-SB-08-0206	WTB-SB-08-0610	WTB-SB-09-0206	WTB-SB-09-0610	WTB-SB-10-0206	WTB-SB-10-0610	WTB-SB-11-0206
SAMPLE DATE			19980711	19980711	20150604	20150604	20150604	20150604	20150605	20150605	20150601
SAMPLE CODE			NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATERIAL OBSERVED IN SAMPLE INTERVAL			CRANULAR CINDERS, ASH, TRACE COAL, RUST STAINED CINDERS	NO	CINDERS, SLAG, TRACE ASH	NO	CINDERS, SLAG, TRACE ASH	CINDERS, SLAG, TRACE ASH	CINDERS, SLAG, ASH	NO	NO
TOP DEPTH (FEET)			7	13	2	6	2	6	2	6	2
BOTTOM DEPTH (FEET)			9	15	6	10	6	10	6	10	6
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)											
BENZO(A)ANTHRACENE	2900 C	37 - 640	89 J	390 J	290 J	260 J	120	1800	570	620	780
BENZO(A)PYRENE	290 C	36 - 1100	64 J	290 J	300 J	220 J	87	**1500**	600	450 J	750 J
BENZO(B)FLUORANTHENE	2900 C	41 - 1700	110 J	390 J	380	390	130	2100	880	650 J	1100 J
BENZO(K)FLUORANTHENE	29000 C	38 - 1100	52 J	220 J	170 J	150 J	50	820	170	260 J	290 J
DIBENZO(A,H)ANTHRACENE	290 C	180 - 190	69 J	89 J	68 J	50 J	17 J	**370 J**	82	78 J	110 J
INDENO(1,2,3-CD)PYRENE	2900 C	38 - 440	50 J	170 J	190 J	170 J	46	830	250	260 J	360 J
BAP TEQ-HALFND	290 C	243 - 1575	159	477	456	354	134	**2353**	854	684	1088
BAP TEQ-POS	290 C	0 - 1575	159	477	456	354	134	**2353**	854	684	1088
METALS (MG/KG)											
ALUMINUM	110000 N	4,930 - 33500	1910	14700	7220	6720	5170	5610	7450	10300	5560
ANTIMONY	47 N	7 - 9.4	0.68 U	0.83 U	3.1 J	8.46 J	**1610 J**	**616**	1 J	3.27 J	**1340**
ARSENIC	3 C	4.4 - 58.6	6.8 J	8.3 J	**61.9**	34	35.1	30.9	9.26 J	19.4 J	29.7
CADMIUM	98 N	0.82 - 3.4	0.55 U	1.1 U	5.41 J	7.29 J	6.81 J	7.63	1.1 J	0.423 J	7.64
COBALT	35 N	3.1 - 24.2	4.4	9.4	15.2	26.3	17.1	19.5	8.8	9.39	**40.7**
COPPER	4700 N	8.5 - 316	102 J	91.8 J	**21300**	**23900**	**23100**	**39600 J**	502 J	123 J	**9840**
IRON	82000 N	8730 - 45000	20700	28900	**208000**	**203000**	**208000**	**172000**	23900	27600	**269000**
LEAD	800	9.5 - 1100	492 J	278 J	**1140**	**1980**	**20100**	**16900**	781 J	430 J	**5760**
MANGANESE	2600 N	110 - 611	33.3 J	224 J	1480 J-	1000 J-	701 J-	738	254	324	1430
MERCURY	35 N[3]	0.0825 - 1.8	1 J	4.6 J	1.38	9.53 J	0.332 J	3.74 J	0.604 J	1.92 J	18.6 J
NICKEL	2200 N	8.1 - 73.2	8.7 U	22.7 U	1370	**2810**	735	1100 J	32.6	28.7	944
THALLIUM	1.2 N	0.22 - 0.23	0.77 U	1.2 U	0.134	0.15	0.122	0.143	0.183	0.254	0.099 U
VANADIUM	580 N	13.5 - 89.5	11.6	43.9	33.8	22.3 U	35.6	47.8	26.2	26.6	18.5
ZINC	35000 N	23.1 - 1390	31.3 J	155 J	3290	3020	7350	5060 J	846 J	198 J	6850
MISCELLANEOUS PARAMETERS (MG/KG)											
CYANIDE	1.2 N	NA	2 UJ	2 UJ	--	--	--	--	--	--	--

APPENDIX B.1 TABLE 2

OU8 SUBSURFACE SOIL DATA - SELECTED PARAMETERS[1]

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	USEPA Industrial Soil RSL	PNS Facility Background Range of Detected Concentrations	WTB-SB11	WTB-SB12	WTB-SB12	WTB-SB13	WTB-SB13	WTB-SB14	WTB-SB14	WTB-SB14	WTB-SB15
SAMPLE ID			WTB-SB-11-0610	WTB-SB-12-0206	WTB-SB-12-0610	WTB-SB-13-0206	WTB-SB-13-0610	WTB-SB-14-0206	WTB-SB-14-0206-D	WTB-SB-14-0607	WTB-SB-15-0206
SAMPLE DATE			20150601	20150604	20150604	20150605	20150605	20150603	20150603	20150603	20150604
SAMPLE CODE			NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	ORIG
MATERIAL OBSERVED IN SAMPLE INTERVAL			NO	CINDERS, SLAG, TRACE ASH	CINDERS, SLAG, TRACE ASH	CINDERS, SLAG, ASH	CINDERS, SLAG, ASH	NO	NO	NO	NO
TOP DEPTH (FEET)			6	2	6	2	6	2	2	6	2
BOTTOM DEPTH (FEET)			10	6	10	6	10	6	6	7	6
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)											
BENZO(A)ANTHRACENE	2900 C	37 - 640	610	230	1600	**5400**	130 J	4.4 J	7.2 J	24	110
BENZO(A)PYRENE	290 C	36 - 1100	580 J	200	1100	**3500**	170 J	4.8 J	9.2 J	20 J	120
BENZO(B)FLUORANTHENE	2900 C	41 - 1700	960 J	280	1500	**4800**	250 J	8.1 J	15 J	38 J	140
BENZO(K)FLUORANTHENE	29000 C	38 - 1100	320 J	110	540	1400 J	64 J	10 UJ	10 U	11 J	58 J
DIBENZO(A,H)ANTHRACENE	290 C	180 - 190	120 J	34	170	**630 J**	48 J	10 UJ	10 U	10 UJ	36
INDENO(1,2,3-CD)PYRENE	2900 C	38 - 440	310 J	120	540	2100	110 J	10 UJ	8.7 J	12 J	91
BAP TEQ-HALFND	290 C	243 - 1575	892	298	**1641**	**5379**	268	12	17	33	191
BAP TEQ-POS	290 C	0 - 1575	892	298	**1641**	**5379**	268	6	12	28	191
METALS (MG/KG)											
ALUMINUM	110000 N	4,930 - 33500	8540	8440	5030	12200	10500	7090	8300	5830	11600
ANTIMONY	47 N	7 - 9.4	**52.5**	1.13	11.4	0.527 J	0.2 J	0.35	0.11	0.551	0.11
ARSENIC	3 C	4.4 - 58.6	46.2	22.7	8.57	12.1 J	12.2 J	10.9	12.4	2.48	11.5
CADMIUM	98 N	0.82 - 3.4	5.22 U	0.697	1.51	0.814 U	0.647	0.254 J	0.416 J	0.276 J	0.263 U
COBALT	35 N	3.1 - 24.2	**39**	7.16	9.9	10.7	7.7	5.64	6.33	6.28	9.51
COPPER	4700 N	8.5 - 316	**8100 J**	818 J	958 J	141 J	163 J	19.2 J	21.4 J	36.8 J	45.1 J
IRON	82000 N	8730 - 45000	**239000 J**	25500	33900	34600	18200	14200 J	16200 J	15800 J	17500
LEAD	800	9.5 - 1100	**18700**	**1580**	401	341 J	520 J	18.5	17.9	48.6	41.3
MANGANESE	2600 N	110 - 611	**12600 J**	356	440	537	320	202 J	225 J	210 J	315
MERCURY	35 N[3]	0.0825 - 1.8	2.89 J	1.66 J	0.548 J	1.19 J	1.07 J	0.012 J	0.014 J	0.286 J	0.209 J
NICKEL	2200 N	8.1 - 73.2	**3260**	27.8 J	127 J	40.8	32.2	22.1	25.3	26.7	35.1 J
THALLIUM	1.2 N	0.22 - 0.23	0.118 U	0.111	0.126	0.232	0.149	0.121	0.129	0.152	0.138
VANADIUM	580 N	13.5 - 89.5	49 J	21.2	24	41.4	31.7	15.6 J	18.8 J	20.9 J	27.1
ZINC	35000 N	23.1 - 1390	3210	898 J	1050 J	283 J	365 J	151	204	464	65.8 J
MISCELLANEOUS PARAMETERS (MG/KG)											
CYANIDE	1.2 N	NA	--	--	--	--	--	--	--	--	--

APPENDIX B.1 TABLE 2

OU8 SUBSURFACE SOIL DATA - SELECTED PARAMETERS[1]

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	USEPA Industrial Soil RSL	PNS Facility Background Range of Detected Concentrations	WTB-SB15	WTB-SB15	WTB-SB16	WTB-SB16	WTB-SB17	WTB-SB17	WTB-SB18	WTB-SB18	WTB-SB19
SAMPLE ID			WTB-SB-15-0206-D	WTB-SB-15-0610	WTB-SB-16-0206	WTB-SB-16-0610	WTB-SB-17-0206	WTB-SB-17-0610	WTB-SB-18-0206	WTB-SB-18-0610	WTB-SB-19-0206
SAMPLE DATE			20150604	20150604	20150604	20150604	20150603	20150603	20150604	20150604	20150603
SAMPLE CODE			DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATERIAL OBSERVED IN SAMPLE INTERVAL			NO	CINDERS, SLAG, TRACE ASH	CINDERS, SLAG, TRACE ASH	CINDERS, SLAG, TRACE ASH	NO	NO	CINDERS, SLAG, TRACE ASH	NO	NO
TOP DEPTH (FEET)			2	6	2	6	2	6	2	6	2
BOTTOM DEPTH (FEET)			6	10	6	10	6	10	6	10	6
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)											
BENZO(A)ANTHRACENE	2900 C	37 - 640	100	410	880	240	40	200 J	150	130	170
BENZO(A)PYRENE	290 C	36 - 1100	120	360 J	1000	250	30	370 J	120	120	140 J
BENZO(B)FLUORANTHENE	2900 C	41 - 1700	140	570 J	1500	350	51	510 J	150	150	230 J
BENZO(K)FLUORANTHENE	29000 C	38 - 1100	60 J	220 J	510	120 J	14 J	160 J	69 J	70 J	69 J
DIBENZO(A,H)ANTHRACENE	290 C	180 - 190	42	72 J	210	62	11 U	98 J	30	29	31 J
INDENO(1,2,3-CD)PYRENE	2900 C	38 - 440	100	230 J	800	170	16 J	230 J	76	96	84 J
BAP TEQ-HALFND	290 C	243 - 1575	197	556	1534	390	46	564	188	187	220
BAP TEQ-POS	290 C	0 - 1575	197	556	1534	390	41	564	188	187	220
METALS (MG/KG)											
ALUMINUM	110000 N	4,930 - 33500	10400	5580	18100	10300	4440	4040	15100	14900	9150
ANTIMONY	47 N	7 - 9.4	0.12	2.76	0.297	4.37 J	0.255	8.26	0.12 J	0.918 J	0.301
ARSENIC	3 C	4.4 - 58.6	12.5	10.2	16.6	14 J	10.8	26.5	13 J	9.71 J	11.8
CADMIUM	98 N	0.82 - 3.4	0.153 U	0.856	0.54 U	0.729 U	0.429 J	4.41	0.284 J	1.31	0.299 J
COBALT	35 N	3.1 - 24.2	7.09	6.45	12.2	8.09	4.28	10.2	12.5	10	7.49
COPPER	4700 N	8.5 - 316	30.4 J	373 J	118 J	254 J	224 J	2360 J	74.8 J	306 J	303 J
IRON	82000 N	8730 - 45000	16300	15700	25200	8300	9810 J	**102000 J**	23000	21100	17800 J
LEAD	800	9.5 - 1100	40.1	270	173	**1230 J**	122	**3080**	151 J	375 J	176
MANGANESE	2600 N	110 - 611	272	194	391	282	259 J	139 J	344	589	301 J
MERCURY	35 N[3]	0.0825 - 1.8	0.254 J	0.726 J	0.751 J	0.339 J	0.213 J	0.484 J	0.17 J	0.211 J	0.245 J
NICKEL	2200 N	8.1 - 73.2	25.7 J	27.2 J	48.2 J	47	21.2	194	48.1	28.1	26.5
THALLIUM	1.2 N	0.22 - 0.23	0.146	0.095 U	0.212	0.167	0.0888 U	0.065 U	0.168	0.217	0.128
VANADIUM	580 N	13.5 - 89.5	23	17.8	39.7	29.6	11.2 J	84.4 J	32.5	29.1	26.1 J
ZINC	35000 N	23.1 - 1390	64.6	371 J	120 J	344 J	205	2060	108 J	764 J	173
MISCELLANEOUS PARAMETERS (MG/KG)											
CYANIDE	1.2 N	NA	--	--	--	--	--	--	--	--	--

APPENDIX B.1 TABLE 2
OU8 SUBSURFACE SOIL DATA - SELECTED PARAMETERS[1]
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	USEPA Industrial Soil RSL	PNS Facility Background Range of Detected Concentrations	WTB-SB19	WTB-SB20	WTB-SB20	WTB-SB21	WTB-SB21	WTB-SB22	WTB-SB22	WTB-SB22	WTB-SB23
SAMPLE ID			WTB-SB-19-0610	WTB-SB-20-0206	WTB-SB-20-0610	WTB-SB-21-0206	WTB-SB-21-0610	WTB-SB-22-0206	WTB-SB-22-0610	WTB-SB-22-0610-D	WTB-SB-23-0206
SAMPLE DATE			20150603	20150604	20150604	20150604	20150604	20150603	20150603	20150603	20150603
SAMPLE CODE			NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
MATERIAL OBSERVED IN SAMPLE INTERVAL			NO	CINDERS	NO	CINDERS	CINDERS	NO	NO	NO	CINDERS, SLAG
TOP DEPTH (FEET)			6	2	6	2	6	2	6	6	2
BOTTOM DEPTH (FEET)			10	6	10	6	10	6	10	10	6
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)											
BENZO(A)ANTHRACENE	2900 C	37 - 640	130	38 J	80	250 J	410	1400	230 J	58 J	**14000**
BENZO(A)PYRENE	290 C	36 - 1100	110	32 J	68	210 J	360	**1200**	200 J	62 J	**12000**
BENZO(B)FLUORANTHENE	2900 C	41 - 1700	150	58 J	92	310 J	380	1800	330 J	95 J	**17000**
BENZO(K)FLUORANTHENE	29000 C	38 - 1100	62	12 J	29	120 J	170	840	100 J	31 J	6700
DIBENZO(A,H)ANTHRACENE	290 C	180 - 190	20 J	11 J	19 J	44 J	60	220	55 J	13 UJ	**1600**
INDENO(1,2,3-CD)PYRENE	2900 C	38 - 440	64	28 J	44	120 J	180	670	150 J	39 J	**6500**
BAP TEQ-HALFND	290 C	243 - 1575	165	56	109	323	519	**1817**	327	88	**17430**
BAP TEQ-POS	290 C	0 - 1575	165	56	109	323	519	**1817**	327	82	**17430**
METALS (MG/KG)											
ALUMINUM	110000 N	4,930 - 33500	12700	12300	11900	7490	6320	2030	2150 J	5360 J	12800
ANTIMONY	47 N	7 - 9.4	1.29	0.937 J	0.077 U	40.8 J	5.87 J	0.509 J	0.632 J	0.55 J	0.654 J
ARSENIC	3 C	4.4 - 58.6	14.9	11.1 J	12.7 J	19.7 J	15.1 J	8.44	14.9	15.9	20.8
CADMIUM	98 N	0.82 - 3.4	0.305 J	0.32 U	0.197 J	3.64 U	5.88	0.053 J	0.199 J	0.204 J	0.776
COBALT	35 N	3.1 - 24.2	9.98	8.48	12.4	10.6	16.6	5.46	5.11	7.95	10.6
COPPER	4700 N	8.5 - 316	130 J	64.2 J	70.2 J	**22900 J**	4070 J	72.5	173 J	190 J	129
IRON	82000 N	8730 - 45000	20300 J	16500	18600	**109000**	**140000**	16700	23500	27900	21100
LEAD	800	9.5 - 1100	280	85.9 J	131 J	**2350 J**	1060 J	**2530**	406 J	438 J	315
MANGANESE	2600 N	110 - 611	349 J	313	1220	773	548	49 J-	149 J	239 J	273 J-
MERCURY	35 N[3]	0.0825 - 1.8	1.95 J	0.0707 J	0.655 J	1.47 J	0.627 J	0.462	0.818	0.485	0.628
NICKEL	2200 N	8.1 - 73.2	41.3	30.3	23.6	52.4	80.4	10.4	12.6	24.5	42.6
THALLIUM	1.2 N	0.22 - 0.23	0.145	0.161	0.182	0.108	0.098 U	0.145	0.12 U	0.149	0.219
VANADIUM	580 N	13.5 - 89.5	30.9 J	26.9	23.9	23.4	26.4	8.92	17.1	27.8	40.6
ZINC	35000 N	23.1 - 1390	217	90.2 J	87.7 J	2220 J	3320 J	45.3	106 J	158 J	407
MISCELLANEOUS PARAMETERS (MG/KG)											
CYANIDE	1.2 N	NA	--	--	--	--	--	--	--	--	--

APPENDIX B.1 TABLE 2
OU8 SUBSURFACE SOIL DATA - SELECTED PARAMETERS[1]
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	USEPA Industrial Soil RSL	PNS Facility Background Range of Detected Concentrations	WTB-SB23	WTB-SB24	WTB-SB24
SAMPLE ID			WTB-SB-23-0610	WTB-SB-24-0206	WTB-SB-24-069.7
SAMPLE DATE			20150603	20150603	20150603
SAMPLE CODE			NORMAL	NORMAL	NORMAL
MATERIAL OBSERVED IN SAMPLE INTERVAL			CINDERS, SLAG	NO	NO
TOP DEPTH (FEET)			6	2	6
BOTTOM DEPTH (FEET)			10	6	9.7
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)					
BENZO(A)ANTHRACENE	2900 C	37 - 640	**7400**	9.1 U	9.8 U
BENZO(A)PYRENE	290 C	36 - 1100	**6400**	9.1 U	9.8 UJ
BENZO(B)FLUORANTHENE	2900 C	41 - 1700	**9000**	9.1 U	9.8 UJ
BENZO(K)FLUORANTHENE	29000 C	38 - 1100	3900	9.1 U	9.8 UJ
DIBENZO(A,H)ANTHRACENE	290 C	180 - 190	**1600**	9.1 U	9.8 UJ
INDENO(1,2,3-CD)PYRENE	2900 C	38 - 440	**4000**	9.1 U	9.8 UJ
BAP TEQ-HALFND	290 C	243 - 1575	**10086**	9.1 U	9.8 U
BAP TEQ-POS	290 C	0 - 1575	**10086**	9.1 U	9.8 U
METALS (MG/KG)					
ALUMINUM	110000 N	4,930 - 33500	8470	7550	6260
ANTIMONY	47 N	7 - 9.4	1.4 J	0.047 U	0.049 U
ARSENIC	3 C	4.4 - 58.6	10.5	11.6	12.8
CADMIUM	98 N	0.82 - 3.4	0.482 J	0.0869 J	0.059 J
COBALT	35 N	3.1 - 24.2	8.67	7.57	5.27
COPPER	4700 N	8.5 - 316	1260	17.2	15.2
IRON	82000 N	8730 - 45000	25900	14200	10300
LEAD	800	9.5 - 1100	**2180**	4.79	21.2
MANGANESE	2600 N	110 - 611	186 J-	285 J-	157 J-
MERCURY	35 N[3]	0.0825 - 1.8	0.516	0.014 U	0.014 U
NICKEL	2200 N	8.1 - 73.2	31	26.6	16.5
THALLIUM	1.2 N	0.22 - 0.23	0.152	0.108	0.078 U
VANADIUM	580 N	13.5 - 89.5	27.7	22.9	12.8
ZINC	35000 N	23.1 - 1390	220	33	30.6
MISCELLANEOUS PARAMETERS (MG/KG)					
CYANIDE	1.2 N	NA	--	--	--

USEPA RSLs (June 2015) are based on ILCR = 1x10-6 (C) and HI = 0.1 (N). C = carcinogen; N = Non-carciongen.
Shaded values indicate the industrial RSL and maximum background value were exceeded.

1 - Only chemicals exceeding residential RSLs are presented.
2 - WTB-MW01 and WTB-MW05 are located outside boundary of OU8 and may not represent site data.
3 - Value for mercuric chloride and other mercury salts.

Data Qualifiers:
J = Estimated value
J - = Estimated value, biased low
U = Not detected
R = Rejected

NA - No value available.

B.2 BACKGROUND EVALUATION

Background Comparisons
OU8
Portsmouth Naval Shipyard, Kittery, Maine

1. INTRODUCTION

Comparisons of site surface soil and subsurface soil at OU8 to facility background data was conducted to determine if chemical concentrations are consistent with background concentrations or should be associated with site usage. The background soil data are presented in Table 1. The background comparisons are based on the comparative statistical method. The comparative method utilizes several statistical techniques to compare site and background data which are described in Section 2.0. Section 3.0 presents the results of the background comparisons for each media. The statistical program R version 2.15.0 was used to perform all statistical analyses.

2. STATISTICAL METHODLOGY

This section describes the graphical displays and hypothesis tests used to compare site data and background data.

The comparative statistical method of site data and background data involved a graphical evaluation and a hypothesis test comparing the central tendency (mean/median) concentrations and a hypothesis test comparing the right tails (largest values). The graphical evaluation consisted of visual inspection of boxplots, normal probability plots, and histograms. The graphical displays are presented at the end of this Appendix. The detection limit was used for non-detected concentrations for the graphical displays and any statistical hypothesis tests that were computed.

2.1 Graphical Displays

Boxplots show the central tendency, degree of symmetry, range of variation, and potential outliers of a data set. The data set is shown as a rectangular box that represents the middle 50 percent of the data. The upper value of the box represents the 75th percentile and the lower value of the box represents the 25th percentile. The median is represented by the middle line in the box. Box plots for the same analyte were plotted on the same graph. The plots were visually inspected to see which data sets look similar and which ones differed. Particular attention was paid to see if the median from one data set fell within the 75th and 25th percentile range of the other data sets.

Probability plots are a useful first step for visually comparing two data sets in a single graph. If the site and background distributions were exactly identical, the plotted values would lie on a straight line through the origin. Deviations from this line show the differences between the two distributions. If the site and background distributions are similar the scattering of the two data sets will be mixed. If there is grouping of the two data sets then data sets are most likely different.

Histograms are a visual representation of the data collected into groups. The data range is divided into several bins or classes and the data are sorted into the bins. The x-axis displays the chemical concentration range for the bin and the y-axis shows the number of observations that fall within the bin. The histograms of the site and background datasets were plotted on top of each other to be able to compare the shapes of the two distributions, overall concentration ranges, and ranges of concentrations that have the most samples.

2.2 Hypothesis Tests

Two types of hypothesis tests were conducted one comparing the central tendency of the data sets and one comparing the right tails of the data sets. The Two sample T-test (equal and unequal variance), Wilcoxon Rank Sum test, and Gehan test were used to compare the central tendency (mean/median) of the site and background data sets. The Slippage Test and Quantile test were used to compare the right tails of the site and background datasets. All hypothesis tests were conducted using a five percent significance level meaning that if the p-value associated with the hypothesis test is less than 0.05 there is statistically significant evidence that the null hypothesis (H_o or assumed hypothesis) is false. The p-value of a test can be thought of as the credibility of the null hypothesis; p-values greater than 0.05 indicate that the null hypothesis is credible whereas p-values less than 0.05 indicate otherwise.

The Two Sample T-Test tests for a difference between two populations means when it can be assumed that the data are approximately normally distributed or sample sizes are large enough (m and n at least 30) and the data are all detected. If the variances of the two data sets are not equal than the Two sample T Test with unequal variance was computed. The null and alternative hypotheses were:

H_o: Site Average ≥ Background Average + Background Standard Deviation
H_A: Site Average < Background Average + Background Standard Deviation

The Wilcoxon Rank-Sum (WRS) nonparametric test is used to test for a difference between median concentrations between two independent populations. The WRS test was used when the data were not normally distributed and there were less than three reporting limits if non-detected concentrations were present. The null and alternative hypotheses were:

H_o: Site Median ≥ Background Media + Background Standard Deviation
H_A: Site Median < Background Median + Background Standard Deviation

The Gehan nonparametric test is used to test for a difference between median concentrations between two independent populations. The Gehan test can be used when the background or site datasets contain multiple nondetects with different reporting limits. The Gehan test was used when the nondetects had more than three reporting limits. The null and alternative hypotheses are the same as the null and alternative hypothesis for the WRS test.

The Slippage Test and Quantile tests are used to test for a shift to the right in the extreme right-tail of the site versus the background concentrations. This is equivalent to asking if a set of the largest values of the site distribution are larger than the maximum value of the background distribution. If the slippage test found the extreme right tail of the site data to be larger than the background data it was concluded that the site concentrations are greater than background. The null and alternative hypotheses were:

H_o: Right Tail of Site Dataset ≤ Right Tail of the Background Dataset
H_A: Right Tail of the Site Dataset > Right Tail of the Background Dataset

3. STATISTICAL CONCLUSIONS

The results of the statistical tests for surface soil and subsurface soil are presented in Tables 2 and 3, respectively. For surface soil, aluminum, arsenic, cobalt, lead, and vanadium site concentrations are consistent with background concentrations. For subsurface soil, aluminum and vanadium site concentrations are consistent with background concentrations.

TABLE 1
SOIL BACKGROUND DATA
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	BGS-01			BGS-02	BGS-03	BGS-04	BGS-06	BGS-07	BGS-08	BGS-09
SAMPLE ID	**BGS-01**	**BGS-01-AVG**	**BGS-01-D**	**BGS-02**	**BGS-03**	**BGS-04**	**BGS-06**	**BGS-07**	**BGS-08**	**BGS-09**
SAMPLE DATE	**99990101**	**99990101**	**99990101**	**99990101**	**99990101**	**99990101**	**99990101**	**99990101**	**99990101**	**99990101**
SAMPLE CODE	**ORIG**	**AVG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
MATRIX	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**
SAMPLE TYPE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SUBMATRIX	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
METALS (MG/KG)										
ALUMINUM	19500	21300	23100	26500	25900	###	19000	20800	16500	25800
ANTIMONY	7 J	5.125 U	6.5 U	9.4 J	7.4 U	5.6 U	6.4 U	7.5 U	6.1 U	7 J
ARSENIC	10.6 J	11.45 J	12.3 J	10.8 J	14.1 J	12.7 J	20.5 J	58.6 J	11.5 J	11 J
CADMIUM	2.4	2.7	3	2.7	2.8	2.3	2.6	2.8	2.7	3.4
COBALT	12.8	14.1	15.4	14.6	14.8	12	10.3	12.4	12.4	12.7
COPPER	61.1	188.55	316	16.8	13.2	89.9	97.5	232	59	18.5
IRON	22500	24200	25900	27200	24500	###	20600	22800	23400	26400
LEAD	112 J	115.5	119	9.5 J	10.8 J	89.7 J	543 J	1100	88.5 J	40.1 J
MANGANESE	263	294	325	295	196	381	323	330	350	460
MERCURY	0.11 U	0.0825	0.11	0.1 U	0.11 U	0.11	0.32	0.57	0.11 U	0.27
NICKEL	49.5	51.5	53.5	50	52.2	42.8	37.2	42.9	38.2	44.6
THALLIUM	0.22 J	0.1575 U	0.19 U	0.23 J	0.21 U	0.2 U	0.2 U	0.19 U	0.21 U	0.21 U
VANADIUM	47.7	52.25	56.8	53.6	52.4	30.6	46.8	62.7	43.9	66.7
ZINC	187	168.5	150	46.6	43.9	108	246	237	88.4	73.7
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)										
BENZO(A)ANTHRACENE	140 J	100.5 J	61 J	390 U	390 U	59 J	89 J	210 J	47 J	380 U
BENZO(A)PYRENE	110 J	85 J	60 J	390 U	390 U	50 J	88 J	200 J	43 J	380 U
BENZO(B)FLUORANTHENE	140 J	112 J	84 J	390 U	390 U	44 J	87 J	250 J	57 J	380 U
BENZO(K)FLUORANTHENE	110 J	78 J	46 J	390 U	390 U	55 J	88 J	150 J	380 U	380 U
DIBENZO(A,H)ANTHRACENE	400 U	380 U	360 U	390 U	390 U	360 U	410 U	410 U	380 U	380 U
INDENO(1,2,3-CD)PYRENE	79 J	79 J	360 U	390 U	390 U	360 U	410 U	100 J	380 U	380 U
BAP EQUIVALENT-POS	147	114.93	74.96	390 U	390 U	60.9	106.48	257.5	53.4	380 U
BAP EQUIVALENT-HALFND	347	304.93	272.96	390 U	390 U	259	331.98	462.5	264.3	380 U

TABLE 1
SOIL BACKGROUND DATA
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	**BGS-10**	**BGS-11**	**BGS-12**	**BGS-13**	**BGS-14**	**BGS-15**	**BGS-16**	**BGS-17**	**BGS-18**	**BGS-19**
SAMPLE ID	**BGS-10**	**BGS-11**	**BGS-12**	**BGS-13**	**BGS-14**	**BGS-15**	**BGS-16**	**BGS-17**	**BGS-18**	**BGS-19**
SAMPLE DATE	**99990101**	**99990101**	**99990101**	**99990101**	**99990101**	**99990101**	**99990101**	**99990101**	**99990101**	**99990101**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
MATRIX	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**
SAMPLE TYPE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SUBMATRIX	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
METALS (MG/KG)										
ALUMINUM	17100	4930	15900	33500	14200	13200	22800	9680	23200	17200
ANTIMONY	9.1 U	8.2 U	7 U	8.5 U	7.3 U	8.7 U	9.4 U	7.6 U	9 U	7.4 U
ARSENIC	17.1	6.2	13	8.9	16.8	14.2	12.5	6.7	7.3	12.6
CADMIUM	0.93 B	0.8 U	1.5	2.4	1.1	1.6	1.6	0.74 U	2.1	0.82 B
COBALT	10.5	4.1 B	10.9	24.2	10.3	7.6 B	17	3.1 B	11.2	7.7 B
COPPER	33.3	316	50.4	24	65.5	21.6	31.4	14.7	41.6	25.4
IRON	21700	9450	18900	45000	20800	17900	32100	8730	27200	20200
LEAD	96	119	50.7	50.9	173	67	55.2	12.8	316	191
MANGANESE	254	110	298	243	242	285	427	154	271	350
MERCURY	0.31 U	0.23 U	0.16 U	0.19 U	0.21 U	0.13 U	0.13 U	0.11 U	1.8	0.18 U
NICKEL	33.6	11.2	42	65	44.7	28.5	73.2	8.1	29.5	20.3
THALLIUM	0.49 U	0.58 U	0.47 U	0.65 U	0.56 U	0.6 U	0.64 U	0.57 U	0.49 U	0.67 U
VANADIUM	36.7	28.5	62.1	89.5	85.4	42.5	73.1	13.5	54.5	38.7
ZINC	91.9	150	82.1	109	208	72.3	95.2	23.1	1390	105
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)										
BENZO(A)ANTHRACENE	360 U	37 J	120 J	48 J	640	41 J	380 U	350 U	360 U	96 J
BENZO(A)PYRENE	360 U	39 J	130 J	43 J	1100	36 J	380 U	350 U	360 U	100 J
BENZO(B)FLUORANTHENE	62 J	56 J	170 J	360 U	1700	66 J	60 J	350 U	55 J	240 J
BENZO(K)FLUORANTHENE	360 U	47 J	110 J	360 U	1100	350 U	380 U	350 U	360 U	370 U
DIBENZO(A,H)ANTHRACENE	360 U	360 U	380 U	360 U	180 J	350 U	380 U	350 U	360 U	370 U
INDENO(1,2,3-CD)PYRENE	360 U	360 U	64 J	360 U	440	350 U	380 U	350 U	360 U	47 J
BAP EQUIVALENT-POS	6.2	48.77	166.5	47.8	1569	46.7	6	350 U	5.5	138.3
BAP EQUIVALENT-HALFND	404	246.77	356.5	265.6	1569	240.95	425.9	350 U	403.3	325.15

TABLE 1
SOIL BACKGROUND DATA
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	**BGS-20**	**BGS-21**	**BGS-22**	**BGS-23**	**BGS-24**	**BGS-25**	**BGS-26**
SAMPLE ID	**BGS-20**	**BGS-21**	**BGS-22**	**BGS-23**	**BGS-24**	**BGS-25**	**BGS-26**
SAMPLE DATE	**99990101**	**99990101**	**99990101**	**99990101**	**99990101**	**99990101**	**99990101**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
MATRIX	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**
SAMPLE TYPE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SUBMATRIX	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
METALS (MG/KG)							
ALUMINUM	20800	18200	15000	14200	10900	29600	18900
ANTIMONY	10.2 U	9 U	8.3 U	8.1 U	9 U	9.7 U	8.7 U
ARSENIC	15.7	13.1	13.7	16.2	4.4 B	22.2	10.6 B
CADMIUM	2.5	1.1 B	1.4	1.1	0.88 U	1.3	0.85 U
COBALT	10 B	7.3 B	7.4 B	7.7	5.2 B	16.1	10.5
COPPER	161	68	29.9	11.8	8.5	19.7	35.8
IRON	21100	18200	16600	20000	12800	32200	21000
LEAD	526	387	160	75.3	11.7	23.1	106
MANGANESE	393	208	290	440	218	611	265
MERCURY	0.18 U	0.3 U	0.22 U	0.14 U	0.15 U	0.11 U	0.15 U
NICKEL	38.8	37.9	28.6	16.1	20.8	59.4	36.1
THALLIUM	0.76 U	0.63 U	0.61 U	0.53 U	0.58 U	0.71 U	0.64 U
VANADIUM	64.5	43.7	43	37.8	20.9	56.4	38.7
ZINC	267	81.8	91.5	71.9	29.6	78.9	87.8
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)							
BENZO(A)ANTHRACENE	130 J	69 J	480	60 J	360 U	400 U	360 U
BENZO(A)PYRENE	140 J	76 J	520	89 J	360 U	400 U	360 U
BENZO(B)FLUORANTHENE	320 J	170 J	470	200 J	360 U	400 U	41 J
BENZO(K)FLUORANTHENE	430 U	400 U	680	38 J	360 U	400 U	360 U
DIBENZO(A,H)ANTHRACENE	430 U	400 U	190 J	350 U	360 U	400 U	360 U
INDENO(1,2,3-CD)PYRENE	61 J	400 U	400	38 J	360 U	400 U	360 U
BAP EQUIVALENT-POS	191.1	99.9	851.8	119.18	360 U	400 U	4.1
BAP EQUIVALENT-HALFND	408.25	321.9	851.8	294.18	360 U	400 U	401.9

TABLE 2
BACKGROUND COMPARISONS
OU8 SURFACE SOIL
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

PARAMETER	SITE FOD	BACKGROUND FOD	SITE MAXIMUM DETECT	SITE MAX NON-DETECT	BACKGROUND MAXIMUM DETECT	BACKGROUND MAXIMUM NON-DETECT	SITE DISTRIBUTION	BACKGROUND DISTRIBUTION	HYPOTHESIS TEST	HYPOTHESIS TEST P-VALUE	HYPOTHESIS TEST CONCLUSION	QUANTILE TEST(1)	SLIPPAGE TEST(1)	VISUAL CONCLUSION	FINAL CONCLUSION(2)
METALS (MG/KG)															
ALUMINUM	20 / 20	25 / 25	18000	--	33500	--	Normal	Normal	T-Test	4.48E-11	Site Consistent with Background	Site Consistent with Background	Site Consistent with Background	Site Consistent with Background	Site Consistent with Background
ANTIMONY	15 / 20	2 / 25	3.2	0.91	9.4	10.2	Nonparametric	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	20 / 20	25 / 25	18.6	--	58.6	--	Normal	Nonparametric	WRS	5.45E-08	Site Consistent with Background	Site Consistent with Background	Site Consistent with Background	Site Consistent with Background	Site Consistent with Background
COBALT	20 / 20	25 / 25	19.5	--	24.2	--	Normal	Normal	T-Test	1.02E-04	Site Consistent with Background	Site Consistent with Background	Site Consistent with Background	Site Consistent with Background	Site Consistent with Background
COPPER	20 / 20	25 / 25	769	--	316	--	Nonparametric	Nonparametric	WRS	7.46E-01	Site Greater than Background	Site Greater Background	Site Consistent with Background	Site Greater Background	Site Greater Background
IRON	20 / 20	25 / 25	48500	--	45000	--	Normal	Nonparametric	WRS	4.44E-02	Site Consistent with Background	Site Greater Background	Site Consistent with Background	Site Greater Background	Site Greater Background
LEAD	20 / 20	25 / 25	858	--	1100	--	Nonparametric	Nonparametric	WRS	1.44E-05	Site Consistent with Background	Site Consistent with Background	Site Consistent with Background	Site Consistent with Background	Site Consistent with Background
MANGANESE	20 / 20	25 / 25	672	--	611	--	Normal	Normal	T-Test	2.08E-01	Site Greater than Background	Site Greater Background	Site Consistent with Background	Site Greater Background	Site Greater Background
NICKEL	20 / 20	25 / 25	260	--	73.2	--	Nonparametric	Normal	WRS	2.38E-01	Site Greater than Background	Site Greater Background	Site Consistent with Background	Site Greater Background	Site Greater Background
SILVER	9 / 20	0 / 18	44650	1.3	--	0.74	Nonparametric	NA	NA	NA	NA	NA	NA	NA	NA
THALLIUM	15 / 20	1 / 25	0.3005	1	0.23	0.76	Nonparametric	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	20 / 20	25 / 25	69.3	--	89.5	--	Normal	Normal	T-Test	8.01E-09	Site Consistent with Background	Site Consistent with Background	Site Consistent with Background	Site Consistent with Background	Site Consistent with Background
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)															
BAP EQUIVALENT-HALFND	19 / 20	20 / 25	15129	9.9	1574.7	400	Nonparametric	Nonparametric	Gehan	1.41E-02	Site Consistent with Background	Site Greater Background	Site Consistent with Background	Site Greater Background	Site Greater Background
BAP EQUIVALENT-POS	19 / 20	20 / 25	15129	9.9	1574.7	0	Nonparametric	Nonparametric	Gehan	1.59E-01	Site Greater than Background	Site Greater Background	Site Consistent with Background	Site Greater Background	Site Greater Background
BENZO(A)ANTHRACENE	17 / 20	15 / 25	13000	10	640	400	Nonparametric	Nonparametric	Gehan	1.28E-01	Site Greater than Background	Site Consistent with Background	Site Consistent with Background	Site Greater Background	Site Greater Background
BENZO(A)PYRENE	17 / 20	15 / 25	10000	10	1100	400	Nonparametric	Nonparametric	Gehan	1.88E-01	Site Greater than Background	Site Greater Background	Site Consistent with Background	Site Greater Background	Site Greater Background
BENZO(B)FLUORANTHENE	19 / 20	18 / 25	15000	9.9	1700	400	Nonparametric	Nonparametric	Gehan	7.55E-02	Site Greater than Background	Site Greater Background	Site Consistent with Background	Site Greater Background	Site Greater Background
BENZO(K)FLUORANTHENE	16 / 20	9 / 25	4700	10	1100	430	Nonparametric	Nonparametric	Gehan	2.99E-01	Site Greater than Background	Site Consistent with Background	Site Consistent with Background	Site Greater Background	Site Greater Background
DIBENZO(A,H)ANTHRACENE	15 / 20	2 / 25	1700	10	190	430	Nonparametric	NA	NA	NA	NA	NA	NA	NA	NA
INDENO(1,2,3-CD)PYRENE	17 / 20	8 / 25	6700	10	440	410	Nonparametric	Nonparametric	Gehan	4.46E-01	Site Greater than Background	Site Greater Background	Site Greater Background	Site Greater Background	Site Greater Background

The statistical evaluation was conducted when each dataset had at least 4 detections.

A 5 percent significance level was used.
1) The Quantile and Slippage test cannot be computed if there are non-detected concentrations in the upper tail of the dataset.
2) Based on statistical tests and visual observations.

FOD - Frequency of Detection
WRS - Wilcoxon Rank Sum
NA - Not applicable

TABLE 3
BACKGROUND COMPARISONS
OU8 SUBSURFACE SOIL
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

PARAMETER	SITE FOD	BACKGROUND FOD	SITE MAXIMUM DETECT	SITE MAX NON-DETECT	BACKGROUND MAXIMUM DETECT	BACKGROUND MAXIMUM NON-DETECT	SITE DISTRIBUTION	BACKGROUND DISTRIBUTION	HYPOTHESIS TEST	HYPOTHESIS TEST P-VALUE	HYPOTHESIS TEST CONCLUSION	QUANTILE TEST(1)	SLIPPAGE TEST(1)	VISUAL CONCLUSION	FINAL CONCLUSION(2)
METALS (MG/KG)															
ALUMINUM	45 / 45	25 / 25	18100	--	33500	--	Normal	Normal	T-Test	1.21E-13	Site Consistent with Background	Site Consistent with Background	Site Consistent with Background	Site Consistent with Background	Site Consistent with Background
ANTIMONY	31 / 41	2 / 25	1610	1.1	9.4	10.2	Nonparametric	NA	NA	NA	NA	NA	NA	NA	NA
ARSENIC	45 / 45	25 / 25	61.9	--	58.6	--	Nonparametric	Nonparametric	WRS	5.65E-05	Site Consistent with Background	Site Greater Background	Site Consistent with Background	Site Greater Background	Site Greater Background
CADMIUM	29 / 45	21 / 25	7.64	5.22	3.4	0.88	Nonparametric	Nonparametric	Gehan	2.00E-04	Site Consistent with Background	NA	Site Greater Background	Site Greater Background	Site Greater Background
COBALT	45 / 45	25 / 25	40.7	--	24.2	--	Nonparametric	Normal	WRS	5.64E-05	Site Consistent with Background	Site Consistent with Background	Site Consistent with Background	Site Greater Background	Site Greater Background
COPPER	45 / 45	25 / 25	39600	--	316	--	Nonparametric	Nonparametric	WRS	9.58E-01	Site Greater than Background	Site Greater Background	Site Greater Background	Site Greater Background	Site Greater Background
IRON	45 / 45	25 / 25	269000	--	45000	--	Nonparametric	Nonparametric	WRS	1.70E-02	Site Consistent with Background	Site Greater Background	Site Greater Background	Site Greater Background	Site Greater Background
LEAD	43 / 45	25 / 25	20100	36.9	1100	--	Nonparametric	Nonparametric	Gehan	7.16E-01	Site Greater than Background	Site Greater Background	Site Greater Background	Site Greater Background	Site Greater Background
MANGANESE	45 / 45	25 / 25	12600	--	611	--	Nonparametric	Normal	WRS	2.79E-02	Site Consistent with Background	Site Greater Background	Site Greater Background	Site Greater Background	Site Greater Background
MERCURY	42 / 45	6 / 25	18.6	0.07	1.8	0.31	Nonparametric	Nonparametric	Gehan	9.97E-01	Site Greater than Background	Site Greater Background	Site Greater Background	Site Greater Background	Site Greater Background
NICKEL	43 / 45	25 / 25	3260	10.3	73.2	--	Nonparametric	Normal	Gehan	9.10E-03	Site Consistent with Background	Site Greater Background	Site Greater Background	Site Greater Background	Site Greater Background
THALLIUM	27 / 45	1 / 25	0.254	0.98	0.23	0.76	Nonparametric	NA	NA	NA	NA	NA	NA	NA	NA
VANADIUM	44 / 45	25 / 25	84.4	22.3	89.5	--	Nonparametric	Normal	WRS	4.10E-10	Site Consistent with Background	Site Consistent with Background	Site Consistent with Background	Site Consistent with Background	Site Consistent with Background
ZINC	45 / 45	25 / 25	7350	--	1390	--	Nonparametric	Nonparametric	WRS	1.02E-01	Site Greater than Background	Site Greater Background	Site Greater Background	Site Greater Background	Site Greater Background
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)															
BAP EQUIVALENT-HALFND	43 / 45	20 / 25	17430	9.8	1574.7	400	Nonparametric	Nonparametric	Gehan	4.53E-02	Site Consistent with Background	Site Greater Background	Site Greater Background	Site Greater Background	Site Greater Background
BAP EQUIVALENT-POS	43 / 45	20 / 25	17430	9.8	1574.7	0	Nonparametric	Nonparametric	Gehan	3.85E-01	Site Greater than Background	Site Greater Background	Site Greater Background	Site Greater Background	Site Greater Background
BENZO(A)ANTHRACENE	43 / 45	15 / 25	14000	400	640	400	Nonparametric	Nonparametric	Gehan	5.33E-01	Site Greater than Background	Site Greater Background	Site Greater Background	Site Greater Background	Site Greater Background
BENZO(A)PYRENE	43 / 45	15 / 25	12000	400	1100	400	Nonparametric	Nonparametric	Gehan	3.17E-01	Site Greater than Background	Site Greater Background	Site Consistent with Background	Site Greater Background	Site Greater Background
BENZO(B)FLUORANTHENE	43 / 45	18 / 25	17000	400	1700	400	Nonparametric	Nonparametric	Gehan	1.62E-01	Site Greater than Background	Site Greater Background	Site Consistent with Background	Site Greater Background	Site Greater Background
BENZO(K)FLUORANTHENE	41 / 45	9 / 25	6700	530	1100	430	Nonparametric	Nonparametric	Gehan	1.94E-01	Site Greater than Background	NA	Site Consistent with Background	Site Greater Background	Site Greater Background
DIBENZO(A,H)ANTHRACENE	40 / 45	2 / 25	1600	400	190	430	Nonparametric	NA	NA	NA	NA	NA	NA	NA	NA
INDENO(1,2,3-CD)PYRENE	43 / 45	8 / 25	6500	400	440	410	Nonparametric	Nonparametric	Gehan	5.31E-01	Site Greater than Background	NA	Site Greater Background	Site Greater Background	Site Greater Background

The statistical evaluation was conducted when each dataset had at least 4 detections.

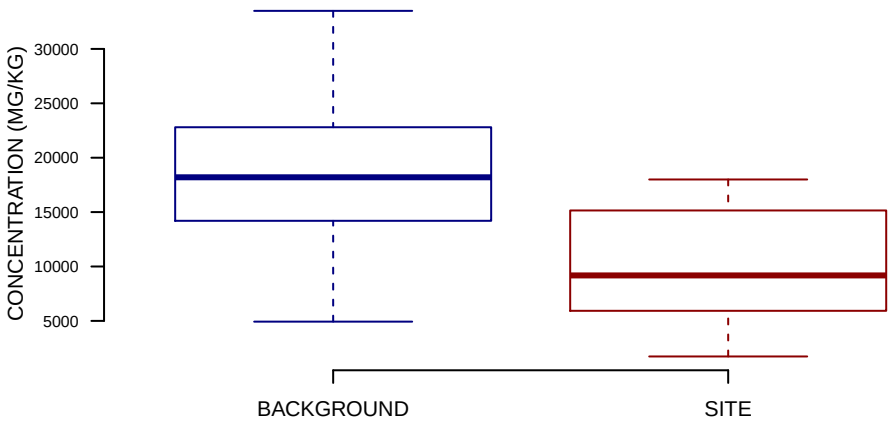
A 5 percent significance level was used.
1) The Quantile and Slippage test cannot be computed if there are non-detected concentrations in the upper tail of the dataset.
2) Based on statistical tests and visual observations.

FOD - Frequency of Detection
WRS - Wilcoxon Rank Sum
NA - Not applicable

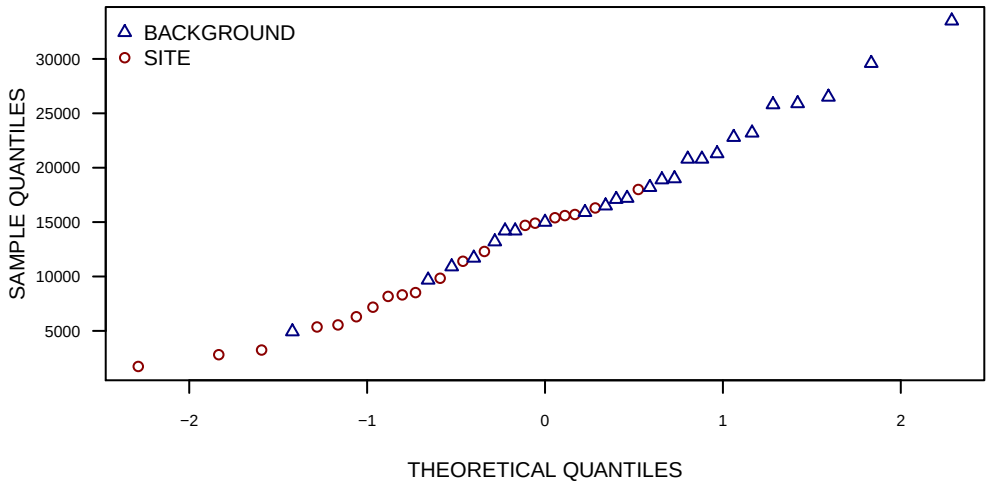
SURFACE SOIL GRAPHICAL DISPLAYS

ALUMINUM SURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 1 OF 20

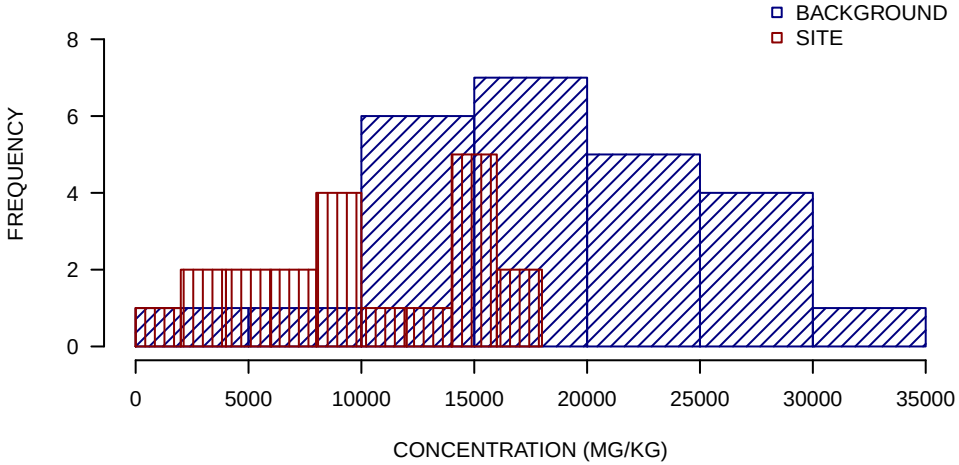
BOXPLOTS



NORMAL Q−Q PLOT



HISTOGRAMS



SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	4900	1700
25TH PERCENTILE	14000	6100
MEDIAN	18000	9200
MEAN	19000	10000
75TH PERCENTILE	23000	15000
MAXIMUM	34000	18000

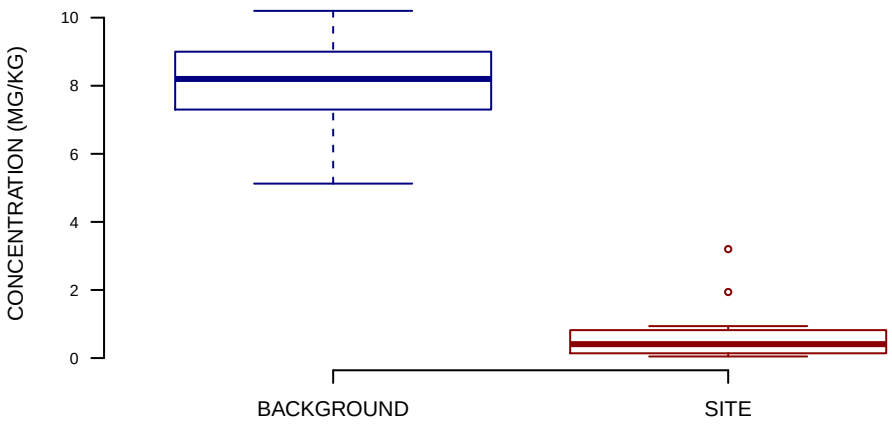
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

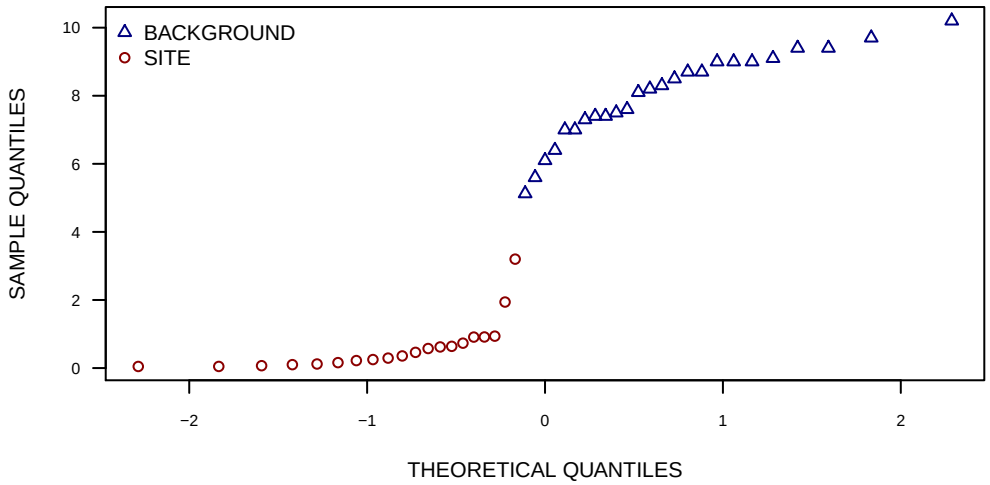
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ANTIMONY SURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 2 OF 20

BOXPLOTS



NORMAL Q−Q PLOT



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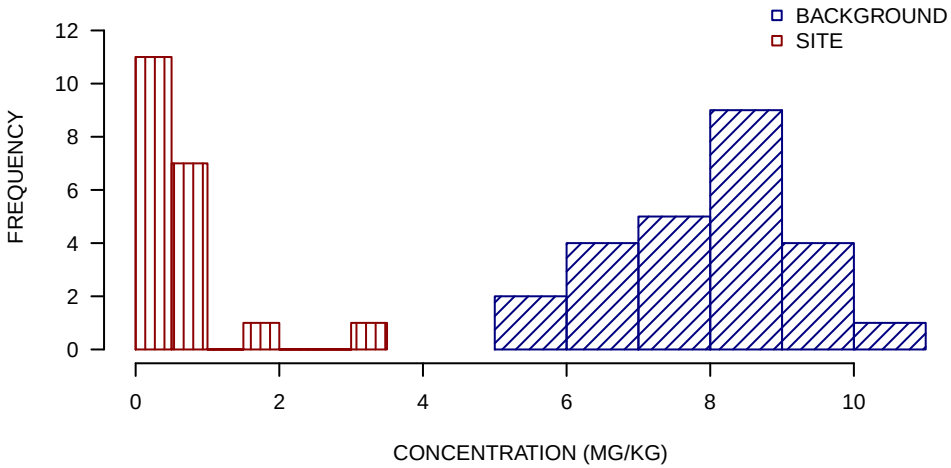


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	5.1	0.047
25TH PERCENTILE	7.3	0.15
MEDIAN	8.2	0.41
MEAN	8	0.63
75TH PERCENTILE	9	0.78
MAXIMUM	10	3.2

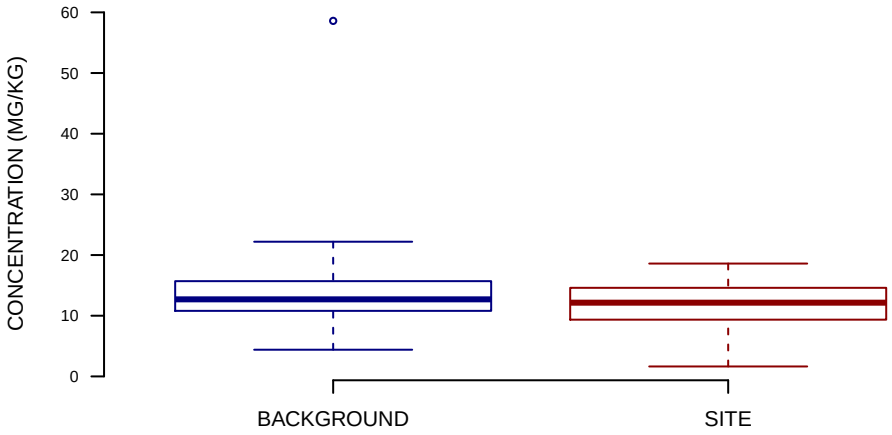
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

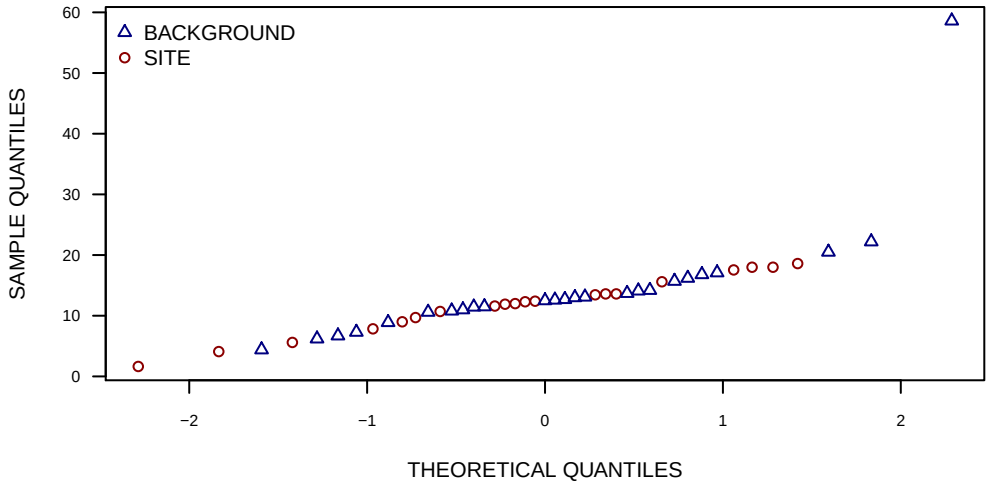
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ARSENIC SURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 3 OF 20

BOXPLOTS



NORMAL Q−Q PLOT



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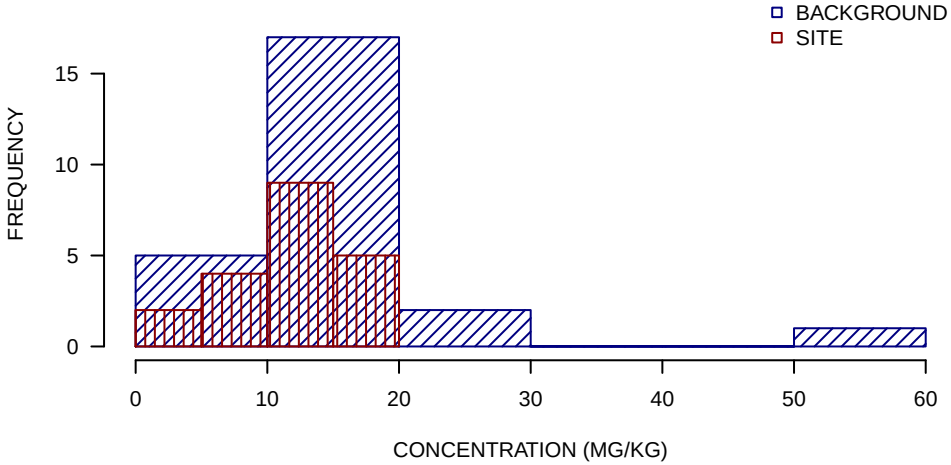


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	4.4	1.6
25TH PERCENTILE	11	9.5
MEDIAN	13	12
MEAN	14	12
75TH PERCENTILE	16	14
MAXIMUM	59	19

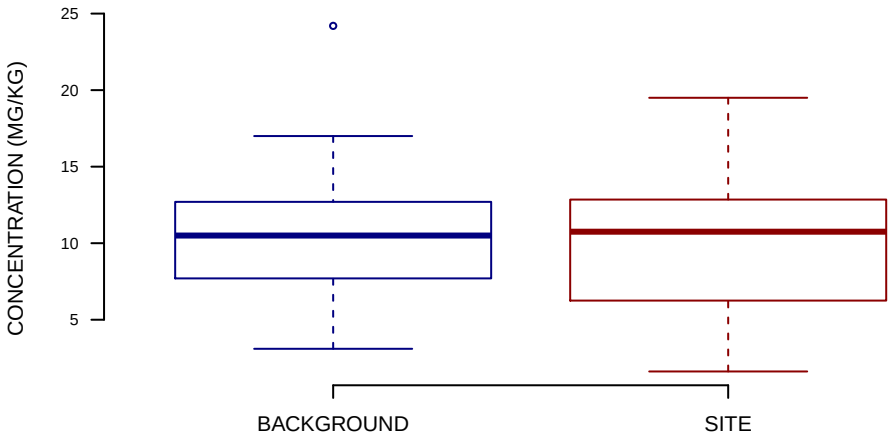
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

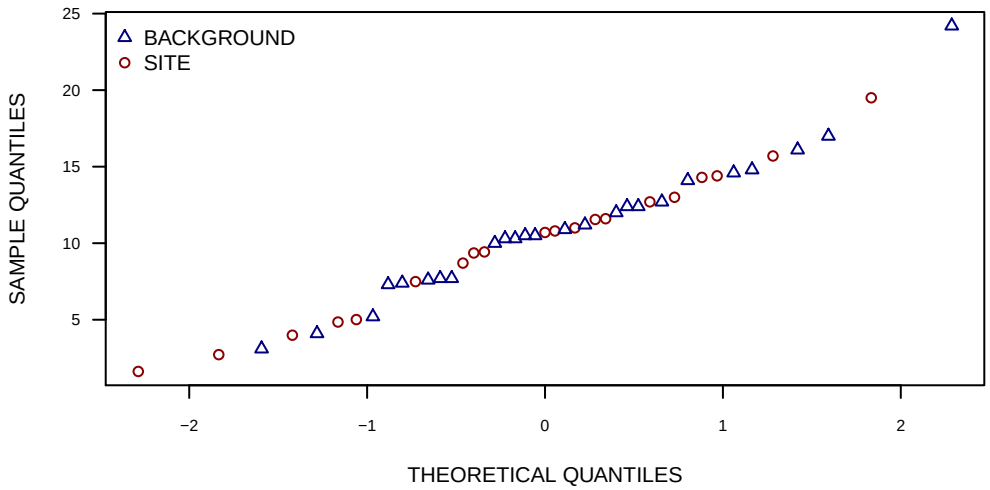
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

COBALT SURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 4 OF 20

BOXPLOTS



NORMAL Q−Q PLOT



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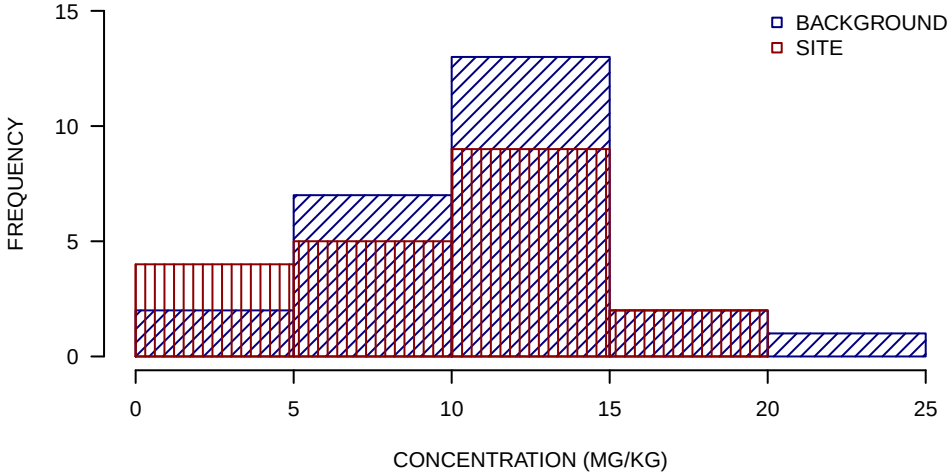


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	3.1	1.6
25TH PERCENTILE	7.7	6.9
MEDIAN	10	11
MEAN	11	9.9
75TH PERCENTILE	13	13
MAXIMUM	24	20

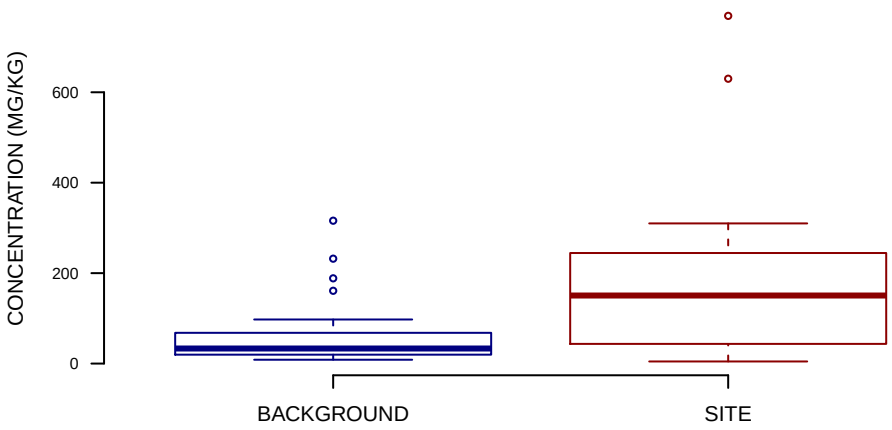
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

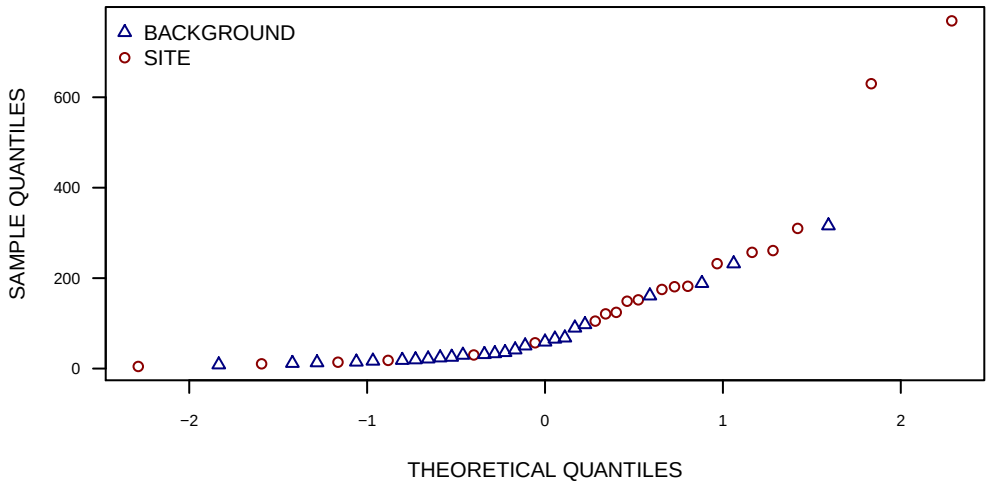
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

COPPER SURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 5 OF 20

BOXPLOTS



NORMAL Q−Q PLOT



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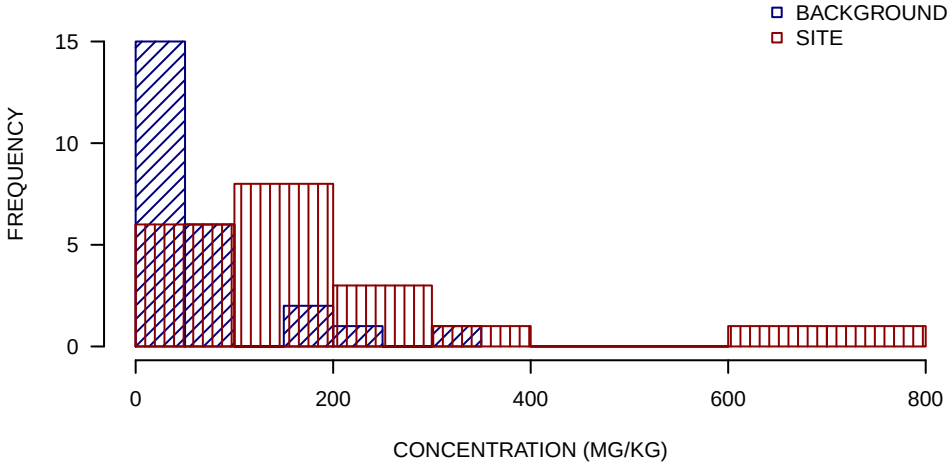


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	8.5	4.7
25TH PERCENTILE	20	50
MEDIAN	33	150
MEAN	67	190
75TH PERCENTILE	68	240
MAXIMUM	320	770

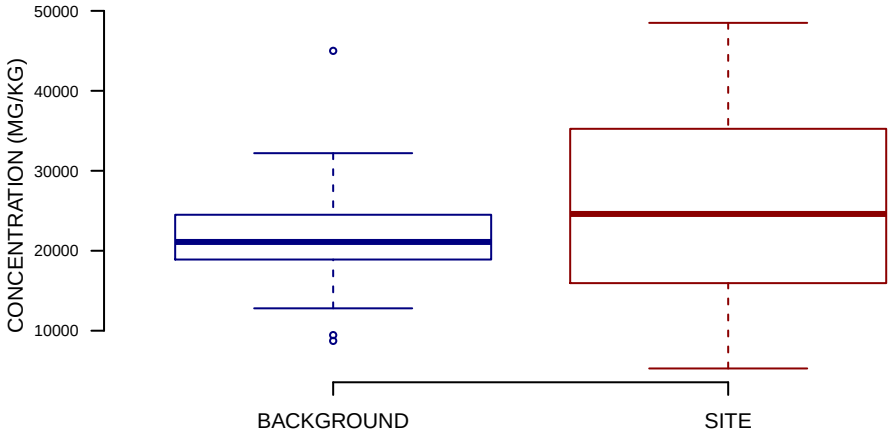
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

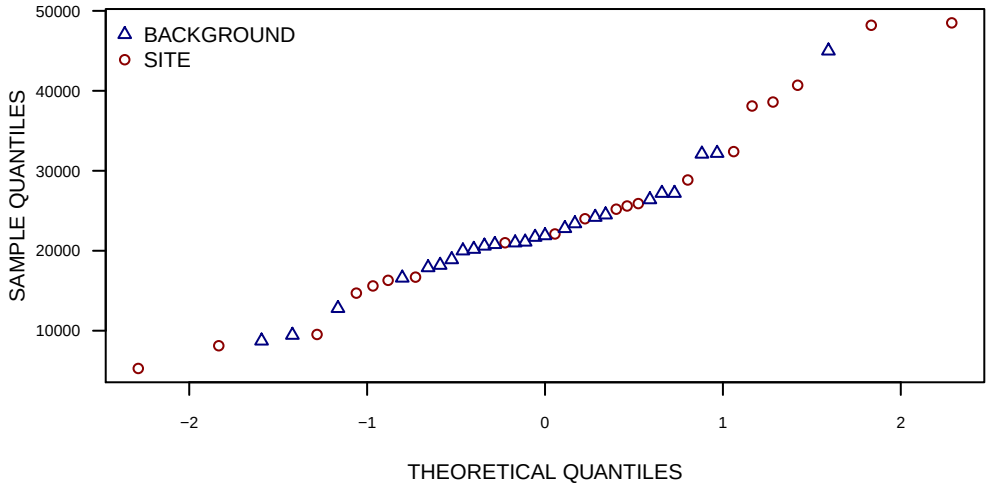
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

IRON SURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 6 OF 20

BOXPLOTS



NORMAL Q−Q PLOT



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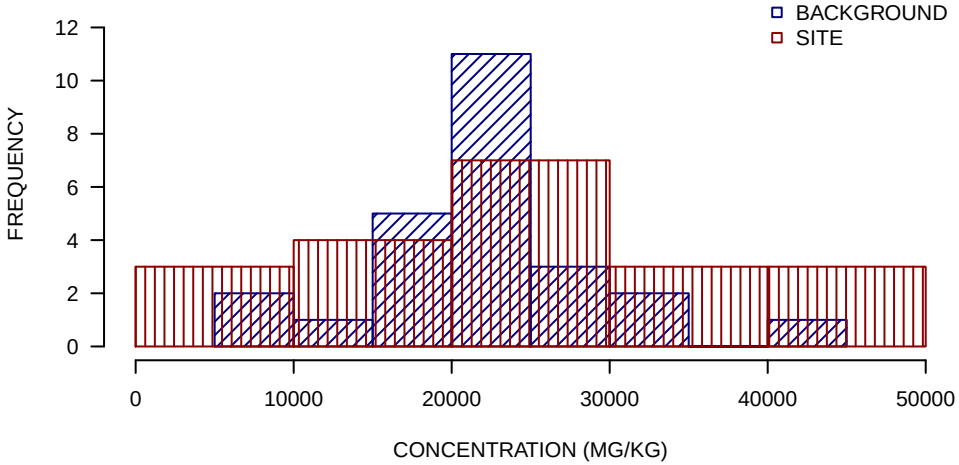


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	8700	5300
25TH PERCENTILE	19000	16000
MEDIAN	21000	25000
MEAN	22000	25000
75TH PERCENTILE	24000	34000
MAXIMUM	45000	48000

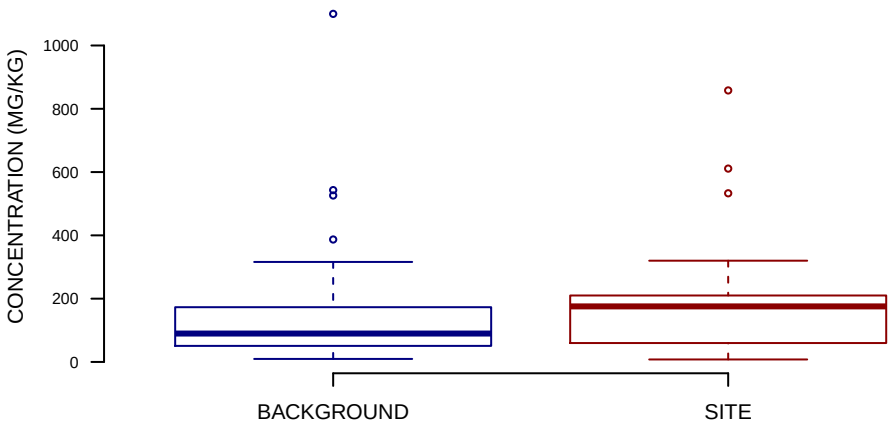
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

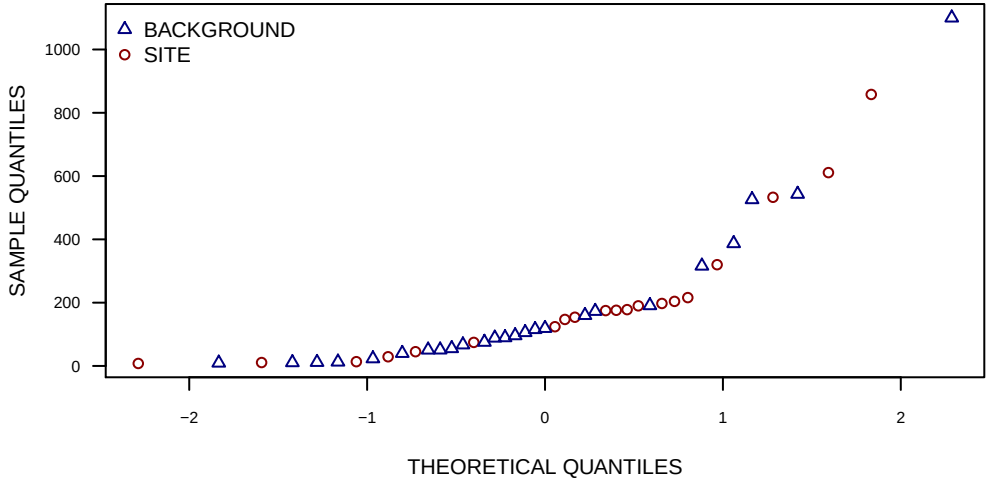
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

LEAD SURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 7 OF 20

BOXPLOTS



NORMAL Q−Q PLOT



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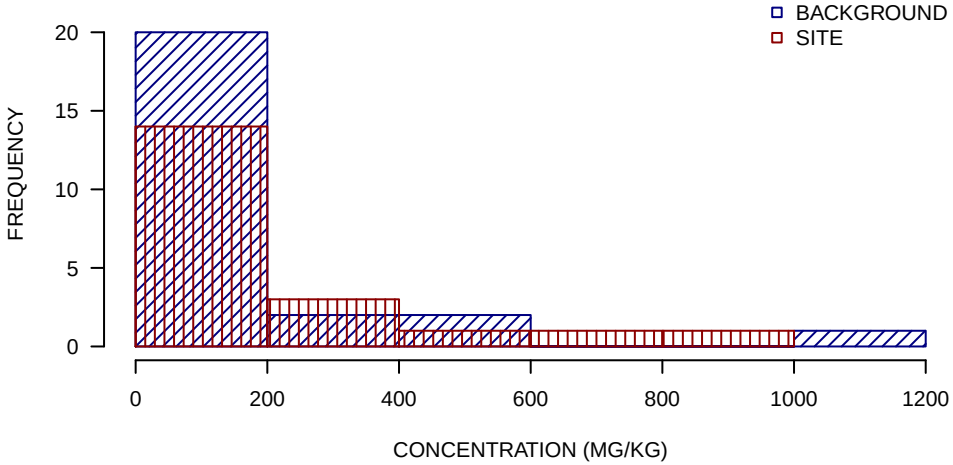


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	9.5	7.9
25TH PERCENTILE	51	67
MEDIAN	90	180
MEAN	180	210
75TH PERCENTILE	170	210
MAXIMUM	1100	860

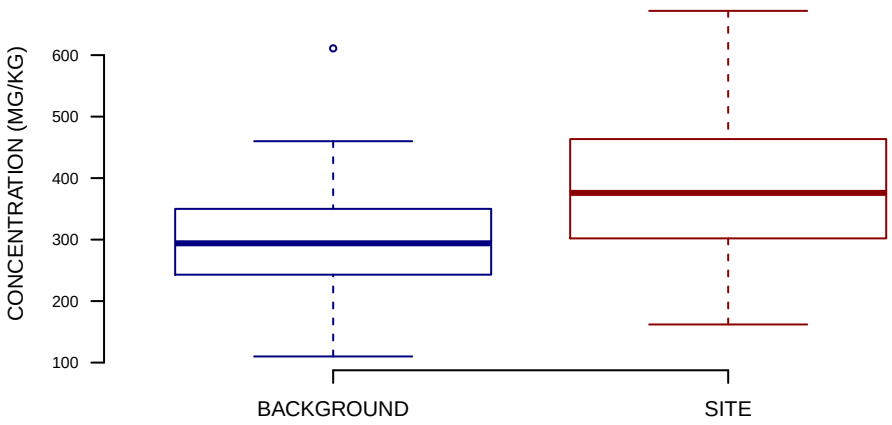
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

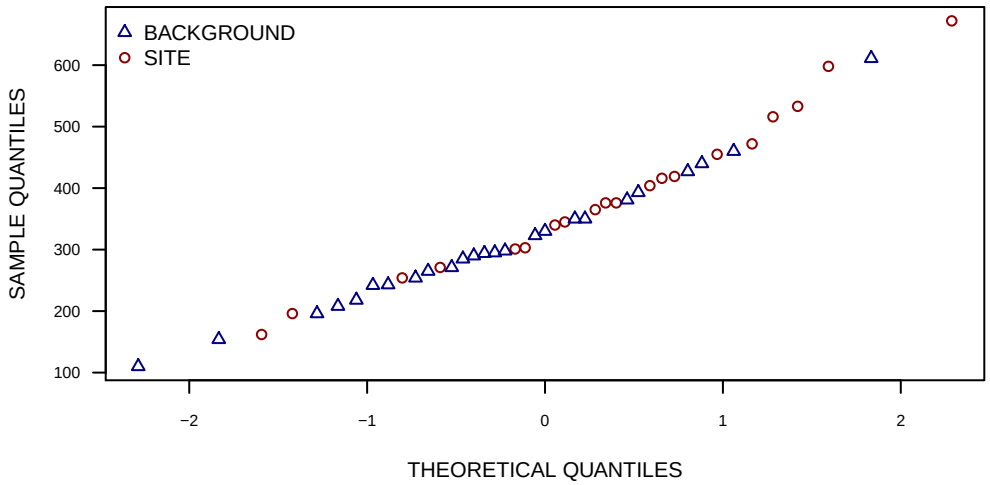
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

MANGANESE SURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 8 OF 20

BOXPLOTS



NORMAL Q−Q PLOT



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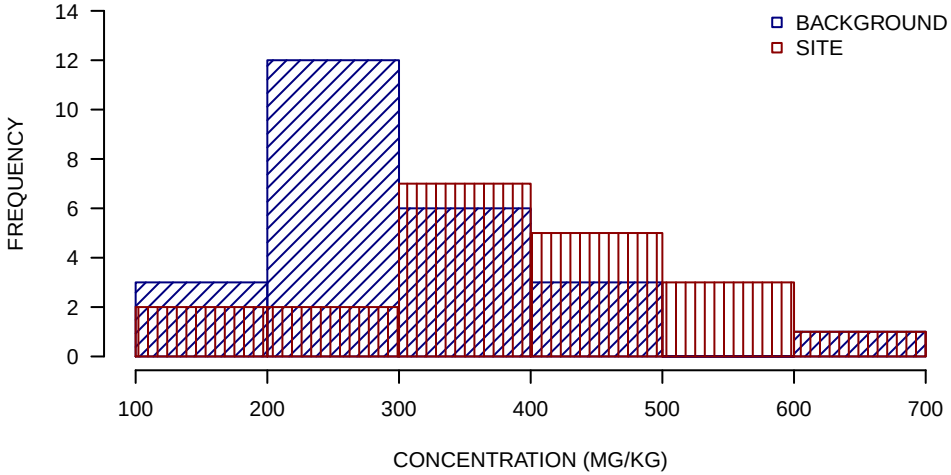


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	110	160
25TH PERCENTILE	240	300
MEDIAN	290	380
MEAN	310	390
75TH PERCENTILE	350	460
MAXIMUM	610	670

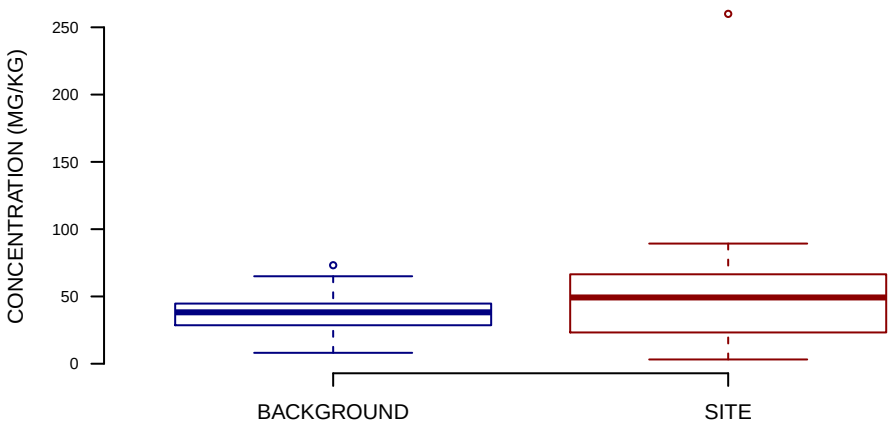
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

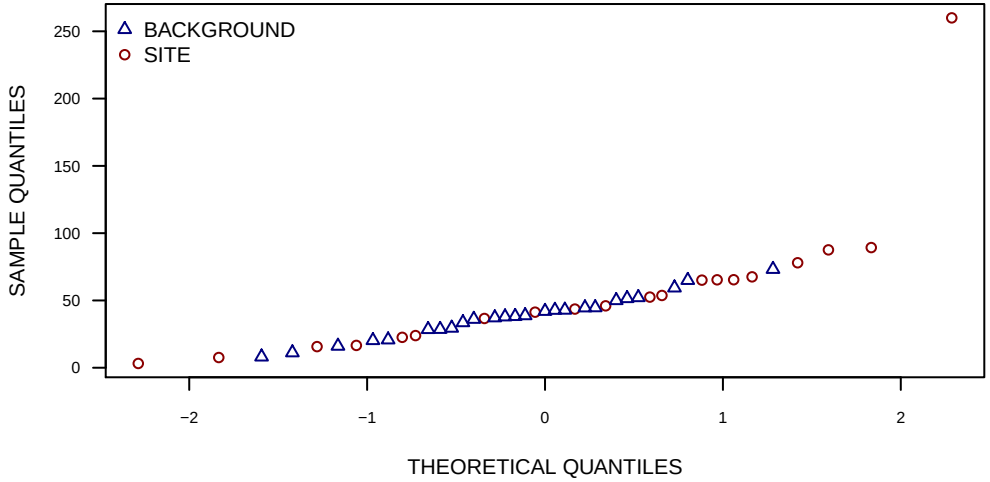
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

NICKEL SURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 9 OF 20

BOXPLOTS



NORMAL Q−Q PLOT



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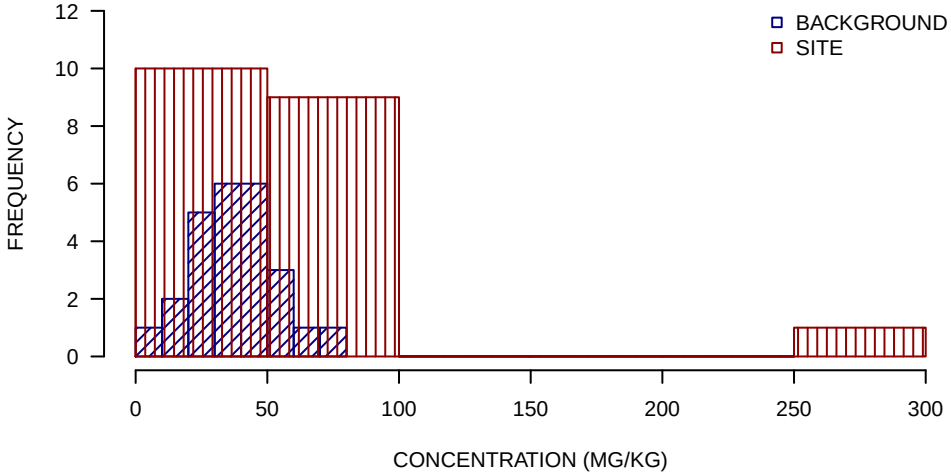


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	8.1	3.2
25TH PERCENTILE	29	24
MEDIAN	38	49
MEAN	38	57
75TH PERCENTILE	45	66
MAXIMUM	73	260

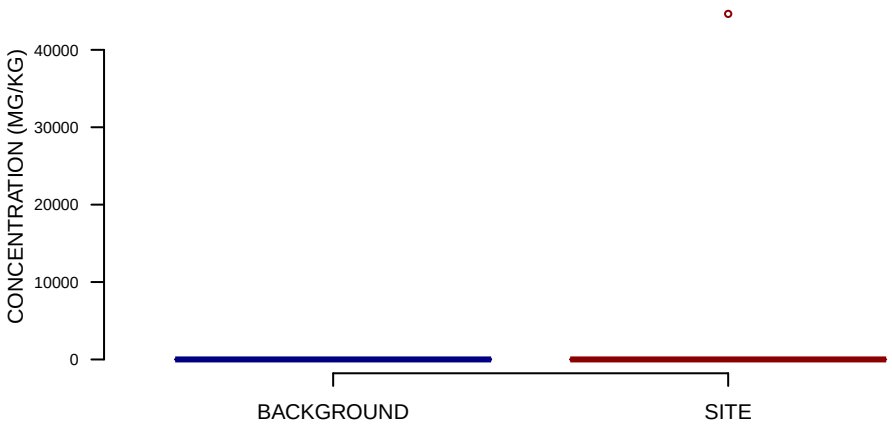
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

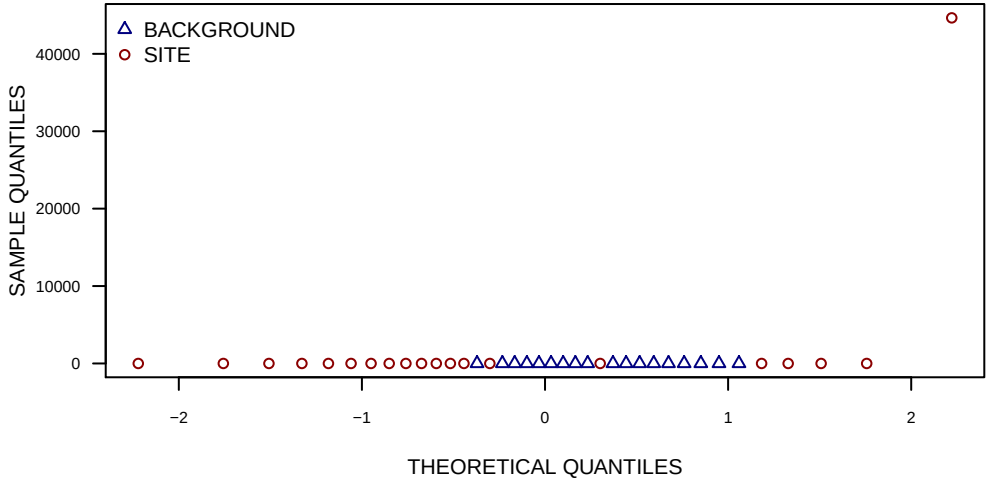
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

SILVER SURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 10 OF 20

BOXPLOTS



NORMAL Q−Q PLOT



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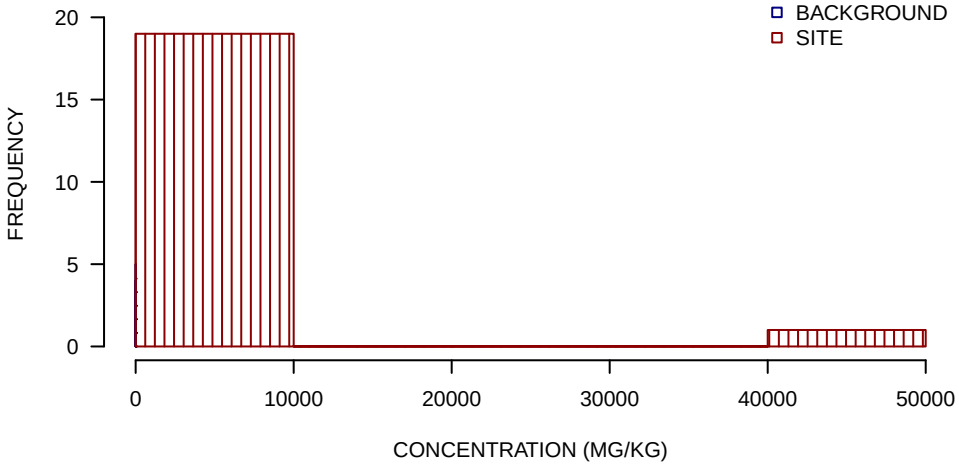


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	0.51	0.049
25TH PERCENTILE	0.59	0.2
MEDIAN	0.63	0.42
MEAN	0.62	2200
75TH PERCENTILE	0.66	0.68
MAXIMUM	0.74	45000

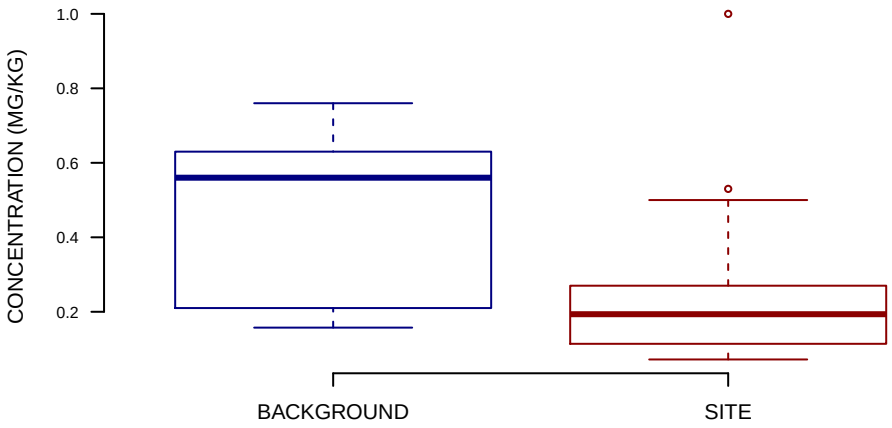
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

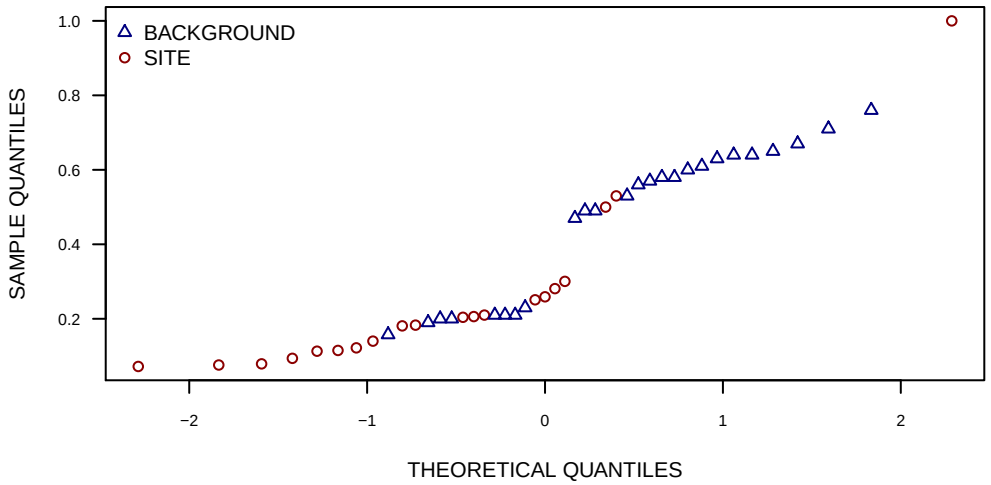
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

THALLIUM SURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 11 OF 20

BOXPLOTS



NORMAL Q−Q PLOT



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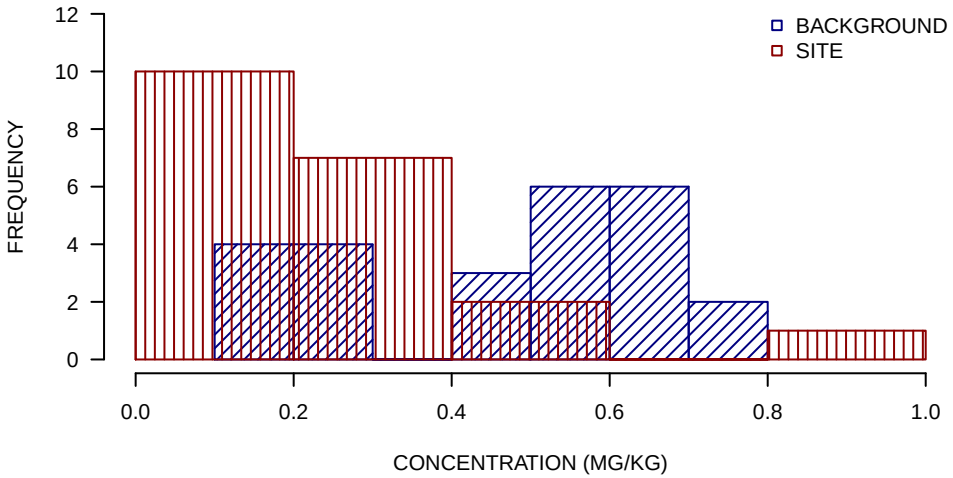


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	0.16	0.072
25TH PERCENTILE	0.21	0.11
MEDIAN	0.56	0.19
MEAN	0.47	0.25
75TH PERCENTILE	0.63	0.26
MAXIMUM	0.76	1

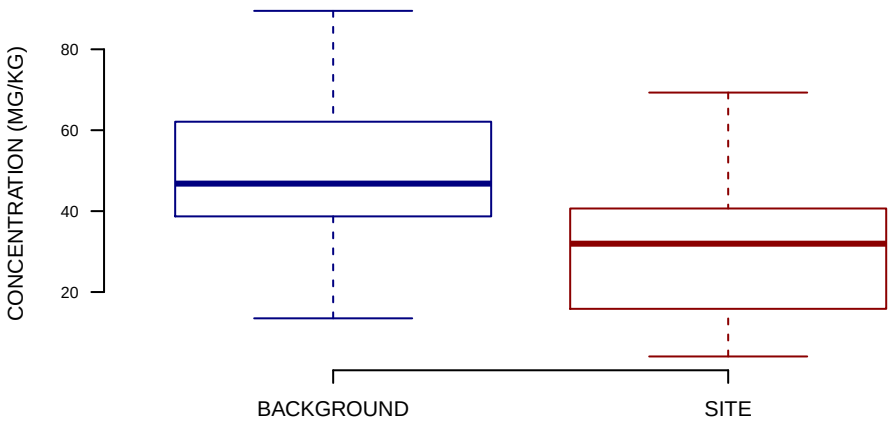
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

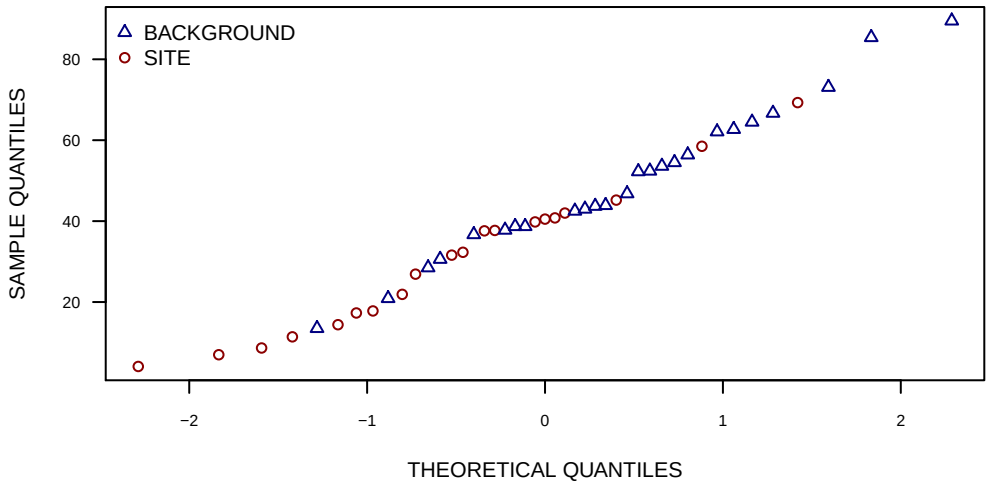
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

VANADIUM SURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 12 OF 20

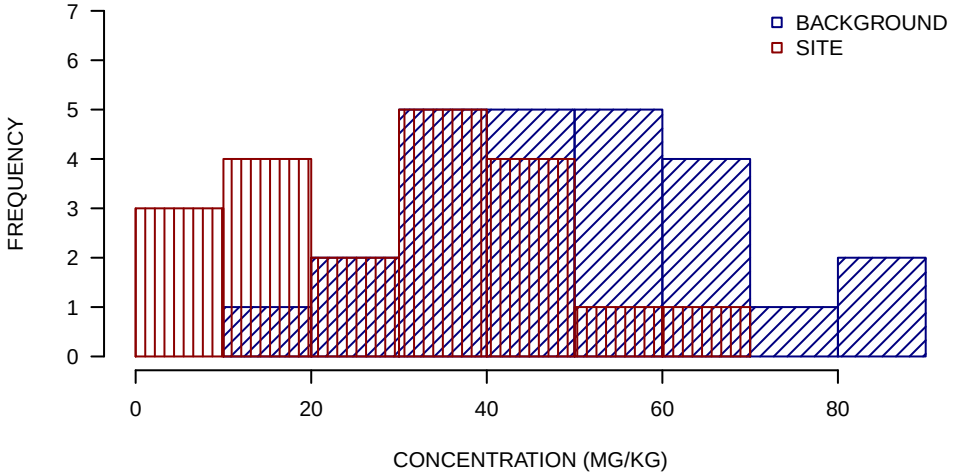
BOXPLOTS



NORMAL Q−Q PLOT



HISTOGRAMS



SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	14	4.1
25TH PERCENTILE	39	17
MEDIAN	47	32
MEAN	50	30
75TH PERCENTILE	62	41
MAXIMUM	90	69

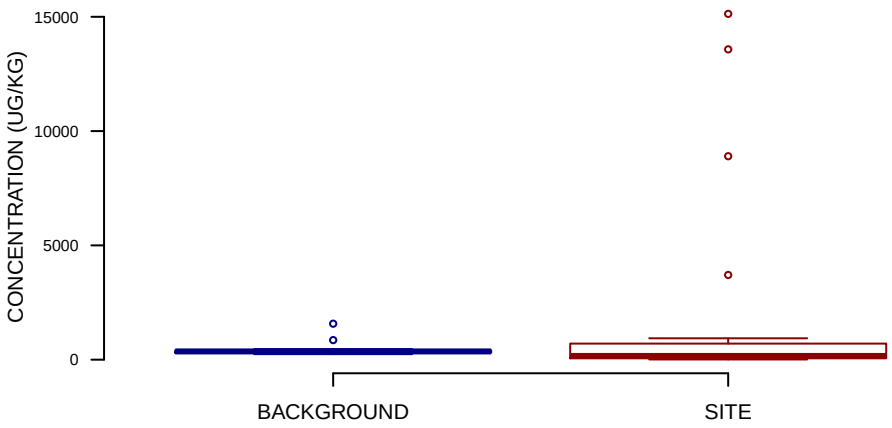
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

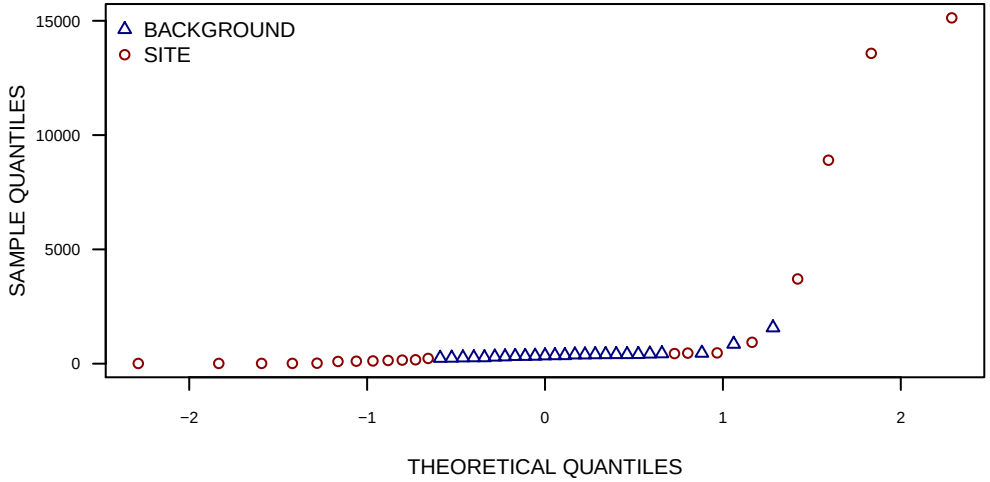
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

BAP EQUIVALENT−HALFND SURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 13 OF 20

BOXPLOTS



NORMAL Q−Q PLOT



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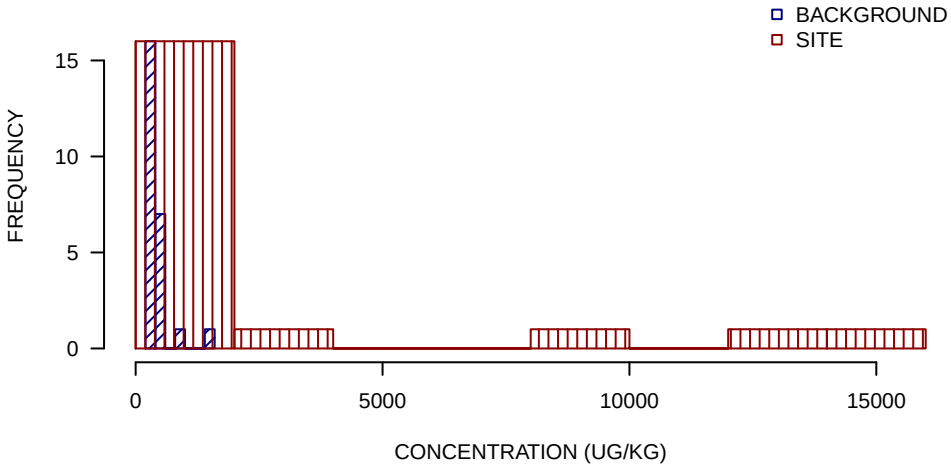


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	240	9.9
25TH PERCENTILE	310	79
MEDIAN	360	160
MEAN	420	2200
75TH PERCENTILE	410	590
MAXIMUM	1600	15000

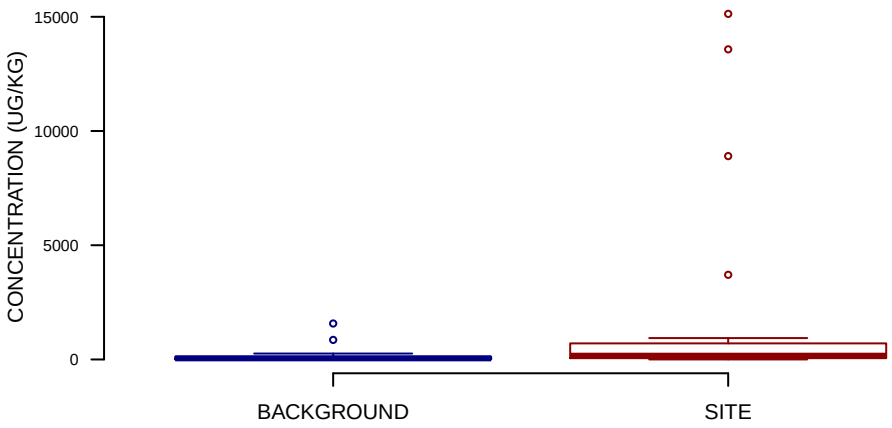
UNITS ARE UG/KG

DETECTION LIMIT USED FOR NON−DETECTS

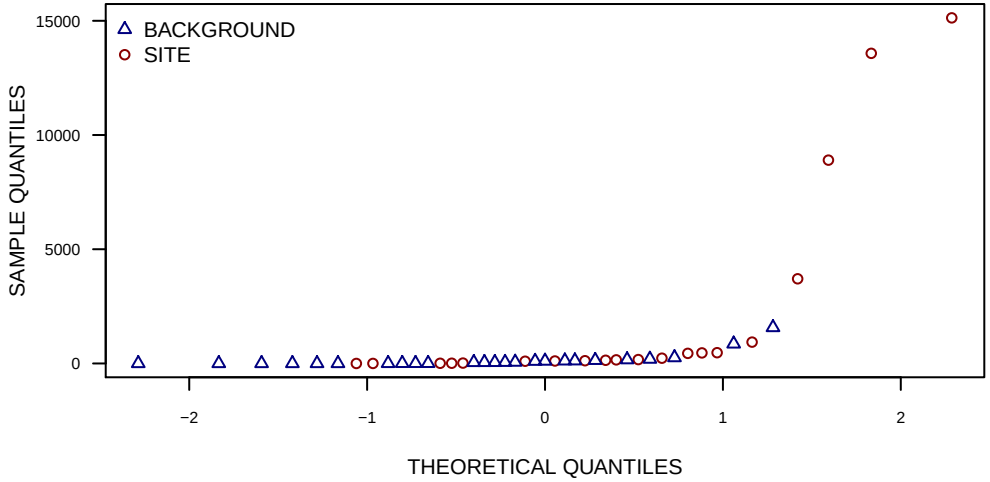
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

BAP EQUIVALENT−POS SURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 14 OF 20

BOXPLOTS



NORMAL Q−Q PLOT



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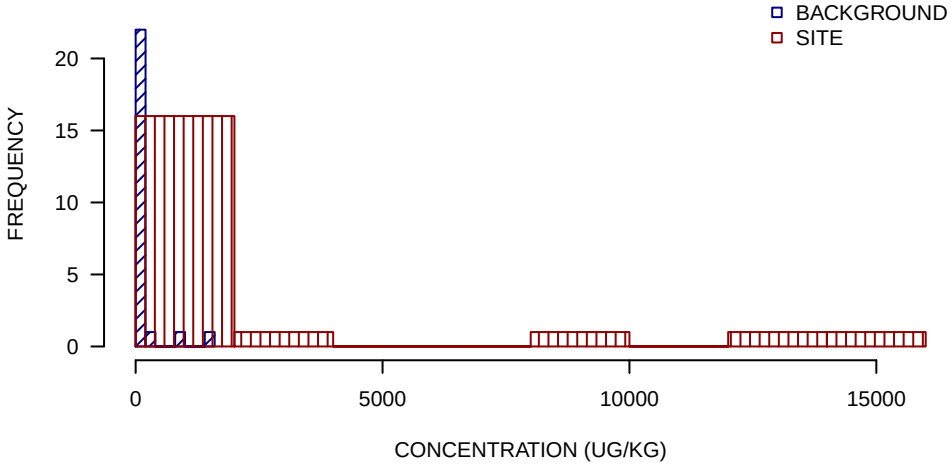


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	0	0.44
25TH PERCENTILE	4.1	77
MEDIAN	49	160
MEAN	160	2200
75TH PERCENTILE	120	590
MAXIMUM	1600	15000

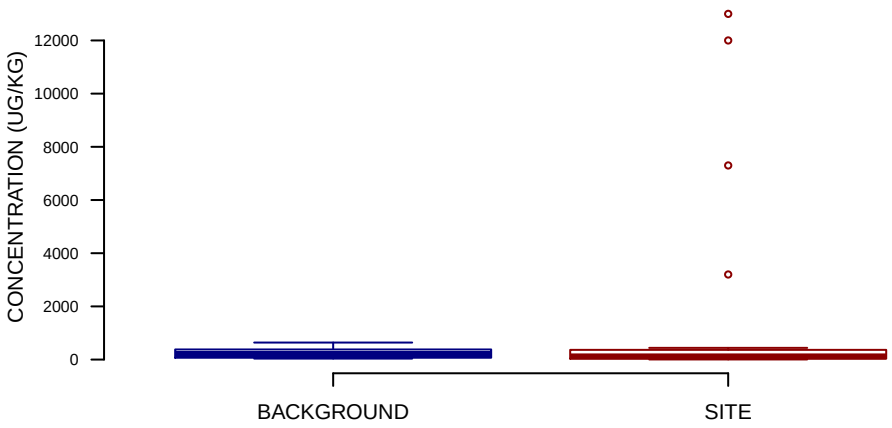
UNITS ARE UG/KG

DETECTION LIMIT USED FOR NON−DETECTS

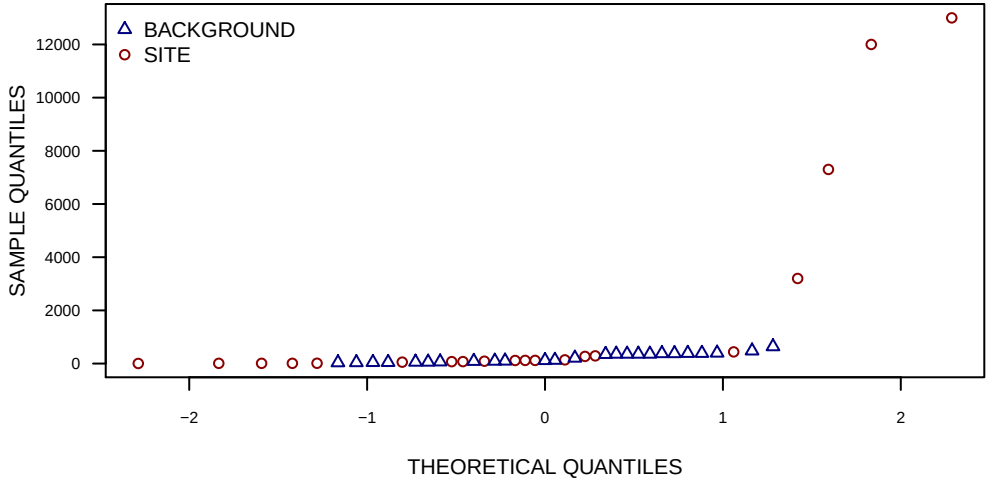
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

BENZO(A)ANTHRACENE SURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 15 OF 20

BOXPLOTS



NORMAL Q−Q PLOT



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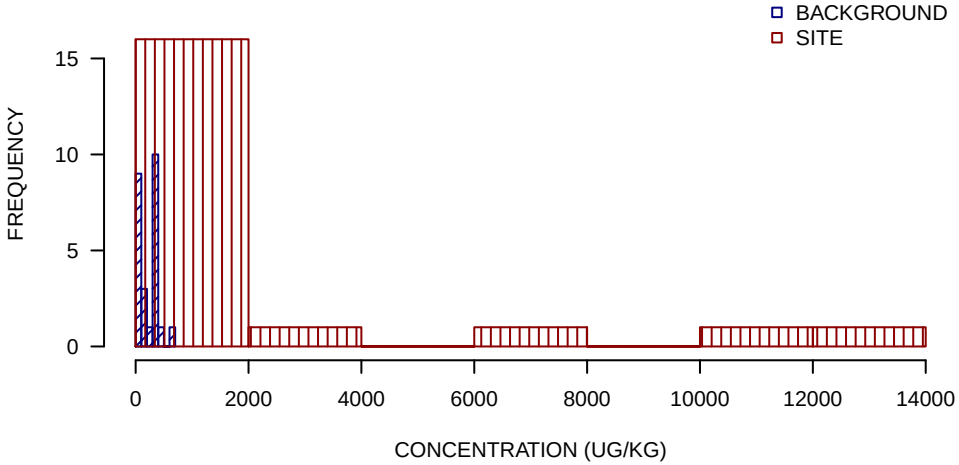


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	37	4.7
25TH PERCENTILE	69	44
MEDIAN	210	120
MEAN	240	1900
75TH PERCENTILE	380	330
MAXIMUM	640	13000

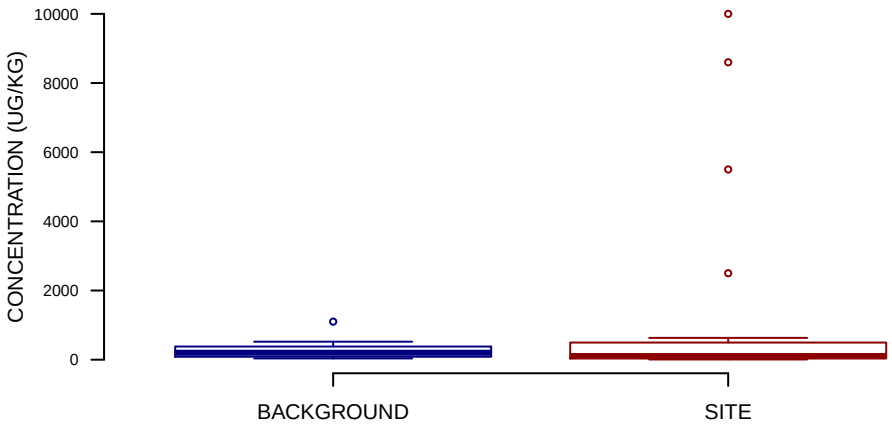
UNITS ARE UG/KG

DETECTION LIMIT USED FOR NON−DETECTS

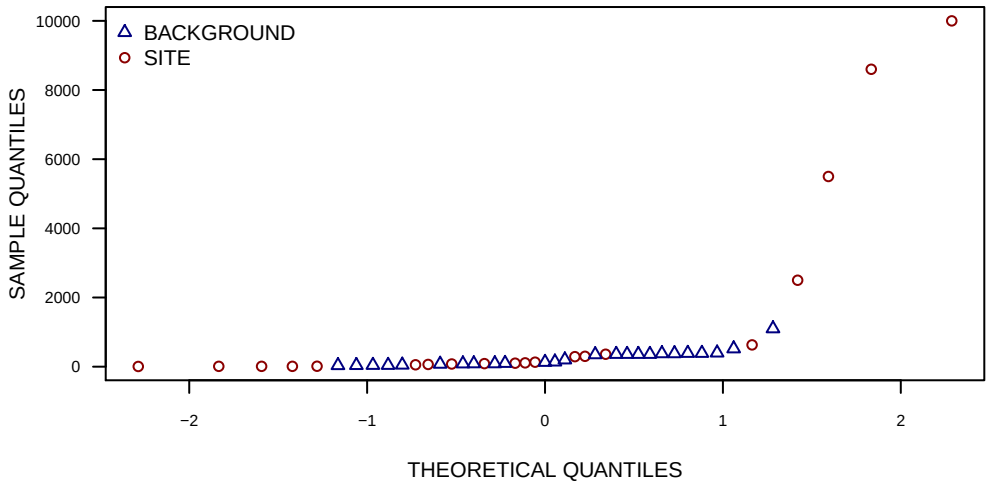
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

BENZO(A)PYRENE SURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 16 OF 20

BOXPLOTS



NORMAL Q−Q PLOT



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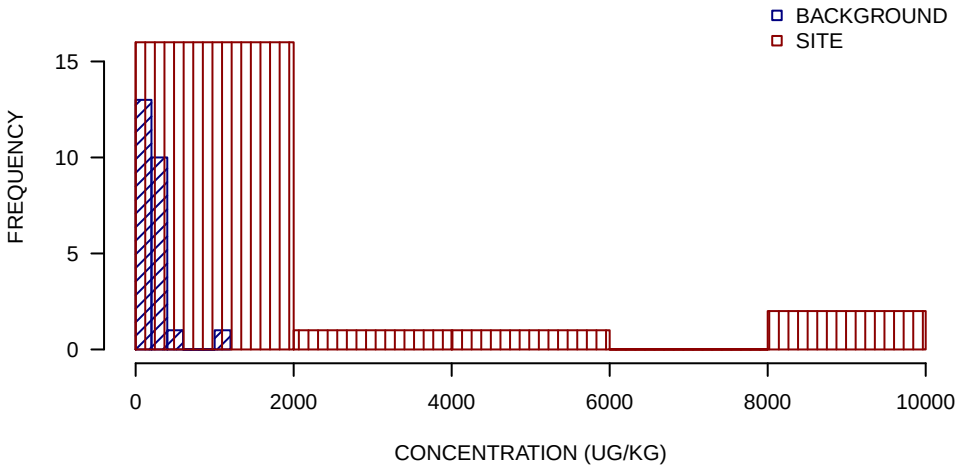


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	36	6.3
25TH PERCENTILE	85	44
MEDIAN	200	110
MEAN	260	1400
75TH PERCENTILE	380	430
MAXIMUM	1100	10000

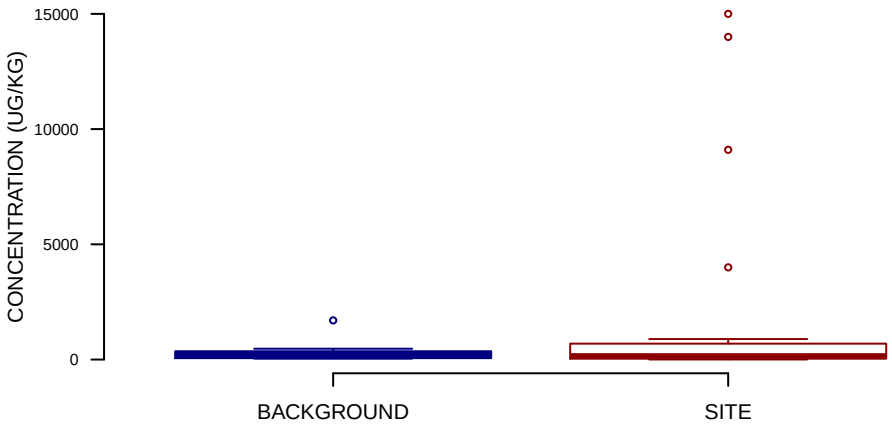
UNITS ARE UG/KG

DETECTION LIMIT USED FOR NON−DETECTS

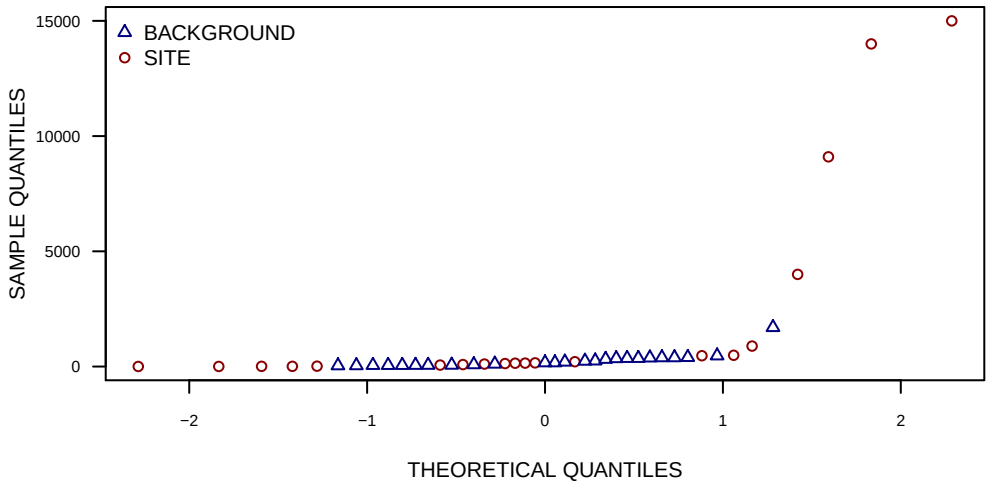
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

BENZO(B)FLUORANTHENE SURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 17 OF 20

BOXPLOTS



NORMAL Q−Q PLOT



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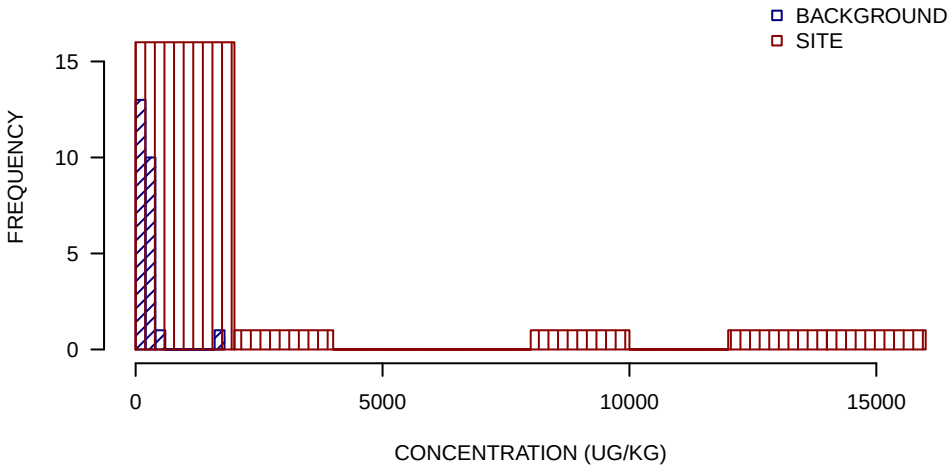


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	41	4.4
25TH PERCENTILE	62	52
MEDIAN	200	150
MEAN	270	2300
75TH PERCENTILE	360	590
MAXIMUM	1700	15000

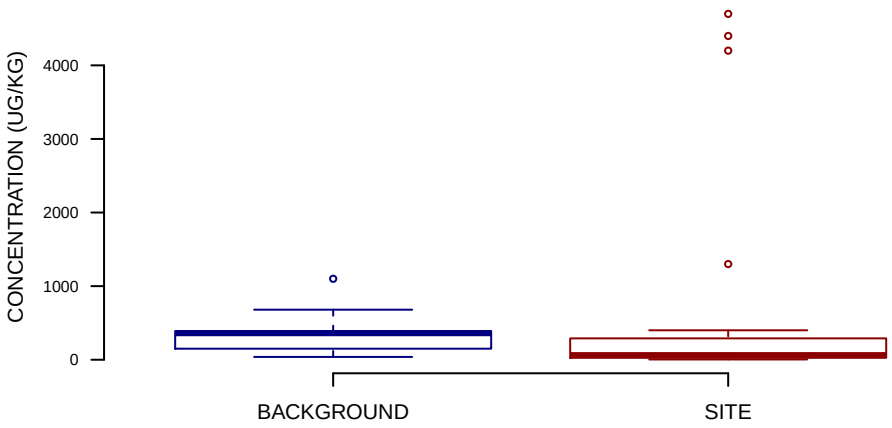
UNITS ARE UG/KG

DETECTION LIMIT USED FOR NON−DETECTS

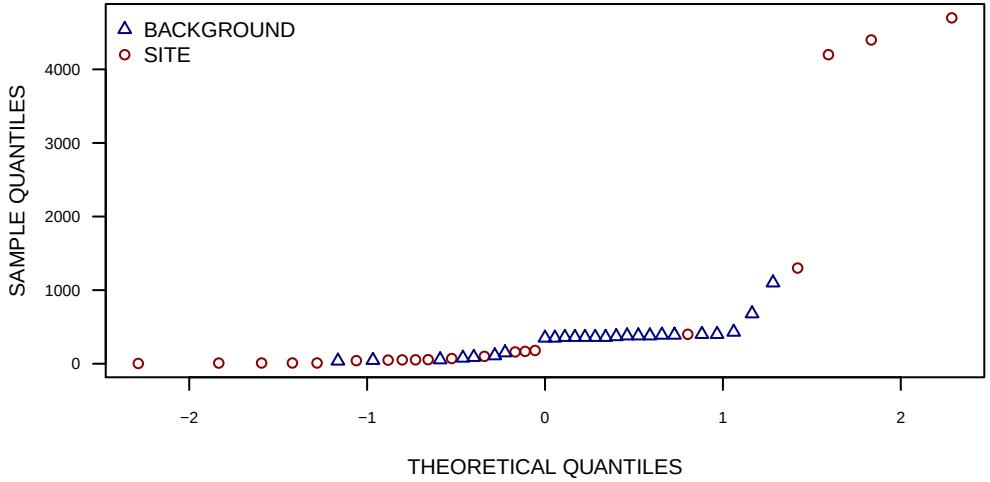
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

BENZO(K)FLUORANTHENE SURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 18 OF 20

BOXPLOTS



NORMAL Q−Q PLOT



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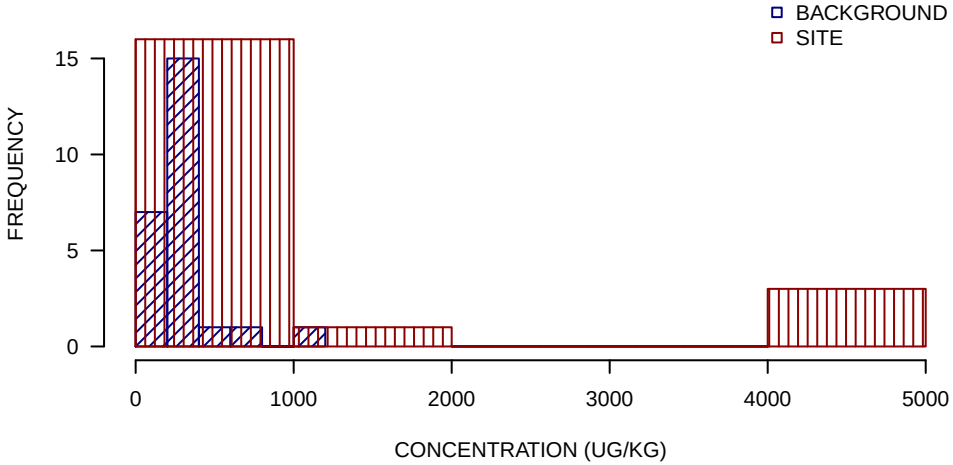


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	38	3.6
25TH PERCENTILE	150	34
MEDIAN	360	63
MEAN	330	800
75TH PERCENTILE	390	240
MAXIMUM	1100	4700

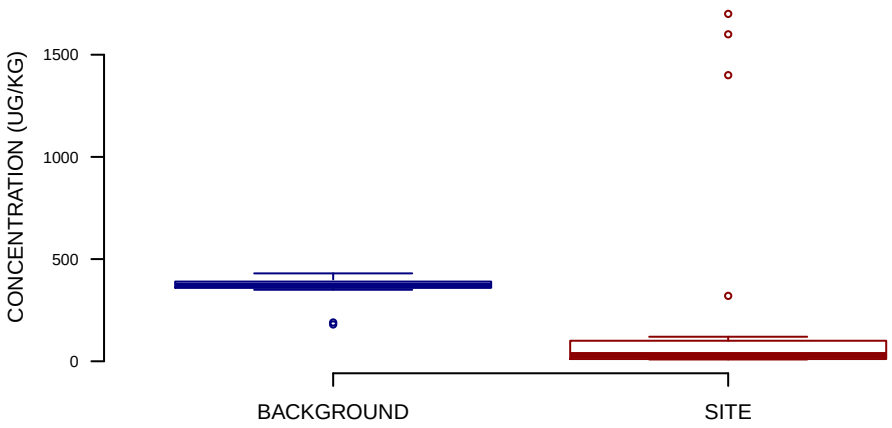
UNITS ARE UG/KG

DETECTION LIMIT USED FOR NON−DETECTS

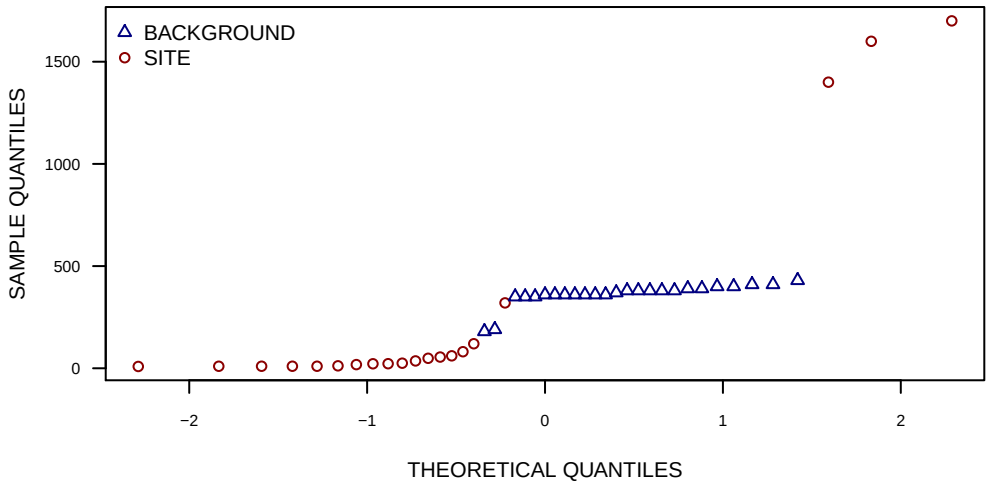
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

DIBENZO(A,H)ANTHRACENE SURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 19 OF 20

BOXPLOTS



NORMAL Q−Q PLOT



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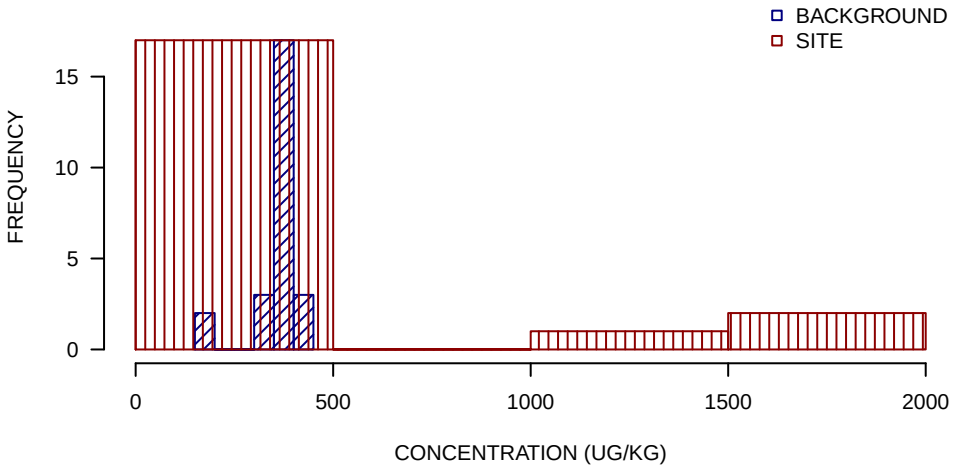


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	180	8.9
25TH PERCENTILE	360	12
MEDIAN	370	30
MEAN	360	280
75TH PERCENTILE	390	91
MAXIMUM	430	1700

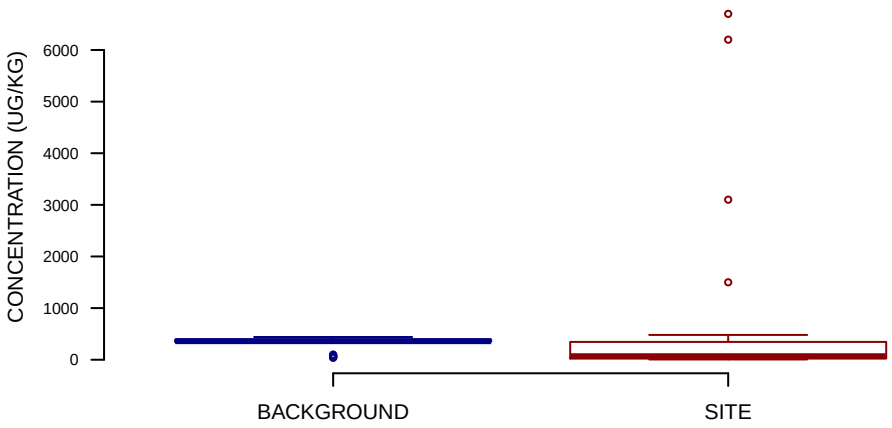
UNITS ARE UG/KG

DETECTION LIMIT USED FOR NON−DETECTS

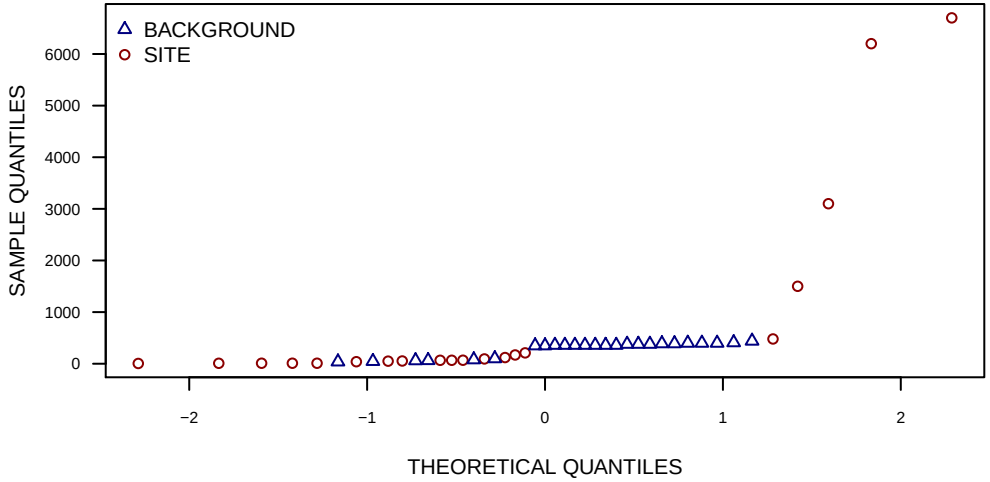
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

INDENO(1,2,3−CD)PYRENE SURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 20 OF 20

BOXPLOTS



NORMAL Q−Q PLOT



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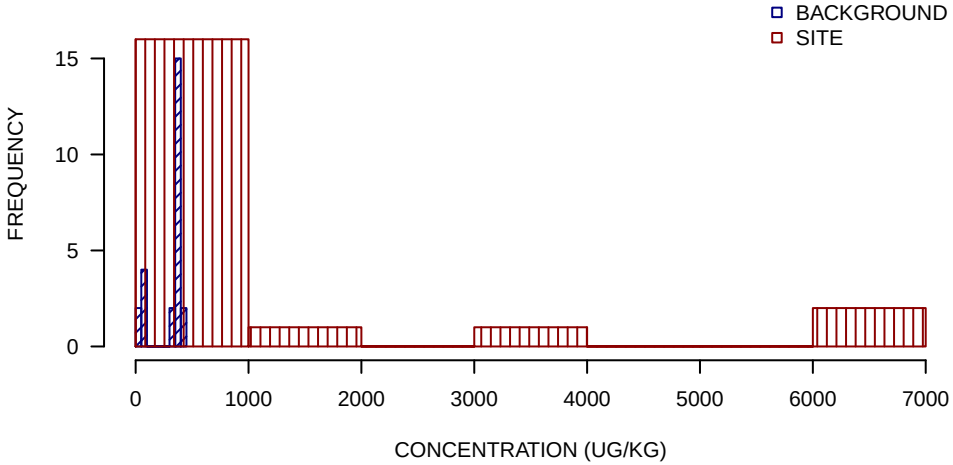


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	38	5.2
25TH PERCENTILE	350	32
MEDIAN	360	68
MEAN	300	950
75TH PERCENTILE	390	280
MAXIMUM	440	6700

UNITS ARE UG/KG

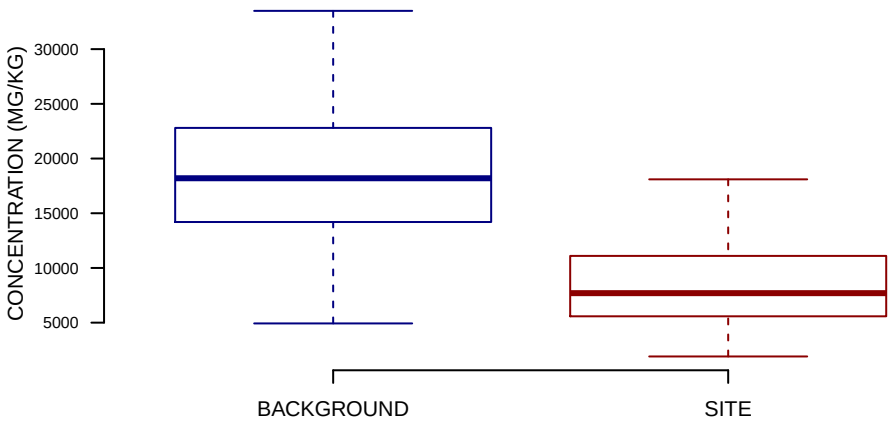
DETECTION LIMIT USED FOR NON−DETECTS

SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

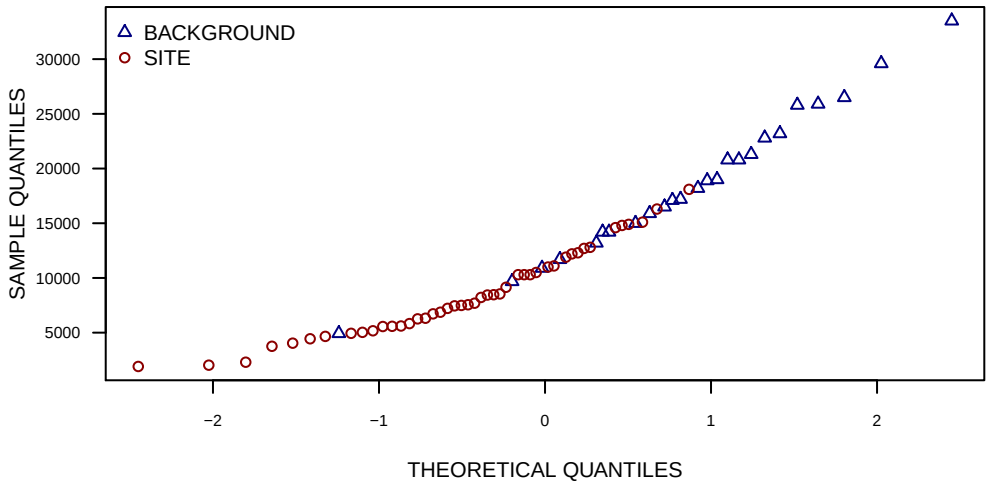
SUBSURFACE SOIL GRAPHICAL DISPLAYS

ALUMINUM SUBSURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 1 OF 22

BOXPLOTS



NORMAL Q−Q PLOT



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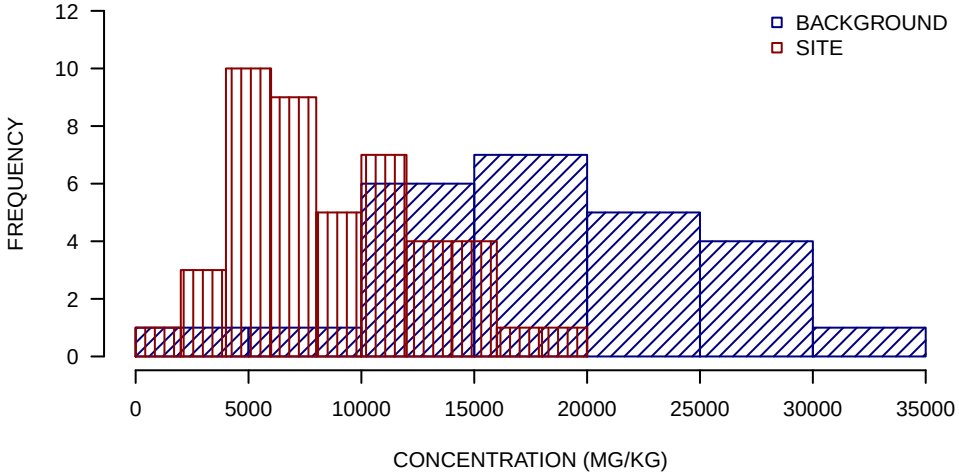


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	4900	1900
25TH PERCENTILE	14000	5600
MEDIAN	18000	7700
MEAN	19000	8600
75TH PERCENTILE	23000	11000
MAXIMUM	34000	18000

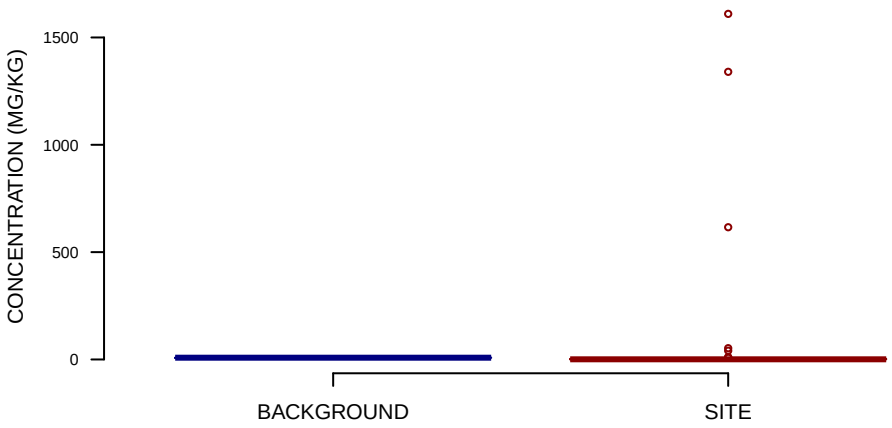
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

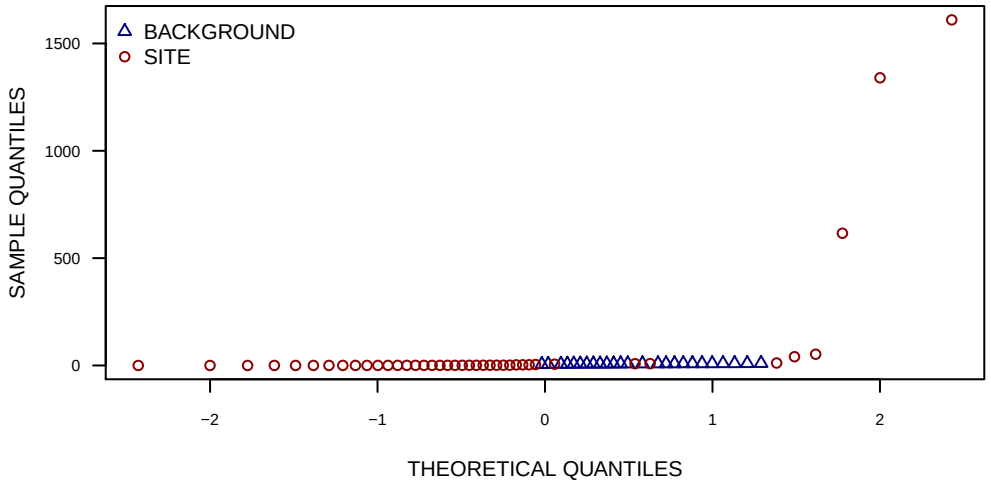
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ANTIMONY SUBSURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 2 OF 22

BOXPLOTS



NORMAL Q−Q PLOT



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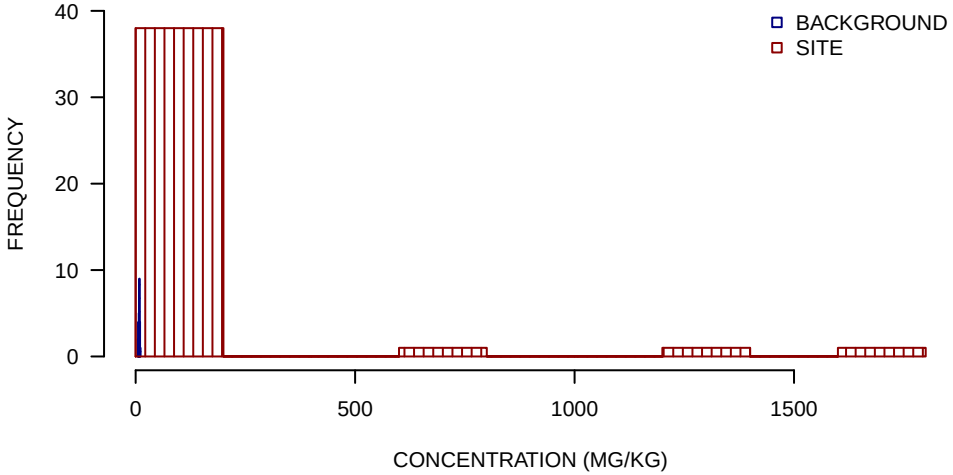


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	5.1	0.047
25TH PERCENTILE	7.3	0.32
MEDIAN	8.2	0.74
MEAN	8	91
75TH PERCENTILE	9	3.3
MAXIMUM	10	1600

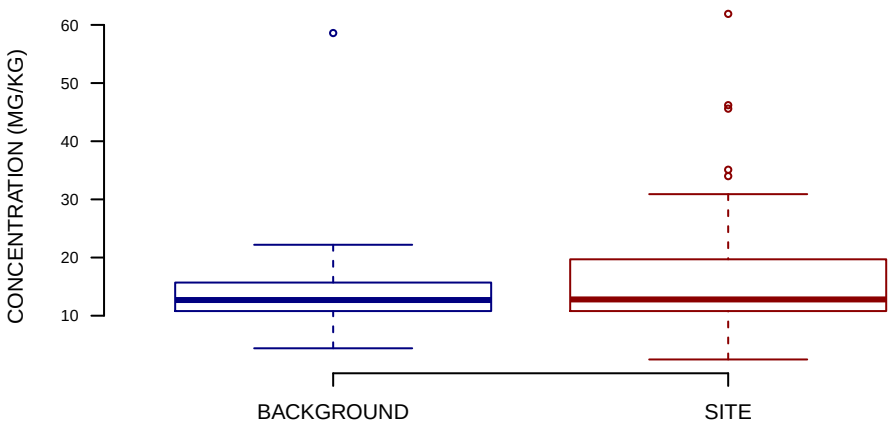
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

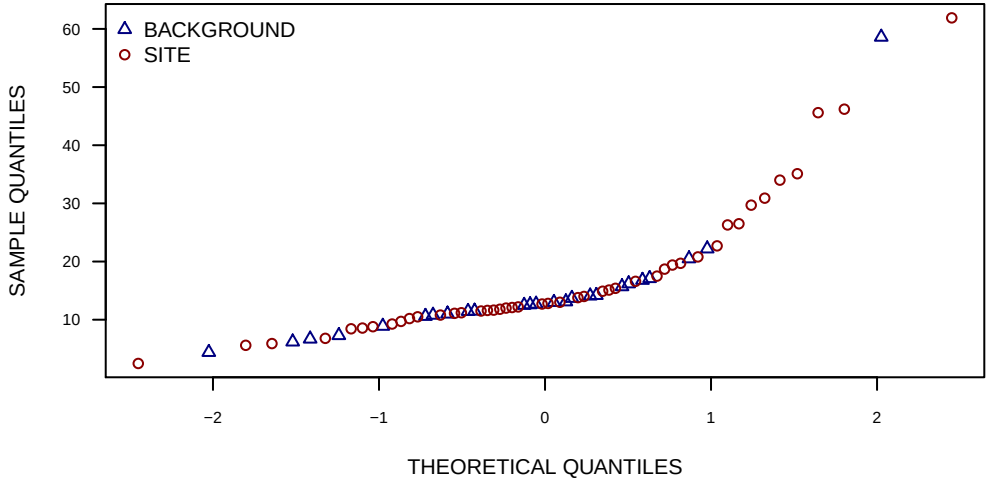
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ARSENIC SUBSURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 3 OF 22

BOXPLOTS



NORMAL Q−Q PLOT



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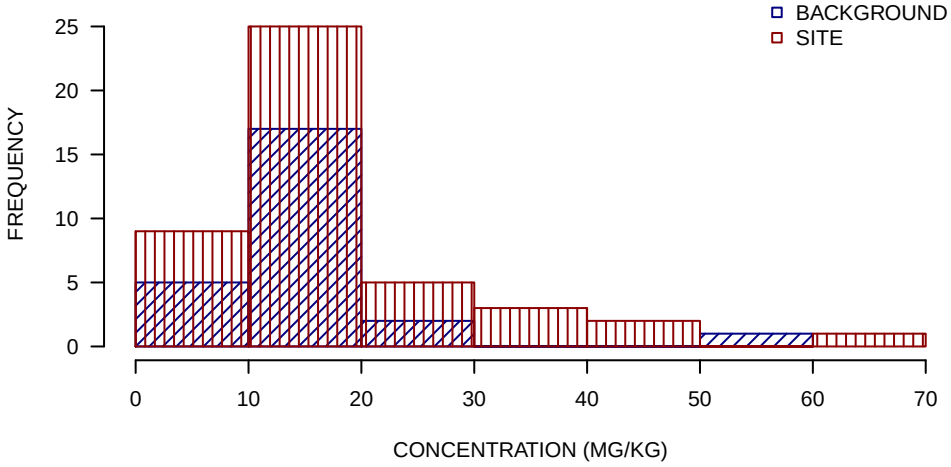


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	4.4	2.5
25TH PERCENTILE	11	11
MEDIAN	13	13
MEAN	14	17
75TH PERCENTILE	16	20
MAXIMUM	59	62

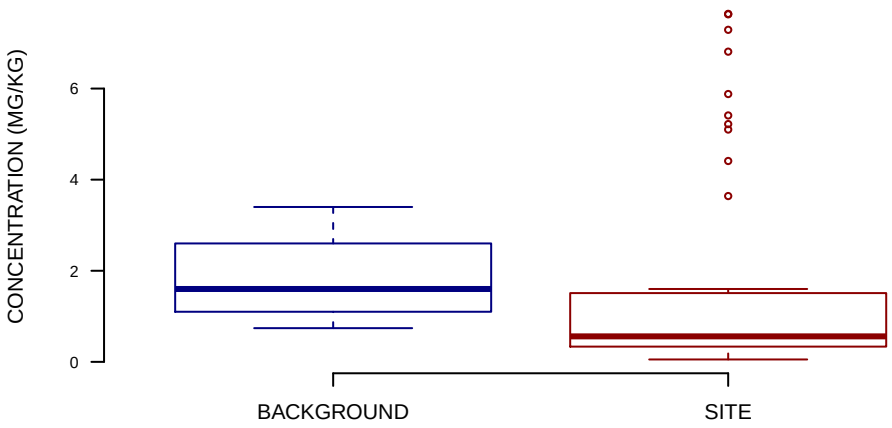
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

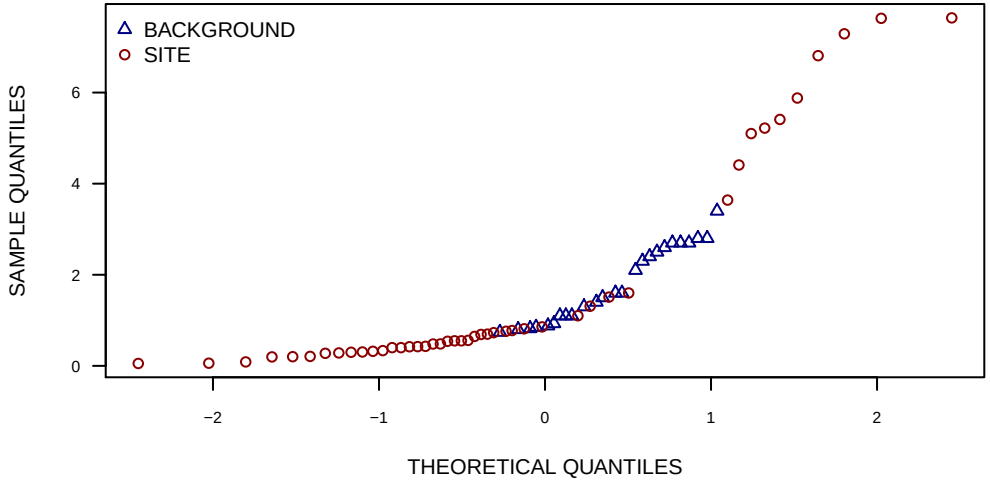
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

CADMIUM SUBSURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 4 OF 22

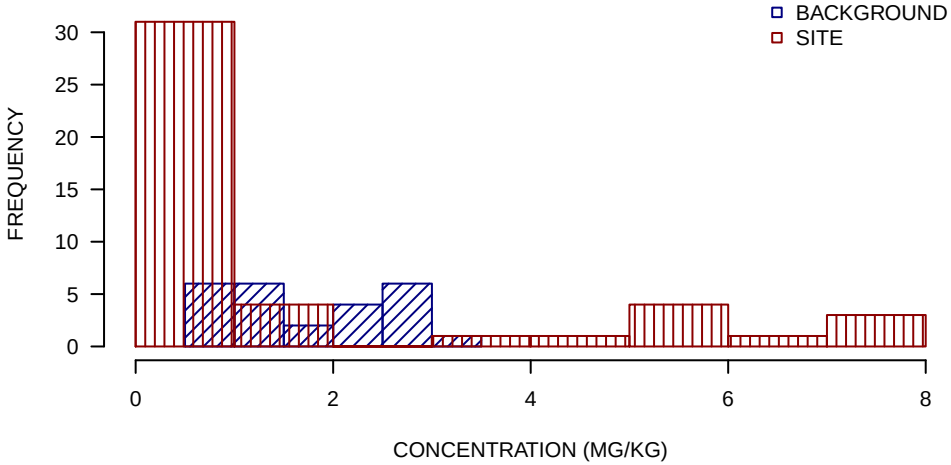
BOXPLOTS



NORMAL Q−Q PLOT



HISTOGRAMS



SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	0.74	0.053
25TH PERCENTILE	1.1	0.34
MEDIAN	1.6	0.56
MEAN	1.8	1.7
75TH PERCENTILE	2.6	1.5
MAXIMUM	3.4	7.6

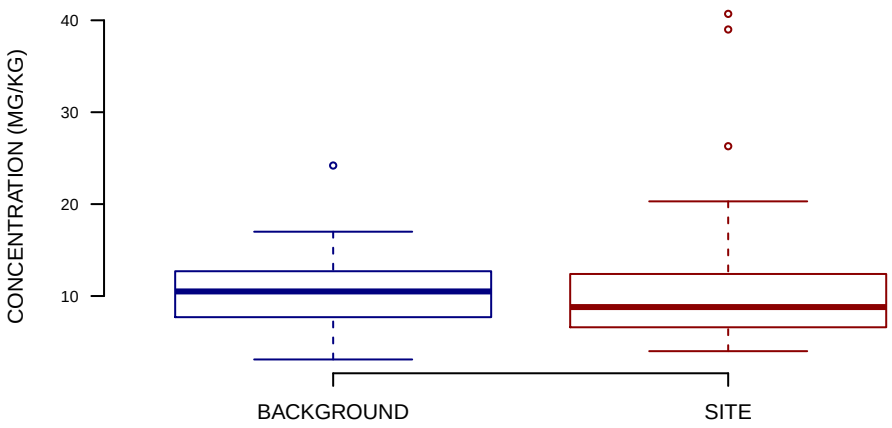
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

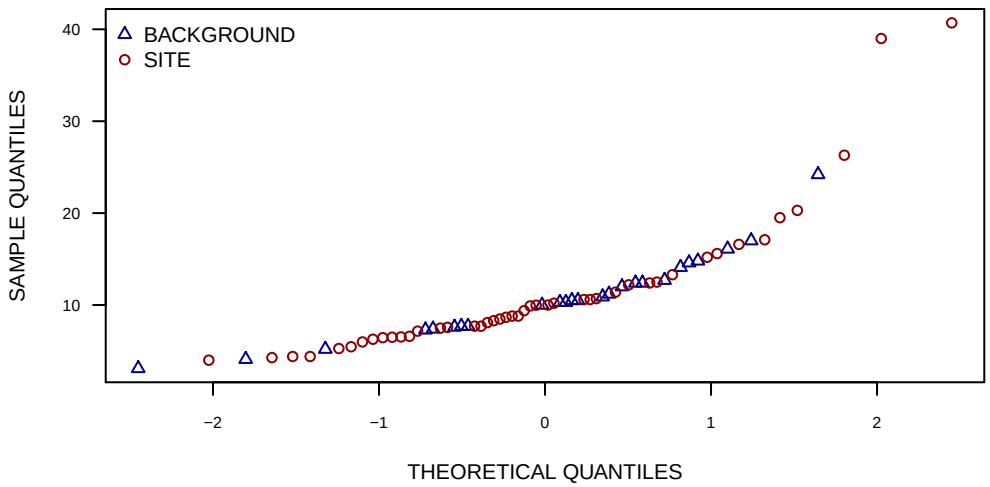
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

COBALT SUBSURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 5 OF 22

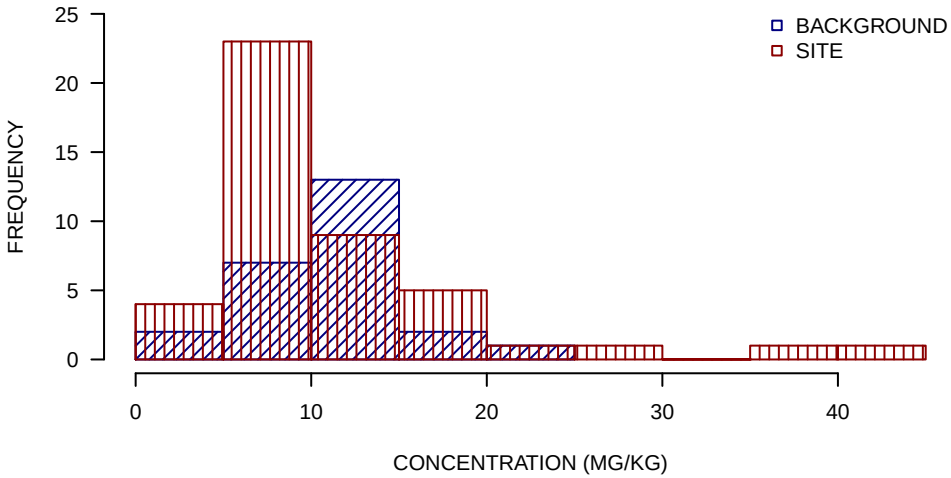
BOXPLOTS



NORMAL Q−Q PLOT



HISTOGRAMS



SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	3.1	4
25TH PERCENTILE	7.7	6.6
MEDIAN	10	8.8
MEAN	11	11
75TH PERCENTILE	13	12
MAXIMUM	24	41

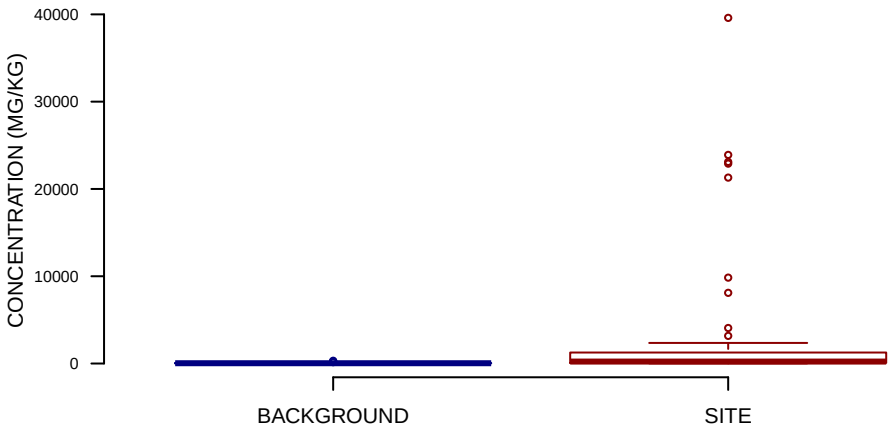
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

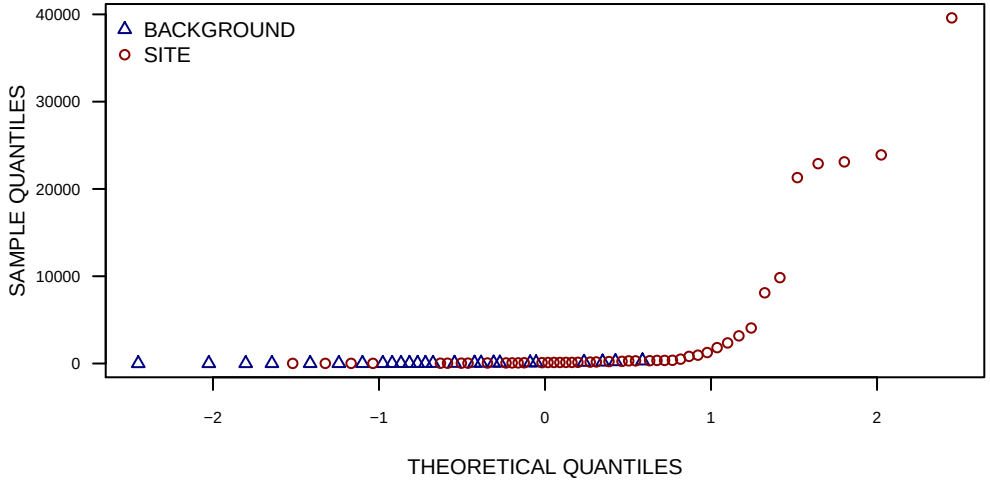
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

COPPER SUBSURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 6 OF 22

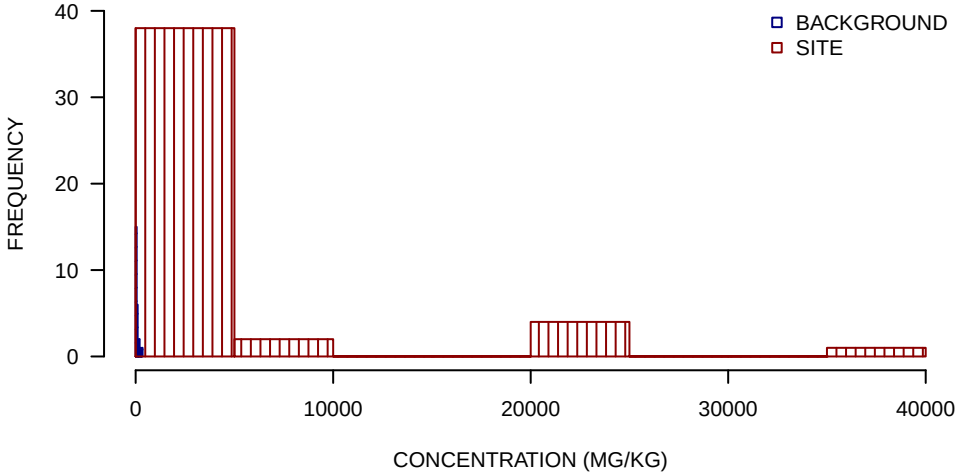
BOXPLOTS



NORMAL Q−Q PLOT



HISTOGRAMS



SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	8.5	15
25TH PERCENTILE	20	75
MEDIAN	33	220
MEAN	67	3700
75TH PERCENTILE	68	1300
MAXIMUM	320	40000

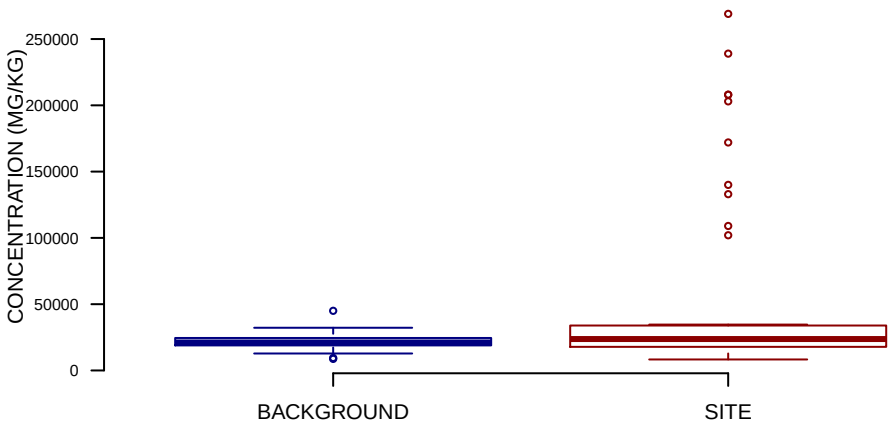
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

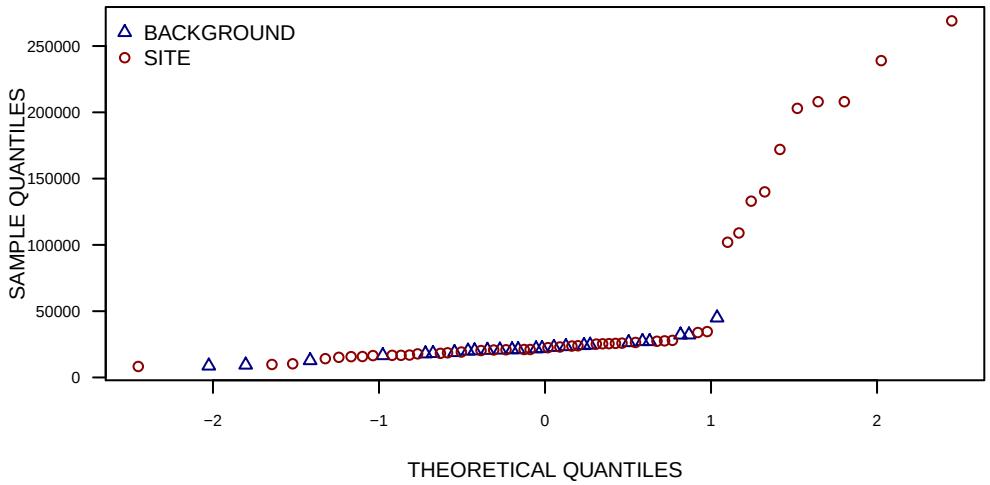
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

IRON SUBSURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 7 OF 22

BOXPLOTS



NORMAL Q−Q PLOT



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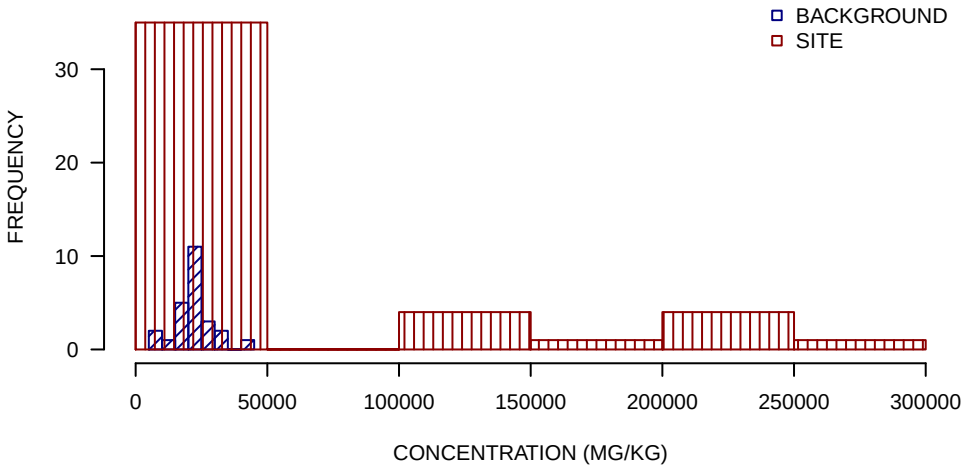


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	8700	8300
25TH PERCENTILE	19000	18000
MEDIAN	21000	24000
MEAN	22000	56000
75TH PERCENTILE	24000	34000
MAXIMUM	45000	270000

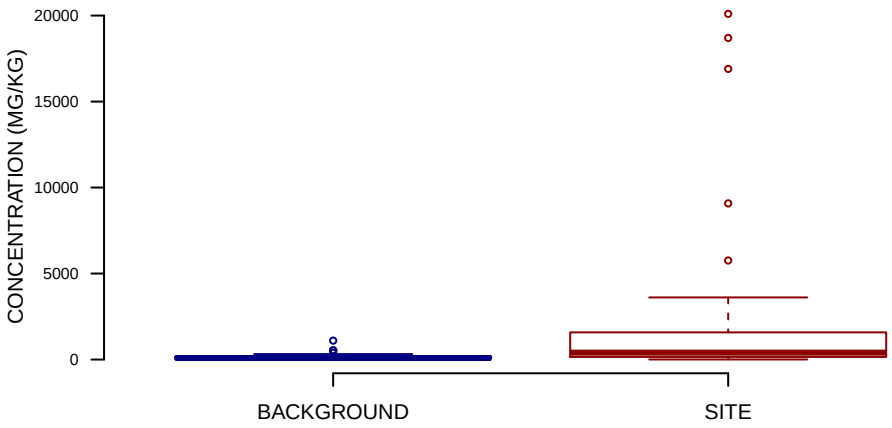
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

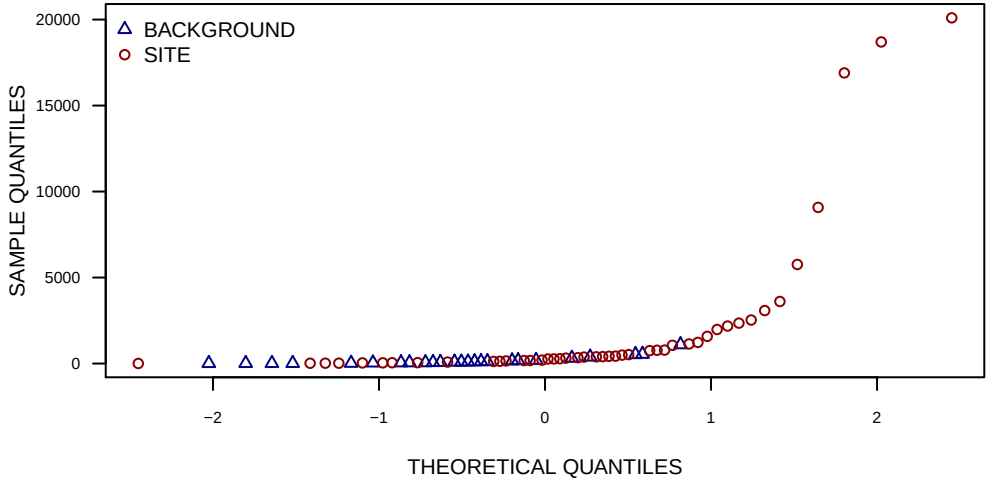
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

LEAD SUBSURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 8 OF 22

BOXPLOTS



NORMAL Q−Q PLOT



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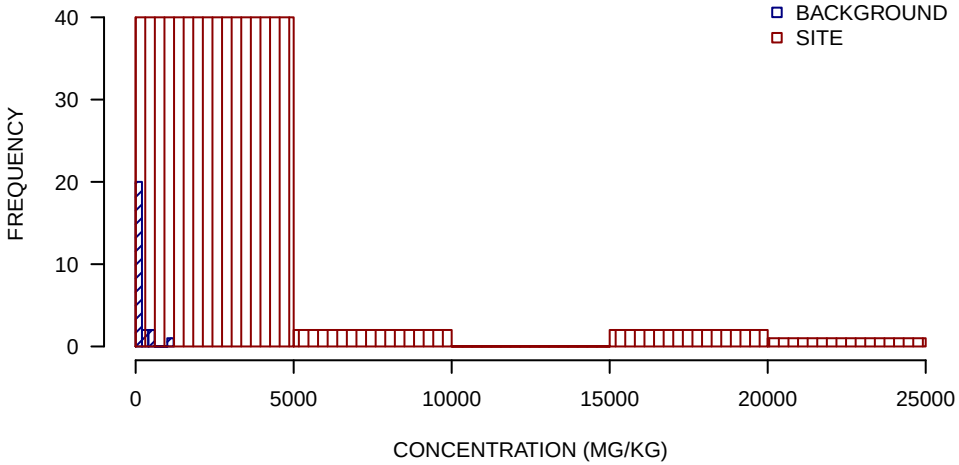


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	9.5	4.8
25TH PERCENTILE	51	150
MEDIAN	90	400
MEAN	180	2200
75TH PERCENTILE	170	1600
MAXIMUM	1100	20000

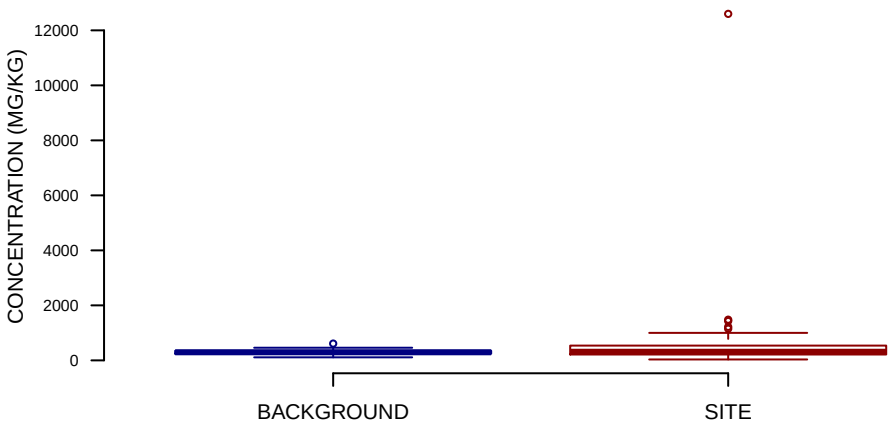
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

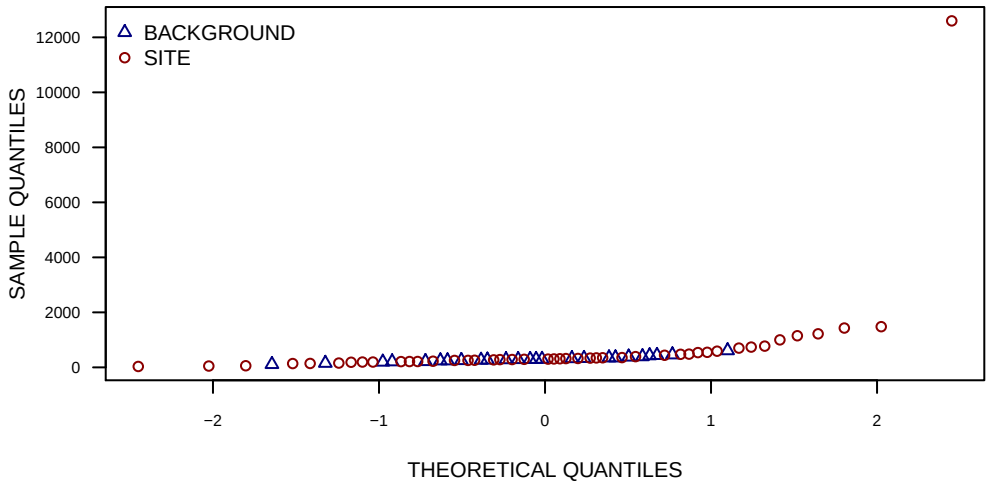
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

MANGANESE SUBSURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 9 OF 22

BOXPLOTS



NORMAL Q−Q PLOT



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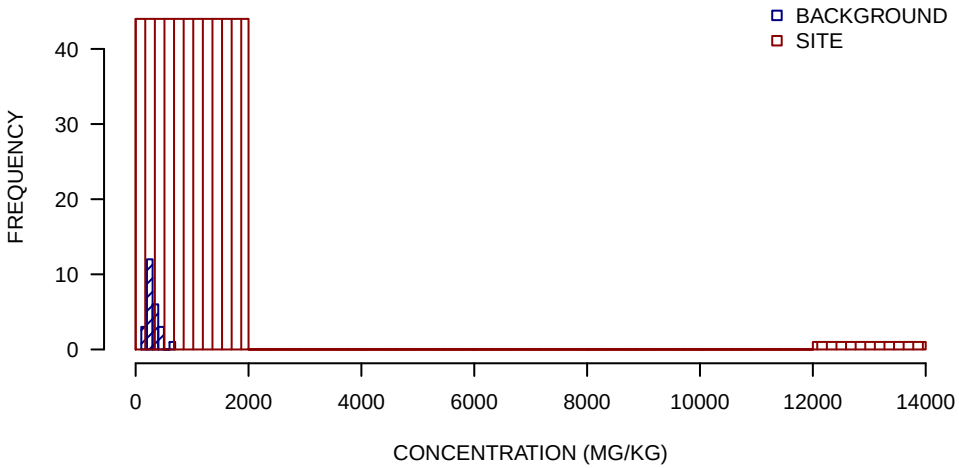


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	110	33
25TH PERCENTILE	240	210
MEDIAN	290	310
MEAN	310	700
75TH PERCENTILE	350	540
MAXIMUM	610	13000

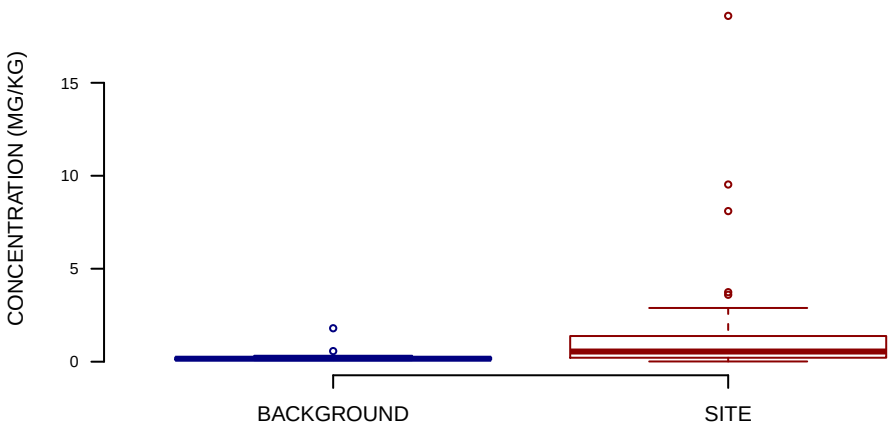
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

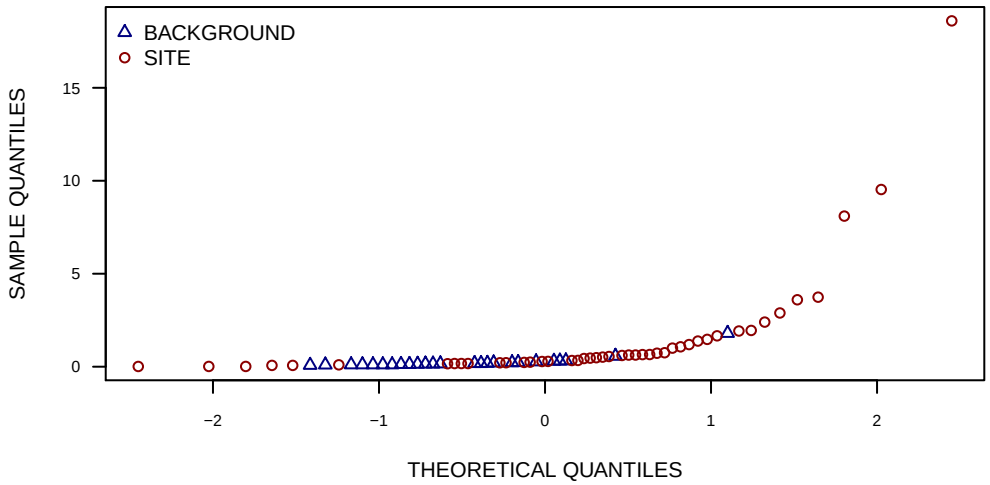
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

MERCURY SUBSURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 10 OF 22

BOXPLOTS



NORMAL Q−Q PLOT



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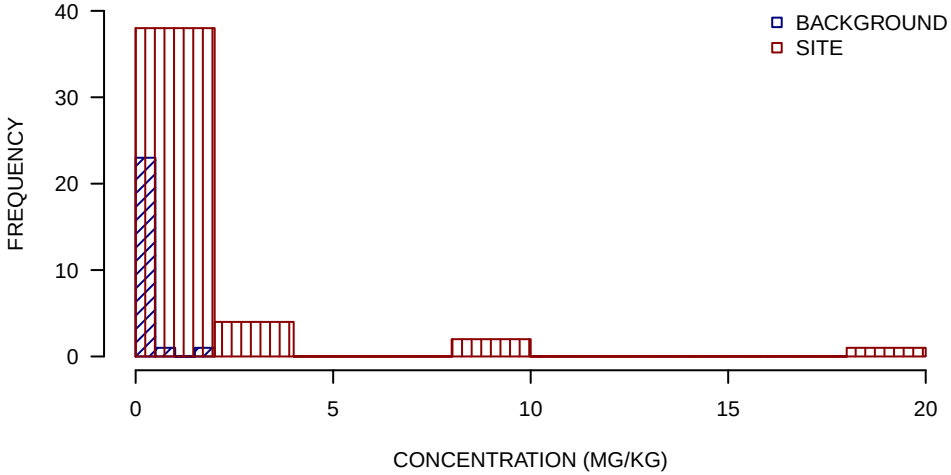


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	0.082	0.013
25TH PERCENTILE	0.11	0.21
MEDIAN	0.16	0.55
MEAN	0.25	1.6
75TH PERCENTILE	0.23	1.4
MAXIMUM	1.8	19

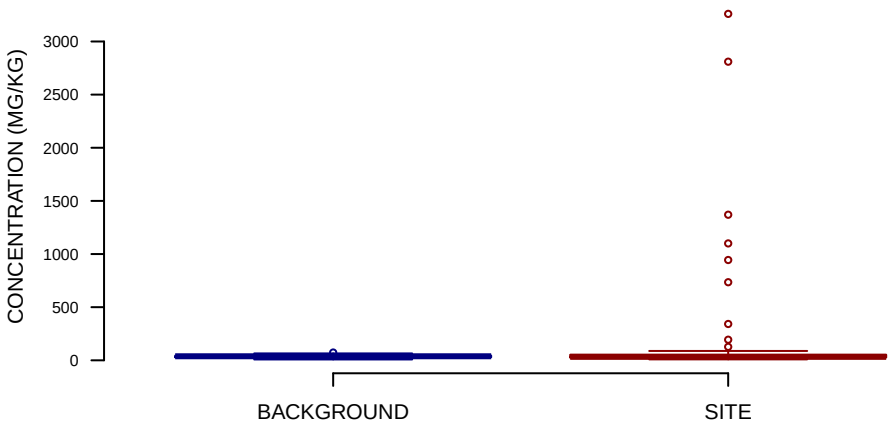
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

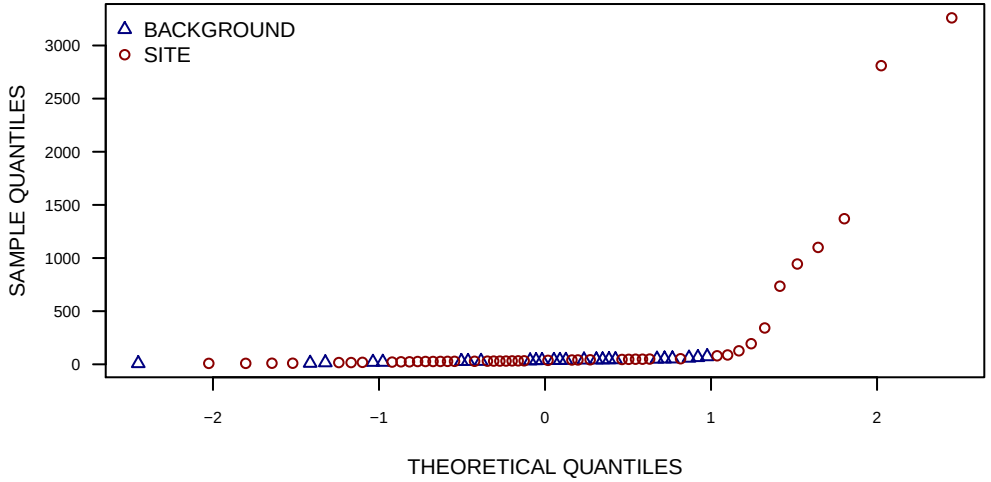
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

NICKEL SUBSURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 11 OF 22

BOXPLOTS



NORMAL Q−Q PLOT



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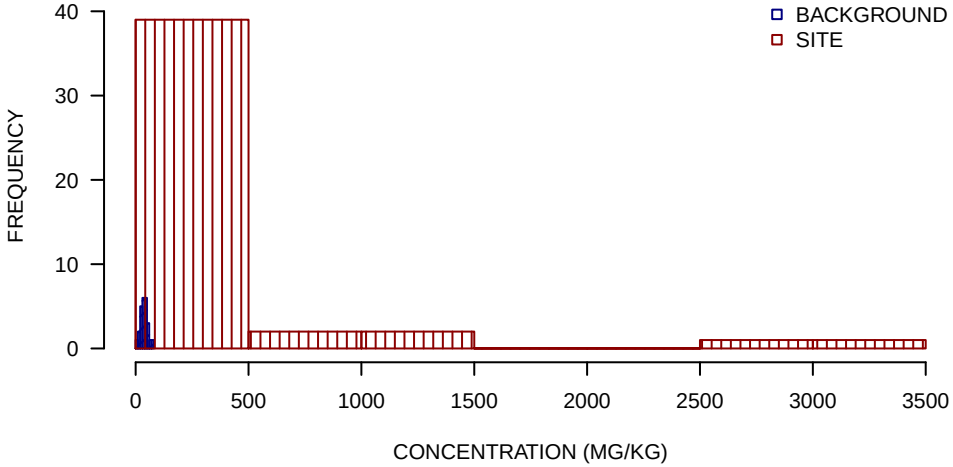


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	8.1	8.7
25TH PERCENTILE	29	27
MEDIAN	38	33
MEAN	38	270
75TH PERCENTILE	45	52
MAXIMUM	73	3300

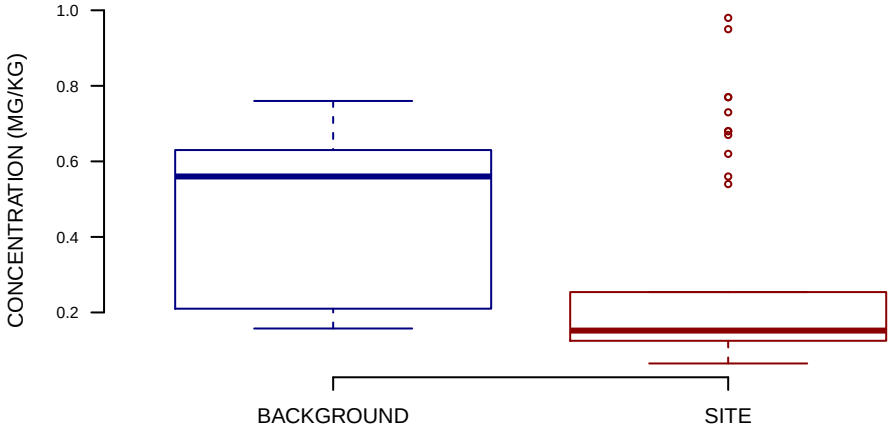
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

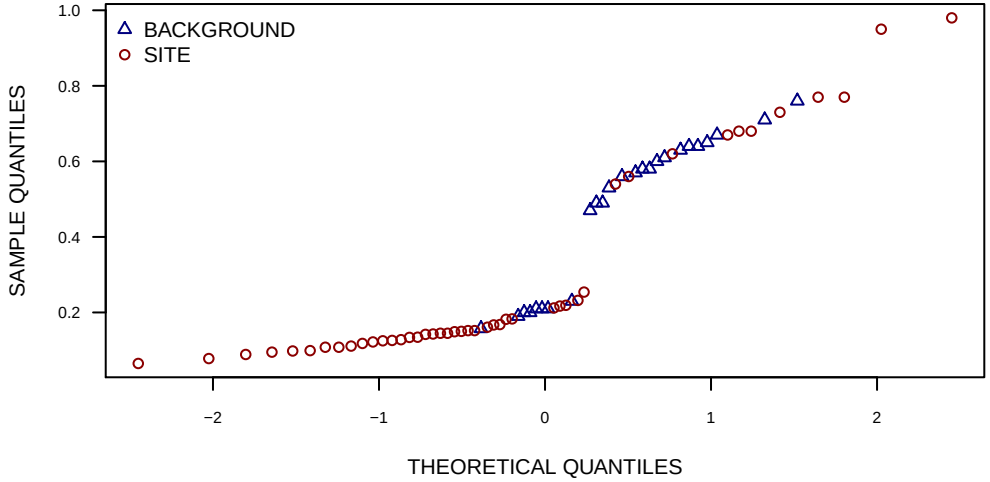
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

THALLIUM SUBSURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 12 OF 22

BOXPLOTS



NORMAL Q−Q PLOT



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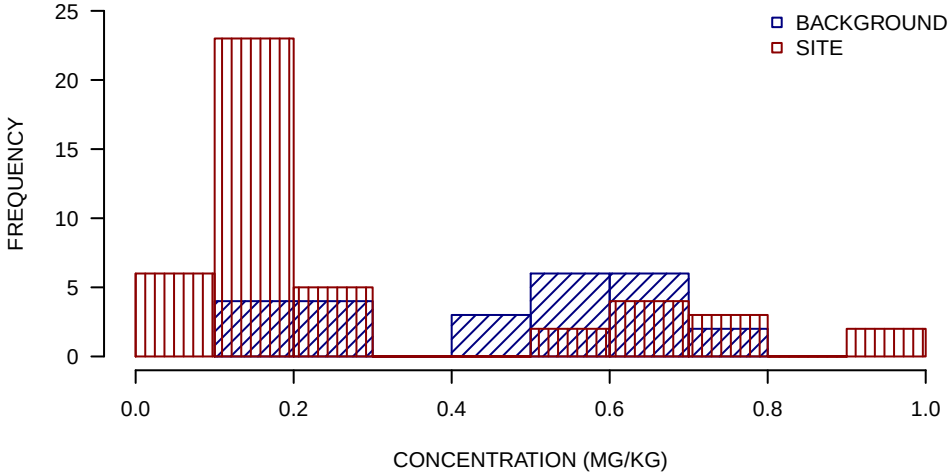


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	0.16	0.065
25TH PERCENTILE	0.21	0.12
MEDIAN	0.56	0.15
MEAN	0.47	0.29
75TH PERCENTILE	0.63	0.25
MAXIMUM	0.76	0.98

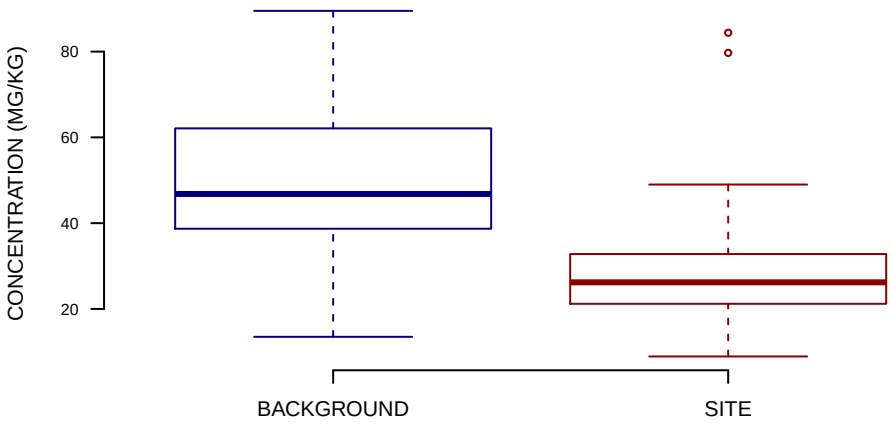
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

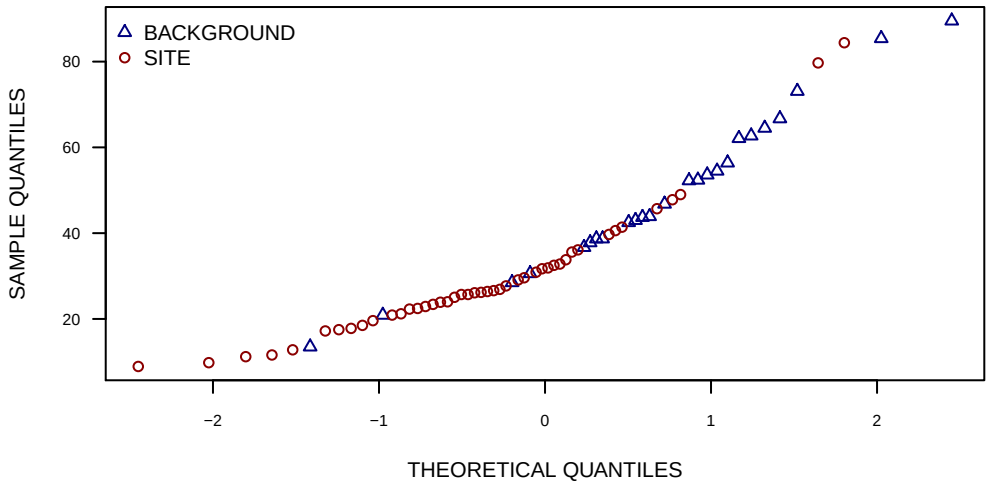
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

VANADIUM SUBSURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 13 OF 22

BOXPLOTS



NORMAL Q−Q PLOT



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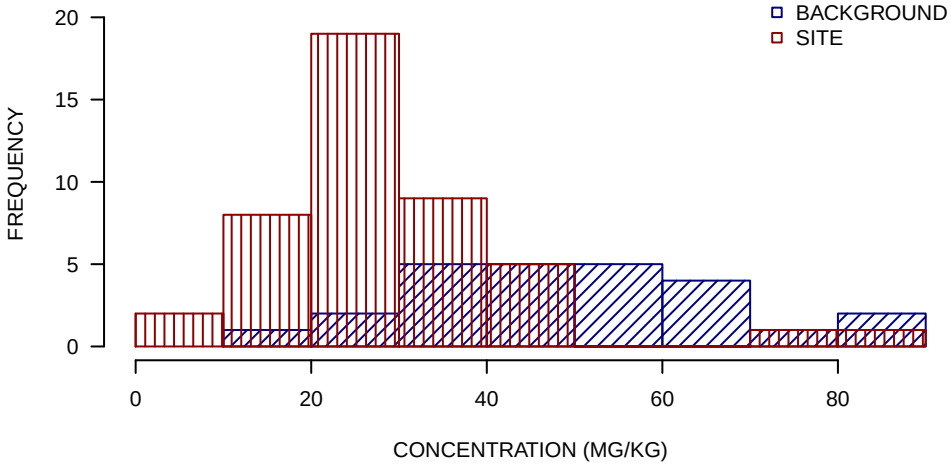


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	14	8.9
25TH PERCENTILE	39	21
MEDIAN	47	26
MEAN	50	29
75TH PERCENTILE	62	33
MAXIMUM	90	84

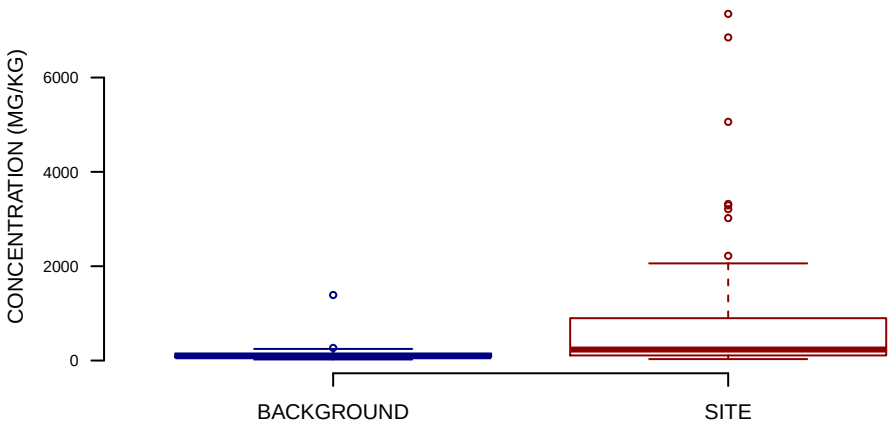
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

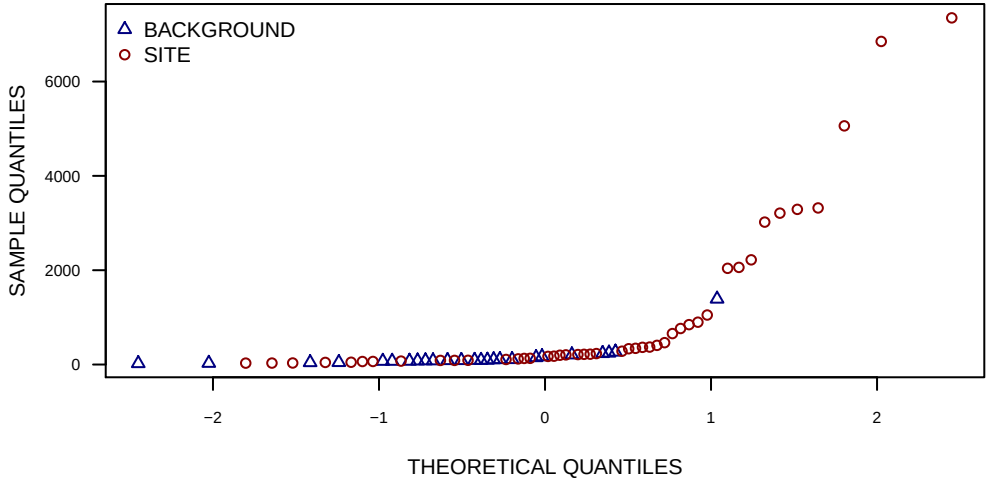
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ZINC SUBSURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 14 OF 22

BOXPLOTS



NORMAL Q−Q PLOT



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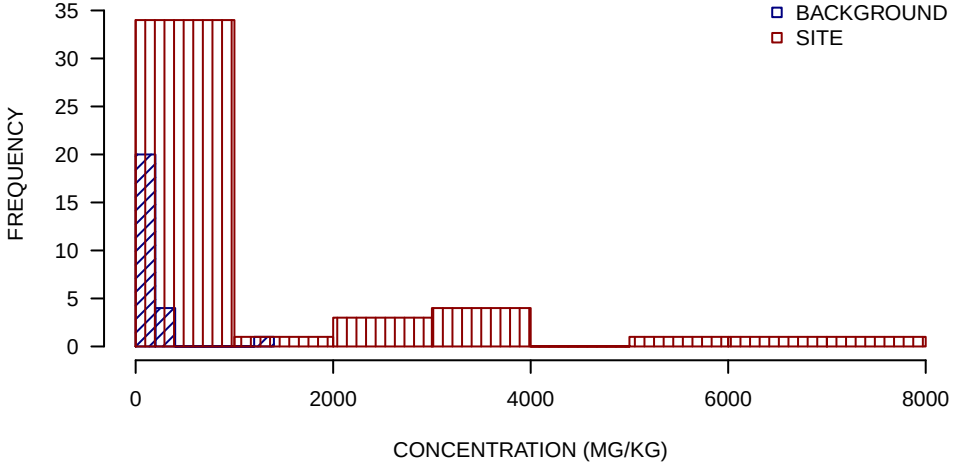


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	23	31
25TH PERCENTILE	74	110
MEDIAN	92	230
MEAN	160	1100
75TH PERCENTILE	150	900
MAXIMUM	1400	7400

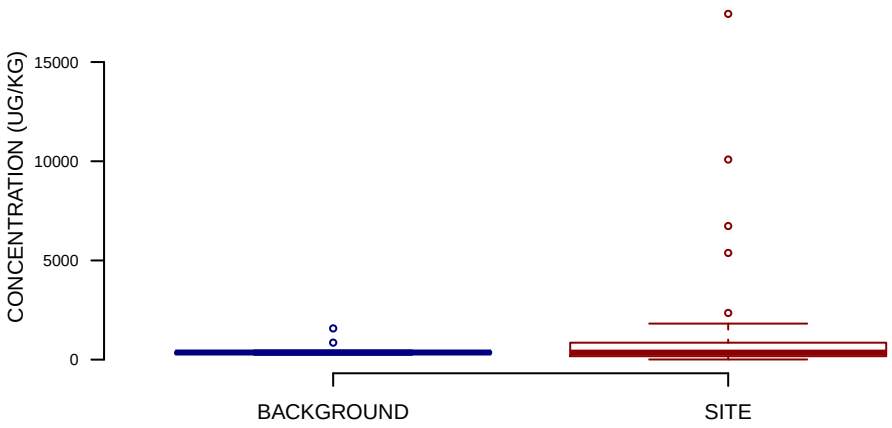
UNITS ARE MG/KG

DETECTION LIMIT USED FOR NON−DETECTS

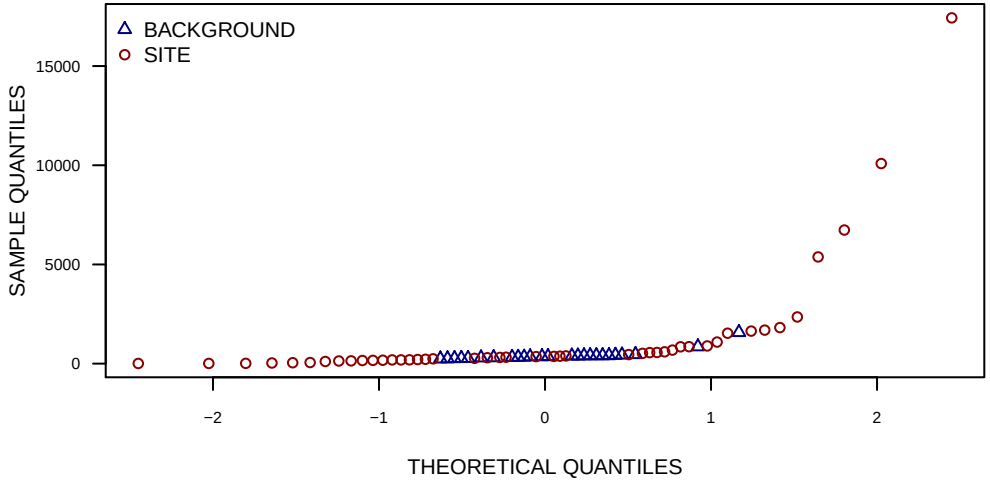
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

BAP EQUIVALENT−HALFND SUBSURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 15 OF 22

BOXPLOTS



NORMAL Q−Q PLOT



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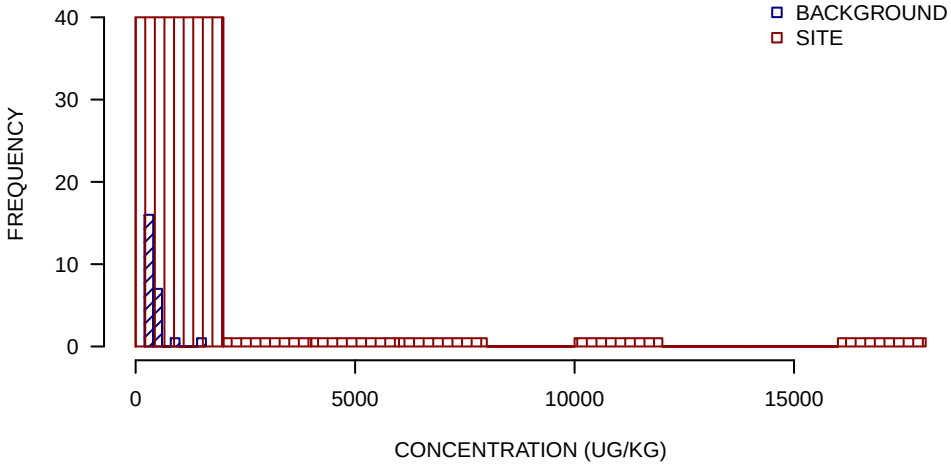


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	240	9.1
25TH PERCENTILE	310	170
MEDIAN	360	350
MEAN	420	1300
75TH PERCENTILE	410	850
MAXIMUM	1600	17000

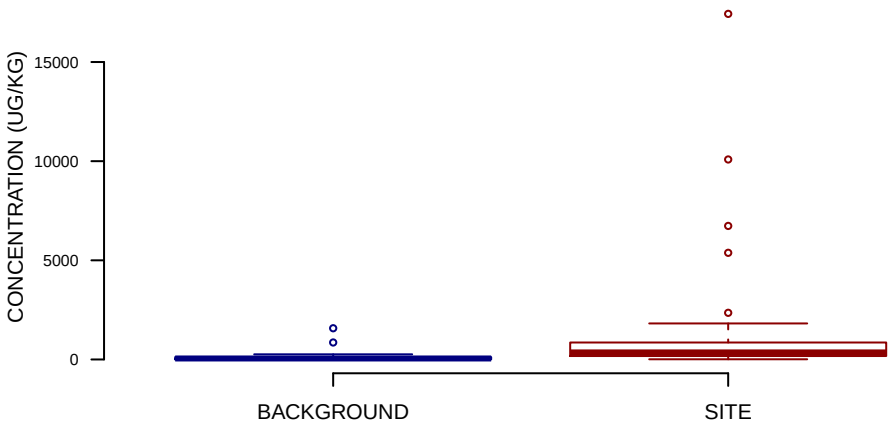
UNITS ARE UG/KG

DETECTION LIMIT USED FOR NON−DETECTS

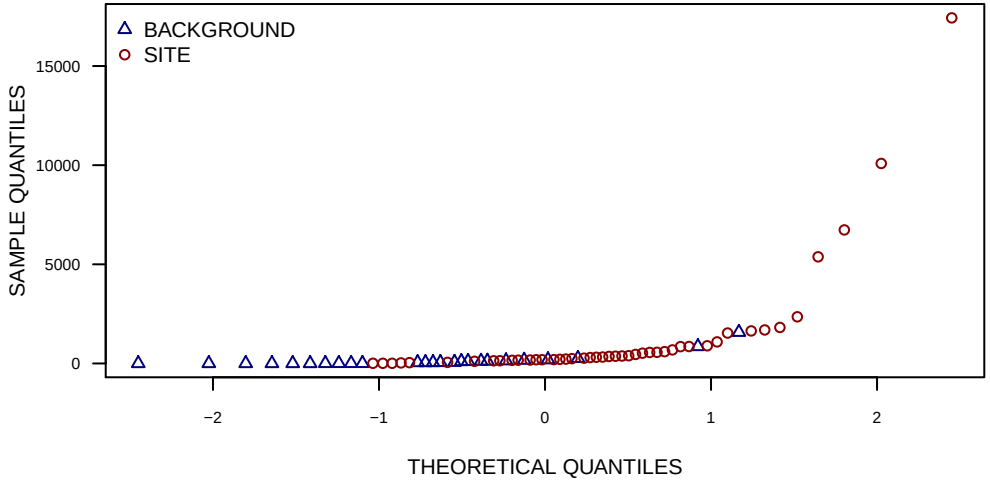
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

BAP EQUIVALENT−POS SUBSURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 16 OF 22

BOXPLOTS



NORMAL Q−Q PLOT



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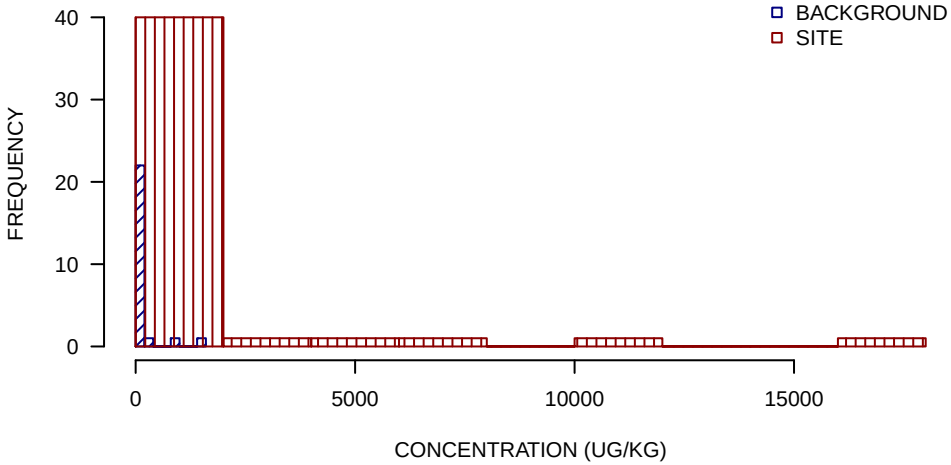


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	0	9.1
25TH PERCENTILE	4.1	170
MEDIAN	49	350
MEAN	160	1300
75TH PERCENTILE	120	850
MAXIMUM	1600	17000

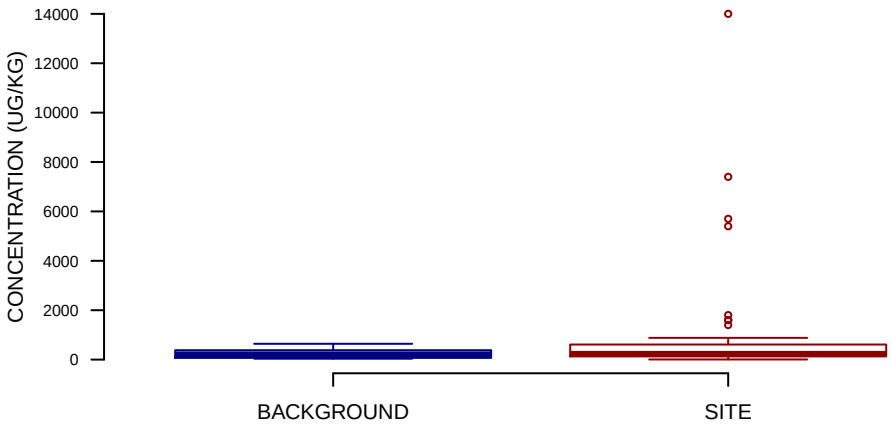
UNITS ARE UG/KG

DETECTION LIMIT USED FOR NON−DETECTS

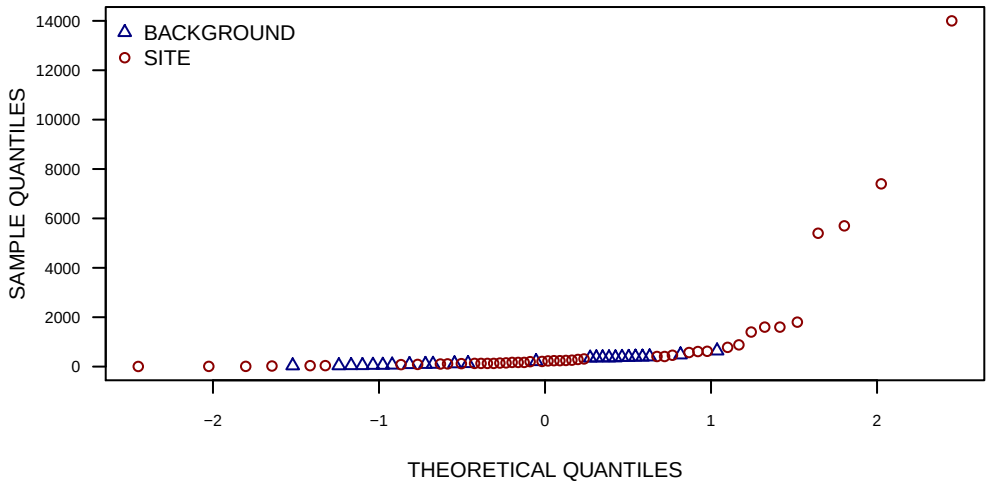
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

BENZO(A)ANTHRACENE SUBSURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 17 OF 22

BOXPLOTS



NORMAL Q−Q PLOT



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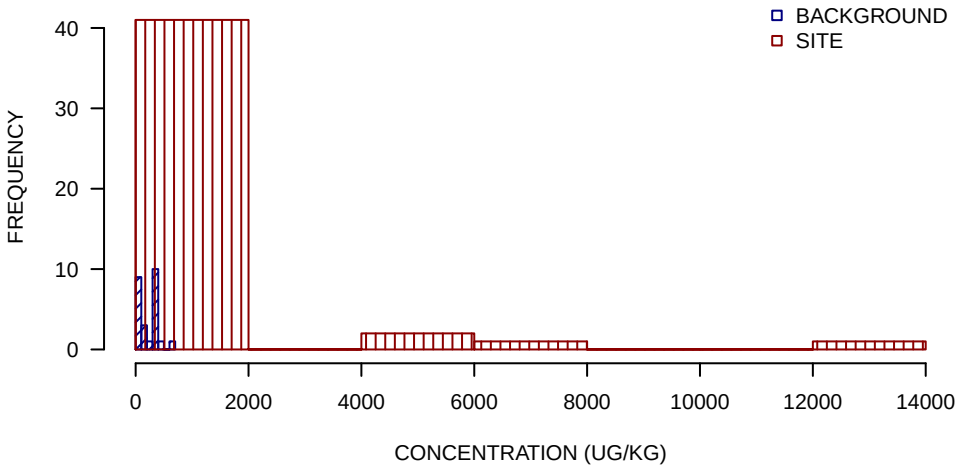


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	37	5.8
25TH PERCENTILE	69	130
MEDIAN	210	230
MEAN	240	1100
75TH PERCENTILE	380	610
MAXIMUM	640	14000

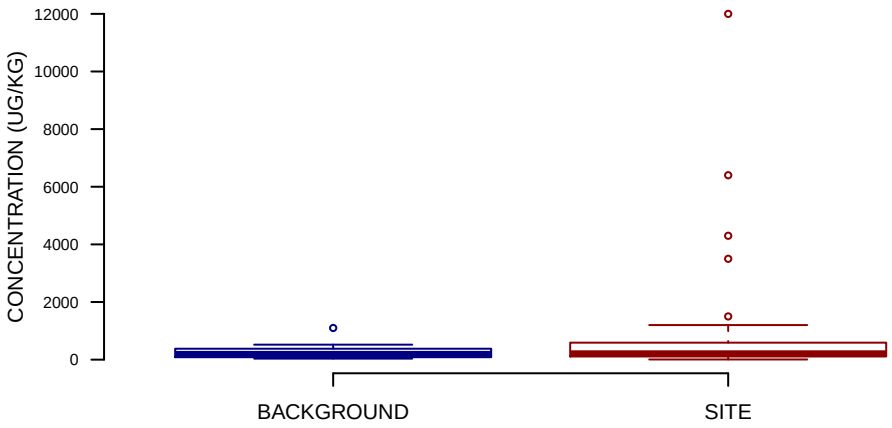
UNITS ARE UG/KG

DETECTION LIMIT USED FOR NON−DETECTS

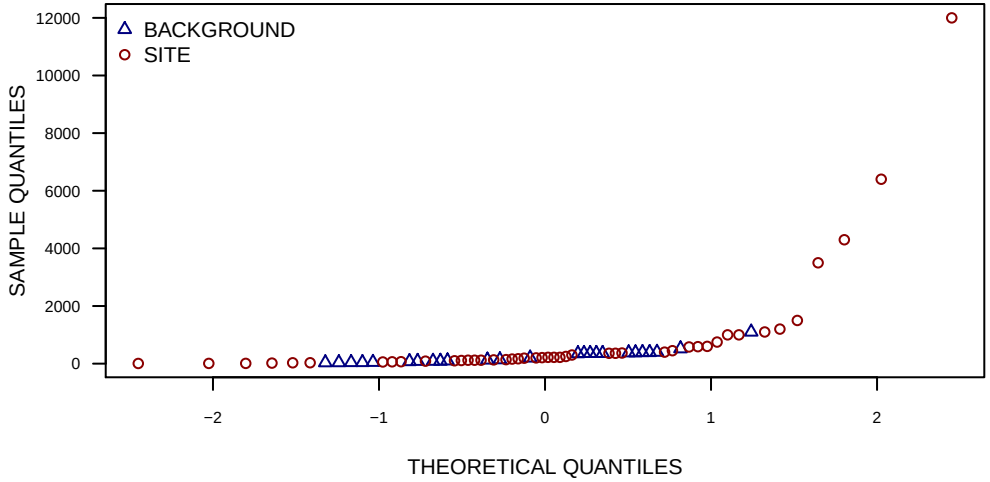
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

BENZO(A)PYRENE SUBSURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 18 OF 22

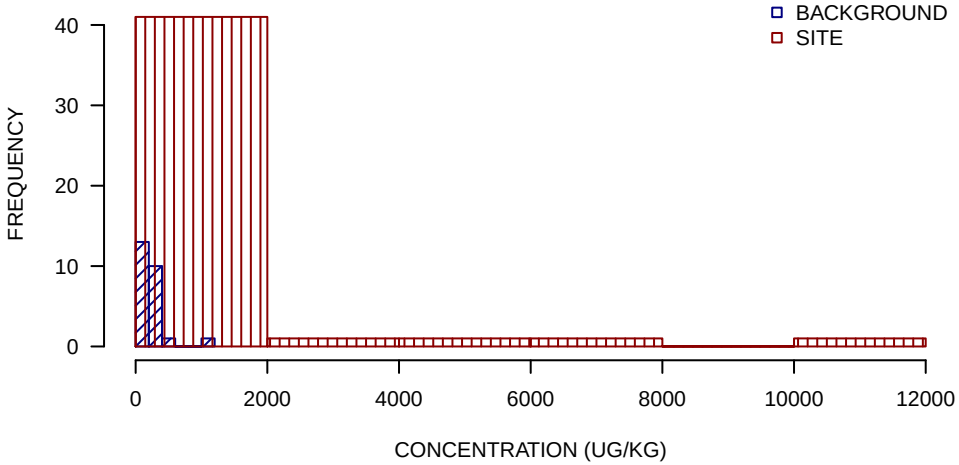
BOXPLOTS



NORMAL Q−Q PLOT



HISTOGRAMS



SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	36	7
25TH PERCENTILE	85	110
MEDIAN	200	220
MEAN	260	880
75TH PERCENTILE	380	590
MAXIMUM	1100	12000

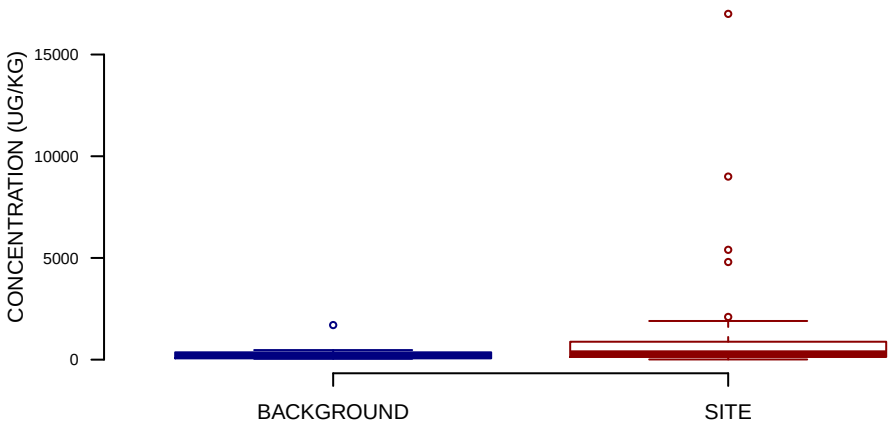
UNITS ARE UG/KG

DETECTION LIMIT USED FOR NON−DETECTS

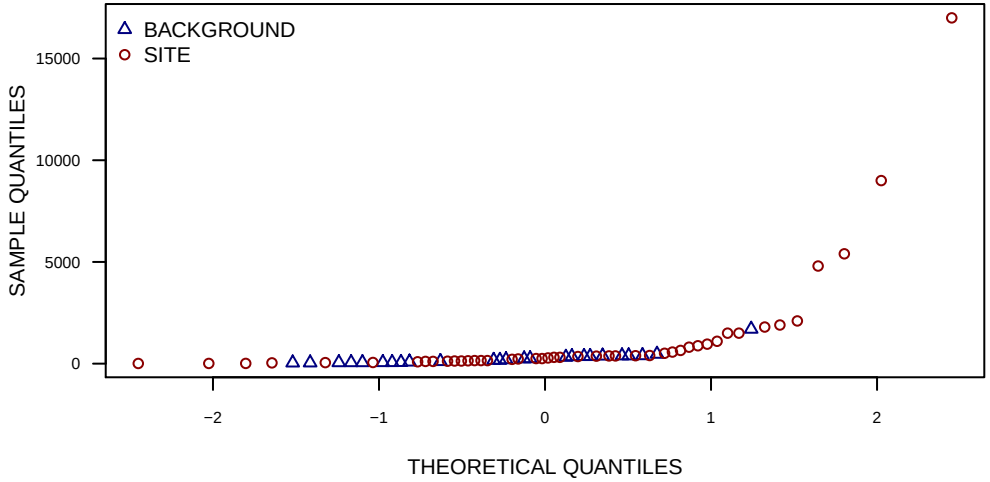
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

BENZO(B)FLUORANTHENE SUBSURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 19 OF 22

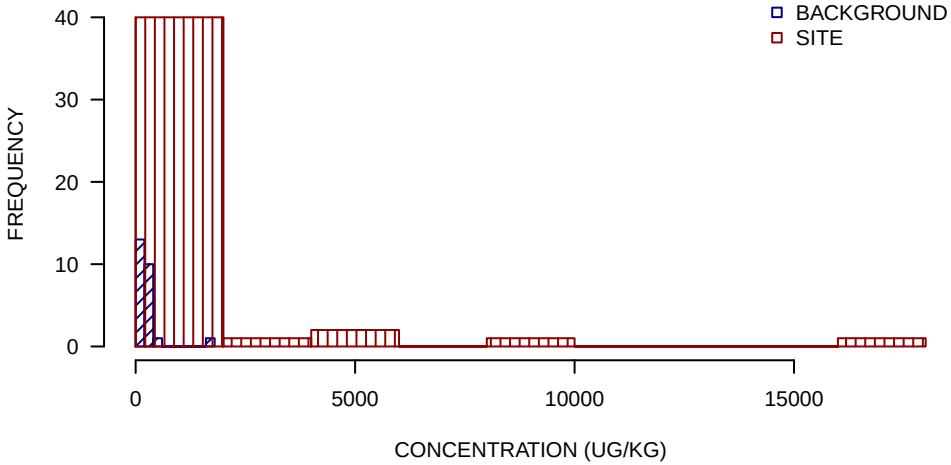
BOXPLOTS



NORMAL Q−Q PLOT



HISTOGRAMS



SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	41	9.1
25TH PERCENTILE	62	130
MEDIAN	200	310
MEAN	270	1200
75TH PERCENTILE	360	880
MAXIMUM	1700	17000

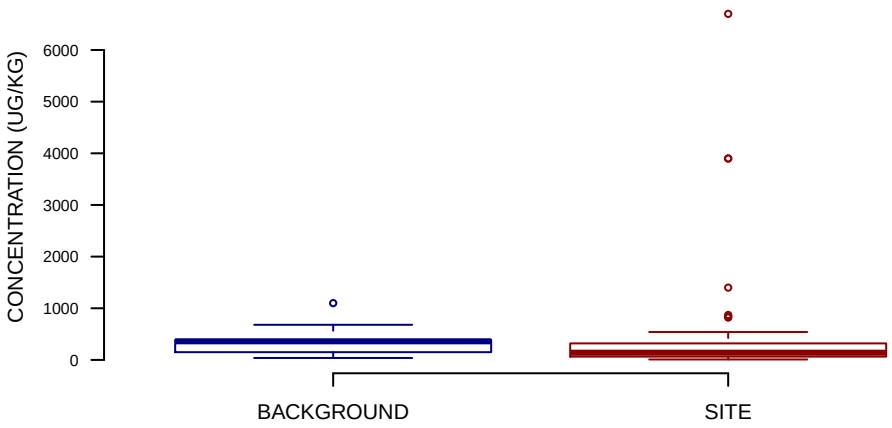
UNITS ARE UG/KG

DETECTION LIMIT USED FOR NON−DETECTS

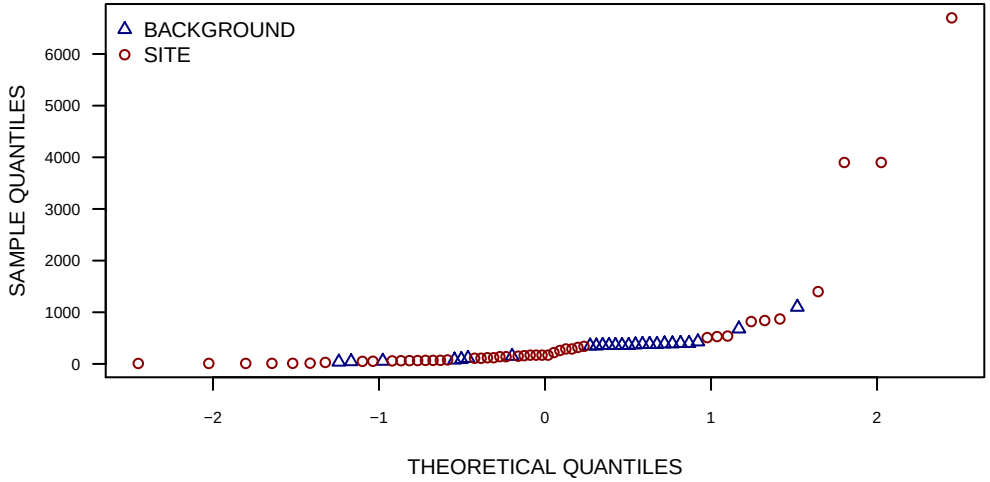
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

BENZO(K)FLUORANTHENE SUBSURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 20 OF 22

BOXPLOTS



NORMAL Q−Q PLOT



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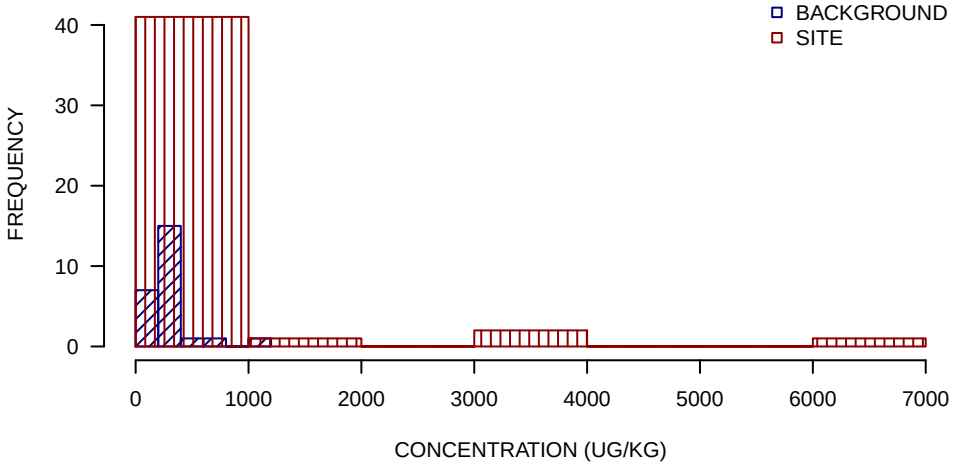


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	38	9.1
25TH PERCENTILE	150	64
MEDIAN	360	140
MEAN	330	540
75TH PERCENTILE	390	320
MAXIMUM	1100	6700

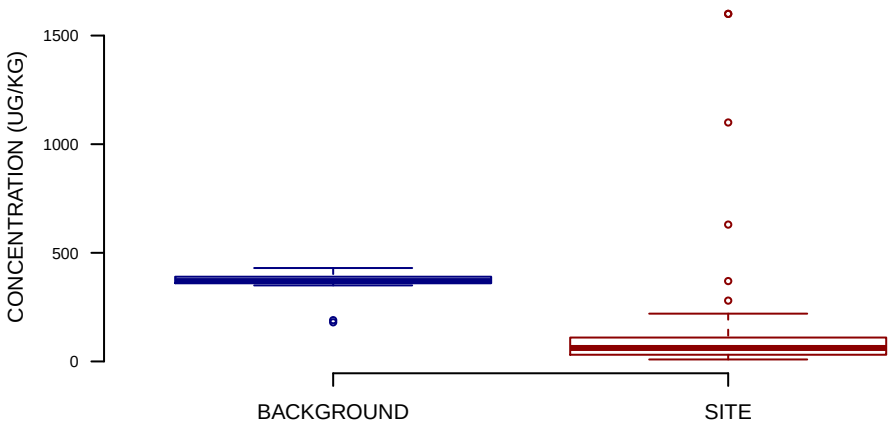
UNITS ARE UG/KG

DETECTION LIMIT USED FOR NON−DETECTS

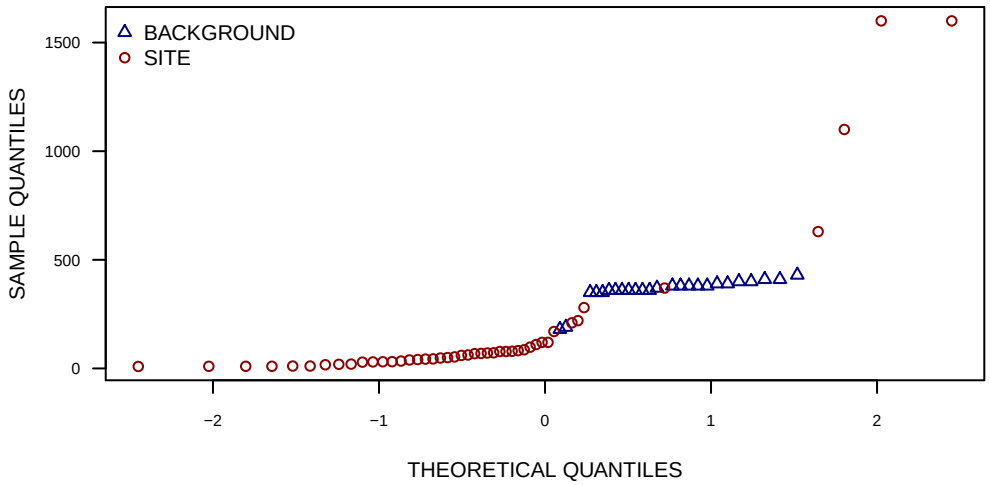
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

DIBENZO(A,H)ANTHRACENE SUBSURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 21 OF 22

BOXPLOTS



NORMAL Q−Q PLOT



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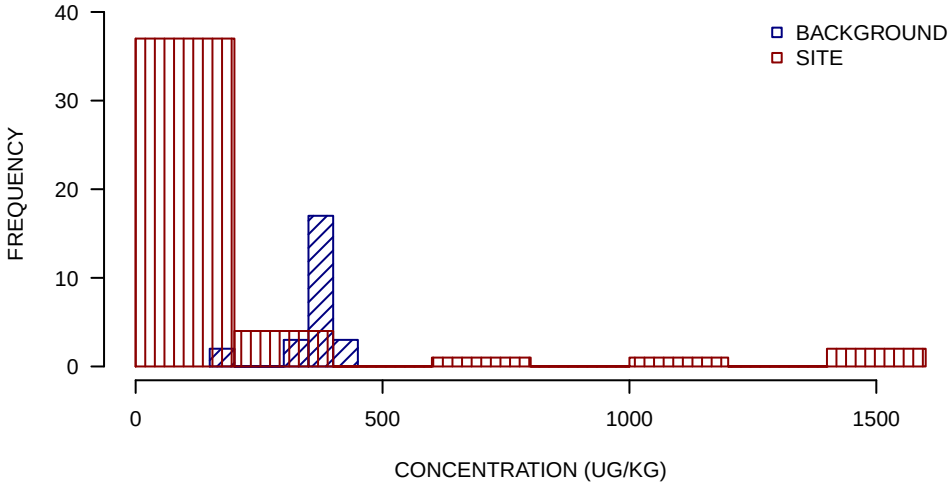


SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	180	9.1
25TH PERCENTILE	360	31
MEDIAN	370	62
MEAN	360	180
75TH PERCENTILE	390	110
MAXIMUM	430	1600

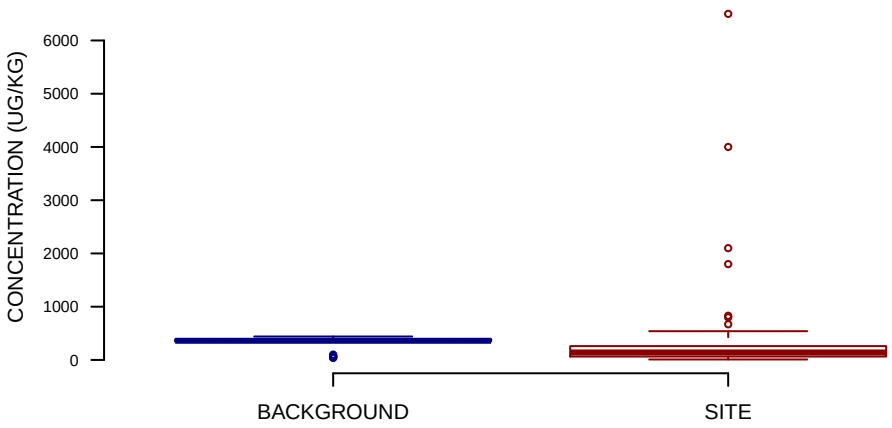
UNITS ARE UG/KG

DETECTION LIMIT USED FOR NON−DETECTS

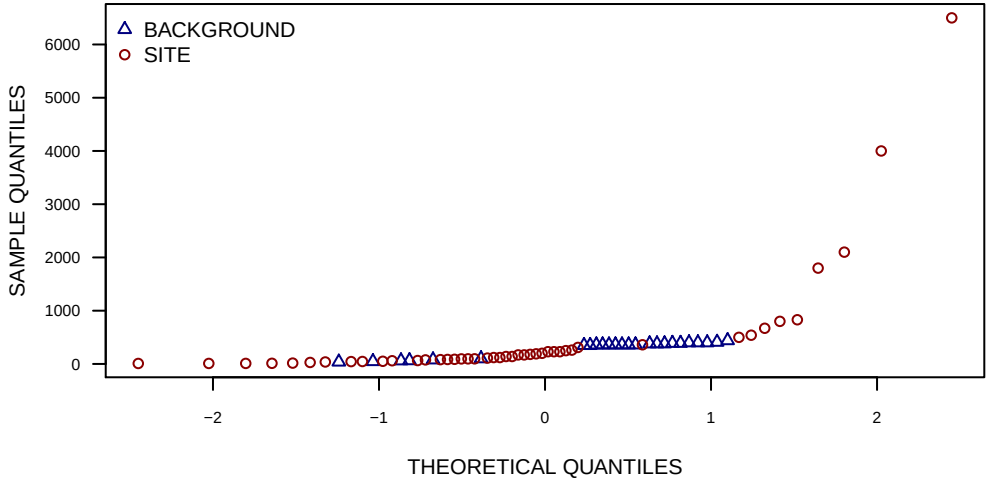
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

INDENO(1,2,3−CD)PYRENE SUBSURFACE SOIL GRAPHICAL DISPLAYS
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE
FIGURE 22 OF 22

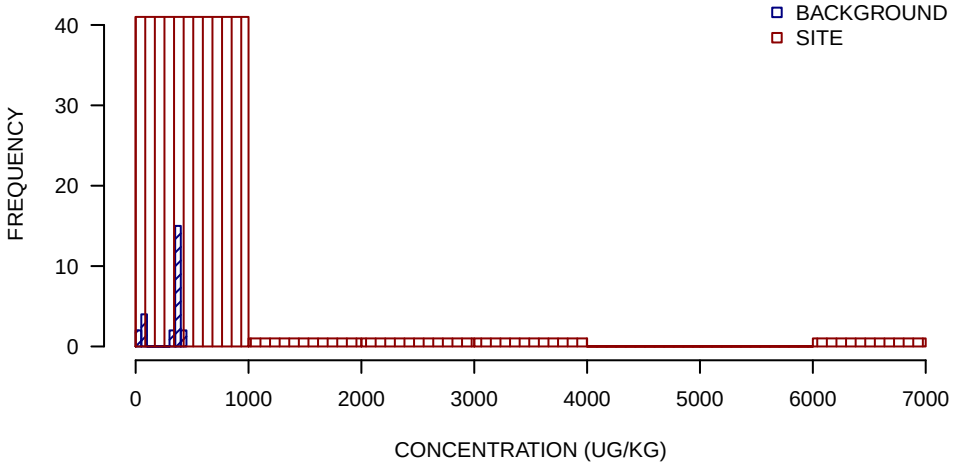
BOXPLOTS



NORMAL Q−Q PLOT



HISTOGRAMS



SUMMARY STATISTICS

	BACKGROUND	SITE
MINIMUM	38	9.1
25TH PERCENTILE	350	64
MEDIAN	360	140
MEAN	300	490
75TH PERCENTILE	390	260
MAXIMUM	440	6500

UNITS ARE UG/KG

DETECTION LIMIT USED FOR NON−DETECTS

SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

B.3 2015 DATA VALIDATION REPORTS
(ON CD)

TETRA TECH **INTERNAL CORRESPONDENCE**

TO:	**M. VEDS**	**DATE:**	**AUGUST 13, 2015**
FROM:	**JOSEPH KALINYAK**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION – PAH / PETS**
PNS KITTERY, CTO WE32 OU8
SAMPLE DELIVERY GROUP (SDG) OU8-1

SAMPLES: 1 / Aqueous / PAH / PETS (Extractible Petroleum Hydrocarbons - EPH)

WTB-RB01-060415

56 / Soil / PAH / PETS

WTB-FD01-060315	WTB-FD01-060415	WTB-FD02-060315
WTB-FD02-060415	WTB-FD03-060415	WTB-SB-08-0206
WTB-SB-08-0610	WTB-SB-09-0206	WTB-SB-09-0610
WTB-SB-10-0206	WTB-SB-10-0610	WTB-SB-11-0206
WTB-SB-11-0610	WTB-SB-12-0206	WTB-SB-12-0610
WTB-SB-13-0206	WTB-SB-13-0610	WTB-SB-14-0206
WTB-SB-14-0607	WTB-SB-15-0206	WTB-SB-15-0610
WTB-SB-16-0206	WTB-SB-16-0610	WTB-SB-17-0206
WTB-SB-17-0610	WTB-SB-18-0206	WTB-SB-18-0610
WTB-SB-19-0206	WTB-SB-19-0610	WTB-SB-20-0206
WTB-SB-20-0610	WTB-SB-21-0206	WTB-SB-21-0610
WTB-SB-22-0206	WTB-SB-22-0610	WTB-SB-23-0206
WTB-SB-23-0610	WTB-SB-24-0206	WTB-SB-24-069.7
WTB-SS-08-0002	WTB-SS-09-0002	WTB-SS-10-0002
WTB-SS-11-0002	WTB-SS-12-0002	WTB-SS-13-0002
WTB-SS-14-0002	WTB-SS-15-0002	WTB-SS-16-0002
WTB-SS-17-0002	WTB-SS-18-0002	WTB-SS-19-0002
WTB-SS-20-0002	WTB-SS-21-0002	WTB-SS-22-0002
WTB-SS-23-0002	WTB-SS-24-0002	

OVERVIEW

The sample set for PNS Kittery, CTO WE32 OU8, SDG OU8-1, consisted of fifty-six (56) soil samples and one (1) aqueous rinse blank sample. All aqueous and soil sample samples were analyzed for polynuclear aromatic hydrocarbons (PAH) and petroleum semi-volatiles (PETS), as listed above. Four (4) field duplicate sample pairs were included in this sample delivery group (SDG);

WTB-FD01-060315 / WTB-SB-14-0206	WTB-FD01-060415 / WTB-SS-08-0002
WTB-FD02-060315 / WTB-SB-22-0610	WTB-FD02-060415 / WTB-SB-15-0206
WTB-FD03-060415 / WTB-SS-20-0002	

The samples were collected by Tetra Tech on June 1, 3, 4, and 5, 2015 and analyzed by Katahdin Analytical Services, Inc. All analyses were conducted in accordance with EPA SW-846 Method 8270D Selective Ion-Monitoring (SIM) for PAHs and the Massachusetts Department of Environmental Protection – Extractible Petroleum Hydrocarbons (MADEP- EPH), analytical and reporting protocols.

The data was evaluated based on the following parameters:

* • Data Completeness
  • Holding Times
* • GC/MS Instrument Tuning and System Performance
  • Initial and Continuing Calibration
  • Blank Results
* • Blank Spike/Blank Spike Duplicate Results
* • Matrix Spike/Matrix Spike Duplicate Recoveries
  • Surrogate Spike Recoveries
  • Internal Standard Recoveries
  • Field Duplicate Precision
* • Compound Identification and Quantification
* • Detection Limits

The asterisk (*) indicates that all quality control criteria were met for this parameter. Qualified (if applicable) analytical results are summarized in Appendix A. Results as reported by the laboratory are presented in Appendix B. Appendix C contains the documentation to support the findings as discussed in this data validation report. The text of this report has been formulated to address only those problem areas affecting data quality.

HOLD TIME

The sample collection to extraction hold time of 7 days was exceeded (<2X hold time) for the PETS/EPH (MA Dept. EPH Method 4.1.1) extraction for samples WTB-SB-10-0610 and WTB-SB-23-0610. Only the re-extractions of the samples were reported by the laboratory.

Affected Samples: WTB-SB-10-0610 and WTB-SB-23-0610

Actions: The sample positive and detected PETs results were qualified estimated, (J) and (UJ),

BLANKS

The following PAH analytes were detected in the method blank at the maximum concentrations as indicated below.

Analytes	Maximum Conc. µg/kg	Action Level µg/kg
Fluoranthene (1)	2.0	10.0
Pyrene (1)	3.9	19.5
Benzo(a)anthracene (1)	2.2	11.0
Fluoranthene (2)	5.2	26.0
Pyrene (2)	6.6	33.0
Benzo(a)anthracene (2)	3.0	15.0

(1) Method blank for batch WG164507 affecting samples (DL=dilution analysis):

WTB-FD01-060415	WTB-FD02-060315	WTB-SB-08-0206
WTB-SB-08-0206DL	WTB-SB-08-0610	WTB-SB-08-0610DL
WTB-SB-09-0206	WTB-SB-09-0610	WTB-SB-09-0610DL
WTB-SB-12-0206	WTB-SB-12-0206DL	WTB-SB-12-0610
WTB-SB-12-0610DL	WTB-SB-22-0206	WTB-SB-22-0206DL
WTB-SB-22-0610	WTB-SB-23-0206DL	WTB-SB-23-0206DL2
WTB-SB-23-0610DL	WTB-SB-23-0610DL2	WTB-SB-24-0206

WTB-SB-24-069.7	WTB-SS-08-0002	WTB-SS-09-0002
WTB-SS-09-0002DL	WTB-SS-12-0002DL	WTB-SS-12-0002DL2
WTB-SS-22-0002	WTB-SS-23-0002DL	WTB-SS-23-0002DL2
WTB-SS-24-0002		

(2) Method blank for batch WG164585 affecting samples:

WTB-FD02-060415	WTB-FD03-060415	WTB-SB-13-0206
WTB-SB-13-0206DL	WTB-SB-13-0610	WTB-SB-15-0206
WTB-SB-15-0610	WTB-SB-15-0610DL	WTB-SB-16-0206
WTB-SB-16-0206DL	WTB-SB-16-0610	WTB-SB-18-0206
WTB-SB-18-0610	WTB-SB-20-0206	WTB-SB-20-0610
WTB-SB-21-0206	WTB-SB-21-0610	WTB-SB-21-0610DL
WTB-SS-13-0002	WTB-SS-15-0002	WTB-SS-15-0002-DL
WTB-SS-16-0002	WTB-SS-16-0002DL	WTB-SS-18-0002
WTB-SS-20-0002	WTB-SS-21-0002	

An action level of 5X for the PAHs was established to evaluate laboratory contamination. Dilution factors and sample aliquots were taken into consideration during the application of all action levels. The positive sample PAH results less than the action level were qualified as non-detected, (U), and raised to the Limit of Detection (LOD) if necessary, as a result of blank contamination.

CALIBRATIONS – INITIAL AND CONTINUING

The PAH CCV %D was greater than the 20% quality control limit for benzo(k)fluoranthene on 06/16/15 @ 09:00 on instrument GCMS-N.

Affected Samples:

WTB-SS-12-0002DL2	WTB-SB-15-0206	WTB-FD02-060415
WTB-SB-16-0610	WTB-SS-18-0002	WTB-SB-18-0206
WTB-SB-18-0610	WTB-SB-22-0206	WTB-SB-15-0610
WTB-SS-15-0002	WTB-SS-09-0002	WTB-SB-16-0206
WTB-SS-12-0002DL		

Actions: The sample positive benzo(k)fluoranthene results were qualified estimated, (J).

The PAH CCV %D was greater than the 20% quality control limit for pyrene on 06/17/15 @ 14:08 on instrument GCMS-N.

Affected Samples:

WTB-SB-17-0610DL2	WTB-SS-23-0002DL2	WTB-SS-15-0002DL
WTB-SB-15-0610DL	WTB-SB-16-0206DL	WTB-SS-20-0002
WTB-FD03-060415	WTB-SB-20-0206	WTB-SB-20-0610
WTB-SS-21-0002	WTB-SB-21-0206	WTB-SB-21-0610
WTB-SS-13-0002	WTB-SS-16-0002	WTB-SB-13-0206

Actions: The sample positive and non-detected pyrene results were qualified estimated, (J) and (UJ), respectively, with the exception of sample WTB-SS-13-0002 and WTB-SS-21-0002 pyrene results which were qualified non-detected, (U), due to method blank contamination.

The PAH CCV %D was greater than the 20% quality control limit for chrysene on 06/18/15 @ 11:20 on instrument GCMS-N.

Affected Samples:
WTB-SS-16-0002DL WTB-SB-21-0610DL WTB-SB-13-0206DL
WTB-SB-13-0610

Actions: The sample positive and non-detected chrysene results were qualified estimated, (J) and (UJ).

LABORATORY CONTROL SPIKE/LABORATORY CONTROL SPIKE DUPLICATE (LCS/LCSD)

No issues were identified.

MATRIX SPIKE / MATRIX SPIKE DUPLICATE (MS/MSD)

The PAH MS and MSD %Rs were non-compliant for benzo(a)pyrene and benzo(g,h,i)perylene for spiked sample WTB-SB-24-069.7.

Affected Sample: WTB-SB-24-069.7

Actions: The sample non-detected benzo(a)pyrene and benzo(g,h,i)perylene results were qualified estimated, (UJ).

The PAH MS and MSD %Rs were less than the QC limit for phenanthrene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene, and the MSD %R was less than the QC limit for dibenzo(a,h)anthracene, for spiked sample WTB-SB-20-206.

Affected Sample: WTB-SB-20-206

Actions: The sample aforementioned detected PAH results were qualified estimated, (J), with the exception of the dibenzo(a,h)anthracene result as the MS %R and the MS/MSD RPD were QC compliant for the sample.

SURROGATE SPIKE RECOVERIES and INTERNAL STANDARD RECOVERIES

The PAH surrogate %R was less than the quality control limit for pyrene-d10 for sample WTB-SB-13-0206. The sample was also analyzed at a dilution due to high concentrations of most PAHs.

Affected Sample: WTB-SB-13-0206

Actions: The sample positive acenapthylene and napthalene results were qualified estimated, (J). The remaining PAHs were reported from the dilution analysis and were not qualified.

The PAH sample analyses had recoveries for internal standards less than the QC limit as listed below. The analytes associated with the internal standard perylene-d12 were benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene. The analytes associated with the internal standard chrysene-d12 were benzo(a)anthracene, chrysene, fluoranthene, and pyrene. Analytes listed in the "Analytes not qualified" column were not qualified for the sample since the sample results reported for those analytes were reported from other sample undiluted or dilution analyses that were QC internal standard compliant.

Sample	Int. Std.(s) Non-Compliant	Associated Analytes not qualified
WTB-FD01-060415	perylene-d12	
WTB-SB-08-0206	chrysene-d12, perylene-d12	benzo(b)fluoranthene, chrysene, pyrene
WTB-SB-08-0610	chrysene-d12, perylene-d12	benzo(b)fluoranthene, chrysene, pyrene
WTB-SB-09-0610	chrysene-d12, perylene-d12	benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene, benzo(a)anthracene, chrysene, fluoranthene, pyrene
WTB-SB-10-0610 WTB-SB-10-0610DL	perylene-d12 perylene-d12	
WTB-SB-11-0206 WTB-SB-11-0206DL	chrysene-d12, perylene-d12 perylene-d12	benzo(a)anthracene, chrysene, fluoranthene, pyrene
WTB-SB-11-0610 WTB-SB-11-0610DL	chrysene-d12, perylene-d12 perylene-d12	benzo(a)anthracene, chrysene, pyrene
WTB-SB-13-0206	chrysene-d12, perylene-d12	
WTB-SB-13-0610	chrysene-d12, perylene-d12	
WTB-SB-14-0206	perylene-d12	
WTB-SB-14-0607	perylene-d12	
WTB-SB-15-0610 WTB-SB-15-0610DL	perylene-d12 perylene-d12	
WTB-SB-17-0610DL2	chrysene-d12, perylene-d12	
WTB-SB-19-0206	perylene-d12	
WTB-SB-21-0206	chrysene-d12, perylene-d12	
WTB-SB-22-0610	perylene-d12	
WTB-SB-24-069.7	perylene-d12	
WTB-SS-09-0002	perylene-d12	dibenzo(a,h)anthracene
WTB-SS-11-0002	perylene-d12	benzo(b)fluoranthene
WTB-SS-12-0002DL	chrysene-d12, perylene-d12	
WTB-SS-16-0002	chrysene-d12, perylene-d12	benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene, benzo(a)anthracene, chrysene, fluoranthene, pyrene
WTB-SS-17-0002 WTB-SS-17-0002DL	perylene-d12 perylene-d12	
WTB-SS-20-0002	perylene-d12	
WTB-SS-22-0002	perylene-d12	

Actions: Samples WTB-SB-14-0206 and WTB-SB-14-0607 were re-analyzed with similar non-compliant internal standard recovery results, therefore the sample initial analyses were reported. All affected sample detected and non-detected PAH analytes results were qualified estimated, (J) and (UJ).

The PETS surrogate %Rs were less than the quality control limit for 5-alpha androstane (5AA) for samples listed below.

Affected Samples: WTB-SB-08-0206DL (0%), WTB-SB-11-0610DL, WTB-SB-13-0206

Actions: The samples WTB-SB-08-0206DL and WTB-SB-11-0610DL were diluted 10X and 6X, respectively, for the C19-C36 Aliphatics analyses diluting out the surrogate, therefore no action was necessary. The sample WTB-SB-13-0206 positive C19-C36 Aliphatic result and the non-detected C9-C18 Aliphatic result for the sample were qualified estimated, (J) and (UJ), respectively.

The PETS surrogate %Rs were less than the quality control limit for 5AA and o-terphenyl (OTP) for samples listed below.

Affected Sample: WTB-SS-12-0002

Actions: The sample was re-extracted with similar low surrogate %Rs. The initial sample analysis results were validated/reported and the positive C11-C22 Aromatic and C19-C36 Aliphatic results, and the non-detected C9-C18 Aliphatic result for the sample were qualified estimated, (J) and (UJ), respectively.

FIELD DUPLICATE PRECISION

Field duplicate imprecision was noted for the PAH phenanthrene in the field duplicate samples WTB-FD01-060415 / WTB-SS-08-0002. The RPD for the phenanthrene results exceeded the 50% quality control limit. The sample detected phenanthrene results were qualified as estimated (J).

The field duplicate sample pair WTB-FD02-060315 / WTB-SB-22-0610 had RPDs which exceeded the 50% QC limit for the PAH analytes anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluorenthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene. The positive aforementioned sample analyte results were qualified estimated, (J).

ADDITIONAL COMMENTS

Positive results reported below the quantitation limit but above the method detection limit were qualified as estimated, (J).

Samples were analyzed both undiluted and diluted for PAHS as listed below. Only the PAH analytes that exceeded the highest calibration standard in the undiluted analysis were reported from the diluted sample analyses.

Sample	Dilution
WTB-SB-08-0206	1X, 3X
WTB-SB-08-0610	1X, 4X
WTB-SB-09-0610	1X, 10X
WTB-SB-10-0206	1X, 5X
WTB-SB-10-0610	1X, 4X
WTB-SB-11-0206	1X, 8X
WTB-SB-11-0610	1X, 4X
WTB-SB-12-0206	1X, 2X
WTB-SB-12-0610	1X, 10X
WTB-SB-13-0206	1X, 75X
WTB-SB-15-0610	1X, 3X
WTB-SB-16-0206	1X, 8X
WTB-SB-17-0610	5X

WTB-SB-21-0610	1X, 3X
WTB-SB-22-0206	1X, 8X
WTB-SB-23-0206	10X, 100X
WTB-SB-23-0610	10X, 100X
WTB-SS-09-0002	1X, 3X
WTB-SS-11-0002	1X, 3X
WTB-SS-12-0002	2X, 100
WTB-SS-15-0002	1X, 25X
WTB-SS-16-0002	1X, 100X
WTB-SS-17-0002	1X, 2X
WTB-SS-23-0002	10X, 200X

The PAH continuing calibration verification (CCV) percent difference (%D) was greater than the 20% quality control limit for benzo(g,h,i)perylene on 06/09/15 @ 09:23 on instrument GCMS-N. Only a method blank and laboratory control sample (LCS) were affected, therefore no action was necessary.

The PAH MS and MSD %Rs were non-compliant for all the PAHs except naphthalene and acenaphthylene for spiked sample WTB-SS-16-0002.

Affected Sample: WTB-SS-16-0002

Actions: No action was taken as all the native PAH sample concentrations were >5X the PAH spike concentrations added with the exception of naphthalene and acenaphthylene which had QC compliant %Rs.

Samples were analyzed diluted 2X for all PETs as listed below.

Samples		
WTB-FD01-060315	WTB-FD02-060315	WTB-SB-08-0610
WTB-SB-12-0206	WTB-SB-12-0610	WTB-SB-14-0206
WTB-SB-14-0607	WTB-SB-15-0610	WTB-SB-16-0206
WTB-SB-17-0206	WTB-SB-19-0206	WTB-SB-19-0610
WTB-SB-22-0610	WTB-SB-24-069.7	WTB-SS-09-0002
WTB-SS-11-0002	WTB-SS-14-0002	WTB-SS-15-0002
WTB-SS-16-0002	WTB-SS-17-0002	WTB-SS-18-0002
WTB-SS-22-0002		

Samples were analyzed at additional dilutions for PETS as listed below.

Sample	Dilution
WTB-SB-08-0206	2X for C9-C18 Aliphatics and C11-C22 Aromatics
	10X for C19-C36 Aliphatics
WTB-SB-09-0610	2X for C9-C18 Aliphatics and C11-C22 Aromatics
	6X for C19-C36 Aliphatics
WTB-SB-11-0206	2X for C11-C22 Aromatics
	6X for C9-C18 and C19-C36 Aliphatics
WTB-SB-11-0610	2X for C9-C18 Aliphatics and C11-C22 Aromatics
	6X for C19-C36 Aliphatics
WTB-SB-13-0206	5X for C11-C22 Aromatics and C9-C18 and C19-C36 Aliphatics
WTB-SB-13-0610	5X for C11-C22 Aromatics and C9-C18 and C19-C36 Aliphatics
WTB-SB-17-0610	2X for C9-C18 and C19-C36 Aliphatics
	4X for C11-C22 Aromatics
WTB-SB-21-0206	3X for C19-C36 Aliphatics

WTB-SB-21-0610	2X for C9-C18 and C19-C36 Aliphatics
WTB-SB-23-0206	5X for C11-C22 Aromatics and C9-C18 and C19-C36 Aliphatics
WTB-SB-23-0610	5X for C11-C22 Aromatics and C9-C18 and C19-C36 Aliphatics
WTB-SS-12-0002	5X for C11-C22 Aromatics and C9-C18 and C19-C36 Aliphatics
WTB-SS-19-000	2X for C9-C18 Aliphatics and C11-C22 Aromatics
	6X for C11-C22 Aromatics
WTB-SS-23-0002	5X for C11-C22 Aromatics and C9-C18 and C19-C36 Aliphatics

The EPH C9-C18 Aliphatics LCS percent recovery (%R) was marginally less than the quality control limit. The C9-C18 Aliphatics LCSD %R and the LCS/LCSD result relative percent difference (RPD) were QC compliant for batch WG164506, therefore no action was taken for this issue.
Sample results were reported to the Limit of Detection (LOD).

EXECUTIVE SUMMARY

Laboratory Performance: PET sample results were qualified for sample collection to extraction hold time non-compliances. PAH sample results were qualified for method blank contamination. PAH sample results were qualified CCV %D, MS/MSD %R, surrogate %R, and internal standard recovery quality control limit non-compliances. PET sample results were qualified for surrogate %R non-compliances.

Other Factors Affecting Data Quality: Positive results reported below the limit of quantitation (LOQ) but above the method detection limit were qualified as estimated, (J). Field duplicate samples PAH results were qualified for field duplicate sample imprecision.

The data for these analyses were reviewed with reference to the National Functional Guidelines for Organic Data Validation (June 2008) and the (DOD) QSM document entitled "Quality Systems Manual (QSM) for Environmental Laboratories" (July 2013).

Tetra Tech
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Chemist/Data Validator

Tetra Tech
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Data Validation Manager

Attachments:
Appendix A – Qualified Analytical Results
Appendix B – Results as Reported by the Laboratory
Appendix C – Regional Worksheets
Appendix D – Support Documentation

APPENDIX A

QUALIFIED ANALYTICAL RESULTS

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (i.e., % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = ICP PDS Recovery Noncompliance; MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; i.e.chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = RPD between columns/detectors >40% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 standard deviations is greater than sample activity
Z1 = Tentatively Identified Compound considered presumptively present
Z2 = Tentatively Identified Compound column bleed
Z3 = Tentatively Identified Compound aldol condensate

PROJ_NO: 03270	NSAMPLE	WTB-RB01-060415		
SDG: OU8-1	LAB_ID	SI3897-38		
FRACTION: PAH	SAMP_DATE	6/4/2015		
MEDIA: WATER	QC_TYPE	RB		
	UNITS	UG/L		
	PCT_SOLIDS	0.0		
	DUP_OF			
PARAMETER		RESULT	VQL	QLCD
ACENAPHTHENE		0.097	U	
ACENAPHTHYLENE		0.097	U	
ANTHRACENE		0.097	U	
BENZO(A)ANTHRACENE		0.097	U	
BENZO(A)PYRENE		0.097	U	
BENZO(B)FLUORANTHENE		0.097	U	
BENZO(G,H,I)PERYLENE		0.097	U	
BENZO(K)FLUORANTHENE		0.097	U	
CHRYSENE		0.097	U	
DIBENZO(A,H)ANTHRACENE		0.097	U	
FLUORANTHENE		0.097	U	
FLUORENE		0.097	U	
INDENO(1,2,3-CD)PYRENE		0.097	U	
NAPHTHALENE		0.097	U	
PHENANTHRENE		0.097	U	
PYRENE		0.097	U	

PROJ_NO: 03270	NSAMPLE	WTB-FD01-060315			WTB-FD01-060415			WTB-FD02-060315			WTB-FD02-060415		
SDG: OU8-1	LAB_ID	SI3772-6			SI3897-12			SI3897-7			SI3897-23		
FRACTION: PAH	SAMP_DATE	6/3/2015			6/4/2015			6/3/2015			6/4/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	95.0			93.2			74.7			85.5		
	DUP_OF	WTB-SB-14-0206			WTB-SS-08-0002			WTB-SB-22-0610			WTB-SB-15-0206		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ACENAPHTHENE		10	U		15	J	P	13	U		11	U	
ACENAPHTHYLENE		10	U		11	U		13	U		6.1	J	P
ANTHRACENE		10	U		45			13	UJ	G	19	J	P
BENZO(A)ANTHRACENE		7.2	J	P	140			58	J	G	100		
BENZO(A)PYRENE		9.2	J	P	120	J	N	62	J	G	120		
BENZO(B)FLUORANTHENE		15	J	P	170	J	N	95	J	G	140		
BENZO(G,H,I)PERYLENE		11	J	P	66	J	N	39	J	G	100		
BENZO(K)FLUORANTHENE		10	U		88	J	N	31	J	G	60	J	C
CHRYSENE		10	U		170			100	J	G	130		
DIBENZO(A,H)ANTHRACENE		10	U		21	J	NP	13	UJ	G	42		
FLUORANTHENE		13	J	P	220			63	J	G	140		
FLUORENE		10	U		15	J	P	4.1	J	P	5.8	J	P
INDENO(1,2,3-CD)PYRENE		8.7	J	P	77	J	N	39	J	G	100		
NAPHTHALENE		10	U		8.1	J	P	6.9	J	P	11	U	
PHENANTHRENE		7.4	J	P	180	J	G	71	J	G	90		
PYRENE		15	J	P	290			82	J	G	160		

PROJ_NO: 03270	NSAMPLE	WTB-FD03-060415			WTB-SB-08-0206			WTB-SB-08-0206-DL			WTB-SB-08-0610		
SDG: OU8-1	LAB_ID	SI3897-32			SI3897-13			SI3897-13DL			SI3897-14		
FRACTION: PAH	SAMP_DATE	6/4/2015			6/4/2015			6/4/2015			6/4/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	82.9			84.1			84.1			68.6		
	DUP_OF	WTB-SS-20-0002											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ACENAPHTHENE		11	J	P	9.7	J	P				18	J	P
ACENAPHTHYLENE		2.3	J	P	24						13	U	
ANTHRACENE		30			65						26	J	P
BENZO(A)ANTHRACENE		130			290	J	N				260	J	N
BENZO(A)PYRENE		120			300	J	N				220	J	N
BENZO(B)FLUORANTHENE		170						380					
BENZO(G,H,I)PERYLENE		58			160	J	N				150	J	N
BENZO(K)FLUORANTHENE		58			170	J	N				150	J	N
CHRYSENE		150						530					
DIBENZO(A,H)ANTHRACENE		23			68	J	N				50	J	N
FLUORANTHENE		160			220	J	N				400	J	N
FLUORENE		11	J	P	19	J	P				11	J	P
INDENO(1,2,3-CD)PYRENE		67			190	J	N				170	J	N
NAPHTHALENE		11	U		64						13	J	P
PHENANTHRENE		140			230						68		
PYRENE		230	J	C				550					

PROJ_NO: 03270	NSAMPLE	WTB-SB-08-0610-DL			WTB-SB-09-0206			WTB-SB-09-0610			WTB-SB-09-0610-DL		
SDG: OU8-1	LAB_ID	SI3897-14DL			SI3897-16			SI3897-17			SI3897-17DL		
FRACTION: PAH	SAMP_DATE	6/4/2015			6/4/2015			6/4/2015			6/4/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	68.6			89.1			83.8			83.8		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ACENAPHTHENE					11	J	P	320					
ACENAPHTHYLENE					11	U		21	J	P			
ANTHRACENE					36						790		
BENZO(A)ANTHRACENE					120						1800		
BENZO(A)PYRENE					87						1500		
BENZO(B)FLUORANTHENE		390			130						2100		
BENZO(G,H,I)PERYLENE					42						730		
BENZO(K)FLUORANTHENE					50						820		
CHRYSENE		460			160						2100		
DIBENZO(A,H)ANTHRACENE					17	J	P	370	J	N			
FLUORANTHENE					230						2400		
FLUORENE					12	J	P	280					
INDENO(1,2,3-CD)PYRENE					46						830		
NAPHTHALENE					9.7	J	P	190					
PHENANTHRENE					190						3300		
PYRENE		570			240						3200		

PROJ_NO: 03270	NSAMPLE	WTB-SB-10-0206			WTB-SB-10-0206-DL			WTB-SB-10-0610			WTB-SB-10-0610-DL		
SDG: OU8-1	LAB_ID	SI3897-43			SI3897-43DL			SI3897-44			SI3897-44DL		
FRACTION: PAH	SAMP_DATE	6/5/2015			6/5/2015			6/5/2015			6/5/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	82.6			82.6			86.7			86.7		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ACENAPHTHENE		120						130					
ACENAPHTHYLENE		12	U					6	J	P			
ANTHRACENE		210						240					
BENZO(A)ANTHRACENE					570						620		
BENZO(A)PYRENE					600						450	J	N
BENZO(B)FLUORANTHENE					880						650	J	N
BENZO(G,H,I)PERYLENE		220						240	J	N			
BENZO(K)FLUORANTHENE		170						260	J	N			
CHRYSENE					730						610		
DIBENZO(A,H)ANTHRACENE		82						78	J	N			
FLUORANTHENE					540						940		
FLUORENE		120						120					
INDENO(1,2,3-CD)PYRENE		250						260	J	N			
NAPHTHALENE		24	J	P				26					
PHENANTHRENE					400						1000		
PYRENE					720						1100		

PROJ_NO: 03270	NSAMPLE	WTB-SB-11-0206			WTB-SB-11-0206-DL			WTB-SB-11-0610			WTB-SB-11-0610-DL		
SDG: OU8-1	LAB_ID	SI3772-2			SI3772-2DL			SI3772-3			SI3772-3DL		
FRACTION: PAH	SAMP_DATE	6/1/2015			6/1/2015			6/1/2015			6/1/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	78.6			78.6			78.8			78.8		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ACENAPHTHENE		21	J	P				7.8	J	P			
ACENAPHTHYLENE		8.3	J	P				5.8	J	P			
ANTHRACENE		140						39					
BENZO(A)ANTHRACENE					780						610		
BENZO(A)PYRENE					750	J	N				580	J	N
BENZO(B)FLUORANTHENE					1100	J	N				960	J	N
BENZO(G,H,I)PERYLENE		350	J	N				250	J	N			
BENZO(K)FLUORANTHENE		290	J	N				320	J	N			
CHRYSENE					890						720		
DIBENZO(A,H)ANTHRACENE		110	J	N				120	J	N			
FLUORANTHENE					970			340	J	N			
FLUORENE		33						16	J	P			
INDENO(1,2,3-CD)PYRENE		360	J	N				310	J	N			
NAPHTHALENE		60						13	J	P			
PHENANTHRENE					620			200					
PYRENE					1200						660		

PROJ_NO: 03270	NSAMPLE	WTB-SB-12-0206			WTB-SB-12-0206-DL			WTB-SB-12-0610			WTB-SB-12-0610-DL		
SDG: OU8-1	LAB_ID	SI3897-19			SI3897-19DL			SI3897-20			SI3897-20DL		
FRACTION: PAH	SAMP_DATE	6/4/2015			6/4/2015			6/4/2015			6/4/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	85.1			85.1			81.3			81.3		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ACENAPHTHENE		23						81					
ACENAPHTHYLENE		12	U					14	J	P			
ANTHRACENE		51									520		
BENZO(A)ANTHRACENE		230									1600		
BENZO(A)PYRENE		200									1100		
BENZO(B)FLUORANTHENE		280									1500		
BENZO(G,H,I)PERYLENE		120									430		
BENZO(K)FLUORANTHENE		110									540		
CHRYSENE		260									1600		
DIBENZO(A,H)ANTHRACENE		34						170					
FLUORANTHENE		290									2700		
FLUORENE		17	J	P				62					
INDENO(1,2,3-CD)PYRENE		120									540		
NAPHTHALENE		10	J	P				74					
PHENANTHRENE		250									1500		
PYRENE					530						2600		

PROJ_NO: 03270	NSAMPLE	WTB-SB-13-0206			WTB-SB-13-0206-DL			WTB-SB-13-0610			WTB-SB-14-0206		
SDG: OU8-1	LAB_ID	SI3897-40			SI3897-40DL			SI3897-41			SI3772-5		
FRACTION: PAH	SAMP_DATE	6/5/2015			6/5/2015			6/5/2015			6/3/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	89.2			89.2			86.9			95.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ACENAPHTHENE					1800			3.6	J	P	10	U	
ACENAPHTHYLENE		36	J	R				6.3	J	P	10	U	
ANTHRACENE					3200			23			10	U	
BENZO(A)ANTHRACENE					5400			130	J	N	4.4	J	P
BENZO(A)PYRENE					3500			170	J	N	4.8	J	NP
BENZO(B)FLUORANTHENE					4800			250	J	N	8.1	J	NP
BENZO(G,H,I)PERYLENE					1900			110	J	N	10	UJ	N
BENZO(K)FLUORANTHENE					1400	J	P	64	J	N	10	UJ	N
CHRYSENE					4800			170	J	CN	10	U	
DIBENZO(A,H)ANTHRACENE					630	J	P	48	J	N	10	UJ	N
FLUORANTHENE					11000			130	J	N	7.9	J	P
FLUORENE					1800			6.1	J	P	10	U	
INDENO(1,2,3-CD)PYRENE					2100			110	J	N	10	UJ	N
NAPHTHALENE		350	J	R				9.9	U		10	U	
PHENANTHRENE					11000			100			5.1	J	P
PYRENE					8800			260	J	N	8.9	J	P

PROJ_NO: 03270	NSAMPLE	WTB-SB-14-0607			WTB-SB-15-0206			WTB-SB-15-0610			WTB-SB-15-0610-DL		
SDG: OU8-1	LAB_ID	SI3772-7			SI3897-22			SI3897-24			SI3897-24DL		
FRACTION: PAH	SAMP_DATE	6/3/2015			6/4/2015			6/4/2015			6/4/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.4			85.1			85.4			85.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ACENAPHTHENE		28			7.4	J	P	12	J	P			
ACENAPHTHYLENE		10	U		6.1	J	P	13	J	P			
ANTHRACENE		16	J	P	22			79					
BENZO(A)ANTHRACENE		24			110						410		
BENZO(A)PYRENE		20	J	NP	120			360	J	N			
BENZO(B)FLUORANTHENE		38	J	N	140						570	J	N
BENZO(G,H,I)PERYLENE		13	J	NP	92			210	J	N			
BENZO(K)FLUORANTHENE		11	J	NP	58	J	C	220	J	CN			
CHRYSENE		69			140						520		
DIBENZO(A,H)ANTHRACENE		10	UJ	N	36			72	J	N			
FLUORANTHENE		53			160						440		
FLUORENE		8	J	P	6.9	J	P	19	J	P			
INDENO(1,2,3-CD)PYRENE		12	J	NP	91			230	J	N			
NAPHTHALENE		10	U		10	U		23					
PHENANTHRENE		35			120			340					
PYRENE		64			180						690	J	C

PROJ_NO: 03270	NSAMPLE	WTB-SB-16-0206			WTB-SB-16-0206-DL			WTB-SB-16-0610			WTB-SB-17-0206		
SDG: OU8-1	LAB_ID	SI3897-26			SI3897-26DL			SI3897-27			SI3772-9		
FRACTION: PAH	SAMP_DATE	6/4/2015			6/4/2015			6/4/2015			6/3/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	89.6			89.6			82.6			90.7		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ACENAPHTHENE		21						1.9	J	P	11	U	
ACENAPHTHYLENE		13	J	P				5.4	J	P	11	U	
ANTHRACENE		120						23	J	P	7.1	J	P
BENZO(A)ANTHRACENE					880			240			40		
BENZO(A)PYRENE					1000			250			30		
BENZO(B)FLUORANTHENE					1500			350			51		
BENZO(G,H,I)PERYLENE					720			140			17	J	P
BENZO(K)FLUORANTHENE					510			120	J	C	14	J	P
CHRYSENE					1000			320			60		
DIBENZO(A,H)ANTHRACENE		210						62			11	U	
FLUORANTHENE					1100			190			46		
FLUORENE		11	J	P				7.4	J	P	11	U	
INDENO(1,2,3-CD)PYRENE					800			170			16	J	P
NAPHTHALENE		21						13	J	P	11	U	
PHENANTHRENE					730			120			40		
PYRENE					1400	J	C	240			55		

PROJ_NO: 03270	NSAMPLE	WTB-SB-17-0610-DL2			WTB-SB-18-0206			WTB-SB-18-0610			WTB-SB-19-0206		
SDG: OU8-1	LAB_ID	SI3772-10DL2			SI3897-29			SI3897-30			SI3772-12		
FRACTION: PAH	SAMP_DATE	6/3/2015			6/4/2015			6/4/2015			6/3/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	82.5			83.7			82.6			87.5		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ACENAPHTHENE		67	J	P	14	J	P	12	U		14	J	P
ACENAPHTHYLENE		48	J	P	11	U		12	U		10	U	
ANTHRACENE		95	J	P	66			21	J	P	44		
BENZO(A)ANTHRACENE		200	J	N	150			130			170		
BENZO(A)PYRENE		370	J	N	120			120			140	J	N
BENZO(B)FLUORANTHENE		510	J	N	150			150			230	J	N
BENZO(G,H,I)PERYLENE		240	J	N	70			93			76	J	N
BENZO(K)FLUORANTHENE		160	J	N	69	J	C	70	J	C	69	J	N
CHRYSENE		230	J	N	180			170			210		
DIBENZO(A,H)ANTHRACENE		98	J	NP	30			29			31	J	N
FLUORANTHENE		270	J	N	250			160			210		
FLUORENE		47	J	P	16	J	P	5.6	J	P	18	J	P
INDENO(1,2,3-CD)PYRENE		230	J	N	76			96			84	J	N
NAPHTHALENE		160			11	U		12	U		10	U	
PHENANTHRENE		540			230			110			210		
PYRENE		400	J	CN	300			190			340		

PROJ_NO: 03270	NSAMPLE	WTB-SB-19-0610			WTB-SB-20-0206			WTB-SB-20-0610			WTB-SB-21-0206		
SDG: OU8-1	LAB_ID	SI3772-13			SI3897-33			SI3897-34			SI3897-36		
FRACTION: PAH	SAMP_DATE	6/3/2015			6/4/2015			6/4/2015			6/4/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	88.8			84.5			82.6			92.5		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ACENAPHTHENE		11	U		12	U		12	U		4.4	J	P
ACENAPHTHYLENE		11	U		12	U		12	U		7.9	J	P
ANTHRACENE		22	J	P	6.4	J	P	20	J	P	30		
BENZO(A)ANTHRACENE		130			38	J	D	80			250	J	N
BENZO(A)PYRENE		110			32	J	D	68			210	J	N
BENZO(B)FLUORANTHENE		150			58	J	D	92			310	J	N
BENZO(G,H,I)PERYLENE		64			27	J	D	39			95	J	N
BENZO(K)FLUORANTHENE		62			12	J	P	29			120	J	N
CHRYSENE		140			69	J	D	79			290	J	N
DIBENZO(A,H)ANTHRACENE		20	J	P	11	J	P	19	J	P	44	J	N
FLUORANTHENE		180			48	J	D	99			220	J	N
FLUORENE		11	U		3.9	J	P	8.5	J	P	7.2	J	P
INDENO(1,2,3-CD)PYRENE		64			28	J	D	44			120	J	N
NAPHTHALENE		11	U		12	U		12	U		10	J	P
PHENANTHRENE		91			61	J	D	120			150		
PYRENE		180			84	J	CD	150	J	C	310	J	CN

PROJ_NO: 03270	NSAMPLE	WTB-SB-21-0610			WTB-SB-21-0610-DL			WTB-SB-22-0206			WTB-SB-22-0206-DL		
SDG: OU8-1	LAB_ID	SI3897-37			SI3897-37DL			SI3897-5			SI3897-5DL		
FRACTION: PAH	SAMP_DATE	6/4/2015			6/4/2015			6/3/2015			6/3/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	75.5			75.5			84.2			84.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ACENAPHTHENE		54						4.7	J	P			
ACENAPHTHYLENE		8.1	J	P				2.3	J	P			
ANTHRACENE		190						62					
BENZO(A)ANTHRACENE					410						1400		
BENZO(A)PYRENE		360									1200		
BENZO(B)FLUORANTHENE					380						1800		
BENZO(G,H,I)PERYLENE		150									610		
BENZO(K)FLUORANTHENE		170									840		
CHRYSENE					370	J	C				1500		
DIBENZO(A,H)ANTHRACENE		60						220					
FLUORANTHENE					630						1600		
FLUORENE		58						8.7	J	P			
INDENO(1,2,3-CD)PYRENE		180									670		
NAPHTHALENE		20	J	P				12	J	P			
PHENANTHRENE					610			230					
PYRENE					610						1500		

PROJ_NO: 03270	NSAMPLE	WTB-SB-22-0610			WTB-SB-23-0206-DL			WTB-SB-23-0206-DL2			WTB-SB-23-0610-DL		
SDG: OU8-1	LAB_ID	SI3897-6			SI3897-9DL			SI3897-9DL2			SI3897-10DL		
FRACTION: PAH	SAMP_DATE	6/3/2015			6/3/2015			6/3/2015			6/3/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	75.5			87.2			87.2			62.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ACENAPHTHENE		23	J	P	2200						1400		
ACENAPHTHYLENE		13	U		290						160	J	P
ANTHRACENE		57	J	G				5100			3000		
BENZO(A)ANTHRACENE		230	J	G				14000					
BENZO(A)PYRENE		200	J	GN				12000					
BENZO(B)FLUORANTHENE		330	J	GN				17000					
BENZO(G,H,I)PERYLENE		140	J	GN				6100			3600		
BENZO(K)FLUORANTHENE		100	J	GN				6700			3900		
CHRYSENE		300	J	G				13000					
DIBENZO(A,H)ANTHRACENE		55	J	GN	1600						1600		
FLUORANTHENE		280	J	G				33000					
FLUORENE		23	J	P	2200						1500		
INDENO(1,2,3-CD)PYRENE		150	J	GN				6500			4000		
NAPHTHALENE		9.1	J	P	470						190	J	P
PHENANTHRENE		250	J	G				13000					
PYRENE		420	J	G				25000					

PROJ_NO: 03270	NSAMPLE	WTB-SB-23-0610-DL2			WTB-SB-24-0206			WTB-SB-24-069.7			WTB-SS-08-0002		
SDG: OU8-1	LAB_ID	SI3897-10DL2			SI3897-3			SI3897-4			SI3897-11		
FRACTION: PAH	SAMP_DATE	6/3/2015			6/3/2015			6/3/2015			6/4/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	62.9			92.6			86.1			93.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ACENAPHTHENE					9.1	U		9.8	U		5.6	J	P
ACENAPHTHYLENE					9.1	U		9.8	U		10	U	
ANTHRACENE					9.1	U		1.9	J	P	17	J	P
BENZO(A)ANTHRACENE		7400			9.1	U		9.8	U		93		
BENZO(A)PYRENE		6400			9.1	U		9.8	UJ	DN	82		
BENZO(B)FLUORANTHENE		9000			9.1	U		9.8	UJ	N	120		
BENZO(G,H,I)PERYLENE					9.1	U		9.8	UJ	DN	54		
BENZO(K)FLUORANTHENE					9.1	U		9.8	UJ	N	53		
CHRYSENE		7200			9.1	U		9.8	U		120		
DIBENZO(A,H)ANTHRACENE					9.1	U		9.8	UJ	N	24		
FLUORANTHENE		17000			9.1	U		9.8	U	A	140		
FLUORENE					9.1	U		9.8	U		6.1	J	P
INDENO(1,2,3-CD)PYRENE					9.1	U		9.8	UJ	N	56		
NAPHTHALENE					9.1	U		9.8	U		10	U	
PHENANTHRENE		7900			9.1	U		16	J	P	87	J	G
PYRENE		14000			9.1	U		10	U	A	190		

PROJ_NO: 03270	NSAMPLE	WTB-SS-09-0002			WTB-SS-09-0002-DL			WTB-SS-10-0002			WTB-SS-11-0002		
SDG: OU8-1	LAB_ID	SI3897-15			SI3897-15DL			SI3897-42			SI3772-1		
FRACTION: PAH	SAMP_DATE	6/4/2015			6/4/2015			6/5/2015			6/1/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	91.0			91.0			92.7			92.3		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ACENAPHTHENE		5.1	J	P				10	U		13	J	P
ACENAPHTHYLENE		23						10	U		11	J	P
ANTHRACENE		39						3.9	J	P	50		
BENZO(A)ANTHRACENE					440			13	J	P	270		
BENZO(A)PYRENE					630			13	J	P	300	J	N
BENZO(B)FLUORANTHENE					890			17	J	P			
BENZO(G,H,I)PERYLENE					490			8.4	J	P	170	J	N
BENZO(K)FLUORANTHENE					400			3.6	J	P	180	J	N
CHRYSENE					500			11	J	P			
DIBENZO(A,H)ANTHRACENE		120	J	N				10	U		49	J	N
FLUORANTHENE		310						22					
FLUORENE		5.5	J	P				10	U		21	J	NP
INDENO(1,2,3-CD)PYRENE					480			8.8	J	P	170		
NAPHTHALENE		11	J	P				10	U		22	J	P
PHENANTHRENE		100						14	J	P	290		
PYRENE					640			23					

PROJ_NO: 03270	NSAMPLE	WTB-SS-11-0002-DL			WTB-SS-12-0002-DL			WTB-SS-12-0002-DL2			WTB-SS-13-0002		
SDG: OU8-1	LAB_ID	SI3772-1DL			SI3897-18DL			SI3897-18DL2			SI3897-39		
FRACTION: PAH	SAMP_DATE	6/1/2015			6/4/2015			6/4/2015			6/5/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	92.3			92.1			92.1			89.3		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ACENAPHTHENE					540						10	U	
ACENAPHTHYLENE					260						10	U	
ANTHRACENE								2500			10	U	
BENZO(A)ANTHRACENE								7300	J	N	10	U	A
BENZO(A)PYRENE								5500			10	U	
BENZO(B)FLUORANTHENE		470						9100			4.4	J	P
BENZO(G,H,I)PERYLENE								2600			10	U	
BENZO(K)FLUORANTHENE								4200	J	C	10	U	
CHRYSENE		420						9400	J	N	10	U	
DIBENZO(A,H)ANTHRACENE								1400	J	P	10	U	
FLUORANTHENE		450						15000	J	N	10	U	A
FLUORENE					640						10	U	
INDENO(1,2,3-CD)PYRENE								3100			10	U	
NAPHTHALENE					110						10	U	
PHENANTHRENE								6000			2.1	J	P
PYRENE		630						14000	J	N	10	U	A

PROJ_NO: 03270	NSAMPLE	WTB-SS-14-0002			WTB-SS-15-0002			WTB-SS-15-0002-DL			WTB-SS-16-0002		
SDG: OU8-1	LAB_ID	SI3772-4			SI3897-21			SI3897-21DL			SI3897-25		
FRACTION: PAH	SAMP_DATE	6/3/2015			6/4/2015			6/4/2015			6/4/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	97.1			92.6			92.6			88.7		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ACENAPHTHENE		8.9	U					750					
ACENAPHTHYLENE		8.9	U		10	J	P				17	J	P
ANTHRACENE		8.9	U					1500					
BENZO(A)ANTHRACENE		4.7	J	P				3200					
BENZO(A)PYRENE		6.3	J	P				2500					
BENZO(B)FLUORANTHENE		9.8	J	P				4000					
BENZO(G,H,I)PERYLENE		5.4	J	P				1300					
BENZO(K)FLUORANTHENE		8.9	U					1300					
CHRYSENE		8.9	U					3400					
DIBENZO(A,H)ANTHRACENE		8.9	U		320								
FLUORANTHENE		8.5	J	P				6300					
FLUORENE		8.9	U					820					
INDENO(1,2,3-CD)PYRENE		5.2	J	P				1500					
NAPHTHALENE		8.9	U		120						55		
PHENANTHRENE		4	J	P				6700					
PYRENE		9.2	J	P				6400	J	C			

PROJ_NO: 03270	NSAMPLE	WTB-SS-16-0002-DL			WTB-SS-17-0002			WTB-SS-17-0002-DL			WTB-SS-18-0002		
SDG: OU8-1	LAB_ID	SI3897-25DL			SI3772-8			SI3772-8DL			SI3897-28		
FRACTION: PAH	SAMP_DATE	6/4/2015			6/3/2015			6/3/2015			6/4/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	88.7			94.6			94.6			85.5		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ACENAPHTHENE		1600	J	P	6.9	J	P				11	U	
ACENAPHTHYLENE					9.1	U					5	J	P
ANTHRACENE		3900			43						11	J	P
BENZO(A)ANTHRACENE		13000			290						90		
BENZO(A)PYRENE		8600			290	J	N				89		
BENZO(B)FLUORANTHENE		14000						490	J	N	130		
BENZO(G,H,I)PERYLENE		6000			190	J	N				63		
BENZO(K)FLUORANTHENE		4400			160	J	N				55	J	C
CHRYSENE		12000	J	C	300						130		
DIBENZO(A,H)ANTHRACENE		1600	J	P	81	J	N				22	J	P
FLUORANTHENE		24000			300						140		
FLUORENE		1400	J	P	8.8	J	NP				4.5	J	P
INDENO(1,2,3-CD)PYRENE		6200			210						68		
NAPHTHALENE					8.3	J	P				11	U	
PHENANTHRENE		13000			120						68		
PYRENE		19000						460			140		

PROJ_NO: 03270	NSAMPLE	WTB-SS-19-0002			WTB-SS-20-0002			WTB-SS-21-0002			WTB-SS-22-0002		
SDG: OU8-1	LAB_ID	SI3772-11			SI3897-31			SI3897-35			SI3897-1		
FRACTION: PAH	SAMP_DATE	6/3/2015			6/4/2015			6/4/2015			6/3/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	95.8			83.3			95.9			90.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ACENAPHTHENE		10	U		11	U		10	U		10	U	
ACENAPHTHYLENE		10	U		11	U		10	U		10	U	
ANTHRACENE		21			18	J	P	10	U		11	J	P
BENZO(A)ANTHRACENE		75			110			10	U	A	73		
BENZO(A)PYRENE		65			100	J	N	10	U		78	J	N
BENZO(B)FLUORANTHENE		86			150	J	N	5	J	P	110	J	N
BENZO(G,H,I)PERYLENE		41			56	J	N	10	U		50	J	N
BENZO(K)FLUORANTHENE		42			48	J	N	10	U		49	J	N
CHRYSENE		84			120			10	U		91		
DIBENZO(A,H)ANTHRACENE		12	J	P	27	J	N	10	U		18	J	NP
FLUORANTHENE		120			120			10	U	A	81		
FLUORENE		10	U		5.4	J	P	10	U		10	U	
INDENO(1,2,3-CD)PYRENE		39			67	J	N	10	U		50	J	N
NAPHTHALENE		10	U		11	U		10	U		10	U	
PHENANTHRENE		93			91			2.8	J	P	56		
PYRENE		120			190	J	C	10	U	A	110		

PROJ_NO: 03270	NSAMPLE	WTB-SS-23-0002-DL			WTB-SS-23-0002-DL2			WTB-SS-24-0002		
SDG: OU8-1	LAB_ID	SI3897-8DL			SI3897-8DL2			SI3897-2		
FRACTION: PAH	SAMP_DATE	6/3/2015			6/3/2015			6/3/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	91.5			91.5			93.0		
	DUP_OF									
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ACENAPHTHENE		680						9.9	U	
ACENAPHTHYLENE		100	J	P				9.9	U	
ANTHRACENE		2100						9.9	U	
BENZO(A)ANTHRACENE					12000			9.9	U	
BENZO(A)PYRENE					10000			9.9	U	
BENZO(B)FLUORANTHENE					15000			9.9	U	
BENZO(G,H,I)PERYLENE					6100			9.9	U	
BENZO(K)FLUORANTHENE					4700			9.9	U	
CHRYSENE					12000			9.9	U	
DIBENZO(A,H)ANTHRACENE		1700						9.9	U	
FLUORANTHENE					23000			9.9	U	
FLUORENE		510						9.9	U	
INDENO(1,2,3-CD)PYRENE					6700			9.9	U	
NAPHTHALENE		100	J	P				9.9	U	
PHENANTHRENE					5600			9.9	U	
PYRENE					27000	J	C	9.9	U	

PROJ_NO: 03270	NSAMPLE	WTB-RB01-060415		
SDG: OU8-1	LAB_ID	SI3897-38		
FRACTION: PETS	SAMP_DATE	6/4/2015		
MEDIA: WATER	QC_TYPE	RB		
	UNITS	UG/L		
	PCT_SOLIDS	0.0		
	DUP_OF			
PARAMETER		RESULT	VQL	QLCD
C11-C22 AROMATICS		72	U	
C19-C36 ALIPHATICS		72	U	
C9-C18 ALIPHATICS		72	U	

PROJ_NO: 03270	NSAMPLE	WTB-FD01-060315			WTB-FD01-060415			WTB-FD02-060315			WTB-FD02-060415		
SDG: OU8-1	LAB_ID	SI3772-6			SI3897-12			SI3897-7			SI3897-23		
FRACTION: PETS	SAMP_DATE	6/3/2015			6/4/2015			6/3/2015			6/4/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	95.0			93.2			74.7			85.5		
	DUP_OF	WTB-SB-14-0206			WTB-SS-08-0002			WTB-SB-22-0610			WTB-SB-15-0206		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
C11-C22 AROMATICS		29	J	P	13	J	P	520			22		
C19-C36 ALIPHATICS		30	J	P	20			66			16	U	
C9-C18 ALIPHATICS		27	U		13	U		85			16	U	

PROJ_NO: 03270	NSAMPLE	WTB-FD03-060415			WTB-SB-08-0206			WTB-SB-08-0206-DL			WTB-SB-08-0610		
SDG: OU8-1	LAB_ID	SI3897-32			SI3897-13			SI3897-13DL			SI3897-14		
FRACTION: PETS	SAMP_DATE	6/4/2015			6/4/2015			6/4/2015			6/4/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	82.9			84.1			84.1			68.6		
	DUP_OF	WTB-SS-20-0002											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
C11-C22 AROMATICS		20	J	P	1100						530		
C19-C36 ALIPHATICS		12	J	P				2500			840		
C9-C18 ALIPHATICS		17	U		140						73		

PROJ_NO: 03270	NSAMPLE	WTB-SB-09-0206			WTB-SB-09-0610			WTB-SB-09-0610-DL			WTB-SB-10-0206		
SDG: OU8-1	LAB_ID	SI3897-16			SI3897-17			SI3897-17DL			SI3897-43		
FRACTION: PETS	SAMP_DATE	6/4/2015			6/4/2015			6/4/2015			6/5/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	89.1			83.8			83.8			82.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
C11-C22 AROMATICS		26			680						89		
C19-C36 ALIPHATICS		15	U					1200			60		
C9-C18 ALIPHATICS		15	U		91						14	J	P

PROJ_NO: 03270	NSAMPLE	WTB-SB-10-0610-RE			WTB-SB-11-0206-DL			WTB-SB-11-0610			WTB-SB-11-0610-DL		
SDG: OU8-1	LAB_ID	SI3897-44RE			SI3772-2DL			SI3772-3			SI3772-3DL		
FRACTION: PETS	SAMP_DATE	6/5/2015			6/1/2015			6/1/2015			6/1/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	86.7			78.6			78.8			78.8		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
C11-C22 AROMATICS		82	J	H	570			620					
C19-C36 ALIPHATICS		72	J	H	1000						1100		
C9-C18 ALIPHATICS		17	J	HP	170			140					

PROJ_NO: 03270	NSAMPLE	WTB-SB-12-0206			WTB-SB-12-0610			WTB-SB-13-0206			WTB-SB-13-0610		
SDG: OU8-1	LAB_ID	SI3897-19			SI3897-20			SI3897-40			SI3897-41		
FRACTION: PETS	SAMP_DATE	6/4/2015			6/4/2015			6/5/2015			6/5/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	85.1			81.3			89.2			86.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
C11-C22 AROMATICS		49			100			270			180		
C19-C36 ALIPHATICS		34	J	P	55			190	J	R	180		
C9-C18 ALIPHATICS		34	U		33	U		74	UJ	R	78	U	

PROJ_NO: 03270	NSAMPLE	WTB-SB-14-0206			WTB-SB-14-0607			WTB-SB-15-0206			WTB-SB-15-0610		
SDG: OU8-1	LAB_ID	SI3772-5			SI3772-7			SI3897-22			SI3897-24		
FRACTION: PETS	SAMP_DATE	6/3/2015			6/3/2015			6/4/2015			6/4/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	95.4			94.4			85.1			85.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
C11-C22 AROMATICS		22	J	P	79			12	J	P	110		
C19-C36 ALIPHATICS		37			190			15	U		100		
C9-C18 ALIPHATICS		26	U		43			15	U		34	U	

PROJ_NO: 03270	NSAMPLE	WTB-SB-16-0206			WTB-SB-16-0610			WTB-SB-17-0206			WTB-SB-17-0610		
SDG: OU8-1	LAB_ID	SI3897-26			SI3897-27			SI3772-9			SI3772-10		
FRACTION: PETS	SAMP_DATE	6/4/2015			6/4/2015			6/3/2015			6/3/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	89.6			82.6			90.7			82.5		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
C11-C22 AROMATICS		130			100			73			2200		
C19-C36 ALIPHATICS		67			32			44			410		
C9-C18 ALIPHATICS		32	U		25			30	U		74		

PROJ_NO: 03270	NSAMPLE	WTB-SB-18-0206			WTB-SB-18-0610			WTB-SB-19-0206			WTB-SB-19-0610		
SDG: OU8-1	LAB_ID	SI3897-29			SI3897-30			SI3772-12			SI3772-13		
FRACTION: PETS	SAMP_DATE	6/4/2015			6/4/2015			6/3/2015			6/3/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	83.7			82.6			87.5			88.8		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
C11-C22 AROMATICS		17	J	P	49			410			78		
C19-C36 ALIPHATICS		16	U		37			83			23	J	P
C9-C18 ALIPHATICS		16	U		11	J	P	32	U		29	U	

PROJ_NO: 03270	NSAMPLE	WTB-SB-20-0206			WTB-SB-20-0610			WTB-SB-21-0206			WTB-SB-21-0610-DL		
SDG: OU8-1	LAB_ID	SI3897-33			SI3897-34			SI3897-36			SI3897-37DL		
FRACTION: PETS	SAMP_DATE	6/4/2015			6/4/2015			6/4/2015			6/4/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	84.5			82.6			92.5			75.5		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
C11-C22 AROMATICS		24			25			370			370		
C19-C36 ALIPHATICS		16	U		14	J	P	570			450		
C9-C18 ALIPHATICS		16	U		17	U		58			84		

PROJ_NO: 03270	NSAMPLE	WTB-SB-22-0206			WTB-SB-22-0610			WTB-SB-23-0206			WTB-SB-23-0610-RE		
SDG: OU8-1	LAB_ID	SI3897-5			SI3897-6			SI3897-9			SI3897-10RE		
FRACTION: PETS	SAMP_DATE	6/3/2015			6/3/2015			6/3/2015			6/3/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	84.2			75.5			87.2			62.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
C11-C22 AROMATICS		280			470			540			480	J	H
C19-C36 ALIPHATICS		25			97			230			83	J	HP
C9-C18 ALIPHATICS		44			67			83	U		120	UJ	H

PROJ_NO: 03270	NSAMPLE	WTB-SB-24-0206			WTB-SB-24-069.7			WTB-SS-08-0002			WTB-SS-09-0002		
SDG: OU8-1	LAB_ID	SI3897-3			SI3897-4			SI3897-11			SI3897-15		
FRACTION: PETS	SAMP_DATE	6/3/2015			6/3/2015			6/4/2015			6/4/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	92.6			86.1			93.2			91.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
C11-C22 AROMATICS		16	U		76			10	J	P	50		
C19-C36 ALIPHATICS		16	U		28	U		19			29	J	P
C9-C18 ALIPHATICS		16	U		28	U		14	U		30	U	

PROJ_NO: 03270	NSAMPLE	WTB-SS-10-0002			WTB-SS-11-0002			WTB-SS-12-0002			WTB-SS-13-0002		
SDG: OU8-1	LAB_ID	SI3897-42			SI3772-1			SI3897-18			SI3897-39		
FRACTION: PETS	SAMP_DATE	6/5/2015			6/1/2015			6/4/2015			6/5/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	92.7			92.3			92.1			89.3		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
C11-C22 AROMATICS		15	U		180			150	J	R	12	J	P
C19-C36 ALIPHATICS		15	U		140			120	J	R	15	U	
C9-C18 ALIPHATICS		15	U		32	U		61	UJ	R	15	U	

PROJ_NO: 03270	NSAMPLE	WTB-SS-14-0002			WTB-SS-15-0002			WTB-SS-16-0002			WTB-SS-17-0002		
SDG: OU8-1	LAB_ID	SI3772-4			SI3897-21			SI3897-25			SI3772-8		
FRACTION: PETS	SAMP_DATE	6/3/2015			6/4/2015			6/4/2015			6/3/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	97.1			92.6			88.7			94.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
C11-C22 AROMATICS		23	U		120			240			58		
C19-C36 ALIPHATICS		23	U		44			65			45		
C9-C18 ALIPHATICS		23	U		29	U		32	U		29	U	

PROJ_NO: 03270	NSAMPLE	WTB-SS-18-0002			WTB-SS-19-0002			WTB-SS-20-0002			WTB-SS-21-0002		
SDG: OU8-1	LAB_ID	SI3897-28			SI3772-11			SI3897-31			SI3897-35		
FRACTION: PETS	SAMP_DATE	6/4/2015			6/3/2015			6/4/2015			6/4/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	85.5			95.8			83.3			95.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
C11-C22 AROMATICS		50			1800			20			14	U	
C19-C36 ALIPHATICS		31	U		25	J	P	15	J	P	14	U	
C9-C18 ALIPHATICS		31	U		26	U		15	U		14	U	

PROJ_NO: 03270	NSAMPLE	WTB-SS-22-0002			WTB-SS-23-0002			WTB-SS-24-0002		
SDG: OU8-1	LAB_ID	SI3897-1			SI3897-8			SI3897-2		
FRACTION: PETS	SAMP_DATE	6/3/2015			6/3/2015			6/3/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	90.4			91.5			93.0		
	DUP_OF									
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
C11-C22 AROMATICS		120			300			14	U	
C19-C36 ALIPHATICS		30	J	P	120			14	U	
C9-C18 ALIPHATICS		32	U		70	U		14	U	

APPENDIX B

RESULTS AS REPORTED BY THE LABORATORY

KATAHDIN ANALYTICAL SERVICES - ORGANIC DATA QUALIFIERS

The sampled date indicated on the attached Report(s) of Analysis (ROA) is the date for which a grab sample was collected or the date for which a composite sample was completed. Beginning and start times for composite samples can be found on the Chain-of-Custody.

U Indicates the compound was analyzed for but not detected above the specified level. This level may be the Limit of Quantitation (LOQ)(previously called Practical Quantitation Level (PQL)), the Limit of Detection (LOD) or Method Detection Limit (MDL) as required by the client.

Note: All results reported as “U” MDL have a 50% rate for false negatives compared to those results reported as “U” PQL/LOQ or “U” LOD, where the rate of false negatives is <1%.

* Compound recovery outside of quality control limits.

D Indicates the result was obtained from analysis of a diluted sample. Surrogate recoveries may not be calculable.

E Estimated value. This flag identifies compounds whose concentrations exceed the upper level of the calibration range of the instrument for that specific analysis.

J Estimated value. The analyte was detected in the sample at a concentration less than the laboratory Limit of Quantitation (LOQ)(previously called Practical Quantitation Limit (PQL)), but above the Method Detection Limit (MDL).

or

J Used for Pesticides, PCBs, Herbicides, Formaldehyde, Explosives and Method 504.1 analytes when there is a greater than 40% difference for detected concentrations between the two GC columns.

B Indicates the analyte was detected in the laboratory method blank analyzed concurrently with the sample.

C Indicates that the flagged compound did not meet DoD criteria in the corresponding daily calibration verification (CV).

L Indicates that the flagged compound did not meet DoD criteria in the corresponding Laboratory Control Sample (LCS) and/or Laboratory Control Sample Duplicate (LCSD) prepared and/or analyzed concurrently with the sample.

M Indicates that the flagged compound did not meet DoD criteria in the Matrix Spike and/or Matrix Spike Duplicate prepared and/or analyzed concurrently with the native sample.

N Presumptive evidence of a compound based on a mass spectral library search.

A Indicates that a tentatively identified compound is a suspected aldol-condensation product.

P Used for Pesticide/Aroclor analyte when there is a greater than 25% difference for detected concentrations between the two GC columns. (for CLP methods only).

KATAHDIN ANALYTICAL SERVICES – INORGANIC DATA QUALIFIERS

The sampled date indicated on the attached Report(s) of Analysis (ROA) is the date for which a grab sample was collected or the date for which a composite sample was completed. Beginning and start times for composite samples can be found on the Chain-of-Custody.

U Indicates the compound was analyzed for but not detected above the specified level. This level may be the Limit of Quantitation (LOQ)(previously called Practical Quantitation Level (PQL)), the Limit of Detection (LOD) or Method Detection Limit (MDL) as required by the client.

Note: All results reported as "U" MDL have a 50% rate for false negatives compared to those results reported as "U" PQL/LOQ or "U" LOD, where the rate of false negatives is <1%.

E Estimated value. This flag identifies compounds whose concentrations exceed the upper level of the calibration range of the instrument for that specific analysis.

J Estimated value. The analyte was detected in the sample at a concentration less than the laboratory Limit of Quantitation (LOQ)(previously called Practical Quantitation Limit (PQL)), but above the Method Detection Limit (MDL).

I-7 The laboratory's Practical Quantitation Level could not be achieved for this parameter due to sample composition, matrix effects, sample volume, or quantity used for analysis.

A-4 Please refer to cover letter or narrative for further information.

H_ Please note that the regulatory holding time for _____ is "analyze immediately". Ideally, this analysis must be performed in the field at the time of sample collection. _____ for this sample was not performed at the time of sample collection. The analysis was performed as soon as possible after receipt by the laboratory.

H1 - pH H2 - DO H3 - sulfide H4 - residual chlorine

T1 The client did not provide the full volume of at least one liter for analysis of TSS. Therefore, the PQL of 2.5 mg/L could not be achieved.

T2 The client provided the required volume of at least one liter for analysis of TSS, but the laboratory could not filter the full one liter volume due to the sample matrix. Therefore, the PQL of 2.5 mg/L could not be achieved.

M1 The matrix spike and/or matrix spike duplicate recovery performed on this sample was outside of the laboratory acceptance criteria. Sample matrix is suspected. The laboratory criteria was met for the Laboratory Control Sample (LCS) analyzed concurrently with this sample.

M2 The matrix spike and/or matrix spike duplicate recovery was outside of the laboratory acceptance criteria. The native sample concentration is greater than four times the spike added concentration so the spike added could not be distinguished from the native sample concentration.

R1 The relative percent difference (RPD) between the duplicate analyses performed on this sample was outside of the laboratory acceptance criteria (when both values are greater than ten times the PQL).

MCL	Maximum Contaminant Level	NL	No limit
NFL	No Free Liquid Present	FLP	Free Liquid Present
NOD	No Odor Detected	TON	Threshold Odor Number

D-1 As required by Method 5210B, APHA Standard Methods for the Examination of Water and Wastewater (21st edition), the BOD value reported for this sample is 'qualified' because the check standard run concurrently with the sample analysis did not meet the criteria specified in the method (198 +/- 30.5 mg/L). These results may not be reportable for compliance purposes.

D-2 The measured final dissolved oxygen concentrations of all dilutions were less than the method-specified limit of 1 mg/L. The reported BOD result was calculated assuming a final oxygen concentration equal to 1 mg/L.

D-3 The dilution water used to prepare this sample did not meet the method and/or regulatory criteria of less than 0.2 or 0.4 mg/L dissolved oxygen (DO) uptake over the five day period of incubation. These results may not be reportable for compliance purposes.

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-38
Client ID: WTB-RB01-060415
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6492.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164368

Analysis Date: 10-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: AQ
% Solids: NA
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	0.097	ug/L	1	.2	0.19	0.062	0.097
Acenaphthylene	U	0.097	ug/L	1	.2	0.19	0.052	0.097
Acenaphthene	U	0.097	ug/L	1	.2	0.19	0.062	0.097
Fluorene	U	0.097	ug/L	1	.2	0.19	0.059	0.097
Phenanthrene	U	0.097	ug/L	1	.2	0.19	0.050	0.097
Anthracene	U	0.097	ug/L	1	.2	0.19	0.043	0.097
Fluoranthene	U	0.097	ug/L	1	.2	0.19	0.071	0.097
Pyrene	U	0.097	ug/L	1	.2	0.19	0.057	0.097
Benzo(a)anthracene	U	0.097	ug/L	1	.2	0.19	0.045	0.097
Chrysene	U	0.097	ug/L	1	.2	0.19	0.035	0.097
Benzo(b)Fluoranthene	U	0.097	ug/L	1	.2	0.19	0.086	0.097
Benzo(k)fluoranthene	U	0.097	ug/L	1	.2	0.19	0.048	0.097
Benzo(a)pyrene	U	0.097	ug/L	1	.2	0.19	0.064	0.097
Indeno(1,2,3-cd)pyrene	U	0.097	ug/L	1	.2	0.19	0.050	0.097
Dibenzo(a,h)anthracene	U	0.097	ug/L	1	.2	0.19	0.068	0.097
Benzo(g,h,i)perylene	U	0.097	ug/L	1	.2	0.19	0.063	0.097
2-Methylnaphthalene-D10		60.2	%					
Fluorene-D10		71.8	%					
pyrene-d10		85.1	%					

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Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-6
Client ID: WTB-FD01-060315
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6510.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 11-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 95.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	10	ug/Kgdrywt	1	20	21.	2.7	10.
Acenaphthylene	U	10	ug/Kgdrywt	1	20	21.	1.2	10.
Acenaphthene	U	10	ug/Kgdrywt	1	20	21.	1.6	10.
Fluorene	U	10	ug/Kgdrywt	1	20	21.	3.3	10.
Phenanthrene	J	7.4	ug/Kgdrywt	1	20	21.	1.9	10.
Anthracene	U	10	ug/Kgdrywt	1	20	21.	1.2	10.
Fluoranthene	J	13	ug/Kgdrywt	1	20	21.	1.9	10.
Pyrene	J	15	ug/Kgdrywt	1	20	21.	2.2	10.
Benzo(a)anthracene	J	7.2	ug/Kgdrywt	1	20	21.	2.0	10.
Chrysene	U	10	ug/Kgdrywt	1	20	21.	1.8	10.
Benzo(b)Fluoranthene	J	15	ug/Kgdrywt	1	20	21.	2.5	10.
Benzo(k)fluoranthene	U	10	ug/Kgdrywt	1	20	21.	3.2	10.
Benzo(a)pyrene	J	9.2	ug/Kgdrywt	1	20	21.	3.4	10.
Indeno(1,2,3-cd)pyrene	J	8.7	ug/Kgdrywt	1	20	21.	2.0	10.
Dibenzo(a,h)anthracene	U	10	ug/Kgdrywt	1	20	21.	1.9	10.
Benzo(g,h,i)perylene	J	11	ug/Kgdrywt	1	20	21.	2.1	10.
2-Methylnaphthalene-D10		49.0	%					
Fluorene-D10		63.5	%					
Pyrene-D10		69.5	%					

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Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-12
Client ID: WTB-FD01-060415
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6567.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 12-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 93.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	8.1	ug/Kgdrywt	1	20	21.	2.8	11.
Acenaphthylene	U	11	ug/Kgdrywt	1	20	21.	1.3	11.
Acenaphthene	J	15	ug/Kgdrywt	1	20	21.	1.6	11.
Fluorene	J	15	ug/Kgdrywt	1	20	21.	3.4	11.
Phenanthrene		180	ug/Kgdrywt	1	20	21.	1.9	11.
Anthracene		45	ug/Kgdrywt	1	20	21.	1.3	11.
Fluoranthene		220	ug/Kgdrywt	1	20	21.	1.9	11.
Pyrene		290	ug/Kgdrywt	1	20	21.	2.2	11.
Benzo(a)anthracene		140	ug/Kgdrywt	1	20	21.	2.0	11.
Chrysene		170	ug/Kgdrywt	1	20	21.	1.8	11.
Benzo(b)Fluoranthene		170	ug/Kgdrywt	1	20	21.	2.6	11.
Benzo(k)fluoranthene		88	ug/Kgdrywt	1	20	21.	3.3	11.
Benzo(a)pyrene		120	ug/Kgdrywt	1	20	21.	3.5	11.
Indeno(1,2,3-cd)pyrene		77	ug/Kgdrywt	1	20	21.	2.0	11.
Dibenzo(a,h)anthracene	J	21	ug/Kgdrywt	1	20	21.	1.9	11.
Benzo(g,h,i)perylene		66	ug/Kgdrywt	1	20	21.	2.1	11.
2-Methylnaphthalene-D10		43.8	%					
Fluorene-D10		61.5	%					
Pyrene-D10		89.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-7
Client ID: WTB-FD02-060315
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6619.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 15-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 75.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	6.9	ug/Kgdrywt	1	20	26.	3.4	13.
Acenaphthylene	U	13	ug/Kgdrywt	1	20	26.	1.5	13.
Acenaphthene	U	13	ug/Kgdrywt	1	20	26.	1.9	13.
Fluorene	J	4.1	ug/Kgdrywt	1	20	26.	4.1	13.
Phenanthrene		71	ug/Kgdrywt	1	20	26.	2.3	13.
Anthracene	U	13	ug/Kgdrywt	1	20	26.	1.5	13.
Fluoranthene		63	ug/Kgdrywt	1	20	26.	2.3	13.
Pyrene		82	ug/Kgdrywt	1	20	26.	2.7	13.
Benzo(a)anthracene		58	ug/Kgdrywt	1	20	26.	2.4	13.
Chrysene		100	ug/Kgdrywt	1	20	26.	2.2	13.
Benzo(b)Fluoranthene		95	ug/Kgdrywt	1	20	26.	3.1	13.
Benzo(k)fluoranthene		31	ug/Kgdrywt	1	20	26.	4.0	13.
Benzo(a)pyrene		62	ug/Kgdrywt	1	20	26.	4.2	13.
Indeno(1,2,3-cd)pyrene		39	ug/Kgdrywt	1	20	26.	2.4	13.
Dibenzo(a,h)anthracene	U	13	ug/Kgdrywt	1	20	26.	2.3	13.
Benzo(g,h,i)perylene		39	ug/Kgdrywt	1	20	26.	2.6	13.
2-Methylnaphthalene-D10		48.9	%					
Fluorene-D10		54.0	%					
Pyrene-D10		53.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-23
Client ID: WTB-FD02-060415
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6637.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 16-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 85.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	11	ug/Kgdrywt	1	20	22.	2.8	11.
Acenaphthylene	J	6.1	ug/Kgdrywt	1	20	22.	1.3	11.
Acenaphthene	U	11	ug/Kgdrywt	1	20	22.	1.6	11.
Fluorene	J	5.8	ug/Kgdrywt	1	20	22.	3.5	11.
Phenanthrene		90	ug/Kgdrywt	1	20	22.	2.0	11.
Anthracene	J	19	ug/Kgdrywt	1	20	22.	1.3	11.
Fluoranthene		140	ug/Kgdrywt	1	20	22.	2.0	11.
Pyrene		160	ug/Kgdrywt	1	20	22.	2.3	11.
Benzo(a)anthracene		100	ug/Kgdrywt	1	20	22.	2.1	11.
Chrysene		130	ug/Kgdrywt	1	20	22.	1.8	11.
Benzo(b)Fluoranthene		140	ug/Kgdrywt	1	20	22.	2.6	11.
Benzo(k)fluoranthene		60	ug/Kgdrywt	1	20	22.	3.4	11.
Benzo(a)pyrene		120	ug/Kgdrywt	1	20	22.	3.6	11.
Indeno(1,2,3-cd)pyrene		100	ug/Kgdrywt	1	20	22.	2.1	11.
Dibenzo(a,h)anthracene		42	ug/Kgdrywt	1	20	22.	2.0	11.
Benzo(g,h,i)perylene		100	ug/Kgdrywt	1	20	22.	2.2	11.
2-Methylnaphthalene-D10		58.0	%					
Fluorene-D10		68.5	%					
Pyrene-D10		68.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-32
Client ID: WTB-FD03-060415
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6672.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 17-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 83.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	11	ug/Kgdrywt	1	20	22.	2.9	11.
Acenaphthylene	J	2.3	ug/Kgdrywt	1	20	22.	1.3	11.
Acenaphthene	J	11	ug/Kgdrywt	1	20	22.	1.7	11.
Fluorene	J	11	ug/Kgdrywt	1	20	22.	3.6	11.
Phenanthrene		140	ug/Kgdrywt	1	20	22.	2.0	11.
Anthracene		30	ug/Kgdrywt	1	20	22.	1.3	11.
Fluoranthene		160	ug/Kgdrywt	1	20	22.	2.0	11.
Pyrene		230	ug/Kgdrywt	1	20	22.	2.4	11.
Benzo(a)anthracene		130	ug/Kgdrywt	1	20	22.	2.1	11.
Chrysene		150	ug/Kgdrywt	1	20	22.	1.9	11.
Benzo(b)Fluoranthene		170	ug/Kgdrywt	1	20	22.	2.7	11.
Benzo(k)fluoranthene		58	ug/Kgdrywt	1	20	22.	3.5	11.
Benzo(a)pyrene		120	ug/Kgdrywt	1	20	22.	3.7	11.
Indeno(1,2,3-cd)pyrene		67	ug/Kgdrywt	1	20	22.	2.1	11.
Dibenzo(a,h)anthracene		23	ug/Kgdrywt	1	20	22.	2.0	11.
Benzo(g,h,i)perylene		58	ug/Kgdrywt	1	20	22.	2.2	11.
2-Methylnaphthalene-D10		45.2	%					
Fluorene-D10		58.0	%					
Pyrene-D10		69.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-13
Client ID: WTB-SB-08-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6568.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 12-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 84.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene		64	ug/Kgdrywt	1	20	23.	3.0	12.
Acenaphthylene		24	ug/Kgdrywt	1	20	23.	1.4	12.
Acenaphthene	J	9.7	ug/Kgdrywt	1	20	23.	1.7	12.
Fluorene	J	19	ug/Kgdrywt	1	20	23.	3.7	12.
Phenanthrene		230	ug/Kgdrywt	1	20	23.	2.1	12.
Anthracene		65	ug/Kgdrywt	1	20	23.	1.4	12.
Fluoranthene		220	ug/Kgdrywt	1	20	23.	2.1	12.
Pyrene	E	680	ug/Kgdrywt	1	20	23.	2.4	12.
Benzo(a)anthracene		290	ug/Kgdrywt	1	20	23.	2.2	12.
Chrysene	E	500	ug/Kgdrywt	1	20	23.	2.0	12.
Benzo(b)Fluoranthene	E	420	ug/Kgdrywt	1	20	23.	2.8	12.
Benzo(k)fluoranthene		170	ug/Kgdrywt	1	20	23.	3.6	12.
Benzo(a)pyrene		300	ug/Kgdrywt	1	20	23.	3.8	12.
Indeno(1,2,3-cd)pyrene		190	ug/Kgdrywt	1	20	23.	2.2	12.
Dibenzo(a,h)anthracene		68	ug/Kgdrywt	1	20	23.	2.1	12.
Benzo(g,h,i)perylene		160	ug/Kgdrywt	1	20	23.	2.3	12.
2-Methylnaphthalene-D10		74.0	%					
Fluorene-D10		57.5	%					
Pyrene-D10		93.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-13DL
Client ID: WTB-SB-08-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6611.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 15-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 84.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	67	ug/Kgdrywt	3	20	69.	9.0	35.
Acenaphthylene	J	28	ug/Kgdrywt	3	20	69.	4.2	35.
Acenaphthene	J	8.5	ug/Kgdrywt	3	20	69.	5.2	35.
Fluorene	J	16	ug/Kgdrywt	3	20	69.	11.	35.
Phenanthrene		250	ug/Kgdrywt	3	20	69.	6.2	35.
Anthracene		69	ug/Kgdrywt	3	20	69.	4.2	35.
Fluoranthene		360	ug/Kgdrywt	3	20	69.	6.2	35.
Pyrene		550	ug/Kgdrywt	3	20	69.	7.3	35.
Benzo(a)anthracene		310	ug/Kgdrywt	3	20	69.	6.6	35.
Chrysene		530	ug/Kgdrywt	3	20	69.	5.9	35.
Benzo(b)Fluoranthene		380	ug/Kgdrywt	3	20	69.	8.3	35.
Benzo(k)fluoranthene		98	ug/Kgdrywt	3	20	69.	11.	35.
Benzo(a)pyrene		260	ug/Kgdrywt	3	20	69.	11.	35.
Indeno(1,2,3-cd)pyrene		180	ug/Kgdrywt	3	20	69.	6.6	35.
Dibenzo(a,h)anthracene	J	58	ug/Kgdrywt	3	20	69.	6.2	35.
Benzo(g,h,i)perylene		150	ug/Kgdrywt	3	20	69.	6.9	35.
2-Methylnaphthalene-D10		77.4	%					
Fluorene-D10		71.2	%					
Pyrene-D10		85.4	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-14
Client ID: WTB-SB-08-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6571.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 12-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 69.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	13	ug/Kgdrywt	1	20	26.	3.4	13.
Acenaphthylene	U	13	ug/Kgdrywt	1	20	26.	1.6	13.
Acenaphthene	J	18	ug/Kgdrywt	1	20	26.	2.0	13.
Fluorene	J	11	ug/Kgdrywt	1	20	26.	4.2	13.
Phenanthrene		68	ug/Kgdrywt	1	20	26.	2.3	13.
Anthracene	J	26	ug/Kgdrywt	1	20	26.	1.6	13.
Fluoranthene		400	ug/Kgdrywt	1	20	26.	2.3	13.
Pyrene	E	860	ug/Kgdrywt	1	20	26.	2.7	13.
Benzo(a)anthracene		260	ug/Kgdrywt	1	20	26.	2.5	13.
Chrysene	E	450	ug/Kgdrywt	1	20	26.	2.2	13.
Benzo(b)Fluoranthene	E	450	ug/Kgdrywt	1	20	26.	3.1	13.
Benzo(k)fluoranthene		150	ug/Kgdrywt	1	20	26.	4.0	13.
Benzo(a)pyrene		220	ug/Kgdrywt	1	20	26.	4.3	13.
Indeno(1,2,3-cd)pyrene		170	ug/Kgdrywt	1	20	26.	2.5	13.
Dibenzo(a,h)anthracene		50	ug/Kgdrywt	1	20	26.	2.3	13.
Benzo(g,h,i)perylene		150	ug/Kgdrywt	1	20	26.	2.6	13.
2-Methylnaphthalene-D10		65.5	%					
Fluorene-D10		57.0	%					
Pyrene-D10		102.	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-14DL
Client ID: WTB-SB-08-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6612.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 15-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 69.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	52	ug/Kgdrywt	4	20	100	14.	52.
Acenaphthylene	U	52	ug/Kgdrywt	4	20	100	6.2	52.
Acenaphthene	J	23	ug/Kgdrywt	4	20	100	7.8	52.
Fluorene	U	52	ug/Kgdrywt	4	20	100	17.	52.
Phenanthrene	J	75	ug/Kgdrywt	4	20	100	9.4	52.
Anthracene	J	22	ug/Kgdrywt	4	20	100	6.2	52.
Fluoranthene		560	ug/Kgdrywt	4	20	100	9.4	52.
Pyrene		570	ug/Kgdrywt	4	20	100	11.	52.
Benzo(a)anthracene		270	ug/Kgdrywt	4	20	100	9.9	52.
Chrysene		460	ug/Kgdrywt	4	20	100	8.8	52.
Benzo(b)Fluoranthene		390	ug/Kgdrywt	4	20	100	12.	52.
Benzo(k)fluoranthene		110	ug/Kgdrywt	4	20	100	16.	52.
Benzo(a)pyrene		220	ug/Kgdrywt	4	20	100	17.	52.
Indeno(1,2,3-cd)pyrene		190	ug/Kgdrywt	4	20	100	9.9	52.
Dibenzo(a,h)anthracene	J	55	ug/Kgdrywt	4	20	100	9.4	52.
Benzo(g,h,i)perylene		180	ug/Kgdrywt	4	20	100	10.	52.
2-Methylnaphthalene-D10		67.2	%					
Fluorene-D10		63.8	%					
Pyrene-D10		75.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-16
Client ID: WTB-SB-09-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6565.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 12-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 89.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	9.7	ug/Kgdrywt	1	20	22.	2.9	11.
Acenaphthylene	U	11	ug/Kgdrywt	1	20	22.	1.3	11.
Acenaphthene	J	11	ug/Kgdrywt	1	20	22.	1.6	11.
Fluorene	J	12	ug/Kgdrywt	1	20	22.	3.5	11.
Phenanthrene		190	ug/Kgdrywt	1	20	22.	2.0	11.
Anthracene		36	ug/Kgdrywt	1	20	22.	1.3	11.
Fluoranthene		230	ug/Kgdrywt	1	20	22.	2.0	11.
Pyrene		240	ug/Kgdrywt	1	20	22.	2.3	11.
Benzo(a)anthracene		120	ug/Kgdrywt	1	20	22.	2.1	11.
Chrysene		160	ug/Kgdrywt	1	20	22.	1.9	11.
Benzo(b)Fluoranthene		130	ug/Kgdrywt	1	20	22.	2.6	11.
Benzo(k)fluoranthene		50	ug/Kgdrywt	1	20	22.	3.4	11.
Benzo(a)pyrene		87	ug/Kgdrywt	1	20	22.	3.6	11.
Indeno(1,2,3-cd)pyrene		46	ug/Kgdrywt	1	20	22.	2.1	11.
Dibenzo(a,h)anthracene	J	17	ug/Kgdrywt	1	20	22.	2.0	11.
Benzo(g,h,i)perylene		42	ug/Kgdrywt	1	20	22.	2.2	11.
2-Methylnaphthalene-D10		59.0	%					
Fluorene-D10		61.5	%					
Pyrene-D10		72.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-17
Client ID: WTB-SB-09-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6621.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 15-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 84.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene		190	ug/Kgdrywt	1	20	24.	3.1	12.
Acenaphthylene	J	21	ug/Kgdrywt	1	20	24.	1.4	12.
Acenaphthene		320	ug/Kgdrywt	1	20	24.	1.8	12.
Fluorene		280	ug/Kgdrywt	1	20	24.	3.8	12.
Phenanthrene	E	3200	ug/Kgdrywt	1	20	24.	2.1	12.
Anthracene	E	760	ug/Kgdrywt	1	20	24.	1.4	12.
Fluoranthene	E	2000	ug/Kgdrywt	1	20	24.	2.1	12.
Pyrene	E	3500	ug/Kgdrywt	1	20	24.	2.5	12.
Benzo(a)anthracene	E	2000	ug/Kgdrywt	1	20	24.	2.2	12.
Chrysene	E	2400	ug/Kgdrywt	1	20	24.	2.0	12.
Benzo(b)Fluoranthene	E	1700	ug/Kgdrywt	1	20	24.	2.8	12.
Benzo(k)fluoranthene	E	510	ug/Kgdrywt	1	20	24.	3.7	12.
Benzo(a)pyrene	E	1200	ug/Kgdrywt	1	20	24.	3.9	12.
Indeno(1,2,3-cd)pyrene	E	860	ug/Kgdrywt	1	20	24.	2.2	12.
Dibenzo(a,h)anthracene		370	ug/Kgdrywt	1	20	24.	2.1	12.
Benzo(g,h,i)perylene	E	770	ug/Kgdrywt	1	20	24.	2.4	12.
2-Methylnaphthalene-D10		79.5	%					
Fluorene-D10		64.0	%					
Pyrene-D10		77.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-17DL
Client ID: WTB-SB-09-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6615.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 15-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 84.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	180	ug/Kgdrywt	10	20	240	31.	120
Acenaphthylene	U	120	ug/Kgdrywt	10	20	240	14.	120
Acenaphthene		330	ug/Kgdrywt	10	20	240	18.	120
Fluorene		350	ug/Kgdrywt	10	20	240	38.	120
Phenanthrene		3300	ug/Kgdrywt	10	20	240	21.	120
Anthracene		790	ug/Kgdrywt	10	20	240	14.	120
Fluoranthene		2400	ug/Kgdrywt	10	20	240	21.	120
Pyrene		3200	ug/Kgdrywt	10	20	240	25.	120
Benzo(a)anthracene		1800	ug/Kgdrywt	10	20	240	22.	120
Chrysene		2100	ug/Kgdrywt	10	20	240	20.	120
Benzo(b)Fluoranthene		2100	ug/Kgdrywt	10	20	240	28.	120
Benzo(k)fluoranthene		820	ug/Kgdrywt	10	20	240	37.	120
Benzo(a)pyrene		1500	ug/Kgdrywt	10	20	240	39.	120
Indeno(1,2,3-cd)pyrene		830	ug/Kgdrywt	10	20	240	22.	120
Dibenzo(a,h)anthracene	J	220	ug/Kgdrywt	10	20	240	21.	120
Benzo(g,h,i)perylene		730	ug/Kgdrywt	10	20	240	24.	120
2-Methylnaphthalene-D10	D	0.00	%					
Fluorene-D10	D	0.00	%					
Pyrene-D10	D	0.00	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-43
Client ID: WTB-SB-10-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6505.D

Sample Date: 05-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 10-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 82.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	24	ug/Kgdrywt	1	20	24.	3.0	12.
Acenaphthylene	U	12	ug/Kgdrywt	1	20	24.	1.4	12.
Acenaphthene		120	ug/Kgdrywt	1	20	24.	1.8	12.
Fluorene		120	ug/Kgdrywt	1	20	24.	3.8	12.
Phenanthrene	E	1000	ug/Kgdrywt	1	20	24.	2.1	12.
Anthracene		210	ug/Kgdrywt	1	20	24.	1.4	12.
Fluoranthene	E	900	ug/Kgdrywt	1	20	24.	2.1	12.
Pyrene	E	1000	ug/Kgdrywt	1	20	24.	2.5	12.
Benzo(a)anthracene	E	620	ug/Kgdrywt	1	20	24.	2.2	12.
Chrysene	E	660	ug/Kgdrywt	1	20	24.	2.0	12.
Benzo(b)Fluoranthene	E	690	ug/Kgdrywt	1	20	24.	2.8	12.
Benzo(k)fluoranthene		170	ug/Kgdrywt	1	20	24.	3.6	12.
Benzo(a)pyrene	E	440	ug/Kgdrywt	1	20	24.	3.9	12.
Indeno(1,2,3-cd)pyrene		250	ug/Kgdrywt	1	20	24.	2.2	12.
Dibenzo(a,h)anthracene		82	ug/Kgdrywt	1	20	24.	2.1	12.
Benzo(g,h,i)perylene		220	ug/Kgdrywt	1	20	24.	2.4	12.
2-Methylnaphthalene-D10		57.0	%					
Fluorene-D10		70.5	%					
Pyrene-D10		71.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-43DL
Client ID: WTB-SB-10-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6530.D

Sample Date: 05-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 11-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 82.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	54	ug/Kgdrywt	5	20	120	15.	59.
Acenaphthylene	J	20	ug/Kgdrywt	5	20	120	7.0	59.
Acenaphthene	J	19	ug/Kgdrywt	5	20	120	8.8	59.
Fluorene	J	47	ug/Kgdrywt	5	20	120	19.	59.
Phenanthrene		400	ug/Kgdrywt	5	20	120	10.	59.
Anthracene	J	99	ug/Kgdrywt	5	20	120	7.0	59.
Fluoranthene		540	ug/Kgdrywt	5	20	120	10.	59.
Pyrene		720	ug/Kgdrywt	5	20	120	12.	59.
Benzo(a)anthracene		570	ug/Kgdrywt	5	20	120	11.	59.
Chrysene		730	ug/Kgdrywt	5	20	120	10.	59.
Benzo(b)Fluoranthene		880	ug/Kgdrywt	5	20	120	14.	59.
Benzo(k)fluoranthene		390	ug/Kgdrywt	5	20	120	18.	59.
Benzo(a)pyrene		600	ug/Kgdrywt	5	20	120	19.	59.
Indeno(1,2,3-cd)pyrene		430	ug/Kgdrywt	5	20	120	11.	59.
Dibenzo(a,h)anthracene		190	ug/Kgdrywt	5	20	120	10.	59.
Benzo(g,h,i)perylene		410	ug/Kgdrywt	5	20	120	12.	59.
2-Methylnaphthalene-D10		71.2	%					
Fluorene-D10		73.2	%					
Pyrene-D10		82.2	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-44
Client ID: WTB-SB-10-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6539.D

Sample Date: 05-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 11-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 87.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene		26	ug/Kgdrywt	1	20	23.	2.9	11.
Acenaphthylene	J	6.0	ug/Kgdrywt	1	20	23.	1.4	11.
Acenaphthene		130	ug/Kgdrywt	1	20	23.	1.7	11.
Fluorene		120	ug/Kgdrywt	1	20	23.	3.6	11.
Phenanthrene	E	1000	ug/Kgdrywt	1	20	23.	2.0	11.
Anthracene		240	ug/Kgdrywt	1	20	23.	1.4	11.
Fluoranthene	E	900	ug/Kgdrywt	1	20	23.	2.0	11.
Pyrene	E	1200	ug/Kgdrywt	1	20	23.	2.4	11.
Benzo(a)anthracene	E	620	ug/Kgdrywt	1	20	23.	2.2	11.
Chrysene	E	680	ug/Kgdrywt	1	20	23.	1.9	11.
Benzo(b)Fluoranthene	E	740	ug/Kgdrywt	1	20	23.	2.7	11.
Benzo(k)fluoranthene		260	ug/Kgdrywt	1	20	23.	3.5	11.
Benzo(a)pyrene	E	440	ug/Kgdrywt	1	20	23.	3.7	11.
Indeno(1,2,3-cd)pyrene		260	ug/Kgdrywt	1	20	23.	2.2	11.
Dibenzo(a,h)anthracene		78	ug/Kgdrywt	1	20	23.	2.0	11.
Benzo(g,h,i)perylene		240	ug/Kgdrywt	1	20	23.	2.3	11.
2-Methylnaphthalene-D10		69.0	%					
Fluorene-D10		74.0	%					
Pyrene-D10		92.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-44DL
Client ID: WTB-SB-10-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6531.D

Sample Date: 05-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 11-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 87.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	24	ug/Kgdrywt	4	20	91.	12.	45.
Acenaphthylene	J	6.5	ug/Kgdrywt	4	20	91.	5.4	45.
Acenaphthene		150	ug/Kgdrywt	4	20	91.	6.8	45.
Fluorene		110	ug/Kgdrywt	4	20	91.	14.	45.
Phenanthrene		1000	ug/Kgdrywt	4	20	91.	8.2	45.
Anthracene		280	ug/Kgdrywt	4	20	91.	5.4	45.
Fluoranthene		940	ug/Kgdrywt	4	20	91.	8.2	45.
Pyrene		1100	ug/Kgdrywt	4	20	91.	9.5	45.
Benzo(a)anthracene		620	ug/Kgdrywt	4	20	91.	8.6	45.
Chrysene		610	ug/Kgdrywt	4	20	91.	7.7	45.
Benzo(b)Fluoranthene		650	ug/Kgdrywt	4	20	91.	11.	45.
Benzo(k)fluoranthene		320	ug/Kgdrywt	4	20	91.	14.	45.
Benzo(a)pyrene		450	ug/Kgdrywt	4	20	91.	15.	45.
Indeno(1,2,3-cd)pyrene		230	ug/Kgdrywt	4	20	91.	8.6	45.
Dibenzo(a,h)anthracene	J	72	ug/Kgdrywt	4	20	91.	8.2	45.
Benzo(g,h,i)perylene		200	ug/Kgdrywt	4	20	91.	9.1	45.
2-Methylnaphthalene-D10		71.8	%					
Fluorene-D10		72.6	%					
Pyrene-D10		83.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-2
Client ID: WTB-SB-11-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6508.D

Sample Date: 01-JUN-15
Received Date: 03-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 11-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 79.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene		60	ug/Kgdrywt	1	20	24.	3.1	12.
Acenaphthylene	J	8.3	ug/Kgdrywt	1	20	24.	1.4	12.
Acenaphthene	J	21	ug/Kgdrywt	1	20	24.	1.8	12.
Fluorene		33	ug/Kgdrywt	1	20	24.	3.9	12.
Phenanthrene	E	630	ug/Kgdrywt	1	20	24.	2.2	12.
Anthracene		140	ug/Kgdrywt	1	20	24.	1.4	12.
Fluoranthene	E	970	ug/Kgdrywt	1	20	24.	2.2	12.
Pyrene	E	1600	ug/Kgdrywt	1	20	24.	2.5	12.
Benzo(a)anthracene	E	810	ug/Kgdrywt	1	20	24.	2.3	12.
Chrysene	E	980	ug/Kgdrywt	1	20	24.	2.0	12.
Benzo(b)Fluoranthene	E	840	ug/Kgdrywt	1	20	24.	2.9	12.
Benzo(k)fluoranthene		290	ug/Kgdrywt	1	20	24.	3.7	12.
Benzo(a)pyrene	E	580	ug/Kgdrywt	1	20	24.	4.0	12.
Indeno(1,2,3-cd)pyrene		360	ug/Kgdrywt	1	20	24.	2.3	12.
Dibenzo(a,h)anthracene		110	ug/Kgdrywt	1	20	24.	2.2	12.
Benzo(g,h,i)perylene		350	ug/Kgdrywt	1	20	24.	2.4	12.
2-Methylnaphthalene-D10		56.0	%					
Fluorene-D10		64.0	%					
Pyrene-D10		99.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-2DL
Client ID: WTB-SB-11-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6533.D

Sample Date: 01-JUN-15
Received Date: 03-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 11-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 79.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	55	ug/Kgdrywt	8	20	190	25.	97.
Acenaphthylene	U	97	ug/Kgdrywt	8	20	190	12.	97.
Acenaphthene	J	30	ug/Kgdrywt	8	20	190	14.	97.
Fluorene	J	34	ug/Kgdrywt	8	20	190	31.	97.
Phenanthrene		620	ug/Kgdrywt	8	20	190	17.	97.
Anthracene	U	97	ug/Kgdrywt	8	20	190	12.	97.
Fluoranthene		970	ug/Kgdrywt	8	20	190	17.	97.
Pyrene		1200	ug/Kgdrywt	8	20	190	20.	97.
Benzo(a)anthracene		780	ug/Kgdrywt	8	20	190	18.	97.
Chrysene		890	ug/Kgdrywt	8	20	190	16.	97.
Benzo(b)Fluoranthene		1100	ug/Kgdrywt	8	20	190	23.	97.
Benzo(k)fluoranthene		450	ug/Kgdrywt	8	20	190	30.	97.
Benzo(a)pyrene		750	ug/Kgdrywt	8	20	190	32.	97.
Indeno(1,2,3-cd)pyrene		410	ug/Kgdrywt	8	20	190	18.	97.
Dibenzo(a,h)anthracene	J	130	ug/Kgdrywt	8	20	190	17.	97.
Benzo(g,h,i)perylene		370	ug/Kgdrywt	8	20	190	19.	97.
2-Methylnaphthalene-D10		52.8	%					
Fluorene-D10		59.2	%					
Pyrene-D10		66.4	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-3
Client ID: WTB-SB-11-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6509.D

Sample Date: 01-JUN-15
Received Date: 03-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 11-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 79.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	13	ug/Kgdrywt	1	20	23.	3.0	12.
Acenaphthylene	J	5.8	ug/Kgdrywt	1	20	23.	1.4	12.
Acenaphthene	J	7.8	ug/Kgdrywt	1	20	23.	1.7	12.
Fluorene	J	16	ug/Kgdrywt	1	20	23.	3.7	12.
Phenanthrene		200	ug/Kgdrywt	1	20	23.	2.1	12.
Anthracene		39	ug/Kgdrywt	1	20	23.	1.4	12.
Fluoranthene		340	ug/Kgdrywt	1	20	23.	2.1	12.
Pyrene	E	770	ug/Kgdrywt	1	20	23.	2.4	12.
Benzo(a)anthracene	E	590	ug/Kgdrywt	1	20	23.	2.2	12.
Chrysene	E	660	ug/Kgdrywt	1	20	23.	2.0	12.
Benzo(b)Fluoranthene	E	810	ug/Kgdrywt	1	20	23.	2.8	12.
Benzo(k)fluoranthene		320	ug/Kgdrywt	1	20	23.	3.6	12.
Benzo(a)pyrene	E	530	ug/Kgdrywt	1	20	23.	3.8	12.
Indeno(1,2,3-cd)pyrene		310	ug/Kgdrywt	1	20	23.	2.2	12.
Dibenzo(a,h)anthracene		120	ug/Kgdrywt	1	20	23.	2.1	12.
Benzo(g,h,i)perylene		250	ug/Kgdrywt	1	20	23.	2.3	12.
2-Methylnaphthalene-D10		62.5	%					
Fluorene-D10		63.0	%					
Pyrene-D10		110.	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-3DL
Client ID: WTB-SB-11-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6534.D

Sample Date: 01-JUN-15
Received Date: 03-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 11-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 79.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	14	ug/Kgdrywt	4	20	92.	12.	46.
Acenaphthylene	U	46	ug/Kgdrywt	4	20	92.	5.5	46.
Acenaphthene	J	11	ug/Kgdrywt	4	20	92.	6.9	46.
Fluorene	U	46	ug/Kgdrywt	4	20	92.	15.	46.
Phenanthrene		220	ug/Kgdrywt	4	20	92.	8.3	46.
Anthracene	J	39	ug/Kgdrywt	4	20	92.	5.5	46.
Fluoranthene		460	ug/Kgdrywt	4	20	92.	8.3	46.
Pyrene		660	ug/Kgdrywt	4	20	92.	9.7	46.
Benzo(a)anthracene		610	ug/Kgdrywt	4	20	92.	8.8	46.
Chrysene		720	ug/Kgdrywt	4	20	92.	7.8	46.
Benzo(b)Fluoranthene		960	ug/Kgdrywt	4	20	92.	11.	46.
Benzo(k)fluoranthene		300	ug/Kgdrywt	4	20	92.	14.	46.
Benzo(a)pyrene		580	ug/Kgdrywt	4	20	92.	15.	46.
Indeno(1,2,3-cd)pyrene		310	ug/Kgdrywt	4	20	92.	8.8	46.
Dibenzo(a,h)anthracene		120	ug/Kgdrywt	4	20	92.	8.3	46.
Benzo(g,h,i)perylene		250	ug/Kgdrywt	4	20	92.	9.2	46.
2-Methylnaphthalene-D10		69.4	%					
Fluorene-D10		71.2	%					
Pyrene-D10		109.	%					

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Katahdin
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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-19DL
Client ID: WTB-SB-12-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6836.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 25-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 85.
Report Date: 26-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	12	ug/Kgdrywt	2	20	47.	6.1	23.
Acenaphthylene	J	3.0	ug/Kgdrywt	2	20	47.	2.8	23.
Acenaphthene	J	24	ug/Kgdrywt	2	20	47.	3.5	23.
Fluorene	J	17	ug/Kgdrywt	2	20	47.	7.5	23.
Phenanthrene		280	ug/Kgdrywt	2	20	47.	4.2	23.
Anthracene		54	ug/Kgdrywt	2	20	47.	2.8	23.
Fluoranthene		370	ug/Kgdrywt	2	20	47.	4.2	23.
Pyrene		530	ug/Kgdrywt	2	20	47.	4.9	23.
Benzo(a)anthracene		230	ug/Kgdrywt	2	20	47.	4.4	23.
Chrysene		280	ug/Kgdrywt	2	20	47.	4.0	23.
Benzo(b)Fluoranthene		250	ug/Kgdrywt	2	20	47.	5.6	23.
Benzo(k)fluoranthene		86	ug/Kgdrywt	2	20	47.	7.2	23.
Benzo(a)pyrene		200	ug/Kgdrywt	2	20	47.	7.7	23.
Indeno(1,2,3-cd)pyrene		150	ug/Kgdrywt	2	20	47.	4.4	23.
Dibenzo(a,h)anthracene		66	ug/Kgdrywt	2	20	47.	4.2	23.
Benzo(g,h,i)perylene		200	ug/Kgdrywt	2	20	47.	4.7	23.
2-Methylnaphthalene-D10		52.1	%					
Fluorene-D10		67.3	%					
Pyrene-D10		73.2	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-19
Client ID: WTB-SB-12-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6569.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 12-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 85.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	10	ug/Kgdrywt	1	20	23.	3.0	12.
Acenaphthylene	U	12	ug/Kgdrywt	1	20	23.	1.4	12.
Acenaphthene		23	ug/Kgdrywt	1	20	23.	1.8	12.
Fluorene	J	17	ug/Kgdrywt	1	20	23.	3.7	12.
Phenanthrene		250	ug/Kgdrywt	1	20	23.	2.1	12.
Anthracene		51	ug/Kgdrywt	1	20	23.	1.4	12.
Fluoranthene		290	ug/Kgdrywt	1	20	23.	2.1	12.
Pyrene	E	450	ug/Kgdrywt	1	20	23.	2.4	12.
Benzo(a)anthracene		230	ug/Kgdrywt	1	20	23.	2.2	12.
Chrysene		260	ug/Kgdrywt	1	20	23.	2.0	12.
Benzo(b)Fluoranthene		280	ug/Kgdrywt	1	20	23.	2.8	12.
Benzo(k)fluoranthene		110	ug/Kgdrywt	1	20	23.	3.6	12.
Benzo(a)pyrene		200	ug/Kgdrywt	1	20	23.	3.8	12.
Indeno(1,2,3-cd)pyrene		120	ug/Kgdrywt	1	20	23.	2.2	12.
Dibenzo(a,h)anthracene		34	ug/Kgdrywt	1	20	23.	2.1	12.
Benzo(g,h,i)perylene		120	ug/Kgdrywt	1	20	23.	2.3	12.
2-Methylnaphthalene-D10		47.4	%					
Fluorene-D10		61.5	%					
Pyrene-D10		77.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-20
Client ID: WTB-SB-12-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6620.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 15-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 81.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene		74	ug/Kgdrywt	1	20	24.	3.1	12.
Acenaphthylene	J	14	ug/Kgdrywt	1	20	24.	1.4	12.
Acenaphthene		81	ug/Kgdrywt	1	20	24.	1.8	12.
Fluorene		62	ug/Kgdrywt	1	20	24.	3.8	12.
Phenanthrene	E	1400	ug/Kgdrywt	1	20	24.	2.1	12.
Anthracene	E	510	ug/Kgdrywt	1	20	24.	1.4	12.
Fluoranthene	E	2300	ug/Kgdrywt	1	20	24.	2.1	12.
Pyrene	E	1800	ug/Kgdrywt	1	20	24.	2.5	12.
Benzo(a)anthracene	E	1600	ug/Kgdrywt	1	20	24.	2.2	12.
Chrysene	E	1500	ug/Kgdrywt	1	20	24.	2.0	12.
Benzo(b)Fluoranthene	E	1300	ug/Kgdrywt	1	20	24.	2.8	12.
Benzo(k)fluoranthene	E	550	ug/Kgdrywt	1	20	24.	3.7	12.
Benzo(a)pyrene	E	960	ug/Kgdrywt	1	20	24.	3.9	12.
Indeno(1,2,3-cd)pyrene	E	600	ug/Kgdrywt	1	20	24.	2.2	12.
Dibenzo(a,h)anthracene		170	ug/Kgdrywt	1	20	24.	2.1	12.
Benzo(g,h,i)perylene	E	490	ug/Kgdrywt	1	20	24.	2.4	12.
2-Methylnaphthalene-D10		55.0	%					
Fluorene-D10		52.0	%					
Pyrene-D10		40.0	%					

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Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-20DL
Client ID: WTB-SB-12-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6614.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 15-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 81.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	88	ug/Kgdrywt	10	20	240	31.	120
Acenaphthylene	U	120	ug/Kgdrywt	10	20	240	14.	120
Acenaphthene	J	87	ug/Kgdrywt	10	20	240	18.	120
Fluorene	J	75	ug/Kgdrywt	10	20	240	38.	120
Phenanthrene		1500	ug/Kgdrywt	10	20	240	21.	120
Anthracene		520	ug/Kgdrywt	10	20	240	14.	120
Fluoranthene		2700	ug/Kgdrywt	10	20	240	21.	120
Pyrene		2600	ug/Kgdrywt	10	20	240	25.	120
Benzo(a)anthracene		1600	ug/Kgdrywt	10	20	240	22.	120
Chrysene		1600	ug/Kgdrywt	10	20	240	20.	120
Benzo(b)Fluoranthene		1500	ug/Kgdrywt	10	20	240	28.	120
Benzo(k)fluoranthene		540	ug/Kgdrywt	10	20	240	37.	120
Benzo(a)pyrene		1100	ug/Kgdrywt	10	20	240	39.	120
Indeno(1,2,3-cd)pyrene		540	ug/Kgdrywt	10	20	240	22.	120
Dibenzo(a,h)anthracene	J	150	ug/Kgdrywt	10	20	240	21.	120
Benzo(g,h,i)perylene		430	ug/Kgdrywt	10	20	240	24.	120
2-Methylnaphthalene-D10	D	0.00	%					
Fluorene-D10	D	0.00	%					
Pyrene-D10	D	0.00	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-40
Client ID: WTB-SB-13-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6685.D

Sample Date: 05-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 18-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 89.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene		350	ug/Kgdrywt	1	20	21.	2.8	11.
Acenaphthylene		36	ug/Kgdrywt	1	20	21.	1.3	11.
Acenaphthene	E	1400	ug/Kgdrywt	1	20	21.	1.6	11.
Fluorene	E	1300	ug/Kgdrywt	1	20	21.	3.4	11.
Phenanthrene	E	8000	ug/Kgdrywt	1	20	21.	1.9	11.
Anthracene	E	2400	ug/Kgdrywt	1	20	21.	1.3	11.
Fluoranthene	E	5000	ug/Kgdrywt	1	20	21.	1.9	11.
Pyrene	E	13000	ug/Kgdrywt	1	20	21.	2.2	11.
Benzo(a)anthracene	E	5500	ug/Kgdrywt	1	20	21.	2.0	11.
Chrysene	E	4500	ug/Kgdrywt	1	20	21.	1.8	11.
Benzo(b)Fluoranthene	E	4000	ug/Kgdrywt	1	20	21.	2.6	11.
Benzo(k)fluoranthene	E	1400	ug/Kgdrywt	1	20	21.	3.3	11.
Benzo(a)pyrene	E	2600	ug/Kgdrywt	1	20	21.	3.5	11.
Indeno(1,2,3-cd)pyrene	E	1600	ug/Kgdrywt	1	20	21.	2.0	11.
Dibenzo(a,h)anthracene	E	550	ug/Kgdrywt	1	20	21.	1.9	11.
Benzo(g,h,i)perylene	E	1500	ug/Kgdrywt	1	20	21.	2.1	11.
2-Methylnaphthalene-D10		75.0	%					
Fluorene-D10		61.5	%					
Pyrene-D10	*	142.	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-40DL
Client ID: WTB-SB-13-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6703.D

Sample Date: 05-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 18-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 89.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	350	ug/Kgdrywt	75	20	1600	210	810
Acenaphthylene	U	810	ug/Kgdrywt	75	20	1600	97.	810
Acenaphthene		1800	ug/Kgdrywt	75	20	1600	120	810
Fluorene		1800	ug/Kgdrywt	75	20	1600	260	810
Phenanthrene		11000	ug/Kgdrywt	75	20	1600	140	810
Anthracene		3200	ug/Kgdrywt	75	20	1600	97.	810
Fluoranthene		11000	ug/Kgdrywt	75	20	1600	140	810
Pyrene		8800	ug/Kgdrywt	75	20	1600	170	810
Benzo(a)anthracene		5400	ug/Kgdrywt	75	20	1600	150	810
Chrysene		4800	ug/Kgdrywt	75	20	1600	140	810
Benzo(b)Fluoranthene		4800	ug/Kgdrywt	75	20	1600	190	810
Benzo(k)fluoranthene	J	1400	ug/Kgdrywt	75	20	1600	250	810
Benzo(a)pyrene		3500	ug/Kgdrywt	75	20	1600	270	810
Indeno(1,2,3-cd)pyrene		2100	ug/Kgdrywt	75	20	1600	150	810
Dibenzo(a,h)anthracene	J	630	ug/Kgdrywt	75	20	1600	140	810
Benzo(g,h,i)perylene		1900	ug/Kgdrywt	75	20	1600	160	810
2-Methylnaphthalene-D10	D	0.00	%					
Fluorene-D10	D	0.00	%					
Pyrene-D10	D	0.00	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-41
Client ID: WTB-SB-13-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6705.D

Sample Date: 05-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 18-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 87.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	9.9	ug/Kgdrywt	1	20	20.	2.6	9.9
Acenaphthylene	J	6.3	ug/Kgdrywt	1	20	20.	1.2	9.9
Acenaphthene	J	3.6	ug/Kgdrywt	1	20	20.	1.5	9.9
Fluorene	J	6.1	ug/Kgdrywt	1	20	20.	3.2	9.9
Phenanthrene		100	ug/Kgdrywt	1	20	20.	1.8	9.9
Anthracene		23	ug/Kgdrywt	1	20	20.	1.2	9.9
Fluoranthene		130	ug/Kgdrywt	1	20	20.	1.8	9.9
Pyrene		260	ug/Kgdrywt	1	20	20.	2.1	9.9
Benzo(a)anthracene		130	ug/Kgdrywt	1	20	20.	1.9	9.9
Chrysene		170	ug/Kgdrywt	1	20	20.	1.7	9.9
Benzo(b)Fluoranthene		250	ug/Kgdrywt	1	20	20.	2.4	9.9
Benzo(k)fluoranthene		64	ug/Kgdrywt	1	20	20.	3.1	9.9
Benzo(a)pyrene		170	ug/Kgdrywt	1	20	20.	3.3	9.9
Indeno(1,2,3-cd)pyrene		110	ug/Kgdrywt	1	20	20.	1.9	9.9
Dibenzo(a,h)anthracene		48	ug/Kgdrywt	1	20	20.	1.8	9.9
Benzo(g,h,i)perylene		110	ug/Kgdrywt	1	20	20.	2.0	9.9
2-Methylnaphthalene-D10		70.0	%					
Fluorene-D10		69.5	%					
Pyrene-D10		82.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-5
Client ID: WTB-SB-14-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6506.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 10-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 95.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	10	ug/Kgdrywt	1	20	20.	2.6	10.
Acenaphthylene	U	10	ug/Kgdrywt	1	20	20.	1.2	10.
Acenaphthene	U	10	ug/Kgdrywt	1	20	20.	1.5	10.
Fluorene	U	10	ug/Kgdrywt	1	20	20.	3.3	10.
Phenanthrene	J	5.1	ug/Kgdrywt	1	20	20.	1.8	10.
Anthracene	U	10	ug/Kgdrywt	1	20	20.	1.2	10.
Fluoranthene	J	7.9	ug/Kgdrywt	1	20	20.	1.8	10.
Pyrene	J	8.9	ug/Kgdrywt	1	20	20.	2.1	10.
Benzo(a)anthracene	J	4.4	ug/Kgdrywt	1	20	20.	1.9	10.
Chrysene	U	10	ug/Kgdrywt	1	20	20.	1.7	10.
Benzo(b)Fluoranthene	J	8.1	ug/Kgdrywt	1	20	20.	2.4	10.
Benzo(k)fluoranthene	U	10	ug/Kgdrywt	1	20	20.	3.2	10.
Benzo(a)pyrene	J	4.8	ug/Kgdrywt	1	20	20.	3.4	10.
Indeno(1,2,3-cd)pyrene	U	10	ug/Kgdrywt	1	20	20.	1.9	10.
Dibenzo(a,h)anthracene	U	10	ug/Kgdrywt	1	20	20.	1.8	10.
Benzo(g,h,i)perylene	U	10	ug/Kgdrywt	1	20	20.	2.0	10.
2-Methylnaphthalene-D10		50.5	%					
Fluorene-D10		60.5	%					
Pyrene-D10		72.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-5RA
Client ID: WTB-SB-14-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6538.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 11-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 95.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	10	ug/Kgdrywt	1	20	20.	2.6	10.
Acenaphthylene	U	10	ug/Kgdrywt	1	20	20.	1.2	10.
Acenaphthene	U	10	ug/Kgdrywt	1	20	20.	1.5	10.
Fluorene	U	10	ug/Kgdrywt	1	20	20.	3.3	10.
Phenanthrene	J	3.2	ug/Kgdrywt	1	20	20.	1.8	10.
Anthracene	U	10	ug/Kgdrywt	1	20	20.	1.2	10.
Fluoranthene	J	6.7	ug/Kgdrywt	1	20	20.	1.8	10.
Pyrene	J	10	ug/Kgdrywt	1	20	20.	2.1	10.
Benzo(a)anthracene	J	4.6	ug/Kgdrywt	1	20	20.	1.9	10.
Chrysene	U	10	ug/Kgdrywt	1	20	20.	1.7	10.
Benzo(b)Fluoranthene	J	13	ug/Kgdrywt	1	20	20.	2.4	10.
Benzo(k)fluoranthene	U	10	ug/Kgdrywt	1	20	20.	3.2	10.
Benzo(a)pyrene	J	7.1	ug/Kgdrywt	1	20	20.	3.4	10.
Indeno(1,2,3-cd)pyrene	J	9.8	ug/Kgdrywt	1	20	20.	1.9	10.
Dibenzo(a,h)anthracene	J	4.0	ug/Kgdrywt	1	20	20.	1.8	10.
Benzo(g,h,i)perylene	J	10	ug/Kgdrywt	1	20	20.	2.0	10.
2-Methylnaphthalene-D10		58.5	%					
Fluorene-D10		64.5	%					
Pyrene-D10		89.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-7
Client ID: WTB-SB-14-0607
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6503.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 10-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 94.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	10	ug/Kgdrywt	1	20	21.	2.7	10.
Acenaphthylene	U	10	ug/Kgdrywt	1	20	21.	1.2	10.
Acenaphthene		28	ug/Kgdrywt	1	20	21.	1.6	10.
Fluorene	J	8.0	ug/Kgdrywt	1	20	21.	3.3	10.
Phenanthrene		35	ug/Kgdrywt	1	20	21.	1.9	10.
Anthracene	J	16	ug/Kgdrywt	1	20	21.	1.2	10.
Fluoranthene		53	ug/Kgdrywt	1	20	21.	1.9	10.
Pyrene		64	ug/Kgdrywt	1	20	21.	2.2	10.
Benzo(a)anthracene		24	ug/Kgdrywt	1	20	21.	2.0	10.
Chrysene		69	ug/Kgdrywt	1	20	21.	1.8	10.
Benzo(b)Fluoranthene		38	ug/Kgdrywt	1	20	21.	2.5	10.
Benzo(k)fluoranthene	J	11	ug/Kgdrywt	1	20	21.	3.2	10.
Benzo(a)pyrene	J	20	ug/Kgdrywt	1	20	21.	3.4	10.
Indeno(1,2,3-cd)pyrene	J	12	ug/Kgdrywt	1	20	21.	2.0	10.
Dibenzo(a,h)anthracene	U	10	ug/Kgdrywt	1	20	21.	1.9	10.
Benzo(g,h,i)perylene	J	13	ug/Kgdrywt	1	20	21.	2.1	10.
2-Methylnaphthalene-D10		64.0	%					
Fluorene-D10		74.0	%					
Pyrene-D10		83.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-7RA
Client ID: WTB-SB-14-0607
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6537.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 11-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 94.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	10	ug/Kgdrywt	1	20	21.	2.7	10.
Acenaphthylene	U	10	ug/Kgdrywt	1	20	21.	1.2	10.
Acenaphthene		27	ug/Kgdrywt	1	20	21.	1.6	10.
Fluorene	J	6.9	ug/Kgdrywt	1	20	21.	3.3	10.
Phenanthrene		31	ug/Kgdrywt	1	20	21.	1.9	10.
Anthracene	J	15	ug/Kgdrywt	1	20	21.	1.2	10.
Fluoranthene		48	ug/Kgdrywt	1	20	21.	1.9	10.
Pyrene		70	ug/Kgdrywt	1	20	21.	2.2	10.
Benzo(a)anthracene		27	ug/Kgdrywt	1	20	21.	2.0	10.
Chrysene		56	ug/Kgdrywt	1	20	21.	1.8	10.
Benzo(b)Fluoranthene		54	ug/Kgdrywt	1	20	21.	2.5	10.
Benzo(k)fluoranthene	J	19	ug/Kgdrywt	1	20	21.	3.2	10.
Benzo(a)pyrene		30	ug/Kgdrywt	1	20	21.	3.4	10.
Indeno(1,2,3-cd)pyrene		22	ug/Kgdrywt	1	20	21.	2.0	10.
Dibenzo(a,h)anthracene	J	7.6	ug/Kgdrywt	1	20	21.	1.9	10.
Benzo(g,h,i)perylene		22	ug/Kgdrywt	1	20	21.	2.1	10.
2-Methylnaphthalene-D10		60.0	%					
Fluorene-D10		66.0	%					
Pyrene-D10		87.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-22
Client ID: WTB-SB-15-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6636.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 16-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 85.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	10	ug/Kgdrywt	1	20	21.	2.8	10.
Acenaphthylene	J	6.1	ug/Kgdrywt	1	20	21.	1.3	10.
Acenaphthene	J	7.4	ug/Kgdrywt	1	20	21.	1.6	10.
Fluorene	J	6.9	ug/Kgdrywt	1	20	21.	3.4	10.
Phenanthrene		120	ug/Kgdrywt	1	20	21.	1.9	10.
Anthracene		22	ug/Kgdrywt	1	20	21.	1.3	10.
Fluoranthene		160	ug/Kgdrywt	1	20	21.	1.9	10.
Pyrene		180	ug/Kgdrywt	1	20	21.	2.2	10.
Benzo(a)anthracene		110	ug/Kgdrywt	1	20	21.	2.0	10.
Chrysene		140	ug/Kgdrywt	1	20	21.	1.8	10.
Benzo(b)Fluoranthene		140	ug/Kgdrywt	1	20	21.	2.5	10.
Benzo(k)fluoranthene		58	ug/Kgdrywt	1	20	21.	3.3	10.
Benzo(a)pyrene		120	ug/Kgdrywt	1	20	21.	3.5	10.
Indeno(1,2,3-cd)pyrene		91	ug/Kgdrywt	1	20	21.	2.0	10.
Dibenzo(a,h)anthracene		36	ug/Kgdrywt	1	20	21.	1.9	10.
Benzo(g,h,i)perylene		92	ug/Kgdrywt	1	20	21.	2.1	10.
2-Methylnaphthalene-D10		53.5	%					
Fluorene-D10		66.5	%					
Pyrene-D10		70.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-24
Client ID: WTB-SB-15-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6644.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 16-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 85.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene		23	ug/Kgdrywt	1	20	23.	3.0	11.
Acenaphthylene	J	13	ug/Kgdrywt	1	20	23.	1.4	11.
Acenaphthene	J	12	ug/Kgdrywt	1	20	23.	1.7	11.
Fluorene	J	19	ug/Kgdrywt	1	20	23.	3.6	11.
Phenanthrene		340	ug/Kgdrywt	1	20	23.	2.0	11.
Anthracene		79	ug/Kgdrywt	1	20	23.	1.4	11.
Fluoranthene	E	460	ug/Kgdrywt	1	20	23.	2.0	11.
Pyrene	E	590	ug/Kgdrywt	1	20	23.	2.4	11.
Benzo(a)anthracene	E	400	ug/Kgdrywt	1	20	23.	2.2	11.
Chrysene	E	470	ug/Kgdrywt	1	20	23.	1.9	11.
Benzo(b)Fluoranthene	E	530	ug/Kgdrywt	1	20	23.	2.7	11.
Benzo(k)fluoranthene		220	ug/Kgdrywt	1	20	23.	3.5	11.
Benzo(a)pyrene		360	ug/Kgdrywt	1	20	23.	3.8	11.
Indeno(1,2,3-cd)pyrene		230	ug/Kgdrywt	1	20	23.	2.2	11.
Dibenzo(a,h)anthracene		72	ug/Kgdrywt	1	20	23.	2.0	11.
Benzo(g,h,i)perylene		210	ug/Kgdrywt	1	20	23.	2.3	11.
2-Methylnaphthalene-D10		62.0	%					
Fluorene-D10		65.0	%					
Pyrene-D10		71.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-24DL
Client ID: WTB-SB-15-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6669.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 17-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 85.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	25	ug/Kgdrywt	3	20	69.	8.9	34.
Acenaphthylene	J	11	ug/Kgdrywt	3	20	69.	4.1	34.
Acenaphthene	J	12	ug/Kgdrywt	3	20	69.	5.1	34.
Fluorene	J	19	ug/Kgdrywt	3	20	69.	11.	34.
Phenanthrene		360	ug/Kgdrywt	3	20	69.	6.2	34.
Anthracene		80	ug/Kgdrywt	3	20	69.	4.1	34.
Fluoranthene		440	ug/Kgdrywt	3	20	69.	6.2	34.
Pyrene		690	ug/Kgdrywt	3	20	69.	7.2	34.
Benzo(a)anthracene		410	ug/Kgdrywt	3	20	69.	6.5	34.
Chrysene		520	ug/Kgdrywt	3	20	69.	5.8	34.
Benzo(b)Fluoranthene		570	ug/Kgdrywt	3	20	69.	8.2	34.
Benzo(k)fluoranthene		180	ug/Kgdrywt	3	20	69.	11.	34.
Benzo(a)pyrene		360	ug/Kgdrywt	3	20	69.	11.	34.
Indeno(1,2,3-cd)pyrene		230	ug/Kgdrywt	3	20	69.	6.5	34.
Dibenzo(a,h)anthracene		81	ug/Kgdrywt	3	20	69.	6.2	34.
Benzo(g,h,i)perylene		220	ug/Kgdrywt	3	20	69.	6.9	34.
2-Methylnaphthalene-D10		64.8	%					
Fluorene-D10		69.6	%					
Pyrene-D10		78.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-26
Client ID: WTB-SB-16-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6648.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 16-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 90.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene		21	ug/Kgdrywt	1	20	20.	2.5	9.8
Acenaphthylene	J	13	ug/Kgdrywt	1	20	20.	1.2	9.8
Acenaphthene		21	ug/Kgdrywt	1	20	20.	1.5	9.8
Fluorene	J	11	ug/Kgdrywt	1	20	20.	3.1	9.8
Phenanthrene	E	710	ug/Kgdrywt	1	20	20.	1.8	9.8
Anthracene		120	ug/Kgdrywt	1	20	20.	1.2	9.8
Fluoranthene	E	1100	ug/Kgdrywt	1	20	20.	1.8	9.8
Pyrene	E	1400	ug/Kgdrywt	1	20	20.	2.0	9.8
Benzo(a)anthracene	E	970	ug/Kgdrywt	1	20	20.	1.8	9.8
Chrysene	E	1100	ug/Kgdrywt	1	20	20.	1.6	9.8
Benzo(b)Fluoranthene	E	1300	ug/Kgdrywt	1	20	20.	2.3	9.8
Benzo(k)fluoranthene	E	520	ug/Kgdrywt	1	20	20.	3.0	9.8
Benzo(a)pyrene	E	910	ug/Kgdrywt	1	20	20.	3.2	9.8
Indeno(1,2,3-cd)pyrene	E	740	ug/Kgdrywt	1	20	20.	1.8	9.8
Dibenzo(a,h)anthracene		210	ug/Kgdrywt	1	20	20.	1.8	9.8
Benzo(g,h,i)perylene	E	720	ug/Kgdrywt	1	20	20.	2.0	9.8
2-Methylnaphthalene-D10		66.5	%					
Fluorene-D10		70.0	%					
Pyrene-D10		90.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-26DL
Client ID: WTB-SB-16-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6670.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 17-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 90.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	78	ug/Kgdrywt	8	20	160	20.	78.
Acenaphthylene	U	78	ug/Kgdrywt	8	20	160	9.4	78.
Acenaphthene	J	22	ug/Kgdrywt	8	20	160	12.	78.
Fluorene	U	78	ug/Kgdrywt	8	20	160	25.	78.
Phenanthrene		730	ug/Kgdrywt	8	20	160	14.	78.
Anthracene	J	100	ug/Kgdrywt	8	20	160	9.4	78.
Fluoranthene		1100	ug/Kgdrywt	8	20	160	14.	78.
Pyrene		1400	ug/Kgdrywt	8	20	160	16.	78.
Benzo(a)anthracene		880	ug/Kgdrywt	8	20	160	15.	78.
Chrysene		1000	ug/Kgdrywt	8	20	160	13.	78.
Benzo(b)Fluoranthene		1500	ug/Kgdrywt	8	20	160	19.	78.
Benzo(k)fluoranthene		510	ug/Kgdrywt	8	20	160	24.	78.
Benzo(a)pyrene		1000	ug/Kgdrywt	8	20	160	26.	78.
Indeno(1,2,3-cd)pyrene		800	ug/Kgdrywt	8	20	160	15.	78.
Dibenzo(a,h)anthracene		220	ug/Kgdrywt	8	20	160	14.	78.
Benzo(g,h,i)perylene		720	ug/Kgdrywt	8	20	160	16.	78.
2-Methylnaphthalene-D10		63.2	%					
Fluorene-D10		76.0	%					
Pyrene-D10		84.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-27
Client ID: WTB-SB-16-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6638.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 16-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 83.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	13	ug/Kgdrywt	1	20	23.	3.0	11.
Acenaphthylene	J	5.4	ug/Kgdrywt	1	20	23.	1.4	11.
Acenaphthene	J	1.9	ug/Kgdrywt	1	20	23.	1.7	11.
Fluorene	J	7.4	ug/Kgdrywt	1	20	23.	3.6	11.
Phenanthrene		120	ug/Kgdrywt	1	20	23.	2.0	11.
Anthracene	J	23	ug/Kgdrywt	1	20	23.	1.4	11.
Fluoranthene		190	ug/Kgdrywt	1	20	23.	2.0	11.
Pyrene		240	ug/Kgdrywt	1	20	23.	2.4	11.
Benzo(a)anthracene		240	ug/Kgdrywt	1	20	23.	2.2	11.
Chrysene		320	ug/Kgdrywt	1	20	23.	1.9	11.
Benzo(b)Fluoranthene		350	ug/Kgdrywt	1	20	23.	2.7	11.
Benzo(k)fluoranthene		120	ug/Kgdrywt	1	20	23.	3.5	11.
Benzo(a)pyrene		250	ug/Kgdrywt	1	20	23.	3.8	11.
Indeno(1,2,3-cd)pyrene		170	ug/Kgdrywt	1	20	23.	2.2	11.
Dibenzo(a,h)anthracene		62	ug/Kgdrywt	1	20	23.	2.0	11.
Benzo(g,h,i)perylene		140	ug/Kgdrywt	1	20	23.	2.3	11.
2-Methylnaphthalene-D10		51.5	%					
Fluorene-D10		62.0	%					
Pyrene-D10		63.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-9
Client ID: WTB-SB-17-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6504.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 10-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 91.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	11	ug/Kgdrywt	1	20	21.	2.8	11.
Acenaphthylene	U	11	ug/Kgdrywt	1	20	21.	1.3	11.
Acenaphthene	U	11	ug/Kgdrywt	1	20	21.	1.6	11.
Fluorene	U	11	ug/Kgdrywt	1	20	21.	3.4	11.
Phenanthrene		40	ug/Kgdrywt	1	20	21.	1.9	11.
Anthracene	J	7.1	ug/Kgdrywt	1	20	21.	1.3	11.
Fluoranthene		46	ug/Kgdrywt	1	20	21.	1.9	11.
Pyrene		55	ug/Kgdrywt	1	20	21.	2.2	11.
Benzo(a)anthracene		40	ug/Kgdrywt	1	20	21.	2.0	11.
Chrysene		60	ug/Kgdrywt	1	20	21.	1.8	11.
Benzo(b)Fluoranthene		51	ug/Kgdrywt	1	20	21.	2.6	11.
Benzo(k)fluoranthene	J	14	ug/Kgdrywt	1	20	21.	3.3	11.
Benzo(a)pyrene		30	ug/Kgdrywt	1	20	21.	3.5	11.
Indeno(1,2,3-cd)pyrene	J	16	ug/Kgdrywt	1	20	21.	2.0	11.
Dibenzo(a,h)anthracene	U	11	ug/Kgdrywt	1	20	21.	1.9	11.
Benzo(g,h,i)perylene	J	17	ug/Kgdrywt	1	20	21.	2.1	11.
2-Methylnaphthalene-D10		53.0	%					
Fluorene-D10		65.5	%					
Pyrene-D10		68.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-10DL2
Client ID: WTB-SB-17-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6665.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 17-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 82.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene		160	ug/Kgdrywt	5	20	120	15.	58.
Acenaphthylene	J	48	ug/Kgdrywt	5	20	120	7.0	58.
Acenaphthene	J	67	ug/Kgdrywt	5	20	120	8.7	58.
Fluorene	J	47	ug/Kgdrywt	5	20	120	19.	58.
Phenanthrene		540	ug/Kgdrywt	5	20	120	10.	58.
Anthracene	J	95	ug/Kgdrywt	5	20	120	7.0	58.
Fluoranthene		270	ug/Kgdrywt	5	20	120	10.	58.
Pyrene		400	ug/Kgdrywt	5	20	120	12.	58.
Benzo(a)anthracene		200	ug/Kgdrywt	5	20	120	11.	58.
Chrysene		230	ug/Kgdrywt	5	20	120	9.9	58.
Benzo(b)Fluoranthene		510	ug/Kgdrywt	5	20	120	14.	58.
Benzo(k)fluoranthene		160	ug/Kgdrywt	5	20	120	18.	58.
Benzo(a)pyrene		370	ug/Kgdrywt	5	20	120	19.	58.
Indeno(1,2,3-cd)pyrene		230	ug/Kgdrywt	5	20	120	11.	58.
Dibenzo(a,h)anthracene	J	98	ug/Kgdrywt	5	20	120	10.	58.
Benzo(g,h,i)perylene		240	ug/Kgdrywt	5	20	120	12.	58.
2-Methylnaphthalene-D10	*	98.8	%					
Fluorene-D10		66.0	%					
Pyrene-D10		66.8	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-29
Client ID: WTB-SB-18-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6640.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 16-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 84.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	11	ug/Kgdrywt	1	20	23.	3.0	11.
Acenaphthylene	U	11	ug/Kgdrywt	1	20	23.	1.4	11.
Acenaphthene	J	14	ug/Kgdrywt	1	20	23.	1.7	11.
Fluorene	J	16	ug/Kgdrywt	1	20	23.	3.7	11.
Phenanthrene		230	ug/Kgdrywt	1	20	23.	2.1	11.
Anthracene		66	ug/Kgdrywt	1	20	23.	1.4	11.
Fluoranthene		250	ug/Kgdrywt	1	20	23.	2.1	11.
Pyrene		300	ug/Kgdrywt	1	20	23.	2.4	11.
Benzo(a)anthracene		150	ug/Kgdrywt	1	20	23.	2.2	11.
Chrysene		180	ug/Kgdrywt	1	20	23.	2.0	11.
Benzo(b)Fluoranthene		150	ug/Kgdrywt	1	20	23.	2.8	11.
Benzo(k)fluoranthene		69	ug/Kgdrywt	1	20	23.	3.6	11.
Benzo(a)pyrene		120	ug/Kgdrywt	1	20	23.	3.8	11.
Indeno(1,2,3-cd)pyrene		76	ug/Kgdrywt	1	20	23.	2.2	11.
Dibenzo(a,h)anthracene		30	ug/Kgdrywt	1	20	23.	2.1	11.
Benzo(g,h,i)perylene		70	ug/Kgdrywt	1	20	23.	2.3	11.
2-Methylnaphthalene-D10		48.6	%					
Fluorene-D10		59.0	%					
Pyrene-D10		65.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-30
Client ID: WTB-SB-18-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6641.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 16-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 83.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	12	ug/Kgdrywt	1	20	24.	3.1	12.
Acenaphthylene	U	12	ug/Kgdrywt	1	20	24.	1.4	12.
Acenaphthene	U	12	ug/Kgdrywt	1	20	24.	1.8	12.
Fluorene	J	5.6	ug/Kgdrywt	1	20	24.	3.9	12.
Phenanthrene		110	ug/Kgdrywt	1	20	24.	2.2	12.
Anthracene	J	21	ug/Kgdrywt	1	20	24.	1.4	12.
Fluoranthene		160	ug/Kgdrywt	1	20	24.	2.2	12.
Pyrene		190	ug/Kgdrywt	1	20	24.	2.5	12.
Benzo(a)anthracene		130	ug/Kgdrywt	1	20	24.	2.3	12.
Chrysene		170	ug/Kgdrywt	1	20	24.	2.0	12.
Benzo(b)Fluoranthene		150	ug/Kgdrywt	1	20	24.	2.9	12.
Benzo(k)fluoranthene		70	ug/Kgdrywt	1	20	24.	3.8	12.
Benzo(a)pyrene		120	ug/Kgdrywt	1	20	24.	4.0	12.
Indeno(1,2,3-cd)pyrene		96	ug/Kgdrywt	1	20	24.	2.3	12.
Dibenzo(a,h)anthracene		29	ug/Kgdrywt	1	20	24.	2.2	12.
Benzo(g,h,i)perylene		93	ug/Kgdrywt	1	20	24.	2.4	12.
2-Methylnaphthalene-D10		57.0	%					
Fluorene-D10		65.5	%					
Pyrene-D10		68.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-12
Client ID: WTB-SB-19-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6576.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 13-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 87.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	10	ug/Kgdrywt	1	20	21.	2.7	10.
Acenaphthylene	U	10	ug/Kgdrywt	1	20	21.	1.2	10.
Acenaphthene	J	14	ug/Kgdrywt	1	20	21.	1.6	10.
Fluorene	J	18	ug/Kgdrywt	1	20	21.	3.3	10.
Phenanthrene		210	ug/Kgdrywt	1	20	21.	1.9	10.
Anthracene		44	ug/Kgdrywt	1	20	21.	1.2	10.
Fluoranthene		210	ug/Kgdrywt	1	20	21.	1.9	10.
Pyrene		340	ug/Kgdrywt	1	20	21.	2.2	10.
Benzo(a)anthracene		170	ug/Kgdrywt	1	20	21.	2.0	10.
Chrysene		210	ug/Kgdrywt	1	20	21.	1.8	10.
Benzo(b)Fluoranthene		230	ug/Kgdrywt	1	20	21.	2.5	10.
Benzo(k)fluoranthene		69	ug/Kgdrywt	1	20	21.	3.2	10.
Benzo(a)pyrene		140	ug/Kgdrywt	1	20	21.	3.4	10.
Indeno(1,2,3-cd)pyrene		84	ug/Kgdrywt	1	20	21.	2.0	10.
Dibenzo(a,h)anthracene		31	ug/Kgdrywt	1	20	21.	1.9	10.
Benzo(g,h,i)perylene		76	ug/Kgdrywt	1	20	21.	2.1	10.
2-Methylnaphthalene-D10		65.0	%					
Fluorene-D10		61.0	%					
Pyrene-D10		89.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-13
Client ID: WTB-SB-19-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6501.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 10-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 89.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	11	ug/Kgdrywt	1	20	22.	2.9	11.
Acenaphthylene	U	11	ug/Kgdrywt	1	20	22.	1.4	11.
Acenaphthene	U	11	ug/Kgdrywt	1	20	22.	1.7	11.
Fluorene	U	11	ug/Kgdrywt	1	20	22.	3.6	11.
Phenanthrene		91	ug/Kgdrywt	1	20	22.	2.0	11.
Anthracene	J	22	ug/Kgdrywt	1	20	22.	1.4	11.
Fluoranthene		180	ug/Kgdrywt	1	20	22.	2.0	11.
Pyrene		180	ug/Kgdrywt	1	20	22.	2.4	11.
Benzo(a)anthracene		130	ug/Kgdrywt	1	20	22.	2.1	11.
Chrysene		140	ug/Kgdrywt	1	20	22.	1.9	11.
Benzo(b)Fluoranthene		150	ug/Kgdrywt	1	20	22.	2.7	11.
Benzo(k)fluoranthene		62	ug/Kgdrywt	1	20	22.	3.5	11.
Benzo(a)pyrene		110	ug/Kgdrywt	1	20	22.	3.7	11.
Indeno(1,2,3-cd)pyrene		64	ug/Kgdrywt	1	20	22.	2.1	11.
Dibenzo(a,h)anthracene	J	20	ug/Kgdrywt	1	20	22.	2.0	11.
Benzo(g,h,i)perylene		64	ug/Kgdrywt	1	20	22.	2.2	11.
2-Methylnaphthalene-D10		56.0	%					
Fluorene-D10		71.0	%					
Pyrene-D10		72.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-33
Client ID: WTB-SB-20-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6673.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 17-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 84.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	12	ug/Kgdrywt	1	20	24.	3.0	12.
Acenaphthylene	U	12	ug/Kgdrywt	1	20	24.	1.4	12.
Acenaphthene	U	12	ug/Kgdrywt	1	20	24.	1.8	12.
Fluorene	J	3.9	ug/Kgdrywt	1	20	24.	3.8	12.
Phenanthrene	MM	61	ug/Kgdrywt	1	20	24.	2.1	12.
Anthracene	J	6.4	ug/Kgdrywt	1	20	24.	1.4	12.
Fluoranthene	MM	48	ug/Kgdrywt	1	20	24.	2.1	12.
Pyrene	MM	84	ug/Kgdrywt	1	20	24.	2.5	12.
Benzo(a)anthracene	MM	38	ug/Kgdrywt	1	20	24.	2.2	12.
Chrysene	MM	69	ug/Kgdrywt	1	20	24.	2.0	12.
Benzo(b)Fluoranthene	MM	58	ug/Kgdrywt	1	20	24.	2.8	12.
Benzo(k)fluoranthene	J	12	ug/Kgdrywt	1	20	24.	3.6	12.
Benzo(a)pyrene	MM	32	ug/Kgdrywt	1	20	24.	3.9	12.
Indeno(1,2,3-cd)pyrene	MM	28	ug/Kgdrywt	1	20	24.	2.2	12.
Dibenzo(a,h)anthracene	JM	11	ug/Kgdrywt	1	20	24.	2.1	12.
Benzo(g,h,i)perylene	MM	27	ug/Kgdrywt	1	20	24.	2.4	12.
2-Methylnaphthalene-D10		50.0	%					
Fluorene-D10		61.0	%					
Pyrene-D10		85.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-34
Client ID: WTB-SB-20-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6677.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 17-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 82.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	12	ug/Kgdrywt	1	20	23.	3.0	12.
Acenaphthylene	U	12	ug/Kgdrywt	1	20	23.	1.4	12.
Acenaphthene	U	12	ug/Kgdrywt	1	20	23.	1.7	12.
Fluorene	J	8.5	ug/Kgdrywt	1	20	23.	3.7	12.
Phenanthrene		120	ug/Kgdrywt	1	20	23.	2.1	12.
Anthracene	J	20	ug/Kgdrywt	1	20	23.	1.4	12.
Fluoranthene		99	ug/Kgdrywt	1	20	23.	2.1	12.
Pyrene		150	ug/Kgdrywt	1	20	23.	2.4	12.
Benzo(a)anthracene		80	ug/Kgdrywt	1	20	23.	2.2	12.
Chrysene		79	ug/Kgdrywt	1	20	23.	2.0	12.
Benzo(b)Fluoranthene		92	ug/Kgdrywt	1	20	23.	2.8	12.
Benzo(k)fluoranthene		29	ug/Kgdrywt	1	20	23.	3.6	12.
Benzo(a)pyrene		68	ug/Kgdrywt	1	20	23.	3.8	12.
Indeno(1,2,3-cd)pyrene		44	ug/Kgdrywt	1	20	23.	2.2	12.
Dibenzo(a,h)anthracene	J	19	ug/Kgdrywt	1	20	23.	2.1	12.
Benzo(g,h,i)perylene		39	ug/Kgdrywt	1	20	23.	2.3	12.
2-Methylnaphthalene-D10		49.4	%					
Fluorene-D10		64.0	%					
Pyrene-D10		79.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-36
Client ID: WTB-SB-21-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6679.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 17-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 92.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	10	ug/Kgdrywt	1	20	21.	2.7	10.
Acenaphthylene	J	7.9	ug/Kgdrywt	1	20	21.	1.2	10.
Acenaphthene	J	4.4	ug/Kgdrywt	1	20	21.	1.6	10.
Fluorene	J	7.2	ug/Kgdrywt	1	20	21.	3.3	10.
Phenanthrene		150	ug/Kgdrywt	1	20	21.	1.9	10.
Anthracene		30	ug/Kgdrywt	1	20	21.	1.2	10.
Fluoranthene		220	ug/Kgdrywt	1	20	21.	1.9	10.
Pyrene		310	ug/Kgdrywt	1	20	21.	2.2	10.
Benzo(a)anthracene		250	ug/Kgdrywt	1	20	21.	2.0	10.
Chrysene		290	ug/Kgdrywt	1	20	21.	1.8	10.
Benzo(b)Fluoranthene		310	ug/Kgdrywt	1	20	21.	2.5	10.
Benzo(k)fluoranthene		120	ug/Kgdrywt	1	20	21.	3.2	10.
Benzo(a)pyrene		210	ug/Kgdrywt	1	20	21.	3.4	10.
Indeno(1,2,3-cd)pyrene		120	ug/Kgdrywt	1	20	21.	2.0	10.
Dibenzo(a,h)anthracene		44	ug/Kgdrywt	1	20	21.	1.9	10.
Benzo(g,h,i)perylene		95	ug/Kgdrywt	1	20	21.	2.1	10.
2-Methylnaphthalene-D10		69.5	%					
Fluorene-D10		65.0	%					
Pyrene-D10		89.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-37
Client ID: WTB-SB-21-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6680.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 17-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 75.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	20	ug/Kgdrywt	1	20	25.	3.3	13.
Acenaphthylene	J	8.1	ug/Kgdrywt	1	20	25.	1.5	13.
Acenaphthene		54	ug/Kgdrywt	1	20	25.	1.9	13.
Fluorene		58	ug/Kgdrywt	1	20	25.	4.0	13.
Phenanthrene	E	640	ug/Kgdrywt	1	20	25.	2.3	13.
Anthracene		190	ug/Kgdrywt	1	20	25.	1.5	13.
Fluoranthene	E	620	ug/Kgdrywt	1	20	25.	2.3	13.
Pyrene	E	660	ug/Kgdrywt	1	20	25.	2.6	13.
Benzo(a)anthracene	E	450	ug/Kgdrywt	1	20	25.	2.4	13.
Chrysene	E	450	ug/Kgdrywt	1	20	25.	2.2	13.
Benzo(b)Fluoranthene	E	520	ug/Kgdrywt	1	20	25.	3.0	13.
Benzo(k)fluoranthene		170	ug/Kgdrywt	1	20	25.	3.9	13.
Benzo(a)pyrene		360	ug/Kgdrywt	1	20	25.	4.2	13.
Indeno(1,2,3-cd)pyrene		180	ug/Kgdrywt	1	20	25.	2.4	13.
Dibenzo(a,h)anthracene		60	ug/Kgdrywt	1	20	25.	2.3	13.
Benzo(g,h,i)perylene		150	ug/Kgdrywt	1	20	25.	2.5	13.
2-Methylnaphthalene-D10		58.5	%					
Fluorene-D10		62.0	%					
Pyrene-D10		63.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-37DL
Client ID: WTB-SB-21-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6702.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 18-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 75.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	19	ug/Kgdrywt	3	20	76.	9.9	38.
Acenaphthylene	J	7.0	ug/Kgdrywt	3	20	76.	4.6	38.
Acenaphthene	J	53	ug/Kgdrywt	3	20	76.	5.7	38.
Fluorene	J	59	ug/Kgdrywt	3	20	76.	12.	38.
Phenanthrene		610	ug/Kgdrywt	3	20	76.	6.8	38.
Anthracene		180	ug/Kgdrywt	3	20	76.	4.6	38.
Fluoranthene		630	ug/Kgdrywt	3	20	76.	6.8	38.
Pyrene		610	ug/Kgdrywt	3	20	76.	8.0	38.
Benzo(a)anthracene		410	ug/Kgdrywt	3	20	76.	7.2	38.
Chrysene		370	ug/Kgdrywt	3	20	76.	6.4	38.
Benzo(b)Fluoranthene		380	ug/Kgdrywt	3	20	76.	9.1	38.
Benzo(k)fluoranthene		120	ug/Kgdrywt	3	20	76.	12.	38.
Benzo(a)pyrene		280	ug/Kgdrywt	3	20	76.	12.	38.
Indeno(1,2,3-cd)pyrene		160	ug/Kgdrywt	3	20	76.	7.2	38.
Dibenzo(a,h)anthracene	J	49	ug/Kgdrywt	3	20	76.	6.8	38.
Benzo(g,h,i)perylene		140	ug/Kgdrywt	3	20	76.	7.6	38.
2-Methylnaphthalene-D10		57.3	%					
Fluorene-D10		69.6	%					
Pyrene-D10		63.6	%					

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Cert No E87604

Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-5
Client ID: WTB-SB-22-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6642.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 16-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 84.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	12	ug/Kgdrywt	1	20	23.	3.0	12.
Acenaphthylene	J	2.3	ug/Kgdrywt	1	20	23.	1.4	12.
Acenaphthene	J	4.7	ug/Kgdrywt	1	20	23.	1.7	12.
Fluorene	J	8.7	ug/Kgdrywt	1	20	23.	3.7	12.
Phenanthrene		230	ug/Kgdrywt	1	20	23.	2.1	12.
Anthracene		62	ug/Kgdrywt	1	20	23.	1.4	12.
Fluoranthene	E	1200	ug/Kgdrywt	1	20	23.	2.1	12.
Pyrene	E	1400	ug/Kgdrywt	1	20	23.	2.4	12.
Benzo(a)anthracene	E	1300	ug/Kgdrywt	1	20	23.	2.2	12.
Chrysene	E	1400	ug/Kgdrywt	1	20	23.	2.0	12.
Benzo(b)Fluoranthene	E	1600	ug/Kgdrywt	1	20	23.	2.8	12.
Benzo(k)fluoranthene	E	530	ug/Kgdrywt	1	20	23.	3.6	12.
Benzo(a)pyrene	E	1000	ug/Kgdrywt	1	20	23.	3.8	12.
Indeno(1,2,3-cd)pyrene	E	670	ug/Kgdrywt	1	20	23.	2.2	12.
Dibenzo(a,h)anthracene		220	ug/Kgdrywt	1	20	23.	2.1	12.
Benzo(g,h,i)perylene	E	580	ug/Kgdrywt	1	20	23.	2.3	12.
2-Methylnaphthalene-D10		45.2	%					
Fluorene-D10		61.0	%					
Pyrene-D10		58.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-5DL
Client ID: WTB-SB-22-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6607.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 15-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 84.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	92	ug/Kgdrywt	8	20	180	24.	92.
Acenaphthylene	U	92	ug/Kgdrywt	8	20	180	11.	92.
Acenaphthene	U	92	ug/Kgdrywt	8	20	180	14.	92.
Fluorene	U	92	ug/Kgdrywt	8	20	180	30.	92.
Phenanthrene		230	ug/Kgdrywt	8	20	180	17.	92.
Anthracene	J	62	ug/Kgdrywt	8	20	180	11.	92.
Fluoranthene		1600	ug/Kgdrywt	8	20	180	17.	92.
Pyrene		1500	ug/Kgdrywt	8	20	180	19.	92.
Benzo(a)anthracene		1400	ug/Kgdrywt	8	20	180	18.	92.
Chrysene		1500	ug/Kgdrywt	8	20	180	16.	92.
Benzo(b)Fluoranthene		1800	ug/Kgdrywt	8	20	180	22.	92.
Benzo(k)fluoranthene		840	ug/Kgdrywt	8	20	180	29.	92.
Benzo(a)pyrene		1200	ug/Kgdrywt	8	20	180	30.	92.
Indeno(1,2,3-cd)pyrene		670	ug/Kgdrywt	8	20	180	18.	92.
Dibenzo(a,h)anthracene		200	ug/Kgdrywt	8	20	180	17.	92.
Benzo(g,h,i)perylene		610	ug/Kgdrywt	8	20	180	18.	92.
2-Methylnaphthalene-D10		46.0	%					
Fluorene-D10		64.0	%					
Pyrene-D10		59.6	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-6
Client ID: WTB-SB-22-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6622.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 15-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 75.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	9.1	ug/Kgdrywt	1	20	26.	3.4	13.
Acenaphthylene	U	13	ug/Kgdrywt	1	20	26.	1.6	13.
Acenaphthene	J	23	ug/Kgdrywt	1	20	26.	2.0	13.
Fluorene	J	23	ug/Kgdrywt	1	20	26.	4.2	13.
Phenanthrene		250	ug/Kgdrywt	1	20	26.	2.4	13.
Anthracene		57	ug/Kgdrywt	1	20	26.	1.6	13.
Fluoranthene		280	ug/Kgdrywt	1	20	26.	2.4	13.
Pyrene		420	ug/Kgdrywt	1	20	26.	2.8	13.
Benzo(a)anthracene		230	ug/Kgdrywt	1	20	26.	2.5	13.
Chrysene		300	ug/Kgdrywt	1	20	26.	2.2	13.
Benzo(b)Fluoranthene		330	ug/Kgdrywt	1	20	26.	3.2	13.
Benzo(k)fluoranthene		100	ug/Kgdrywt	1	20	26.	4.1	13.
Benzo(a)pyrene		200	ug/Kgdrywt	1	20	26.	4.3	13.
Indeno(1,2,3-cd)pyrene		150	ug/Kgdrywt	1	20	26.	2.5	13.
Dibenzo(a,h)anthracene		55	ug/Kgdrywt	1	20	26.	2.4	13.
Benzo(g,h,i)perylene		140	ug/Kgdrywt	1	20	26.	2.6	13.
2-Methylnaphthalene-D10		65.5	%					
Fluorene-D10		64.0	%					
Pyrene-D10		87.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-9DL
Client ID: WTB-SB-23-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6617.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 15-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 87.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene		470	ug/Kgdrywt	10	20	210	28.	110
Acenaphthylene		290	ug/Kgdrywt	10	20	210	13.	110
Acenaphthene		2200	ug/Kgdrywt	10	20	210	16.	110
Fluorene		2200	ug/Kgdrywt	10	20	210	34.	110
Phenanthrene	E	12000	ug/Kgdrywt	10	20	210	19.	110
Anthracene	E	4800	ug/Kgdrywt	10	20	210	13.	110
Fluoranthene	E	21000	ug/Kgdrywt	10	20	210	19.	110
Pyrene	E	28000	ug/Kgdrywt	10	20	210	22.	110
Benzo(a)anthracene	E	14000	ug/Kgdrywt	10	20	210	20.	110
Chrysene	E	13000	ug/Kgdrywt	10	20	210	18.	110
Benzo(b)Fluoranthene	E	16000	ug/Kgdrywt	10	20	210	26.	110
Benzo(k)fluoranthene	E	6600	ug/Kgdrywt	10	20	210	33.	110
Benzo(a)pyrene	E	12000	ug/Kgdrywt	10	20	210	35.	110
Indeno(1,2,3-cd)pyrene	E	6400	ug/Kgdrywt	10	20	210	20.	110
Dibenzo(a,h)anthracene		1600	ug/Kgdrywt	10	20	210	19.	110
Benzo(g,h,i)perylene	E	5200	ug/Kgdrywt	10	20	210	21.	110
2-Methylnaphthalene-D10	D	0.00	%					
Fluorene-D10	D	0.00	%					
Pyrene-D10	D	0.00	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-9DL2
Client ID: WTB-SB-23-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6609.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 15-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 87.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	530	ug/Kgdrywt	100	20	2100	280	1100
Acenaphthylene	J	260	ug/Kgdrywt	100	20	2100	130	1100
Acenaphthene		2100	ug/Kgdrywt	100	20	2100	160	1100
Fluorene		2200	ug/Kgdrywt	100	20	2100	340	1100
Phenanthrene		13000	ug/Kgdrywt	100	20	2100	190	1100
Anthracene		5100	ug/Kgdrywt	100	20	2100	130	1100
Fluoranthene		33000	ug/Kgdrywt	100	20	2100	190	1100
Pyrene		25000	ug/Kgdrywt	100	20	2100	220	1100
Benzo(a)anthracene		14000	ug/Kgdrywt	100	20	2100	200	1100
Chrysene		13000	ug/Kgdrywt	100	20	2100	180	1100
Benzo(b)Fluoranthene		17000	ug/Kgdrywt	100	20	2100	260	1100
Benzo(k)fluoranthene		6700	ug/Kgdrywt	100	20	2100	330	1100
Benzo(a)pyrene		12000	ug/Kgdrywt	100	20	2100	350	1100
Indeno(1,2,3-cd)pyrene		6500	ug/Kgdrywt	100	20	2100	200	1100
Dibenzo(a,h)anthracene	J	1600	ug/Kgdrywt	100	20	2100	190	1100
Benzo(g,h,i)perylene		6100	ug/Kgdrywt	100	20	2100	210	1100
2-Methylnaphthalene-D10	D	0.00	%					
Fluorene-D10	D	0.00	%					
Pyrene-D10	D	0.00	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-10DL
Client ID: WTB-SB-23-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6717.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 19-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 63.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	190	ug/Kgdrywt	10	20	300	40.	150
Acenaphthylene	J	160	ug/Kgdrywt	10	20	300	18.	150
Acenaphthene		1400	ug/Kgdrywt	10	20	300	23.	150
Fluorene		1500	ug/Kgdrywt	10	20	300	49.	150
Phenanthrene	E	9200	ug/Kgdrywt	10	20	300	27.	150
Anthracene		3000	ug/Kgdrywt	10	20	300	18.	150
Fluoranthene	E	16000	ug/Kgdrywt	10	20	300	27.	150
Pyrene	E	17000	ug/Kgdrywt	10	20	300	32.	150
Benzo(a)anthracene	E	8200	ug/Kgdrywt	10	20	300	29.	150
Chrysene	E	7700	ug/Kgdrywt	10	20	300	26.	150
Benzo(b)Fluoranthene	E	9800	ug/Kgdrywt	10	20	300	36.	150
Benzo(k)fluoranthene		3900	ug/Kgdrywt	10	20	300	47.	150
Benzo(a)pyrene	E	7100	ug/Kgdrywt	10	20	300	50.	150
Indeno(1,2,3-cd)pyrene		4000	ug/Kgdrywt	10	20	300	29.	150
Dibenzo(a,h)anthracene		1600	ug/Kgdrywt	10	20	300	27.	150
Benzo(g,h,i)perylene		3600	ug/Kgdrywt	10	20	300	30.	150
2-Methylnaphthalene-D10	D	0.00	%					
Fluorene-D10	D	0.00	%					
Pyrene-D10	D	0.00	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-10DL2
Client ID: WTB-SB-23-0610
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6719.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 19-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 63.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	1500	ug/Kgdrywt	100	20	3000	400	1500
Acenaphthylene	U	1500	ug/Kgdrywt	100	20	3000	180	1500
Acenaphthene	J	1300	ug/Kgdrywt	100	20	3000	230	1500
Fluorene	J	1500	ug/Kgdrywt	100	20	3000	490	1500
Phenanthrene		7900	ug/Kgdrywt	100	20	3000	270	1500
Anthracene		3200	ug/Kgdrywt	100	20	3000	180	1500
Fluoranthene		17000	ug/Kgdrywt	100	20	3000	270	1500
Pyrene		14000	ug/Kgdrywt	100	20	3000	320	1500
Benzo(a)anthracene		7400	ug/Kgdrywt	100	20	3000	290	1500
Chrysene		7200	ug/Kgdrywt	100	20	3000	260	1500
Benzo(b)Fluoranthene		9000	ug/Kgdrywt	100	20	3000	360	1500
Benzo(k)fluoranthene	J	2400	ug/Kgdrywt	100	20	3000	470	1500
Benzo(a)pyrene		6400	ug/Kgdrywt	100	20	3000	500	1500
Indeno(1,2,3-cd)pyrene		4400	ug/Kgdrywt	100	20	3000	290	1500
Dibenzo(a,h)anthracene	J	1300	ug/Kgdrywt	100	20	3000	270	1500
Benzo(g,h,i)perylene		4200	ug/Kgdrywt	100	20	3000	300	1500
2-Methylnaphthalene-D10	D	0.00	%					
Fluorene-D10	D	0.00	%					
Pyrene-D10	D	0.00	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-3
Client ID: WTB-SB-24-0206
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6558.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 12-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 93.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	9.1	ug/Kgdrywt	1	20	18.	2.4	9.1
Acenaphthylene	U	9.1	ug/Kgdrywt	1	20	18.	1.1	9.1
Acenaphthene	U	9.1	ug/Kgdrywt	1	20	18.	1.4	9.1
Fluorene	U	9.1	ug/Kgdrywt	1	20	18.	2.9	9.1
Phenanthrene	U	9.1	ug/Kgdrywt	1	20	18.	1.6	9.1
Anthracene	U	9.1	ug/Kgdrywt	1	20	18.	1.1	9.1
Fluoranthene	U	9.1	ug/Kgdrywt	1	20	18.	1.6	9.1
Pyrene	U	9.1	ug/Kgdrywt	1	20	18.	1.9	9.1
Benzo(a)anthracene	U	9.1	ug/Kgdrywt	1	20	18.	1.7	9.1
Chrysene	U	9.1	ug/Kgdrywt	1	20	18.	1.6	9.1
Benzo(b)Fluoranthene	U	9.1	ug/Kgdrywt	1	20	18.	2.2	9.1
Benzo(k)fluoranthene	U	9.1	ug/Kgdrywt	1	20	18.	2.8	9.1
Benzo(a)pyrene	U	9.1	ug/Kgdrywt	1	20	18.	3.0	9.1
Indeno(1,2,3-cd)pyrene	U	9.1	ug/Kgdrywt	1	20	18.	1.7	9.1
Dibenzo(a,h)anthracene	U	9.1	ug/Kgdrywt	1	20	18.	1.6	9.1
Benzo(g,h,i)perylene	U	9.1	ug/Kgdrywt	1	20	18.	1.8	9.1
2-Methylnaphthalene-D10		57.5	%					
Fluorene-D10		63.5	%					
Pyrene-D10		84.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-4
Client ID: WTB-SB-24-069.7
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6572.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 12-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 86.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	9.8	ug/Kgdrywt	1	20	20.	2.5	9.8
Acenaphthylene	U	9.8	ug/Kgdrywt	1	20	20.	1.2	9.8
Acenaphthene	U	9.8	ug/Kgdrywt	1	20	20.	1.5	9.8
Fluorene	U	9.8	ug/Kgdrywt	1	20	20.	3.1	9.8
Phenanthrene	J	16	ug/Kgdrywt	1	20	20.	1.8	9.8
Anthracene	J	1.9	ug/Kgdrywt	1	20	20.	1.2	9.8
Fluoranthene	J	3.8	ug/Kgdrywt	1	20	20.	1.8	9.8
Pyrene	J	10	ug/Kgdrywt	1	20	20.	2.0	9.8
Benzo(a)anthracene	U	9.8	ug/Kgdrywt	1	20	20.	1.8	9.8
Chrysene	U	9.8	ug/Kgdrywt	1	20	20.	1.6	9.8
Benzo(b)Fluoranthene	U	9.8	ug/Kgdrywt	1	20	20.	2.3	9.8
Benzo(k)fluoranthene	U	9.8	ug/Kgdrywt	1	20	20.	3.0	9.8
Benzo(a)pyrene	UMM	9.8	ug/Kgdrywt	1	20	20.	3.2	9.8
Indeno(1,2,3-cd)pyrene	U	9.8	ug/Kgdrywt	1	20	20.	1.8	9.8
Dibenzo(a,h)anthracene	U	9.8	ug/Kgdrywt	1	20	20.	1.8	9.8
Benzo(g,h,i)perylene	UMM	9.8	ug/Kgdrywt	1	20	20.	2.0	9.8
2-Methylnaphthalene-D10		65.0	%					
Fluorene-D10		67.5	%					
Pyrene-D10		77.5	%					

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ANALYTICAL SERVICES

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-11
Client ID: WTB-SS-08-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6566.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 12-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 93.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	10	ug/Kgdrywt	1	20	21.	2.7	10.
Acenaphthylene	U	10	ug/Kgdrywt	1	20	21.	1.2	10.
Acenaphthene	J	5.6	ug/Kgdrywt	1	20	21.	1.6	10.
Fluorene	J	6.1	ug/Kgdrywt	1	20	21.	3.3	10.
Phenanthrene		87	ug/Kgdrywt	1	20	21.	1.9	10.
Anthracene	J	17	ug/Kgdrywt	1	20	21.	1.2	10.
Fluoranthene		140	ug/Kgdrywt	1	20	21.	1.9	10.
Pyrene		190	ug/Kgdrywt	1	20	21.	2.2	10.
Benzo(a)anthracene		93	ug/Kgdrywt	1	20	21.	2.0	10.
Chrysene		120	ug/Kgdrywt	1	20	21.	1.8	10.
Benzo(b)Fluoranthene		120	ug/Kgdrywt	1	20	21.	2.5	10.
Benzo(k)fluoranthene		53	ug/Kgdrywt	1	20	21.	3.2	10.
Benzo(a)pyrene		82	ug/Kgdrywt	1	20	21.	3.4	10.
Indeno(1,2,3-cd)pyrene		56	ug/Kgdrywt	1	20	21.	2.0	10.
Dibenzo(a,h)anthracene		24	ug/Kgdrywt	1	20	21.	1.9	10.
Benzo(g,h,i)perylene		54	ug/Kgdrywt	1	20	21.	2.1	10.
2-Methylnaphthalene-D10		49.8	%					
Fluorene-D10		70.0	%					
Pyrene-D10		97.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-15
Client ID: WTB-SS-09-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6647.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 16-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 91.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	11	ug/Kgdrywt	1	20	20.	2.6	10.
Acenaphthylene		23	ug/Kgdrywt	1	20	20.	1.2	10.
Acenaphthene	J	5.1	ug/Kgdrywt	1	20	20.	1.5	10.
Fluorene	J	5.5	ug/Kgdrywt	1	20	20.	3.2	10.
Phenanthrene		100	ug/Kgdrywt	1	20	20.	1.8	10.
Anthracene		39	ug/Kgdrywt	1	20	20.	1.2	10.
Fluoranthene		310	ug/Kgdrywt	1	20	20.	1.8	10.
Pyrene	E	470	ug/Kgdrywt	1	20	20.	2.1	10.
Benzo(a)anthracene	E	400	ug/Kgdrywt	1	20	20.	1.9	10.
Chrysene	E	460	ug/Kgdrywt	1	20	20.	1.7	10.
Benzo(b)Fluoranthene	E	770	ug/Kgdrywt	1	20	20.	2.4	10.
Benzo(k)fluoranthene	E	380	ug/Kgdrywt	1	20	20.	3.1	10.
Benzo(a)pyrene	E	530	ug/Kgdrywt	1	20	20.	3.3	10.
Indeno(1,2,3-cd)pyrene	E	410	ug/Kgdrywt	1	20	20.	1.9	10.
Dibenzo(a,h)anthracene		120	ug/Kgdrywt	1	20	20.	1.8	10.
Benzo(g,h,i)perylene	E	440	ug/Kgdrywt	1	20	20.	2.0	10.
2-Methylnaphthalene-D10		71.5	%					
Fluorene-D10		76.5	%					
Pyrene-D10		76.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-15DL
Client ID: WTB-SS-09-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6618.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 15-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 91.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	30	ug/Kgdrywt	3	20	60.	7.8	30.
Acenaphthylene	J	22	ug/Kgdrywt	3	20	60.	3.6	30.
Acenaphthene	J	6.2	ug/Kgdrywt	3	20	60.	4.5	30.
Fluorene	U	30	ug/Kgdrywt	3	20	60.	9.6	30.
Phenanthrene		100	ug/Kgdrywt	3	20	60.	5.4	30.
Anthracene	J	31	ug/Kgdrywt	3	20	60.	3.6	30.
Fluoranthene		390	ug/Kgdrywt	3	20	60.	5.4	30.
Pyrene		640	ug/Kgdrywt	3	20	60.	6.3	30.
Benzo(a)anthracene		440	ug/Kgdrywt	3	20	60.	5.7	30.
Chrysene		500	ug/Kgdrywt	3	20	60.	5.1	30.
Benzo(b)Fluoranthene		890	ug/Kgdrywt	3	20	60.	7.2	30.
Benzo(k)fluoranthene		400	ug/Kgdrywt	3	20	60.	9.3	30.
Benzo(a)pyrene		630	ug/Kgdrywt	3	20	60.	9.9	30.
Indeno(1,2,3-cd)pyrene		480	ug/Kgdrywt	3	20	60.	5.7	30.
Dibenzo(a,h)anthracene		120	ug/Kgdrywt	3	20	60.	5.4	30.
Benzo(g,h,i)perylene		490	ug/Kgdrywt	3	20	60.	6.0	30.
2-Methylnaphthalene-D10		83.5	%					
Fluorene-D10		84.2	%					
Pyrene-D10		106.	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-42
Client ID: WTB-SS-10-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6499.D

Sample Date: 05-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 10-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 93.
Report Date: 26-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	10	ug/Kgdrywt	1	20	21.	2.7	10.
Acenaphthylene	U	10	ug/Kgdrywt	1	20	21.	1.3	10.
Acenaphthene	U	10	ug/Kgdrywt	1	20	21.	1.6	10.
Fluorene	U	10	ug/Kgdrywt	1	20	21.	3.4	10.
Phenanthrene	J	14	ug/Kgdrywt	1	20	21.	1.9	10.
Anthracene	J	3.9	ug/Kgdrywt	1	20	21.	1.3	10.
Fluoranthene		22	ug/Kgdrywt	1	20	21.	1.9	10.
Pyrene		23	ug/Kgdrywt	1	20	21.	2.2	10.
Benzo(a)anthracene	J	13	ug/Kgdrywt	1	20	21.	2.0	10.
Chrysene	J	11	ug/Kgdrywt	1	20	21.	1.8	10.
Benzo(b)Fluoranthene	J	17	ug/Kgdrywt	1	20	21.	2.5	10.
Benzo(k)fluoranthene	J	3.6	ug/Kgdrywt	1	20	21.	3.3	10.
Benzo(a)pyrene	J	13	ug/Kgdrywt	1	20	21.	3.5	10.
Indeno(1,2,3-cd)pyrene	J	8.8	ug/Kgdrywt	1	20	21.	2.0	10.
Dibenzo(a,h)anthracene	U	10	ug/Kgdrywt	1	20	21.	1.9	10.
Benzo(g,h,i)perylene	J	8.4	ug/Kgdrywt	1	20	21.	2.1	10.
2-Methylnaphthalene-D10		54.0	%					
Fluorene-D10		66.0	%					
Pyrene-D10		79.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-1
Client ID: WTB-SS-11-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6507.D

Sample Date: 01-JUN-15
Received Date: 03-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 10-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 92.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	22	ug/Kgdrywt	1	20	22.	2.8	11.
Acenaphthylene	J	11	ug/Kgdrywt	1	20	22.	1.3	11.
Acenaphthene	J	13	ug/Kgdrywt	1	20	22.	1.6	11.
Fluorene	J	21	ug/Kgdrywt	1	20	22.	3.4	11.
Phenanthrene		290	ug/Kgdrywt	1	20	22.	1.9	11.
Anthracene		50	ug/Kgdrywt	1	20	22.	1.3	11.
Fluoranthene	E	410	ug/Kgdrywt	1	20	22.	1.9	11.
Pyrene	E	540	ug/Kgdrywt	1	20	22.	2.3	11.
Benzo(a)anthracene		270	ug/Kgdrywt	1	20	22.	2.0	11.
Chrysene	E	360	ug/Kgdrywt	1	20	22.	1.8	11.
Benzo(b)Fluoranthene	E	430	ug/Kgdrywt	1	20	22.	2.6	11.
Benzo(k)fluoranthene		180	ug/Kgdrywt	1	20	22.	3.3	11.
Benzo(a)pyrene		300	ug/Kgdrywt	1	20	22.	3.6	11.
Indeno(1,2,3-cd)pyrene		170	ug/Kgdrywt	1	20	22.	2.0	11.
Dibenzo(a,h)anthracene		49	ug/Kgdrywt	1	20	22.	1.9	11.
Benzo(g,h,i)perylene		170	ug/Kgdrywt	1	20	22.	2.2	11.
2-Methylnaphthalene-D10		63.5	%					
Fluorene-D10		71.0	%					
Pyrene-D10		83.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-1DL
Client ID: WTB-SS-11-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6532.D

Sample Date: 01-JUN-15
Received Date: 03-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 11-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 92.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	23	ug/Kgdrywt	3	20	65.	8.4	32.
Acenaphthylene	J	14	ug/Kgdrywt	3	20	65.	3.9	32.
Acenaphthene	J	16	ug/Kgdrywt	3	20	65.	4.8	32.
Fluorene	J	24	ug/Kgdrywt	3	20	65.	10.	32.
Phenanthrene		320	ug/Kgdrywt	3	20	65.	5.8	32.
Anthracene	J	58	ug/Kgdrywt	3	20	65.	3.9	32.
Fluoranthene		450	ug/Kgdrywt	3	20	65.	5.8	32.
Pyrene		630	ug/Kgdrywt	3	20	65.	6.8	32.
Benzo(a)anthracene		300	ug/Kgdrywt	3	20	65.	6.1	32.
Chrysene		420	ug/Kgdrywt	3	20	65.	5.5	32.
Benzo(b)Fluoranthene		470	ug/Kgdrywt	3	20	65.	7.8	32.
Benzo(k)fluoranthene		160	ug/Kgdrywt	3	20	65.	10.	32.
Benzo(a)pyrene		310	ug/Kgdrywt	3	20	65.	11.	32.
Indeno(1,2,3-cd)pyrene		200	ug/Kgdrywt	3	20	65.	6.1	32.
Dibenzo(a,h)anthracene	J	62	ug/Kgdrywt	3	20	65.	5.8	32.
Benzo(g,h,i)perylene		190	ug/Kgdrywt	3	20	65.	6.5	32.
2-Methylnaphthalene-D10		66.4	%					
Fluorene-D10		74.4	%					
Pyrene-D10		98.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-18DL
Client ID: WTB-SS-12-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6649.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 16-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 92.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene		110	ug/Kgdrywt	2	20	42.	5.4	21.
Acenaphthylene		260	ug/Kgdrywt	2	20	42.	2.5	21.
Acenaphthene		540	ug/Kgdrywt	2	20	42.	3.1	21.
Fluorene		640	ug/Kgdrywt	2	20	42.	6.6	21.
Phenanthrene	E	5600	ug/Kgdrywt	2	20	42.	3.7	21.
Anthracene	E	2100	ug/Kgdrywt	2	20	42.	2.5	21.
Fluoranthene	E	7600	ug/Kgdrywt	2	20	42.	3.7	21.
Pyrene	E	12000	ug/Kgdrywt	2	20	42.	4.4	21.
Benzo(a)anthracene	E	5800	ug/Kgdrywt	2	20	42.	3.9	21.
Chrysene	E	5800	ug/Kgdrywt	2	20	42.	3.5	21.
Benzo(b)Fluoranthene	E	8100	ug/Kgdrywt	2	20	42.	5.0	21.
Benzo(k)fluoranthene	E	2500	ug/Kgdrywt	2	20	42.	6.4	21.
Benzo(a)pyrene	E	4300	ug/Kgdrywt	2	20	42.	6.8	21.
Indeno(1,2,3-cd)pyrene	E	2800	ug/Kgdrywt	2	20	42.	3.9	21.
Dibenzo(a,h)anthracene	E	880	ug/Kgdrywt	2	20	42.	3.7	21.
Benzo(g,h,i)perylene	E	2300	ug/Kgdrywt	2	20	42.	4.2	21.
2-Methylnaphthalene-D10		75.1	%					
Fluorene-D10		60.9	%					
Pyrene-D10		70.8	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-18DL2
Client ID: WTB-SS-12-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6634.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 16-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 92.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	1000	ug/Kgdrywt	100	20	2100	270	1000
Acenaphthylene	J	200	ug/Kgdrywt	100	20	2100	120	1000
Acenaphthene	J	620	ug/Kgdrywt	100	20	2100	160	1000
Fluorene	J	780	ug/Kgdrywt	100	20	2100	330	1000
Phenanthrene		6000	ug/Kgdrywt	100	20	2100	190	1000
Anthracene		2500	ug/Kgdrywt	100	20	2100	120	1000
Fluoranthene		15000	ug/Kgdrywt	100	20	2100	190	1000
Pyrene		14000	ug/Kgdrywt	100	20	2100	220	1000
Benzo(a)anthracene		7300	ug/Kgdrywt	100	20	2100	200	1000
Chrysene		9400	ug/Kgdrywt	100	20	2100	180	1000
Benzo(b)Fluoranthene		9100	ug/Kgdrywt	100	20	2100	250	1000
Benzo(k)fluoranthene		4200	ug/Kgdrywt	100	20	2100	320	1000
Benzo(a)pyrene		5500	ug/Kgdrywt	100	20	2100	340	1000
Indeno(1,2,3-cd)pyrene		3100	ug/Kgdrywt	100	20	2100	200	1000
Dibenzo(a,h)anthracene	J	1400	ug/Kgdrywt	100	20	2100	190	1000
Benzo(g,h,i)perylene		2600	ug/Kgdrywt	100	20	2100	210	1000
2-Methylnaphthalene-D10	D	0.00	%					
Fluorene-D10	D	0.00	%					
Pyrene-D10	D	0.00	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-39
Client ID: WTB-SS-13-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6681.D

Sample Date: 05-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 17-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 89.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	10	ug/Kgdrywt	1	20	21.	2.7	10.
Acenaphthylene	U	10	ug/Kgdrywt	1	20	21.	1.2	10.
Acenaphthene	U	10	ug/Kgdrywt	1	20	21.	1.6	10.
Fluorene	U	10	ug/Kgdrywt	1	20	21.	3.3	10.
Phenanthrene	J	2.1	ug/Kgdrywt	1	20	21.	1.9	10.
Anthracene	U	10	ug/Kgdrywt	1	20	21.	1.2	10.
Fluoranthene	J	2.4	ug/Kgdrywt	1	20	21.	1.9	10.
Pyrene	J	3.5	ug/Kgdrywt	1	20	21.	2.2	10.
Benzo(a)anthracene	J	3.6	ug/Kgdrywt	1	20	21.	2.0	10.
Chrysene	U	10	ug/Kgdrywt	1	20	21.	1.8	10.
Benzo(b)Fluoranthene	J	4.4	ug/Kgdrywt	1	20	21.	2.5	10.
Benzo(k)fluoranthene	U	10	ug/Kgdrywt	1	20	21.	3.2	10.
Benzo(a)pyrene	U	10	ug/Kgdrywt	1	20	21.	3.4	10.
Indeno(1,2,3-cd)pyrene	U	10	ug/Kgdrywt	1	20	21.	2.0	10.
Dibenzo(a,h)anthracene	U	10	ug/Kgdrywt	1	20	21.	1.9	10.
Benzo(g,h,i)perylene	U	10	ug/Kgdrywt	1	20	21.	2.1	10.
2-Methylnaphthalene-D10		52.5	%					
Fluorene-D10		62.5	%					
Pyrene-D10		77.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-4
Client ID: WTB-SS-14-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6502.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 10-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 97.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	8.9	ug/Kgdrywt	1	20	18.	2.3	8.9
Acenaphthylene	U	8.9	ug/Kgdrywt	1	20	18.	1.1	8.9
Acenaphthene	U	8.9	ug/Kgdrywt	1	20	18.	1.3	8.9
Fluorene	U	8.9	ug/Kgdrywt	1	20	18.	2.8	8.9
Phenanthrene	J	4.0	ug/Kgdrywt	1	20	18.	1.6	8.9
Anthracene	U	8.9	ug/Kgdrywt	1	20	18.	1.1	8.9
Fluoranthene	J	8.5	ug/Kgdrywt	1	20	18.	1.6	8.9
Pyrene	J	9.2	ug/Kgdrywt	1	20	18.	1.9	8.9
Benzo(a)anthracene	J	4.7	ug/Kgdrywt	1	20	18.	1.7	8.9
Chrysene	U	8.9	ug/Kgdrywt	1	20	18.	1.5	8.9
Benzo(b)Fluoranthene	J	9.8	ug/Kgdrywt	1	20	18.	2.1	8.9
Benzo(k)fluoranthene	U	8.9	ug/Kgdrywt	1	20	18.	2.8	8.9
Benzo(a)pyrene	J	6.3	ug/Kgdrywt	1	20	18.	2.9	8.9
Indeno(1,2,3-cd)pyrene	J	5.2	ug/Kgdrywt	1	20	18.	1.7	8.9
Dibenzo(a,h)anthracene	U	8.9	ug/Kgdrywt	1	20	18.	1.6	8.9
Benzo(g,h,i)perylene	J	5.4	ug/Kgdrywt	1	20	18.	1.8	8.9
2-Methylnaphthalene-D10		50.0	%					
Fluorene-D10		69.0	%					
Pyrene-D10		70.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-21
Client ID: WTB-SS-15-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6646.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 16-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 92.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene		120	ug/Kgdrywt	1	20	20.	2.6	10.
Acenaphthylene	J	10	ug/Kgdrywt	1	20	20.	1.2	10.
Acenaphthene	E	620	ug/Kgdrywt	1	20	20.	1.5	10.
Fluorene	E	630	ug/Kgdrywt	1	20	20.	3.2	10.
Phenanthrene	E	4000	ug/Kgdrywt	1	20	20.	1.8	10.
Anthracene	E	1200	ug/Kgdrywt	1	20	20.	1.2	10.
Fluoranthene	E	3700	ug/Kgdrywt	1	20	20.	1.8	10.
Pyrene	E	4500	ug/Kgdrywt	1	20	20.	2.1	10.
Benzo(a)anthracene	E	3000	ug/Kgdrywt	1	20	20.	1.9	10.
Chrysene	E	2800	ug/Kgdrywt	1	20	20.	1.7	10.
Benzo(b)Fluoranthene	E	3100	ug/Kgdrywt	1	20	20.	2.4	10.
Benzo(k)fluoranthene	E	1200	ug/Kgdrywt	1	20	20.	3.1	10.
Benzo(a)pyrene	E	2000	ug/Kgdrywt	1	20	20.	3.3	10.
Indeno(1,2,3-cd)pyrene	E	1100	ug/Kgdrywt	1	20	20.	1.9	10.
Dibenzo(a,h)anthracene		320	ug/Kgdrywt	1	20	20.	1.8	10.
Benzo(g,h,i)perylene	E	940	ug/Kgdrywt	1	20	20.	2.0	10.
2-Methylnaphthalene-D10		60.0	%					
Fluorene-D10		66.5	%					
Pyrene-D10		71.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-21DL
Client ID: WTB-SS-15-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6668.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 17-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 92.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	140	ug/Kgdrywt	25	20	500	65.	250
Acenaphthylene	U	250	ug/Kgdrywt	25	20	500	30.	250
Acenaphthene		750	ug/Kgdrywt	25	20	500	38.	250
Fluorene		820	ug/Kgdrywt	25	20	500	80.	250
Phenanthrene		6700	ug/Kgdrywt	25	20	500	45.	250
Anthracene		1500	ug/Kgdrywt	25	20	500	30.	250
Fluoranthene		6300	ug/Kgdrywt	25	20	500	45.	250
Pyrene		6400	ug/Kgdrywt	25	20	500	53.	250
Benzo(a)anthracene		3200	ug/Kgdrywt	25	20	500	48.	250
Chrysene		3400	ug/Kgdrywt	25	20	500	43.	250
Benzo(b)Fluoranthene		4000	ug/Kgdrywt	25	20	500	60.	250
Benzo(k)fluoranthene		1300	ug/Kgdrywt	25	20	500	78.	250
Benzo(a)pyrene		2500	ug/Kgdrywt	25	20	500	83.	250
Indeno(1,2,3-cd)pyrene		1500	ug/Kgdrywt	25	20	500	48.	250
Dibenzo(a,h)anthracene	J	450	ug/Kgdrywt	25	20	500	45.	250
Benzo(g,h,i)perylene		1300	ug/Kgdrywt	25	20	500	50.	250
2-Methylnaphthalene-D10	D	0.00	%					
Fluorene-D10	D	0.00	%					
Pyrene-D10	D	0.00	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-25
Client ID: WTB-SS-16-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6682.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 17-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 89.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene		55	ug/Kgdrywt	1	20	20.	2.6	10.
Acenaphthylene	J	17	ug/Kgdrywt	1	20	20.	1.2	10.
Acenaphthene	EMM	1300	ug/Kgdrywt	1	20	20.	1.5	10.
Fluorene	EMM	1100	ug/Kgdrywt	1	20	20.	3.2	10.
Phenanthrene	EMM	7400	ug/Kgdrywt	1	20	20.	1.8	10.
Anthracene	EMM	2300	ug/Kgdrywt	1	20	20.	1.2	10.
Fluoranthene	EMM	8400	ug/Kgdrywt	1	20	20.	1.8	10.
Pyrene	EMM	18000	ug/Kgdrywt	1	20	20.	2.1	10.
Benzo(a)anthracene	EMM	14000	ug/Kgdrywt	1	20	20.	1.9	10.
Chrysene	EMM	11000	ug/Kgdrywt	1	20	20.	1.7	10.
Benzo(b)Fluoranthene	EMM	9300	ug/Kgdrywt	1	20	20.	2.4	10.
Benzo(k)fluoranthene	EMM	2900	ug/Kgdrywt	1	20	20.	3.1	10.
Benzo(a)pyrene	EMM	5200	ug/Kgdrywt	1	20	20.	3.3	10.
Indeno(1,2,3-cd)pyrene	EMM	3600	ug/Kgdrywt	1	20	20.	1.9	10.
Dibenzo(a,h)anthracene	EMM	1200	ug/Kgdrywt	1	20	20.	1.8	10.
Benzo(g,h,i)perylene	EMM	3200	ug/Kgdrywt	1	20	20.	2.0	10.
2-Methylnaphthalene-D10		65.5	%					
Fluorene-D10		70.0	%					
Pyrene-D10		124.	%					

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Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-25DL
Client ID: WTB-SS-16-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6701.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 18-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 89.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	1000	ug/Kgdrywt	100	20	2000	260	1000
Acenaphthylene	U	1000	ug/Kgdrywt	100	20	2000	120	1000
Acenaphthene	J	1600	ug/Kgdrywt	100	20	2000	150	1000
Fluorene	J	1400	ug/Kgdrywt	100	20	2000	320	1000
Phenanthrene		13000	ug/Kgdrywt	100	20	2000	180	1000
Anthracene		3900	ug/Kgdrywt	100	20	2000	120	1000
Fluoranthene		24000	ug/Kgdrywt	100	20	2000	180	1000
Pyrene		19000	ug/Kgdrywt	100	20	2000	210	1000
Benzo(a)anthracene		13000	ug/Kgdrywt	100	20	2000	190	1000
Chrysene		12000	ug/Kgdrywt	100	20	2000	170	1000
Benzo(b)Fluoranthene		14000	ug/Kgdrywt	100	20	2000	240	1000
Benzo(k)fluoranthene		4400	ug/Kgdrywt	100	20	2000	310	1000
Benzo(a)pyrene		8600	ug/Kgdrywt	100	20	2000	330	1000
Indeno(1,2,3-cd)pyrene		6200	ug/Kgdrywt	100	20	2000	190	1000
Dibenzo(a,h)anthracene	J	1600	ug/Kgdrywt	100	20	2000	180	1000
Benzo(g,h,i)perylene		6000	ug/Kgdrywt	100	20	2000	200	1000
2-Methylnaphthalene-D10	D	0.00	%					
Fluorene-D10	D	0.00	%					
Pyrene-D10	D	0.00	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-8
Client ID: WTB-SS-17-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6718.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 19-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 95.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	8.3	ug/Kgdrywt	1	20	18.	2.4	9.1
Acenaphthylene	U	9.1	ug/Kgdrywt	1	20	18.	1.1	9.1
Acenaphthene	J	6.9	ug/Kgdrywt	1	20	18.	1.4	9.1
Fluorene	J	8.8	ug/Kgdrywt	1	20	18.	2.9	9.1
Phenanthrene		120	ug/Kgdrywt	1	20	18.	1.6	9.1
Anthracene		43	ug/Kgdrywt	1	20	18.	1.1	9.1
Fluoranthene		300	ug/Kgdrywt	1	20	18.	1.6	9.1
Pyrene	E	380	ug/Kgdrywt	1	20	18.	1.9	9.1
Benzo(a)anthracene		290	ug/Kgdrywt	1	20	18.	1.7	9.1
Chrysene		300	ug/Kgdrywt	1	20	18.	1.5	9.1
Benzo(b)Fluoranthene	E	440	ug/Kgdrywt	1	20	18.	2.2	9.1
Benzo(k)fluoranthene		160	ug/Kgdrywt	1	20	18.	2.8	9.1
Benzo(a)pyrene		290	ug/Kgdrywt	1	20	18.	3.0	9.1
Indeno(1,2,3-cd)pyrene		210	ug/Kgdrywt	1	20	18.	1.7	9.1
Dibenzo(a,h)anthracene		81	ug/Kgdrywt	1	20	18.	1.6	9.1
Benzo(g,h,i)perylene		190	ug/Kgdrywt	1	20	18.	1.8	9.1
2-Methylnaphthalene-D10		59.5	%					
Fluorene-D10		67.5	%					
Pyrene-D10		69.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-8DL
Client ID: WTB-SS-17-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6535.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 11-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 95.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	8.4	ug/Kgdrywt	2	20	36.	4.7	18.
Acenaphthylene	U	18	ug/Kgdrywt	2	20	36.	2.2	18.
Acenaphthene	U	18	ug/Kgdrywt	2	20	36.	2.7	18.
Fluorene	J	7.4	ug/Kgdrywt	2	20	36.	5.8	18.
Phenanthrene		130	ug/Kgdrywt	2	20	36.	3.3	18.
Anthracene		42	ug/Kgdrywt	2	20	36.	2.2	18.
Fluoranthene		330	ug/Kgdrywt	2	20	36.	3.3	18.
Pyrene		460	ug/Kgdrywt	2	20	36.	3.8	18.
Benzo(a)anthracene		330	ug/Kgdrywt	2	20	36.	3.4	18.
Chrysene		320	ug/Kgdrywt	2	20	36.	3.1	18.
Benzo(b)Fluoranthene		490	ug/Kgdrywt	2	20	36.	4.3	18.
Benzo(k)fluoranthene		180	ug/Kgdrywt	2	20	36.	5.6	18.
Benzo(a)pyrene		310	ug/Kgdrywt	2	20	36.	6.0	18.
Indeno(1,2,3-cd)pyrene		180	ug/Kgdrywt	2	20	36.	3.4	18.
Dibenzo(a,h)anthracene		53	ug/Kgdrywt	2	20	36.	3.3	18.
Benzo(g,h,i)perylene		160	ug/Kgdrywt	2	20	36.	3.6	18.
2-Methylnaphthalene-D10		64.4	%					
Fluorene-D10		71.1	%					
Pyrene-D10		87.2	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-28
Client ID: WTB-SS-18-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6639.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 16-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 86.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	11	ug/Kgdrywt	1	20	22.	2.9	11.
Acenaphthylene	J	5.0	ug/Kgdrywt	1	20	22.	1.3	11.
Acenaphthene	U	11	ug/Kgdrywt	1	20	22.	1.6	11.
Fluorene	J	4.5	ug/Kgdrywt	1	20	22.	3.5	11.
Phenanthrene		68	ug/Kgdrywt	1	20	22.	2.0	11.
Anthracene	J	11	ug/Kgdrywt	1	20	22.	1.3	11.
Fluoranthene		140	ug/Kgdrywt	1	20	22.	2.0	11.
Pyrene		140	ug/Kgdrywt	1	20	22.	2.3	11.
Benzo(a)anthracene		90	ug/Kgdrywt	1	20	22.	2.1	11.
Chrysene		130	ug/Kgdrywt	1	20	22.	1.9	11.
Benzo(b)Fluoranthene		130	ug/Kgdrywt	1	20	22.	2.6	11.
Benzo(k)fluoranthene		55	ug/Kgdrywt	1	20	22.	3.4	11.
Benzo(a)pyrene		89	ug/Kgdrywt	1	20	22.	3.6	11.
Indeno(1,2,3-cd)pyrene		68	ug/Kgdrywt	1	20	22.	2.1	11.
Dibenzo(a,h)anthracene	J	22	ug/Kgdrywt	1	20	22.	2.0	11.
Benzo(g,h,i)perylene		63	ug/Kgdrywt	1	20	22.	2.2	11.
2-Methylnaphthalene-D10		57.0	%					
Fluorene-D10		65.0	%					
Pyrene-D10		62.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-11
Client ID: WTB-SS-19-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6500.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 10-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 96.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	10	ug/Kgdrywt	1	20	20.	2.6	10.
Acenaphthylene	U	10	ug/Kgdrywt	1	20	20.	1.2	10.
Acenaphthene	U	10	ug/Kgdrywt	1	20	20.	1.5	10.
Fluorene	U	10	ug/Kgdrywt	1	20	20.	3.2	10.
Phenanthrene		93	ug/Kgdrywt	1	20	20.	1.8	10.
Anthracene		21	ug/Kgdrywt	1	20	20.	1.2	10.
Fluoranthene		120	ug/Kgdrywt	1	20	20.	1.8	10.
Pyrene		120	ug/Kgdrywt	1	20	20.	2.1	10.
Benzo(a)anthracene		75	ug/Kgdrywt	1	20	20.	1.9	10.
Chrysene		84	ug/Kgdrywt	1	20	20.	1.7	10.
Benzo(b)Fluoranthene		86	ug/Kgdrywt	1	20	20.	2.4	10.
Benzo(k)fluoranthene		42	ug/Kgdrywt	1	20	20.	3.1	10.
Benzo(a)pyrene		65	ug/Kgdrywt	1	20	20.	3.3	10.
Indeno(1,2,3-cd)pyrene		39	ug/Kgdrywt	1	20	20.	1.9	10.
Dibenzo(a,h)anthracene	J	12	ug/Kgdrywt	1	20	20.	1.8	10.
Benzo(g,h,i)perylene		41	ug/Kgdrywt	1	20	20.	2.0	10.
2-Methylnaphthalene-D10		56.0	%					
Fluorene-D10		68.0	%					
Pyrene-D10		76.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-31
Client ID: WTB-SS-20-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6671.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 17-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 83.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	11	ug/Kgdrywt	1	20	22.	2.9	11.
Acenaphthylene	U	11	ug/Kgdrywt	1	20	22.	1.4	11.
Acenaphthene	U	11	ug/Kgdrywt	1	20	22.	1.7	11.
Fluorene	J	5.4	ug/Kgdrywt	1	20	22.	3.6	11.
Phenanthrene		91	ug/Kgdrywt	1	20	22.	2.0	11.
Anthracene	J	18	ug/Kgdrywt	1	20	22.	1.4	11.
Fluoranthene		120	ug/Kgdrywt	1	20	22.	2.0	11.
Pyrene		190	ug/Kgdrywt	1	20	22.	2.4	11.
Benzo(a)anthracene		110	ug/Kgdrywt	1	20	22.	2.1	11.
Chrysene		120	ug/Kgdrywt	1	20	22.	1.9	11.
Benzo(b)Fluoranthene		150	ug/Kgdrywt	1	20	22.	2.7	11.
Benzo(k)fluoranthene		48	ug/Kgdrywt	1	20	22.	3.5	11.
Benzo(a)pyrene		100	ug/Kgdrywt	1	20	22.	3.7	11.
Indeno(1,2,3-cd)pyrene		67	ug/Kgdrywt	1	20	22.	2.1	11.
Dibenzo(a,h)anthracene		27	ug/Kgdrywt	1	20	22.	2.0	11.
Benzo(g,h,i)perylene		56	ug/Kgdrywt	1	20	22.	2.2	11.
2-Methylnaphthalene-D10		50.5	%					
Fluorene-D10		67.0	%					
Pyrene-D10		83.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-35
Client ID: WTB-SS-21-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6678.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 17-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 96.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	10	ug/Kgdrywt	1	20	20.	2.7	10.
Acenaphthylene	U	10	ug/Kgdrywt	1	20	20.	1.2	10.
Acenaphthene	U	10	ug/Kgdrywt	1	20	20.	1.5	10.
Fluorene	U	10	ug/Kgdrywt	1	20	20.	3.3	10.
Phenanthrene	J	2.8	ug/Kgdrywt	1	20	20.	1.8	10.
Anthracene	U	10	ug/Kgdrywt	1	20	20.	1.2	10.
Fluoranthene	J	3.3	ug/Kgdrywt	1	20	20.	1.8	10.
Pyrene	J	4.8	ug/Kgdrywt	1	20	20.	2.2	10.
Benzo(a)anthracene	J	3.9	ug/Kgdrywt	1	20	20.	2.0	10.
Chrysene	U	10	ug/Kgdrywt	1	20	20.	1.7	10.
Benzo(b)Fluoranthene	J	5.0	ug/Kgdrywt	1	20	20.	2.5	10.
Benzo(k)fluoranthene	U	10	ug/Kgdrywt	1	20	20.	3.2	10.
Benzo(a)pyrene	U	10	ug/Kgdrywt	1	20	20.	3.4	10.
Indeno(1,2,3-cd)pyrene	U	10	ug/Kgdrywt	1	20	20.	2.0	10.
Dibenzo(a,h)anthracene	U	10	ug/Kgdrywt	1	20	20.	1.8	10.
Benzo(g,h,i)perylene	U	10	ug/Kgdrywt	1	20	20.	2.0	10.
2-Methylnaphthalene-D10		57.0	%					
Fluorene-D10		70.0	%					
Pyrene-D10		86.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-1
Client ID: WTB-SS-22-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6570.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 12-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 90.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	10	ug/Kgdrywt	1	20	20.	2.6	10.
Acenaphthylene	U	10	ug/Kgdrywt	1	20	20.	1.2	10.
Acenaphthene	U	10	ug/Kgdrywt	1	20	20.	1.5	10.
Fluorene	U	10	ug/Kgdrywt	1	20	20.	3.3	10.
Phenanthrene		56	ug/Kgdrywt	1	20	20.	1.8	10.
Anthracene	J	11	ug/Kgdrywt	1	20	20.	1.2	10.
Fluoranthene		81	ug/Kgdrywt	1	20	20.	1.8	10.
Pyrene		110	ug/Kgdrywt	1	20	20.	2.1	10.
Benzo(a)anthracene		73	ug/Kgdrywt	1	20	20.	1.9	10.
Chrysene		91	ug/Kgdrywt	1	20	20.	1.7	10.
Benzo(b)Fluoranthene		110	ug/Kgdrywt	1	20	20.	2.4	10.
Benzo(k)fluoranthene		49	ug/Kgdrywt	1	20	20.	3.2	10.
Benzo(a)pyrene		78	ug/Kgdrywt	1	20	20.	3.4	10.
Indeno(1,2,3-cd)pyrene		50	ug/Kgdrywt	1	20	20.	1.9	10.
Dibenzo(a,h)anthracene	J	18	ug/Kgdrywt	1	20	20.	1.8	10.
Benzo(g,h,i)perylene		50	ug/Kgdrywt	1	20	20.	2.0	10.
2-Methylnaphthalene-D10		69.0	%					
Fluorene-D10		75.5	%					
Pyrene-D10		97.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-8DL
Client ID: WTB-SS-23-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6616.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 15-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 91.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	100	ug/Kgdrywt	10	20	220	28.	110
Acenaphthylene	J	100	ug/Kgdrywt	10	20	220	13.	110
Acenaphthene		680	ug/Kgdrywt	10	20	220	16.	110
Fluorene		510	ug/Kgdrywt	10	20	220	35.	110
Phenanthrene	E	5500	ug/Kgdrywt	10	20	220	20.	110
Anthracene		2100	ug/Kgdrywt	10	20	220	13.	110
Fluoranthene	E	20000	ug/Kgdrywt	10	20	220	20.	110
Pyrene	E	25000	ug/Kgdrywt	10	20	220	23.	110
Benzo(a)anthracene	E	12000	ug/Kgdrywt	10	20	220	21.	110
Chrysene	E	11000	ug/Kgdrywt	10	20	220	18.	110
Benzo(b)Fluoranthene	E	14000	ug/Kgdrywt	10	20	220	26.	110
Benzo(k)fluoranthene	E	5400	ug/Kgdrywt	10	20	220	34.	110
Benzo(a)pyrene	E	9600	ug/Kgdrywt	10	20	220	36.	110
Indeno(1,2,3-cd)pyrene	E	5800	ug/Kgdrywt	10	20	220	21.	110
Dibenzo(a,h)anthracene		1700	ug/Kgdrywt	10	20	220	20.	110
Benzo(g,h,i)perylene	E	4800	ug/Kgdrywt	10	20	220	22.	110
2-Methylnaphthalene-D10	D	0.00	%					
Fluorene-D10	D	0.00	%					
Pyrene-D10	D	0.00	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-8DL2
Client ID: WTB-SS-23-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6667.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 17-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 91.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	2200	ug/Kgdrywt	200	20	4400	570	2200
Acenaphthylene	U	2200	ug/Kgdrywt	200	20	4400	260	2200
Acenaphthene	J	650	ug/Kgdrywt	200	20	4400	330	2200
Fluorene	U	2200	ug/Kgdrywt	200	20	4400	700	2200
Phenanthrene		5600	ug/Kgdrywt	200	20	4400	390	2200
Anthracene	J	2400	ug/Kgdrywt	200	20	4400	260	2200
Fluoranthene		23000	ug/Kgdrywt	200	20	4400	390	2200
Pyrene		27000	ug/Kgdrywt	200	20	4400	460	2200
Benzo(a)anthracene		12000	ug/Kgdrywt	200	20	4400	410	2200
Chrysene		12000	ug/Kgdrywt	200	20	4400	370	2200
Benzo(b)Fluoranthene		15000	ug/Kgdrywt	200	20	4400	520	2200
Benzo(k)fluoranthene		4700	ug/Kgdrywt	200	20	4400	680	2200
Benzo(a)pyrene		10000	ug/Kgdrywt	200	20	4400	720	2200
Indeno(1,2,3-cd)pyrene		6700	ug/Kgdrywt	200	20	4400	410	2200
Dibenzo(a,h)anthracene	J	2000	ug/Kgdrywt	200	20	4400	390	2200
Benzo(g,h,i)perylene		6100	ug/Kgdrywt	200	20	4400	440	2200
2-Methylnaphthalene-D10	D	0.00	%					
Fluorene-D10	D	0.00	%					
Pyrene-D10	D	0.00	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-2
Client ID: WTB-SS-24-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: N6564.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 12-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 93.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	9.9	ug/Kgdrywt	1	20	20.	2.6	9.9
Acenaphthylene	U	9.9	ug/Kgdrywt	1	20	20.	1.2	9.9
Acenaphthene	U	9.9	ug/Kgdrywt	1	20	20.	1.5	9.9
Fluorene	U	9.9	ug/Kgdrywt	1	20	20.	3.2	9.9
Phenanthrene	U	9.9	ug/Kgdrywt	1	20	20.	1.8	9.9
Anthracene	U	9.9	ug/Kgdrywt	1	20	20.	1.2	9.9
Fluoranthene	U	9.9	ug/Kgdrywt	1	20	20.	1.8	9.9
Pyrene	U	9.9	ug/Kgdrywt	1	20	20.	2.1	9.9
Benzo(a)anthracene	U	9.9	ug/Kgdrywt	1	20	20.	1.9	9.9
Chrysene	U	9.9	ug/Kgdrywt	1	20	20.	1.7	9.9
Benzo(b)Fluoranthene	U	9.9	ug/Kgdrywt	1	20	20.	2.4	9.9
Benzo(k)fluoranthene	U	9.9	ug/Kgdrywt	1	20	20.	3.1	9.9
Benzo(a)pyrene	U	9.9	ug/Kgdrywt	1	20	20.	3.3	9.9
Indeno(1,2,3-cd)pyrene	U	9.9	ug/Kgdrywt	1	20	20.	1.9	9.9
Dibenzo(a,h)anthracene	U	9.9	ug/Kgdrywt	1	20	20.	1.8	9.9
Benzo(g,h,i)perylene	U	9.9	ug/Kgdrywt	1	20	20.	2.0	9.9
2-Methylnaphthalene-D10		60.0	%					
Fluorene-D10		65.5	%					
Pyrene-D10		89.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-1
Client ID: WTB-SS-11-0002
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2083.D

Sample Date: 01-JUN-15
Received Date: 03-JUN-15
Extract Date: 05-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164213

Analysis Date: 09-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 92.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	32	mg/Kgdrywt	2	20	42.	21.	32.
C19-C36 Aliphatics		140	mg/Kgdrywt	2	20	42.	21.	32.
C11-C22 Aromatics		180	mg/Kgdrywt	2	20	42.	21.	32.
5-Alpha Androstane		66.2	%					
o-Terphenyl		60.7	%					
2-Fluorobiphenyl		63.4	%					
2-Bromonaphthalene		65.2	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-2DL
Client ID: WTB-SB-11-0206
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2109.D

Sample Date: 01-JUN-15
Received Date: 03-JUN-15
Extract Date: 05-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164213

Analysis Date: 09-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 79.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics		170	mg/Kgdrywt	6	20	120	60.	89.
C19-C36 Aliphatics		1000	mg/Kgdrywt	6	20	120	60.	89.
C11-C22 Aromatics		570	mg/Kgdrywt	2	20	40.	20.	30.
5-Alpha Androstane		48.9	%					
o-Terphenyl		43.2	%					
2-Fluorobiphenyl		64.2	%					
2-Bromonaphthalene		62.3	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-3DL
Client ID: WTB-SB-11-0610
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2110.D

Sample Date: 01-JUN-15
Received Date: 03-JUN-15
Extract Date: 05-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164213

Analysis Date: 10-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 79.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics		140	mg/Kgdrywt	2	20	48.	24.	36.
C19-C36 Aliphatics		1100	mg/Kgdrywt	6	20	140	72.	110
C11-C22 Aromatics		620	mg/Kgdrywt	2	20	48.	24.	36.
5-Alpha Androstane		40.1	%					
o-Terphenyl		42.4	%					
2-Fluorobiphenyl		70.1	%					
2-Bromonaphthalene		68.3	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-4
Client ID: WTB-SS-14-0002
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2097.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 05-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164213

Analysis Date: 09-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 97.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	23	mg/Kgdrywt	2	20	31.	16.	23.
C19-C36 Aliphatics	U	23	mg/Kgdrywt	2	20	31.	16.	23.
C11-C22 Aromatics	U	23	mg/Kgdrywt	2	20	31.	16.	23.
5-Alpha Androstane		72.6	%					
o-Terphenyl		71.8	%					
2-Fluorobiphenyl		77.8	%					
2-Bromonaphthalene		78.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-5
Client ID: WTB-SB-14-0206
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2087.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 05-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164213

Analysis Date: 09-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 95.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	26	mg/Kgdrywt	2	20	34.	17.	26.
C19-C36 Aliphatics		37	mg/Kgdrywt	2	20	34.	17.	26.
C11-C22 Aromatics	J	22	mg/Kgdrywt	2	20	34.	17.	26.
5-Alpha Androstane		72.1	%					
o-Terphenyl		58.9	%					
2-Fluorobiphenyl		66.6	%					
2-Bromonaphthalene		67.1	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-6
Client ID: WTB-FD01-060315
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2098.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 05-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164213

Analysis Date: 09-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 95.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	27	mg/Kgdrywt	2	20	36.	18.	27.
C19-C36 Aliphatics	J	30	mg/Kgdrywt	2	20	36.	18.	27.
C11-C22 Aromatics	J	29	mg/Kgdrywt	2	20	36.	18.	27.
5-Alpha Androstane		78.3	%					
o-Terphenyl		66.5	%					
2-Fluorobiphenyl		69.4	%					
2-Bromonaphthalene		69.9	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-7
Client ID: WTB-SB-14-0607
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2093.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 05-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164213

Analysis Date: 09-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 94.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics		43	mg/Kgdrywt	2	20	39.	20.	29.
C19-C36 Aliphatics		190	mg/Kgdrywt	2	20	39.	20.	29.
C11-C22 Aromatics		79	mg/Kgdrywt	2	20	39.	20.	29.
5-Alpha Androstane		73.7	%					
o-Terphenyl		79.5	%					
2-Fluorobiphenyl		81.8	%					
2-Bromonaphthalene		83.6	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-8
Client ID: WTB-SS-17-0002
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2099.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 05-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164213

Analysis Date: 09-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 95.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	29	mg/Kgdrywt	2	20	39.	19.	29.
C19-C36 Aliphatics		45	mg/Kgdrywt	2	20	39.	19.	29.
C11-C22 Aromatics		58	mg/Kgdrywt	2	20	39.	19.	29.
5-Alpha Androstane		74.4	%					
o-Terphenyl		81.9	%					
2-Fluorobiphenyl		85.8	%					
2-Bromonaphthalene		86.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-9
Client ID: WTB-SB-17-0206
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2095.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 05-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164213

Analysis Date: 09-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 91.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	30	mg/Kgdrywt	2	20	40.	20.	30.
C19-C36 Aliphatics		44	mg/Kgdrywt	2	20	40.	20.	30.
C11-C22 Aromatics		73	mg/Kgdrywt	2	20	40.	20.	30.
5-Alpha Androstane		44.7	%					
o-Terphenyl		41.7	%					
2-Fluorobiphenyl		64.4	%					
2-Bromonaphthalene		62.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-10
Client ID: WTB-SB-17-0610
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2096.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 05-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164213

Analysis Date: 09-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 82.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics		74	mg/Kgdrywt	2	20	45.	22.	34.
C19-C36 Aliphatics		410	mg/Kgdrywt	2	20	45.	22.	34.
C11-C22 Aromatics		2200	mg/Kgdrywt	4	20	90.	45.	67.
5-Alpha Androstane		66.5	%					
o-Terphenyl		118.	%					
2-Fluorobiphenyl		79.0	%					
2-Bromonaphthalene		74.4	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-11
Client ID: WTB-SS-19-0002
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2126.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 05-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164213

Analysis Date: 10-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 96.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	26	mg/Kgdrywt	2	20	35.	18.	26.
C19-C36 Aliphatics	J	25	mg/Kgdrywt	2	20	35.	18.	26.
C11-C22 Aromatics		1800	mg/Kgdrywt	6	20	100	53.	79.
5-Alpha Androstane		72.2	%					
o-Terphenyl		64.8	%					
2-Fluorobiphenyl		73.4	%					
2-Bromonaphthalene		75.4	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-12
Client ID: WTB-SB-19-0206
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2127.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 05-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164213

Analysis Date: 10-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 87.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	32	mg/Kgdrywt	2	20	42.	21.	32.
C19-C36 Aliphatics		83	mg/Kgdrywt	2	20	42.	21.	32.
C11-C22 Aromatics		410	mg/Kgdrywt	2	20	42.	21.	32.
5-Alpha Androstane		67.7	%					
o-Terphenyl		72.7	%					
2-Fluorobiphenyl		75.0	%					
2-Bromonaphthalene		77.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3772-13
Client ID: WTB-SB-19-0610
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2128.D

Sample Date: 03-JUN-15
Received Date: 03-JUN-15
Extract Date: 05-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164213

Analysis Date: 10-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 89.
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	29	mg/Kgdrywt	2	20	39.	19.	29.
C19-C36 Aliphatics	J	23	mg/Kgdrywt	2	20	39.	19.	29.
C11-C22 Aromatics		78	mg/Kgdrywt	2	20	39.	19.	29.
5-Alpha Androstane		69.4	%					
o-Terphenyl		73.0	%					
2-Fluorobiphenyl		73.3	%					
2-Bromonaphthalene		73.6	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-1
Client ID: WTB-SS-22-0002
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2175.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 09-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164430

Analysis Date: 12-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 90.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	32	mg/Kgdrywt	2	20	43.	21.	32.
C19-C36 Aliphatics	J	30	mg/Kgdrywt	2	20	43.	21.	32.
C11-C22 Aromatics		120	mg/Kgdrywt	2	20	43.	21.	32.
5-Alpha Androstane		70.9	%					
o-Terphenyl		66.4	%					
2-Fluorobiphenyl		78.2	%					
2-Bromonaphthalene		78.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-2
Client ID: WTB-SS-24-0002
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2170.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 09-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164430

Analysis Date: 11-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 93.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	14	mg/Kgdrywt	1	20	19.	9.6	14.
C19-C36 Aliphatics	U	14	mg/Kgdrywt	1	20	19.	9.6	14.
C11-C22 Aromatics	U	14	mg/Kgdrywt	1	20	19.	9.6	14.
5-Alpha Androstane		55.4	%					
o-Terphenyl		56.2	%					
2-Fluorobiphenyl		72.0	%					
2-Bromonaphthalene		71.4	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-3
Client ID: WTB-SB-24-0206
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2171.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 09-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164430

Analysis Date: 11-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 93.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	16	mg/Kgdrywt	1	20	21.	10.	16.
C19-C36 Aliphatics	U	16	mg/Kgdrywt	1	20	21.	10.	16.
C11-C22 Aromatics	U	16	mg/Kgdrywt	1	20	21.	10.	16.
5-Alpha Androstane		60.4	%					
o-Terphenyl		63.0	%					
2-Fluorobiphenyl		75.5	%					
2-Bromonaphthalene		74.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-4
Client ID: WTB-SB-24-069.7
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2214.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 09-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164430

Analysis Date: 13-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 86.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	28	mg/Kgdrywt	2	20	38.	19.	28.
C19-C36 Aliphatics	U	28	mg/Kgdrywt	2	20	38.	19.	28.
C11-C22 Aromatics		76	mg/Kgdrywt	2	20	38.	19.	28.
5-Alpha Androstane		74.8	%					
o-Terphenyl		71.5	%					
2-Fluorobiphenyl		79.6	%					
2-Bromonaphthalene		80.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-5
Client ID: WTB-SB-22-0206
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2183.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 09-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164430

Analysis Date: 12-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 84.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics		44	mg/Kgdrywt	1	20	22.	11.	17.
C19-C36 Aliphatics		25	mg/Kgdrywt	1	20	22.	11.	17.
C11-C22 Aromatics		280	mg/Kgdrywt	1	20	22.	11.	17.
5-Alpha Androstane		55.9	%					
o-Terphenyl		64.4	%					
2-Fluorobiphenyl		63.4	%					
2-Bromonaphthalene		66.2	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-6
Client ID: WTB-SB-22-0610
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2188.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 09-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164430

Analysis Date: 12-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 75.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics		67	mg/Kgdrywt	2	20	52.	26.	39.
C19-C36 Aliphatics		97	mg/Kgdrywt	2	20	52.	26.	39.
C11-C22 Aromatics		470	mg/Kgdrywt	2	20	52.	26.	39.
5-Alpha Androstane		62.6	%					
o-Terphenyl		74.7	%					
2-Fluorobiphenyl		78.0	%					
2-Bromonaphthalene		72.1	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-7
Client ID: WTB-FD02-060315
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2184.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 09-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164430

Analysis Date: 12-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 75.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics		85	mg/Kgdrywt	2	20	54.	27.	40.
C19-C36 Aliphatics		66	mg/Kgdrywt	2	20	54.	27.	40.
C11-C22 Aromatics		520	mg/Kgdrywt	2	20	54.	27.	40.
5-Alpha Androstane		61.1	%					
o-Terphenyl		69.3	%					
2-Fluorobiphenyl		76.5	%					
2-Bromonaphthalene		69.7	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-8
Client ID: WTB-SS-23-0002
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2185.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 09-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164430

Analysis Date: 12-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 91.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	70	mg/Kgdrywt	5	20	93.	47.	70.
C19-C36 Aliphatics		120	mg/Kgdrywt	5	20	93.	47.	70.
C11-C22 Aromatics		300	mg/Kgdrywt	5	20	93.	47.	70.
5-Alpha Androstane		70.0	%					
o-Terphenyl		56.1	%					
2-Fluorobiphenyl		55.5	%					
2-Bromonaphthalene		56.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-9
Client ID: WTB-SB-23-0206
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2189.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 09-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164430

Analysis Date: 12-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 87.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	83	mg/Kgdrywt	5	20	110	55.	83.
C19-C36 Aliphatics		230	mg/Kgdrywt	5	20	110	55.	83.
C11-C22 Aromatics		540	mg/Kgdrywt	5	20	110	55.	83.
5-Alpha Androstane		70.8	%					
o-Terphenyl		62.0	%					
2-Fluorobiphenyl		57.0	%					
2-Bromonaphthalene		60.7	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-10RE
Client ID: WTB-SB-23-0610
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF4016.D

Sample Date: 03-JUN-15
Received Date: 05-JUN-15
Extract Date: 15-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164811

Analysis Date: 17-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 63.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	120	mg/Kgdrywt	5	20	160	79.	120
C19-C36 Aliphatics	J	83	mg/Kgdrywt	5	20	160	79.	120
C11-C22 Aromatics		480	mg/Kgdrywt	5	20	160	79.	120
5-Alpha Androstane		40.2	%					
o-Terphenyl		42.2	%					
2-Fluorobiphenyl		55.7	%					
2-Bromonaphthalene		57.7	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-11
Client ID: WTB-SS-08-0002
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2172.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 09-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164430

Analysis Date: 11-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 93.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	14	mg/Kgdrywt	1	20	18.	9.0	14.
C19-C36 Aliphatics		19	mg/Kgdrywt	1	20	18.	9.0	14.
C11-C22 Aromatics	J	10	mg/Kgdrywt	1	20	18.	9.0	14.
5-Alpha Androstane		56.4	%					
o-Terphenyl		51.9	%					
2-Fluorobiphenyl		59.7	%					
2-Bromonaphthalene		58.9	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-12
Client ID: WTB-FD01-060415
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2173.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 09-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164430

Analysis Date: 12-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 93.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	13	mg/Kgdrywt	1	20	17.	8.6	13.
C19-C36 Aliphatics		20	mg/Kgdrywt	1	20	17.	8.6	13.
C11-C22 Aromatics	J	13	mg/Kgdrywt	1	20	17.	8.6	13.
5-Alpha Androstane		60.0	%					
o-Terphenyl		55.9	%					
2-Fluorobiphenyl		65.8	%					
2-Bromonaphthalene		65.2	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-13DL
Client ID: WTB-SB-08-0206
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2215.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 09-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164430

Analysis Date: 13-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 84.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics		140	mg/Kgdrywt	2	20	44.	22.	33.
C19-C36 Aliphatics		2500	mg/Kgdrywt	10	20	220	110	160
C11-C22 Aromatics		1100	mg/Kgdrywt	2	20	44.	22.	33.
5-Alpha Androstane		71.5	%					
o-Terphenyl		69.2	%					
2-Fluorobiphenyl		72.4	%					
2-Bromonaphthalene		71.9	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-14
Client ID: WTB-SB-08-0610
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2176.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164506

Analysis Date: 12-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 69.
Report Date: 24-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	L	73	mg/Kgdrywt	2	20	53.	27.	40
C19-C36 Aliphatics		840	mg/Kgdrywt	2	20	53.	27.	40.
C11-C22 Aromatics		530	mg/Kgdrywt	2	20	53.	27.	40.
5-Alpha Androstane		52.0	%					
o-Terphenyl		63.2	%					
2-Fluorobiphenyl		76.0	%					
2-Bromonaphthalene		75.7	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-15
Client ID: WTB-SS-09-0002
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2182.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164506

Analysis Date: 12-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 91.
Report Date: 24-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	UL	30	mg/Kgdrywt	2	20	40.	20.	30.
C19-C36 Aliphatics	J	29	mg/Kgdrywt	2	20	40.	20.	30.
C11-C22 Aromatics		50	mg/Kgdrywt	2	20	40.	20.	30.
5-Alpha Androstane		53.6	%					
o-Terphenyl		60.6	%					
2-Fluorobiphenyl		81.9	%					
2-Bromonaphthalene		81.4	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-16
Client ID: WTB-SB-09-0206
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2174.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164506

Analysis Date: 12-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 89.
Report Date: 24-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	UL	15	mg/Kgdrywt	1	20	20.	9.8	15
C19-C36 Aliphatics	U	15	mg/Kgdrywt	1	20	20.	9.8	15.
C11-C22 Aromatics		26	mg/Kgdrywt	1	20	20.	9.8	15.
5-Alpha Androstane		50.3	%					
o-Terphenyl		49.5	%					
2-Fluorobiphenyl		62.1	%					
2-Bromonaphthalene		62.1	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-17DL
Client ID: WTB-SB-09-0610
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2216.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164506

Analysis Date: 13-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 84.
Report Date: 24-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	L	91	mg/Kgdrywt	2	20	45.	22.	34
C19-C36 Aliphatics		1200	mg/Kgdrywt	6	20	140	68.	100
C11-C22 Aromatics		680	mg/Kgdrywt	2	20	45.	22.	34.
5-Alpha Androstane		55.0	%					
o-Terphenyl		50.5	%					
2-Fluorobiphenyl		70.2	%					
2-Bromonaphthalene		72.6	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-18
Client ID: WTB-SS-12-0002
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2199.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164506

Analysis Date: 12-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 92.
Report Date: 24-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	UL	61	mg/Kgdrywt	5	20	81.	40.	61
C19-C36 Aliphatics		120	mg/Kgdrywt	5	20	81.	40.	61.
C11-C22 Aromatics		150	mg/Kgdrywt	5	20	81.	40.	61.
5-Alpha Androstane	*	23.7	%					
o-Terphenyl	*	18.1	%					
2-Fluorobiphenyl		60.3	%					
2-Bromonaphthalene		61.1	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-18RE
Client ID: WTB-SS-12-0002
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-1
Lab File ID: CIF4017.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 15-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164811

Analysis Date: 17-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 92.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	73	mg/Kgdrywt	5	20	98.	49.	73.
C19-C36 Aliphatics	J	62	mg/Kgdrywt	5	20	98.	49.	73.
C11-C22 Aromatics		150	mg/Kgdrywt	5	20	98.	49.	73.
5-Alpha Androstane	*	17.9	%					
o-Terphenyl	*	15.0	%					
2-Fluorobiphenyl		49.9	%					
2-Bromonaphthalene		50.6	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-19
Client ID: WTB-SB-12-0206
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2194.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164506

Analysis Date: 12-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 85.
Report Date: 24-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	UL	34	mg/Kgdrywt	2	20	45.	22.	34
C19-C36 Aliphatics	J	34	mg/Kgdrywt	2	20	45.	22.	34.
C11-C22 Aromatics		49	mg/Kgdrywt	2	20	45.	22.	34.
5-Alpha Androstane		67.8	%					
o-Terphenyl		79.7	%					
2-Fluorobiphenyl		89.1	%					
2-Bromonaphthalene		88.6	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-20
Client ID: WTB-SB-12-0610
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2195.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164506

Analysis Date: 12-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 81.
Report Date: 24-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	UL	33	mg/Kgdrywt	2	20	44.	22.	33
C19-C36 Aliphatics		55	mg/Kgdrywt	2	20	44.	22.	33.
C11-C22 Aromatics		100	mg/Kgdrywt	2	20	44.	22.	33.
5-Alpha Androstane		59.2	%					
o-Terphenyl		56.9	%					
2-Fluorobiphenyl		71.8	%					
2-Bromonaphthalene		71.8	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-21
Client ID: WTB-SS-15-0002
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2153.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164370

Analysis Date: 11-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 92.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	29	mg/Kgdrywt	2	20	39.	19.	29.
C19-C36 Aliphatics		44	mg/Kgdrywt	2	20	39.	19.	29.
C11-C22 Aromatics		120	mg/Kgdrywt	2	20	39.	19.	29.
5-Alpha Androstane		76.5	%					
o-Terphenyl		78.3	%					
2-Fluorobiphenyl		79.2	%					
2-Bromonaphthalene		79.6	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-22
Client ID: WTB-SB-15-0206
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2114.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164370

Analysis Date: 10-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 85.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	15	mg/Kgdrywt	1	20	20.	9.9	15.
C19-C36 Aliphatics	U	15	mg/Kgdrywt	1	20	20.	9.9	15.
C11-C22 Aromatics	J	12	mg/Kgdrywt	1	20	20.	9.9	15.
5-Alpha Androstane		45.6	%					
o-Terphenyl		44.5	%					
2-Fluorobiphenyl		72.4	%					
2-Bromonaphthalene		72.7	%					

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Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-23
Client ID: WTB-FD02-060415
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2115.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164370

Analysis Date: 10-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 85.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	16	mg/Kgdrywt	1	20	21.	10.	16.
C19-C36 Aliphatics	U	16	mg/Kgdrywt	1	20	21.	10.	16.
C11-C22 Aromatics		22	mg/Kgdrywt	1	20	21.	10.	16.
5-Alpha Androstane		65.4	%					
o-Terphenyl		63.9	%					
2-Fluorobiphenyl		76.0	%					
2-Bromonaphthalene		75.3	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-24
Client ID: WTB-SB-15-0610
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2129.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164370

Analysis Date: 10-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 85.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	34	mg/Kgdrywt	2	20	46.	23.	34.
C19-C36 Aliphatics		100	mg/Kgdrywt	2	20	46.	23.	34.
C11-C22 Aromatics		110	mg/Kgdrywt	2	20	46.	23.	34.
5-Alpha Androstane		63.9	%					
o-Terphenyl		51.1	%					
2-Fluorobiphenyl		51.6	%					
2-Bromonaphthalene		52.9	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-25
Client ID: WTB-SS-16-0002
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2130.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164370

Analysis Date: 10-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 89.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	32	mg/Kgdrywt	2	20	42.	21.	32.
C19-C36 Aliphatics		65	mg/Kgdrywt	2	20	42.	21.	32.
C11-C22 Aromatics		240	mg/Kgdrywt	2	20	42.	21.	32.
5-Alpha Androstane		70.2	%					
o-Terphenyl		64.5	%					
2-Fluorobiphenyl		68.1	%					
2-Bromonaphthalene		68.6	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-26
Client ID: WTB-SB-16-0206
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2131.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164370

Analysis Date: 10-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 90.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	32	mg/Kgdrywt	2	20	42.	21.	32.
C19-C36 Aliphatics		67	mg/Kgdrywt	2	20	42.	21.	32.
C11-C22 Aromatics		130	mg/Kgdrywt	2	20	42.	21.	32.
5-Alpha Androstane		76.2	%					
o-Terphenyl		81.4	%					
2-Fluorobiphenyl		83.8	%					
2-Bromonaphthalene		85.2	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-27
Client ID: WTB-SB-16-0610
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2132.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164370

Analysis Date: 10-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 83.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics		25	mg/Kgdrywt	1	20	21.	11.	16.
C19-C36 Aliphatics		32	mg/Kgdrywt	1	20	21.	11.	16.
C11-C22 Aromatics		100	mg/Kgdrywt	1	20	21.	11.	16.
5-Alpha Androstane		55.4	%					
o-Terphenyl		49.3	%					
2-Fluorobiphenyl		69.3	%					
2-Bromonaphthalene		69.2	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-28
Client ID: WTB-SS-18-0002
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2116.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164370

Analysis Date: 10-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 86.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	31	mg/Kgdrywt	2	20	42.	21.	31.
C19-C36 Aliphatics	U	31	mg/Kgdrywt	2	20	42.	21.	31.
C11-C22 Aromatics		50	mg/Kgdrywt	2	20	42.	21.	31.
5-Alpha Androstane		80.4	%					
o-Terphenyl		72.8	%					
2-Fluorobiphenyl		74.0	%					
2-Bromonaphthalene		74.8	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-29
Client ID: WTB-SB-18-0206
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2117.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164370

Analysis Date: 10-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 84.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	16	mg/Kgdrywt	1	20	21.	10.	16.
C19-C36 Aliphatics	U	16	mg/Kgdrywt	1	20	21.	10.	16.
C11-C22 Aromatics	J	17	mg/Kgdrywt	1	20	21.	10.	16.
5-Alpha Androstane		63.2	%					
o-Terphenyl		56.2	%					
2-Fluorobiphenyl		67.2	%					
2-Bromonaphthalene		67.7	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-30
Client ID: WTB-SB-18-0610
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2118.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164370

Analysis Date: 10-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 83.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	J	11	mg/Kgdrywt	1	20	22.	11.	16.
C19-C36 Aliphatics		37	mg/Kgdrywt	1	20	22.	11.	16.
C11-C22 Aromatics		49	mg/Kgdrywt	1	20	22.	11.	16.
5-Alpha Androstane		66.6	%					
o-Terphenyl		61.7	%					
2-Fluorobiphenyl		63.7	%					
2-Bromonaphthalene		64.2	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-31
Client ID: WTB-SS-20-0002
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2119.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164370

Analysis Date: 10-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 83.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	15	mg/Kgdrywt	1	20	20.	9.8	15.
C19-C36 Aliphatics	J	15	mg/Kgdrywt	1	20	20.	9.8	15.
C11-C22 Aromatics		20	mg/Kgdrywt	1	20	20.	9.8	15.
5-Alpha Androstane		70.0	%					
o-Terphenyl		60.4	%					
2-Fluorobiphenyl		68.3	%					
2-Bromonaphthalene		69.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-32
Client ID: WTB-FD03-060415
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2120.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164370

Analysis Date: 10-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 83.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	17	mg/Kgdrywt	1	20	23.	12.	17.
C19-C36 Aliphatics	J	12	mg/Kgdrywt	1	20	23.	12.	17.
C11-C22 Aromatics	J	20	mg/Kgdrywt	1	20	23.	12.	17.
5-Alpha Androstane		64.7	%					
o-Terphenyl		54.3	%					
2-Fluorobiphenyl		69.0	%					
2-Bromonaphthalene		68.4	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-33
Client ID: WTB-SB-20-0206
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2121.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164370

Analysis Date: 10-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 84.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	16	mg/Kgdrywt	1	20	22.	11.	16.
C19-C36 Aliphatics	U	16	mg/Kgdrywt	1	20	22.	11.	16.
C11-C22 Aromatics		24	mg/Kgdrywt	1	20	22.	11.	16.
5-Alpha Androstane		61.6	%					
o-Terphenyl		64.0	%					
2-Fluorobiphenyl		80.4	%					
2-Bromonaphthalene		80.1	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-34
Client ID: WTB-SB-20-0610
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2122.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164370

Analysis Date: 10-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 82.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	17	mg/Kgdrywt	1	20	23.	12.	17.
C19-C36 Aliphatics	J	14	mg/Kgdrywt	1	20	23.	12.	17.
C11-C22 Aromatics		25	mg/Kgdrywt	1	20	23.	12.	17.
5-Alpha Androstane		63.2	%					
o-Terphenyl		63.5	%					
2-Fluorobiphenyl		77.7	%					
2-Bromonaphthalene		77.2	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-35
Client ID: WTB-SS-21-0002
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2123.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164370

Analysis Date: 10-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 96.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	14	mg/Kgdrywt	1	20	19.	9.5	14.
C19-C36 Aliphatics	U	14	mg/Kgdrywt	1	20	19.	9.5	14.
C11-C22 Aromatics	U	14	mg/Kgdrywt	1	20	19.	9.5	14.
5-Alpha Androstane		50.2	%					
o-Terphenyl		53.8	%					
2-Fluorobiphenyl		59.6	%					
2-Bromonaphthalene		59.2	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-36DL
Client ID: WTB-SB-21-0206
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2217.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164370

Analysis Date: 13-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 92.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics		58	mg/Kgdrywt	1	20	19.	9.7	15.
C19-C36 Aliphatics		570	mg/Kgdrywt	3	20	58.	29.	44.
C11-C22 Aromatics		370	mg/Kgdrywt	1	20	19.	9.7	15.
5-Alpha Androstane		70.2	%					
o-Terphenyl		63.0	%					
2-Fluorobiphenyl		68.3	%					
2-Bromonaphthalene		69.6	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-37DL
Client ID: WTB-SB-21-0610
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2218.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164370

Analysis Date: 13-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 75.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics		84	mg/Kgdrywt	2	20	50.	25.	38.
C19-C36 Aliphatics		450	mg/Kgdrywt	2	20	50.	25.	38.
C11-C22 Aromatics		370	mg/Kgdrywt	1	20	25.	12.	19.
5-Alpha Androstane		69.6	%					
o-Terphenyl		75.7	%					
2-Fluorobiphenyl		78.5	%					
2-Bromonaphthalene		78.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-38
Client ID: WTB-RB01-060415
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2166.D

Sample Date: 04-JUN-15
Received Date: 05-JUN-15
Extract Date: 09-JUN-15
Extracted By: HG
Extraction Method: SW846 3510
Lab Prep Batch: WG164369

Analysis Date: 11-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: AQ
% Solids: NA
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	72	ug/L	1	100	96.	48.	72.
C19-C36 Aliphatics	U	72	ug/L	1	100	96.	48.	72.
C11-C22 Aromatics	U	72	ug/L	1	100	96.	48.	72.
5-Alpha Androstane		44.2	%					
o-Terphenyl		52.9	%					
2-Fluorobiphenyl		62.6	%					
2-Bromonaphthalene		46.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-39
Client ID: WTB-SS-13-0002
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2191.D

Sample Date: 05-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164506

Analysis Date: 12-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 89.
Report Date: 24-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	UL	15	mg/Kgdrywt	1	20	20.	10.	15
C19-C36 Aliphatics	U	15	mg/Kgdrywt	1	20	20.	10.	15.
C11-C22 Aromatics	J	12	mg/Kgdrywt	1	20	20.	10.	15.
5-Alpha Androstane		53.0	%					
o-Terphenyl		51.0	%					
2-Fluorobiphenyl		60.9	%					
2-Bromonaphthalene		60.8	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-40
Client ID: WTB-SB-13-0206
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2196.D

Sample Date: 05-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164506

Analysis Date: 12-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 89.
Report Date: 24-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	UL	74	mg/Kgdrywt	5	20	99.	50.	74
C19-C36 Aliphatics		190	mg/Kgdrywt	5	20	99.	50.	74.
C11-C22 Aromatics		270	mg/Kgdrywt	5	20	99.	50.	74.
5-Alpha Androstane		39.9	%					
o-Terphenyl		42.8	%					
2-Fluorobiphenyl		67.4	%					
2-Bromonaphthalene		69.8	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-41
Client ID: WTB-SB-13-0610
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2197.D

Sample Date: 05-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164506

Analysis Date: 12-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 87.
Report Date: 24-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	UL	78	mg/Kgdrywt	5	20	100	52.	78
C19-C36 Aliphatics		180	mg/Kgdrywt	5	20	100	52.	78.
C11-C22 Aromatics		180	mg/Kgdrywt	5	20	100	52.	78.
5-Alpha Androstane		48.6	%					
o-Terphenyl		45.1	%					
2-Fluorobiphenyl		55.9	%					
2-Bromonaphthalene		55.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-42
Client ID: WTB-SS-10-0002
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2192.D

Sample Date: 05-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164506

Analysis Date: 12-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 93.
Report Date: 24-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	UL	15	mg/Kgdrywt	1	20	20.	10.	15
C19-C36 Aliphatics	U	15	mg/Kgdrywt	1	20	20.	10.	15.
C11-C22 Aromatics	U	15	mg/Kgdrywt	1	20	20.	10.	15.
5-Alpha Androstane		49.4	%					
o-Terphenyl		50.9	%					
2-Fluorobiphenyl		66.7	%					
2-Bromonaphthalene		65.9	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-43
Client ID: WTB-SB-10-0206
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF2198.D

Sample Date: 05-JUN-15
Received Date: 05-JUN-15
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164506

Analysis Date: 12-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 82.
Report Date: 24-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	JL	14	mg/Kgdrywt	1	20	22.	11.	17
C19-C36 Aliphatics		60	mg/Kgdrywt	1	20	22.	11.	17.
C11-C22 Aromatics		89	mg/Kgdrywt	1	20	22.	11.	17.
5-Alpha Androstane		51.2	%					
o-Terphenyl		51.3	%					
2-Fluorobiphenyl		63.2	%					
2-Bromonaphthalene		64.3	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI3897-44RE
Client ID: WTB-SB-10-0610
Project: Portsmouth Naval Shipyard - `
SDG: OU8-1
Lab File ID: CIF4018.D

Sample Date: 05-JUN-15
Received Date: 05-JUN-15
Extract Date: 15-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164811

Analysis Date: 17-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 87.
Report Date: 23-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	J	17	mg/Kgdrywt	1	20	22.	11.	17.
C19-C36 Aliphatics		72	mg/Kgdrywt	1	20	22.	11.	17.
C11-C22 Aromatics		82	mg/Kgdrywt	1	20	22.	11.	17.
5-Alpha Androstane		59.1	%					
o-Terphenyl		58.7	%					
2-Fluorobiphenyl		68.8	%					
2-Bromonaphthalene		68.7	%					

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APPENDIX C

REGIONAL WORKSHEETS

REGION I, EPA-NE ORGANIC REGIONAL DATA ASSESSMENT (ORDA)*

CASE #: Rio

SITE NAME: PNS Kittery

LAB NAME: Rotabin

OF SAMPLES/MATRIX: _____

SDG #: OU8-1

VALIDATION CONTRACTOR: TetraTech

SOW #/CONTRACT #: _____

VALIDATOR'S NAME: Joe Kaliwyak

EPA-NE DV TIER LEVEL: _____

DATE DP REC'D BY EPA-NE: _____

TPO/PO: **ACTION ____ FYI ____

DV COMPLETION DATE: _____

ANALYTICAL DATA QUALITY SUMMARY

	VOA	SV PCTs/PAH	Pest/PCB
1. Preservation and Contractual Holding Times			
2. GC/MS / GC/ECD Instrument Performance Check			
3. Initial Calibration			
4. Continuing Calibration			
5. Blanks			
6. Surrogate Compounds			
7. Internal Standards			
8. Matrix Spike/Matrix Spike Duplicate			
9. Sensitivity Check			
10. PE Samples-Accuracy Check			
11. Target Compound Identification			
12. Compound Quantitation and Reported QLs			
13. Tentatively Identified Compounds			
14. Semivolatile Cleanup/Pesticide/PCB Cleanup			
15. Data Completeness			
16. Overall Evaluation of Data		V	

o = Data had no problems or were qualified due to minor contractual problems.
m = Data were qualified due to major contractual problems.
z = Data were rejected as unusable due major contractual problems.

ACTION ITEMS: (z items)_____

AREAS OF CONCERN: (m items)_____

COMMENTS: _____

*This form assesses the analytical data quality in terms of contractual compliance only. It does not assess sampling errors and/or non-contractual analytical issues that affect data quality.

**Check "ACTION" only if contractual defects resulted in reduced payment/data rejection recommendations.

Validator: _____ Date: 8/14/15

INSTRUCTIONS ON REVERSE SIDE

Site Name _____
Reference No. _____

REGION I ORGANIC DATA VALIDATION

The following data package has been validated:

Lab Name Katahdin
Case/Project No. _____
SDG No. OU8-1
No. of Samples/Matrix _____

SOW/Method No. _____
Sampling Date(s) _____
Shipping Date(s) _____
Date Rec'd by lab _____

Traffic Report Sample Nos. _____

Trip Blank No. _____
Equipment Blank No. _____
Bottle Blank No. _____
Field Duplicate Nos. _____

PES Nos. _____

The Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, revision _____ was used to evaluate the data and/or approved modifications to the EPA-NE Functional Guidelines were used to evaluate the data and are attached to this cover page: (attach modified criteria from EPA approved QAPjP or amendment to QAPjP).

A Tier II or Tier III evaluation was used to validate the data (circle one). If a Tier II validation with a partial Tier III was used, then identify samples, parameters, etc. that received partial Tier III validation _____

The data were evaluated based upon the following parameters:

- Overall Evaluation of Data
- Data Completeness (CSF Audit - Tier I)
- Preservation & Technical Holding Times
- GC/MS & GC/ECD Instrument Performance Check
- Initial & Continuing Calibrations
- Blanks
- Surrogate Compounds
- Internal Standards
- Matrix Spike/Matrix Spike Duplicate
- Field Duplicates
- Sensitivity Check
- PE Samples/Accuracy Check
- Target Compound Identification
- Compound Quantitation and Reported Quantitation Limits
- TICs
- Semivolatile and Pesticide/PCB Cleanup
- System Performance

Region I Definitions and Qualifiers:

A - Acceptable Data
J - Numerical value associated with compound is an estimated quantity.
R - The data are rejected as unusable. The R replaces the numerical value or sample quantitation limit.
U - Compound not detected at that numerical sample quantitation limit.
UJ - The sample quantitation limit is an estimated quantity.
TB, BB, EB - Compound detected in aqueous trip blank, aqueous bottle blank, or aqueous equipment blank associated with soil/sediment samples.

Validator's Name J Kalinyak Company Name Tetra Tech Phone Number 412-921-8539

Date Validation Started _____ Date Validation Completed _____

EPA-NE
Data Validation Worksheet Cover Page - Page 2

Check if all criteria are met and no hard copy worksheet provided. Indicate NA if worksheet is not applicable to analytical method. Note: there is no standard worksheet for System Performance, however, the validator must document all system performance issues in the Data Validation Memorandum.

VOA/SV worksheets:

VOA/SV-Pest/PCB	COMPLETE SDG FILE (CSF) AUDIT	OK
VOA/SV-Pest/PCB-I	PRESERVATION AND HOLDING TIMES	
VOA/SV-II	GC/MS INSTRUMENT PERFORMANCE CHECK (TUNING)	
VOA/SV-III	INITIAL CALIBRATION	
VOA/SV-IV	CONTINUING CALIBRATION	
VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS	
VOA/SV-Pest/PCB-V-B	BLANK ANALYSIS	
VOA-VI	VOA SURROGATE SPIKE RECOVERIES	
SV-VI	SV SURROGATE SPIKE RECOVERIES	
VOA/SV-VII	INTERNAL STANDARD PERFORMANCE	
VOA/SV-Pest/PCB-VIII	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	
VOA/SV-Pest/PCB-IX	FIELD DUPLICATE PRECISION	
VOA/SV-Pest/PCB-X	SENSITIVITY CHECK	
VOA/SV-Pest/PCB-XI	ACCURACY CHECK	
VOA/SV-Pest/PCB-XII	TARGET COMPOUND IDENTIFICATION	
VOA/SV-Pest/PCB-XIII	SAMPLE QUANTITATION	
VOA/SV-XIV	TENTATIVELY IDENTIFIED COMPOUNDS	
VOA/SV-XV	SEMIVOLATILE CLEANUP	
TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA	

Pest/PCB worksheets:

VOA/SV-Pest/PCB	COMPLETE SDG FILE (CSF) AUDIT	
VOA/SV-Pest/PCB-I	PRESERVATION AND HOLDING TIMES	
Pest/PCB-IIA	GC/ECD INSTRUMENT PERFORMANCE CHECK-RESOLUTION	
Pest/PCB-IIB	GC/ECD INSTRUMENT PERFORMANCE CHECK-RETENTION TIMES	
Pest/PCB-IIC	GC/ECD INSTRUMENT PERFORMANCE CHECK-ACCURACY CHECK OF INITIAL CALIBRATION	
Pest/PCB-IID	GC/ECD INSTRUMENT PERFORMANCE CHECK-PESTICIDE DEGRADATION	
Pest/PCB-III	INITIAL CALIBRATION	
Pest/PCB-IV	CONTINUING CALIBRATION	
VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS	
VOA/SV-Pest/PCB-V-B	BLANK ANALYSIS	
Pest/PCB-VI	SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT	
Pest/PCB-VII	PESTICIDE CLEANUP	
VOA/SV-Pest/PCB-VIII	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	
VOA/SV-Pest/PCB-IX	FIELD DUPLICATE PRECISION	
VOA/SV-Pest/PCB-X	SENSITIVITY CHECK	
VOA/SV-Pest/PCB-XI	ACCURACY CHECK	
Pest/PCB-XII	COMPOUND IDENTIFICATION	
VOA/SV-Pest/PCB-XIII	SAMPLE QUANTITATION	
TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA	

I certify that all criteria were met for the worksheets checked above.

Signature: [signature] Name: J. Kalinyak

Date: 8/14/15

EPA-NE - Data Validation Worksheet
Overall Evaluation of Data - Data Validation Memorandum - Table II

N/A See DV Report

VOLATILE ORGANICS					
DQO (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability**	Potential Usability Issues
		Analytical Error	Sampling Error*		

* The evaluation of "sampling error" cannot be completely assessed in data validation.

** Sampling variability is not assessed in data validation.

Validator: _____ Date: 8/14/15

EPA-NE - Data Validation Worksheet
Overall Evaluation of Data - Data Validation Memorandum - Table II

See DV Report

SEMIVOLATILE ORGANICS					
DQO (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability**	Potential Usability Issues
		Analytical Error	Sampling Error*		

* The evaluation of "sampling error" cannot be completely assessed in data validation.

** Sampling variability is not assessed in data validation.

Validator: _____ Date: 8/14/15

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB

See DV Report

COMPLETE SDG FILE (CSF) AUDIT

Organic Fractions:_____

Missing Information	Date Lab Contacted	Date Received

Validator: _____ Date: 8/14/15

EPA-NE - Data Validation
VOA/SV - Pest/PCB-I

12/96

See DV Report

Sampler:_____ Company:_____ Contacted: Yes No Date:_____

I. PRESERVATION AND HOLDING TIMES - Circle sample numbers with exceeded technical holding times or omitted preservation.
List all required preservation codes and circle omitted preservation codes.
Circle all exceeded technical holding times.
Identify extraction technique after "# of Days"/(*Extraction Code).

Sample No. (TR No.)	Matrix	Pres. Code	Date Sampled	VOA			BNA					PEST/PCB				
				Date Analyzed	# of Days from Samp. to Anal.	Action	Date Extracted	# of Days from Samp. to Extr./(*)	Date Analyzed	# of Days from Extr. to Anal.	Action	Date Extracted	# of Days from Samp. to Extr./(*)	Date Analyzed	# of Days from Extr. to Anal.	Action

Preservation Code:
1. Cool @ 4°C (± 2°)
2. Preserve with HCl to at least pH 2
3. Protect from light
4. Freeze
5. Room Temperature (Avoid excessive heat)

(*Extraction Code:)
L/L - Liquid/Liquid
SON - Sonication
SEP - Separatory Funnel
SOX - Soxhlet
SPE - Solid Phase Extraction

Action Code:
J - Estimate (J) Detected Values
UJ - Estimate (UJ) Non-Detected Values
R - Reject (R) Non-Detected Values

Validator: _____

Date: 8/14/15

II. GC/MS INSTRUMENT PERFORMANCE CHECK (TUNING)

See DV Report

List all Instrument Performance Checks that are outside method QC tuning acceptance criteria.

Volatile Instrument Performance Check (Compound Name)	Analysis Date and Time	Instrument	Ion(s) Affected	Percent Relative Abundance	QC Limits	Samples Affected	Action

Comments:

Semivolatile Instrument Performance Check (Compound Name)	Analysis Date and Time	Instrument	Ion(s) Affected	Percent Relative Abundance	QC Limits	Samples Affected	Action

Comments:

If tuning compounds and criteria are different from those specified in CLP SOW OLM03.1, then the validator should include a copy of the method-specific tuning criteria with this worksheet.

Validator: _____

Date: 8/14/15

EPA-NE - Data Validation Worksheet
VOA/SV-III

See DV Report

III. INITIAL CALIBRATION - List all analytes that are outside calibration criteria.

Date of ICAL	Instrument	Parameter	Matrix	Compound	% RSD	$\overline{RRF}$	Samples Affected	Action

Comments:

Validator: [signature]

Date: 8/14/15

EPA-NE - Data Validation Worksheet
VOA/SV-IV

See DV Report

IV. CONTINUING CALIBRATION - List all analytes that are outside calibration criteria.

Date of ICAL	Date of CCAL	Instrument	Parameter	Matrix	Compound	%D	RRF	Samples Affected	Action

Comments:

Validator: [signature]

Date: 8/14/15

12/96

EPA-NE - Data Validation Worksheet

VOA/SV - Pest/PCB-V-A

See DV Report

V. BLANK ANALYSIS

List the blank contamination below. Concentration Level:_____

Sampler: _____ Company: _____ Contacted: Yes No Date:_____

1. Laboratory: Method, Storage and Instrument Blanks

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)

2. Field: Equipment (Rinsate), Trip and Bottle Blanks

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)

Validator: _____ Date: 8/14/15

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-V-B

See DV Report

3. Blank Actions - List the maximum concentrations of blank compounds.

Compound	Type of Blank	Date Blank Sampled/Originated	Max. Conc. (units)	Action Level (units)	Sample QL	Samples Affected	Action

Comments: _____

Validator: _____ Date: 8/14/15

See DV Report

EPA-NE - Data Validation Worksheet
VOA-VI

VI. VOA SURROGATE SPIKE RECOVERIES - List all surrogate compound recoveries that are outside method QC acceptance criteria.

Method	Volatile Method QC Acceptance Criteria				
	Toluene-d_8	BFB	DCE-d_4	Other:	
OLM03.2	Water 88-110 Soil 84-138	Water 86-115 Soil 59-113	Water 76-114 Soil 70-121		
OLC02.1	NA	80-120	NA		
Other:					
Sample Number/Matrix	**% Recovery**	**% Recovery**	**% Recovery**	**% Recovery**	**Action**

Validator: _____

Date: 8/14/15

See DV Report

VI. SV SURROGATE SPIKE RECOVERIES - List all surrogate compound recoveries that are outside method QC acceptance criteria.

Method	Base/Neutral Method QC Acceptance Criteria					
	NBZ-d_5	2-FBP	TPH-d_{14}	1,2-DCB-d_4*	Other:	
OLM03.2	Water Soil 35-114 23-120	Water Soil 43-116 30-115	Water Soil 33-141 18-137	Water Soil 16-110 20-130		
OLC02.1	40-110	30-110	20-140	NA		
Other:						
Sample Number/Matrix	**% Recovery**	**% Recovery**	**% Recovery**	**% Recovery**	**% Recovery**	**Action**

Method	Acid Method QC Acceptance Criteria					
	Phenol-d_5	2-FP	2,4,6-TBP	2-CP-d_4*	Other:	
OLM03.2	Water Soil 10-110 24-113	Water Soil 21-110 25-121	Water Soil 10-123 19-122	Water Soil 33-110 20-130		
OLC02.1	15-115	15-110	15-130	NA		
Other:						
Sample Number/Matrix	**% Recovery**	**% Recovery**	**% Recovery**	**% Recovery**	**% Recovery**	**Action**

* Advisory Surrogates - OLM03.2

Validator: _____ Date: 8/14/15

EPA-NE - Data Validation Worksheet
VOA/SV-VII

See IDV Report

VII. INTERNAL STANDARD PERFORMANCE

List the internal standards that are outside the area count and retention time method QC acceptance criteria.
IS Area Count method QC acceptance criteria:_____
IS Retention Time method QC acceptance criteria:_____

Sample Number (TR#)	Date and Time Analyzed	Instrument	Parameter	IS Outside Area Count and/or RT Criteria	__IS Area	RT Shift	Acceptable Range (IS area or RT shift)	Action

Validator: _____ Date: 8/14/15

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-VIII

See DV Report

VIII. MATRIX SPIKE/MATRIX SPIKE DUPLICATE - List all MS/MSD analytes that are outside method QC acceptance criteria.

Use a separate worksheet for each MS/MSD pair.

Sample # _____ Matrix _____ Concentration Level _____

Parameter	Compound	MS %Rec	MSD %Rec	RPD	Method QC Limits		Concentration			% RSD	Action
					% Rec	RPD	Unspiked Sample	MS	MSD		

Validator: _____

Date: 8/14/15

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-IX

See DV Report

IX. FIELD DUPLICATE PRECISION - List all field duplicate analytes that are outside criteria.

Use a separate worksheet for each field duplicate pair.

Sample Number _____ Duplicate Sample Number _____ Matrix _____

Parameter	Compound	Sample Conc.	Sample QL		Duplicate Conc.	Duplicate QL		RPD	QC Acceptance Criteria RPD or NA*	Action
			SQL	2xSQL		SQL	2xSQL			

* For instances where one duplicate result is ND (or reported less than the sample QL).

Does the MS/MSD data indicate acceptable laboratory precision? Y N

Comments: _____

Sampler Name: _____ Contractor Name: _____ Date Contacted: _____

Reason for Contact and resolution obtained: _____

Validator: _____ Date: 8/14/15

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-X

See DV Report

X. SENSITIVITY CHECK (Method Detection Limit Study)

List all compounds, surrogates, and internal standards that are outside the MDL criteria.

- Has an appropriate MDL study been submitted with seven replicates for each compound and matrix of interest? **Y N**
- Date of Preparation/Analysis: _____ Within 1 year? **Y N**
- Instrument I.D.: _____ Same as samples? **Y N**
- Column I.D.: _____ Same as samples? **Y N**

Matrix	Compound	MDL > QL	Method QC Limits < 80% or > 120%	IS Outside Area Count and/or RT Criteria	RSD > 20%	Samples Affected	Action

If an MDL study has not been submitted, use only the LFB results to evaluate data.

(Laboratory Fortified Blank) - List all LFB compounds, surrogates and internal standards that are outside criteria.

- Has an appropriate and complete LFB been submitted at the proper frequency? **Y N**
- Does it contain all target compounds at the method-required QLs? **Y N**
- Was the LFB spiked with a standard from a source (vendor) independent of the calibration standard? **Y N**

Matrix	Compound	Method QC Limits < 60% or > 140% Other:	IS Outside Area Count and/or RT Criteria	Samples Affected	Action

Validator: _____ Date: 8/14/5

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-XI

See DV Report

XI. ACCURACY CHECK (Performance Evaluation Results) - List all analytes that are outside criteria.

SDG No: _____ CASE: _____

Are more than one-half of the PES analytes within criteria for each parameter. **Y N**

PE Sample Number	Ampule Number	Parameter	Type of PES	Matrix	Analyte	Conc.	Region I EPA PES Scores*	Non-EPA PES Scores**	Samples Affected	Action

* For Region I PESs indicate the Region I PES Score Report Result: Action High; Action Low; TCL MISS; TCL CONTAMINANT; TIC HIT; TIC MISS; TIC CONTAMINANT

** For Non-EPA PESs indicate the Non-EPA PES Score: PES COMPOUND MISS; PES COMPOUND CONTAMINANT; PES COMPOUND HIT (% Recovery Limits)

Validator: _____ Date: 8/14/15

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-XII

See DV Report

XII. TARGET COMPOUND IDENTIFICATION - List the analytes that are outside the acceptance criteria.

Sample Number	Compound	___MS Ions	____RRT	Action

Validator: _____

Date: 8/14/15

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-XIII

See DV Report

XIII. SAMPLE QUANTITATION

Recalculate, from the raw data, the concentrations for one positive detect and one reported sample quantitation limit for a non-detect in a diluted sample or soil sample per fraction. (Note: Although Section XIII, C.1.a, requires that one calculation for each fraction in each sample be performed, the validator is only required to reproduce an example, for each fraction, of one positive detect and one sample quantitation limit calculation on this worksheet.)

Do all soil/sediment samples have % solids greater than 30%? **Y N**
If no, list sample numbers_____

Fraction		Calculation
VOA		
Sample No.:		
Reported Compound:		
Reported Value:		
Not Detected Compound:		
Reported Quantitation Limit:		
BNA		
Sample No.:		
Reported Compound:		
Reported Value:		
Not Detected Compound:		
Reported Quantitation Limit:		
Pesticide/PCB		
Sample No.:		
Reported Compound:		
Reported Value:		
Not Detected Compound:		
Reported Quantitation Limit:		

Validator: _____ Date: 8/14/15

XIV. TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

See DV Report

List the 5 TICs having the highest concentration for each sample parameter.

Sample Number	Parameter	Compound	____RRT	__Est. Conc.	Action

Validator: _____

Date: 8/14/15

EPA-NE - Data Validation Worksheet
VOA/SV-XV

See DV Report

XV. SEMIVOLATILE CLEANUP - List all analytes that are outside method cleanup QC criteria.

Cleanup Procedure	Instrument # or Lot #	Date/Time GPC Calibrated or Check Solution Analyzed	Compound	% Rec	QC Limits	Samples Affected	Action

Did the GPC column meet; resolution requirements? Y or N
peak shape requirements? Y or N
retention time shift requirements? Y or N

Was the GPC calibration, Silica Gel cleanup checked at the method required frequency with correct compounds and concentrations? Y or N

Were all compounds less than QL for the GPC/Silica Gel/Acid-Partition blank? Y or N

Did the blank surrogate recoveries and IS area counts and RTs (if added) meet method QC acceptance criteria? Y or N

Comments:

Validator: HeQ

Date: 8/14/15

APPENDIX D

SUPPORT DOCUMENTATION

SDG NARRATIVE
KATAHDIN ANALYTICAL SERVICES
TETRA TECH NUS, INC.
PORTSMOUTH NAVAL SHIPYARD – WE32 OU8
OU8-1
SI3772 & SI3897

Sample Receipt

The following samples were received on June 03 and 05, 2015 and were logged in under Katahdin Analytical Services work order numbers SI3772 and SI3897 for a hardcopy due date of June 24, 2015.

KATAHDIN Sample No.	TTNUS Sample Identification
SI3772-1	WTB-SS-11-0002
SI3772-2	WTB-SB-11-0206
SI3772-3	WTB-SB-11-0610
SI3772-4	WTB-SS-14-0002
SI3772-5	WTB-SB-14-0206
SI3772-6	WTB-FD01-060315
SI3772-7	WTB-SB-14-0607
SI3772-8	WTB-SS-17-0002
SI3772-9	WTB-SB-17-0206
SI3772-10	WTB-SB-17-0610
SI3772-11	WTB-SS-19-0002
SI3772-12	WTB-SB-19-0206
SI3772-13	WTB-SB-19-0610
SI3897-1	WTB-SS-22-0002
SI3897-2	WTB-SS-24-0002
SI3897-3	WTB-SB-24-0206
SI3897-4	WTB-SB-24-069.7
SI3897-5	WTB-SB-22-0206
SI3897-6	WTB-SB-22-0610
SI3897-7	WTB-FD02-060315
SI3897-8	WTB-SS-23-0002
SI3897-9	WTB-SB-23-0206
SI3897-10	WTB-SB-23-0610
SI3897-11	WTB-SS-08-0002
SI3897-12	WTB-FD01-060415
SI3897-13	WTB-SB-08-0206
SI3897-14	WTB-SB-08-0610
SI3897-15	WTB-SS-09-0002
SI3897-16	WTB-SB-09-0206
SI3897-17	WTB-SB-09-0610
SI3897-18	WTB-SS-12-0002
SI3897-19	WTB-SB-12-0206
SI3897-20	WTB-SB-12-0610

SI3897-21	WTB-SS-15-0002
SI3897-22	WTB-SB-15-0206
SI3897-23	WTB-FD02-060415
SI3897-24	WTB-SB-15-0610
SI3897-25	WTB-SS-16-0002
SI3897-26	WTB-SB-16-0206
SI3897-27	WTB-SB-16-0610
SI3897-28	WTB-SS-18-0002
SI3897-29	WTB-SB-18-0206
SI3897-30	WTB-SB-18-0610
SI3897-31	WTB-SS-20-0002
SI3897-32	WTB-FD03-060415
SI3897-33	WTB-SB-20-0206
SI3897-34	WTB-SB-20-0610
SI3897-35	WTB-SS-21-0002
SI3897-36	WTB-SB-21-0206
SI3897-37	WTB-SB-21-0610
SI3897-38	WTB-RB01-060415
SI3897-39	WTB-SS-13-0002
SI3897-40	WTB-SB-13-0206
SI3897-41	WTB-SB-13-0610
SI3897-42	WTB-SS-10-0002
SI3897-43	WTB-SB-10-0206
SI3897-44	WTB-SB-10-0610

The samples were logged in for the analyses specified on the chain of custody form. All problems encountered and resolved during sample receipt have been documented on the applicable chain of custody forms.

We certify that the test results provided in this report meet all the requirements of the NELAC standards unless otherwise noted in this narrative or in the Report of Analysis.

Sample analyses have been performed by the methods as noted herein.

Should you have any questions or comments concerning this Report of Analysis, please do not hesitate to contact your Katahdin Analytical Services Project Manager, **Ms. Jennifer Obrin.** This narrative is an integral part of the Report of Analysis.

Organics Analysis

The samples of SDG OU8-1 were analyzed in accordance with "Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods." SW-846, 2nd edition, 1982 (revised 1984), 3rd edition, 1986, and Updates I, II, IIA, III, IIIA, and IIIB 1996, 1998 & 2004, Office of Solid Waste and Emergency Response, U.S. EPA, and/or Method for the Determination of Extractable Petroleum Hydrocarbons (EPH) MADEP, May 2004, Revision 1.1, and/or for the specific methods listed below or on the Report of Analysis.

Samples SI3897-4, 25, and 33 were used for the matrix spike (MS) and matrix spike duplicate (MSD), as requested by the client.

EPH Analysis

Sample SI3897-18 had low recoveries for the extraction surrogates o-terphenyl and 5-alpha androstane that were outside of method acceptance limits. The sample was reextracted within hold time and had similar surrogate deviations. The results from both extractions are reported.

Sample SI3772-3DL had a low recovery for the extraction surrogate 5-alpha androstane that were outside of method acceptance limits. Since the surrogate recovery was acceptable in the undiluted analysis, no further action was taken.

The LCS WG164506-2 had a low recovery for C9-C18 aliphatic range that was outside of method acceptance limits. Since the LCSD was acceptable, no further action was taken.

Samples SI3772-1, 2DL, 3DL, 7, 9, 10, 11, and 12, SI3897-4 through 7, 13DL, 14, 17DL, 18, 18RE, 20, 24, 25, 27, 30, 36DL, 37DL, 40, 41, 43, and 44RE were manually integrated for the extraction surrogates, the C11-C22 aromatic range, the C19-C36 aliphatic range and the fractionation surrogates 2-bromonaphthalene and/or 2-fluorobiphenyl. The specific reasons for the manual integrations are indicated on the raw data by the manual integration codes (M1-M11). These codes are further explained in the attachment following this narrative.

All samples in work order SI3772, samples SI3897-1, 4, 6, 7, 13, 14, 15, 17, 19, 20, 21, 24, 25, 26, 28 and the MS/MSD's WG164370-4 and 5 and WG164430-4 and 5 were diluted 1:2 prior to fractionating due to the sample matrix. Consequently, the samples PQLs are elevated by a factor of 2.

Samples SI3897-8, 9, 10RE, 18, 18RE, 40, and 41 were diluted 1:5 prior to fractionating due to the sample matrix. Consequently, the samples PQLs are elevated by a factor of 5.

8270D SIM Analysis

All samples except SI3897-2, 3, and 38 were manually integrated for the analytes acenaphthylene, acenaphthene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)perylene, benzo(g,h,i)perylene, the surrogates 2-methylnaphthalene-d10, fluorene-d10, pyrene-d10, the internal standards phenanthrene,d10, chrysene-d12, and/or perylene-d12. The specific reason for the manual integration is indicated on the raw data by the manual integration codes (M1-M11). These codes are further explained in the attachment following this narrative.

Samples SI3897-10DL2 and 40 had high recoveries for one surrogate that were outside DoD QSM acceptance limits. Since each sample had a second analysis with acceptable surrogate recoveries, no further action was taken.

Samples SI3772-1, 2, 2DL, 3, 3DL, 5, 5RA, 7, 7RA, 8, 8DL, 12, SI3897-1, 4, 6, 12, 13, 14, 15, 17, 18DL, 24, 24DL, 25, 31, 36, 40, 41, and 44DL had low responses for one or more internal standards that resulted in %D's which were outside -50% to +100% the response of the internal

standard of the midpoint of the ICAL.

The CV (file N6451) had a low response for the target analyte benzo(g,h,i)perylene. The CV (file N6525) had a low response for the target analyte benzo(k)fluoranthene. The CV (file N6661) had low responses for the target analyte pyrene and surrogate pyrene-d10. The CV (file N6700) had a high response for the target analyte chrysene. These responses resulted in a %D's that were greater than the DoD QSM acceptance limit of 20%.

The target analyte fluoranthene, pyrene and benzo(a)anthracene were detected below ½ of the LOQ in the method blanks WG164507-1, and WG164585-1. According to the DoD QSM section D.1.1.1, a method blank is considered to be contaminated if the concentration of any target analyte in the blank exceeds ½ the reporting limit and is greater than 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Since the method blanks were acceptable, no further action was taken.

The reported percent recovery acceptance limits for the aqueous Laboratory Control Samples (LCSs) are statistically derived for the full list of spiked compounds and nominal limits for all additional compounds. The recoveries of the spiked analytes in the LCS, Matrix Spike (MS) and Matrix Spike Duplicate (MSD) are compared to these acceptance limits. Katahdin standard operating procedure is to take corrective action only if the number of spiked analytes in the LCS that are outside of the QC limits is greater than the DoD QSM allowable number of exceedances. If the associated MS/MSD has greater than the allowable number of exceedances, no corrective action is taken, as long the LCS is acceptable.

The MS/MSD WG164585-3 and 4 and the MSD WG164585-6 had several spiked target analytes with recoveries that were non-calculable and reported as 0% recovery due to the concentration in the native sample being higher than in the MS and MSD. This is likely due to a non-homogeneous sample.

There were no other protocol deviations or observations noted by the organics laboratory staff.

Metals Analysis

The samples of SDG OU8-1 were prepared and analyzed for metals in accordance with the "Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods" SW-846. 2nd edition, 1982 (revised 1984), 3rd edition, 1986, and Updates I, II, IIA, III, IIIA, and IIIB 1996, 1998 & 2004, Office of Solid Waste and Emergency Response, U.S. EPA.

Inductively-Coupled Plasma Atomic Emission Spectroscopic Analysis (ICP)

Solid-matrix Katahdin Sample Numbers SI3772-(1 and 3-13) were digested for ICP analysis on 06/04/15 (QC Batch IF04ICS1) in accordance with USEPA Method 3050B. Katahdin Sample Number SI3772-1 was prepared in duplicate and with a matrix-spiked aliquot. The measured manganese concentration (0.27 mg/Kg) of the preparation blank in this batch exceed the project acceptance limit (> ½ LOQ). However, because the measured manganese concentrations of all of the samples in this batch are greater than ten times that of the preparation blank, no corrective action was necessary. The manganese results for these samples appear with a "B" flag on the accompanying Form I's.

Wet Chemistry Analysis

The samples SDG OU8-1 were analyzed in accordance with the specific methods listed on the Report of Analysis.

Analyses for total solids were performed according to "Standard Methods for the Examination of Water and Wastewater", 15th, 16th, 17th, 18th, 19th, and 20th editions, 1980, 1985, 1989, 1992, 1995, 1999. APHA-AWWA-WPCF.

All Wet Chemistry results were evaluated to Katahdin Analytical Services' Method Detection Limits (MDL). Measured concentrations that fall between the MDL and Katahdin's Limit of Quantitation (LOQ) are flagged "J". Measured concentrations that are below the MDL are flagged "U" and reported as "U LOD", where "LOD" is the numerical value of the Limit of Detection.

All analyses were performed within holding times. All quality control criteria were met.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Operations Manager or the Quality Assurance Officer as verified by the following signature.

Leslie Dimond
07.02.15

Leslie Dimond
Quality Assurance Officer

Katahdin Analytical Services, Inc.

Manual Integration Codes For GC/MS, GC, HPLC and/or IC

M1	Peak splitting.
M2	Well defined peaks on the shoulders of the other peaks.
M3	There is additional area due to a coeluting interferant.
M4	There are negative spikes in the baseline.
M5	There are rising or falling baselines.
M6	The software has failed to detect a peak or misidentified a peak.
M7	Excessive peak tailing.
M8	Analysis such as GRO, DRO and TPH require a baseline hold.
M9	Peak was not completely integrated as in GC/MS.
M10	Primary ion was correctly integrated, but secondary or tertiary ion needed manual integration as in GC/MS.
M11	For GC analysis, when a sample is diluted by 1:10 or more, the surrogate is set to undetected and then the area under the surrogate is manually integrated.
M12	Manual integration saved in method due to TurboChrom floating point error.

Katahdin Analytical Services, Inc. **Sample Receipt Condition Report**

Client:	TetraTech	KAS PM:	JO	Sampled By:	Client
Project:		KIMS Entry By:	AP GN	Delivered By:	KAS
KAS Work Order#:	S13772	KIMS Review By:	JO	Received By:	AP
SDG #:	Cooler: 1 of 1			Date/Time Rec.:	6/3/15 1100

Receipt Criteria	Y	N	EX*	NA	Comments and/or Resolution
1. Custody seals present / intact?		✓			
2. Chain of Custody present in cooler?	✓				
3. Chain of Custody signed by client?	✓				
4. Chain of Custody matches samples?	✓				
5. Temperature Blanks present? If not, take temperature of any sample w/ IR gun.					Temp (°C): 2.9
Samples received at <6 °C w/o freezing?	✓				Note: Not required for metals (except Hg) analysis.
Ice packs or ice present?	✓				The lack of ice or ice packs (i.e. no attempt to begin cooling process) or insufficient ice may not meet certain regulatory requirements and may invalidate certain data.
If yes, was there sufficient ice to meet temperature requirements?	✓				
If temp. out, has the cooling process begun (i.e. ice or packs present) and sample collection times <6hrs., but samples are not yet cool?				✓	Note: No cooling process required for metals (except Hg) analysis.
6. Volatiles:					
Aqueous: No bubble larger than a pea?				✓	
Soil/Sediment:					
Received in airtight container?				✓	
Received in methanol?				✓	
Methanol covering soil?				✓	
D.I. Water - Received within 48 hour HT?				✓	
Air: Refer to KAS COC for canister/flow controller requirements.	√ if air included			✓	
7. Trip Blank present in cooler?		✓		✓	
8. Proper sample containers and volume?	✓				
9. Samples within hold time upon receipt?	✓				
10. Aqueous samples properly preserved? Metals, COD, NH3, TKN, O/G, phenol, TPO4, N+N, TOC, DRO, TPH – pH <2				✓	
Sulfide - >9				✓	
Cyanide – pH >12				✓	

* Log-In Notes to Exceptions: document any problems with samples or discrepancies or pH adjustments.

Katahdin Analytical Services, Inc. **Sample Receipt Condition Report**

Client:	Tetra	KAS PM:	JO	Sampled By:	Client
Project:		KIMS Entry By:	GN	Delivered By:	KAS
KAS Work Order#:	S1389~~67~~ AP	KIMS Review By:		Received By:	AP
SDG #:	Cooler: 1 of 2			Date/Time Rec.:	6/5/15 1530

Receipt Criteria	Y	N	EX*	NA	Comments and/or Resolution
1. Custody seals present / intact?		✓			
2. Chain of Custody present in cooler?	✓				
3. Chain of Custody signed by client?	✓				
4. Chain of Custody matches samples?	✓				
5. Temperature Blanks present? If not, take temperature of any sample w/ IR gun.	✓				Temp (°C): 5.7
Samples received at <6 °C w/o freezing?	✓				Note: Not required for metals (except Hg) analysis
Ice packs or ice present?	✓				The lack of ice or ice packs (i.e. no attempt to begin cooling process) or insufficient ice may not meet certain regulatory requirements and may invalidate certain data.
If yes, was there sufficient ice to meet temperature requirements?	✓				
If temp. out, has the cooling process begun (i.e. ice or packs present) and sample collection times <6hrs., but samples are not yet cool?				✓	Note: No cooling process required for metals (except Hg) analysis.
6. Volatiles:					
Aqueous: No bubble larger than a pea?				✓	
Soil/Sediment:					
Received in airtight container?				✓	
Received in methanol?				✓	
Methanol covering soil?				✓	
D.I. Water - Received within 48 hour HT?				✓	
Air: Refer to KAS COC for canister/flow controller requirements.	√ if air included				
7. Trip Blank present in cooler?				✓	
8. Proper sample containers and volume?	✓				
9. Samples within hold time upon receipt?	✓				
10. Aqueous samples properly preserved? Metals, COD, NH3, TKN, O/G, phenol, TPO4, N+N, TOC, DRO, TPH – pH <2				✓	
Sulfide - >9				✓	
Cyanide – pH >12				✓	

* Log-In Notes to Exceptions: document any problems with samples or discrepancies or pH adjustments.

SD38~~7-08~~ SB-18-0002 on chain, should be SS

Katahdin Analytical Services, Inc. **Sample Receipt Condition Report**

Client: Tetra		KAS PM: JO		Sampled By: Client	
Project:		KIMS Entry By:		Delivered By: KAS	
KAS Work Order#: S1 3897		KIMS Review By:		Received By: AP	
SDG #:	Cooler: 2 of 2			Date/Time Rec.: 6/5/15 1530	

Receipt Criteria	Y	N	EX*	NA	Comments and/or Resolution
1. Custody seals present / intact?					
2. Chain of Custody present in cooler?					
3. Chain of Custody signed by client?					
4. Chain of Custody matches samples?					
5. Temperature Blanks present? If not, take temperature of any sample w/ IR gun.					Temp (°C): 5.1
Samples received at <6 °C w/o freezing?					Note: Not required for metals (except Hg) analysis
Ice packs or ice present?					The lack of ice or ice packs (i.e. no attempt to begin cooling process) or insufficient ice may not meet certain regulatory requirements and may invalidate certain data.
If yes, was there sufficient ice to meet temperature requirements?					
If temp. out, has the cooling process begun (i.e. ice or packs present) and sample collection times <6hrs., but samples are not yet cool?					Note: No cooling process required for metals (except Hg) analysis.
6. Volatiles:					
Aqueous: No bubble larger than a pea?					
Soil/Sediment:					
Received in airtight container?					
Received in methanol?					
Methanol covering soil?					
D.I. Water - Received within 48 hour HT?					
Air: Refer to KAS COC for canister/flow controller requirements.	√ if air included				
7. Trip Blank present in cooler?					
8. Proper sample containers and volume?					
9. Samples within hold time upon receipt?					
10. Aqueous samples properly preserved? Metals, COD, NH3, TKN, O/G, phenol, TPO4, N+N, TOC, DRO, TPH – pH <2					
Sulfide - >9					
Cyanide – pH >12					

* Log-In Notes to Exceptions: document any problems with samples or discrepancies or pH adjustments.

Jennifer Obrin

From: Samchuck, Joseph [Joseph.Samchuck@tetratech.com]
Sent: Wednesday, June 24, 2015 1:34 PM
To: Jennifer Obrin; Thomson, Amy; Ved, Megan; Evans, Tim
Subject: RE: Login COC for the samples received 06/05 - PNSY WE32 OU8 -SI3897

Hi Jennifer,

I'm OK with using method 6020. Your note didn't identify the QC issue that affected the 6010 analysis but if switching to method 6020 is possible then that would be acceptable. As for the limits, I think you can use the limits associated with method 6020.

Thanks.

Joe

From: Jennifer Obrin [mailto:jobrin@katahdinlab.com]
Sent: Wednesday, June 24, 2015 12:52 PM
To: Thomson, Amy; Samchuck, Joseph; Ved, Megan; Evans, Tim
Subject: RE: Login COC for the samples received 06/05 - PNSY WE32 OU8 -SI3897

Good Afternoon,

The lab has come to me with a question regarding the soil samples for PNS under the SDG: OU8-1. They were wondering if it would be okay to report Antimony by SW6020 instead of SW6010. The limits are lower but we can change the limits to match the SW6010 limits that are in the QAPP if you would like to make things easier on your end. They are having issues with the QC passing which will delay the report if you need to keep it by SW6010.

Target List	EPA Method	Soil LOQ	Soil LODs	Soil MDLs
Metals -ICP		**mg/Kg**	**mg/Kg**	**mg/Kg**
Antimony	6010	0.80	0.50	0.070
Metals -ICPMS		**mg/Kg**	**mg/Kg**	**mg/Kg**
Antimony	6020	0.1	0.05	0.020

Please let me know what you think.
Thank you,

Jennifer Obrin
Federal Programs Project Manager

000006

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 4908 | PAGE 1 OF 1

215442

PROJECT NO: 1126-03270	FACILITY: OU8 / PNSY	PROJECT MANAGER: Megan Ved	PHONE NUMBER: 412 921-7271
LABORATORY NAME AND CONTACT: Katahdin Analytical / Jennifer Obrin			
SAMPLERS (SIGNATURE): [signature]		FIELD OPERATIONS LEADER: Tim Evans	PHONE NUMBER: 412 921 7281
ADDRESS: 600 Technology Way			
CARRIER/WAYBILL NUMBER:		CITY, STATE: Scarborough ME 04074	

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: 1

DATE YEAR 2015	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: PAHs (SIM) TAL Metals EPH	COMMENTS
6/1	1100	WTB-SS-11-0002	SB11	0	2	SO	G	1	1	
	1115	WTB-SB-11-0206	SB11	2	6	SO	G	1	1	
	1125	WTB-SB-11-0610	SB11	6	10	SO	G	1	1	
6/3	0915	WTB-~~SB~~ SS-14-0002	SB14	0	2	SO	G	1	1	
	0925	WTB-SB-14-0206	SB14	2	6	SO	G	1	1	
	0000	WTB-FD01-060315	—	—	—	QC	G	1	1	
	1020	WTB-SB-14-0607	SB14	6	7	SO	G	1	1	
	1035	WTB-SS-17-0002	SB17	0	2	SO	G	1	1	
	1040	WTB-SB-17-0206	SB17	2	6	SO	G	1	1	
	1045	WTB-SB-17-0610	SB17	6	10	SO	G	1	1	
	1100	WTB-SS-19-0002	SB19	0	2	SO	G	1	1	
	1105	WTB-SB-19-0206	SB19	2	6	SO	G	1	1	
	1115	WTB-SB-19-0610	SB19	6	10	SO	G	1	1	

1. RELINQUISHED BY [signature]	DATE 6/3/15	TIME 12:45	1. RECEIVED BY [signature]	DATE 6/3/15	TIME 12:45
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

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FORM NO. TtNUS-001

000011

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 4909 | PAGE 1 OF 4 513897

PROJECT NO: 112G03270	FACILITY: 048 / PNSY	PROJECT MANAGER Megan Ved	PHONE NUMBER 412 921 7271
LABORATORY NAME AND CONTACT: Katahdin Analytical / Jennifer Obrin			
SAMPLERS (SIGNATURE) [signature] K Jarbut		FIELD OPERATIONS LEADER Tim Evans	PHONE NUMBER 412 921 7281
ADDRESS 600 Technology Way			
CARRIER/WAYBILL NUMBER		CITY, STATE Scarborough ME 04074	

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: -

DATE YEAR 2015	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: PAHs (SIM), EPH, TPH, metals	COMMENTS
6/3	1310	WTB-SS-22-0002	SB22	0	2	SO	G	1	1	
	1325	WTB-SS-24-0002	SB24	0	2	SO	G	1	1	
	1330	WTB-SB-24-0206	SB24	2	6	SO	G	1	1	
	1335	WTB-SB-24-06~~10~~ 9.7 (TC)	SB24	6	9.7	SO	G	3	3	+ ~~[illegible]~~ (TC) MS/MSD
	1405	WTB-SB-22-0206	SB22	2	6	SO	G	1	1	
	1410	WTB-SB-22-0610	SB22	6	10	SO	G	1	1	
	0000	WTB-FD02-060315	—	—	—	QC	G	1	1	
	1430	WTB-SS-23-0002	SB23	0	2	SO	G	1	1	*
	1435	WTB-SB-23-0206	SB23	2	6	SO	G	1	1	
	1440	WTB-SB-23-0610	SB23	6	10	SO	G	1	1	
6/4	0820	WTB-SS-08-0002	SB08	0	2	SO	G	1	1	
	0000	WTB-FD01-060415	—	—	—	QC	G	1	1	
	0825	WTB-SB-08-0206	SB08	2	6	SO	G	1	1	

1. RELINQUISHED BY [signature]	DATE 6/5/15	TIME 1250	1. RECEIVED BY [signature]	DATE 6/5/15	TIME ~~1250~~ 1300
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

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FORM NO. TtNUS-001

S13897

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 4910 | PAGE 2 OF 4

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
112G03270	OU8 / PNSY	Megan Ved	412-921 7271	Katahdin Analytical / Jennifer O'brien
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
[signature] K Jalbert		Tim Evans	412 921 7281	600 Technology Way
		CARRIER/WAYBILL NUMBER		CITY, STATE
				Scarborough ME 04074

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: /
TYPE OF ANALYSIS: PAHs (SIM), EPH, TPH, metals

DATE YEAR 2015	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS									COMMENTS
6/4	0830	WTB-SB-08-0610	SB08	6	10	SO	G	1	1								
	0840	WTB-SBSS-09-0002	SB09	0	2	SO	G	1	1								
	0845	WTB-SB-09-0206	SB09	2	6	SO	G	1	1								
	0850	WTB-SB-09-0610	SB09	6	10	SO	G	1	1								*
	1005	WTB-SS-12-0002	SB12	0	2	SO	G	1	1								
	1008	WTB-SB-12-0206	↓	2	6	↓	↓	1	1								
	1015	WTB-SB-12-0610	↓	6	10	↓	↓	1	1								
	1025	WTB-SS-15-0002	SB15	0	2	SO	G	1	1								
	1030	WTB-SB-15-0206	SB15	2	6	↓	↓	1	1								
	0000	WTB-FD02-060415	—	—	—	QC	G	1	1								
	1035	WTB-SB-15-0610	SB15	6	10	SO	G	1	1								
	1105	WTB-SS-16-0002	SB16	0	2	SO	G	3	3								+MS/MSD
	1110	WTB-SB-16-0206	SB16	2	6	SO	G	1	1								

1. RELINQUISHED BY [signature]	DATE 6/5/15	TIME 1250	1. RECEIVED BY [signature]	DATE 6/5/15	TIME ~~1250~~ 1300
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME
COMMENTS					

00009

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FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 4911 | PAGE 3 OF 4

513847

PROJECT NO: 112G03270	FACILITY: OU8 / PNSY	PROJECT MANAGER: Megan Ved	PHONE NUMBER: 412-921-7281
LABORATORY NAME AND CONTACT: Katahdin Analytical / Jennifer O'Brien			
SAMPLERS (SIGNATURE): [signature] K Jarbut	FIELD OPERATIONS LEADER: Jim Evans	PHONE NUMBER: 412 921-7281	ADDRESS: 600 Technology Way
CARRIER/WAYBILL NUMBER			CITY, STATE: Scarborough ME 04074

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2015	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	PAHs (SIM), EPH, TAL metals	PAHs (SIM)	EPH	TAL metals					COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									G	G	G	P					
PRESERVATIVE USED									-	-	HCl	HNO_3					
6/4	1115	WTB-SB-16-0610	SB16	6	10	SO	G	1	1								
	1310	WTB-SB-18-0002	SB18	0	2	SO	G	1	1								*
	1315	WTB-SB-18-0206	SB18	2	6	SO	G	1	1								
	1320	WTB-SB-18-0610	SB18	6	10	SO	G	1	1								
	1335	WTB-SB-20-0002	SB20	0	2	SO	G	1	1								
	0000	WTB-FD03-060415	—	—	—	QC	G	1	1								
	1340	WTB-SB-20-0206	SB20	2	6	SO	G	3	3								+ MS/MSD
	1345	WTB-SB-20-0610	SB20	6	10	SO	G	1	1								
	1405	WTB-SS-21-0002	SB21	0	2	SO	G	1	1								
	1410	WTB-SB-21-0206	SB21	2	6	SO	G	1	1								
	1415	WTB-SB-21-0610	SB21	6	10	SO	G	1	1								
	1600	WTB-RB01-060415	Rinsate	—	—	QC	G	5		2	2	1					
6/5	0830	WTB-SS-13-0002	SB13	0	2	SO	G	1	1								

1. RELINQUISHED BY [signature]	DATE 6/5/15	TIME 1300	1. RECEIVED BY [signature]	DATE 6/5/15	TIME 1300
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

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FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 4913 | PAGE 4 OF 4 S13897

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
112G03270	OU8/PNSY	Megan Ved	412 921 7271	Katahdin Analytical / Jennifer Obrien
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		Tim Evans	412 921-7281	600 Technology Way
		CARRIER/WAYBILL NUMBER		CITY, STATE
				Scarborough ME 04074

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2015	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED	TYPE OF ANALYSIS: PAHs (SIM), EPH, TPH, Metals	COMMENTS
6/5	0833	WTB-SB-13-0206	SB13	2	6	SO	G	1	G	1	1	
	0840	WTB-SB-13-0610	SB13	6	10	SO	G	1			1	
	0850	WTB-SB-10-0002	SB10	0	2	SO	G	1			1	
	0855	WTB-SB-10-0206	SB10	2	6	SO	G	1			1	
	1000	WTB-SB-10-0610	SB10	6	10	SO	G	1			1	

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	6/5/15	1300	1. RECEIVED BY	6/5/15	1300
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS

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4/02R
FORM NO. TtNUS-001

120000

Katahdin
ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Jun. 04, 2015
06:09 AM

Quote/Incoming: TETRATWE32-OU8

Login Number: SI3772

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Primary Report Address:
Amy Thomson
Tetra Tech NUS, Inc.
661 Andersen Drive
Foster Plaza 7
Pittsburgh,PA 15220

Primary Invoice Address:
Accounts Payable
Tetra Tech NUS, Inc.
661 Andersen Drive
Foster Plaza 7
Pittsburgh,PA 15220

Report CC Addresses:
Invoice CC Addresses:

Login Information:

ANALYSIS INSTRUCTIONS	:	DoD QSM 4.2 with DoD limits. ND to LOD. "J" flag between DL and LOQ. Determine TS first, increase aliquot as needed in order to compensate for moisture, must meet PQLs. Metals run MS/lab dup and if ms outside limits run post dig spike. Metals run serial dilution on field QC sample. 8270D/6010C. SL EQ blanks much match soil lists. EPH ranges only-must meet MEDEP guidelines.
CHECK NO.	:	
CLIENT PO#	:	1045366 112G03270 46-CTO WE32
CLIENT PROJECT MANAGE	:	Megan Ved
CONTRACT	:	N62470-08-D-1001
COOLER TEMPERATURE	:	2.9
DELIVERY SERVICES	:	FedEx
EDD FORMAT	:	KAS119QC-CSV
LOGIN INITIALS	:	GN
PM	:	JO
PROJECT NAME	:	Portsmouth Naval Shipyard - WE32 OU8
QC LEVEL	:	IV
REGULATORY LIST	:	
REPORT INSTRUCTIONS	:	Summary package needs all forms. Send 2 HCs & 2 CDs to Amy Thomson.
SDG STATUS	:	Begin

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3772-1	WTB-SS-11-0002	01-JUN-15 11:00	SDG-01 03-JUN-15			OU8-1 22-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	15-JUN-15	100g Glass		
Solid	S	SW3050-PREP	28-NOV-15			
Solid	S	SW3050MS-PREP	28-NOV-15			
Solid	S	SW6010-ALUMINUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	28-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	28-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	28-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	28-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	28-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	28-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	28-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	28-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	28-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	28-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	28-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	29-JUN-15	50g Glass		
Solid	S	SW8270SIM-S	15-JUN-15	100g Glass		
Solid	S	TS-ME	01-JUL-15			

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ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Jun. 04, 2015
06:09 AM

Login Number: SI3772

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3772-2	WTB-SB-11-0206	01-JUN-15 11:15	03-JUN-15			22-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	15-JUN-15	100g Glass		
Solid	S	SW3050-PREP	28-NOV-15			
Solid	S	SW3050MS-PREP	28-NOV-15			
Solid	S	SW6010-ALUMINUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	28-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	28-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	28-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	28-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	28-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	28-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	28-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	28-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	28-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	28-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	28-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	29-JUN-15	50g Glass		
Solid	S	SW8270SIM-S	15-JUN-15	100g Glass		
Solid	S	TS-ME	01-JUL-15			

SI3772-3	WTB-SB-11-0610	01-JUN-15 11:25	03-JUN-15			22-JUN-15

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	15-JUN-15	100g Glass		
Solid	S	SW3050-PREP	28-NOV-15			
Solid	S	SW3050MS-PREP	28-NOV-15			
Solid	S	SW6010-ALUMINUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	28-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	28-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	28-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	28-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	28-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	28-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	28-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	28-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	28-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	28-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	28-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	28-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	29-JUN-15	50g Glass		
Solid	S	SW8270SIM-S	15-JUN-15	100g Glass		
Solid	S	TS-ME	01-JUL-15			

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Katahdin ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Jun. 04, 2015
06:09 AM

Login Number: SI3772

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3772-4	WTB-SS-14-0002	03-JUN-15 09:15	03-JUN-15			22-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	17-JUN-15	100g Glass		
Solid	S	SW3050-PREP	30-NOV-15			
Solid	S	SW3050MS-PREP	30-NOV-15			
Solid	S	SW6010-ALUMINUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	30-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	30-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	30-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	30-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	30-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	30-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	30-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	30-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	30-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	30-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	30-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	01-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	17-JUN-15	100g Glass		
Solid	S	TS-ME	03-JUL-15			

SI3772-5	WTB-SB-14-0206	03-JUN-15 09:25	03-JUN-15			22-JUN-15

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	17-JUN-15	100g Glass		
Solid	S	SW3050-PREP	30-NOV-15			
Solid	S	SW3050MS-PREP	30-NOV-15			
Solid	S	SW6010-ALUMINUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	30-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	30-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	30-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	30-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	30-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	30-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	30-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	30-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	30-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	30-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	30-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	01-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	17-JUN-15	100g Glass		
Solid	S	TS-ME	03-JUL-15			

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Login Chain of Custody Report (lno1)

Jun. 04, 2015
06:09 AM

Login Number: SI3772

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3772-6	WTB-FD01-060315	03-JUN-15 00:00	03-JUN-15			22-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	17-JUN-15	100g Glass		
Solid	S	SW3050-PREP	30-NOV-15			
Solid	S	SW3050MS-PREP	30-NOV-15			
Solid	S	SW6010-ALUMINUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	30-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	30-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	30-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	30-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	30-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	30-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	30-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	30-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	30-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	30-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	30-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	01-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	17-JUN-15	100g Glass		
Solid	S	TS-ME	03-JUL-15			

SI3772-7	WTB-SB-14-0607	03-JUN-15 10:20	03-JUN-15			22-JUN-15

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	17-JUN-15	100g Glass		
Solid	S	SW3050-PREP	30-NOV-15			
Solid	S	SW3050MS-PREP	30-NOV-15			
Solid	S	SW6010-ALUMINUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	30-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	30-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	30-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	30-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	30-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	30-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	30-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	30-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	30-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	30-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	30-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	01-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	17-JUN-15	100g Glass		
Solid	S	TS-ME	03-JUL-15			

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ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Jun. 04, 2015
06:09 AM

Login Number: SI3772

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3772-8	WTB-SS-17-0002	03-JUN-15 10:35	03-JUN-15			22-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	17-JUN-15	100g Glass		
Solid	S	SW3050-PREP	30-NOV-15			
Solid	S	SW3050MS-PREP	30-NOV-15			
Solid	S	SW6010-ALUMINUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	30-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	30-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	30-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	30-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	30-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	30-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	30-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	30-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	30-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	30-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	30-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	01-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	17-JUN-15	100g Glass		
Solid	S	TS-ME	03-JUL-15			

SI3772-9	WTB-SB-17-0206	03-JUN-15 10:40	03-JUN-15			22-JUN-15

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	17-JUN-15	100g Glass		
Solid	S	SW3050-PREP	30-NOV-15			
Solid	S	SW3050MS-PREP	30-NOV-15			
Solid	S	SW6010-ALUMINUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	30-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	30-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	30-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	30-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	30-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	30-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	30-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	30-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	30-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	30-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	30-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	01-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	17-JUN-15	100g Glass		
Solid	S	TS-ME	03-JUL-15			

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Katahdin ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (Ino1)

Jun. 04, 2015
06:09 AM

Login Number: SI3772

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3772-10	WTB-SB-17-0610	03-JUN-15 10:45	03-JUN-15			22-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	17-JUN-15	100g Glass		
Solid	S	SW3050-PREP	30-NOV-15			
Solid	S	SW3050MS-PREP	30-NOV-15			
Solid	S	SW6010-ALUMINUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	30-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	30-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	30-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	30-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	30-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	30-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	30-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	30-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	30-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	30-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	30-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	01-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	17-JUN-15	100g Glass		
Solid	S	TS-ME	03-JUL-15			

SI3772-11	WTB-SS-19-0002	03-JUN-15 11:00	03-JUN-15			22-JUN-15

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	17-JUN-15	100g Glass		
Solid	S	SW3050-PREP	30-NOV-15			
Solid	S	SW3050MS-PREP	30-NOV-15			
Solid	S	SW6010-ALUMINUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	30-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	30-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	30-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	30-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	30-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	30-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	30-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	30-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	30-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	30-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	30-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	01-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	17-JUN-15	100g Glass		
Solid	S	TS-ME	03-JUL-15			

06.04.15

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Katahdin
ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Jun. 04, 2015
06:09 AM

Login Number: SI3772

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3772-12	WTB-SB-19-0206	03-JUN-15 11:05	03-JUN-15			22-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	17-JUN-15	100g Glass		
Solid	S	SW3050-PREP	30-NOV-15			
Solid	S	SW3050MS-PREP	30-NOV-15			
Solid	S	SW6010-ALUMINUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	30-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	30-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	30-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	30-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	30-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	30-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	30-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	30-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	30-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	30-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	30-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	01-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	17-JUN-15	100g Glass		
Solid	S	TS-ME	03-JUL-15			

SI3772-13	WTB-SB-19-0610	03-JUN-15 11:15	03-JUN-15			22-JUN-15

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	17-JUN-15	100g Glass		
Solid	S	SW3050-PREP	30-NOV-15			
Solid	S	SW3050MS-PREP	30-NOV-15			
Solid	S	SW6010-ALUMINUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	30-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	30-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	30-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	30-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	30-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	30-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	30-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	30-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	30-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	30-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	30-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	01-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	17-JUN-15	100g Glass		
Solid	S	TS-ME	03-JUL-15			

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Katahdin
ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Jun. 04, 2015
06:09 AM

Login Number: SI3772

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed

Total Samples: *13* ***Total Analyses:*** *364*

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Katahdin
ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Jun. 07, 2015
04:21 PM

Login Number: SI3897

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Primary Report Address:
Amy Thomson
Tetra Tech NUS, Inc.
661 Andersen Drive
Foster Plaza 7
Pittsburgh,PA 15220

Primary Invoice Address:
Accounts Payable
Tetra Tech NUS, Inc.
661 Andersen Drive
Foster Plaza 7
Pittsburgh,PA 15220

Report CC Addresses:
Invoice CC Addresses:

Quote/Incoming: TETRATWE32-OU8

Login Information:

ANALYSIS INSTRUCTIONS	:	DoD QSM 4.2 with DoD limits. ND to LOD. "J" flag between DL and LOQ. Determine TS first, increase aliquot as needed in order to compensate for moisture, must meet PQLs. Metals run MS/lab dup and if ms outside limits run post dig spike. Metals run serial dilution on field QC sample. 8270D/6010C. GW samples will have high salinity-attaining detection limits are very important! SL EQ blanks much match soil lists. EPH ranges only-must meet MEDEP guidelines.
CHECK NO.	:	
CLIENT PO#	:	1045366 112G03270 46-CTO WE32
CLIENT PROJECT MANAGE	:	Megan Ved
CONTRACT	:	N62470-08-D-1001
COOLER TEMPERATURE	:	5.7, 5.1
DELIVERY SERVICES	:	KAS
EDD FORMAT	:	KAS119QC-CSV
LOGIN INITIALS	:	GN
PM	:	JO
PROJECT NAME	:	Portsmouth Naval Shipyard - WE32 OU8
QC LEVEL	:	IV
REGULATORY LIST	:	
REPORT INSTRUCTIONS	:	Summary package needs all forms. Send 2 HCs & 2 CDs to Amy Thomson.
SDG ID	:	OU8-1
SDG STATUS	:	End

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-1	WTB-SS-22-0002	03-JUN-15 13:10	03-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	17-JUN-15	100g Glass		
Solid	S	SW3050-PREP	30-NOV-15			
Solid	S	SW3050MS-PREP	30-NOV-15			
Solid	S	SW6010-ALUMINUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	30-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	30-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	30-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	30-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	30-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	30-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	30-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	30-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	30-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	30-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	30-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	01-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	17-JUN-15	100g Glass		
Solid	S	TS-ME	03-JUL-15			

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Katahdin
ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Jun. 07, 2015
04:21 PM

Login Number: SI3897

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-2	WTB-SS-24-0002	03-JUN-15 13:25	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	17-JUN-15	100g Glass		
Solid	S	SW3050-PREP	30-NOV-15			
Solid	S	SW3050MS-PREP	30-NOV-15			
Solid	S	SW6010-ALUMINUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	30-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	30-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	30-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	30-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	30-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	30-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	30-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	30-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	30-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	30-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	30-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	01-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	17-JUN-15	100g Glass		
Solid	S	TS-ME	03-JUL-15			

SI3897-3	WTB-SB-24-0206	03-JUN-15 13:30	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	17-JUN-15	100g Glass		
Solid	S	SW3050-PREP	30-NOV-15			
Solid	S	SW3050MS-PREP	30-NOV-15			
Solid	S	SW6010-ALUMINUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	30-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	30-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	30-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	30-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	30-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	30-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	30-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	30-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	30-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	30-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	30-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	01-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	17-JUN-15	100g Glass		
Solid	S	TS-ME	03-JUL-15			

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Katahdin ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Jun. 07, 2015
04:21 PM

Login Number: SI3897

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-4	WTB-SB-24-069.7	03-JUN-15 13:35	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	17-JUN-15	100g Glass		**MS/MSD**
Solid	S	SW3050-PREP	30-NOV-15			
Solid	S	SW3050MS-PREP	30-NOV-15			
Solid	S	SW6010-ALUMINUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	30-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	30-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	30-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	30-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	30-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	30-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	30-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	30-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	30-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	30-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	30-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	01-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	17-JUN-15	100g Glass		
Solid	S	TS-ME	03-JUL-15			

SI3897-5	WTB-SB-22-0206	03-JUN-15 14:05	05-JUN-15			24-JUN-15

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	17-JUN-15	100g Glass		
Solid	S	SW3050-PREP	30-NOV-15			
Solid	S	SW3050MS-PREP	30-NOV-15			
Solid	S	SW6010-ALUMINUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	30-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	30-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	30-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	30-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	30-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	30-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	30-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	30-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	30-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	30-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	30-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	01-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	17-JUN-15	100g Glass		
Solid	S	TS-ME	03-JUL-15			

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06.07.15

Katahdin ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Jun. 07, 2015
04:21 PM

Login Number: SI3897

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-6	WTB-SB-22-0610	03-JUN-15 14:10	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	17-JUN-15	100g Glass		
Solid	S	SW3050-PREP	30-NOV-15			
Solid	S	SW3050MS-PREP	30-NOV-15			
Solid	S	SW6010-ALUMINUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	30-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	30-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	30-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	30-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	30-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	30-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	30-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	30-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	30-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	30-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	30-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	01-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	17-JUN-15	100g Glass		
Solid	S	TS-ME	03-JUL-15			

SI3897-7	WTB-FD02-060315	03-JUN-15 00:00	05-JUN-15			24-JUN-15

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	17-JUN-15	100g Glass		
Solid	S	SW3050-PREP	30-NOV-15			
Solid	S	SW3050MS-PREP	30-NOV-15			
Solid	S	SW6010-ALUMINUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	30-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	30-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	30-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	30-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	30-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	30-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	30-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	30-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	30-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	30-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	30-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	01-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	17-JUN-15	100g Glass		
Solid	S	TS-ME	03-JUL-15			

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Katahdin ANALYTICAL SERVICES

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Login Chain of Custody Report (Ino1)

Jun. 07, 2015
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Login Number: SI3897

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-8	WTB-SS-23-0002	03-JUN-15 14:30	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	17-JUN-15	100g Glass		
Solid	S	SW3050-PREP	30-NOV-15			
Solid	S	SW3050MS-PREP	30-NOV-15			
Solid	S	SW6010-ALUMINUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	30-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	30-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	30-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	30-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	30-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	30-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	30-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	30-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	30-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	30-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	30-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	01-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	17-JUN-15	100g Glass		
Solid	S	TS-ME	03-JUL-15			

SI3897-9	WTB-SB-23-0206	03-JUN-15 14:35	05-JUN-15			24-JUN-15

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	17-JUN-15	100g Glass		
Solid	S	SW3050-PREP	30-NOV-15			
Solid	S	SW3050MS-PREP	30-NOV-15			
Solid	S	SW6010-ALUMINUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	30-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	30-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	30-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	30-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	30-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	30-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	30-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	30-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	30-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	30-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	30-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	01-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	17-JUN-15	100g Glass		
Solid	S	TS-ME	03-JUL-15			

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Katahdin ANALYTICAL SERVICES

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Login Chain of Custody Report (Ino1)

Jun. 07, 2015
04:21 PM

Login Number: SI3897

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-10	WTB-SB-23-0610	03-JUN-15 14:40	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	17-JUN-15	100g Glass		
Solid	S	SW3050-PREP	30-NOV-15			
Solid	S	SW3050MS-PREP	30-NOV-15			
Solid	S	SW6010-ALUMINUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	30-NOV-15	4oz Glass		
Solid	S	SW6010-BARIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CADMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CALCIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-COPPER	30-NOV-15	4oz Glass		
Solid	S	SW6010-IRON	30-NOV-15	4oz Glass		
Solid	S	SW6010-LEAD	30-NOV-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-MANGANESE	30-NOV-15	4oz Glass		
Solid	S	SW6010-NICKEL	30-NOV-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SELENIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-SILVER	30-NOV-15	4oz Glass		
Solid	S	SW6010-SODIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-VANADIUM	30-NOV-15	4oz Glass		
Solid	S	SW6010-ZINC	30-NOV-15	4oz Glass		
Solid	S	SW6020-ARSENIC	30-NOV-15	4oz Glass		
Solid	S	SW6020-COBALT	30-NOV-15	4oz Glass		
Solid	S	SW6020-THALLIUM	30-NOV-15	4oz Glass		
Solid	S	SW7471-MERCURY	01-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	17-JUN-15	100g Glass		
Solid	S	TS-ME	03-JUL-15			

SI3897-11	WTB-SS-08-0002	04-JUN-15 08:20	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

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Katahdin ANALYTICAL SERVICES

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Login Chain of Custody Report (lno1)

Jun. 07, 2015
04:21 PM

Login Number: SI3897

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-12	WTB-FD01-060415	04-JUN-15 00:00	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

SI3897-13	WTB-SB-08-0206	04-JUN-15 08:25	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

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Katahdin ANALYTICAL SERVICES

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Jun. 07, 2015
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Login Number: SI3897

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-14	WTB-SB-08-0610	04-JUN-15 08:30	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

SI3897-15	WTB-SS-09-0002	04-JUN-15 08:40	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

OP 06.07.15

0000037

Katahdin ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Jun. 07, 2015
04:21 PM

Login Number: SI3897

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-16	WTB-SB-09-0206	04-JUN-15 08:45	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

SI3897-17	WTB-SB-09-0610	04-JUN-15 08:50	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

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Katahdin
ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Jun. 07, 2015
04:21 PM

Login Number: SI3897

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-18	WTB-SS-12-0002	04-JUN-15 10:05	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

SI3897-19	WTB-SB-12-0206	04-JUN-15 10:08	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

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Katahdin ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Jun. 07, 2015
04:21 PM

Login Number: SI3897

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-20	WTB-SB-12-0610	04-JUN-15 10:15	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

SI3897-21	WTB-SS-15-0002	04-JUN-15 10:25	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

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Katahdin ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (Ino1)

Jun. 07, 2015
04:21 PM

Login Number: SI3897

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-22	WTB-SB-15-0206	04-JUN-15 10:30	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

SI3897-23	WTB-FD02-060415	04-JUN-15 00:00	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

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Katahdin
ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (Ino1)

Jun. 07, 2015
04:21 PM

Login Number: SI3897

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-24	WTB-SB-15-0610	04-JUN-15 10:35	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

SI3897-25	WTB-SS-16-0002	04-JUN-15 11:05	05-JUN-15			24-JUN-15

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		**MS/MSD**
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

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Katahdin ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (Ino1)

Jun. 07, 2015
04:21 PM

Login Number: SI3897

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-26	WTB-SB-16-0206	04-JUN-15 11:10	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

SI3897-27	WTB-SB-16-0610	04-JUN-15 11:15	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

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Katahdin
ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (Ino1)

Jun. 07, 2015
04:21 PM

Login Number: SI3897

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-28	WTB-SS-18-0002	04-JUN-15 13:10	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

SI3897-29	WTB-SB-18-0206	04-JUN-15 13:15	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

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Katahdin ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Jun. 07, 2015
04:21 PM

Login Number: SI3897

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-30	WTB-SB-18-0610	04-JUN-15 13:20	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

SI3897-31	WTB-SS-20-0002	04-JUN-15 13:35	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

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Katahdin ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Jun. 07, 2015
04:21 PM

Login Number: SI3897

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-32	WTB-FD03-060415	04-JUN-15 00:00	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

SI3897-33	WTB-SB-20-0206	04-JUN-15 13:40	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		**MS/MSD**
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

06.07.15

0000046

Katahdin
ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Jun. 07, 2015
04:21 PM

Login Number: SI3897

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-34	WTB-SB-20-0610	04-JUN-15 13:45	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

SI3897-35	WTB-SS-21-0002	04-JUN-15 14:05	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

06.07.15

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Katahdin ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Jun. 07, 2015
04:21 PM

Login Number: SI3897

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-36	WTB-SB-21-0206	04-JUN-15 14:10	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

SI3897-37	WTB-SB-21-0610	04-JUN-15 14:15	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	18-JUN-15	100g Glass		
Solid	S	SW3050-PREP	01-DEC-15			
Solid	S	SW3050MS-PREP	01-DEC-15			
Solid	S	SW6010-ALUMINUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	01-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	01-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	01-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	01-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	01-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	01-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	01-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	01-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	01-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	01-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	01-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	01-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	02-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	18-JUN-15	100g Glass		
Solid	S	TS-ME	04-JUL-15			

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06.07.15

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Katahdin ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Jun. 07, 2015
04:21 PM

Login Number: SI3897

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-38	WTB-RB01-060415	04-JUN-15 16:00	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Aqueous	S	MA-EPH-LOD	18-JUN-15	1L N-Amber Glass		
Aqueous	S	SW3010-PREP	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW3010MS-PREP	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW6010-ALUMINUM	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW6010-ANTIMONY	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW6010-BARIUM	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW6010-BERYLLIUM	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW6010-CADMIUM	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW6010-CALCIUM	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW6010-CHROMIUM	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW6010-COPPER	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW6010-IRON	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW6010-LEAD	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW6010-MAGNESIUM	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW6010-MANGANESE	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW6010-NICKEL	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW6010-POTASSIUM	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW6010-SELENIUM	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW6010-SILVER	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW6010-SODIUM	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW6010-VANADIUM	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW6010-ZINC	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW6020-ARSENIC	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW6020-COBALT	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW6020-THALLIUM	01-DEC-15	250mL Plastic+HNO3		
Aqueous	S	SW7470-MERCURY	02-JUL-15	500mL Plastic+HNO3		
Aqueous	S	SW8270SIM-S	11-JUN-15	1L N-Amber Glass		

SI3897-39	WTB-SS-13-0002	05-JUN-15 08:30	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	19-JUN-15	100g Glass		
Solid	S	SW3050-PREP	02-DEC-15			
Solid	S	SW3050MS-PREP	02-DEC-15			
Solid	S	SW6010-ALUMINUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	02-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	02-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	02-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	02-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	02-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	02-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	02-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	02-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	02-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	02-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	02-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	03-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	19-JUN-15	100g Glass		
Solid	S	TS-ME	05-JUL-15			

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Katahdin ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Jun. 07, 2015
04:21 PM

Login Number: SI3897

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-40	WTB-SB-13-0206	05-JUN-15 08:33	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	19-JUN-15	100g Glass		
Solid	S	SW3050-PREP	02-DEC-15			
Solid	S	SW3050MS-PREP	02-DEC-15			
Solid	S	SW6010-ALUMINUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	02-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	02-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	02-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	02-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	02-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	02-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	02-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	02-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	02-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	02-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	02-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	03-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	19-JUN-15	100g Glass		
Solid	S	TS-ME	05-JUL-15			

SI3897-41	WTB-SB-13-0610	05-JUN-15 08:40	05-JUN-15			24-JUN-15

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	19-JUN-15	100g Glass		
Solid	S	SW3050-PREP	02-DEC-15			
Solid	S	SW3050MS-PREP	02-DEC-15			
Solid	S	SW6010-ALUMINUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	02-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	02-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	02-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	02-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	02-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	02-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	02-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	02-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	02-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	02-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	02-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	03-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	19-JUN-15	100g Glass		
Solid	S	TS-ME	05-JUL-15			

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Katahdin ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Jun. 07, 2015
04:21 PM

Login Number: SI3897

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-42	WTB-SS-10-0002	05-JUN-15 08:50	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	19-JUN-15	100g Glass		
Solid	S	SW3050-PREP	02-DEC-15			
Solid	S	SW3050MS-PREP	02-DEC-15			
Solid	S	SW6010-ALUMINUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	02-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	02-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	02-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	02-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	02-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	02-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	02-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	02-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	02-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	02-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	02-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	03-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	19-JUN-15	100g Glass		
Solid	S	TS-ME	05-JUL-15			

SI3897-43	WTB-SB-10-0206	05-JUN-15 08:55	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	19-JUN-15	100g Glass		
Solid	S	SW3050-PREP	02-DEC-15			
Solid	S	SW3050MS-PREP	02-DEC-15			
Solid	S	SW6010-ALUMINUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	02-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	02-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	02-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	02-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	02-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	02-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	02-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	02-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	02-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	02-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	02-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	03-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	19-JUN-15	100g Glass		
Solid	S	TS-ME	05-JUL-15			

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Katahdin
ANALYTICAL SERVICES

Katahdin Analytical Services

Login Chain of Custody Report (lno1)

Jun. 07, 2015
04:21 PM

Login Number: SI3897

Quote/Incoming: TETRATWE32-OU8

Account: TETRAT001 Web
Tetra Tech NUS, Inc.

Project: TETRATWE32-OU8
Portsmouth Naval Shipyard - WE32 OU8

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SI3897-44	WTB-SB-10-0610	05-JUN-15 10:00	05-JUN-15			24-JUN-15	

Matrix		Product	Hold Date (shortest)	Bottle Type	Bottle Count	Comments
Solid	S	MA-EPH-LOD	19-JUN-15	100g Glass		
Solid	S	SW3050-PREP	02-DEC-15			
Solid	S	SW3050MS-PREP	02-DEC-15			
Solid	S	SW6010-ALUMINUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-ANTIMONY	02-DEC-15	4oz Glass		
Solid	S	SW6010-BARIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-BERYLLIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-CADMIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-CALCIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-CHROMIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-COPPER	02-DEC-15	4oz Glass		
Solid	S	SW6010-IRON	02-DEC-15	4oz Glass		
Solid	S	SW6010-LEAD	02-DEC-15	4oz Glass		
Solid	S	SW6010-MAGNESIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-MANGANESE	02-DEC-15	4oz Glass		
Solid	S	SW6010-NICKEL	02-DEC-15	4oz Glass		
Solid	S	SW6010-POTASSIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-SELENIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-SILVER	02-DEC-15	4oz Glass		
Solid	S	SW6010-SODIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-VANADIUM	02-DEC-15	4oz Glass		
Solid	S	SW6010-ZINC	02-DEC-15	4oz Glass		
Solid	S	SW6020-ARSENIC	02-DEC-15	4oz Glass		
Solid	S	SW6020-COBALT	02-DEC-15	4oz Glass		
Solid	S	SW6020-THALLIUM	02-DEC-15	4oz Glass		
Solid	S	SW7471-MERCURY	03-JUL-15	50g Glass		
Solid	S	SW8270SIM-S	19-JUN-15	100g Glass		
Solid	S	TS-ME	05-JUL-15			

***Total Samples:* 44** ***Total Analyses:* 1231**

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06.07.15

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SAMPLE DATA SUMMARY PACKAGE

Form 5
Semivolatile Organic Instrument Performance Check

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : ND946.D
Instrument ID : GCMS-N

SDG : OU8-1
Date Analyzed : 05-JUN-15
Time Analyzed : 11:11

m/e	Ion Abundance Criteria	% Relative Abundance		
51	30.0 - 60.0% of mass 198	35.3		
68	Less than 2.0% of mass 69	0.0	0.0	1
69	Less than 100.0% of mass 198	50.5		
70	Less than 2.0% of mass 69	0.3	0.51	1
127	40.0 - 60.0% of mass 198	55.6		
197	Less than 1.0% of mass 198	0.0		
198	Base Peak, 100% relative abundance	100		
199	5.0 - 9.0% of mass 198	6.7		
275	10.0 - 30.0% of mass 198	23.9		
365	1.0 - 100.0% of mass 198	2.5		
441	0.0 - 100.0% of mass 443	12.6	81.66	2
442	40.0 - 100.0% of mass 198	78.7		
443	17.0 - 23.0% of mass 442	15.5	19.66	3

1-Value is % mass 69
2-Value is % mass 443
3-Value is % mass 442

This check applies to the following samples, LCS, MS, MSD and standards:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Initial Calibration	WG164187-4	N6392.D	06/05/15	11:28
Initial Calibration	WG164187-2	N6393.D	06/05/15	11:56
Initial Calibration	WG164187-3	N6394.D	06/05/15	12:23
Initial Calibration	WG164187-5	N6395.D	06/05/15	12:50
Initial Calibration	WG164187-6	N6396.D	06/05/15	13:18
Initial Calibration	WG164187-7	N6397.D	06/05/15	13:54
Independent Source	WG164187-8	N6398.D	06/05/15	14:21

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 6
Initial Calibration Summary

Lab Name : Katahdin Analytical Services **SDG:** OU8-1
Project : Portsmouth Naval Shipyard - WE32 OU8 **Instrument ID:** GCMS-N
Lab File IDs : N6393.D N6394.D N6392.D N6395.D N6396.D N6397.D **Column ID:**
Calibration Date(s): 05-JUN-15 11:28 05-JUN-15 13:54

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Crv					Max	
	0.200000(	0.500000(	1.0000	3.0000	7.0000	10.0000	New	b	m1	m2	%RSD	%RSD	
Naphthalene	0.94693	0.99217	1.00383	0.98243	0.90376	0.84536	AVG		0.94575		6.46931	15.00000	O
Acenaphthylene	1.65471	1.71811	1.79549	1.72285	1.69520	1.60580	AVG		1.69869		3.80652	15.00000	O
Acenaphthene	1.06761	1.10401	1.11741	1.08398	1.09097	0.99594	AVG		1.07666		3.99820	15.00000	O
Fluorene	1.16631	1.16414	1.26852	1.22661	1.20387	1.15320	AVG		1.19711		3.73202	15.00000	O
Phenanthrene	1.05251	1.07407	1.13064	1.05309	1.05622	1.01203	AVG		1.06309		3.65535	15.00000	O
Anthracene	1.12854	1.07273	1.11514	1.07039	1.07225	1.00328	AVG		1.07705		4.07478	15.00000	O
Fluoranthene	1.09319	1.03376	1.13932	1.09596	1.13667	1.03291	AVG		1.08864		4.32168	15.00000	O
Pyrene	2.15102	1.99815	1.80146	1.75384	1.54217	1.46725	AVG		1.78565		14.61585	15.00000	O
Benzo(a)anthracene	0.98404	1.00064	1.04724	1.01158	1.03497	0.99563	AVG		1.01235		2.39852	15.00000	O
Chrysene	26145	48292	115504	351816	976758	1580779	LNR	-0.25656	0.99061		0.99769	0.99000	O
Benzo(b)fluoranthene	1.24381	1.09769	1.25045	1.15156	1.29505	1.23721	AVG		1.21263		6.03087	15.00000	O
Benzo(k)fluoranthene	20139	40770	95172	289233	820399	1329974	LNR	-0.24135	1.36508		0.99686	0.99000	O
Benzo(a)pyrene	1.28595	1.13162	1.10326	1.06166	1.10044	1.05904	AVG		1.12366		7.48582	15.00000	O
Indeno(1,2,3-cd)pyrene	0.85824	0.78022	0.76299	0.75240	0.79701	0.76105	AVG		0.78532		4.98130	15.00000	O
Dibenzo(a,h)anthracene	0.54145	0.54237	0.54037	0.54163	0.58588	0.56496	AVG		0.55278		3.39348	15.00000	O
Benzo(g,h,i)perylene	0.93508	0.83332	0.78628	0.75375	0.74962	0.69782	AVG		0.79265		10.45517	15.00000	O
2-Methylnaphthalene-D10	1.00905	1.02883	1.07957	1.01453	0.98828	0.92286	AVG		1.00719		5.10795	15.00000	
Fluorene-D10	0.87129	0.85247	0.92818	0.88195	0.88446	0.84062	AVG		0.87649		3.48128	15.00000	
Pyrene-D10	1.41829	1.37689	1.23514	1.23225	1.07061	1.03060	AVG		1.22730		12.73725	15.00000	

Legend: O = Kept Original Curve
Y = Failed Minimum RF
W = Failed %RSD Value

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Form 5
Semivolatile Organic Instrument Performance Check

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : ND948.D
Instrument ID : GCMS-N

SDG : OU8-1
Date Analyzed : 09-JUN-15
Time Analyzed : 09:03

m/e	Ion Abundance Criteria	% Relative Abundance		
51	30.0 - 60.0% of mass 198	36.3		
68	Less than 2.0% of mass 69	0.5	0.94	1
69	Less than 100.0% of mass 198	52.1		
70	Less than 2.0% of mass 69	0.3	0.59	1
127	40.0 - 60.0% of mass 198	55.4		
197	Less than 1.0% of mass 198	0.0		
198	Base Peak, 100% relative abundance	100		
199	5.0 - 9.0% of mass 198	6.7		
275	10.0 - 30.0% of mass 198	24.2		
365	1.0 - 100.0% of mass 198	2.8		
441	0.0 - 100.0% of mass 443	12.9	81.77	2
442	40.0 - 100.0% of mass 198	82.7		
443	17.0 - 23.0% of mass 442	15.8	19.10	3

1-Value is % mass 69
2-Value is % mass 443
3-Value is % mass 442

This check applies to the following samples, LCS, MS, MSD and standards:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Continuing Calibrati	WG164415-2	N6451.D	06/09/15	09:23
Method Blank Sample	WG164368-1	N6452.D	06/09/15	09:55
Laboratory Control S	WG164368-2	N6453.D	06/09/15	10:23

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8 **SDG:** OU8-1
Lab ID : WG164415-2 **Analytical Date:** 06/09/15 09:23
Lab File ID : N6451.D **Instrument ID:** GCMS-N
Initial Calibration Date(s): 06/05/15 11:28 06/05/15 13:54 **Column ID:**

Compound	RRF/Amount	RF1	CCAL RRF1	Min	%D/ %Drift	Max %D/ %Drift	Curve Type	
25 Naphthalene	0.94575	0.91738	0.91738	0.010	-2.99979	20.00000	Averaged	
43 Acenaphthylene	1.69869	1.74958	1.74958	0.010	2.99535	20.00000	Averaged	
46 Acenaphthene	1.07666	1.09914	1.09914	0.010	2.08867	20.01000	Averaged	
54 Fluorene	1.19711	1.20625	1.20625	0.010	0.76356	20.00000	Averaged	
64 Phenanthrene	1.06309	1.04720	1.04720	0.010	-1.49537	20.00000	Averaged	
65 Anthracene	1.07705	1.19389	1.19389	0.010	10.84807	20.00000	Averaged	
68 Fluoranthene	1.08864	1.13956	1.13956	0.010	4.67812	20.01000	Averaged	
70 Pyrene	1.78565	1.90105	1.90105	0.010	6.46254	20.00000	Averaged	
72 Benzo(a)anthracene	1.01235	0.96859	0.96859	0.010	-4.32294	20.00000	Averaged	
75 Chrysene	1.00000	1.09694	1.28997	0.010	9.69449	20.00000	Linear	
78 Benzo(b)fluoranthene	1.21263	1.08291	1.08291	0.010	-10.69694	20.00000	Averaged	
79 Benzo(k)fluoranthene	1.00000	1.08603	1.74609	0.010	8.60297	20.00000	Linear	
80 Benzo(a)pyrene	1.12366	1.05390	1.05390	0.010	-6.20877	20.01000	Averaged	
82 Indeno(1,2,3-cd)pyrene	0.78532	0.63710	0.63710	0.010	-18.87444	20.00000	Averaged	
83 Dibenzo(a,h)anthracene	0.55278	0.45846	0.45846	0.010	-17.06310	20.00000	Averaged	
84 Benzo(g,h,i)perylene	0.79265	0.61421	0.61421	0.010	-22.51082	20.00000	Averaged	*
30 2-Methylnaphthalene-D10	1.00719	1.00371	1.00371	0.010	-0.34501	20.00000	Averaged	
53 Fluorene-D10	0.87649	0.86019	0.86019	0.010	-1.85962	20.00000	Averaged	
69 Pyrene-D10	1.22730	1.27722	1.27722	0.010	4.06795	20.00000	Averaged	

*** = Compound out of QC criteria**

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Form 5
Semivolatile Organic Instrument Performance Check

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : ND949.D
Instrument ID : GCMS-N

SDG : OU8-1
Date Analyzed : 10-JUN-15
Time Analyzed : 13:08

m/e	Ion Abundance Criteria	% Relative Abundance		
51	30.0 - 60.0% of mass 198	39.4		
68	Less than 2.0% of mass 69	0.0	0.0	1
69	Less than 100.0% of mass 198	55.4		
70	Less than 2.0% of mass 69	0.2	0.42	1
127	40.0 - 60.0% of mass 198	57.4		
197	Less than 1.0% of mass 198	0.0		
198	Base Peak, 100% relative abundance	100		
199	5.0 - 9.0% of mass 198	6.7		
275	10.0 - 30.0% of mass 198	23.7		
365	1.0 - 100.0% of mass 198	2.6		
441	0.0 - 100.0% of mass 443	11.7	82.11	2
442	40.0 - 100.0% of mass 198	72.8		
443	17.0 - 23.0% of mass 442	14.3	19.66	3

1-Value is % mass 69
2-Value is % mass 443
3-Value is % mass 442

This check applies to the following samples, LCS, MS, MSD and standards:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Continuing Calibrati	WG164501-2	N6485.D	06/10/15	13:26
Method Blank Sample	WG164374-1	N6486.D	06/10/15	13:54
Laboratory Control S	WG164374-2	N6488.D	06/10/15	14:50
Laboratory Control S	WG164374-3	N6489.D	06/10/15	15:18
WTB-RB01-060415	SI3897-38	N6492.D	06/10/15	16:42
WTB-SS-10-0002	SI3897-42	N6499.D	06/10/15	20:00
WTB-SS-19-0002	SI3772-11	N6500.D	06/10/15	20:28
WTB-SB-19-0610	SI3772-13	N6501.D	06/10/15	20:56
WTB-SS-14-0002	SI3772-4	N6502.D	06/10/15	21:24
WTB-SB-14-0607	SI3772-7	N6503.D	06/10/15	21:52
WTB-SB-17-0206	SI3772-9	N6504.D	06/10/15	22:20
WTB-SB-10-0206	SI3897-43	N6505.D	06/10/15	22:47
WTB-SB-14-0206	SI3772-5	N6506.D	06/10/15	23:15
WTB-SS-11-0002	SI3772-1	N6507.D	06/10/15	23:43
WTB-SB-11-0206	SI3772-2	N6508.D	06/11/15	00:10
WTB-SB-11-0610	SI3772-3	N6509.D	06/11/15	00:38
WTB-FD01-060315	SI3772-6	N6510.D	06/11/15	01:05

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8 **SDG:** OU8-1
Lab ID : WG164501-2 **Analytical Date:** 06/10/15 13:26
Lab File ID : N6485.D **Instrument ID:** GCMS-N
Initial Calibration Date(s): 06/05/15 11:28 06/05/15 13:54 **Column ID:**

Compound	RRF/Amount	RF1	CCAL RRF1	Min	%D/ %Drift	Max %D/ %Drift	Curve Type
25 Naphthalene	0.94575	0.95070	0.95070	0.010	0.52418	20.00000	Averaged
43 Acenaphthylene	1.69869	1.75588	1.75588	0.010	3.36642	20.00000	Averaged
46 Acenaphthene	1.07666	1.13462	1.13462	0.010	5.38342	20.01000	Averaged
54 Fluorene	1.19711	1.21315	1.21315	0.010	1.34043	20.00000	Averaged
64 Phenanthrene	1.06309	0.99356	0.99356	0.010	-6.54067	20.00000	Averaged
65 Anthracene	1.07705	1.26415	1.26415	0.010	17.37075	20.00000	Averaged
68 Fluoranthene	1.08864	0.98689	0.98689	0.010	-9.34620	20.01000	Averaged
70 Pyrene	1.78565	1.83553	1.83553	0.010	2.79320	20.00000	Averaged
72 Benzo(a)anthracene	1.01235	0.91601	0.91601	0.010	-9.51629	20.00000	Averaged
75 Chrysene	1.00000	1.14602	1.33858	0.010	14.60158	20.00000	Linear
78 Benzo(b)fluoranthene	1.21263	1.03820	1.03820	0.010	-14.38462	20.00000	Averaged
79 Benzo(k)fluoranthene	1.00000	1.02875	1.66789	0.010	2.87460	20.00000	Linear
80 Benzo(a)pyrene	1.12366	1.07216	1.07216	0.010	-4.58379	20.01000	Averaged
82 Indeno(1,2,3-cd)pyrene	0.78532	0.78118	0.78118	0.010	-0.52768	20.00000	Averaged
83 Dibenzo(a,h)anthracene	0.55278	0.57385	0.57385	0.010	3.81295	20.00000	Averaged
84 Benzo(g,h,i)perylene	0.79265	0.78494	0.78494	0.010	-0.97257	20.00000	Averaged
30 2-Methylnaphthalene-D10	1.00719	1.06522	1.06522	0.010	5.76138	20.00000	Averaged
53 Fluorene-D10	0.87649	0.91514	0.91514	0.010	4.40956	20.00000	Averaged
69 Pyrene-D10	1.22730	1.23821	1.23821	0.010	0.88941	20.00000	Averaged

*** = Compound out of QC criteria**

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Form 5
Semivolatile Organic Instrument Performance Check

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : ND950.D
Instrument ID : GCMS-N

SDG : OU8-1
Date Analyzed : 11-JUN-15
Time Analyzed : 09:50

m/e	Ion Abundance Criteria	% Relative Abundance		
51	30.0 - 60.0% of mass 198	38.1		
68	Less than 2.0% of mass 69	0.0	0.00	1
69	Less than 100.0% of mass 198	53.9		
70	Less than 2.0% of mass 69	0.4	0.67	1
127	40.0 - 60.0% of mass 198	57.8		
197	Less than 1.0% of mass 198	0.0		
198	Base Peak, 100% relative abundance	100		
199	5.0 - 9.0% of mass 198	6.9		
275	10.0 - 30.0% of mass 198	23.6		
365	1.0 - 100.0% of mass 198	2.6		
441	0.0 - 100.0% of mass 443	12.6	85.26	2
442	40.0 - 100.0% of mass 198	77.9		
443	17.0 - 23.0% of mass 442	14.8	18.94	3

1-Value is % mass 69
2-Value is % mass 443
3-Value is % mass 442

This check applies to the following samples, LCS, MS, MSD and standards:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Continuing Calibrati	WG164582-2	N6515.D	06/11/15	10:08
WTB-SB-10-0206	SI3897-43DL	N6530.D	06/11/15	17:12
WTB-SB-10-0610	SI3897-44DL	N6531.D	06/11/15	17:41
WTB-SS-11-0002	SI3772-1DL	N6532.D	06/11/15	18:10
WTB-SB-11-0206	SI3772-2DL	N6533.D	06/11/15	18:38
WTB-SB-11-0610	SI3772-3DL	N6534.D	06/11/15	19:07
WTB-SS-17-0002	SI3772-8DL	N6535.D	06/11/15	19:36
WTB-SB-14-0607	SI3772-7RA	N6537.D	06/11/15	20:32
WTB-SB-14-0206	SI3772-5RA	N6538.D	06/11/15	21:01
WTB-SB-10-0610	SI3897-44	N6539.D	06/11/15	21:29

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8 **SDG:** OU8-1
Lab ID : WG164582-2 **Analytical Date:** 06/11/15 10:08
Lab File ID : N6515.D **Instrument ID:** GCMS-N
Initial Calibration Date(s): 06/05/15 11:28 06/05/15 13:54 **Column ID:**

Compound	RRF/Amount	RF1	CCAL RRF1	Min	%D/ %Drift	Max %D/ %Drift	Curve Type
25 Naphthalene	0.94575	0.97884	0.97884	0.010	3.49871	20.00000	Averaged
43 Acenaphthylene	1.69869	1.77783	1.77783	0.010	4.65855	20.00000	Averaged
46 Acenaphthene	1.07666	1.13592	1.13592	0.010	5.50420	20.01000	Averaged
54 Fluorene	1.19711	1.27652	1.27652	0.010	6.63376	20.00000	Averaged
64 Phenanthrene	1.06309	1.05833	1.05833	0.010	-0.44759	20.00000	Averaged
65 Anthracene	1.07705	1.19569	1.19569	0.010	11.01511	20.00000	Averaged
68 Fluoranthene	1.08864	1.16043	1.16043	0.010	6.59491	20.01000	Averaged
70 Pyrene	1.78565	1.74626	1.74626	0.010	-2.20582	20.00000	Averaged
72 Benzo(a)anthracene	1.01235	0.97070	0.97070	0.010	-4.11458	20.00000	Averaged
75 Chrysene	1.00000	0.85351	1.04882	0.010	-14.64897	20.00000	Linear
78 Benzo(b)fluoranthene	1.21263	1.08918	1.08918	0.010	-10.18002	20.00000	Averaged
79 Benzo(k)fluoranthene	1.00000	0.98505	1.60825	0.010	-1.49489	20.00000	Linear
80 Benzo(a)pyrene	1.12366	1.00325	1.00325	0.010	-10.71606	20.01000	Averaged
82 Indeno(1,2,3-cd)pyrene	0.78532	0.81473	0.81473	0.010	3.74445	20.00000	Averaged
83 Dibenzo(a,h)anthracene	0.55278	0.60199	0.60199	0.010	8.90344	20.00000	Averaged
84 Benzo(g,h,i)perylene	0.79265	0.73758	0.73758	0.010	-6.94655	20.00000	Averaged
30 2-Methylnaphthalene-D10	1.00719	1.01518	1.01518	0.010	0.79305	20.00000	Averaged
53 Fluorene-D10	0.87649	0.90917	0.90917	0.010	3.72812	20.00000	Averaged
69 Pyrene-D10	1.22730	1.15810	1.15810	0.010	-5.63821	20.00000	Averaged

*** = Compound out of QC criteria**

Form 5
Semivolatile Organic Instrument Performance Check

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : ND951.D
Instrument ID : GCMS-N

SDG : OU8-1
Date Analyzed : 12-JUN-15
Time Analyzed : 13:24

m/e	Ion Abundance Criteria	% Relative Abundance		
51	30.0 - 60.0% of mass 198	39.3		
68	Less than 2.0% of mass 69	0.0	0.0	1
69	Less than 100.0% of mass 198	56.2		
70	Less than 2.0% of mass 69	0.3	0.51	1
127	40.0 - 60.0% of mass 198	56.8		
197	Less than 1.0% of mass 198	0.0		
198	Base Peak, 100% relative abundance	100		
199	5.0 - 9.0% of mass 198	6.8		
275	10.0 - 30.0% of mass 198	23.5		
365	1.0 - 100.0% of mass 198	2.5		
441	0.0 - 100.0% of mass 443	10.7	81.67	2
442	40.0 - 100.0% of mass 198	68.2		
443	17.0 - 23.0% of mass 442	13.1	19.19	3

1-Value is % mass 69
2-Value is % mass 443
3-Value is % mass 442

This check applies to the following samples, LCS, MS, MSD and standards:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Continuing Calibrati	WG164692-2	N6552.D	06/12/15	13:45
Method Blank Sample	WG164507-1	N6553.D	06/12/15	14:13
Laboratory Control S	WG164507-2	N6554.D	06/12/15	14:41
WTB-SB-24-0206	SI3897-3	N6558.D	06/12/15	16:34
WTB-SS-24-0002	SI3897-2	N6564.D	06/12/15	19:23
WTB-SB-09-0206	SI3897-16	N6565.D	06/12/15	19:51
WTB-SS-08-0002	SI3897-11	N6566.D	06/12/15	20:19
WTB-FD01-060415	SI3897-12	N6567.D	06/12/15	20:47
WTB-SB-08-0206	SI3897-13	N6568.D	06/12/15	21:15
WTB-SB-12-0206	SI3897-19	N6569.D	06/12/15	21:43
WTB-SS-22-0002	SI3897-1	N6570.D	06/12/15	22:10
WTB-SB-08-0610	SI3897-14	N6571.D	06/12/15	22:38
WTB-SB-24-069.7	SI3897-4	N6572.D	06/12/15	23:06
Matrix Spike	WG164507-3	N6573.D	06/12/15	23:34
Matrix Spike Duplica	WG164507-4	N6574.D	06/13/15	00:01
WTB-SB-19-0206	SI3772-12	N6576.D	06/13/15	00:57

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8 **SDG:** OU8-1
Lab ID : WG164692-2 **Analytical Date:** 06/12/15 13:45
Lab File ID : N6552.D **Instrument ID:** GCMS-N
Initial Calibration Date(s): 06/05/15 11:28 06/05/15 13:54 **Column ID:**

Compound	RRF/Amount	RF1	CCAL RRF1	Min	%D/ %Drift	Max %D/ %Drift	Curve Type
25 Naphthalene	0.94575	0.88618	0.88618	0.010	-6.29801	20.00000	Averaged
43 Acenaphthylene	1.69869	1.68519	1.68519	0.010	-0.79469	20.00000	Averaged
46 Acenaphthene	1.07666	1.08873	1.08873	0.010	1.12129	20.01000	Averaged
54 Fluorene	1.19711	1.20452	1.20452	0.010	0.61924	20.00000	Averaged
64 Phenanthrene	1.06309	1.00403	1.00403	0.010	-5.55583	20.00000	Averaged
65 Anthracene	1.07705	1.21945	1.21945	0.010	13.22124	20.00000	Averaged
68 Fluoranthene	1.08864	1.06290	1.06290	0.010	-2.36386	20.01000	Averaged
70 Pyrene	1.78565	2.03303	2.03303	0.010	13.85394	20.00000	Averaged
72 Benzo(a)anthracene	1.01235	0.87776	0.87776	0.010	-13.29461	20.00000	Averaged
75 Chrysene	1.00000	0.95333	1.14771	0.010	-4.66655	20.00000	Linear
78 Benzo(b)fluoranthene	1.21263	1.07529	1.07529	0.010	-11.32591	20.00000	Averaged
79 Benzo(k)fluoranthene	1.00000	0.98808	1.61238	0.010	-1.19222	20.00000	Linear
80 Benzo(a)pyrene	1.12366	1.05775	1.05775	0.010	-5.86564	20.01000	Averaged
82 Indeno(1,2,3-cd)pyrene	0.78532	0.68120	0.68120	0.010	-13.25765	20.00000	Averaged
83 Dibenzo(a,h)anthracene	0.55278	0.48545	0.48545	0.010	-12.17919	20.00000	Averaged
84 Benzo(g,h,i)perylene	0.79265	0.65104	0.65104	0.010	-17.86459	20.00000	Averaged
30 2-Methylnaphthalene-D10	1.00719	1.00716	1.00716	0.010	-0.00326	20.00000	Averaged
53 Fluorene-D10	0.87649	0.87054	0.87054	0.010	-0.67937	20.00000	Averaged
69 Pyrene-D10	1.22730	1.38785	1.38785	0.010	13.08153	20.00000	Averaged

*** = Compound out of QC criteria**

Form 5
Semivolatile Organic Instrument Performance Check

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : ND952.D
Instrument ID : GCMS-N

SDG : OU8-1
Date Analyzed : 15-JUN-15
Time Analyzed : 12:17

m/e	Ion Abundance Criteria	% Relative Abundance		
51	30.0 - 60.0% of mass 198	42.5		
68	Less than 2.0% of mass 69	0.0	0.0	1
69	Less than 100.0% of mass 198	60.7		
70	Less than 2.0% of mass 69	0.4	0.60	1
127	40.0 - 60.0% of mass 198	57.4		
197	Less than 1.0% of mass 198	0.0		
198	Base Peak, 100% relative abundance	100		
199	5.0 - 9.0% of mass 198	6.4		
275	10.0 - 30.0% of mass 198	23.5		
365	1.0 - 100.0% of mass 198	2.7		
441	0.0 - 100.0% of mass 443	12.4	81.68	2
442	40.0 - 100.0% of mass 198	77.7		
443	17.0 - 23.0% of mass 442	15.2	19.52	3

1-Value is % mass 69
2-Value is % mass 443
3-Value is % mass 442

This check applies to the following samples, LCS, MS, MSD and standards:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Continuing Calibrati	WG164825-2	N6598.D	06/15/15	12:52
WTB-SB-22-0206	SI3897-5DL	N6607.D	06/15/15	17:00
WTB-SB-23-0206	SI3897-9DL2	N6609.D	06/15/15	17:55
WTB-SB-08-0610	SI3897-14DL	N6612.D	06/15/15	19:17
WTB-SB-12-0610	SI3897-20DL	N6614.D	06/15/15	20:12
WTB-SB-09-0610	SI3897-17DL	N6615.D	06/15/15	20:40
WTB-SS-23-0002	SI3897-8DL	N6616.D	06/15/15	21:07
WTB-SB-23-0206	SI3897-9DL	N6617.D	06/15/15	21:34
WTB-SS-09-0002	SI3897-15DL	N6618.D	06/15/15	22:02
WTB-FD02-060315	SI3897-7	N6619.D	06/15/15	22:29
WTB-SB-12-0610	SI3897-20	N6620.D	06/15/15	22:56
WTB-SB-09-0610	SI3897-17	N6621.D	06/15/15	23:24
WTB-SB-22-0610	SI3897-6	N6622.D	06/15/15	23:51

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8 **SDG:** OU8-1
Lab ID : WG164825-2 **Analytical Date:** 06/15/15 12:52
Lab File ID : N6598.D **Instrument ID:** GCMS-N
Initial Calibration Date(s): 06/05/15 11:28 06/05/15 13:54 **Column ID:**

Compound	RRF/Amount	RF1	CCAL RRF1	Min	%D/ %Drift	Max %D/ %Drift	Curve Type
25 Naphthalene	0.94575	1.06855	1.06855	0.010	12.98468	20.00000	Averaged
43 Acenaphthylene	1.69869	1.70366	1.70366	0.010	0.29241	20.00000	Averaged
46 Acenaphthene	1.07666	1.06351	1.06351	0.010	-1.22099	20.01000	Averaged
54 Fluorene	1.19711	1.19148	1.19148	0.010	-0.46981	20.00000	Averaged
64 Phenanthrene	1.06309	0.93675	0.93675	0.010	-11.88471	20.00000	Averaged
65 Anthracene	1.07705	1.22890	1.22890	0.010	14.09849	20.00000	Averaged
68 Fluoranthene	1.08864	1.01740	1.01740	0.010	-6.54342	20.01000	Averaged
70 Pyrene	1.78565	1.84697	1.84697	0.010	3.43395	20.00000	Averaged
72 Benzo(a)anthracene	1.01235	0.98742	0.98742	0.010	-2.46295	20.00000	Averaged
75 Chrysene	1.00000	0.95958	1.15390	0.010	-4.04153	20.00000	Linear
78 Benzo(b)fluoranthene	1.21263	1.25391	1.25391	0.010	3.40416	20.00000	Averaged
79 Benzo(k)fluoranthene	1.00000	1.05290	1.70087	0.010	5.29043	20.00000	Linear
80 Benzo(a)pyrene	1.12366	1.09525	1.09525	0.010	-2.52878	20.01000	Averaged
82 Indeno(1,2,3-cd)pyrene	0.78532	0.70180	0.70180	0.010	-10.63462	20.00000	Averaged
83 Dibenzo(a,h)anthracene	0.55278	0.52402	0.52402	0.010	-5.20274	20.00000	Averaged
84 Benzo(g,h,i)perylene	0.79265	0.66200	0.66200	0.010	-16.48232	20.00000	Averaged
30 2-Methylnaphthalene-D10	1.00719	1.01502	1.01502	0.010	0.77762	20.00000	Averaged
53 Fluorene-D10	0.87649	0.87603	0.87603	0.010	-0.05318	20.00000	Averaged
69 Pyrene-D10	1.22730	1.23749	1.23749	0.010	0.83067	20.00000	Averaged

*** = Compound out of QC criteria**

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 5
Semivolatile Organic Instrument Performance Check

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : ND953.D
Instrument ID : GCMS-N

SDG : OU8-1
Date Analyzed : 16-JUN-15
Time Analyzed : 08:37

m/e	Ion Abundance Criteria	% Relative Abundance		
51	30.0 - 60.0% of mass 198	43.8		
68	Less than 2.0% of mass 69	0.0	0.0	1
69	Less than 100.0% of mass 198	63.3		
70	Less than 2.0% of mass 69	0.4	0.61	1
127	40.0 - 60.0% of mass 198	57.6		
197	Less than 1.0% of mass 198	0.0		
198	Base Peak, 100% relative abundance	100		
199	5.0 - 9.0% of mass 198	6.5		
275	10.0 - 30.0% of mass 198	23.3		
365	1.0 - 100.0% of mass 198	2.4		
441	0.0 - 100.0% of mass 443	12.3	82.00	2
442	40.0 - 100.0% of mass 198	77.8		
443	17.0 - 23.0% of mass 442	15.0	19.33	3

1-Value is % mass 69
2-Value is % mass 443
3-Value is % mass 442

This check applies to the following samples, LCS, MS, MSD and standards:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Continuing Calibrati	WG164883-2	N6525.D	06/16/15	09:00
Method Blank Sample	WG164585-1	N6632.D	06/16/15	12:16
Laboratory Control S	WG164585-2	N6633.D	06/16/15	12:44
WTB-SS-12-0002	SI3897-18DL2	N6634.D	06/16/15	13:12
WTB-SB-15-0206	SI3897-22	N6636.D	06/16/15	14:07
WTB-FD02-060415	SI3897-23	N6637.D	06/16/15	14:35
WTB-SB-16-0610	SI3897-27	N6638.D	06/16/15	15:03
WTB-SS-18-0002	SI3897-28	N6639.D	06/16/15	15:31
WTB-SB-18-0206	SI3897-29	N6640.D	06/16/15	15:58
WTB-SB-18-0610	SI3897-30	N6641.D	06/16/15	16:26
WTB-SB-22-0206	SI3897-5	N6642.D	06/16/15	16:54
WTB-SB-15-0610	SI3897-24	N6644.D	06/16/15	17:50
WTB-SS-15-0002	SI3897-21	N6646.D	06/16/15	18:45
WTB-SS-09-0002	SI3897-15	N6647.D	06/16/15	19:13
WTB-SB-16-0206	SI3897-26	N6648.D	06/16/15	19:41
WTB-SS-12-0002	SI3897-18DL	N6649.D	06/16/15	20:09

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Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8 **SDG:** OU8-1
Lab ID : WG164883-2 **Analytical Date:** 06/16/15 09:00
Lab File ID : N6525.D **Instrument ID:** GCMS-N
Initial Calibration Date(s): 06/05/15 11:28 06/05/15 13:54 **Column ID:**

Compound	RRF/Amount	RF1	CCAL RRF1	Min	%D/ %Drift	Max %D/ %Drift	Curve Type	
25 Naphthalene	0.94575	0.95607	0.95607	0.010	1.09147	20.00000	Averaged	
43 Acenaphthylene	1.69869	1.78262	1.78262	0.010	4.94094	20.00000	Averaged	
46 Acenaphthene	1.07666	1.11162	1.11162	0.010	3.24768	20.01000	Averaged	
54 Fluorene	1.19711	1.20742	1.20742	0.010	0.86130	20.00000	Averaged	
64 Phenanthrene	1.06309	1.03939	1.03939	0.010	-2.23002	20.00000	Averaged	
65 Anthracene	1.07705	1.08109	1.08109	0.010	0.37440	20.00000	Averaged	
68 Fluoranthene	1.08864	1.12150	1.12150	0.010	3.01856	20.01000	Averaged	
70 Pyrene	1.78565	1.83317	1.83317	0.010	2.66119	20.00000	Averaged	
72 Benzo(a)anthracene	1.01235	0.95926	0.95926	0.010	-5.24449	20.00000	Averaged	
75 Chrysene	1.00000	0.95585	1.15020	0.010	-4.41520	20.00000	Linear	
78 Benzo(b)fluoranthene	1.21263	1.15072	1.15072	0.010	-5.10512	20.00000	Averaged	
79 Benzo(k)fluoranthene	1.00000	0.75317	1.29171	0.010	-24.68271	20.00000	Linear	*
80 Benzo(a)pyrene	1.12366	0.96986	0.96986	0.010	-13.68715	20.01000	Averaged	
82 Indeno(1,2,3-cd)pyrene	0.78532	0.76299	0.76299	0.010	-2.84312	20.00000	Averaged	
83 Dibenzo(a,h)anthracene	0.55278	0.62197	0.62197	0.010	12.51696	20.00000	Averaged	
84 Benzo(g,h,i)perylene	0.79265	0.71740	0.71740	0.010	-9.49285	20.00000	Averaged	
30 2-Methylnaphthalene-D10	1.00719	1.00981	1.00981	0.010	0.26004	20.00000	Averaged	
53 Fluorene-D10	0.87649	0.87021	0.87021	0.010	-0.71717	20.00000	Averaged	
69 Pyrene-D10	1.22730	1.19036	1.19036	0.010	-3.00959	20.00000	Averaged	

*** = Compound out of QC criteria**

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Form 5
Semivolatile Organic Instrument Performance Check

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : ND954.D
Instrument ID : GCMS-N

SDG : OU8-1
Date Analyzed : 17-JUN-15
Time Analyzed : 13:50

m/e	Ion Abundance Criteria	% Relative Abundance		
51	30.0 - 60.0% of mass 198	43.4		
68	Less than 2.0% of mass 69	0.0	0.0	1
69	Less than 100.0% of mass 198	63.0		
70	Less than 2.0% of mass 69	0.4	0.65	1
127	40.0 - 60.0% of mass 198	58.1		
197	Less than 1.0% of mass 198	0.0		
198	Base Peak, 100% relative abundance	100		
199	5.0 - 9.0% of mass 198	6.7		
275	10.0 - 30.0% of mass 198	23.0		
365	1.0 - 100.0% of mass 198	2.5		
441	0.0 - 100.0% of mass 443	12.0	83.58	2
442	40.0 - 100.0% of mass 198	75.5		
443	17.0 - 23.0% of mass 442	14.4	19.06	3

1-Value is % mass 69
2-Value is % mass 443
3-Value is % mass 442

This check applies to the following samples, LCS, MS, MSD and standards:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Continuing Calibrati	WG164949-2	N6661.D	06/17/15	14:08
WTB-SB-17-0610	SI3772-10DL2	N6665.D	06/17/15	16:02
WTB-SS-23-0002	SI3897-8DL2	N6667.D	06/17/15	16:58
WTB-SS-15-0002	SI3897-21DL	N6668.D	06/17/15	17:26
WTB-SB-15-0610	SI3897-24DL	N6669.D	06/17/15	17:55
WTB-SB-16-0206	SI3897-26DL	N6670.D	06/17/15	18:23
WTB-SS-20-0002	SI3897-31	N6671.D	06/17/15	18:51
WTB-FD03-060415	SI3897-32	N6672.D	06/17/15	19:18
WTB-SB-20-0206	SI3897-33	N6673.D	06/17/15	19:46
Matrix Spike	WG164585-5	N6674.D	06/17/15	20:14
Matrix Spike Duplica	WG164585-6	N6675.D	06/17/15	20:42
WTB-SB-20-0610	SI3897-34	N6677.D	06/17/15	21:37
WTB-SS-21-0002	SI3897-35	N6678.D	06/17/15	22:04
WTB-SB-21-0206	SI3897-36	N6679.D	06/17/15	22:32
WTB-SB-21-0610	SI3897-37	N6680.D	06/17/15	22:59
WTB-SS-13-0002	SI3897-39	N6681.D	06/17/15	23:27
WTB-SS-16-0002	SI3897-25	N6682.D	06/17/15	23:54
Matrix Spike	WG164585-3	N6683.D	06/18/15	00:21
Matrix Spike Duplica	WG164585-4	N6684.D	06/18/15	00:49
WTB-SB-13-0206	SI3897-40	N6685.D	06/18/15	01:16

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8 **SDG:** OU8-1
Lab ID : WG164949-2 **Analytical Date:** 06/17/15 14:08
Lab File ID : N6661.D **Instrument ID:** GCMS-N
Initial Calibration Date(s): 06/05/15 11:28 06/05/15 13:54 **Column ID:**

Compound	RRF/Amount	RF1	CCAL RRF1	Min	%D/ %Drift	Max %D/ %Drift	Curve Type	
25 Naphthalene	0.94575	0.95808	0.95808	0.010	1.30452	20.00000	Averaged	
43 Acenaphthylene	1.69869	1.71998	1.71998	0.010	1.25288	20.00000	Averaged	
46 Acenaphthene	1.07666	1.09236	1.09236	0.010	1.45822	20.01000	Averaged	
54 Fluorene	1.19711	1.17055	1.17055	0.010	-2.21879	20.00000	Averaged	
64 Phenanthrene	1.06309	1.06649	1.06649	0.010	0.31990	20.00000	Averaged	
65 Anthracene	1.07705	1.04816	1.04816	0.010	-2.68305	20.00000	Averaged	
68 Fluoranthene	1.08864	1.04826	1.04826	0.010	-3.70904	20.01000	Averaged	
70 Pyrene	1.78565	2.46329	2.46329	0.010	37.94926	20.00000	Averaged	*
72 Benzo(a)anthracene	1.01235	1.11020	1.11020	0.010	9.66536	20.00000	Averaged	
75 Chrysene	1.00000	0.98697	1.18103	0.010	-1.30269	20.00000	Linear	
78 Benzo(b)fluoranthene	1.21263	1.27760	1.27760	0.010	5.35806	20.00000	Averaged	
79 Benzo(k)fluoranthene	1.00000	0.93187	1.53565	0.010	-6.81266	20.00000	Linear	
80 Benzo(a)pyrene	1.12366	1.00014	1.00014	0.010	-10.99251	20.01000	Averaged	
82 Indeno(1,2,3-cd)pyrene	0.78532	0.69557	0.69557	0.010	-11.42870	20.00000	Averaged	
83 Dibenzo(a,h)anthracene	0.55278	0.51794	0.51794	0.010	-6.30186	20.00000	Averaged	
84 Benzo(g,h,i)perylene	0.79265	0.65085	0.65085	0.010	-17.88856	20.00000	Averaged	
30 2-Methylnaphthalene-D10	1.00719	0.93844	0.93844	0.010	-6.82595	20.00000	Averaged	
53 Fluorene-D10	0.87649	0.83911	0.83911	0.010	-4.26470	20.00000	Averaged	
69 Pyrene-D10	1.22730	1.65172	1.65172	0.010	34.58230	20.00000	Averaged	*

*** = Compound out of QC criteria**

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Form 5
Semivolatile Organic Instrument Performance Check

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : ND955.D
Instrument ID : GCMS-N

SDG : OU8-1
Date Analyzed : 18-JUN-15
Time Analyzed : 11:01

m/e	Ion Abundance Criteria	% Relative Abundance		
51	30.0 - 60.0% of mass 198	43.5		
68	Less than 2.0% of mass 69	0.0	0.0	1
69	Less than 100.0% of mass 198	64.2		
70	Less than 2.0% of mass 69	0.3	0.53	1
127	40.0 - 60.0% of mass 198	58.0		
197	Less than 1.0% of mass 198	0.0		
198	Base Peak, 100% relative abundance	100		
199	5.0 - 9.0% of mass 198	6.5		
275	10.0 - 30.0% of mass 198	24.1		
365	1.0 - 100.0% of mass 198	2.5		
441	0.0 - 100.0% of mass 443	13.0	82.90	2
442	40.0 - 100.0% of mass 198	80.5		
443	17.0 - 23.0% of mass 442	15.7	19.50	3

1-Value is % mass 69
2-Value is % mass 443
3-Value is % mass 442

This check applies to the following samples, LCS, MS, MSD and standards:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Continuing Calibrati	WG165004-2	N6700.D	06/18/15	11:20
WTB-SS-16-0002	SI3897-25DL	N6701.D	06/18/15	11:56
WTB-SB-21-0610	SI3897-37DL	N6702.D	06/18/15	12:24
WTB-SB-13-0206	SI3897-40DL	N6703.D	06/18/15	12:51
WTB-SB-13-0610	SI3897-41	N6705.D	06/18/15	13:47

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8 **SDG:** OU8-1
Lab ID : WG165004-2 **Analytical Date:** 06/18/15 11:20
Lab File ID : N6700.D **Instrument ID:** GCMS-N
Initial Calibration Date(s): 06/05/15 11:28 06/05/15 13:54 **Column ID:**

Compound	RRF/Amount	RF1	CCAL RRF1	Min	%D/ %Drift	Max %D/ %Drift	Curve Type	
25 Naphthalene	0.94575	0.87135	0.87135	0.010	-7.86627	20.00000	Averaged	
43 Acenaphthylene	1.69869	1.73079	1.73079	0.010	1.88965	20.00000	Averaged	
46 Acenaphthene	1.07666	1.11565	1.11565	0.010	3.62161	20.01000	Averaged	
54 Fluorene	1.19711	1.23342	1.23342	0.010	3.03359	20.00000	Averaged	
64 Phenanthrene	1.06309	0.99148	0.99148	0.010	-6.73589	20.00000	Averaged	
65 Anthracene	1.07705	1.14760	1.14760	0.010	6.54943	20.00000	Averaged	
68 Fluoranthene	1.08864	0.93472	0.93472	0.010	-14.13854	20.01000	Averaged	
70 Pyrene	1.78565	1.98944	1.98944	0.010	11.41252	20.00000	Averaged	
72 Benzo(a)anthracene	1.01235	1.08489	1.08489	0.010	7.16539	20.00000	Averaged	
75 Chrysene	1.00000	1.25516	1.44670	0.010	25.51648	20.00000	Linear	*
78 Benzo(b)fluoranthene	1.21263	1.02777	1.02777	0.010	-15.24458	20.00000	Averaged	
79 Benzo(k)fluoranthene	1.00000	0.91723	1.51567	0.010	-8.27658	20.00000	Linear	
80 Benzo(a)pyrene	1.12366	1.04982	1.04982	0.010	-6.57127	20.01000	Averaged	
82 Indeno(1,2,3-cd)pyrene	0.78532	0.80260	0.80260	0.010	2.20036	20.00000	Averaged	
83 Dibenzo(a,h)anthracene	0.55278	0.61631	0.61631	0.010	11.49318	20.00000	Averaged	
84 Benzo(g,h,i)perylene	0.79265	0.75562	0.75562	0.010	-4.67062	20.00000	Averaged	
30 2-Methylnaphthalene-D10	1.00719	0.99650	0.99650	0.010	-1.06153	20.00000	Averaged	
53 Fluorene-D10	0.87649	0.86112	0.86112	0.010	-1.75397	20.00000	Averaged	
69 Pyrene-D10	1.22730	1.29142	1.29142	0.010	5.22480	20.00000	Averaged	

*** = Compound out of QC criteria**

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Form 5
Semivolatile Organic Instrument Performance Check

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : ND956.D
Instrument ID : GCMS-N

SDG : OU8-1
Date Analyzed : 19-JUN-15
Time Analyzed : 11:09

m/e	Ion Abundance Criteria	% Relative Abundance		
51	30.0 - 60.0% of mass 198	44.2		
68	Less than 2.0% of mass 69	0.0	0.0	1
69	Less than 100.0% of mass 198	64.7		
70	Less than 2.0% of mass 69	0.3	0.50	1
127	40.0 - 60.0% of mass 198	59.1		
197	Less than 1.0% of mass 198	0.0		
198	Base Peak, 100% relative abundance	100		
199	5.0 - 9.0% of mass 198	6.6		
275	10.0 - 30.0% of mass 198	22.8		
365	1.0 - 100.0% of mass 198	2.5		
441	0.0 - 100.0% of mass 443	12.9	85.71	2
442	40.0 - 100.0% of mass 198	78.3		
443	17.0 - 23.0% of mass 442	15.1	19.28	3

1-Value is % mass 69
2-Value is % mass 443
3-Value is % mass 442

This check applies to the following samples, LCS, MS, MSD and standards:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Continuing Calibrati	WG165089-2	N6715.D	06/19/15	11:27
WTB-SB-23-0610	SI3897-10DL	N6717.D	06/19/15	12:23
WTB-SS-17-0002	SI3772-8	N6718.D	06/19/15	12:51
WTB-SB-23-0610	SI3897-10DL2	N6719.D	06/19/15	14:03

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8 **SDG:** OU8-1
Lab ID : WG165089-2 **Analytical Date:** 06/19/15 11:27
Lab File ID : N6715.D **Instrument ID:** GCMS-N
Initial Calibration Date(s): 06/05/15 11:28 06/05/15 13:54 **Column ID:**

Compound	RRF/Amount	RF1	CCAL RRF1	Min	%D/ %Drift	Max %D/ %Drift	Curve Type
25 Naphthalene	0.94575	0.87304	0.87304	0.010	-7.68741	20.00000	Averaged
43 Acenaphthylene	1.69869	1.69207	1.69207	0.010	-0.38978	20.00000	Averaged
46 Acenaphthene	1.07666	1.07179	1.07179	0.010	-0.45203	20.01000	Averaged
54 Fluorene	1.19711	1.15869	1.15869	0.010	-3.20953	20.00000	Averaged
64 Phenanthrene	1.06309	0.93085	0.93085	0.010	-12.43985	20.00000	Averaged
65 Anthracene	1.07705	1.13930	1.13930	0.010	5.77921	20.00000	Averaged
68 Fluoranthene	1.08864	1.11443	1.11443	0.010	2.36906	20.01000	Averaged
70 Pyrene	1.78565	1.62442	1.62442	0.010	-9.02895	20.00000	Averaged
72 Benzo(a)anthracene	1.01235	0.96808	0.96808	0.010	-4.37247	20.00000	Averaged
75 Chrysene	1.00000	0.86578	1.06097	0.010	-13.42225	20.00000	Linear
78 Benzo(b)fluoranthene	1.21263	1.14828	1.14828	0.010	-5.30649	20.00000	Averaged
79 Benzo(k)fluoranthene	1.00000	0.89218	1.48147	0.010	-10.78202	20.00000	Linear
80 Benzo(a)pyrene	1.12366	0.93062	0.93062	0.010	-17.17960	20.01000	Averaged
82 Indeno(1,2,3-cd)pyrene	0.78532	0.71958	0.71958	0.010	-8.37061	20.00000	Averaged
83 Dibenzo(a,h)anthracene	0.55278	0.52037	0.52037	0.010	-5.86337	20.00000	Averaged
84 Benzo(g,h,i)perylene	0.79265	0.67312	0.67312	0.010	-15.07904	20.00000	Averaged
30 2-Methylnaphthalene-D10	1.00719	0.96643	0.96643	0.010	-4.04631	20.00000	Averaged
53 Fluorene-D10	0.87649	0.81686	0.81686	0.010	-6.80348	20.00000	Averaged
69 Pyrene-D10	1.22730	1.09895	1.09895	0.010	-10.45784	20.00000	Averaged

*** = Compound out of QC criteria**

Form 5
Semivolatile Organic Instrument Performance Check

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : ND958.D
Instrument ID : GCMS-N

SDG : OU8-1
Date Analyzed : 23-JUN-15
Time Analyzed : 12:11

m/e	Ion Abundance Criteria	% Relative Abundance		
51	30.0 - 60.0% of mass 198	32.1		
68	Less than 2.0% of mass 69	0.7	1.60	1
69	Less than 100.0% of mass 198	40.7		
70	Less than 2.0% of mass 69	0.2	0.55	1
127	40.0 - 60.0% of mass 198	60.0		
197	Less than 1.0% of mass 198	0.2		
198	Base Peak, 100% relative abundance	100		
199	5.0 - 9.0% of mass 198	6.6		
275	10.0 - 30.0% of mass 198	22.8		
365	1.0 - 100.0% of mass 198	2.3		
441	0.0 - 100.0% of mass 443	11.0	73.31	2
442	40.0 - 100.0% of mass 198	78.5		
443	17.0 - 23.0% of mass 442	15.0	19.11	3

1-Value is % mass 69
2-Value is % mass 443
3-Value is % mass 442

This check applies to the following samples, LCS, MS, MSD and standards:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Initial Calibration	WG165324-4	N6778.D	06/23/15	13:03
Initial Calibration	WG165324-2	N6779.D	06/23/15	13:31
Initial Calibration	WG165324-3	N6780.D	06/23/15	13:59
Initial Calibration	WG165324-5	N6781.D	06/23/15	14:27
Initial Calibration	WG165324-6	N6782.D	06/23/15	14:55
Initial Calibration	WG165324-7	N6783.D	06/23/15	15:23
Independent Source	WG165324-8	N6784.D	06/23/15	15:51

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Form 6
Initial Calibration Summary

Lab Name : Katahdin Analytical Services **SDG:** OU8-1
Project : Portsmouth Naval Shipyard - WE32 OU8 **Instrument ID:** GCMS-N
Lab File IDs : N6779.D N6780.D N6778.D N6781.D N6782.D N6783.D **Column ID:**
Calibration Date(s): 23-JUN-15 13:03 23-JUN-15 15:23

	0.200000(Level 1	0.500000(Level 2	1.0000 Level 3	3.0000 Level 4	7.0000 Level 5	10.0000 Level 6	New Crv	b	m1	m2	%RSD	Max %RSD	
Naphthalene	1.14657	0.96464	1.00870	0.97468	0.94567	0.88692	AVG		0.98786		8.86019	15.00000	O
Acenaphthylene	2.22876	2.37478	2.40908	2.27085	2.35204	2.20386	AVG		2.30656		3.63289	15.00000	O
Acenaphthene	1.37272	1.45465	1.47437	1.39113	1.45032	1.32283	AVG		1.41100		4.14486	15.00000	O
Fluorene	1.39907	1.50265	1.51958	1.44270	1.52562	1.40814	AVG		1.46629		3.87447	15.00000	O
Phenanthrene	1.25216	1.23333	1.28818	1.22719	1.28422	1.21678	AVG		1.25031		2.40849	15.00000	O
Anthracene	1.50554	1.61772	1.53726	1.33509	1.42329	1.27865	AVG		1.44959		8.84014	15.00000	O
Fluoranthene	1.25300	1.20210	1.24336	1.11653	1.24233	1.16556	AVG		1.20381		4.48136	15.00000	O
Pyrene	49747	118527	258919	728876	1818636	2584079	QUA	-0.03154	0.35532	0.00654	0.99994	0.99000	O
Benzo(a)anthracene	27521	56401	132357	366200	1069947	1681282	LNR	-0.04547	1.25158		0.99949	0.99000	O
Chrysene	40645	84668	138690	434554	1133242	1688346	LNR	-0.27845	1.26064		0.99861	0.99000	O
Benzo(b)fluoranthene	18197	34502	75742	213765	703846	998280	QUA	0.05333	0.59674	0.00295	0.99109	0.99000	O
Benzo(k)fluoranthene	23958	53018	104578	316787	780100	1296802	LNR	-0.15933	1.87606		0.99926	0.99000	O
Benzo(a)pyrene	1.75015	1.62696	1.30023	1.23861	1.35856	1.30267	AVG		1.42953		14.54197	15.00000	O
Indeno(1,2,3-cd)pyrene	1.16040	0.94659	0.95291	0.84337	0.88721	0.82105	AVG		0.93525		13.08892	15.00000	O
Dibenzo(a,h)anthracene	0.80886	0.66139	0.68002	0.60210	0.64051	0.60032	AVG		0.66553		11.57493	15.00000	O
Benzo(g,h,i)perylene	7694	19553	41765	129813	338222	494804	LNR	-0.18495	0.74765		0.99618	0.99000	O
2-Methylnaphthalene-D10	1.09203	1.13690	1.13834	1.07092	1.10734	1.01694	AVG		1.09374		4.18158	15.00000	
Fluorene-D10	0.89557	0.92877	0.93832	0.88861	0.91713	0.85627	AVG		0.90411		3.33644	15.00000	
Pyrene-D10	23587	66268	142886	419789	1048907	1494345	LNR	-0.29475	1.13914		0.99509	0.99000	

Legend: O = Kept Original Curve
Y = Failed Minimum RF
W = Failed %RSD Value

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Form 5
Semivolatile Organic Instrument Performance Check

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : ND960.D
Instrument ID : GCMS-N

SDG : OU8-1
Date Analyzed : 25-JUN-15
Time Analyzed : 13:33

m/e	Ion Abundance Criteria	% Relative Abundance		
51	30.0 - 60.0% of mass 198	33.7		
68	Less than 2.0% of mass 69	0.7	1.72	1
69	Less than 100.0% of mass 198	41.4		
70	Less than 2.0% of mass 69	0.2	0.44	1
127	40.0 - 60.0% of mass 198	59.1		
197	Less than 1.0% of mass 198	0.0		
198	Base Peak, 100% relative abundance	100		
199	5.0 - 9.0% of mass 198	6.5		
275	10.0 - 30.0% of mass 198	23.0		
365	1.0 - 100.0% of mass 198	2.5		
441	0.0 - 100.0% of mass 443	12.1	72.28	2
442	40.0 - 100.0% of mass 198	86.1		
443	17.0 - 23.0% of mass 442	16.7	19.46	3

1-Value is % mass 69
2-Value is % mass 443
3-Value is % mass 442

This check applies to the following samples, LCS, MS, MSD and standards:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Continuing Calibrati	WG165435-2	N6829.D	06/25/15	13:52
WTB-SB-12-0206	SI3897-19DL	N6836.D	06/25/15	17:11

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8 **SDG:** OU8-1
Lab ID : WG165435-2 **Analytical Date:** 06/25/15 13:52
Lab File ID : N6829.D **Instrument ID:** GCMS-N
Initial Calibration Date(s): 06/23/15 13:03 06/23/15 15:23 **Column ID:**

Compound	RRF/Amount	RF1	CCAL RRF1	Min	%D/ %Drift	Max %D/ %Drift	Curve Type
25 Naphthalene	0.98786	1.00665	1.00665	0.010	1.90197	20.00000	Averaged
43 Acenaphthylene	2.30656	2.41439	2.41439	0.010	4.67476	20.00000	Averaged
46 Acenaphthene	1.41100	1.50727	1.50727	0.010	6.82261	20.01000	Averaged
54 Fluorene	1.46629	1.53789	1.53789	0.010	4.88266	20.00000	Averaged
64 Phenanthrene	1.25031	1.23160	1.23160	0.010	-1.49660	20.00000	Averaged
65 Anthracene	1.44959	1.61012	1.61012	0.010	11.07422	20.00000	Averaged
68 Fluoranthene	1.20381	1.22989	1.22989	0.010	2.16623	20.01000	Averaged
70 Pyrene	1.00000	0.80222	2.21571	0.010	-19.77777	20.00000	Quadratic
72 Benzo(a)anthracene	1.00000	1.01923	1.32117	0.010	1.92311	20.00000	Linear
75 Chrysene	1.00000	0.98197	1.51872	0.010	-1.80311	20.00000	Linear
78 Benzo(b)fluoranthene	1.00000	0.93261	1.47785	0.010	-6.73872	20.00000	Quadratic
79 Benzo(k)fluoranthene	1.00000	1.04396	2.19766	0.010	4.39603	20.00000	Linear
80 Benzo(a)pyrene	1.42953	1.45605	1.45605	0.010	1.85513	20.01000	Averaged
82 Indeno(1,2,3-cd)pyrene	0.93525	0.98949	0.98949	0.010	5.79940	20.00000	Averaged
83 Dibenzo(a,h)anthracene	0.66553	0.71290	0.71290	0.010	7.11667	20.00000	Averaged
84 Benzo(g,h,i)perylene	1.00000	1.16695	0.98310	0.010	16.69462	20.00000	Linear
30 2-Methylnaphthalene-D10	1.09374	1.15110	1.15110	0.010	5.24421	20.00000	Averaged
53 Fluorene-D10	0.90411	0.92835	0.92835	0.010	2.68121	20.00000	Averaged
69 Pyrene-D10	1.00000	0.84481	1.23097	0.010	-15.51890	20.00000	Linear

*** = Compound out of QC criteria**

Method Blank Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : N6452.D
Instrument ID : GCMS-N
Matrix : AQ

SDG : OU8-1
Lab Sample ID : WG164368-1
Date Extracted : 08-JUN-15
Date Analyzed : 09-JUN-15
Time Analyzed : 09:55

This Method Blank applies to the following samples, LCS, MS and MSD:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Laboratory Control S	WG164368-2	N6453.D	06/09/15	10:23
WTB-RB01-060415	SI3897-38	N6492.D	06/10/15	16:42

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Report of Analytical Results

Client:
Lab ID: WG164368-1
Client ID: Method Blank Sample
Project:
SDG: OU8-1
Lab File ID: N6452.D

Sample Date:
Received Date:
Extract Date: 08-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164368

Analysis Date: 09-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: AQ
% Solids: NA
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	0.10	ug/L	1	.2	0.20	0.064	0.10
Acenaphthylene	U	0.10	ug/L	1	.2	0.20	0.054	0.10
Acenaphthene	U	0.10	ug/L	1	.2	0.20	0.064	0.10
Fluorene	U	0.10	ug/L	1	.2	0.20	0.061	0.10
Phenanthrene	U	0.10	ug/L	1	.2	0.20	0.051	0.10
Anthracene	U	0.10	ug/L	1	.2	0.20	0.044	0.10
Fluoranthene	U	0.10	ug/L	1	.2	0.20	0.073	0.10
Pyrene	U	0.10	ug/L	1	.2	0.20	0.059	0.10
Benzo(a)anthracene	U	0.10	ug/L	1	.2	0.20	0.046	0.10
Chrysene	U	0.10	ug/L	1	.2	0.20	0.036	0.10
Benzo(b)Fluoranthene	U	0.10	ug/L	1	.2	0.20	0.089	0.10
Benzo(k)fluoranthene	U	0.10	ug/L	1	.2	0.20	0.049	0.10
Benzo(a)pyrene	U	0.10	ug/L	1	.2	0.20	0.066	0.10
Indeno(1,2,3-cd)pyrene	U	0.10	ug/L	1	.2	0.20	0.052	0.10
Dibenzo(a,h)anthracene	U	0.10	ug/L	1	.2	0.20	0.070	0.10
Benzo(g,h,i)perylene	U	0.10	ug/L	1	.2	0.20	0.065	0.10
2-Methylnaphthalene-D10		67.0	%					
Fluorene-D10		71.6	%					
pyrene-d10		94.0	%					

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LCS Recovery Report

Client:
Lab ID: WG164368-2
Client ID: LCS
Project:
SDG: OU8-1
LCS File ID: N6453.D

Sample Date:
Received Date:
Extract Date: 08-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164368

Analysis Date: 09-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: AQ
% Solids: NA
Report Date: 22-JUN-15

Compound	Recovery (%)	Conc Added	Conc Recovered	Conc Units	Limits
Naphthalene	76.0	2.00	1.52	ug/L	42-96
Acenaphthylene	70.0	2.00	1.40	ug/L	17-92
Acenaphthene	73.0	2.00	1.46	ug/L	34-92
Fluorene	72.0	2.00	1.44	ug/L	22-112
Phenanthrene	80.0	2.00	1.60	ug/L	60-107
Anthracene	88.0	2.00	1.76	ug/L	59-110
Fluoranthene	85.5	2.00	1.71	ug/L	69-119
Pyrene	84.5	2.00	1.69	ug/L	36-118
Benzo(a)anthracene	84.5	2.00	1.69	ug/L	57-107
Chrysene	94.5	2.00	1.89	ug/L	62-119
Benzo(b)Fluoranthene	80.5	2.00	1.61	ug/L	55-111
Benzo(k)fluoranthene	100.	2.00	2.01	ug/L	47-107
Benzo(a)pyrene	78.5	2.00	1.57	ug/L	53-99
Indeno(1,2,3-cd)pyrene	68.0	2.00	1.36	ug/L	60-110
Dibenzo(a,h)anthracene	70.5	2.00	1.41	ug/L	62-115
Benzo(g,h,i)perylene	63.5	2.00	1.27	ug/L	55-103
2-Methylnaphthalene-D10	73.6				43-92
Fluorene-D10	72.5				29-101
pyrene-d10	88.4				53-166

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Method Blank Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : N6486.D
Instrument ID : GCMS-N
Matrix : SL

SDG : OU8-1
Lab Sample ID : WG164374-1
Date Extracted : 08-JUN-15
Date Analyzed : 10-JUN-15
Time Analyzed : 13:54

This Method Blank applies to the following samples, LCS, MS and MSD:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Laboratory Control S	WG164374-2	N6488.D	06/10/15	14:50
Laboratory Control S	WG164374-3	N6489.D	06/10/15	15:18
WTB-SS-10-0002	SI3897-42	N6499.D	06/10/15	20:00
WTB-SS-19-0002	SI3772-11	N6500.D	06/10/15	20:28
WTB-SB-19-0610	SI3772-13	N6501.D	06/10/15	20:56
WTB-SS-14-0002	SI3772-4	N6502.D	06/10/15	21:24
WTB-SB-14-0607	SI3772-7	N6503.D	06/10/15	21:52
WTB-SB-17-0206	SI3772-9	N6504.D	06/10/15	22:20
WTB-SB-10-0206	SI3897-43	N6505.D	06/10/15	22:47
WTB-SB-14-0206	SI3772-5	N6506.D	06/10/15	23:15
WTB-SS-11-0002	SI3772-1	N6507.D	06/10/15	23:43
WTB-SB-11-0206	SI3772-2	N6508.D	06/11/15	00:10
WTB-SB-11-0610	SI3772-3	N6509.D	06/11/15	00:38
WTB-FD01-060315	SI3772-6	N6510.D	06/11/15	01:05
WTB-SB-10-0206	SI3897-43DL	N6530.D	06/11/15	17:12
WTB-SB-10-0610	SI3897-44DL	N6531.D	06/11/15	17:41
WTB-SS-11-0002	SI3772-1DL	N6532.D	06/11/15	18:10
WTB-SB-11-0206	SI3772-2DL	N6533.D	06/11/15	18:38
WTB-SB-11-0610	SI3772-3DL	N6534.D	06/11/15	19:07
WTB-SS-17-0002	SI3772-8DL	N6535.D	06/11/15	19:36
WTB-SB-14-0607	SI3772-7RA	N6537.D	06/11/15	20:32
WTB-SB-14-0206	SI3772-5RA	N6538.D	06/11/15	21:01
WTB-SB-10-0610	SI3897-44	N6539.D	06/11/15	21:29
WTB-SB-19-0206	SI3772-12	N6576.D	06/13/15	00:57
WTB-SB-17-0610	SI3772-10DL2	N6665.D	06/17/15	16:02
WTB-SS-17-0002	SI3772-8	N6718.D	06/19/15	12:51

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ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client:
Lab ID: WG164374-1
Client ID: Method Blank Sample
Project:
SDG: OU8-1
Lab File ID: N6486.D

Sample Date:
Received Date:
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374

Analysis Date: 10-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: NA
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	10	ug/Kgdrywt	1	20	20.	2.6	10.
Acenaphthylene	U	10	ug/Kgdrywt	1	20	20.	1.2	10.
Acenaphthene	U	10	ug/Kgdrywt	1	20	20.	1.5	10.
Fluorene	U	10	ug/Kgdrywt	1	20	20.	3.2	10.
Phenanthrene	U	10	ug/Kgdrywt	1	20	20.	1.8	10.
Anthracene	U	10	ug/Kgdrywt	1	20	20.	1.2	10.
Fluoranthene	U	10	ug/Kgdrywt	1	20	20.	1.8	10.
Pyrene	U	10	ug/Kgdrywt	1	20	20.	2.1	10.
Benzo(a)anthracene	U	10	ug/Kgdrywt	1	20	20.	1.9	10.
Chrysene	U	10	ug/Kgdrywt	1	20	20.	1.7	10.
Benzo(b)Fluoranthene	U	10	ug/Kgdrywt	1	20	20.	2.4	10.
Benzo(k)fluoranthene	U	10	ug/Kgdrywt	1	20	20.	3.1	10.
Benzo(a)pyrene	U	10	ug/Kgdrywt	1	20	20.	3.3	10.
Indeno(1,2,3-cd)pyrene	U	10	ug/Kgdrywt	1	20	20.	1.9	10.
Dibenzo(a,h)anthracene	U	10	ug/Kgdrywt	1	20	20.	1.8	10.
Benzo(g,h,i)perylene	U	10	ug/Kgdrywt	1	20	20.	2.0	10.
2-Methylnaphthalene-D10		59.8	%					
Fluorene-D10		66.9	%					
Pyrene-D10		88.9	%					

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Cert No E87604

LCS/LCSD Recovery Report

LCS ID: WG164374-2
LCSD ID: WG164374-3
Project:
SDG: OU8-1
Report Date: 22-JUN-15
LCS File ID: N6488.D

Received Date:
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3550
Lab Prep Batch: WG164374
LCSD File ID: N6489.D

Analysis Date: 10-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: NA

Compound	Spike Amt	LCS Conc	LCS Rec (%)	LCSD Conc	LCSD Rec (%)	Conc Units	RPD (%)	RPD Limit	Limits
Naphthalene	66.7	36.5	54.7	46.2	69.3	ug/Kgdrywt	23	30	10-129
Acenaphthylene	66.7	33.8	50.7	40.7	61.0	ug/Kgdrywt	18	30	25-94
Acenaphthene	66.7	36.5	54.7	43.7	65.5	ug/Kgdrywt	18	30	33-98
Fluorene	66.7	38.5	57.7	44.2	66.3	ug/Kgdrywt	14	30	40-92
Phenanthrene	66.7	41.2	61.8	45.2	67.8	ug/Kgdrywt	9	30	46-96
Anthracene	66.7	45.2	67.8	51.0	76.5	ug/Kgdrywt	12	30	34-96
Fluoranthene	66.7	42.2	63.3	47.0	70.5	ug/Kgdrywt	11	30	38-116
Pyrene	66.7	51.6	77.4	48.7	73.0	ug/Kgdrywt	6	30	35-111
Benzo(a)anthracene	66.7	44.2	66.3	46.1	69.1	ug/Kgdrywt	4	30	48-100
Chrysene	66.7	55.9	83.8	57.8	86.6	ug/Kgdrywt	3	30	46-101
Benzo(b)Fluoranthene	66.7	36.7	55.0	44.3	66.4	ug/Kgdrywt	19	30	53-100
Benzo(k)fluoranthene	66.7	55.3	82.9	58.0	87.0	ug/Kgdrywt	5	30	49-96
Benzo(a)pyrene	66.7	41.7	62.5	45.9	68.8	ug/Kgdrywt	10	30	61-101
Indeno(1,2,3-cd)pyrene	66.7	46.1	69.1	50.0	75.0	ug/Kgdrywt	8	30	50-105
Dibenzo(a,h)anthracene	66.7	48.5	72.7	52.6	78.9	ug/Kgdrywt	8	30	55-105
Benzo(g,h,i)perylene	66.7	45.6	68.4	49.6	74.4	ug/Kgdrywt	8	30	53-103
2-Methylnaphthalene-D10			61.4		69.3				19-94
Fluorene-D10			63.1		69.7				20-96
Pyrene-D10			83.7		77.5				31-128

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Method Blank Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : N6553.D
Instrument ID : GCMS-N
Matrix : SL

SDG : OU8-1
Lab Sample ID : WG164507-1
Date Extracted : 10-JUN-15
Date Analyzed : 12-JUN-15
Time Analyzed : 14:13

This Method Blank applies to the following samples, LCS, MS and MSD:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Laboratory Control S	WG164507-2	N6554.D	06/12/15	14:41
WTB-SB-24-0206	SI3897-3	N6558.D	06/12/15	16:34
WTB-SS-24-0002	SI3897-2	N6564.D	06/12/15	19:23
WTB-SB-09-0206	SI3897-16	N6565.D	06/12/15	19:51
WTB-SS-08-0002	SI3897-11	N6566.D	06/12/15	20:19
WTB-FD01-060415	SI3897-12	N6567.D	06/12/15	20:47
WTB-SB-08-0206	SI3897-13	N6568.D	06/12/15	21:15
WTB-SB-12-0206	SI3897-19	N6569.D	06/12/15	21:43
WTB-SS-22-0002	SI3897-1	N6570.D	06/12/15	22:10
WTB-SB-08-0610	SI3897-14	N6571.D	06/12/15	22:38
WTB-SB-24-069.7	SI3897-4	N6572.D	06/12/15	23:06
Matrix Spike	WG164507-3	N6573.D	06/12/15	23:34
Matrix Spike Duplica	WG164507-4	N6574.D	06/13/15	00:01
WTB-SB-22-0206	SI3897-5DL	N6607.D	06/15/15	17:00
WTB-SB-23-0206	SI3897-9DL2	N6609.D	06/15/15	17:55
WTB-SB-08-0206	SI3897-13DL	N6611.D	06/15/15	18:50
WTB-SB-08-0610	SI3897-14DL	N6612.D	06/15/15	19:17
WTB-SB-12-0610	SI3897-20DL	N6614.D	06/15/15	20:12
WTB-SB-09-0610	SI3897-17DL	N6615.D	06/15/15	20:40
WTB-SS-23-0002	SI3897-8DL	N6616.D	06/15/15	21:07
WTB-SB-23-0206	SI3897-9DL	N6617.D	06/15/15	21:34
WTB-SS-09-0002	SI3897-15DL	N6618.D	06/15/15	22:02
WTB-FD02-060315	SI3897-7	N6619.D	06/15/15	22:29
WTB-SB-12-0610	SI3897-20	N6620.D	06/15/15	22:56
WTB-SB-09-0610	SI3897-17	N6621.D	06/15/15	23:24
WTB-SB-22-0610	SI3897-6	N6622.D	06/15/15	23:51
WTB-SS-12-0002	SI3897-18DL2	N6634.D	06/16/15	13:12
WTB-SB-22-0206	SI3897-5	N6642.D	06/16/15	16:54
WTB-SS-09-0002	SI3897-15	N6647.D	06/16/15	19:13
WTB-SS-12-0002	SI3897-18DL	N6649.D	06/16/15	20:09
WTB-SS-23-0002	SI3897-8DL2	N6667.D	06/17/15	16:58
WTB-SB-23-0610	SI3897-10DL	N6717.D	06/19/15	12:23
WTB-SB-23-0610	SI3897-10DL2	N6719.D	06/19/15	14:03
WTB-SB-12-0206	SI3897-19DL	N6836.D	06/25/15	17:11

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ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client:
Lab ID: WG164507-1
Client ID: Method Blank Sample
Project:
SDG: OU8-1
Lab File ID: N6553.D

Sample Date:
Received Date:
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 12-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: NA
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	10	ug/Kgdrywt	1	20	20.	2.6	10.
Acenaphthylene	U	10	ug/Kgdrywt	1	20	20.	1.2	10.
Acenaphthene	U	10	ug/Kgdrywt	1	20	20.	1.5	10.
Fluorene	U	10	ug/Kgdrywt	1	20	20.	3.2	10.
Phenanthrene	U	10	ug/Kgdrywt	1	20	20.	1.8	10.
Anthracene	U	10	ug/Kgdrywt	1	20	20.	1.2	10.
Fluoranthene	J	2.0	ug/Kgdrywt	1	20	20.	1.8	10.
Pyrene	J	3.9	ug/Kgdrywt	1	20	20.	2.1	10.
Benzo(a)anthracene	J	2.2	ug/Kgdrywt	1	20	20.	1.9	10.
Chrysene	U	10	ug/Kgdrywt	1	20	20.	1.7	10.
Benzo(b)Fluoranthene	U	10	ug/Kgdrywt	1	20	20.	2.4	10.
Benzo(k)fluoranthene	U	10	ug/Kgdrywt	1	20	20.	3.1	10.
Benzo(a)pyrene	U	10	ug/Kgdrywt	1	20	20.	3.3	10.
Indeno(1,2,3-cd)pyrene	U	10	ug/Kgdrywt	1	20	20.	1.9	10.
Dibenzo(a,h)anthracene	U	10	ug/Kgdrywt	1	20	20.	1.8	10.
Benzo(g,h,i)perylene	U	10	ug/Kgdrywt	1	20	20.	2.0	10.
2-Methylnaphthalene-D10		70.1	%					
Fluorene-D10		66.4	%					
Pyrene-D10		102.	%					

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Cert No E87604

LCS Recovery Report

Client:
Lab ID: WG164507-2
Client ID: LCS
Project:
SDG: OU8-1
LCS File ID: N6554.D

Sample Date:
Received Date:
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507

Analysis Date: 12-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: NA
Report Date: 22-JUN-15

Compound	Recovery (%)	Conc Added	Conc Recovered	Conc Units	Limits
Naphthalene	65.1	66.7	43.4	ug/Kgdrywt	10-129
Acenaphthylene	61.8	66.7	41.2	ug/Kgdrywt	25-94
Acenaphthene	66.4	66.7	44.3	ug/Kgdrywt	33-98
Fluorene	65.2	66.7	43.5	ug/Kgdrywt	40-92
Phenanthrene	71.7	66.7	47.8	ug/Kgdrywt	46-96
Anthracene	77.7	66.7	51.8	ug/Kgdrywt	34-96
Fluoranthene	76.8	66.7	51.2	ug/Kgdrywt	38-116
Pyrene	85.2	66.7	56.8	ug/Kgdrywt	35-111
Benzo(a)anthracene	76.3	66.7	50.9	ug/Kgdrywt	48-100
Chrysene	85.3	66.7	56.9	ug/Kgdrywt	46-101
Benzo(b)Fluoranthene	75.0	66.7	50.0	ug/Kgdrywt	53-100
Benzo(k)fluoranthene	87.0	66.7	58.0	ug/Kgdrywt	49-96
Benzo(a)pyrene	67.9	66.7	45.3	ug/Kgdrywt	61-101
Indeno(1,2,3-cd)pyrene	63.7	66.7	42.5	ug/Kgdrywt	50-105
Dibenzo(a,h)anthracene	67.5	66.7	45.0	ug/Kgdrywt	55-105
Benzo(g,h,i)perylene	60.4	66.7	40.3	ug/Kgdrywt	53-103
2-Methylnaphthalene-D10	79.8				19-94
Fluorene-D10	69.3				20-96
Pyrene-D10	89.8				31-128

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Method Blank Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : N6632.D
Instrument ID : GCMS-N
Matrix : SL

SDG : OU8-1
Lab Sample ID : WG164585-1
Date Extracted : 11-JUN-15
Date Analyzed : 16-JUN-15
Time Analyzed : 12:16

This Method Blank applies to the following samples, LCS, MS and MSD:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Laboratory Control S	WG164585-2	N6633.D	06/16/15	12:44
WTB-SB-15-0206	SI3897-22	N6636.D	06/16/15	14:07
WTB-FD02-060415	SI3897-23	N6637.D	06/16/15	14:35
WTB-SB-16-0610	SI3897-27	N6638.D	06/16/15	15:03
WTB-SS-18-0002	SI3897-28	N6639.D	06/16/15	15:31
WTB-SB-18-0206	SI3897-29	N6640.D	06/16/15	15:58
WTB-SB-18-0610	SI3897-30	N6641.D	06/16/15	16:26
WTB-SB-15-0610	SI3897-24	N6644.D	06/16/15	17:50
WTB-SS-15-0002	SI3897-21	N6646.D	06/16/15	18:45
WTB-SB-16-0206	SI3897-26	N6648.D	06/16/15	19:41
WTB-SS-15-0002	SI3897-21DL	N6668.D	06/17/15	17:26
WTB-SB-15-0610	SI3897-24DL	N6669.D	06/17/15	17:55
WTB-SB-16-0206	SI3897-26DL	N6670.D	06/17/15	18:23
WTB-SS-20-0002	SI3897-31	N6671.D	06/17/15	18:51
WTB-FD03-060415	SI3897-32	N6672.D	06/17/15	19:18
WTB-SB-20-0206	SI3897-33	N6673.D	06/17/15	19:46
Matrix Spike	WG164585-5	N6674.D	06/17/15	20:14
Matrix Spike Duplica	WG164585-6	N6675.D	06/17/15	20:42
WTB-SB-20-0610	SI3897-34	N6677.D	06/17/15	21:37
WTB-SS-21-0002	SI3897-35	N6678.D	06/17/15	22:04
WTB-SB-21-0206	SI3897-36	N6679.D	06/17/15	22:32
WTB-SB-21-0610	SI3897-37	N6680.D	06/17/15	22:59
WTB-SS-13-0002	SI3897-39	N6681.D	06/17/15	23:27
WTB-SS-16-0002	SI3897-25	N6682.D	06/17/15	23:54
Matrix Spike	WG164585-3	N6683.D	06/18/15	00:21
Matrix Spike Duplica	WG164585-4	N6684.D	06/18/15	00:49
WTB-SB-13-0206	SI3897-40	N6685.D	06/18/15	01:16
WTB-SS-16-0002	SI3897-25DL	N6701.D	06/18/15	11:56
WTB-SB-21-0610	SI3897-37DL	N6702.D	06/18/15	12:24
WTB-SB-13-0206	SI3897-40DL	N6703.D	06/18/15	12:51
WTB-SB-13-0610	SI3897-41	N6705.D	06/18/15	13:47

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ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client:
Lab ID: WG164585-1
Client ID: Method Blank Sample
Project:
SDG: OU8-1
Lab File ID: N6632.D

Sample Date:
Received Date:
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 16-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: NA
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	10	ug/Kgdrywt	1	20	20.	2.6	10.
Acenaphthylene	U	10	ug/Kgdrywt	1	20	20.	1.2	10.
Acenaphthene	U	10	ug/Kgdrywt	1	20	20.	1.5	10.
Fluorene	U	10	ug/Kgdrywt	1	20	20.	3.2	10.
Phenanthrene	U	10	ug/Kgdrywt	1	20	20.	1.8	10.
Anthracene	U	10	ug/Kgdrywt	1	20	20.	1.2	10.
Fluoranthene	J	5.2	ug/Kgdrywt	1	20	20.	1.8	10.
Pyrene	J	6.6	ug/Kgdrywt	1	20	20.	2.1	10.
Benzo(a)anthracene	J	3.0	ug/Kgdrywt	1	20	20.	1.9	10.
Chrysene	U	10	ug/Kgdrywt	1	20	20.	1.7	10.
Benzo(b)Fluoranthene	U	10	ug/Kgdrywt	1	20	20.	2.4	10.
Benzo(k)fluoranthene	U	10	ug/Kgdrywt	1	20	20.	3.1	10.
Benzo(a)pyrene	U	10	ug/Kgdrywt	1	20	20.	3.3	10.
Indeno(1,2,3-cd)pyrene	U	10	ug/Kgdrywt	1	20	20.	1.9	10.
Dibenzo(a,h)anthracene	U	10	ug/Kgdrywt	1	20	20.	1.8	10.
Benzo(g,h,i)perylene	U	10	ug/Kgdrywt	1	20	20.	2.0	10.
2-Methylnaphthalene-D10		62.6	%					
Fluorene-D10		62.6	%					
Pyrene-D10		71.8	%					

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Cert No E87604

LCS Recovery Report

Client:
Lab ID: WG164585-2
Client ID: LCS
Project:
SDG: OU8-1
LCS File ID: N6633.D

Sample Date:
Received Date:
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585

Analysis Date: 16-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: NA
Report Date: 22-JUN-15

Compound	Recovery (%)	Conc Added	Conc Recovered	Conc Units	Limits
Naphthalene	67.6	66.7	45.1	ug/Kgdrywt	10-129
Acenaphthylene	60.9	66.7	40.6	ug/Kgdrywt	25-94
Acenaphthene	64.2	66.7	42.8	ug/Kgdrywt	33-98
Fluorene	65.2	66.7	43.5	ug/Kgdrywt	40-92
Phenanthrene	68.5	66.7	45.7	ug/Kgdrywt	46-96
Anthracene	72.6	66.7	48.4	ug/Kgdrywt	34-96
Fluoranthene	82.6	66.7	55.1	ug/Kgdrywt	38-116
Pyrene	75.3	66.7	50.2	ug/Kgdrywt	35-111
Benzo(a)anthracene	77.4	66.7	51.6	ug/Kgdrywt	48-100
Chrysene	85.0	66.7	56.7	ug/Kgdrywt	46-101
Benzo(b)Fluoranthene	73.8	66.7	49.2	ug/Kgdrywt	53-100
Benzo(k)fluoranthene	75.0	66.7	50.0	ug/Kgdrywt	49-96
Benzo(a)pyrene	63.0	66.7	42.0	ug/Kgdrywt	61-101
Indeno(1,2,3-cd)pyrene	72.3	66.7	48.2	ug/Kgdrywt	50-105
Dibenzo(a,h)anthracene	78.3	66.7	52.2	ug/Kgdrywt	55-105
Benzo(g,h,i)perylene	66.6	66.7	44.4	ug/Kgdrywt	53-103
2-Methylnaphthalene-D10	69.1				19-94
Fluorene-D10	66.5				20-96
Pyrene-D10	75.6				31-128

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Cert No E87604

MS/MSD Recovery Report

MS ID: WG164507-3
MSD ID: WG164507-4
Sample ID: SI3897-4
Client ID: WTB-SB-24-069.7
Project:
SDG: OU8-1
MS File ID: N6573.D

Received Date:
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164507
Report Date: 22-JUN-15
MSD File ID: N6574.D

Analysis Date: 12-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 86.

Compound	MS Spike	MSD Spike	Conc Units	Samp Conc	MS Conc	MSD Conc	MS Rec (%)	MSD Rec (%)	RPD (%)	RPD Limit	Limits
Naphthalene	70.6	76.2	ug/Kgdrywt	U9.8	34.	42.	48.4	55.7	21	30	10-129
Acenaphthylene	70.6	76.2	ug/Kgdrywt	U9.8	42.	48.	60.2	62.9	12	30	25-94
Acenaphthene	70.6	76.2	ug/Kgdrywt	U9.8	45.	51.	63.7	67.2	13	30	33-98
Fluorene	70.6	76.2	ug/Kgdrywt	U9.8	47.	50.	67.0	65.3	5	30	40-92
Phenanthrene	70.6	76.2	ug/Kgdrywt	J16	55.	69.	54.5	68.8	22	30	46-96
Anthracene	70.6	76.2	ug/Kgdrywt	J1.9	52.	54.	71.4	68.9	4	30	34-96
Fluoranthene	70.6	76.2	ug/Kgdrywt	J3.8	38.	42.	47.8	49.4	10	30	38-116
Pyrene	70.6	76.2	ug/Kgdrywt	J10	49.	63.	55.4	69.6	25	30	35-111
Benzo(a)anthracene	70.6	76.2	ug/Kgdrywt	U9.8	52.	60.	74.2	79.2	14	30	48-100
Chrysene	70.6	76.2	ug/Kgdrywt	U9.8	62.	66.	88.0	86.1	5	30	46-101
Benzo(b)Fluoranthene	70.6	76.2	ug/Kgdrywt	U9.8	46.	51.	65.0	67.4	11	30	53-100
Benzo(k)fluoranthene	70.6	76.2	ug/Kgdrywt	U9.8	46.	49.	64.9	64.1	6	30	49-96
Benzo(a)pyrene	70.6	76.2	ug/Kgdrywt	UMM9.8	40.	44.	57.2*	57.4*	8	30	61-101
Indeno(1,2,3-cd)pyrene	70.6	76.2	ug/Kgdrywt	U9.8	42.	44.	58.8	58.4	7	30	50-105
Dibenzo(a,h)anthracene	70.6	76.2	ug/Kgdrywt	U9.8	49.	52.	69.4	67.8	5	30	55-105
Benzo(g,h,i)perylene	70.6	76.2	ug/Kgdrywt	UMM9.8	34.	37.	48.0*	48.3*	8	30	53-103
2-Methylnaphthalene-D10							61.3	64.2			19-94
Fluorene-D10							67.7	66.1			20-96
Pyrene-D10							73.8	84.1			31-128

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MS/MSD Recovery Report

MS ID: WG164585-3
MSD ID: WG164585-4
Sample ID: SI3897-25
Client ID: WTB-SS-16-0002
Project:
SDG: OU8-1
MS File ID: N6683.D

Received Date:
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585
Report Date: 22-JUN-15
MSD File ID: N6684.D

Analysis Date: 18-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 89.

Compound	MS Spike	MSD Spike	Conc Units	Samp Conc	MS Conc	MSD Conc	MS Rec (%)	MSD Rec (%)	RPD (%)	RPD Limit	Limits
Naphthalene	69.2	73.2	ug/Kgdrywt	55	67.	69.	17.1	18.7	3	30	10-129
Acenaphthylene	69.2	73.2	ug/Kgdrywt	J17	64.	64.	67.1	63.8	0	30	25-94
Acenaphthene	69.2	73.2	ug/Kgdrywt	EMM130	590	500	0*	0*	18	30	33-98
Fluorene	69.2	73.2	ug/Kgdrywt	EMM110	440	350	0*	0*	24	30	40-92
Phenanthrene	69.2	73.2	ug/Kgdrywt	EMM740	3800	3400	0*	0*	11	30	46-96
Anthracene	69.2	73.2	ug/Kgdrywt	EMM230	1400	1200	0*	0*	19	30	34-96
Fluoranthene	69.2	73.2	ug/Kgdrywt	EMM840	6500	6500	0*	0*	0	30	38-116
Pyrene	69.2	73.2	ug/Kgdrywt	EMM180	15000	12000	0*	0*	26	30	35-111
Benzo(a)anthracene	69.2	73.2	ug/Kgdrywt	EMM140	9200	7700	0*	0*	18	30	48-100
Chrysene	69.2	73.2	ug/Kgdrywt	EMM110	8100	6500	0*	0*	22	30	46-101
Benzo(b)Fluoranthene	69.2	73.2	ug/Kgdrywt	EMM930	7800	7000	0*	0*	12	30	53-100
Benzo(k)fluoranthene	69.2	73.2	ug/Kgdrywt	EMM290	2700	2400	0*	0*	11	30	49-96
Benzo(a)pyrene	69.2	73.2	ug/Kgdrywt	EMM520	4700	4100	0*	0*	12	30	61-101
Indeno(1,2,3-cd)pyrene	69.2	73.2	ug/Kgdrywt	EMM360	2800	2500	0*	0*	11	30	50-105
Dibenzo(a,h)anthracene	69.2	73.2	ug/Kgdrywt	EMM120	950	1100	0*	0*	16	30	55-105
Benzo(g,h,i)perylene	69.2	73.2	ug/Kgdrywt	EMM320	2500	2200	0*	0*	11	30	53-103
2-Methylnaphthalene-D10							68.5	72.8			19-94
Fluorene-D10							67.3	67.3			20-96
Pyrene-D10							120.	97.5			31-128

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MS/MSD Recovery Report

MS ID: WG164585-5
MSD ID: WG164585-6
Sample ID: SI3897-33
Client ID: WTB-SB-20-0206
Project:
SDG: OU8-1
MS File ID: N6674.D

Received Date:
Extract Date: 11-JUN-15
Extracted By: HG
Extraction Method: SW846 3550
Lab Prep Batch: WG164585
Report Date: 22-JUN-15
MSD File ID: N6675.D

Analysis Date: 17-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: SL
% Solids: 84.

Compound	MS Spike	MSD Spike	Conc Units	Samp Conc	MS Conc	MSD Conc	MS Rec (%)	MSD Rec (%)	RPD (%)	RPD Limit	Limits
Naphthalene	77.4	73.3	ug/Kgdrywt	U12	52.	41.	67.7	56.4	24	30	10-129
Acenaphthylene	77.4	73.3	ug/Kgdrywt	U12	45.	37.	57.9	50.5	19	30	25-94
Acenaphthene	77.4	73.3	ug/Kgdrywt	U12	46.	38.	58.9	51.2	19	30	33-98
Fluorene	77.4	73.3	ug/Kgdrywt	J3.9	51.	41.	61.1	51.2	21	30	40-92
Phenanthrene	77.4	73.3	ug/Kgdrywt	MM61	90.	72.	37.7*	14.9*	23	30	46-96
Anthracene	77.4	73.3	ug/Kgdrywt	J6.4	45.	38.	50.2	42.8	18	30	34-96
Fluoranthene	77.4	73.3	ug/Kgdrywt	MM48	70.	64.	28.8*	22.1*	9	30	38-116
Pyrene	77.4	73.3	ug/Kgdrywt	MM84	100	79.	20.3*	0*	23	30	35-111
Benzo(a)anthracene	77.4	73.3	ug/Kgdrywt	MM38	71.	65.	41.8*	36.4*	8	30	48-100
Chrysene	77.4	73.3	ug/Kgdrywt	MM69	99.	89.	38.0*	26.3*	11	30	46-101
Benzo(b)Fluoranthene	77.4	73.3	ug/Kgdrywt	MM58	84.	85.	33.7*	37.4*	2	30	53-100
Benzo(k)fluoranthene	77.4	73.3	ug/Kgdrywt	J12	50.	51.	49.4	53.5	2	30	49-96
Benzo(a)pyrene	77.4	73.3	ug/Kgdrywt	MM32	58.	59.	33.9*	37.2*	2	30	61-101
Indeno(1,2,3-cd)pyrene	77.4	73.3	ug/Kgdrywt	MM28	57.	52.	37.6*	33.2*	9	30	50-105
Dibenzo(a,h)anthracene	77.4	73.3	ug/Kgdrywt	JM11	59.	51.	61.4	54.8*	13	30	55-105
Benzo(g,h,i)perylene	77.4	73.3	ug/Kgdrywt	MM27	51.	46.	30.1*	25.1*	10	30	53-103
2-Methylnaphthalene-D10							57.1	48.7			19-94
Fluorene-D10							63.6	56.1			20-96
Pyrene-D10							71.8	57.8			31-128

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Form 2
System Monitoring Compound Recovery

Lab Name: Katahdin Analytical Services **Project:** Portsmouth Naval Shipyard - WE32 OU8 **Matrix:** SL
Lab Code: KAS **SDG:** OU8-1

Client Sample ID	Lab Sample ID	Col. ID	2MN	#	FLO	#	PYR	#
WTB-SS-11-0002	SI3772-1		63.5		71.0		83.5	
WTB-SB-17-0610	SI3772-10DL2		98.8	*	66.0		66.8	
WTB-SS-19-0002	SI3772-11		56.0		68.0		76.5	
WTB-SB-19-0206	SI3772-12		65.0		61.0		89.5	
WTB-SB-19-0610	SI3772-13		56.0		71.0		72.5	
WTB-SS-11-0002	SI3772-1DL		66.4		74.4		98.0	
WTB-SB-11-0206	SI3772-2		56.0		64.0		99.0	
WTB-SB-11-0206	SI3772-2DL		52.8		59.2		66.4	
WTB-SB-11-0610	SI3772-3		62.5		63.0		110.	
WTB-SB-11-0610	SI3772-3DL		69.4		71.2		109.	
WTB-SS-14-0002	SI3772-4		50.0		69.0		70.0	
WTB-SB-14-0206	SI3772-5		50.5		60.5		72.5	
WTB-SB-14-0206	SI3772-5RA		58.5		64.5		89.5	
WTB-FD01-060315	SI3772-6		49.0		63.5		69.5	
WTB-SB-14-0607	SI3772-7		64.0		74.0		83.0	
WTB-SB-14-0607	SI3772-7RA		60.0		66.0		87.5	
WTB-SS-17-0002	SI3772-8		59.5		67.5		69.0	
WTB-SS-17-0002	SI3772-8DL		64.4		71.1		87.2	
WTB-SB-17-0206	SI3772-9		53.0		65.5		68.0	
WTB-SS-22-0002	SI3897-1		69.0		75.5		97.0	
WTB-SB-23-0610	SI3897-10DL		0.00	D	0.00	D	0.00	D
WTB-SB-23-0610	SI3897-10DL2		0.00	D	0.00	D	0.00	D
WTB-SS-08-0002	SI3897-11		49.8		70.0		97.5	
WTB-FD01-060415	SI3897-12		43.8		61.5		89.0	
WTB-SB-08-0206	SI3897-13		74.0		57.5		93.0	
WTB-SB-08-0206	SI3897-13DL		77.4		71.2		85.4	
WTB-SB-08-0610	SI3897-14		65.5		57.0		102.	
WTB-SB-08-0610	SI3897-14DL		67.2		63.8		75.0	
WTB-SS-09-0002	SI3897-15		71.5		76.5		76.5	
WTB-SS-09-0002	SI3897-15DL		83.5		84.2		106.	
WTB-SB-09-0206	SI3897-16		59.0		61.5		72.5	
WTB-SB-09-0610	SI3897-17		79.5		64.0		77.5	
WTB-SB-09-0610	SI3897-17DL		0.00	D	0.00	D	0.00	D
WTB-SS-12-0002	SI3897-18DL		75.1		60.9		70.8	
WTB-SS-12-0002	SI3897-18DL2		0.00	D	0.00	D	0.00	D
WTB-SB-12-0206	SI3897-19		47.4		61.5		77.0	

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Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 2
System Monitoring Compound Recovery

Lab Name: Katahdin Analytical Services **Project:** Portsmouth Naval Shipyard - WE32 OU8 **Matrix:** SL
Lab Code: KAS **SDG:** OU8-1

Client Sample ID	Lab Sample ID	Col. ID	2MN	#	FLO	#	PYR	#
WTB-SB-12-0206	SI3897-19DL		52.1		67.3		73.2	
WTB-SS-24-0002	SI3897-2		60.0		65.5		89.5	
WTB-SB-12-0610	SI3897-20		55.0		52.0		40.0	
WTB-SB-12-0610	SI3897-20DL		0.00	D	0.00	D	0.00	D
WTB-SS-15-0002	SI3897-21		60.0		66.5		71.0	
WTB-SS-15-0002	SI3897-21DL		0.00	D	0.00	D	0.00	D
WTB-SB-15-0206	SI3897-22		53.5		66.5		70.0	
WTB-FD02-060415	SI3897-23		58.0		68.5		68.0	
WTB-SB-15-0610	SI3897-24		62.0		65.0		71.5	
WTB-SB-15-0610	SI3897-24DL		64.8		69.6		78.0	
WTB-SS-16-0002	SI3897-25		65.5		70.0		124.	
WTB-SS-16-0002	SI3897-25DL		0.00	D	0.00	D	0.00	D
WTB-SB-16-0206	SI3897-26		66.5		70.0		90.5	
WTB-SB-16-0206	SI3897-26DL		63.2		76.0		84.0	
WTB-SB-16-0610	SI3897-27		51.5		62.0		63.0	
WTB-SS-18-0002	SI3897-28		57.0		65.0		62.0	
WTB-SB-18-0206	SI3897-29		48.6		59.0		65.5	
WTB-SB-24-0206	SI3897-3		57.5		63.5		84.5	
WTB-SB-18-0610	SI3897-30		57.0		65.5		68.0	
WTB-SS-20-0002	SI3897-31		50.5		67.0		83.5	
WTB-FD03-060415	SI3897-32		45.2		58.0		69.5	
WTB-SB-20-0206	SI3897-33		50.0		61.0		85.5	
WTB-SB-20-0610	SI3897-34		49.4		64.0		79.0	
WTB-SS-21-0002	SI3897-35		57.0		70.0		86.0	
WTB-SB-21-0206	SI3897-36		69.5		65.0		89.5	
WTB-SB-21-0610	SI3897-37		58.5		62.0		63.0	
WTB-SB-21-0610	SI3897-37DL		57.3		69.6		63.6	
WTB-SS-13-0002	SI3897-39		52.5		62.5		77.5	
WTB-SB-24-069.7	SI3897-4		65.0		67.5		77.5	
WTB-SB-13-0206	SI3897-40		75.0		61.5		142.	*
WTB-SB-13-0206	SI3897-40DL		0.00	D	0.00	D	0.00	D
WTB-SB-13-0610	SI3897-41		70.0		69.5		82.0	
WTB-SS-10-0002	SI3897-42		54.0		66.0		79.5	
WTB-SB-10-0206	SI3897-43		57.0		70.5		71.5	
WTB-SB-10-0206	SI3897-43DL		71.2		73.2		82.2	
WTB-SB-10-0610	SI3897-44		69.0		74.0		92.5	

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Form 2
System Monitoring Compound Recovery

Lab Name: Katahdin Analytical Services **Project:** Portsmouth Naval Shipyard - WE32 OU8 **Matrix:** SL
Lab Code: KAS **SDG:** OU8-1

Client Sample ID	Lab Sample ID	Col. ID	2MN	#	FLO	#	PYR	#
WTB-SB-10-0610	SI3897-44DL		71.8		72.6		83.0	
WTB-SB-22-0206	SI3897-5		45.2		61.0		58.5	
WTB-SB-22-0206	SI3897-5DL		46.0		64.0		59.6	
WTB-SB-22-0610	SI3897-6		65.5		64.0		87.0	
WTB-FD02-060315	SI3897-7		48.9		54.0		53.5	
WTB-SS-23-0002	SI3897-8DL		0.00	D	0.00	D	0.00	D
WTB-SS-23-0002	SI3897-8DL2		0.00	D	0.00	D	0.00	D
WTB-SB-23-0206	SI3897-9DL		0.00	D	0.00	D	0.00	D
WTB-SB-23-0206	SI3897-9DL2		0.00	D	0.00	D	0.00	D
Method Blank Sample	WG164374-1		59.8		66.9		88.9	
Laboratory Control S	WG164374-2		61.4		63.1		83.7	
Laboratory Control S	WG164374-3		69.3		69.7		77.5	
Method Blank Sample	WG164507-1		70.1		66.4		102.	
Laboratory Control S	WG164507-2		79.8		69.3		89.8	
Matrix Spike	WG164507-3		61.3		67.7		73.8	
Matrix Spike Duplica	WG164507-4		64.2		66.1		84.1	
Method Blank Sample	WG164585-1		62.6		62.6		71.8	
Laboratory Control S	WG164585-2		69.1		66.5		75.6	
Matrix Spike	WG164585-3		68.5		67.3		120.	
Matrix Spike Duplica	WG164585-4		72.8		67.3		97.5	
Matrix Spike	WG164585-5		57.1		63.6		71.8	
Matrix Spike Duplica	WG164585-6		48.7		56.1		57.8	

		QC Limits
PYR	PYRENE-D10	31-128
FLO	FLUORENE-D10	20-96
2MN	2-METHYLNAPHTHALENE-D10	19-94

= Column to be used to flag recovery limits.
* = Values outside of contract required QC limits.
D= System Monitoring Compound diluted out.

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Form 2
System Monitoring Compound Recovery

Lab Name: Katahdin Analytical Services **Project:** Portsmouth Naval Shipyard - WE32 OU8 **Matrix:** AQ
Lab Code: KAS **SDG:** OU8-1

Client Sample ID	Lab Sample ID	Col. ID	2MN	#	FLO	#	PYR	#
WTB-RB01-060415	SI3897-38		60.2		71.8		85.1	
Method Blank Sample	WG164368-1		67.0		71.6		94.0	
Laboratory Control S	WG164368-2		73.6		72.5		88.4	

		QC Limits
2MN	2-METHYLNAPHTHALENE-D10	43-92
FLO	FLUORENE-D10	29-101
PYR	PYRENE-D10	53-166

= Column to be used to flag recovery limits.
* = Values outside of contract required QC limits.
D= System Monitoring Compound diluted out.

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Form 8
Internal Standard Area and RT Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164187-4
Lab File ID : N6392.D

SDG: OU8-1
Analytical Date: 06/05/15 11:28
Instrument ID: GCMS-N

		1,4-DICHLOROBENZENE-D4		NAPHTHALENE-D8		ACENAPHTHENE-D10	
		Area #	RT #	Area #	RT #	Area #	RT #
	Std .	48698	4.54	146447	5.91	78111	7.97
	Upper Limit	97396	5.04	292894	6.41	156222	8.47
	Lower Limit	24349	4.04	73223.5	5.41	39055.5	7.47
Client Sample ID	Lab Sample ID						
Continuing Calibrati	WG164415-2	73319	4.52	220187	5.90	116768	7.96
Method Blank Sample	WG164368-1	75212	4.53	225415	5.90	122672	7.97
Laboratory Control S	WG164368-2	72531	4.52	229379	5.90	126353	7.96
Continuing Calibrati	WG164501-2	41133	4.52	129403	5.89	68207	7.95
Method Blank Sample	WG164374-1	43320	4.52	134146	5.90	76456	7.96
Laboratory Control S	WG164374-2	44417	4.52	131438	5.89	75765	7.95
Laboratory Control S	WG164374-3	46415	4.52	137333	5.89	80753	7.95
WTB-RB01-060415	SI3897-38	40686	4.52	126102	5.90	75914	7.96
WTB-SS-10-0002	SI3897-42	40092	4.52	123616	5.90	73414	7.96
WTB-SS-19-0002	SI3772-11	40840	4.52	119338	5.90	73653	7.96
WTB-SB-19-0610	SI3772-13	40166	4.52	122056	5.90	74432	7.96
WTB-SS-14-0002	SI3772-4	43731	4.52	132410	5.90	77623	7.96
WTB-SB-14-0607	SI3772-7	39996	4.52	131192	5.89	77052	7.95
WTB-SB-17-0206	SI3772-9	37422	4.52	126315	5.89	77310	7.96
WTB-SB-10-0206	SI3897-43	39163	4.52	127683	5.89	81693	7.95
WTB-SB-14-0206	SI3772-5	40814	4.52	136734	5.90	84146	7.96
WTB-SS-11-0002	SI3772-1	43712	4.52	146238	5.89	84360	7.95
WTB-SB-11-0206	SI3772-2	50920	4.52	154328	5.89	90598	7.96
WTB-SB-11-0610	SI3772-3	56933	4.52	185593	5.89	99675	7.96
WTB-FD01-060315	SI3772-6	47840	4.52	154460	5.89	91963	7.96
Continuing Calibrati	WG164582-2	40673	4.52	129115	5.89	71008	7.95
WTB-SB-10-0206	SI3897-43DL	61116	4.52	191941	5.89	99251	7.96
WTB-SB-10-0610	SI3897-44DL	56022	4.52	166140	5.90	85268	7.96
WTB-SS-11-0002	SI3772-1DL	66119	4.52	198711	5.89	111454	7.96
WTB-SB-11-0206	SI3772-2DL	59039	4.52	179777	5.90	102844	7.96
WTB-SB-11-0610	SI3772-3DL	66617	4.52	200904	5.89	107120	7.96
WTB-SS-17-0002	SI3772-8DL	58856	4.52	179676	5.89	101474	7.96
WTB-SB-14-0607	SI3772-7RA	69504	4.52	208890	5.89	121240	7.96
WTB-SB-14-0206	SI3772-5RA	68743	4.52	204508	5.89	109992	7.96
WTB-SB-10-0610	SI3897-44	57037	4.52	173377	5.90	94906	7.96

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Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 8
Internal Standard Area and RT Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164187-4
Lab File ID : N6392.D

SDG: OU8-1
Analytical Date: 06/05/15 11:28
Instrument ID: GCMS-N

		PHENANTHRENE-D10			CHRYSENE-D12			PERYLENE-D12		
		Area	#	RT	Area	#	RT	Area	#	RT
	Std .	109179		9.76	74082		13.16	47165		15.99
	Upper Limit	218358		10.26	148164		13.66	94330		16.49
	Lower Limit	54589.5		9.26	37041		12.66	23582.5		15.49
Client Sample ID	Lab Sample ID									
Continuing Calibrati	WG164415-2	162854		9.76	103311		13.16	55522		15.98
Method Blank Sample	WG164368-1	158409		9.77	97473		13.18	44388		16.00
Laboratory Control S	WG164368-2	166723		9.76	102687		13.16	54338		15.98
Continuing Calibrati	WG164501-2	89713		9.76	51595		13.15	34254		15.97
Method Blank Sample	WG164374-1	111967		9.76	52226		13.15	27549		15.99
Laboratory Control S	WG164374-2	111380		9.75	55637		13.15	33938		15.97
Laboratory Control S	WG164374-3	114527		9.75	67531		13.15	40713		15.97
WTB-RB01-060415	SI3897-38	137791		9.76	58830		13.15	35215		15.98
WTB-SS-10-0002	SI3897-42	105844		9.75	55314		13.15	36120		15.96
WTB-SS-19-0002	SI3772-11	105068		9.75	54256		13.14	34664		15.95
WTB-SB-19-0610	SI3772-13	110855		9.75	58964		13.14	35662		15.94
WTB-SS-14-0002	SI3772-4	110864		9.75	57638		13.15	32894		15.95
WTB-SB-14-0607	SI3772-7	97232		9.75	43022		13.15	22863	*	15.95
WTB-SB-17-0206	SI3772-9	103062		9.75	46324		13.14	26074		15.95
WTB-SB-10-0206	SI3897-43	111172		9.75	49757		13.14	29915		15.95
WTB-SB-14-0206	SI3772-5	99384		9.75	43379		13.15	22956	*	15.95
WTB-SS-11-0002	SI3772-1	109240		9.75	47172		13.14	17857	*	15.96
WTB-SB-11-0206	SI3772-2	101401		9.76	31301	*	13.18	16904	*	15.99
WTB-SB-11-0610	SI3772-3	99544		9.76	22985	*	13.19	10915	*	16.00
WTB-FD01-060315	SI3772-6	116369		9.75	54398		13.15	26824		15.95
Continuing Calibrati	WG164582-2	105039		9.74	74978		13.13	43950		15.94
WTB-SB-10-0206	SI3897-43DL	118918		9.75	47971		13.14	25123		15.96
WTB-SB-10-0610	SI3897-44DL	106934		9.75	42162		13.15	18930	*	15.96
WTB-SS-11-0002	SI3772-1DL	147592		9.75	57522		13.15	24094		15.96
WTB-SB-11-0206	SI3772-2DL	125533		9.75	51656		13.15	20090	*	15.97
WTB-SB-11-0610	SI3772-3DL	117795		9.76	41279		13.17	18598	*	15.99
WTB-SS-17-0002	SI3772-8DL	125409		9.75	46730		13.15	19286	*	15.96
WTB-SB-14-0607	SI3772-7RA	139866		9.76	49280		13.16	13758	*	15.97
WTB-SB-14-0206	SI3772-5RA	139477		9.76	48992		13.15	17618	*	15.97
WTB-SB-10-0610	SI3897-44	115863		9.75	39008		13.15	16975	*	15.97

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Form 8
Internal Standard Area and RT Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164187-4
Lab File ID : N6392.D

SDG: OU8-1
Analytical Date: 06/05/15 11:28
Instrument ID: GCMS-N

Area Upper Limit = +100% of internal standard area
Area Lower Limit = - 50% of internal standard area
RT Upper Limit = + 0.50 minutes of internal standard RT
RT Lower Limit = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 8
Internal Standard Area and RT Summary

Lab Name : Katahdin Analytical Services
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Lab ID : WG164187-4
Lab File ID : N6392.D

SDG: OU8-1
Analytical Date: 06/05/15 11:28
Instrument ID: GCMS-N

		1,4-DICHLOROBENZENE-D4		NAPHTHALENE-D8		ACENAPHTHENE-D10	
		Area #	RT #	Area #	RT #	Area #	RT #
	Std .	48698	4.54	146447	5.91	78111	7.97
	Upper Limit	97396	5.04	292894	6.41	156222	8.47
	Lower Limit	24349	4.04	73223.5	5.41	39055.5	7.47
Client Sample ID	Lab Sample ID						
Continuing Calibrati	WG164692-2	63565	4.52	198803	5.89	103613	7.95
Method Blank Sample	WG164507-1	58091	4.52	179746	5.89	97108	7.96
Laboratory Control S	WG164507-2	52174	4.51	166257	5.89	88205	7.96
WTB-SB-24-0206	SI3897-3	49654	4.52	149819	5.90	82088	7.96
WTB-SS-24-0002	SI3897-2	46340	4.52	142610	5.90	74683	7.96
WTB-SB-09-0206	SI3897-16	45452	4.52	139172	5.89	77440	7.96
WTB-SS-08-0002	SI3897-11	45494	4.52	140479	5.90	75313	7.96
WTB-FD01-060415	SI3897-12	46062	4.52	132557	5.90	72461	7.96
WTB-SB-08-0206	SI3897-13	78543	4.52	242070	5.89	113678	7.96
WTB-SB-12-0206	SI3897-19	52381	4.52	164094	5.90	95566	7.96
WTB-SS-22-0002	SI3897-1	51564	4.52	163326	5.90	89032	7.96
WTB-SB-08-0610	SI3897-14	72263	4.52	234341	5.89	125222	7.95
WTB-SB-24-069.7	SI3897-4	60342	4.52	196519	5.89	112856	7.95
Matrix Spike	WG164507-3	58859	4.52	189772	5.89	109566	7.95
Matrix Spike Duplica	WG164507-4	59006	4.52	191107	5.89	109797	7.95
WTB-SB-19-0206	SI3772-12	69014	4.52	218798	5.90	123279	7.96
Continuing Calibrati	WG164825-2	55671	4.53	181026	5.90	93513	7.95
WTB-SB-22-0206	SI3897-5DL	49039	4.52	141325	5.93	80613	7.96
WTB-SB-23-0206	SI3897-9DL2	48406	4.67	128803	5.98	82416	7.97
WTB-SB-08-0206	SI3897-13DL	58552	4.50	178536	5.88	90401	7.94
WTB-SB-08-0610	SI3897-14DL	54461	4.51	161689	5.89	83444	7.94
WTB-SB-12-0610	SI3897-20DL	49846	4.52	157293	5.93	86456	7.96
WTB-SB-09-0610	SI3897-17DL	56771	4.51	170964	5.89	91243	7.94
WTB-SS-23-0002	SI3897-8DL	45919	4.52	154405	5.93	86367	7.95
WTB-SB-23-0206	SI3897-9DL	61649	4.51	177630	5.90	93851	7.94
WTB-SS-09-0002	SI3897-15DL	51120	4.51	132701	5.91	76243	7.96
WTB-FD02-060315	SI3897-7	53859	4.50	160828	5.89	84033	7.95
WTB-SB-12-0610	SI3897-20	43899	4.50	118584	5.88	56310	7.94
WTB-SB-09-0610	SI3897-17	71177	4.50	208534	5.87	95254	7.94
WTB-SB-22-0610	SI3897-6	89200	4.50	270800	5.88	138043	7.94

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Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 8
Internal Standard Area and RT Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164187-4
Lab File ID : N6392.D

SDG: OU8-1
Analytical Date: 06/05/15 11:28
Instrument ID: GCMS-N

		PHENANTHRENE-D10			CHRYSENE-D12			PERYLENE-D12		
		Area	#	RT #	Area	#	RT #	Area	#	RT #
	Std .	109179		9.76	74082		13.16	47165		15.99
	Upper Limit	218358		10.26	148164		13.66	94330		16.49
	Lower Limit	54589.5		9.26	37041		12.66	23582.5		15.49
Client Sample ID	Lab Sample ID									
Continuing Calibrati	WG164692-2	142858		9.76	77838		13.16	35355		15.98
Method Blank Sample	WG164507-1	133887		9.77	53772		13.17	24010		15.99
Laboratory Control S	WG164507-2	124605		9.76	68027		13.16	34357		15.98
WTB-SB-24-0206	SI3897-3	107168		9.76	59495		13.17	25322		15.99
WTB-SS-24-0002	SI3897-2	122572		9.76	55920		13.16	26087		15.99
WTB-SB-09-0206	SI3897-16	115229		9.75	56076		13.15	29040		15.97
WTB-SS-08-0002	SI3897-11	111367		9.76	40648		13.15	25205		15.97
WTB-FD01-060415	SI3897-12	103847		9.75	38273		13.15	21877	*	15.97
WTB-SB-08-0206	SI3897-13	100031		9.76	17716	*	13.21	8323	*	16.01
WTB-SB-12-0206	SI3897-19	133179		9.75	51372		13.15	24836		15.97
WTB-SS-22-0002	SI3897-1	112792		9.76	42666		13.15	20589	*	15.97
WTB-SB-08-0610	SI3897-14	121324		9.76	27984	*	13.19	13415	*	15.99
WTB-SB-24-069.7	SI3897-4	125037		9.75	47423		13.16	21475	*	15.97
Matrix Spike	WG164507-3	122670		9.75	53190		13.16	32368		15.97
Matrix Spike Duplica	WG164507-4	116904		9.75	42029		13.15	24426		15.97
WTB-SB-19-0206	SI3772-12	135882		9.76	37860		13.17	14104	*	16.00
Continuing Calibrati	WG164825-2	137357		9.77	80561		13.15	40075		15.98
WTB-SB-22-0206	SI3897-5DL	115971		9.75	78891		13.13	49747		15.94
WTB-SB-23-0206	SI3897-9DL2	121506		9.75	84833		13.13	50615		15.95
WTB-SB-08-0206	SI3897-13DL	108800		9.74	40838		13.17	26474		15.97
WTB-SB-08-0610	SI3897-14DL	94605		9.74	47332		13.14	35754		15.95
WTB-SB-12-0610	SI3897-20DL	131932		9.74	73336		13.13	46632		15.94
WTB-SB-09-0610	SI3897-17DL	115688		9.73	49314		13.13	29200		15.95
WTB-SS-23-0002	SI3897-8DL	131173		9.74	54353		13.13	29642		15.93
WTB-SB-23-0206	SI3897-9DL	125878		9.73	50835		13.13	30651		15.93
WTB-SS-09-0002	SI3897-15DL	105735		9.75	47077		13.13	24639		15.94
WTB-FD02-060315	SI3897-7	116218		9.74	56089		13.13	27663		15.94
WTB-SB-12-0610	SI3897-20	65744		9.73	47441		13.13	34529		15.94
WTB-SB-09-0610	SI3897-17	80541		9.76	23705	*	13.20	20712	*	16.05
WTB-SB-22-0610	SI3897-6	154120		9.74	46626		13.15	20331	*	15.97

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Form 8
Internal Standard Area and RT Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164187-4
Lab File ID : N6392.D

SDG: OU8-1
Analytical Date: 06/05/15 11:28
Instrument ID: GCMS-N

Area Upper Limit = +100% of internal standard area
Area Lower Limit = - 50% of internal standard area
RT Upper Limit = + 0.50 minutes of internal standard RT
RT Lower Limit = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

Katahdin
ANALYTICAL SERVICES

Cert No E87604

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Internal Standard Area and RT Summary

Lab Name : Katahdin Analytical Services
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Lab File ID : N6392.D

SDG: OU8-1
Analytical Date: 06/05/15 11:28
Instrument ID: GCMS-N

		1,4-DICHLOROBENZENE-D4		NAPHTHALENE-D8		ACENAPHTHENE-D10	
		Area #	RT #	Area #	RT #	Area #	RT #
	Std .	48698	4.54	146447	5.91	78111	7.97
	Upper Limit	97396	5.04	292894	6.41	156222	8.47
	Lower Limit	24349	4.04	73223.5	5.41	39055.5	7.47
Client Sample ID	Lab Sample ID						
Continuing Calibrati	WG164883-2	49544	4.47	150743	5.85	80287	7.92
Method Blank Sample	WG164585-1	37498	4.47	111226	5.86	54617	7.93
Laboratory Control S	WG164585-2	49463	4.47	142384	5.85	79024	7.92
WTB-SS-12-0002	SI3897-18DL2	49366	4.48	153467	5.86	80754	7.93
WTB-SB-15-0206	SI3897-22	46793	4.47	137733	5.85	75425	7.92
WTB-FD02-060415	SI3897-23	51131	4.47	152182	5.85	80725	7.92
WTB-SB-16-0610	SI3897-27	46062	4.47	139573	5.85	77223	7.92
WTB-SS-18-0002	SI3897-28	53890	4.47	161554	5.85	90308	7.92
WTB-SB-18-0206	SI3897-29	45702	4.47	143104	5.85	79523	7.92
WTB-SB-18-0610	SI3897-30	48134	4.47	140612	5.86	74469	7.92
WTB-SB-22-0206	SI3897-5	51368	4.47	162976	5.85	91293	7.92
WTB-SB-15-0610	SI3897-24	51062	4.47	162908	5.85	89581	7.92
WTB-SS-15-0002	SI3897-21	47604	4.47	155196	5.85	88436	7.92
WTB-SS-09-0002	SI3897-15	43077	4.47	138976	5.85	75381	7.92
WTB-SB-16-0206	SI3897-26	45228	4.47	153009	5.85	85374	7.92
WTB-SS-12-0002	SI3897-18DL	54472	4.47	166043	5.86	79258	7.93
Continuing Calibrati	WG164949-2	49407	4.45	161129	5.82	84757	7.89
WTB-SB-17-0610	SI3772-10DL2	60206	4.44	183535	5.82	81126	7.89
WTB-SS-23-0002	SI3897-8DL2	46107	4.45	141953	5.83	79727	7.89
WTB-SS-15-0002	SI3897-21DL	46747	4.45	140915	5.82	82863	7.89
WTB-SB-15-0610	SI3897-24DL	47210	4.45	157772	5.82	88546	7.89
WTB-SB-16-0206	SI3897-26DL	47550	4.45	154175	5.82	85498	7.89
WTB-SS-20-0002	SI3897-31	49069	4.45	157063	5.82	86641	7.89
WTB-FD03-060415	SI3897-32	48871	4.45	158627	5.82	90804	7.89
WTB-SB-20-0206	SI3897-33	46223	4.45	149712	5.82	86566	7.89
Matrix Spike	WG164585-5	42597	4.45	130171	5.82	78280	7.89
Matrix Spike Duplica	WG164585-6	44780	4.44	143744	5.82	81235	7.89
WTB-SB-20-0610	SI3897-34	46868	4.45	152027	5.82	87047	7.89
WTB-SS-21-0002	SI3897-35	42739	4.45	141815	5.82	81365	7.89
WTB-SB-21-0206	SI3897-36	57337	4.45	180793	5.82	86476	7.89
WTB-SB-21-0610	SI3897-37	51705	4.45	164155	5.82	89712	7.89
WTB-SS-13-0002	SI3897-39	44635	4.45	145216	5.82	82245	7.89
WTB-SS-16-0002	SI3897-25	56242	4.45	184506	5.82	103605	7.89
Matrix Spike	WG164585-3	60025	4.44	193947	5.82	101539	7.89
Matrix Spike Duplica	WG164585-4	50848	4.45	166020	5.82	88710	7.89
WTB-SB-13-0206	SI3897-40	60131	4.45	182368	5.82	85920	7.89

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Katahdin
ANALYTICAL SERVICES

Cert No E87604

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Internal Standard Area and RT Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164187-4
Lab File ID : N6392.D

SDG: OU8-1
Analytical Date: 06/05/15 11:28
Instrument ID: GCMS-N

		PHENANTHRENE-D10		CHRYSENE-D12		PERYLENE-D12	
		Area #	RT #	Area #	RT #	Area #	RT #
	Std .	109179	9.76	74082	13.16	47165	15.99
	Upper Limit	218358	10.26	148164	13.66	94330	16.49
	Lower Limit	54589.5	9.26	37041	12.66	23582.5	15.49
Client Sample ID	Lab Sample ID						
Continuing Calibrati	WG164883-2	119536	9.71	73200	13.09	46131	15.87
Method Blank Sample	WG164585-1	67510	9.71	43276	13.09	27802	15.88
Laboratory Control S	WG164585-2	117631	9.71	79225	13.09	50699	15.88
WTB-SS-12-0002	SI3897-18DL2	126831	9.71	71686	13.08	47142	15.87
WTB-SB-15-0206	SI3897-22	101676	9.70	53985	13.07	44852	15.87
WTB-FD02-060415	SI3897-23	111090	9.71	58487	13.07	44071	15.87
WTB-SB-16-0610	SI3897-27	96779	9.70	45243	13.09	34444	15.87
WTB-SS-18-0002	SI3897-28	134962	9.70	80927	13.09	54158	15.87
WTB-SB-18-0206	SI3897-29	112932	9.70	49981	13.07	37550	15.87
WTB-SB-18-0610	SI3897-30	92098	9.71	43638	13.09	34578	15.87
WTB-SB-22-0206	SI3897-5	133984	9.70	69827	13.09	48002	15.88
WTB-SB-15-0610	SI3897-24	108685	9.71	46247	13.09	20798 *	15.88
WTB-SS-15-0002	SI3897-21	101316	9.71	43263	13.11	24830	15.89
WTB-SS-09-0002	SI3897-15	86889	9.71	41100	13.08	21626 *	15.88
WTB-SB-16-0206	SI3897-26	102392	9.71	39910	13.10	23636	15.90
WTB-SS-12-0002	SI3897-18DL	76068	9.71	25457 *	13.11	12877 *	15.91
Continuing Calibrati	WG164949-2	118709	9.67	52292	13.03	25226	15.80
WTB-SB-17-0610	SI3772-10DL2	83691	9.68	36123 *	13.07	7255 *	15.85
WTB-SS-23-0002	SI3897-8DL2	124826	9.67	52109	13.03	30614	15.80
WTB-SS-15-0002	SI3897-21DL	129233	9.67	57369	13.03	31415	15.80
WTB-SB-15-0610	SI3897-24DL	110897	9.67	38468	13.03	20722 *	15.80
WTB-SB-16-0206	SI3897-26DL	121037	9.67	44908	13.03	25385	15.79
WTB-SS-20-0002	SI3897-31	115831	9.67	39434	13.03	22970 *	15.80
WTB-FD03-060415	SI3897-32	129971	9.67	46614	13.03	26603	15.79
WTB-SB-20-0206	SI3897-33	125343	9.67	38467	13.03	23863	15.80
Matrix Spike	WG164585-5	118296	9.67	46260	13.03	26784	15.80
Matrix Spike Duplica	WG164585-6	125292	9.67	58692	13.03	33793	15.79
WTB-SB-20-0610	SI3897-34	121599	9.67	41405	13.03	25339	15.80
WTB-SS-21-0002	SI3897-35	118538	9.67	49080	13.03	30607	15.79
WTB-SB-21-0206	SI3897-36	80242	9.68	34398 *	13.08	15637 *	15.85
WTB-SB-21-0610	SI3897-37	103315	9.68	51577	13.06	24901	15.84
WTB-SS-13-0002	SI3897-39	113426	9.67	47176	13.03	29842	15.81
WTB-SS-16-0002	SI3897-25	104391	9.69	25955 *	13.09	20206 *	15.84
Matrix Spike	WG164585-3	113112	9.68	26641 *	13.07	16070 *	15.84
Matrix Spike Duplica	WG164585-4	96183	9.68	29282 *	13.07	17395 *	15.83
WTB-SB-13-0206	SI3897-40	70179	9.69	10754 *	13.06	6596 *	15.84

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Form 8
Internal Standard Area and RT Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164187-4
Lab File ID : N6392.D

SDG: OU8-1
Analytical Date: 06/05/15 11:28
Instrument ID: GCMS-N

Area Upper Limit = +100% of internal standard area
Area Lower Limit = - 50% of internal standard area
RT Upper Limit = + 0.50 minutes of internal standard RT
RT Lower Limit = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 8
Internal Standard Area and RT Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164187-4
Lab File ID : N6392.D

SDG: OU8-1
Analytical Date: 06/05/15 11:28
Instrument ID: GCMS-N

		1,4-DICHLOROBENZENE-D4				NAPHTHALENE-D8				ACENAPHTHENE-D10			
		Area	#	RT	#	Area	#	RT	#	Area	#	RT	#
	Std .	48698		4.54		146447		5.91		78111		7.97	
	Upper Limit	97396		5.04		292894		6.41		156222		8.47	
	Lower Limit	24349		4.04		73223.5		5.41		39055.5		7.47	
Client Sample ID	Lab Sample ID												
Continuing Calibrati	WG165004-2	34215		4.43		108835		5.81		54633		7.87	
WTB-SS-16-0002	SI3897-25DL	39092		4.46		116832		5.85		61832		7.88	
WTB-SB-21-0610	SI3897-37DL	35250		4.43		106700		5.82		59698		7.88	
WTB-SB-13-0206	SI3897-40DL	35734		4.46		106295		5.85		58385		7.88	
WTB-SB-13-0610	SI3897-41	52230		4.43		156025		5.81		81720		7.87	
Continuing Calibrati	WG165089-2	40717		4.42		111057		5.80		55652		7.86	
WTB-SB-23-0610	SI3897-10DL	36038		4.43		107508		5.82		59420		7.86	
WTB-SS-17-0002	SI3772-8	41319		4.42		123230		5.80		66237		7.86	
WTB-SB-23-0610	SI3897-10DL2	33093		4.45		103468		5.82		57607		7.86	

Area Upper Limit = +100% of internal standard area
Area Lower Limit = - 50% of internal standard area
RT Upper Limit = + 0.50 minutes of internal standard RT
RT Lower Limit = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

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Cert No E87604

Form 8
Internal Standard Area and RT Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164187-4
Lab File ID : N6392.D

SDG: OU8-1
Analytical Date: 06/05/15 11:28
Instrument ID: GCMS-N

		PHENANTHRENE-D10			CHRYSENE-D12			PERYLENE-D12		
		Area	#	RT	Area	#	RT	Area	#	RT
	Std .	109179		9.76	74082		13.16	47165		15.99
	Upper Limit	218358		10.26	148164		13.66	94330		16.49
	Lower Limit	54589.5		9.26	37041		12.66	23582.5		15.49
Client Sample ID	Lab Sample ID									
Continuing Calibrati	WG165004-2	77596		9.67	38665		13.03	26771		15.81
WTB-SS-16-0002	SI3897-25DL	95831		9.66	60266		13.02	45420		15.78
WTB-SB-21-0610	SI3897-37DL	86034		9.66	46366		13.02	32640		15.78
WTB-SB-13-0206	SI3897-40DL	94385		9.66	57548		13.02	39521		15.78
WTB-SB-13-0610	SI3897-41	89761		9.66	27493	*	13.03	11241	*	15.81
Continuing Calibrati	WG165089-2	81146		9.65	58204		13.01	32491		15.77
WTB-SB-23-0610	SI3897-10DL	97879		9.64	46935		13.00	28320		15.75
WTB-SS-17-0002	SI3772-8	88107		9.64	37350		13.00	20077	*	15.76
WTB-SB-23-0610	SI3897-10DL2	105123		9.65	67284		13.00	45958		15.76

Area Upper Limit = +100% of internal standard area
Area Lower Limit = - 50% of internal standard area
RT Upper Limit = + 0.50 minutes of internal standard RT
RT Lower Limit = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

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Cert No E87604

Form 8
Internal Standard Area and RT Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG165324-4
Lab File ID : N6778.D

SDG: OU8-1
Analytical Date: 06/23/15 13:03
Instrument ID: GCMS-N

		1,4-DICHLOROBENZENE-D4				NAPHTHALENE-D8				ACENAPHTHENE-D10			
		Area	#	RT	#	Area	#	RT	#	Area	#	RT	#
	Std .	88250		4.40		265068		5.77		116126		7.83	
	Upper Limit	176500		4.90		530136		6.27		232252		8.33	
	Lower Limit	44125		3.90		132534		5.27		58063		7.33	
Client Sample ID	Lab Sample ID												
Continuing Calibrati	WG165435-2	47758		4.36		164160		5.72		67620		7.79	
WTB-SB-12-0206	SI3897-19DL	47870		4.36		155132		5.76		71774		7.80	

Area Upper Limit = +100% of internal standard area
Area Lower Limit = - 50% of internal standard area
RT Upper Limit = + 0.50 minutes of internal standard RT
RT Lower Limit = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

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Form 8
Internal Standard Area and RT Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG165324-4
Lab File ID : N6778.D

SDG: OU8-1
Analytical Date: 06/23/15 13:03
Instrument ID: GCMS-N

		PHENANTHRENE-D10				CHRYSENE-D12				PERYLENE-D12			
		Area	#	RT	#	Area	#	RT	#	Area	#	RT	#
	Std .	156981		9.62		75747		12.97		36246		15.72	
	Upper Limit	313962		10.12		151494		13.47		72492		16.22	
	Lower Limit	78490.5		9.12		37873.5		12.47		18123		15.22	
Client Sample ID	Lab Sample ID												
Continuing Calibrati	WG165435-2	97361		9.58		57197		12.91		32761		15.64	
WTB-SB-12-0206	SI3897-19DL	112906		9.57		46551		12.90		27422		15.62	

Area Upper Limit = +100% of internal standard area
Area Lower Limit = - 50% of internal standard area
RT Upper Limit = + 0.50 minutes of internal standard RT
RT Lower Limit = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

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FORM 8
DRO ANALYTICAL SEQUENCE

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

GC Column: RTX-5 ID: 0.53 (mm)Init. Calib. Date(s): 05/06/15 05/06/15

Instrument ID: GC12

THE ANALYTICAL SEQUENCE OF PERFORMANCE EVALUATION MIXTURES, BLANKS, SAMPLES, AND STANDARDS IS GIVEN BELOW:

MEAN SURROGATE RT FROM INITIAL CALIBRATION
S1 : 8.98 S2 : 10.36

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S1 RT #	S2 RT #
01		WG162358-5	05/06/15	1743	8.99	10.37
02		WG162358-4	05/06/15	1829	8.98	10.36
03		WG162358-3	05/06/15	1914	8.97	10.35
04		WG162358-2	05/06/15	1959	8.97	10.35
05		WG162358-1	05/06/15	2044	8.98	10.36
06		WG162358-6	05/06/15	2129		
07	CCV	WG164234-1	06/08/15	1311	8.98	10.36
08	WG164213-BLANK	WG164213-1	06/08/15	1828	8.93	10.30
09	WG164213-LCS	WG164213-2	06/08/15	1914	8.93	10.31
10	WG164213-LCSD	WG164213-3	06/08/15	1959	8.93	10.31
11	WTB-SS-11-0002	SI3772-1	06/09/15	0201	8.95	10.32
12	WTB-SB-11-0206	SI3772-2	06/09/15	0247	8.95	10.32
13	WTB-SB-11-0610	SI3772-3	06/09/15	0332	8.95	10.33
14	CCV	WG164234-2	06/09/15	0633	8.95	10.33
15	WTB-SB-14-0607	SI3772-7	06/09/15	0934	8.93	10.31
16	WTB-SS-17-0002	SI3772-8	06/09/15	1019	8.93	10.31
17	WTB-SB-17-0206	SI3772-9	06/09/15	1105	8.93	10.31
18	WTB-SB-14-0206	SI3772-5	06/09/15	1508	8.93	10.31
19	WTB-FD01-060315	SI3772-6	06/09/15	1554	8.92	10.30
20	WG164370-LCS	WG164370-2	06/09/15	1645	8.93	10.31

QC LIMITS
S1 = 2-Fluorobiphenyl (+/- 0.15 MINUTES)
S2 = 2-Bromonaphthalene (+/- 0.15 MINUTES)

Column used to flag retention time values with an asterisk.
* Values outside of QC limits.

Katahdin Analytical Services 2000019

FORM 8
DRO ANALYTICAL SEQUENCE

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

GC Column: RTX-5 ID: 0.53 (mm)Init. Calib. Date(s): 05/06/15 05/06/15

Instrument ID: GC12

THE ANALYTICAL SEQUENCE OF PERFORMANCE EVALUATION MIXTURES, BLANKS, SAMPLES, AND STANDARDS IS GIVEN BELOW:

MEAN SURROGATE RT FROM INITIAL CALIBRATION
S3 : 15.22

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S3 RT #	RT #
01		WG162358-5	05/06/15	1743	15.23	
02		WG162358-4	05/06/15	1829	15.22	
03		WG162358-3	05/06/15	1914	15.21	
04		WG162358-2	05/06/15	1959	15.21	
05		WG162358-1	05/06/15	2044	15.22	
06		WG162358-6	05/06/15	2129		
07		WG164234-1	06/08/15	1311	15.22	
08	WG164213-BLANK	WG164213-1	06/08/15	1828	15.16	
09	WG164213-LCS	WG164213-2	06/08/15	1914	15.17	
10	WG164213-LCSD	WG164213-3	06/08/15	1959	15.17	
11	WTB-SS-11-0002	SI3772-1	06/09/15	0201	15.18	
12	WTB-SB-11-0206	SI3772-2	06/09/15	0247	15.19	
13	WTB-SB-11-0610	SI3772-3	06/09/15	0332	15.19	
14		WG164234-2	06/09/15	0633	15.19	
15	WTB-SB-14-0607	SI3772-7	06/09/15	0934	15.16	
16	WTB-SS-17-0002	SI3772-8	06/09/15	1019	15.17	
17	WTB-SB-17-0206	SI3772-9	06/09/15	1105	15.16	
18	WTB-SB-14-0206	SI3772-5	06/09/15	1508	15.16	
19	WTB-FD01-060315	SI3772-6	06/09/15	1554	15.15	
20	WG164370-LCS	WG164370-2	06/09/15	1645	15.17	

QC LIMITS
S3 = O-Terphenyl (+/- 0.15 MINUTES)

Column used to flag retention time values with an asterisk.
* Values outside of QC limits.

Katahdin Analytical Services 2000024

Form 6
Initial Calibration Summary

Lab Name : Katahdin Analytical Services **SDG:** OU8-1
Project : Portsmouth Naval Shipyard - WE32 OU8 **Instrument ID:** GC12
Lab File IDs : CIE1031.d CIE1030.d CIE1029.d CIE1028.d CIE1027.d **Calibration Date(s):** 06-MAY-15 17:43 06-MAY-15 20:44

	1.0000 Level 1	10.0000 Level 2	50.0000 Level 3	100.0000 Level 4	200.0000 Level 5		New Crv	b	m1	m2	%RSD	Max %RSD	
Unadjusted C11-C22 Aromatic	8292	9422	7924	7053	8230		AVG		8184		10.3928	25.00000	M (
Naphthalene	8320	9472	7972	7079	8255		AVG		8220		10.4358	25.00000	O
2-Methylnaphthalene	8432	9401	7914	7027	8193		AVG		8193		10.4879	25.00000	O
Acenaphthylene	8247	9367	7875	6989	8143		AVG		8124		10.4971	25.00000	O
Acenaphthene	8967	9596	8062	7150	8331		AVG		8421		10.9980	25.00000	O
Fluorene	8553	9539	7951	7058	8220		AVG		8264		10.9278	25.00000	O
Phenanthrene	7825	9510	7995	7099	8281		AVG		8142		10.8130	25.00000	O
Anthracene	7275	8298	6977	6201	7221		AVG		7194		10.4491	25.00000	O
Fluoranthene	8335	9529	7972	7082	8266		AVG		8237		10.6613	25.00000	O
Pyrene	8508	9725	8152	7243	8452		AVG		8416		10.5753	25.00000	O
Benzo(a)Anthracene	8032	9261	7791	6932	8107		AVG		8024		10.3965	25.00000	O
Chrysene	8287	9363	7871	7004	8151		AVG		8135		10.4301	25.00000	O
Benzo(b)Fluoranthene	8731	9738	8664	7875	9455		AVG		8893		8.23668	25.00000	O
Benzo(k)Fluoranthene	8729	9723	7703	6718	7573		AVG		8089		14.3303	25.00000	O
Benzo(a)Pyrene	8105	9290	7825	6983	8153		AVG		8071		10.2491	25.00000	O
Indeno(1,2,3-cd)Pyrene	8287	9719	8783	7992	9688		AVG		8894		8.89931	25.00000	O
Dibenzo(a,h)Anthracene	8201	9286	7299	6394	7147		AVG		7666		14.4850	25.00000	O
Benzo(g,h,i)Perylene	8125	9365	7908	7076	8280		AVG		8151		10.0906	25.00000	O
2-Fluorobiphenyl	7203	8339	6920	6151	7195		AVG		7161		10.9714	25.00000	
2-Bromonaphthalene	5298	5868	4940	4387	5124		AVG		5123		10.5086	25.00000	
O-Terphenyl	7983	9503	7938	7053	8224		AVG		8140		10.8372	25.00000	

Legend: O = Kept Original Curve
Y = Failed Minimum RF
W = Failed %RSD Value

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164234-1
Lab File ID : CIF1066.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-1
Analytical Date: 06/08/15 13:11
Instrument ID: GC12
Column ID: A

	Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
2	Naphthalene	8220	7949	0.010	-3.28850	25.00000	Averaged
3	2-Methylnaphthalene	8193	7893	0.010	-3.66552	25.00000	Averaged
5	Acenaphthylene	8124	7866	0.010	-3.17516	25.00000	Averaged
7	Acenaphthene	8421	8041	0.010	-4.51595	25.00000	Averaged
8	Fluorene	8264	7918	0.010	-4.19051	25.00000	Averaged
9	Phenanthrene	8142	7989	0.010	-1.87686	25.00000	Averaged
10	Anthracene	7194	6917	0.010	-3.85665	25.00000	Averaged
12	Fluoranthene	8237	7961	0.010	-3.35085	25.00000	Averaged
13	Pyrene	8416	8144	0.010	-3.22465	25.00000	Averaged
16	Benzo(a)Anthracene	8024	7781	0.010	-3.02808	25.00000	Averaged
17	Chrysene	8135	7880	0.010	-3.13618	25.00000	Averaged
18	Benzo(b)Fluoranthene	8893	8073	0.010	-9.22108	25.00000	Averaged
19	Benzo(k)Fluoranthene	8089	8354	0.010	3.27669	25.00000	Averaged
20	Benzo(a)Pyrene	8071	7810	0.010	-3.24269	25.00000	Averaged
21	Indeno(1,2,3-cd)Pyrene	8894	8574	0.010	-3.59247	25.00000	Averaged
22	Dibenzo(a,h)Anthracene	7666	7524	0.010	-1.84283	25.00000	Averaged
23	Benzo(g,h,i)Perylene	8151	7963	0.010	-2.30491	25.00000	Averaged
4	2-Fluorobiphenyl	7161	6915	0.010	-3.44124	25.00000	Averaged
6	2-Bromonaphthalene	5123	4924	0.010	-3.88245	25.00000	Averaged
11	O-Terphenyl	8140	7935	0.010	-2.52271	25.00000	Averaged

*** = Compound out of QC criteria**

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Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164234-2
Lab File ID : CIF1089.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-1
Analytical Date: 06/09/15 06:33
Instrument ID: GC12
Column ID: A

Compound	$\overline{RRF}$/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
2 Naphthalene	8220	8760	0.010	6.57219	25.00000	Averaged
3 2-Methylnaphthalene	8193	8706	0.010	6.25424	25.00000	Averaged
5 Acenaphthylene	8124	8644	0.010	6.39443	25.00000	Averaged
7 Acenaphthene	8421	8880	0.010	5.44310	25.00000	Averaged
8 Fluorene	8264	8757	0.010	5.96773	25.00000	Averaged
9 Phenanthrene	8142	8827	0.010	8.41075	25.00000	Averaged
10 Anthracene	7194	7555	0.010	5.01674	25.00000	Averaged
12 Fluoranthene	8237	8799	0.010	6.83168	25.00000	Averaged
13 Pyrene	8416	9007	0.010	7.02246	25.00000	Averaged
16 Benzo(a)Anthracene	8024	8605	0.010	7.23217	25.00000	Averaged
17 Chrysene	8135	8754	0.010	7.60125	25.00000	Averaged
18 Benzo(b)Fluoranthene	8893	9432	0.010	6.07127	25.00000	Averaged
19 Benzo(k)Fluoranthene	8089	8826	0.010	9.11026	25.00000	Averaged
20 Benzo(a)Pyrene	8071	8703	0.010	7.82279	25.00000	Averaged
21 Indeno(1,2,3-cd)Pyrene	8894	9932	0.010	11.67070	25.00000	Averaged
22 Dibenzo(a,h)Anthracene	7666	8221	0.010	7.25026	25.00000	Averaged
23 Benzo(g,h,i)Perylene	8151	8989	0.010	10.28649	25.00000	Averaged
4 2-Fluorobiphenyl	7161	7633	0.010	6.58328	25.00000	Averaged
6 2-Bromonaphthalene	5123	5440	0.010	6.17355	25.00000	Averaged
11 O-Terphenyl	8140	8774	0.010	7.79308	25.00000	Averaged

*** = Compound out of QC criteria**

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FORM 8
DRO ANALYTICAL SEQUENCE

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

GC Column: RTX-5 ID: 0.53 (mm)Init. Calib. Date(s): 05/06/15 05/06/15

Instrument ID: GC12

THE ANALYTICAL SEQUENCE OF PERFORMANCE EVALUATION MIXTURES, BLANKS, SAMPLES, AND STANDARDS IS GIVEN BELOW:

MEAN SURROGATE RT FROM INITIAL CALIBRATION
S1 : 8.98 S2 : 10.36

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S1 RT #	S2 RT #
01	WG164370-LCSD	WG164370-3	06/09/15	1730	8.92	10.30
02	WG164370-BLANK	WG164370-1	06/09/15	1816	8.92	10.30
03	WTB-SB-20-0206MS	WG164370-6	06/09/15	1901	8.93	10.31
04	WTB-SB-20-0206MSD	WG164370-7	06/09/15	1946	8.93	10.31
05	WTB-SB-17-0610	SI3772-10DL	06/09/15	2248	8.95	10.32
06	CCV	WG164234-3	06/10/15	0149	8.95	10.32
07	WTB-SB-15-0206	SI3897-22	06/10/15	0319	8.95	10.33
08	WTB-FD02-060415	SI3897-23	06/10/15	0405	8.95	10.33
09	WTB-SS-18-0002	SI3897-28	06/10/15	0450	8.95	10.33
10	WTB-SB-18-0206	SI3897-29	06/10/15	0535	8.95	10.33
11	WTB-SB-18-0610	SI3897-30	06/10/15	0621	8.95	10.33
12	WTB-SS-20-0002	SI3897-31	06/10/15	0706	8.94	10.32
13	WTB-FD03-060415	SI3897-32	06/10/15	0751	8.94	10.31
14	WTB-SB-20-0206	SI3897-33	06/10/15	0836	8.94	10.31
15	WTB-SB-20-0610	SI3897-34	06/10/15	0922	8.93	10.31
16	WTB-SS-21-0002	SI3897-35	06/10/15	1007	8.93	10.31
17	WTB-SB-21-0206	SI3897-36	06/10/15	1052	8.93	10.31
18	WTB-SB-21-0610	SI3897-37	06/10/15	1138	8.93	10.31
19	WTB-SB-19-0610	SI3772-13	06/10/15	1354	8.93	10.31
20	WTB-SB-15-0610	SI3897-24	06/10/15	1439	8.93	10.31

QC LIMITS
S1 = 2-Fluorobiphenyl (+/- 0.15 MINUTES)
S2 = 2-Bromonaphthalene (+/- 0.15 MINUTES)

Column used to flag retention time values with an asterisk.
* Values outside of QC limits.

Katahdin Analytical Services 2000020

FORM 8
DRO ANALYTICAL SEQUENCE

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

GC Column: RTX-5 ID: 0.53 (mm)Init. Calib. Date(s): 05/06/15 05/06/15

Instrument ID: GC12

THE ANALYTICAL SEQUENCE OF PERFORMANCE EVALUATION MIXTURES, BLANKS, SAMPLES, AND STANDARDS IS GIVEN BELOW:

MEAN SURROGATE RT FROM INITIAL CALIBRATION
S3 : 15.22

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S3 RT #	RT #
01	WG164370-LCSD	WG164370-3	06/09/15	1730	15.16	
02	WG164370-BLANK	WG164370-1	06/09/15	1816	15.16	
03	WTB-SB-20-0206MS	WG164370-6	06/09/15	1901	15.17	
04	WTB-SB-20-0206MSD	WG164370-7	06/09/15	1946	15.17	
05	WTB-SB-17-0610	SI3772-10DL	06/09/15	2248	15.17	
06		WG164234-3	06/10/15	0149	15.18	
07	WTB-SB-15-0206	SI3897-22	06/10/15	0319	15.18	
08	WTB-FD02-060415	SI3897-23	06/10/15	0405	15.18	
09	WTB-SS-18-0002	SI3897-28	06/10/15	0450	15.18	
10	WTB-SB-18-0206	SI3897-29	06/10/15	0535	15.18	
11	WTB-SB-18-0610	SI3897-30	06/10/15	0621	15.19	
12	WTB-SS-20-0002	SI3897-31	06/10/15	0706	15.17	
13	WTB-FD03-060415	SI3897-32	06/10/15	0751	15.17	
14	WTB-SB-20-0206	SI3897-33	06/10/15	0836	15.17	
15	WTB-SB-20-0610	SI3897-34	06/10/15	0922	15.17	
16	WTB-SS-21-0002	SI3897-35	06/10/15	1007	15.16	
17	WTB-SB-21-0206	SI3897-36	06/10/15	1052	15.17	
18	WTB-SB-21-0610	SI3897-37	06/10/15	1138	15.17	
19	WTB-SB-19-0610	SI3772-13	06/10/15	1354	15.17	
20	WTB-SB-15-0610	SI3897-24	06/10/15	1439	15.16	

QC LIMITS
S3 = O-Terphenyl (+/- 0.15 MINUTES)

Column used to flag retention time values with an asterisk.
* Values outside of QC limits.

Katahdin Analytical Services 2000025

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164234-3
Lab File ID : CIF1112.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-1
Analytical Date: 06/10/15 01:49
Instrument ID: GC12
Column ID: A

	Compound	$\overline{RRF}$/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
2	Naphthalene	8220	8766	0.010	6.64568	25.00000	Averaged
3	2-Methylnaphthalene	8193	8688	0.010	6.03479	25.00000	Averaged
5	Acenaphthylene	8124	8608	0.010	5.95697	25.00000	Averaged
7	Acenaphthene	8421	8844	0.010	5.01561	25.00000	Averaged
8	Fluorene	8264	8718	0.010	5.49799	25.00000	Averaged
9	Phenanthrene	8142	8783	0.010	7.88016	25.00000	Averaged
10	Anthracene	7194	7531	0.010	4.67786	25.00000	Averaged
12	Fluoranthene	8237	8760	0.010	6.35600	25.00000	Averaged
13	Pyrene	8416	8965	0.010	6.51960	25.00000	Averaged
16	Benzo(a)Anthracene	8024	8566	0.010	6.75164	25.00000	Averaged
17	Chrysene	8135	8706	0.010	7.01074	25.00000	Averaged
18	Benzo(b)Fluoranthene	8893	9450	0.010	6.27054	25.00000	Averaged
19	Benzo(k)Fluoranthene	8089	8681	0.010	7.32389	25.00000	Averaged
20	Benzo(a)Pyrene	8071	8639	0.010	7.03035	25.00000	Averaged
21	Indeno(1,2,3-cd)Pyrene	8894	9862	0.010	10.88253	25.00000	Averaged
22	Dibenzo(a,h)Anthracene	7666	8046	0.010	4.96029	25.00000	Averaged
23	Benzo(g,h,i)Perylene	8151	8824	0.010	8.25744	25.00000	Averaged
4	2-Fluorobiphenyl	7161	7609	0.010	6.24326	25.00000	Averaged
6	2-Bromonaphthalene	5123	5411	0.010	5.62117	25.00000	Averaged
11	O-Terphenyl	8140	8783	0.010	7.90549	25.00000	Averaged

*** = Compound out of QC criteria**

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FORM 8
DRO ANALYTICAL SEQUENCE

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

GC Column: RTX-5 ID: 0.53 (mm)Init. Calib. Date(s): 05/06/15 05/06/15

Instrument ID: GC12

THE ANALYTICAL SEQUENCE OF PERFORMANCE EVALUATION MIXTURES, BLANKS, SAMPLES, AND STANDARDS IS GIVEN BELOW:

MEAN SURROGATE RT FROM INITIAL CALIBRATION
S1 : 8.98 S2 : 10.36

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S1 RT #	S2 RT #
01	WTB-SS-16-0002	SI3897-25	06/10/15	1525	8.93	10.31
02	WTB-SB-16-0206	SI3897-26	06/10/15	1610	8.93	10.31
03	WTB-SB-16-0610	SI3897-27	06/10/15	1655	8.93	10.31
04	CCV	WG164234-4	06/10/15	1911	8.93	10.31
05	WG164369-BLANK	WG164369-1	06/10/15	2042	8.93	10.31
06	WG164369-LCS	WG164369-2	06/10/15	2127	8.94	10.32
07	WG164369-LCSD	WG164369-3	06/10/15	2212	8.94	10.32
08	WG164430-BLANK	WG164430-1	06/10/15	2257	8.94	10.32
09	WG164430-LCS	WG164430-2	06/10/15	2343	8.95	10.32
10	WG164430-LCSD	WG164430-3	06/11/15	0028	8.95	10.32
11	WTB-SS-15-0002	SI3897-21	06/11/15	0845	8.94	10.32
12	WTB-SS-16-0002MS	WG164370-4	06/11/15	0931	8.93	10.31
13	WTB-SS-16-0002MSD	WG164370-5	06/11/15	1016	8.93	10.31
14	CCV	WG164234-5	06/11/15	1232	8.93	10.30
15	WTB-RB01-060415	SI3897-38	06/11/15	1921	8.92	10.30
16	WG164506-BLANK	WG164506-1	06/11/15	2007	8.92	10.30
17	WG164506-LCS	WG164506-2	06/11/15	2052	8.92	10.30
18	WG164506-LCSD	WG164506-3	06/11/15	2138	8.92	10.30
19	WTB-SS-24-0002	SI3897-2	06/11/15	2223	8.93	10.31
20	WTB-SB-24-0206	SI3897-3	06/11/15	2308	8.93	10.31

QC LIMITS
S1 = 2-Fluorobiphenyl (+/- 0.15 MINUTES)
S2 = 2-Bromonaphthalene (+/- 0.15 MINUTES)

Column used to flag retention time values with an asterisk.
* Values outside of QC limits.

Katahdin Analytical Services 2000021

FORM 8
DRO ANALYTICAL SEQUENCE

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

GC Column: RTX-5 ID: 0.53 (mm)Init. Calib. Date(s): 05/06/15 05/06/15

Instrument ID: GC12

THE ANALYTICAL SEQUENCE OF PERFORMANCE EVALUATION MIXTURES, BLANKS, SAMPLES, AND STANDARDS IS GIVEN BELOW:

MEAN SURROGATE RT FROM INITIAL CALIBRATION
S3 : 15.22

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S3 RT #	RT #
01	WTB-SS-16-0002	SI3897-25	06/10/15	1525	15.17	
02	WTB-SB-16-0206	SI3897-26	06/10/15	1610	15.16	
03	WTB-SB-16-0610	SI3897-27	06/10/15	1655	15.16	
04		WG164234-4	06/10/15	1911	15.16	
05	WG164369-BLANK	WG164369-1	06/10/15	2042	15.17	
06	WG164369-LCS	WG164369-2	06/10/15	2127	15.18	
07	WG164369-LCSD	WG164369-3	06/10/15	2212	15.18	
08	WG164430-BLANK	WG164430-1	06/10/15	2257	15.18	
09	WG164430-LCS	WG164430-2	06/10/15	2343	15.18	
10	WG164430-LCSD	WG164430-3	06/11/15	0028	15.18	
11	WTB-SS-15-0002	SI3897-21	06/11/15	0845	15.18	
12	WTB-SS-16-0002MS	WG164370-4	06/11/15	0931	15.17	
13	WTB-SS-16-0002MSD	WG164370-5	06/11/15	1016	15.17	
14		WG164234-5	06/11/15	1232	15.16	
15	WTB-RB01-060415	SI3897-38	06/11/15	1921	15.16	
16	WG164506-BLANK	WG164506-1	06/11/15	2007	15.16	
17	WG164506-LCS	WG164506-2	06/11/15	2052	15.16	
18	WG164506-LCSD	WG164506-3	06/11/15	2138	15.16	
19	WTB-SS-24-0002	SI3897-2	06/11/15	2223	15.16	
20	WTB-SB-24-0206	SI3897-3	06/11/15	2308	15.17	

QC LIMITS
S3 = O-Terphenyl (+/- 0.15 MINUTES)

Column used to flag retention time values with an asterisk.
* Values outside of QC limits.

Katahdin Analytical Services 2000026

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164234-4
Lab File ID : CIF1135.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-1
Analytical Date: 06/10/15 19:11
Instrument ID: GC12
Column ID: A

Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
2 Naphthalene	8220	8780	0.010	6.82038	25.00000	Averaged
3 2-Methylnaphthalene	8193	8714	0.010	6.35628	25.00000	Averaged
5 Acenaphthylene	8124	8612	0.010	6.00399	25.00000	Averaged
7 Acenaphthene	8421	8872	0.010	5.35072	25.00000	Averaged
8 Fluorene	8264	8760	0.010	6.00186	25.00000	Averaged
9 Phenanthrene	8142	8839	0.010	8.56600	25.00000	Averaged
10 Anthracene	7194	7489	0.010	4.09073	25.00000	Averaged
12 Fluoranthene	8237	8818	0.010	7.06017	25.00000	Averaged
13 Pyrene	8416	9025	0.010	7.23444	25.00000	Averaged
16 Benzo(a)Anthracene	8024	8637	0.010	7.63445	25.00000	Averaged
17 Chrysene	8135	8741	0.010	7.44342	25.00000	Averaged
18 Benzo(b)Fluoranthene	8893	10132	0.010	13.93786	25.00000	Averaged
19 Benzo(k)Fluoranthene	8089	8113	0.010	0.29216	25.00000	Averaged
20 Benzo(a)Pyrene	8071	8729	0.010	8.15186	25.00000	Averaged
21 Indeno(1,2,3-cd)Pyrene	8894	9791	0.010	10.08333	25.00000	Averaged
22 Dibenzo(a,h)Anthracene	7666	8222	0.010	7.25626	25.00000	Averaged
23 Benzo(g,h,i)Perylene	8151	8877	0.010	8.91040	25.00000	Averaged
4 2-Fluorobiphenyl	7161	7647	0.010	6.77737	25.00000	Averaged
6 2-Bromonaphthalene	5123	5441	0.010	6.19990	25.00000	Averaged
11 O-Terphenyl	8140	8777	0.010	7.82748	25.00000	Averaged

*** = Compound out of QC criteria**

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164234-5
Lab File ID : CIF1157.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-1
Analytical Date: 06/11/15 12:32
Instrument ID: GC12
Column ID: A

Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
2 Naphthalene	8220	8877	0.010	8.00217	25.00000	Averaged
3 2-Methylnaphthalene	8193	8815	0.010	7.58633	25.00000	Averaged
5 Acenaphthylene	8124	8736	0.010	7.52979	25.00000	Averaged
7 Acenaphthene	8421	8991	0.010	6.76523	25.00000	Averaged
8 Fluorene	8264	8854	0.010	7.13956	25.00000	Averaged
9 Phenanthrene	8142	8943	0.010	9.84360	25.00000	Averaged
10 Anthracene	7194	7623	0.010	5.96387	25.00000	Averaged
12 Fluoranthene	8237	8906	0.010	8.12978	25.00000	Averaged
13 Pyrene	8416	9119	0.010	8.35281	25.00000	Averaged
16 Benzo(a)Anthracene	8024	8723	0.010	8.70145	25.00000	Averaged
17 Chrysene	8135	8849	0.010	8.77294	25.00000	Averaged
18 Benzo(b)Fluoranthene	8893	9850	0.010	10.77049	25.00000	Averaged
19 Benzo(k)Fluoranthene	8089	8600	0.010	6.31116	25.00000	Averaged
20 Benzo(a)Pyrene	8071	8818	0.010	9.24884	25.00000	Averaged
21 Indeno(1,2,3-cd)Pyrene	8894	9843	0.010	10.66688	25.00000	Averaged
22 Dibenzo(a,h)Anthracene	7666	8507	0.010	10.97651	25.00000	Averaged
23 Benzo(g,h,i)Perylene	8151	9051	0.010	11.04520	25.00000	Averaged
4 2-Fluorobiphenyl	7161	7726	0.010	7.87701	25.00000	Averaged
6 2-Bromonaphthalene	5123	5507	0.010	7.48520	25.00000	Averaged
11 O-Terphenyl	8140	8886	0.010	9.17085	25.00000	Averaged

*** = Compound out of QC criteria**

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FORM 8
DRO ANALYTICAL SEQUENCE

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

GC Column: RTX-5 ID: 0.53 (mm)Init. Calib. Date(s): 05/06/15 05/06/15

Instrument ID: GC12

THE ANALYTICAL SEQUENCE OF PERFORMANCE EVALUATION MIXTURES, BLANKS, SAMPLES, AND STANDARDS IS GIVEN BELOW:

MEAN SURROGATE RT FROM INITIAL CALIBRATION
S1 : 8.98 S2 : 10.36

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S1 RT #	S2 RT #
01	WTB-SS-08-0002	SI3897-11	06/11/15	2354	8.94	10.31
02	WTB-FD01-060415	SI3897-12	06/12/15	0039	8.94	10.32
03	WTB-SB-09-0206	SI3897-16	06/12/15	0124	8.94	10.31
04	WTB-SS-22-0002	SI3897-1	06/12/15	0209	8.94	10.31
05	WTB-SB-08-0610	SI3897-14	06/12/15	0255	8.94	10.31
06	WTB-SB-08-0206	SI3897-13	06/12/15	0425	8.93	10.32
07	CCV	WG164234-6	06/12/15	0556	8.94	10.32
08	WTB-SS-09-0002	SI3897-15	06/12/15	0726	8.94	10.31
09	WTB-SB-22-0206	SI3897-5	06/12/15	0811	8.93	10.32
10	WTB-FD02-060315	SI3897-7	06/12/15	0856	8.93	10.31
11	WTB-SS-23-0002	SI3897-8	06/12/15	0942	8.93	10.31
12	WTB-SB-09-0610	SI3897-17	06/12/15	1027	8.93	10.30
13	WTB-SB-24-069.7	SI3897-4	06/12/15	1112	8.92	10.30
14	WTB-SB-22-0610	SI3897-6	06/12/15	1158	8.92	10.31
15	WTB-SB-23-0206	SI3897-9	06/12/15	1243	8.92	10.30
16	WTB-SS-13-0002	SI3897-39	06/12/15	1413	8.92	10.30
17	WTB-SS-10-0002	SI3897-42	06/12/15	1458	8.92	10.30
18	WTB-SB-12-0206	SI3897-19	06/12/15	1629	8.92	10.30
19	WTB-SB-12-0610	SI3897-20	06/12/15	1715	8.92	10.30
20	WTB-SB-13-0206	SI3897-40	06/12/15	1800	8.92	10.30

QC LIMITS
S1 = 2-Fluorobiphenyl (+/- 0.15 MINUTES)
S2 = 2-Bromonaphthalene (+/- 0.15 MINUTES)

Column used to flag retention time values with an asterisk.
* Values outside of QC limits.

Katahdin Analytical Services 2000022

FORM 8
DRO ANALYTICAL SEQUENCE

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

GC Column: RTX-5 ID: 0.53 (mm)Init. Calib. Date(s): 05/06/15 05/06/15

Instrument ID: GC12

THE ANALYTICAL SEQUENCE OF PERFORMANCE EVALUATION MIXTURES, BLANKS, SAMPLES, AND STANDARDS IS GIVEN BELOW:

MEAN SURROGATE RT FROM INITIAL CALIBRATION
S3 : 15.22

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S3 RT #	RT #
01	WTB-SS-08-0002	SI3897-11	06/11/15	2354	15.17	
02	WTB-FD01-060415	SI3897-12	06/12/15	0039	15.17	
03	WTB-SB-09-0206	SI3897-16	06/12/15	0124	15.17	
04	WTB-SS-22-0002	SI3897-1	06/12/15	0209	15.17	
05	WTB-SB-08-0610	SI3897-14	06/12/15	0255	15.17	
06	WTB-SB-08-0206	SI3897-13	06/12/15	0425	15.17	
07		WG164234-6	06/12/15	0556	15.18	
08	WTB-SS-09-0002	SI3897-15	06/12/15	0726	15.17	
09	WTB-SB-22-0206	SI3897-5	06/12/15	0811	15.17	
10	WTB-FD02-060315	SI3897-7	06/12/15	0856	15.17	
11	WTB-SS-23-0002	SI3897-8	06/12/15	0942	15.16	
12	WTB-SB-09-0610	SI3897-17	06/12/15	1027	15.16	
13	WTB-SB-24-069.7	SI3897-4	06/12/15	1112	15.16	
14	WTB-SB-22-0610	SI3897-6	06/12/15	1158	15.16	
15	WTB-SB-23-0206	SI3897-9	06/12/15	1243	15.15	
16	WTB-SS-13-0002	SI3897-39	06/12/15	1413	15.16	
17	WTB-SS-10-0002	SI3897-42	06/12/15	1458	15.16	
18	WTB-SB-12-0206	SI3897-19	06/12/15	1629	15.15	
19	WTB-SB-12-0610	SI3897-20	06/12/15	1715	15.15	
20	WTB-SB-13-0206	SI3897-40	06/12/15	1800	15.15	

QC LIMITS
S3 = O-Terphenyl (+/- 0.15 MINUTES)

Column used to flag retention time values with an asterisk.
* Values outside of QC limits.

Katahdin Analytical Services 2000027

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164234-6
Lab File ID : CIF1180.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-1
Analytical Date: 06/12/15 05:56
Instrument ID: GC12
Column ID: A

	Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
2	Naphthalene	8220	8884	0.010	8.08417	25.00000	Averaged
3	2-Methylnaphthalene	8193	8814	0.010	7.58023	25.00000	Averaged
5	Acenaphthylene	8124	8658	0.010	6.56626	25.00000	Averaged
7	Acenaphthene	8421	8958	0.010	6.37693	25.00000	Averaged
8	Fluorene	8264	8847	0.010	7.04856	25.00000	Averaged
9	Phenanthrene	8142	8944	0.010	9.85784	25.00000	Averaged
10	Anthracene	7194	7386	0.010	2.67072	25.00000	Averaged
12	Fluoranthene	8237	8904	0.010	8.10768	25.00000	Averaged
13	Pyrene	8416	9113	0.010	8.28936	25.00000	Averaged
16	Benzo(a)Anthracene	8024	8699	0.010	8.40685	25.00000	Averaged
17	Chrysene	8135	8838	0.010	8.63330	25.00000	Averaged
18	Benzo(b)Fluoranthene	8893	10313	0.010	15.97620	25.00000	Averaged
19	Benzo(k)Fluoranthene	8089	8091	0.010	0.02365	25.00000	Averaged
20	Benzo(a)Pyrene	8071	8778	0.010	8.75425	25.00000	Averaged
21	Indeno(1,2,3-cd)Pyrene	8894	9889	0.010	11.18386	25.00000	Averaged
22	Dibenzo(a,h)Anthracene	7666	8272	0.010	7.90435	25.00000	Averaged
23	Benzo(g,h,i)Perylene	8151	8897	0.010	9.15504	25.00000	Averaged
4	2-Fluorobiphenyl	7161	7728	0.010	7.90703	25.00000	Averaged
6	2-Bromonaphthalene	5123	5495	0.010	7.24902	25.00000	Averaged
11	O-Terphenyl	8140	8882	0.010	9.11864	25.00000	Averaged

*** = Compound out of QC criteria**

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FORM 8
DRO ANALYTICAL SEQUENCE

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

GC Column: RTX-5 ID: 0.53 (mm)Init. Calib. Date(s): 05/06/15 05/06/15

Instrument ID: GC12

THE ANALYTICAL SEQUENCE OF PERFORMANCE EVALUATION MIXTURES, BLANKS, SAMPLES, AND STANDARDS IS GIVEN BELOW:

MEAN SURROGATE RT FROM INITIAL CALIBRATION
S1 : 8.98 S2 : 10.36

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S1 RT #	S2 RT #
01	WTB-SB-13-0610	SI3897-41	06/12/15	1845	8.93	10.30
02	WTB-SB-10-0206	SI3897-43	06/12/15	1931	8.93	10.31
03	WTB-SS-12-0002	SI3897-18	06/12/15	2016	8.93	10.31
04		WG164234-7	06/12/15	2146	8.94	10.32
05	WTB-SS-14-0002	SI3772-4	06/13/15	0735	8.95	10.33
06	WTB-SS-19-0002	SI3772-11DL	06/13/15	0820	8.95	10.33
07	WTB-SB-19-0206	SI3772-12	06/13/15	0906	8.95	10.33
08		WG164234-8	06/13/15	1036	8.95	10.33
09		WG165009-1	06/17/15	1014	8.96	10.34
10	WG164811-BLANK	WG164811-1	06/17/15	1447	8.92	10.30
11	WG164811-LCS	WG164811-2	06/17/15	1533	8.92	10.30
12	WG164811-LCSD	WG164811-3	06/17/15	1618	8.92	10.29
13	WTB-SB-23-0610	SI3897-10RE	06/17/15	2050	8.93	10.31
14	WTB-SS-12-0002	SI3897-18RE	06/17/15	2135	8.93	10.31
15	WTB-SB-10-0610	SI3897-44RE	06/17/15	2221	8.94	10.31
16	WTB-SB-24-069.7MS	WG164430-4	06/17/15	2306	8.94	10.32
17	WTB-SB-24-069.7MSD	WG164430-5	06/17/15	2351	8.93	10.31
18		WG165009-2	06/18/15	0421	8.95	10.32
19						
20						

QC LIMITS
S1 = 2-Fluorobiphenyl (+/- 0.15 MINUTES)
S2 = 2-Bromonaphthalene (+/- 0.15 MINUTES)

Column used to flag retention time values with an asterisk.
* Values outside of QC limits.

Katahdin Analytical Services 2000023

FORM 8
DRO ANALYTICAL SEQUENCE

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

GC Column: RTX-5 ID: 0.53 (mm)Init. Calib. Date(s): 05/06/15 05/06/15

Instrument ID: GC12

THE ANALYTICAL SEQUENCE OF PERFORMANCE EVALUATION MIXTURES, BLANKS, SAMPLES, AND STANDARDS IS GIVEN BELOW:

MEAN SURROGATE RT FROM INITIAL CALIBRATION
S3 : 15.22

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S3 RT #	RT #
01	WTB-SB-13-0610	SI3897-41	06/12/15	1845	15.16	
02	WTB-SB-10-0206	SI3897-43	06/12/15	1931	15.17	
03	WTB-SS-12-0002	SI3897-18	06/12/15	2016	15.16	
04		WG164234-7	06/12/15	2146	15.17	
05	WTB-SS-14-0002	SI3772-4	06/13/15	0735	15.18	
06	WTB-SS-19-0002	SI3772-11DL	06/13/15	0820	15.19	
07	WTB-SB-19-0206	SI3772-12	06/13/15	0906	15.18	
08		WG164234-8	06/13/15	1036	15.18	
09		WG165009-1	06/17/15	1014	15.19	
10	WG164811-BLANK	WG164811-1	06/17/15	1447	15.15	
11	WG164811-LCS	WG164811-2	06/17/15	1533	15.15	
12	WG164811-LCSD	WG164811-3	06/17/15	1618	15.15	
13	WTB-SB-23-0610	SI3897-10RE	06/17/15	2050	15.16	
14	WTB-SS-12-0002	SI3897-18RE	06/17/15	2135	15.16	
15	WTB-SB-10-0610	SI3897-44RE	06/17/15	2221	15.17	
16	WTB-SB-24-069.7MS	WG164430-4	06/17/15	2306	15.17	
17	WTB-SB-24-069.7MSD	WG164430-5	06/17/15	2351	15.17	
18		WG165009-2	06/18/15	0421	15.18	
19						
20						

QC LIMITS
S3 = O-Terphenyl (+/- 0.15 MINUTES)

Column used to flag retention time values with an asterisk.
* Values outside of QC limits.

FORM VIII DRO

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164234-7
Lab File ID : CIF1201.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-1
Analytical Date: 06/12/15 21:46
Instrument ID: GC12
Column ID: A

	Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
2	Naphthalene	8220	8277	0.010	0.70215	25.00000	Averaged
3	2-Methylnaphthalene	8193	8211	0.010	0.21358	25.00000	Averaged
5	Acenaphthylene	8124	8126	0.010	0.01552	25.00000	Averaged
7	Acenaphthene	8421	8366	0.010	-0.65597	25.00000	Averaged
8	Fluorene	8264	8253	0.010	-0.12760	25.00000	Averaged
9	Phenanthrene	8142	8325	0.010	2.25489	25.00000	Averaged
10	Anthracene	7194	7070	0.010	-1.72720	25.00000	Averaged
12	Fluoranthene	8237	8306	0.010	0.84430	25.00000	Averaged
13	Pyrene	8416	8507	0.010	1.07724	25.00000	Averaged
16	Benzo(a)Anthracene	8024	8110	0.010	1.06471	25.00000	Averaged
17	Chrysene	8135	8252	0.010	1.43404	25.00000	Averaged
18	Benzo(b)Fluoranthene	8893	9289	0.010	4.46116	25.00000	Averaged
19	Benzo(k)Fluoranthene	8089	8900	0.010	10.02483	25.00000	Averaged
20	Benzo(a)Pyrene	8071	8153	0.010	1.01688	25.00000	Averaged
21	Indeno(1,2,3-cd)Pyrene	8894	9407	0.010	5.76579	25.00000	Averaged
22	Dibenzo(a,h)Anthracene	7666	8169	0.010	6.56121	25.00000	Averaged
23	Benzo(g,h,i)Perylene	8151	8276	0.010	1.53356	25.00000	Averaged
4	2-Fluorobiphenyl	7161	7195	0.010	0.46789	25.00000	Averaged
6	2-Bromonaphthalene	5123	5121	0.010	-0.03630	25.00000	Averaged
11	O-Terphenyl	8140	8271	0.010	1.60508	25.00000	Averaged

*** = Compound out of QC criteria**

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164234-8
Lab File ID : CIF1218.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-1
Analytical Date: 06/13/15 10:36
Instrument ID: GC12
Column ID: A

Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
2 Naphthalene	8220	8759	0.010	6.56319	25.00000	Averaged
3 2-Methylnaphthalene	8193	8693	0.010	6.09728	25.00000	Averaged
5 Acenaphthylene	8124	8608	0.010	5.95032	25.00000	Averaged
7 Acenaphthene	8421	8855	0.010	5.15502	25.00000	Averaged
8 Fluorene	8264	8731	0.010	5.65239	25.00000	Averaged
9 Phenanthrene	8142	8819	0.010	8.31667	25.00000	Averaged
10 Anthracene	7194	7495	0.010	4.18358	25.00000	Averaged
12 Fluoranthene	8237	8810	0.010	6.96013	25.00000	Averaged
13 Pyrene	8416	9017	0.010	7.14437	25.00000	Averaged
16 Benzo(a)Anthracene	8024	8614	0.010	7.35231	25.00000	Averaged
17 Chrysene	8135	8780	0.010	7.92503	25.00000	Averaged
18 Benzo(b)Fluoranthene	8893	9240	0.010	3.90429	25.00000	Averaged
19 Benzo(k)Fluoranthene	8089	8980	0.010	11.01728	25.00000	Averaged
20 Benzo(a)Pyrene	8071	8691	0.010	7.68031	25.00000	Averaged
21 Indeno(1,2,3-cd)Pyrene	8894	9595	0.010	7.88094	25.00000	Averaged
22 Dibenzo(a,h)Anthracene	7666	8015	0.010	4.55536	25.00000	Averaged
23 Benzo(g,h,i)Perylene	8151	8655	0.010	6.18939	25.00000	Averaged
4 2-Fluorobiphenyl	7161	7624	0.010	6.45830	25.00000	Averaged
6 2-Bromonaphthalene	5123	5427	0.010	5.93444	25.00000	Averaged
11 O-Terphenyl	8140	8806	0.010	8.18313	25.00000	Averaged

*** = Compound out of QC criteria**

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Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG165009-1
Lab File ID : CIF3002.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-1
Analytical Date: 06/17/15 10:14
Instrument ID: GC12
Column ID: A

Compound	$\overline{RRF}$/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
2 Naphthalene	8220	7406	0.010	-9.89506	25.00000	Averaged
3 2-Methylnaphthalene	8193	7307	0.010	-10.81174	25.00000	Averaged
5 Acenaphthylene	8124	7195	0.010	-11.43657	25.00000	Averaged
7 Acenaphthene	8421	7436	0.010	-11.70156	25.00000	Averaged
8 Fluorene	8264	7348	0.010	-11.08885	25.00000	Averaged
9 Phenanthrene	8142	7392	0.010	-9.20593	25.00000	Averaged
10 Anthracene	7194	6265	0.010	-12.92047	25.00000	Averaged
12 Fluoranthene	8237	7397	0.010	-10.19634	25.00000	Averaged
13 Pyrene	8416	7549	0.010	-10.29702	25.00000	Averaged
16 Benzo(a)Anthracene	8024	7196	0.010	-10.32585	25.00000	Averaged
17 Chrysene	8135	7320	0.010	-10.02667	25.00000	Averaged
18 Benzo(b)Fluoranthene	8893	8411	0.010	-5.41205	25.00000	Averaged
19 Benzo(k)Fluoranthene	8089	6826	0.010	-15.61898	25.00000	Averaged
20 Benzo(a)Pyrene	8071	7248	0.010	-10.20198	25.00000	Averaged
21 Indeno(1,2,3-cd)Pyrene	8894	8018	0.010	-9.84864	25.00000	Averaged
22 Dibenzo(a,h)Anthracene	7666	7110	0.010	-7.24880	25.00000	Averaged
23 Benzo(g,h,i)Perylene	8151	7471	0.010	-8.33511	25.00000	Averaged
4 2-Fluorobiphenyl	7161	6421	0.010	-10.33510	25.00000	Averaged
6 2-Bromonaphthalene	5123	4558	0.010	-11.03993	25.00000	Averaged
11 O-Terphenyl	8140	7364	0.010	-9.52890	25.00000	Averaged

*** = Compound out of QC criteria**

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Katahdin
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Cert No E87604

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG165009-2
Lab File ID : CIF3026.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-1
Analytical Date: 06/18/15 04:21
Instrument ID: GC12
Column ID: A

	Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
2	Naphthalene	8220	7840	0.010	-4.62285	25.00000	Averaged
3	2-Methylnaphthalene	8193	7767	0.010	-5.19753	25.00000	Averaged
5	Acenaphthylene	8124	7621	0.010	-6.19475	25.00000	Averaged
7	Acenaphthene	8421	7915	0.010	-6.00670	25.00000	Averaged
8	Fluorene	8264	7814	0.010	-5.44971	25.00000	Averaged
9	Phenanthrene	8142	7877	0.010	-3.25223	25.00000	Averaged
10	Anthracene	7194	6586	0.010	-8.46223	25.00000	Averaged
12	Fluoranthene	8237	7856	0.010	-4.61690	25.00000	Averaged
13	Pyrene	8416	8037	0.010	-4.49582	25.00000	Averaged
16	Benzo(a)Anthracene	8024	7658	0.010	-4.56166	25.00000	Averaged
17	Chrysene	8135	7781	0.010	-4.35974	25.00000	Averaged
18	Benzo(b)Fluoranthene	8893	8551	0.010	-3.83545	25.00000	Averaged
19	Benzo(k)Fluoranthene	8089	7613	0.010	-5.88607	25.00000	Averaged
20	Benzo(a)Pyrene	8071	7707	0.010	-4.51065	25.00000	Averaged
21	Indeno(1,2,3-cd)Pyrene	8894	8808	0.010	-0.97204	25.00000	Averaged
22	Dibenzo(a,h)Anthracene	7666	7234	0.010	-5.63614	25.00000	Averaged
23	Benzo(g,h,i)Perylene	8151	7888	0.010	-3.21993	25.00000	Averaged
4	2-Fluorobiphenyl	7161	6811	0.010	-4.89556	25.00000	Averaged
6	2-Bromonaphthalene	5123	4844	0.010	-5.44492	25.00000	Averaged
11	O-Terphenyl	8140	7830	0.010	-3.81388	25.00000	Averaged

*** = Compound out of QC criteria**

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FORM 8
DRO ANALYTICAL SEQUENCE

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

GC Column: RTX-1 ID: 0.53 (mm)Init. Calib. Date(s): 05/06/15 05/06/15

Instrument ID: GC12

THE ANALYTICAL SEQUENCE OF PERFORMANCE EVALUATION MIXTURES, BLANKS, SAMPLES, AND STANDARDS IS GIVEN BELOW:

MEAN SURROGATE RT FROM INITIAL CALIBRATION
S1 : 16.17

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S1 RT #	RT #
01		WG162358-11	05/06/15	1743	16.19	
02		WG162358-10	05/06/15	1829	16.18	
03		WG162358-9	05/06/15	1914	16.17	
04		WG162358-8	05/06/15	1959	16.17	
05		WG162358-7	05/06/15	2044	16.17	
06		WG162358-12	05/06/15	2129		
07		WG164234-11	06/08/15	1311	16.14	
08	WG164213-BLANK	WG164213-1	06/08/15	1828	16.12	
09	WG164213-LCS	WG164213-2	06/08/15	1914	16.12	
10	WG164213-LCSD	WG164213-3	06/08/15	1959	16.12	
11	WTB-SS-11-0002	SI3772-1	06/09/15	0201	16.12	
12	WTB-SB-11-0610	SI3772-3	06/09/15	0332	16.12	
13	WTB-SB-14-0206	SI3772-5	06/09/15	0502	16.12	
14		WG164234-12	06/09/15	0633	16.12	
15	WTB-SB-14-0607	SI3772-7	06/09/15	0934	16.12	
16	WTB-SB-17-0206	SI3772-9	06/09/15	1105	16.11	
17	WTB-SB-17-0610	SI3772-10	06/09/15	1150	16.12	
18	WTB-SS-14-0002	SI3772-4	06/09/15	1423	16.12	
19	WTB-FD01-060315	SI3772-6	06/09/15	1508	16.11	
20	WTB-SS-17-0002	SI3772-8	06/09/15	1554	16.11	

QC LIMITS
S1 = 5-alpha androstane (+/- 0.32 MINUTES)

Column used to flag retention time values with an asterisk.
* Values outside of QC limits.

Katahdin Analytical Services 2000029

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 6
Initial Calibration Summary

Lab Name : Katahdin Analytical Services **SDG:** OU8-1
Project : Portsmouth Naval Shipyard - WE32 OU8 **Instrument ID:** GC12
Lab File IDs : CIE2031.d CIE2030.d CIE2029.d CIE2028.d CIE2027.d **Calibration Date(s):** 06-MAY-15 17:43 06-MAY-15 20:44

	1.0000 Level 1	10.0000 Level 2	50.0000 Level 3	100.0000 Level 4	200.0000 Level 5		New Crv	b	m1	m2	%RSD	Max %RSD	
C9-C18 Aliphatic	5997	6518	5559	5720	5502		AVG		5859		7.08772	25.00000	M (
C19-C36 Aliphatic	5752	6494	5563	5764	5512		AVG		5817		6.78269	25.00000	M (
C-9	6729	6767	5514	5684	5479		AVG		6034		10.87143	30.00000	O
C-10	5822	6463	5553	5717	5510		AVG		5813		6.61974	25.00000	O
C-12	5615	6370	5534	5698	5488		AVG		5741		6.27979	25.00000	O
C-14	5986	6485	5562	5721	5497		AVG		5850		6.87077	25.00000	O
C-16	6137	6505	5576	5734	5502		AVG		5891		7.16686	25.00000	O
C-18	5692	6517	5618	5767	5536		AVG		5826		6.79223	25.00000	O
C-19	5778	6549	5650	5796	5573		AVG		5869		6.65871	25.00000	O
C-20	5678	6480	5599	5746	5536		AVG		5808		6.61234	25.00000	O
C-22	5792	6553	5648	5792	5579		AVG		5873		6.66839	25.00000	O
C-24	5554	6196	5364	5513	5286		AVG		5583		6.44335	25.00000	O
C-26	5826	6698	5778	5929	5677		AVG		5982		6.86752	25.00000	O
C-28	5767	6547	5676	5838	5589		AVG		5884		6.50532	25.00000	O
C-30	5974	6628	5761	5894	5647		AVG		5981		6.40139	25.00000	O
C-36	5647	6301	5030	5604	5212		AVG		5559		8.81526	25.00000	O
5-alpha androstane	5683	6615	5730	5875	5678		AVG		5916		6.73963	25.00000	

Legend: O = Kept Original Curve
Y = Failed Minimum RF
W = Failed %RSD Value

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Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE
Lab ID : WG164234-11
Lab File ID : CIF2066.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-1
Analytical Date: 06/08/15 13:11
Instrument ID: GC12
Column ID: A

Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
1 C9-C18 Aliphatic	5859	5562	0.010	-5.08003	25.00000	Averaged
2 C19-C36 Aliphatic	5817	5463	0.010	-6.09484	25.00000	Averaged
3 C-9	6034	5559	0.010	-7.87177	30.00000	Averaged
4 C-10	5813	5572	0.010	-4.14588	25.00000	Averaged
5 C-12	5741	5522	0.010	-3.81020	25.00000	Averaged
7 C-14	5850	5550	0.010	-5.12443	25.00000	Averaged
8 C-16	5891	5559	0.010	-5.63938	25.00000	Averaged
9 C-18	5826	5607	0.010	-3.75502	25.00000	Averaged
10 C-19	5869	5638	0.010	-3.93821	25.00000	Averaged
11 C-20	5808	5592	0.010	-3.71354	25.00000	Averaged
13 C-22	5873	5643	0.010	-3.91709	25.00000	Averaged
14 C-24	5583	5330	0.010	-4.52261	25.00000	Averaged
15 C-26	5982	5683	0.010	-4.98753	25.00000	Averaged
16 C-28	5884	5602	0.010	-4.78729	25.00000	Averaged
18 C-30	5981	5648	0.010	-5.55632	25.00000	Averaged
19 C-36	5559	4564	0.010	-17.89049	25.00000	Averaged
44 5-alpha androstane	5916	5727	0.010	-3.19088	25.00000	Averaged

*** = Compound out of QC criteria**

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE
Lab ID : WG164234-12
Lab File ID : CIF2089.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-1
Analytical Date: 06/09/15 06:33
Instrument ID: GC12
Column ID: A

	Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
1	C9-C18 Aliphatic	5859	5667	0.010	-3.28460	25.00000	Averaged
2	C19-C36 Aliphatic	5817	5630	0.010	-3.22018	25.00000	Averaged
3	C-9	6034	5625	0.010	-6.78071	30.00000	Averaged
4	C-10	5813	5653	0.010	-2.75036	25.00000	Averaged
5	C-12	5741	5646	0.010	-1.65269	25.00000	Averaged
7	C-14	5850	5671	0.010	-3.06435	25.00000	Averaged
8	C-16	5891	5675	0.010	-3.66240	25.00000	Averaged
9	C-18	5826	5731	0.010	-1.63735	25.00000	Averaged
10	C-19	5869	5762	0.010	-1.83054	25.00000	Averaged
11	C-20	5808	5712	0.010	-1.65803	25.00000	Averaged
13	C-22	5873	5765	0.010	-1.83630	25.00000	Averaged
14	C-24	5583	5466	0.010	-2.08470	25.00000	Averaged
15	C-26	5982	5864	0.010	-1.97130	25.00000	Averaged
16	C-28	5884	5772	0.010	-1.89038	25.00000	Averaged
18	C-30	5981	5852	0.010	-2.14833	25.00000	Averaged
19	C-36	5559	4846	0.010	-12.82285	25.00000	Averaged
44	5-alpha androstane	5916	5849	0.010	-1.14397	25.00000	Averaged

*** = Compound out of QC criteria**

FORM 8
DRO ANALYTICAL SEQUENCE

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

GC Column: RTX-1 ID: 0.53 (mm)Init. Calib. Date(s): 05/06/15 05/06/15

Instrument ID: GC12

THE ANALYTICAL SEQUENCE OF PERFORMANCE EVALUATION MIXTURES, BLANKS, SAMPLES, AND STANDARDS IS GIVEN BELOW:

MEAN SURROGATE RT FROM INITIAL CALIBRATION
S1 : 16.17

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S1 RT #	RT #
01	WG164370-LCS	WG164370-2	06/09/15	1645	16.12	
02	WG164370-LCSD	WG164370-3	06/09/15	1730	16.11	
03	WG164370-BLANK	WG164370-1	06/09/15	1816	16.11	
04	WTB-SB-20-0206MS	WG164370-6	06/09/15	1901	16.12	
05	WTB-SB-20-0206MSD	WG164370-7	06/09/15	1946	16.12	
06	WTB-SB-11-0206	SI3772-2DL	06/09/15	2333	16.12	
07	WTB-SB-11-0610	SI3772-3DL	06/10/15	0019	16.12	
08		WG164234-13	06/10/15	0149	16.12	
09	WTB-SB-15-0206	SI3897-22	06/10/15	0319	16.12	
10	WTB-FD02-060415	SI3897-23	06/10/15	0405	16.12	
11	WTB-SS-18-0002	SI3897-28	06/10/15	0450	16.12	
12	WTB-SB-18-0206	SI3897-29	06/10/15	0535	16.12	
13	WTB-SB-18-0610	SI3897-30	06/10/15	0621	16.12	
14	WTB-SS-20-0002	SI3897-31	06/10/15	0706	16.11	
15	WTB-FD03-060415	SI3897-32	06/10/15	0751	16.11	
16	WTB-SB-20-0206	SI3897-33	06/10/15	0836	16.11	
17	WTB-SB-20-0610	SI3897-34	06/10/15	0922	16.11	
18	WTB-SS-21-0002	SI3897-35	06/10/15	1007	16.11	
19	WTB-SB-21-0206	SI3897-36	06/10/15	1052	16.12	
20	WTB-SS-19-0002	SI3772-11	06/10/15	1223	16.11	

QC LIMITS
S1 = 5-alpha androstane (+/- 0.32 MINUTES)

Column used to flag retention time values with an asterisk.
* Values outside of QC limits.

Katahdin Analytical Services 2000030

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE
Lab ID : WG164234-13
Lab File ID : CIF2112.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-1
Analytical Date: 06/10/15 01:49
Instrument ID: GC12
Column ID: A

	Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
1	C9-C18 Aliphatic	5859	5839	0.010	-0.34632	25.00000	Averaged
2	C19-C36 Aliphatic	5817	5792	0.010	-0.42507	25.00000	Averaged
3	C-9	6034	5779	0.010	-4.24096	30.00000	Averaged
4	C-10	5813	5830	0.010	0.28876	25.00000	Averaged
5	C-12	5741	5816	0.010	1.30713	25.00000	Averaged
7	C-14	5850	5839	0.010	-0.18891	25.00000	Averaged
8	C-16	5891	5868	0.010	-0.38068	25.00000	Averaged
9	C-18	5826	5902	0.010	1.30832	25.00000	Averaged
10	C-19	5869	5931	0.010	1.04762	25.00000	Averaged
11	C-20	5808	5886	0.010	1.34724	25.00000	Averaged
13	C-22	5873	5941	0.010	1.16364	25.00000	Averaged
14	C-24	5583	5623	0.010	0.72793	25.00000	Averaged
15	C-26	5982	6061	0.010	1.33448	25.00000	Averaged
16	C-28	5884	5950	0.010	1.12686	25.00000	Averaged
18	C-30	5981	5989	0.010	0.13805	25.00000	Averaged
19	C-36	5559	4958	0.010	-10.80587	25.00000	Averaged
44	5-alpha androstane	5916	6035	0.010	2.00246	25.00000	Averaged

*** = Compound out of QC criteria**

FORM 8
DRO ANALYTICAL SEQUENCE

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

GC Column: RTX-1 ID: 0.53 (mm)Init. Calib. Date(s): 05/06/15 05/06/15

Instrument ID: GC12

THE ANALYTICAL SEQUENCE OF PERFORMANCE EVALUATION MIXTURES, BLANKS, SAMPLES, AND STANDARDS IS GIVEN BELOW:

MEAN SURROGATE RT FROM INITIAL CALIBRATION
S1 : 16.17

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S1 RT #	RT #
01	WTB-SB-19-0206	SI3772-12	06/10/15	1308	16.12	
02	WTB-SB-19-0610	SI3772-13	06/10/15	1354	16.12	
03	WTB-SB-15-0610	SI3897-24	06/10/15	1439	16.12	
04	WTB-SS-16-0002	SI3897-25	06/10/15	1525	16.12	
05	WTB-SB-16-0206	SI3897-26	06/10/15	1610	16.11	
06	WTB-SB-16-0610	SI3897-27	06/10/15	1655	16.12	
07		WG164234-14	06/10/15	1911	16.12	
08	WG164369-BLANK	WG164369-1	06/10/15	2042	16.12	
09	WG164369-LCS	WG164369-2	06/10/15	2127	16.12	
10	WG164369-LCSD	WG164369-3	06/10/15	2212	16.12	
11	WG164430-BLANK	WG164430-1	06/10/15	2257	16.12	
12	WG164430-LCS	WG164430-2	06/10/15	2343	16.12	
13	WG164430-LCSD	WG164430-3	06/11/15	0028	16.13	
14	WTB-SS-15-0002	SI3897-21	06/11/15	0845	16.12	
15	WTB-SS-16-0002MS	WG164370-4	06/11/15	0931	16.12	
16	WTB-SS-16-0002MSD	WG164370-5	06/11/15	1016	16.11	
17		WG164234-15	06/11/15	1232	16.11	
18	WTB-RB01-060415	SI3897-38	06/11/15	1921	16.11	
19	WG164506-BLANK	WG164506-1	06/11/15	2007	16.11	
20	WG164506-LCS	WG164506-2	06/11/15	2052	16.11	

QC LIMITS
S1 = 5-alpha androstane (+/- 0.32 MINUTES)

Column used to flag retention time values with an asterisk.
* Values outside of QC limits.

Katahdin Analytical Services 2000031

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE
Lab ID : WG164234-14
Lab File ID : CIF2135.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-1
Analytical Date: 06/10/15 19:11
Instrument ID: GC12
Column ID: A

	Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
1	C9-C18 Aliphatic	5859	5797	0.010	-1.06645	25.00000	Averaged
2	C19-C36 Aliphatic	5817	5729	0.010	-1.52217	25.00000	Averaged
3	C-9	6034	5772	0.010	-4.35265	30.00000	Averaged
4	C-10	5813	5813	0.010	-0.00645	25.00000	Averaged
5	C-12	5741	5764	0.010	0.40239	25.00000	Averaged
7	C-14	5850	5789	0.010	-1.04563	25.00000	Averaged
8	C-16	5891	5801	0.010	-1.52449	25.00000	Averaged
9	C-18	5826	5843	0.010	0.28089	25.00000	Averaged
10	C-19	5869	5874	0.010	0.09073	25.00000	Averaged
11	C-20	5808	5826	0.010	0.30485	25.00000	Averaged
13	C-22	5873	5862	0.010	-0.18598	25.00000	Averaged
14	C-24	5583	5566	0.010	-0.30348	25.00000	Averaged
15	C-26	5982	6003	0.010	0.35014	25.00000	Averaged
16	C-28	5884	5881	0.010	-0.04217	25.00000	Averaged
18	C-30	5981	5918	0.010	-1.04544	25.00000	Averaged
19	C-36	5559	4900	0.010	-11.85933	25.00000	Averaged
44	5-alpha androstane	5916	5972	0.010	0.94858	25.00000	Averaged

*** = Compound out of QC criteria**

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE
Lab ID : WG164234-15
Lab File ID : CIF2157.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-1
Analytical Date: 06/11/15 12:32
Instrument ID: GC12
Column ID: A

	Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
1	C9-C18 Aliphatic	5859	5815	0.010	-0.75642	25.00000	Averaged
2	C19-C36 Aliphatic	5817	5740	0.010	-1.32858	25.00000	Averaged
3	C-9	6034	5814	0.010	-3.65433	30.00000	Averaged
4	C-10	5813	5817	0.010	0.07337	25.00000	Averaged
5	C-12	5741	5786	0.010	0.78422	25.00000	Averaged
7	C-14	5850	5808	0.010	-0.71915	25.00000	Averaged
8	C-16	5891	5805	0.010	-1.45150	25.00000	Averaged
9	C-18	5826	5859	0.010	0.57130	25.00000	Averaged
10	C-19	5869	5886	0.010	0.28531	25.00000	Averaged
11	C-20	5808	5833	0.010	0.43054	25.00000	Averaged
13	C-22	5873	5888	0.010	0.26662	25.00000	Averaged
14	C-24	5583	5575	0.010	-0.13581	25.00000	Averaged
15	C-26	5982	5995	0.010	0.22609	25.00000	Averaged
16	C-28	5884	5887	0.010	0.06253	25.00000	Averaged
18	C-30	5981	5920	0.010	-1.00665	25.00000	Averaged
19	C-36	5559	4934	0.010	-11.24121	25.00000	Averaged
44	5-alpha androstane	5916	5987	0.010	1.19367	25.00000	Averaged

*** = Compound out of QC criteria**

FORM 8
DRO ANALYTICAL SEQUENCE

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

GC Column: RTX-1 ID: 0.53 (mm)Init. Calib. Date(s): 05/06/15 05/06/15

Instrument ID: GC12

THE ANALYTICAL SEQUENCE OF PERFORMANCE EVALUATION MIXTURES, BLANKS, SAMPLES, AND STANDARDS IS GIVEN BELOW:

MEAN SURROGATE RT FROM INITIAL CALIBRATION
S1 : 16.17

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S1 RT #	RT #
01	WG164506-LCSD	WG164506-3	06/11/15	2138	16.11	
02	WTB-SS-24-0002	SI3897-2	06/11/15	2223	16.11	
03	WTB-SB-24-0206	SI3897-3	06/11/15	2308	16.12	
04	WTB-SS-08-0002	SI3897-11	06/11/15	2354	16.12	
05	WTB-FD01-060415	SI3897-12	06/12/15	0039	16.12	
06	WTB-SB-09-0206	SI3897-16	06/12/15	0124	16.11	
07	WTB-SS-22-0002	SI3897-1	06/12/15	0209	16.11	
08	WTB-SB-08-0610	SI3897-14	06/12/15	0255	16.12	
09	WTB-SB-08-0206	SI3897-13	06/12/15	0425	16.12	
10		WG164234-16	06/12/15	0556	16.12	
11	WTB-SS-09-0002	SI3897-15	06/12/15	0726	16.11	
12	WTB-SB-22-0206	SI3897-5	06/12/15	0811	16.12	
13	WTB-FD02-060315	SI3897-7	06/12/15	0856	16.11	
14	WTB-SS-23-0002	SI3897-8	06/12/15	0942	16.11	
15	WTB-SB-09-0610	SI3897-17	06/12/15	1027	16.11	
16	WTB-SB-22-0610	SI3897-6	06/12/15	1158	16.11	
17	WTB-SB-23-0206	SI3897-9	06/12/15	1243	16.10	
18	WTB-SS-13-0002	SI3897-39	06/12/15	1413	16.10	
19	WTB-SS-10-0002	SI3897-42	06/12/15	1458	16.11	
20	WTB-SB-12-0206	SI3897-19	06/12/15	1629	16.10	

QC LIMITS
S1 = 5-alpha androstane (+/- 0.32 MINUTES)

Column used to flag retention time values with an asterisk.
* Values outside of QC limits.

FORM VIII DRO

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164234-16
Lab File ID : CIF2180.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-1
Analytical Date: 06/12/15 05:56
Instrument ID: GC12
Column ID: A

Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
1 C9-C18 Aliphatic	5859	5900	0.010	0.68934	25.00000	Averaged
2 C19-C36 Aliphatic	5817	5845	0.010	0.47111	25.00000	Averaged
3 C-9	6034	5810	0.010	-3.72393	30.00000	Averaged
4 C-10	5813	5909	0.010	1.64609	25.00000	Averaged
5 C-12	5741	5881	0.010	2.43588	25.00000	Averaged
7 C-14	5850	5913	0.010	1.06812	25.00000	Averaged
8 C-16	5891	5920	0.010	0.48881	25.00000	Averaged
9 C-18	5826	5967	0.010	2.41435	25.00000	Averaged
10 C-19	5869	5993	0.010	2.11116	25.00000	Averaged
11 C-20	5808	5943	0.010	2.33178	25.00000	Averaged
13 C-22	5873	6000	0.010	2.16589	25.00000	Averaged
14 C-24	5583	5672	0.010	1.60493	25.00000	Averaged
15 C-26	5982	6096	0.010	1.91392	25.00000	Averaged
16 C-28	5884	5998	0.010	1.95222	25.00000	Averaged
18 C-30	5981	6062	0.010	1.36500	25.00000	Averaged
19 C-36	5559	4991	0.010	-10.21185	25.00000	Averaged
44 5-alpha androstane	5916	6094	0.010	2.99887	25.00000	Averaged

*** = Compound out of QC criteria**

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FORM 8
DRO ANALYTICAL SEQUENCE

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

GC Column: RTX-1 ID: 0.53 (mm)Init. Calib. Date(s): 05/06/15 05/06/15

Instrument ID: GC12

THE ANALYTICAL SEQUENCE OF PERFORMANCE EVALUATION MIXTURES, BLANKS, SAMPLES, AND STANDARDS IS GIVEN BELOW:

MEAN SURROGATE RT FROM INITIAL CALIBRATION
S1 : 16.17

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S1 RT #	RT #
01	WTB-SB-12-0610	SI3897-20	06/12/15	1715	16.11	
02	WTB-SB-13-0206	SI3897-40	06/12/15	1800	16.11	
03	WTB-SB-13-0610	SI3897-41	06/12/15	1845	16.11	
04	WTB-SB-10-0206	SI3897-43	06/12/15	1931	16.11	
05	WTB-SS-12-0002	SI3897-18	06/12/15	2016	16.11	
06		WG164234-17	06/12/15	2146	16.11	
07	WTB-SB-24-069.7	SI3897-4	06/13/15	0735	16.12	
08	WTB-SB-08-0206	SI3897-13DL	06/13/15	0820		
09	WTB-SB-09-0610	SI3897-17DL	06/13/15	0906	16.12	
10	WTB-SB-21-0206	SI3897-36DL	06/13/15	0951	16.12	
11	WTB-SB-21-0610	SI3897-37DL	06/13/15	1036	16.12	
12		WG164234-18	06/13/15	1337	16.11	
13		WG165009-6	06/17/15	1014	16.11	
14	WG164811-BLANK	WG164811-1	06/17/15	1447	16.09	
15	WG164811-LCS	WG164811-2	06/17/15	1533	16.09	
16	WG164811-LCSD	WG164811-3	06/17/15	1618	16.09	
17	WTB-SB-23-0610	SI3897-10RE	06/17/15	2050	16.09	
18	WTB-SS-12-0002	SI3897-18RE	06/17/15	2135	16.09	
19	WTB-SB-10-0610	SI3897-44RE	06/17/15	2221	16.09	
20	WTB-SB-24-069.7MS	WG164430-4	06/17/15	2306	16.09	

QC LIMITS
S1 = 5-alpha androstane (+/- 0.32 MINUTES)

Column used to flag retention time values with an asterisk.
* Values outside of QC limits.

FORM VIII DRO

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE
Lab ID : WG164234-17
Lab File ID : CIF2201.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-1
Analytical Date: 06/12/15 21:46
Instrument ID: GC12
Column ID: A

	Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
1	C9-C18 Aliphatic	5859	5816	0.010	-0.73951	25.00000	Averaged
2	C19-C36 Aliphatic	5817	5750	0.010	-1.15631	25.00000	Averaged
3	C-9	6034	5765	0.010	-4.46534	30.00000	Averaged
4	C-10	5813	5805	0.010	-0.13995	25.00000	Averaged
5	C-12	5741	5794	0.010	0.91695	25.00000	Averaged
7	C-14	5850	5829	0.010	-0.36839	25.00000	Averaged
8	C-16	5891	5831	0.010	-1.01828	25.00000	Averaged
9	C-18	5826	5873	0.010	0.80507	25.00000	Averaged
10	C-19	5869	5891	0.010	0.37936	25.00000	Averaged
11	C-20	5808	5839	0.010	0.53557	25.00000	Averaged
13	C-22	5873	5880	0.010	0.11916	25.00000	Averaged
14	C-24	5583	5576	0.010	-0.12041	25.00000	Averaged
15	C-26	5982	5981	0.010	-0.01063	25.00000	Averaged
16	C-28	5884	5919	0.010	0.60098	25.00000	Averaged
18	C-30	5981	5939	0.010	-0.69531	25.00000	Averaged
19	C-36	5559	4974	0.010	-10.51803	25.00000	Averaged
44	5-alpha androstane	5916	5980	0.010	1.07112	25.00000	Averaged

*** = Compound out of QC criteria**

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE
Lab ID : WG164234-18
Lab File ID : CIF2222.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-1
Analytical Date: 06/13/15 13:37
Instrument ID: GC12
Column ID: A

Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
1 C9-C18 Aliphatic	5859	6025	0.010	2.83254	25.00000	Averaged
2 C19-C36 Aliphatic	5817	5991	0.010	2.99537	25.00000	Averaged
3 C-9	6034	5920	0.010	-1.89841	30.00000	Averaged
4 C-10	5813	6019	0.010	3.53844	25.00000	Averaged
5 C-12	5741	6005	0.010	4.60802	25.00000	Averaged
7 C-14	5850	6038	0.010	3.20376	25.00000	Averaged
8 C-16	5891	6059	0.010	2.86166	25.00000	Averaged
9 C-18	5826	6111	0.010	4.88389	25.00000	Averaged
10 C-19	5869	6138	0.010	4.59096	25.00000	Averaged
11 C-20	5808	6084	0.010	4.75163	25.00000	Averaged
13 C-22	5873	6137	0.010	4.50107	25.00000	Averaged
14 C-24	5583	5827	0.010	4.37064	25.00000	Averaged
15 C-26	5982	6254	0.010	4.56036	25.00000	Averaged
16 C-28	5884	6159	0.010	4.68867	25.00000	Averaged
18 C-30	5981	6186	0.010	3.43568	25.00000	Averaged
19 C-36	5559	5145	0.010	-7.44183	25.00000	Averaged
44 5-alpha androstane	5916	6225	0.010	5.22072	25.00000	Averaged

*** = Compound out of QC criteria**

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG165009-6
Lab File ID : CIF4002.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-1
Analytical Date: 06/17/15 10:14
Instrument ID: GC12
Column ID: A

	Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
1	C9-C18 Aliphatic	5859	5930	0.010	1.20251	25.00000	Averaged
2	C19-C36 Aliphatic	5817	5860	0.010	0.74107	25.00000	Averaged
3	C-9	6034	5901	0.010	-2.21460	30.00000	Averaged
4	C-10	5813	5956	0.010	2.45670	25.00000	Averaged
5	C-12	5741	5925	0.010	3.20475	25.00000	Averaged
7	C-14	5850	5920	0.010	1.19667	25.00000	Averaged
8	C-16	5891	5928	0.010	0.62394	25.00000	Averaged
9	C-18	5826	5949	0.010	2.11570	25.00000	Averaged
10	C-19	5869	5975	0.010	1.79834	25.00000	Averaged
11	C-20	5808	5926	0.010	2.03735	25.00000	Averaged
13	C-22	5873	5984	0.010	1.89515	25.00000	Averaged
14	C-24	5583	5656	0.010	1.31618	25.00000	Averaged
15	C-26	5982	6089	0.010	1.80192	25.00000	Averaged
16	C-28	5884	6017	0.010	2.27277	25.00000	Averaged
18	C-30	5981	6090	0.010	1.82148	25.00000	Averaged
19	C-36	5559	5145	0.010	-7.44758	25.00000	Averaged
44	5-alpha androstane	5916	6085	0.010	2.85266	25.00000	Averaged

*** = Compound out of QC criteria**

FORM 8
DRO ANALYTICAL SEQUENCE

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

GC Column: RTX-1 ID: 0.53 (mm)Init. Calib. Date(s): 05/06/15 05/06/15

Instrument ID: GC12

THE ANALYTICAL SEQUENCE OF PERFORMANCE EVALUATION MIXTURES, BLANKS, SAMPLES, AND STANDARDS IS GIVEN BELOW:

MEAN SURROGATE RT FROM INITIAL CALIBRATION
S1 : 16.17

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S1 RT #	RT #
01	WTB-SB-24-069.7MSD	WG164430-5	06/17/15	2351	16.09	
02		WG165009-7	06/18/15	0421	16.09	
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QC LIMITS
S1 = 5-alpha androstane (+/- 0.32 MINUTES)

Column used to flag retention time values with an asterisk.
* Values outside of QC limits.

FORM VIII DRO

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG165009-7
Lab File ID : CIF4026.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-1
Analytical Date: 06/18/15 04:21
Instrument ID: GC12
Column ID: A

Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
1 C9-C18 Aliphatic	5859	5999	0.010	2.38201	25.00000	Averaged
2 C19-C36 Aliphatic	5817	5928	0.010	1.90533	25.00000	Averaged
3 C-9	6034	5971	0.010	-1.04863	30.00000	Averaged
4 C-10	5813	6006	0.010	3.32512	25.00000	Averaged
5 C-12	5741	5990	0.010	4.33420	25.00000	Averaged
7 C-14	5850	5997	0.010	2.50191	25.00000	Averaged
8 C-16	5891	6004	0.010	1.92020	25.00000	Averaged
9 C-18	5826	6026	0.010	3.42462	25.00000	Averaged
10 C-19	5869	6056	0.010	3.17914	25.00000	Averaged
11 C-20	5808	6002	0.010	3.34903	25.00000	Averaged
13 C-22	5873	6063	0.010	3.23898	25.00000	Averaged
14 C-24	5583	5739	0.010	2.80042	25.00000	Averaged
15 C-26	5982	6185	0.010	3.39312	25.00000	Averaged
16 C-28	5884	6059	0.010	2.98493	25.00000	Averaged
18 C-30	5981	6133	0.010	2.54314	25.00000	Averaged
19 C-36	5559	5187	0.010	-6.68159	25.00000	Averaged
44 5-alpha androstane	5916	6142	0.010	3.80851	25.00000	Averaged

*** = Compound out of QC criteria**

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FORM 4
SEMIVOLATILE METHOD BLANK SUMMARY

CLIENT SAMPLE ID

WG164213-BLANK

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

Lab File ID: CIF1073 Lab Sample ID: WG164213-1

Instrument ID: GC12 Date Extracted: 06/05/15

Matrix: (soil/water) SOIL Date Analyzed: 06/08/15

Level:(low/med) LOW Time Analyzed: 1828

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	WG164213-LCS	WG164213-2	CIF1074	06/08/15	1914
02	WG164213-LCSD	WG164213-3	CIF1075	06/08/15	1959
03	WTB-SS-11-0002	SI3772-1	CIF1083	06/09/15	0201
04	WTB-SB-11-0206	SI3772-2	CIF1084	06/09/15	0247
05	WTB-SB-11-0610	SI3772-3	CIF1085	06/09/15	0332
06	WTB-SB-14-0607	SI3772-7	CIF1093	06/09/15	0934
07	WTB-SS-17-0002	SI3772-8	CIF1094	06/09/15	1019
08	WTB-SB-17-0206	SI3772-9	CIF1095	06/09/15	1105
09	WTB-SB-14-0206	SI3772-5	CIF1098	06/09/15	1508
10	WTB-FD01-060315	SI3772-6	CIF1099	06/09/15	1554
11	WTB-SB-17-0610	SI3772-10DL	CIF1108	06/09/15	2248
12	WTB-SB-19-0610	SI3772-13	CIF1128	06/10/15	1354
13	WTB-SS-14-0002	SI3772-4	CIF1214	06/13/15	0735
14	WTB-SS-19-0002	SI3772-11DL	CIF1215	06/13/15	0820
15	WTB-SB-19-0206	SI3772-12	CIF1216	06/13/15	0906
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COMMENTS:

FORM IVDRO

FORM 4
SEMIVOLATILE METHOD BLANK SUMMARY

CLIENT SAMPLE ID

WG164213-BLANK

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

Lab File ID: CIF2073 Lab Sample ID: WG164213-1

Instrument ID: GC12 Date Extracted: 06/05/15

Matrix: (soil/water) SOIL Date Analyzed: 06/08/15

Level:(low/med) LOW Time Analyzed: 1828

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	WG164213-LCS	WG164213-2	CIF2074	06/08/15	1914
02	WG164213-LCSD	WG164213-3	CIF2075	06/08/15	1959
03	WTB-SS-11-0002	SI3772-1	CIF2083	06/09/15	0201
04	WTB-SB-11-0610	SI3772-3	CIF2085	06/09/15	0332
05	WTB-SB-14-0206	SI3772-5	CIF2087	06/09/15	0502
06	WTB-SB-14-0607	SI3772-7	CIF2093	06/09/15	0934
07	WTB-SB-17-0206	SI3772-9	CIF2095	06/09/15	1105
08	WTB-SB-17-0610	SI3772-10	CIF2096	06/09/15	1150
09	WTB-SS-14-0002	SI3772-4	CIF2097	06/09/15	1423
10	WTB-FD01-060315	SI3772-6	CIF2098	06/09/15	1508
11	WTB-SS-17-0002	SI3772-8	CIF2099	06/09/15	1554
12	WTB-SB-11-0206	SI3772-2DL	CIF2109	06/09/15	2333
13	WTB-SB-11-0610	SI3772-3DL	CIF2110	06/10/15	0019
14	WTB-SS-19-0002	SI3772-11	CIF2126	06/10/15	1223
15	WTB-SB-19-0206	SI3772-12	CIF2127	06/10/15	1308
16	WTB-SB-19-0610	SI3772-13	CIF2128	06/10/15	1354
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COMMENTS:

FORM IVDRO

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client:
Lab ID: WG164213-1
Client ID: Method Blank Sample
Project:
SDG: OU8-1
Lab File ID: CIF2073.D

Sample Date:
Received Date:
Extract Date: 05-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164213

Analysis Date: 08-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: NA
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	15	mg/Kgdrywt	1	20	20.	10.	15.
C19-C36 Aliphatics	U	15	mg/Kgdrywt	1	20	20.	10.	15.
C11-C22 Aromatics	U	15	mg/Kgdrywt	1	20	20.	10.	15.
5-Alpha Androstane		65.4	%					
o-Terphenyl		52.9	%					
2-Fluorobiphenyl		58.2	%					
2-Bromonaphthalene		57.4	%					

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Katahdin
ANALYTICAL SERVICES

Cert No E87604

LCS/LCSD Recovery Report

LCS ID: WG164213-2
LCSD ID: WG164213-3
Project:
SDG: OU8-1
Report Date: 22-JUN-15
LCS File ID: CIF2074.D

Received Date:
Extract Date: 05-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164213
LCSD File ID: CIF1075A.d

Analysis Date: 08-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: NA

Compound	Spike Amt	LCS Conc	LCS Rec (%)	LCSD Conc	LCSD Rec (%)	Conc Units	RPD (%)	RPD Limit	Limits
Unadjusted C11-C22 Aromatics	153.	107.	69.9	102.	66.7	mg/Kgdrywt	5	25	40-140
C9-C18 Aliphatics	54.0	29.2	54.1	29.4	54.4	mg/Kgdrywt	1	25	40-140
C19-C36 Aliphatics	72.0	50.8	70.6	48.7	67.6	mg/Kgdrywt	4	25	40-140
5-Alpha Androstane			68.3		67.4				40-140
o-Terphenyl			67.4		66.2				40-140
2-Fluorobiphenyl			70.6		72.2				40-140
2-Bromonaphthalene			69.8		71.3				40-140

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FORM 4
SEMIVOLATILE METHOD BLANK SUMMARY

CLIENT SAMPLE ID

WG164370-BLANK

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

Lab File ID: CIF1102 Lab Sample ID: WG164370-1

Instrument ID: GC12 Date Extracted: 06/08/15

Matrix: (soil/water) SOIL Date Analyzed: 06/09/15

Level:(low/med) LOW Time Analyzed: 1816

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	WG164370-LCS	WG164370-2	CIF1100	06/09/15	1645
02	WG164370-LCSD	WG164370-3	CIF1101	06/09/15	1730
03	WTB-SB-20-0206MS	WG164370-6	CIF1103	06/09/15	1901
04	WTB-SB-20-0206MSD	WG164370-7	CIF1104	06/09/15	1946
05	WTB-SB-15-0206	SI3897-22	CIF1114	06/10/15	0319
06	WTB-FD02-060415	SI3897-23	CIF1115	06/10/15	0405
07	WTB-SS-18-0002	SI3897-28	CIF1116	06/10/15	0450
08	WTB-SB-18-0206	SI3897-29	CIF1117	06/10/15	0535
09	WTB-SB-18-0610	SI3897-30	CIF1118	06/10/15	0621
10	WTB-SS-20-0002	SI3897-31	CIF1119	06/10/15	0706
11	WTB-FD03-060415	SI3897-32	CIF1120	06/10/15	0751
12	WTB-SB-20-0206	SI3897-33	CIF1121	06/10/15	0836
13	WTB-SB-20-0610	SI3897-34	CIF1122	06/10/15	0922
14	WTB-SS-21-0002	SI3897-35	CIF1123	06/10/15	1007
15	WTB-SB-21-0206	SI3897-36	CIF1124	06/10/15	1052
16	WTB-SB-21-0610	SI3897-37	CIF1125	06/10/15	1138
17	WTB-SB-15-0610	SI3897-24	CIF1129	06/10/15	1439
18	WTB-SS-16-0002	SI3897-25	CIF1130	06/10/15	1525
19	WTB-SB-16-0206	SI3897-26	CIF1131	06/10/15	1610
20	WTB-SB-16-0610	SI3897-27	CIF1132	06/10/15	1655
21	WTB-SS-15-0002	SI3897-21	CIF1153	06/11/15	0845
22	WTB-SS-16-0002MS	WG164370-4	CIF1154	06/11/15	0931
23	WTB-SS-16-0002MSD	WG164370-5	CIF1155	06/11/15	1016
24					
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COMMENTS:

FORM IVDRO

FORM 4
SEMIVOLATILE METHOD BLANK SUMMARY

CLIENT SAMPLE ID

WG164370-BLANK

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

Lab File ID: CIF2102 Lab Sample ID: WG164370-1

Instrument ID: GC12 Date Extracted: 06/08/15

Matrix: (soil/water) SOIL Date Analyzed: 06/09/15

Level:(low/med) LOW Time Analyzed: 1816

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	WG164370-LCS	WG164370-2	CIF2100	06/09/15	1645
02	WG164370-LCSD	WG164370-3	CIF2101	06/09/15	1730
03	WTB-SB-20-0206MS	WG164370-6	CIF2103	06/09/15	1901
04	WTB-SB-20-0206MSD	WG164370-7	CIF2104	06/09/15	1946
05	WTB-SB-15-0206	SI3897-22	CIF2114	06/10/15	0319
06	WTB-FD02-060415	SI3897-23	CIF2115	06/10/15	0405
07	WTB-SS-18-0002	SI3897-28	CIF2116	06/10/15	0450
08	WTB-SB-18-0206	SI3897-29	CIF2117	06/10/15	0535
09	WTB-SB-18-0610	SI3897-30	CIF2118	06/10/15	0621
10	WTB-SS-20-0002	SI3897-31	CIF2119	06/10/15	0706
11	WTB-FD03-060415	SI3897-32	CIF2120	06/10/15	0751
12	WTB-SB-20-0206	SI3897-33	CIF2121	06/10/15	0836
13	WTB-SB-20-0610	SI3897-34	CIF2122	06/10/15	0922
14	WTB-SS-21-0002	SI3897-35	CIF2123	06/10/15	1007
15	WTB-SB-21-0206	SI3897-36	CIF2124	06/10/15	1052
16	WTB-SB-15-0610	SI3897-24	CIF2129	06/10/15	1439
17	WTB-SS-16-0002	SI3897-25	CIF2130	06/10/15	1525
18	WTB-SB-16-0206	SI3897-26	CIF2131	06/10/15	1610
19	WTB-SB-16-0610	SI3897-27	CIF2132	06/10/15	1655
20	WTB-SS-15-0002	SI3897-21	CIF2153	06/11/15	0845
21	WTB-SS-16-0002MS	WG164370-4	CIF2154	06/11/15	0931
22	WTB-SS-16-0002MSD	WG164370-5	CIF2155	06/11/15	1016
23	WTB-SB-21-0206	SI3897-36DL	CIF2217	06/13/15	0951
24	WTB-SB-21-0610	SI3897-37DL	CIF2218	06/13/15	1036
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COMMENTS:

FORM IVDRO

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client:
Lab ID: WG164370-1
Client ID: Method Blank Sample
Project:
SDG: OU8-1
Lab File ID: CIF2102.D

Sample Date:
Received Date:
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164370

Analysis Date: 09-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: NA
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	15	mg/Kgdrywt	1	20	20.	10.	15.
C19-C36 Aliphatics	U	15	mg/Kgdrywt	1	20	20.	10.	15.
C11-C22 Aromatics	U	15	mg/Kgdrywt	1	20	20.	10.	15.
5-Alpha Androstane		66.2	%					
o-Terphenyl		63.2	%					
2-Fluorobiphenyl		69.7	%					
2-Bromonaphthalene		69.0	%					

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Cert No E87604

LCS/LCSD Recovery Report

LCS ID: WG164370-2
LCSD ID: WG164370-3
Project:
SDG: OU8-1
Report Date: 22-JUN-15
LCS File ID: CIF2100.D

Received Date:
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164370
LCSD File ID: CIF1101A.d

Analysis Date: 09-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: NA

Compound	Spike Amt	LCS Conc	LCS Rec (%)	LCSD Conc	LCSD Rec (%)	Conc Units	RPD (%)	RPD Limit	Limits
Unadjusted C11-C22 Aromatics	153.	117.	76.5	101.	66.0	mg/Kgdrywt	15	25	40-140
C9-C18 Aliphatics	54.0	31.5	58.3	25.8	47.8	mg/Kgdrywt	20	25	40-140
C19-C36 Aliphatics	72.0	52.4	72.8	50.6	70.3	mg/Kgdrywt	3	25	40-140
5-Alpha Androstane			72.9		68.3				40-140
o-Terphenyl			70.1		62.9				40-140
2-Fluorobiphenyl			73.4		63.1				40-140
2-Bromonaphthalene			74.0		61.8				40-140

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FORM 4
SEMIVOLATILE METHOD BLANK SUMMARY

CLIENT SAMPLE ID

WG164369-BLANK

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

Lab File ID: CIF1137 Lab Sample ID: WG164369-1

Instrument ID: GC12 Date Extracted: 06/09/15

Matrix: (soil/water) WATER Date Analyzed: 06/10/15

Level:(low/med) LOW Time Analyzed: 2042

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	WG164369-LCS	WG164369-2	CIF1138	06/10/15	2127
02	WG164369-LCSD	WG164369-3	CIF1139	06/10/15	2212
03	WTB-RB01-060415	SI3897-38	CIF1166	06/11/15	1921
04					
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COMMENTS:

FORM IVDRO

FORM 4
SEMIVOLATILE METHOD BLANK SUMMARY

CLIENT SAMPLE ID

WG164369-BLANK

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

Lab File ID: CIF2137 Lab Sample ID: WG164369-1

Instrument ID: GC12 Date Extracted: 06/09/15

Matrix: (soil/water) WATER Date Analyzed: 06/10/15

Level:(low/med) LOW Time Analyzed: 2042

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	WG164369-LCS	WG164369-2	CIF2138	06/10/15	2127
02	WG164369-LCSD	WG164369-3	CIF2139	06/10/15	2212
03	WTB-RB01-060415	SI3897-38	CIF2166	06/11/15	1921
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COMMENTS:

FORM IVDRO

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client:
Lab ID: WG164369-1
Client ID: Method Blank Sample
Project:
SDG: OU8-1
Lab File ID: CIF2137.D

Sample Date:
Received Date:
Extract Date: 09-JUN-15
Extracted By: HG
Extraction Method: SW846 3510
Lab Prep Batch: WG164369

Analysis Date: 10-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: AQ
% Solids: NA
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	75	ug/L	1	100	100	50.	75.
C19-C36 Aliphatics	U	75	ug/L	1	100	100	50.	75.
C11-C22 Aromatics	U	75	ug/L	1	100	100	50.	75.
5-Alpha Androstane		50.6	%					
o-Terphenyl		60.0	%					
2-Fluorobiphenyl		69.6	%					
2-Bromonaphthalene		68.7	%					

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ANALYTICAL SERVICES

Cert No E87604

LCS/LCSD Recovery Report

LCS ID: WG164369-2
LCSD ID: WG164369-3
Project:
SDG: OU8-1
Report Date: 22-JUN-15
LCS File ID: CIF2138.D

Received Date:
Extract Date: 09-JUN-15
Extracted By: HG
Extraction Method: SW846 3510
Lab Prep Batch: WG164369
LCSD File ID: CIF1139A.d

Analysis Date: 10-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: AQ
% Solids: NA

Compound	Spike Amt	LCS Conc	LCS Rec (%)	LCSD Conc	LCSD Rec (%)	Conc Units	RPD (%)	RPD Limit	Limits
Unadjusted C11-C22 Aromatics	1530	968.	63.3	917.	59.9	ug/L	5	25	40-140
C9-C18 Aliphatics	540.	288.	53.3	266.	49.2	ug/L	8	25	40-140
C19-C36 Aliphatics	720.	487.	67.6	421.	58.5	ug/L	14	25	40-140
5-Alpha Androstane			62.2		53.2				40-140
o-Terphenyl			62.2		57.3				40-140
2-Fluorobiphenyl			59.9		66.3				40-140
2-Bromonaphthalene			59.1		65.3				40-140

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FORM 4
SEMIVOLATILE METHOD BLANK SUMMARY

CLIENT SAMPLE ID

WG164430-BLANK

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

Lab File ID: CIF1140 Lab Sample ID: WG164430-1

Instrument ID: GC12 Date Extracted: 06/09/15

Matrix: (soil/water) SOIL Date Analyzed: 06/10/15

Level:(low/med) LOW Time Analyzed: 2257

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	WG164430-LCS	WG164430-2	CIF1141	06/10/15	2343
02	WG164430-LCSD	WG164430-3	CIF1142	06/11/15	0028
03	WTB-SS-24-0002	SI3897-2	CIF1170	06/11/15	2223
04	WTB-SB-24-0206	SI3897-3	CIF1171	06/11/15	2308
05	WTB-SS-08-0002	SI3897-11	CIF1172	06/11/15	2354
06	WTB-FD01-060415	SI3897-12	CIF1173	06/12/15	0039
07	WTB-SS-22-0002	SI3897-1	CIF1175	06/12/15	0209
08	WTB-SB-08-0206	SI3897-13	CIF1178	06/12/15	0425
09	WTB-SB-22-0206	SI3897-5	CIF1183	06/12/15	0811
10	WTB-FD02-060315	SI3897-7	CIF1184	06/12/15	0856
11	WTB-SS-23-0002	SI3897-8	CIF1185	06/12/15	0942
12	WTB-SB-24-069.7	SI3897-4	CIF1187	06/12/15	1112
13	WTB-SB-22-0610	SI3897-6	CIF1188	06/12/15	1158
14	WTB-SB-23-0206	SI3897-9	CIF1189	06/12/15	1243
15	WTB-SB-24-069.7MS	WG164430-4	CIF3019	06/17/15	2306
16	WTB-SB-24-069.7MSD	WG164430-5	CIF3020	06/17/15	2351
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COMMENTS:

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FORM 4
SEMIVOLATILE METHOD BLANK SUMMARY

CLIENT SAMPLE ID

WG164430-BLANK

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

Lab File ID: CIF2140 Lab Sample ID: WG164430-1

Instrument ID: GC12 Date Extracted: 06/09/15

Matrix: (soil/water) SOIL Date Analyzed: 06/10/15

Level:(low/med) LOW Time Analyzed: 2257

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	WG164430-LCS	WG164430-2	CIF2141	06/10/15	2343
02	WG164430-LCSD	WG164430-3	CIF2142	06/11/15	0028
03	WTB-SS-24-0002	SI3897-2	CIF2170	06/11/15	2223
04	WTB-SB-24-0206	SI3897-3	CIF2171	06/11/15	2308
05	WTB-SS-08-0002	SI3897-11	CIF2172	06/11/15	2354
06	WTB-FD01-060415	SI3897-12	CIF2173	06/12/15	0039
07	WTB-SS-22-0002	SI3897-1	CIF2175	06/12/15	0209
08	WTB-SB-08-0206	SI3897-13	CIF2178	06/12/15	0425
09	WTB-SB-22-0206	SI3897-5	CIF2183	06/12/15	0811
10	WTB-FD02-060315	SI3897-7	CIF2184	06/12/15	0856
11	WTB-SS-23-0002	SI3897-8	CIF2185	06/12/15	0942
12	WTB-SB-22-0610	SI3897-6	CIF2188	06/12/15	1158
13	WTB-SB-23-0206	SI3897-9	CIF2189	06/12/15	1243
14	WTB-SB-24-069.7	SI3897-4	CIF2214	06/13/15	0735
15	WTB-SB-08-0206	SI3897-13DL	CIF2215	06/13/15	0820
16	WTB-SB-24-069.7MS	WG164430-4	CIF4019	06/17/15	2306
17	WTB-SB-24-069.7MSD	WG164430-5	CIF4020	06/17/15	2351
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COMMENTS:

FORM IVDRO

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ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client:
Lab ID: WG164430-1
Client ID: Method Blank Sample
Project:
SDG: OU8-1
Lab File ID: CIF2140.D

Sample Date:
Received Date:
Extract Date: 09-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164430

Analysis Date: 10-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: NA
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	15	mg/Kgdrywt	1	20	20.	10.	15.
C19-C36 Aliphatics	U	15	mg/Kgdrywt	1	20	20.	10.	15.
C11-C22 Aromatics	U	15	mg/Kgdrywt	1	20	20.	10.	15.
5-Alpha Androstane		55.4	%					
o-Terphenyl		59.8	%					
2-Fluorobiphenyl		72.2	%					
2-Bromonaphthalene		71.4	%					

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Cert No E87604

LCS/LCSD Recovery Report

LCS ID: WG164430-2
LCSD ID: WG164430-3
Project:
SDG: OU8-1
Report Date: 22-JUN-15
LCS File ID: CIF2141.D

Received Date:
Extract Date: 09-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164430
LCSD File ID: CIF1142A.d

Analysis Date: 10-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: NA

Compound	Spike Amt	LCS Conc	LCS Rec (%)	LCSD Conc	LCSD Rec (%)	Conc Units	RPD (%)	RPD Limit	Limits
Unadjusted C11-C22 Aromatics	153.	96.5	63.1	89.9	58.8	mg/Kgdrywt	7	25	40-140
C9-C18 Aliphatics	54.0	26.9	49.8	25.2	46.7	mg/Kgdrywt	6	25	40-140
C19-C36 Aliphatics	72.0	46.4	64.4	45.0	62.5	mg/Kgdrywt	3	25	40-140
5-Alpha Androstane			63.6		63.0				40-140
o-Terphenyl			62.6		57.9				40-140
2-Fluorobiphenyl			61.8		63.1				40-140
2-Bromonaphthalene			62.4		62.2				40-140

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FORM 4
SEMIVOLATILE METHOD BLANK SUMMARY

CLIENT SAMPLE ID

WG164506-BLANK

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

Lab File ID: CIF1167 Lab Sample ID: WG164506-1

Instrument ID: GC12 Date Extracted: 06/10/15

Matrix: (soil/water) SOIL Date Analyzed: 06/11/15

Level:(low/med) LOW Time Analyzed: 2007

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	WG164506-LCS	WG164506-2	CIF1168	06/11/15	2052
02	WG164506-LCSD	WG164506-3	CIF1169	06/11/15	2138
03	WTB-SB-09-0206	SI3897-16	CIF1174	06/12/15	0124
04	WTB-SB-08-0610	SI3897-14	CIF1176	06/12/15	0255
05	WTB-SS-09-0002	SI3897-15	CIF1182	06/12/15	0726
06	WTB-SB-09-0610	SI3897-17	CIF1186	06/12/15	1027
07	WTB-SS-13-0002	SI3897-39	CIF1191	06/12/15	1413
08	WTB-SS-10-0002	SI3897-42	CIF1192	06/12/15	1458
09	WTB-SB-12-0206	SI3897-19	CIF1194	06/12/15	1629
10	WTB-SB-12-0610	SI3897-20	CIF1195	06/12/15	1715
11	WTB-SB-13-0206	SI3897-40	CIF1196	06/12/15	1800
12	WTB-SB-13-0610	SI3897-41	CIF1197	06/12/15	1845
13	WTB-SB-10-0206	SI3897-43	CIF1198	06/12/15	1931
14	WTB-SS-12-0002	SI3897-18	CIF1199	06/12/15	2016
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COMMENTS:

FORM IVDRO

FORM 4
SEMIVOLATILE METHOD BLANK SUMMARY

CLIENT SAMPLE ID

WG164506-BLANK

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

Lab File ID: CIF2167 Lab Sample ID: WG164506-1

Instrument ID: GC12 Date Extracted: 06/10/15

Matrix: (soil/water) SOIL Date Analyzed: 06/11/15

Level:(low/med) LOW Time Analyzed: 2007

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	WG164506-LCS	WG164506-2	CIF2168	06/11/15	2052
02	WG164506-LCSD	WG164506-3	CIF2169	06/11/15	2138
03	WTB-SB-09-0206	SI3897-16	CIF2174	06/12/15	0124
04	WTB-SB-08-0610	SI3897-14	CIF2176	06/12/15	0255
05	WTB-SS-09-0002	SI3897-15	CIF2182	06/12/15	0726
06	WTB-SB-09-0610	SI3897-17	CIF2186	06/12/15	1027
07	WTB-SS-13-0002	SI3897-39	CIF2191	06/12/15	1413
08	WTB-SS-10-0002	SI3897-42	CIF2192	06/12/15	1458
09	WTB-SB-12-0206	SI3897-19	CIF2194	06/12/15	1629
10	WTB-SB-12-0610	SI3897-20	CIF2195	06/12/15	1715
11	WTB-SB-13-0206	SI3897-40	CIF2196	06/12/15	1800
12	WTB-SB-13-0610	SI3897-41	CIF2197	06/12/15	1845
13	WTB-SB-10-0206	SI3897-43	CIF2198	06/12/15	1931
14	WTB-SS-12-0002	SI3897-18	CIF2199	06/12/15	2016
15	WTB-SB-09-0610	SI3897-17DL	CIF2216	06/13/15	0906
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COMMENTS:

FORM IVDRO

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client:
Lab ID: WG164506-1
Client ID: Method Blank Sample
Project:
SDG: OU8-1
Lab File ID: CIF2167.D

Sample Date:
Received Date:
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164506

Analysis Date: 11-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: NA
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	15	mg/Kgdrywt	1	20	20.	10.	15.
C19-C36 Aliphatics	U	15	mg/Kgdrywt	1	20	20.	10.	15.
C11-C22 Aromatics	U	15	mg/Kgdrywt	1	20	20.	10.	15.
5-Alpha Androstane		53.9	%					
o-Terphenyl		47.7	%					
2-Fluorobiphenyl		59.3	%					
2-Bromonaphthalene		58.9	%					

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ANALYTICAL SERVICES

Cert No E87604

LCS/LCSD Recovery Report

LCS ID: WG164506-2
LCSD ID: WG164506-3
Project:
SDG: OU8-1
Report Date: 22-JUN-15
LCS File ID: CIF2168.D

Received Date:
Extract Date: 10-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164506
LCSD File ID: CIF1169A.d

Analysis Date: 11-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: NA

Compound	Spike Amt	LCS Conc	LCS Rec (%)	LCSD Conc	LCSD Rec (%)	Conc Units	RPD (%)	RPD Limit	Limits
Unadjusted C11-C22 Aromatics	153.	78.8	51.5	77.8	50.8	mg/Kgdrywt	1	25	40-140
C9-C18 Aliphatics	54.0	20.8	38.5*	24.5	45.4	mg/Kgdrywt	16	25	40-140
C19-C36 Aliphatics	72.0	34.8	48.3	38.5	53.5	mg/Kgdrywt	10	25	40-140
5-Alpha Androstane			50.0		54.7				40-140
o-Terphenyl			51.1		51.1				40-140
2-Fluorobiphenyl			68.9		56.9				40-140
2-Bromonaphthalene			68.1		56.2				40-140

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FORM 4
SEMIVOLATILE METHOD BLANK SUMMARY

CLIENT SAMPLE ID

WG164811-BLANK

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

Lab File ID: CIF3008 Lab Sample ID: WG164811-1

Instrument ID: GC12 Date Extracted: 06/15/15

Matrix: (soil/water) SOIL Date Analyzed: 06/17/15

Level:(low/med) LOW Time Analyzed: 1447

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	WG164811-LCS	WG164811-2	CIF3009	06/17/15	1533
02	WG164811-LCSD	WG164811-3	CIF3010	06/17/15	1618
03	WTB-SB-23-0610	SI3897-10RE	CIF3016	06/17/15	2050
04	WTB-SS-12-0002	SI3897-18RE	CIF3017	06/17/15	2135
05	WTB-SB-10-0610	SI3897-44RE	CIF3018	06/17/15	2221
06					
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30					

COMMENTS:

FORM IVDRO

FORM 4
SEMIVOLATILE METHOD BLANK SUMMARY

CLIENT SAMPLE ID

WG164811-BLANK

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-1

Lab File ID: CIF4008 Lab Sample ID: WG164811-1

Instrument ID: GC12 Date Extracted: 06/15/15

Matrix: (soil/water) SOIL Date Analyzed: 06/17/15

Level:(low/med) LOW Time Analyzed: 1447

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	WG164811-LCS	WG164811-2	CIF4009	06/17/15	1533
02	WG164811-LCSD	WG164811-3	CIF4010	06/17/15	1618
03	WTB-SB-23-0610	SI3897-10RE	CIF4016	06/17/15	2050
04	WTB-SS-12-0002	SI3897-18RE	CIF4017	06/17/15	2135
05	WTB-SB-10-0610	SI3897-44RE	CIF4018	06/17/15	2221
06					
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COMMENTS:

FORM IVDRO

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Report of Analytical Results

Client:
Lab ID: WG164811-1
Client ID: Method Blank Sample
Project:
SDG: OU8-1
Lab File ID: CIF4008.D

Sample Date:
Received Date:
Extract Date: 15-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164811

Analysis Date: 17-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: NA
Report Date: 22-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	15	mg/Kgdrywt	1	20	20.	10.	15.
C19-C36 Aliphatics	U	15	mg/Kgdrywt	1	20	20.	10.	15.
C11-C22 Aromatics	U	15	mg/Kgdrywt	1	20	20.	10.	15.
5-Alpha Androstane		60.2	%					
o-Terphenyl		58.4	%					
2-Fluorobiphenyl		66.0	%					
2-Bromonaphthalene		64.7	%					

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Cert No E87604

LCS/LCSD Recovery Report

LCS ID: WG164811-2
LCSD ID: WG164811-3
Project:
SDG: OU8-1
Report Date: 22-JUN-15
LCS File ID: CIF4009.D

Received Date:
Extract Date: 15-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164811
LCSD File ID: CIF3010A.d

Analysis Date: 17-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: NA

Compound	Spike Amt	LCS Conc	LCS Rec (%)	LCSD Conc	LCSD Rec (%)	Conc Units	RPD (%)	RPD Limit	Limits
Unadjusted C11-C22 Aromatics	153.	101.	66.0	87.8	57.4	mg/Kgdrywt	14	25	40-140
C9-C18 Aliphatics	54.0	29.1	53.9	29.2	54.1	mg/Kgdrywt	0	25	40-140
C19-C36 Aliphatics	72.0	49.5	68.8	45.6	63.3	mg/Kgdrywt	8	25	40-140
5-Alpha Androstane			62.9		63.2				40-140
o-Terphenyl			65.1		56.9				40-140
2-Fluorobiphenyl			71.0		59.1				40-140
2-Bromonaphthalene			69.3		58.6				40-140

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MS/MSD Recovery Report

MS ID: WG164370-4
MSD ID: WG164370-5
Sample ID: SI3897-25
Client ID: WTB-SS-16-0002
Project:
SDG: OU8-1
MS File ID: CIF2154.D

Received Date:
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164370
Report Date: 23-JUN-15
MSD File ID: CIF1155.d

Analysis Date: 11-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 89.

Compound	MS Spike	MSD Spike	Conc Units	Samp Conc	MS Conc	MSD Conc	MS Rec (%)	MSD Rec (%)	RPD (%)	RPD Limit	Limits
Unadjusted C11-C22 Aromatics	157.	164.	mg/Kgdrywt	240	388	414	96.8	108.	6	25	40-140
C9-C18 Aliphatics	55.3	58.0	mg/Kgdrywt	U32	32.2	34.8	58.2	60.0	8	25	40-140
C19-C36 Aliphatics	73.8	77.3	mg/Kgdrywt	65	108	101	58.7	47.0	7	25	40-140
5-Alpha Androstane							72.9	78.0			40-140
o-Terphenyl							67.7	76.8			40-140
2-Fluorobiphenyl							63.3	73.3			40-140
2-Bromonaphthalene							67.5	74.9			40-140

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MS/MSD Recovery Report

MS ID: WG164370-6
MSD ID: WG164370-7
Sample ID: SI3897-33
Client ID: WTB-SB-20-0206
Project:
SDG: OU8-1
MS File ID: CIF2103.D

Received Date:
Extract Date: 08-JUN-15
Extracted By: JMS
Extraction Method: SW846 3546
Lab Prep Batch: WG164370
Report Date: 23-JUN-15
MSD File ID: CIF2104.d

Analysis Date: 09-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 84.

Compound	MS Spike	MSD Spike	Conc Units	Samp Conc	MS Conc	MSD Conc	MS Rec (%)	MSD Rec (%)	RPD (%)	RPD Limit	Limits
Unadjusted C11-C22 Aromatics	172.	178.	mg/Kgdrywt	24	112	136	51.3	63.1	19	25	40-140
C9-C18 Aliphatics	60.9	62.6	mg/Kgdrywt	U16	31	29.9	50.9	47.8	4	25	40-140
C19-C36 Aliphatics	81.2	83.5	mg/Kgdrywt	U16	46.1	55.8	56.8	66.8	19	25	40-140
5-Alpha Androstane							59.4	66.0			40-140
o-Terphenyl							55.9	66.4			40-140
2-Fluorobiphenyl							67.9	74.8			40-140
2-Bromonaphthalene							67.4	74.9			40-140

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MS/MSD Recovery Report

MS ID: WG164430-4
MSD ID: WG164430-5
Sample ID: SI3897-4
Client ID: WTB-SB-24-069.7
Project:
SDG: OU8-1
MS File ID: CIF4019.D

Received Date:
Extract Date: 09-JUN-15
Extracted By: HG
Extraction Method: SW846 3546
Lab Prep Batch: WG164430
Report Date: 23-JUN-15
MSD File ID: CIF3020A.d

Analysis Date: 17-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: SL
% Solids: 86.

Compound	MS Spike	MSD Spike	Conc Units	Samp Conc	MS Conc	MSD Conc	MS Rec (%)	MSD Rec (%)	RPD (%)	RPD Limit	Limits
Unadjusted C11-C22 Aromatics	159.	176.	mg/Kgdrywt	76	148	151	45.2	42.5	2	25	40-140
C9-C18 Aliphatics	56.0	62.1	mg/Kgdrywt	U28	41.9	44.8	74.8	72.1	7	25	40-140
C19-C36 Aliphatics	74.6	82.8	mg/Kgdrywt	U28	73.7	81.5	98.8	98.4	10	25	40-140
5-Alpha Androstane							73.1	66.4			40-140
o-Terphenyl							68.4	58.0			40-140
2-Fluorobiphenyl							68.3	60.2			40-140
2-Bromonaphthalene							68.8	61.2			40-140

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Form 2
System Monitoring Compound Recovery

Lab Name: Katahdin Analytical Services **Project:** Portsmouth Naval Shipyard - WE32 OU8 **Matrix:** AQ
Lab Code: KAS **SDG:** OU8-1

Client Sample ID	Lab Sample ID	Col. ID	2BN	#	2FBP	#	5AA	#	OTP	#
WTB-RB01-060415	SI3897-38	B	46.5		62.6		44.2		52.9	
Method Blank Sample	WG164369-1	B	68.7		69.6		50.6		60.0	
Laboratory Control S	WG164369-2	B	59.1		59.9		62.2		62.2	
Laboratory Control S	WG164369-3	B	65.3		66.3		53.2		57.3	

		QC Limits
5AA	5-ALPHA ANDROSTANE	40-140
OTP	O-TERPHENYL	40-140
2FBP	2-FLUOROBIPHENYL	40-140
2BN	2-BROMONAPHTHALENE	40-140

= Column to be used to flag recovery limits.
* = Values outside of contract required QC limits.
D= System Monitoring Compound diluted out.

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Form 2
System Monitoring Compound Recovery

Lab Name: Katahdin Analytical Services **Project:** Portsmouth Naval Shipyard - WE32 OU8 **Matrix:** SL
Lab Code: KAS **SDG:** OU8-1

Client Sample ID	Lab Sample ID	Col. ID	2BN	#	2FBP	#	5AA	#	OTP	#
WTB-SS-11-0002	SI3772-1	B	65.2		63.4		66.2		60.7	
WTB-SB-17-0610	SI3772-10	B	74.4		79.0		66.5		118.	
WTB-SS-19-0002	SI3772-11	B	75.4		73.4		72.2		64.8	
WTB-SB-19-0206	SI3772-12	B	77.0		75.0		67.7		72.7	
WTB-SB-19-0610	SI3772-13	B	73.6		73.3		69.4		73.0	
WTB-SB-11-0206	SI3772-2DL	B	62.3		64.2		48.9		43.2	
WTB-SB-11-0610	SI3772-3	B	68.3		70.1		40.1		42.4	
WTB-SB-11-0610	SI3772-3DL	B	68.3		70.1		38.6	*	42.4	
WTB-SS-14-0002	SI3772-4	B	78.5		77.8		72.6		71.8	
WTB-SB-14-0206	SI3772-5	B	67.1		66.6		72.1		58.9	
WTB-FD01-060315	SI3772-6	B	69.9		69.4		78.3		66.5	
WTB-SB-14-0607	SI3772-7	B	83.6		81.8		73.7		79.5	
WTB-SS-17-0002	SI3772-8	B	86.5		85.8		74.4		81.9	
WTB-SB-17-0206	SI3772-9	B	62.0		64.4		44.7		41.7	
WTB-SS-22-0002	SI3897-1	B	78.0		78.2		70.9		66.4	
WTB-SB-23-0610	SI3897-10RE	B	57.7		55.7		40.2		42.2	
WTB-SS-08-0002	SI3897-11	B	58.9		59.7		56.4		51.9	
WTB-FD01-060415	SI3897-12	B	65.2		65.8		60.0		55.9	
WTB-SB-08-0206	SI3897-13	B	71.9		72.4		71.5		69.2	
WTB-SB-08-0206	SI3897-13DL	B	71.9		72.4		0.00	*	69.2	
WTB-SB-08-0610	SI3897-14	B	75.7		76.0		52.0		63.2	
WTB-SS-09-0002	SI3897-15	B	81.4		81.9		53.6		60.6	
WTB-SB-09-0206	SI3897-16	B	62.1		62.1		50.3		49.5	
WTB-SB-09-0610	SI3897-17	B	72.6		70.2		55.0		50.5	
WTB-SB-09-0610	SI3897-17DL	B	72.6		70.2		50.4		50.5	
WTB-SS-12-0002	SI3897-18	B	61.1		60.3		23.7	*	18.1	*
WTB-SS-12-0002	SI3897-18RE	B	50.6		49.9		17.9	*	15.0	*
WTB-SB-12-0206	SI3897-19	B	88.6		89.1		67.8		79.7	
WTB-SS-24-0002	SI3897-2	B	71.4		72.0		55.4		56.2	
WTB-SB-12-0610	SI3897-20	B	71.8		71.8		59.2		56.9	
WTB-SS-15-0002	SI3897-21	B	79.6		79.2		76.5		78.3	
WTB-SB-15-0206	SI3897-22	B	72.7		72.4		45.6		44.5	
WTB-FD02-060415	SI3897-23	B	75.3		76.0		65.4		63.9	
WTB-SB-15-0610	SI3897-24	B	52.9		51.6		63.9		51.1	
WTB-SS-16-0002	SI3897-25	B	68.6		68.1		70.2		64.5	
WTB-SB-16-0206	SI3897-26	B	85.2		83.8		76.2		81.4	

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Form 2
System Monitoring Compound Recovery

Lab Name: Katahdin Analytical Services **Project:** Portsmouth Naval Shipyard - WE32 OU8 **Matrix:** SL
Lab Code: KAS **SDG:** OU8-1

Client Sample ID	Lab Sample ID	Col. ID	2BN	#	2FBP	#	5AA	#	OTP	#
WTB-SB-16-0610	SI3897-27	B	69.2		69.3		55.4		49.3	
WTB-SS-18-0002	SI3897-28	B	74.8		74.0		80.4		72.8	
WTB-SB-18-0206	SI3897-29	B	67.7		67.2		63.2		56.2	
WTB-SB-24-0206	SI3897-3	B	74.5		75.5		60.4		63.0	
WTB-SB-18-0610	SI3897-30	B	64.2		63.7		66.6		61.7	
WTB-SS-20-0002	SI3897-31	B	69.0		68.3		70.0		60.4	
WTB-FD03-060415	SI3897-32	B	68.4		69.0		64.7		54.3	
WTB-SB-20-0206	SI3897-33	B	80.1		80.4		61.6		64.0	
WTB-SB-20-0610	SI3897-34	B	77.2		77.7		63.2		63.5	
WTB-SS-21-0002	SI3897-35	B	59.2		59.6		50.2		53.8	
WTB-SB-21-0206	SI3897-36	B	69.6		68.3		70.2		63.0	
WTB-SB-21-0206	SI3897-36DL	B	69.6		68.3		64.1		63.0	
WTB-SB-21-0610	SI3897-37DL	B	78.0		78.5		69.6		75.7	
WTB-SS-13-0002	SI3897-39	B	60.8		60.9		53.0		51.0	
WTB-SB-24-069.7	SI3897-4	B	80.0		79.6		74.8		71.5	
WTB-SB-13-0206	SI3897-40	B	69.8		67.4		39.9		42.8	
WTB-SB-13-0610	SI3897-41	B	55.5		55.9		48.6		45.1	
WTB-SS-10-0002	SI3897-42	B	65.9		66.7		49.4		50.9	
WTB-SB-10-0206	SI3897-43	B	64.3		63.2		51.2		51.3	
WTB-SB-10-0610	SI3897-44RE	B	68.7		68.8		59.1		58.7	
WTB-SB-22-0206	SI3897-5	B	66.2		63.4		55.9		64.4	
WTB-SB-22-0610	SI3897-6	B	72.1		78.0		62.6		74.7	
WTB-FD02-060315	SI3897-7	B	69.7		76.5		61.1		69.3	
WTB-SS-23-0002	SI3897-8	B	56.5		55.5		70.0		56.1	
WTB-SB-23-0206	SI3897-9	B	60.7		57.0		70.8		62.0	
Method Blank Sample	WG164213-1	B	57.4		58.2		65.4		52.9	
Laboratory Control S	WG164213-2	B	69.8		70.6		68.3		67.4	
Laboratory Control S	WG164213-3	B	71.3		72.2		67.4		66.2	
Method Blank Sample	WG164370-1	B	69.0		69.7		66.2		63.2	
Laboratory Control S	WG164370-2	B	74.0		73.4		72.9		70.1	
Laboratory Control S	WG164370-3	B	61.8		63.1		68.3		62.9	
Matrix Spike	WG164370-4	B	67.5		63.3		72.9		67.7	
Matrix Spike Duplica	WG164370-5	B	74.9		73.3		78.0		76.8	
Matrix Spike	WG164370-6	B	67.4		67.9		59.4		55.9	
Matrix Spike Duplica	WG164370-7	B	74.9		74.8		66.0		66.4	
Method Blank Sample	WG164430-1	B	71.4		72.2		55.4		59.8	

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Form 2
System Monitoring Compound Recovery

Lab Name: Katahdin Analytical Services **Project:** Portsmouth Naval Shipyard - WE32 OU8 **Matrix:** SL
Lab Code: KAS **SDG:** OU8-1

Client Sample ID	Lab Sample ID	Col. ID	2BN	#	2FBP	#	5AA	#	OTP	#
Laboratory Control S	WG164430-2	B	62.4		61.8		63.6		62.6	
Laboratory Control S	WG164430-3	B	62.2		63.1		63.0		57.9	
Matrix Spike	WG164430-4	B	68.8		68.3		73.1		68.4	
Matrix Spike Duplica	WG164430-5	B	61.2		60.2		66.4		58.0	
Method Blank Sample	WG164506-1	B	58.9		59.3		53.9		47.7	
Laboratory Control S	WG164506-2	B	68.1		68.9		50.0		51.1	
Laboratory Control S	WG164506-3	B	56.2		56.9		54.7		51.1	
Method Blank Sample	WG164811-1	B	64.7		66.0		60.2		58.4	
Laboratory Control S	WG164811-2	B	69.3		71.0		62.9		65.1	
Laboratory Control S	WG164811-3	B	58.6		59.1		63.2		56.9	

		QC Limits
OTP	O-TERPHENYL	40-140
2FBP	2-FLUOROBIPHENYL	40-140
2BN	2-BROMONAPHTHALENE	40-140
5AA	5-ALPHA ANDROSTANE	40-140

= Column to be used to flag recovery limits.
* = Values outside of contract required QC limits.
D= System Monitoring Compound diluted out.

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ORGANICS	FIELD DUPLICATE PRECISION						SOILS	50	PERCENT	LIMIT					
		FIELD DUP SAMPLE			ASSOC. SAMPLE										
FRACTION	ANALYTES														
		WTB-FD01-060315			WTB-SB-14-0206										
		UG/L	Qual.	R.L.	UG/L	Qual.	RPD	EVALUATION	ADDITIONAL EVALUATION FOR "J" RESULTS						
PETS	C11-C22 AROMATICS	29			22		27.45	SATISFACTORY							
	C19-C36 ALIPHATICS	30			37		20.90	SATISFACTORY							
PAH	BENZO(A)ANTHRACENE	7.2	J	21	4.4	J	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	BENZO(A)PYRENE	9.2	J	21	4.8	J	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	BENZO(B)FLUORANTHENE	15	J	21	8.1	J	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	BENZO(G,H,I)PERYLENE	11	J	21		U	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	FLUORANTHENE	13	J	21	7.9	J	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	INDENO(1,2,3-CD)PYRENE	8.6	J	21		U	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	PHENANTHRENE	7.4	J	21	5.1	J	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	PYRENE	15	J	21	8.9	J	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
		WTB-FD01-060415			WTB-SS-08-0002										
		UG/L	Qual.	R.L.	UG/L	Qual.	RPD	EVALUATION							
PETS	C11-C22 AROMATICS	13	J	17	10	J	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	C19-C36 ALIPHATICS	20			19		5.13	SATISFACTORY							
PAH	ACENAPHTHENE	15		21	5.6	J	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	ANTHRACENE	45		21	17	J	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	BENZO(A)ANTHRACENE	140		21	93		40.34	SATISFACTORY							
	BENZO(A)PYRENE	120		21	82		37.62	SATISFACTORY							
	BENZO(B)FLUORANTHENE	170		21	120		34.48	SATISFACTORY							
	BENZO(G,H,I)PERYLENE	66		21	54		20.00	SATISFACTORY							
	BENZO(K)FLUORANTHENE	88		21	53		49.65	SATISFACTORY							
	CHRYSENE	170		21	120		34.48	SATISFACTORY							
	DIBENZO(A,H)ANTHRACENE	21	J	21	24		N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	FLUORANTHENE	220		21	140		44.44	SATISFACTORY							
	FLUORENE	15	J	21	6.1	J	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	INDENO(1,2,3-CD)PYRENE	77		21	56		31.58	SATISFACTORY							
	NAPTHTHALENE	8.1	J	21		U	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	PHENANTHRENE	180		21	87		69.66	EXCEEDS	EXCEEDS						
	PYRENE	290		21	190		41.67	SATISFACTORY							
ORGANICS	FIELD DUPLICATE PRECISION						SOILS	50	PERCENT	LIMIT					
		FIELD DUP SAMPLE			ASSOC. SAMPLE										
FRACTION	ANALYTES														
		WTB-FD02-060315			WTB-SB-22-0610										
		UG/L	Qual.	R.L.	UG/L	Qual.	RPD	EVALUATION							
	C11-C22 AROMATICS	520			470		10.10	SATISFACTORY							
	C19-C36 ALIPHATICS	66			97		38.04	SATISFACTORY							
	C9-C18 ALIPHATICS	85			67		23.68	SATISFACTORY							
	ACENAPHTHENE	13	U	13	23	J	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	ACENAPTHYLENE	13	U	13	13	U									
	ANTHRACENE	13	U	13	57		125.71	EXCEEDS	EXCEEDS						
	BENZO(A)ANTHRACENE	58		13	230		119.44	EXCEEDS	EXCEEDS						
	BENZO(A)PYRENE	62		13	200		105.34	EXCEEDS	EXCEEDS						
	BENZO(B)FLUORANTHENE	95		13	330		110.59	EXCEEDS	EXCEEDS						
	BENZO(G,H,I)PERYLENE	39		13	140		112.85	EXCEEDS	EXCEEDS						
	BENZO(K)FLUORANTHENE	31		13	100		105.34	EXCEEDS	EXCEEDS						
	CHRYSENE	100		13	300		100.00	EXCEEDS	EXCEEDS						
	DIBENZO(A,H)ANTHRACENE	13	U	13	55		123.53	EXCEEDS	EXCEEDS						
	FLUORANTHENE	63		13	280		126.53	EXCEEDS	EXCEEDS						
	FLUORENE	4.1	J	13	23	J	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	INDENO(1,2,3-CD)PYRENE	39		13	150		117.46	EXCEEDS	EXCEEDS						
	NAPTHTHALENE	6.9	J	13	9.1	J	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	PHENANTHRENE	71		13	250		111.53	EXCEEDS	EXCEEDS						
	PYRENE	82		13	420		134.66	EXCEEDS	EXCEEDS						

		WTB-FD02-060415			WTB-SB-15-0206										
		UG/L	Qual.	R.L.	UG/L	Qual.	RPD	EVALUATION							
	C11-C22 AROMATICS	22		16	12	J	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	C19-C36 ALIPHATICS	16	U	16	15	U	6.45	SATISFACTORY							
	C9-C18 ALIPHATICS	16	U	16	15	U	6.45	SATISFACTORY							
	ACENAPHTHENE	11	U	11	7.4	J	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	ACENAPTHYLENE	6.1	J	11	6.1	J									
	ANTHRACENE	19	J	11	22		N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	BENZO(A)ANTHRACENE	100		11	110		9.52	SATISFACTORY							
	BENZO(A)PYRENE	120		11	120		0.00	SATISFACTORY							
	BENZO(B)FLUORANTHENE	140		11	140		0.00	SATISFACTORY							
	BENZO(G,H,I)PERYLENE	100		11	92		8.33	SATISFACTORY							
	BENZO(K)FLUORANTHENE	60		11	58		3.39	SATISFACTORY							
	CHRYSENE	130		11	140		7.41	SATISFACTORY							
	DIBENZO(A,H)ANTHRACENE	42		11	36		15.38	SATISFACTORY							
	FLUORANTHENE	140		11	160		13.33	SATISFACTORY							
	FLUORENE	5.8	J	11	6.9	J	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	INDENO(1,2,3-CD)PYRENE	100		11	91		9.42	SATISFACTORY							
	NAPTHTHALENE	11	U	11	10	U	9.52	SATISFACTORY							
	PHENANTHRENE	90		11	120		28.57	SATISFACTORY							
	PYRENE	160		11	180		11.76	SATISFACTORY							
ORGANICS	**FIELD DUPLICATE PRECISION**						**SOILS**	**50**	**PERCENT**	**LIMIT**					
		FIELD DUP SAMPLE			**ASSOC. SAMPLE**										
FRACTION	**ANALYTES**														
		WTB-FD03-060415			**WTB-SS-20-0002**										
		UG/L	**Qual.**	**R.L.**	**UG/L**	**Qual.**	**RPD**	**EVALUATION**							
	C11-C22 AROMATICS	20	J	16	20		N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	C19-C36 ALIPHATICS	12	J	16	15	J	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	C9-C18 ALIPHATICS	17	U	16	15	U	12.50	SATISFACTORY							
	ACENAPHTHENE	11	J	22	11	U	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	ACENAPTHYLENE	2.3	J	22	11	U									
	ANTHRACENE	30		22	18	J	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	BENZO(A)ANTHRACENE	130		22	110		16.67	SATISFACTORY							
	BENZO(A)PYRENE	120		22	100		18.18	SATISFACTORY							
	BENZO(B)FLUORANTHENE	170		22	150		12.50	SATISFACTORY							
	BENZO(G,H,I)PERYLENE	58		22	56		3.51	SATISFACTORY							
	BENZO(K)FLUORANTHENE	58		22	48		18.87	SATISFACTORY							
	CHRYSENE	150		22	120		22.22	SATISFACTORY							
	DIBENZO(A,H)ANTHRACENE	23		22	27		16.00	SATISFACTORY							
	FLUORANTHENE	160		22	120		28.57	SATISFACTORY							
	FLUORENE	11	J	22	5.4	J	N/A	N/A	SATISFACTORY - THE DIFFERENCE OF THE RESULTS</=2X THE R.L.						
	INDENO(1,2,3-CD)PYRENE	67		22	67		0.00	SATISFACTORY							
	NAPTHTHALENE	11	U	22	11	U	0.00	SATISFACTORY							
	PHENANTHRENE	140		22	91		42.42	SATISFACTORY							
	PYRENE	230		22	190		19.05	SATISFACTORY							

TETRA TECH

INTERNAL CORRESPONDENCE

TO: **M. VED** **DATE:** **AUGUST 18, 2015**

FROM: **EDWARD SEDLMYER** **COPIES:** **DV FILE**

SUBJECT: **INORGANIC AND ORGANIC DATA VALIDATION – PAH / EPH / METALS**
PNS KITTERY
SAMPLE DELIVERY GROUP (SDG) OU8-2

SAMPLES: 8 / Aqueous / PAH / PET / METALS

WTB-GW-FD01-0615	WTB-GW-MW01-0615	WTB-GW-MW02-0615
WTB-GW-MW03-0615	WTB-GW-MW04-0615	WTB-GW-MW05R-0615
WTB-GW-MW06-0615	WTB-GW-MW07-0615	

OVERVIEW

The sample set for PNS Kittery, SDG OU8-2 consisted of eight (8) aqueous samples. The samples were analyzed for polynuclear aromatic hydrocarbons (PAH), extractable petroleum hydrocarbons (EPH), and metals. One field duplicate pair was associated with this SDG: WTB-GW-MW03-0615 / WTB-GW-FD01-0615.

The samples were collected on June 9 and 10, 2015 and analyzed by Katahdin Analytical Laboratory. All analyses were conducted in accordance with a SW-846 Method 8270D Selective Ion-Monitoring (SIM), 6010C, 6020A, 7470A, and Massachusetts Department of Environmental Protection – Extractible Petroleum Hydrocarbons (MADEP- EPH) analytical method and reporting protocols.

The data was evaluated based on the following parameters:

- * Data Completeness
- * Holding Times
- * GC/MS and ICP/MS Instrument Tuning and System Performance
- Initial and Continuing Calibration
- Blank Results
- * Blank Spike/Blank Spike Duplicate Results
- * Matrix Spike/Matrix Spike Duplicate Recoveries
- * Surrogate Spike Recoveries
- * Internal Standard Recoveries
- * ICP Interference Analysis
- * Laboratory Duplicate Results
- * ICP Serial Dilution Results
- * Field Duplicate Precision
- * Analyte Identification and Quantification
- * Detection Limits

The asterisk (*) indicates that all quality control criteria were met for this parameter. Qualified (if applicable) analytical results are summarized in Appendix A. Results as reported by the laboratory are presented in Appendix B. Appendix C contains the documentation to support the findings as discussed in this data validation report.

BLANK RESULTS

Contamination was detected in the laboratory preparation blanks, initial and continuing calibration blanks at the following maximum concentrations:

Analyte	Maximum Concentration (ug/L)	Reporting Limit (RL) (> or <)
Aluminum (1)	18	<RL
Barium (1)	0.43	<RL
Iron (1)	6.1	<RL
Nickel (1)	0.41	<RL
Sodium (1)	44	<RL
Copper (2)	0.785	<RL
Magnesium (2)	9.186	<RL
Barium (3)	0.873	<RL
Chromium (3)	0.521	<RL
Copper (3)	2.154	<RL
Magnesium (3)	8.570	<RL
Sodium (3)	307.2	<RL
Barium (4)	0.36	<RL
Iron (4)	7.6	<RL
Magnesium (4)	12	<RL
Sodium (4)	67	<RL
Aluminum (5)	37.890	<RL
Barium (5)	0.628	<RL
Copper (5)	1.923	<RL
Chromium (6)	0.786	<RL
Aluminum (7)	52.490	<RL
Sodium (7)	96.080	<RL
Selenium (8)	0.27	<RL
Cobalt (9)	0.081	<RL
Antimony (10)	0.016	<RL
Beryllium (10)	0.009	<RL
Cadmium (10)	0.010	<RL
Cobalt (10)	0.013	<RL
Silver (10)	0.007	<RL
Thallium (10)	0.014	<RL

(1) - Maximum concentration detected in the laboratory preparation blank associated with batch IF11ICW2 for 6010 ICP metals.

(2) - Maximum concentration detected in continuing calibration blanks analyzed on June 22, 2015 affecting samples WTB-GW-FD01-0615, WTB-GW-MW03-0615, and WTB-GW-MW04-0615 for 6010 ICP metals.
(3) - Maximum concentration detected in continuing calibration blanks analyzed on June 23, 2015 affecting samples WTB-GW-FD01-0615, WTB-GW-MW01-0615, and WTB-GW-MW05R-0615.
(4) - Maximum concentration detected in the laboratory preparation blank associated with batch IF16ICW1 for 6010 ICP metals.
(5) - Maximum concentration detected in continuing calibration blanks analyzed on June 26, 2015 affecting samples WTB-GW-MW02-0615, WTB-GW-MW06-0615, and WTB-GW-MW07-0615 for 6010 ICP metals.
(6) - Maximum concentration detected in continuing calibration blanks analyzed on June 29, 2015 @17:40 and @18:38 affecting sample WTB-GW-MW02-0615 for 6010 ICP metals.
(7) - Maximum concentration detected in continuing calibration blanks analyzed on June 30, 2015 affecting samples WTB-GW-MW03-0615, WTB-GW-MW04-0615, WTB-GW-MW06-0615, and WTB-GW-MW07-0615.
(8) - Maximum concentration detected in the laboratory preparation blank associated with batch IF11IMW2 for 6020 metals.
(9) - Maximum concentration detected in the laboratory preparation blank associated with batch IF16IMW1 for 6020 metals.
(10) - Maximum concentration detected in continuing calibration blanks analyzed on June 18, 2015 affecting all samples for 6020 ICP metals.

Dilution factor if applicable, were taken into consideration when evaluating for blank contamination. Detected results reported for analytes less than the RL were qualified (U) as nondetects.

INITIAL AND CONTINUING CALIBRATIONS

The PAH continuing calibration %D for naphthalene exceeded the 20% quality control limit on June 6, 2015 @ 15:56 on instrument GCMS-G. The detected naphthalene results for affected samples were qualified as estimated (J).

NOTES

Contamination was detected in the PAH laboratory method blank associated with batch WG164890-1 associated with samples WTB-GW-MW02-0615, WTB-GW-MW06-0615, and WTB-GW-MW07-0615.

Contaminant	Maximum Concentration (ug/L)	Reporting Limit ((RL) (> or <)
Chysene	0.056	<RL
Benzo(k)fluoranthene	0.056	<RL

Dilution factor if applicable, were taken into account when evaluating for blank contamination. No action was taken on this basis because all sample results were nondetect for chrysene and benzo(k)fluoranthene.

Detected results reported below the limit of quantitation (LOQ) but greater than the Method Detection Limit (MDL) were qualified as estimated, (J). Non-detected results were reported to the limit of detection (LOD).

EXECUTIVE SUMMARY

Laboratory Performance Issues: Laboratory blank contamination was noted for metals and resulted in the qualification of data. Continuing calibration %D noncompliance for naphthalene resulted in the qualification of data.

Other Factors Affecting Data Quality: Positive results reported below the LOQ but above the MDL were qualified as estimated.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic Review" (June 2008), the "National Functional Guidelines for Inorganic Review" (January 2010), and the Department of Defense (DoD) document entitled "Quality Systems Manual (QSM) for Environmental Laboratories" (July 2013). The text of this report has been formulated to address only those areas affecting data quality.

Edward Sedlmyer

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Edward Sedlmyer
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Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Regional Worksheets
4. Appendix D- Support Documentation

Data Qualifier Definitions

The following definitions provide brief explanations of the validation qualifiers assigned to results in the data review process.

U	The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted method detection limit for sample and method.
J	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the reporting limit).
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
UJ	The analyte was analyzed for, but was not detected. The reported detection limit is approximate and may be inaccurate or imprecise.
R	The sample result (detected) is unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
UR	The sample result (nondetected) is unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.

APPENDIX A

QUALIFIED ANALYTICAL RESULTS

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (i.e., % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = ICP PDS Recovery Noncompliance; MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; i.e.chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = RPD between columns/detectors >40% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 standard deviations is greater than sample activity
Z1 = Tentatively Identified Compound considered presumptively present
Z2 = Tentatively Identified Compound column bleed
Z3 = Tentatively Identified Compound aldol condensate

PROJ_NO: 03270	NSAMPLE	WTB-GW-FD01-0615			WTB-GW-MW01-0615			WTB-GW-MW02-0615			WTB-GW-MW03-0615		
SDG: OU8-2	LAB_ID	SI4024-4			SI4024-1			SI4157-1			SI4024-3		
FRACTION: PAH	SAMP_DATE	6/10/2015			6/9/2015			6/10/2015			6/10/2015		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF	WTB-GW-MW03-0615											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ACENAPHTHENE		0.097	U		0.094	U		0.094	U		0.098	U	
ACENAPHTHYLENE		0.097	U		0.094	U		0.094	U		0.098	U	
ANTHRACENE		0.097	U		0.094	U		0.094	U		0.098	U	
BENZO(A)ANTHRACENE		0.097	U		0.094	U		0.094	U		0.098	U	
BENZO(A)PYRENE		0.097	U		0.094	U		0.094	U		0.098	U	
BENZO(B)FLUORANTHENE		0.097	U		0.094	U		0.094	U		0.098	U	
BENZO(G,H,I)PERYLENE		0.097	U		0.094	U		0.094	U		0.098	U	
BENZO(K)FLUORANTHENE		0.097	U		0.094	U		0.094	U		0.098	U	
CHRYSENE		0.097	U		0.094	U		0.094	U		0.098	U	
DIBENZO(A,H)ANTHRACENE		0.097	U		0.094	U		0.094	U		0.098	U	
FLUORANTHENE		0.097	U		0.094	U		0.094	U		0.098	U	
FLUORENE		0.097	U		0.094	U		0.094	U		0.098	U	
INDENO(1,2,3-CD)PYRENE		0.13	J	P	0.094	U		0.094	U		0.14	J	P
NAPHTHALENE		0.12	J	CP	0.11	J	CP	0.088	J	P	0.11	J	CP
PHENANTHRENE		0.097	U		0.094	U		0.094	U		0.098	U	
PYRENE		0.097	U		0.094	U		0.094	U		0.098	U	

PROJ_NO: 03270	NSAMPLE	WTB-GW-MW04-0615			WTB-GW-MW05R-0615			WTB-GW-MW06-0615			WTB-GW-MW07-0615		
SDG: OU8-2	LAB_ID	SI4024-5			SI4024-2			SI4157-3			SI4157-2		
FRACTION: PAH	SAMP_DATE	6/10/2015			6/9/2015			6/12/2015			6/11/2015		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ACENAPHTHENE		0.095	U		0.26			0.39			0.094	U	
ACENAPHTHYLENE		0.095	U		0.094	U		0.095	U		0.094	U	
ANTHRACENE		0.095	U		0.13	J	P	0.095	U		0.094	U	
BENZO(A)ANTHRACENE		0.095	U		0.094	U		0.095	U		0.094	U	
BENZO(A)PYRENE		0.095	U		0.094	U		0.095	U		0.094	U	
BENZO(B)FLUORANTHENE		0.095	U		0.094	U		0.095	U		0.094	U	
BENZO(G,H,I)PERYLENE		0.095	U		0.094	U		0.095	U		0.094	U	
BENZO(K)FLUORANTHENE		0.095	U		0.094	U		0.095	U		0.094	U	
CHRYSENE		0.095	U		0.094	U		0.095	U		0.094	U	
DIBENZO(A,H)ANTHRACENE		0.095	U		0.094	U		0.095	U		0.094	U	
FLUORANTHENE		0.095	U		0.15	J	P	0.095	U		0.094	U	
FLUORENE		0.095	U		0.18	J	P	0.14	J	P	0.094	U	
INDENO(1,2,3-CD)PYRENE		0.095	U		0.094	U		0.095	U		0.094	U	
NAPHTHALENE		0.13	J	CP	0.13	J	CP	0.38			0.085	J	P
PHENANTHRENE		0.095	U		0.69			0.12	J	P	0.094	U	
PYRENE		0.095	U		0.12	J	P	0.095	U		0.094	U	

PROJ_NO: 03270	NSAMPLE	WTB-GW-FD01-0615			WTB-GW-MW01-0615			WTB-GW-MW02-0615			WTB-GW-MW03-0615		
SDG: OU8-2	LAB_ID	SI4024-4			SI4024-1			SI4157-1			SI4024-3		
FRACTION: PETS	SAMP_DATE	6/10/2015			6/9/2015			6/10/2015			6/10/2015		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF	WTB-GW-MW03-0615											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
C11-C22 AROMATICS		74	U		71	U		71	U		74	U	
C19-C36 ALIPHATICS		74	U		71	U		71	U		74	U	
C9-C18 ALIPHATICS		74	U		71	U		71	U		74	U	

PROJ_NO: 03270	NSAMPLE	WTB-GW-MW04-0615			WTB-GW-MW05R-0615			WTB-GW-MW06-0615			WTB-GW-MW07-0615		
SDG: OU8-2	LAB_ID	SI4024-5			SI4024-2			SI4157-3			SI4157-2RA		
FRACTION: PETS	SAMP_DATE	6/10/2015			6/9/2015			6/12/2015			6/11/2015		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
C11-C22 AROMATICS		71	U		71	U		71	U		71	U	
C19-C36 ALIPHATICS		71	U		71	U		71	U		71	U	
C9-C18 ALIPHATICS		71	U		71	U		71	U		71	U	

PROJ_NO: 03270	NSAMPLE	WTB-GW-FD01-0615			WTB-GW-MW01-0615			WTB-GW-MW01-0615-DL2			WTB-GW-MW02-0615		
SDG: OU8-2	LAB_ID	SI4024-004			SI4024-001			SI4024-001			SI4157-001		
FRACTION: M	SAMP_DATE	6/10/2015			6/9/2015			6/9/2015			6/10/2015		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF	WTB-GW-MW03-0615											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		83	U	A				89	U	A			
ANTIMONY		0.653	U	A				1	U	A			
ARSENIC		5.3						17	J	P			
BARIUM		181						1100					
BERYLLIUM		0.2	U					1	U				
CADMIUM		0.07	U	A				14.5	U	A			
CALCIUM		63600						862000					
CHROMIUM		1.2	U	A				25.1	U	A			
COBALT		0.59	U	A				48.1					
COPPER		2.6	U	A				22	J				
IRON		5980						12300					
LEAD		4	U					20	U				
MAGNESIUM		15000						54500					
MANGANESE		492						22700					
MERCURY		0.1	U		0.1	U					0.152	J	P
NICKEL		5.64	U	A				421					
POTASSIUM		10400						41200					
SELENIUM		3	U					15	U				
SILVER		0.4	U					1	U	A			
SODIUM		290000						6450000					
THALLIUM		0.4	U					2	U				
VANADIUM		4	U					20	U				
ZINC		7.1	J	P				514					

PROJ_NO: 03270	NSAMPLE	WTB-GW-MW02-0615-DL2			WTB-GW-MW03-0615			WTB-GW-MW03-0615-DL2			WTB-GW-MW04-0615		
SDG: OU8-2	LAB_ID	SI4157-001			SI4024-003			SI4024-003			SI4024-005		
FRACTION: M	SAMP_DATE	6/10/2015			6/10/2015			6/10/2015			6/10/2015		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		46	U	A	92	U	A				69	U	A
ANTIMONY		0.48	U	A				0.696	U	A			
ARSENIC		12	J	P				4.7	J	P			
BARIUM		44.3			181						210		
BERYLLIUM		1	U					0.2	U				
CADMIUM		0.47	U	A				0.065	U	A			
CALCIUM		219000			63100						68100		
CHROMIUM		2.9	U	A	1.2	J	P				1	J	P
COBALT		0.62	U	A				0.604	U	A			
COPPER		12	J	P	3	U	A				4.3	U	A
IRON		15	U	A	6130						6990		
LEAD		23.9			1.5	J	P				1.5	J	P
MAGNESIUM		537000			15300						14100		
MANGANESE		4	U		546						455		
MERCURY					0.1	U					0.1	U	
NICKEL		1.4	J	P	6.06	J	P				69.5		
POTASSIUM		177000			10000						8800		
SELENIUM		15	U					0.31	U	A			
SILVER		2	U					0.4	U				
SODIUM		4620000			306000						210000		
THALLIUM		2	U					0.4	U				
VANADIUM		20	U					4	U				
ZINC		126			7.69	J	P				24.6		

PROJ_NO: 03270	NSAMPLE	WTB-GW-MW04-0615-DL2			WTB-GW-MW05R-0615			WTB-GW-MW05R-0615-DL			WTB-GW-MW06-0615		
SDG: OU8-2	LAB_ID	SI4024-005			SI4024-002			SI4024-002			SI4157-003		
FRACTION: M	SAMP_DATE	6/10/2015			6/9/2015			6/9/2015			6/12/2015		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM								120	U	A			
ANTIMONY		0.14	U	A				0.71	U	A			
ARSENIC		3.6	J	P				20	J	P			
BARIUM								293					
BERYLLIUM		0.2	U					1	U				
CADMIUM		0.2	U					1	U				
CALCIUM								330000					
CHROMIUM								14	U	A			
COBALT		0.55	U	A				4.22	U	A			
COPPER								7.3	U	A			
IRON								417	U	A			
LEAD								20	U				
MAGNESIUM								820000					
MANGANESE								2630					
MERCURY					0.1	U					0.059	J	P
NICKEL								8	U	A			
POTASSIUM								337000					
SELENIUM		0.29	U	A				3.1	U	A			
SILVER		0.4	U					2	U				
SODIUM								7270000					
THALLIUM		0.4	U					2	U				
VANADIUM		4	U					20	U				
ZINC								14	J	P			

PROJ_NO: 03270	NSAMPLE	WTB-GW-MW06-0615-DL2			WTB-GW-MW07-0615			WTB-GW-MW07-0615-DL2		
SDG: OU8-2	LAB_ID	SI4157-003			SI4157-002			SI4157-002		
FRACTION: M	SAMP_DATE	6/12/2015			6/11/2015			6/11/2015		
MEDIA: WATER	QC_TYPE	NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0		
	DUP_OF									
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		62	U	A	287	U	A			
ANTIMONY		0.43	U	A				0.17	U	A
ARSENIC		3.6	J	P				15		
BARIUM		1620			198					
BERYLLIUM		0.2	U					0.041	U	A
CADMIUM		0.063	U	A				0.12	U	A
CALCIUM		111000			61800					
CHROMIUM		2.9	J	P	1.6	J	P			
COBALT		0.918	U	A				3.96		
COPPER		10.7	U	A	2.2	U	A			
IRON		6180			8050					
LEAD		13.1			2.3	J	P			
MAGNESIUM		51400			89000					
MANGANESE		697			2260					
MERCURY					0.1	U				
NICKEL		9.5	J	P	2.5	J	P			
POTASSIUM		28600			45500					
SELENIUM		1.2	J	P				2.77	J	P
SILVER		0.4	U					0.4	U	
SODIUM		725000			1510000					
THALLIUM		0.4	U					0.4	U	
VANADIUM		0.53	J	P				4	U	
ZINC		26.2			17.1	J	P			

APPENDIX B

RESULTS AS REPORTED BY THE LABORATORY

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Cert No E87604

Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI4024-1
Client ID: WTB-GW-MW01-0615
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-2
Lab File ID: G5020.D

Sample Date: 09-JUN-15
Received Date: 10-JUN-15
Extract Date: 11-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164595

Analysis Date: 11-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: AQ
% Solids: NA
Report Date: 29-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	0.11	ug/L	1	.2	0.19	0.060	0.094
Acenaphthylene	U	0.094	ug/L	1	.2	0.19	0.051	0.094
Acenaphthene	U	0.094	ug/L	1	.2	0.19	0.060	0.094
Fluorene	U	0.094	ug/L	1	.2	0.19	0.058	0.094
Phenanthrene	U	0.094	ug/L	1	.2	0.19	0.048	0.094
Anthracene	U	0.094	ug/L	1	.2	0.19	0.042	0.094
Fluoranthene	U	0.094	ug/L	1	.2	0.19	0.069	0.094
Pyrene	U	0.094	ug/L	1	.2	0.19	0.056	0.094
Benzo(a)anthracene	U	0.094	ug/L	1	.2	0.19	0.043	0.094
Chrysene	U	0.094	ug/L	1	.2	0.19	0.034	0.094
Benzo(b)Fluoranthene	U	0.094	ug/L	1	.2	0.19	0.084	0.094
Benzo(k)fluoranthene	U	0.094	ug/L	1	.2	0.19	0.046	0.094
Benzo(a)pyrene	U	0.094	ug/L	1	.2	0.19	0.062	0.094
Indeno(1,2,3-cd)pyrene	U	0.094	ug/L	1	.2	0.19	0.049	0.094
Dibenzo(a,h)anthracene	U	0.094	ug/L	1	.2	0.19	0.066	0.094
Benzo(g,h,i)perylene	U	0.094	ug/L	1	.2	0.19	0.061	0.094
2-Methylnaphthalene-D10		48.3	%					
Fluorene-D10		63.7	%					
pyrene-d10		70.4	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI4024-2
Client ID: WTB-GW-MW05R-0615
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-2
Lab File ID: G5021.D

Sample Date: 09-JUN-15
Received Date: 10-JUN-15
Extract Date: 11-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164595

Analysis Date: 11-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: AQ
% Solids: NA
Report Date: 29-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	0.13	ug/L	1	.2	0.19	0.060	0.094
Acenaphthylene	U	0.094	ug/L	1	.2	0.19	0.051	0.094
Acenaphthene		0.26	ug/L	1	.2	0.19	0.060	0.094
Fluorene	J	0.18	ug/L	1	.2	0.19	0.058	0.094
Phenanthrene		0.69	ug/L	1	.2	0.19	0.048	0.094
Anthracene	J	0.13	ug/L	1	.2	0.19	0.042	0.094
Fluoranthene	J	0.15	ug/L	1	.2	0.19	0.069	0.094
Pyrene	J	0.12	ug/L	1	.2	0.19	0.056	0.094
Benzo(a)anthracene	U	0.094	ug/L	1	.2	0.19	0.043	0.094
Chrysene	U	0.094	ug/L	1	.2	0.19	0.034	0.094
Benzo(b)Fluoranthene	U	0.094	ug/L	1	.2	0.19	0.084	0.094
Benzo(k)fluoranthene	U	0.094	ug/L	1	.2	0.19	0.046	0.094
Benzo(a)pyrene	U	0.094	ug/L	1	.2	0.19	0.062	0.094
Indeno(1,2,3-cd)pyrene	U	0.094	ug/L	1	.2	0.19	0.049	0.094
Dibenzo(a,h)anthracene	U	0.094	ug/L	1	.2	0.19	0.066	0.094
Benzo(g,h,i)perylene	U	0.094	ug/L	1	.2	0.19	0.061	0.094
2-Methylnaphthalene-D10		53.3	%					
Fluorene-D10		61.3	%					
pyrene-d10		89.8	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI4024-3
Client ID: WTB-GW-MW03-0615
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-2
Lab File ID: G5022.D

Sample Date: 10-JUN-15
Received Date: 10-JUN-15
Extract Date: 11-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164595

Analysis Date: 11-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: AQ
% Solids: NA
Report Date: 29-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	0.11	ug/L	1	.2	0.20	0.063	0.098
Acenaphthylene	U	0.098	ug/L	1	.2	0.20	0.053	0.098
Acenaphthene	U	0.098	ug/L	1	.2	0.20	0.063	0.098
Fluorene	U	0.098	ug/L	1	.2	0.20	0.060	0.098
Phenanthrene	U	0.098	ug/L	1	.2	0.20	0.050	0.098
Anthracene	U	0.098	ug/L	1	.2	0.20	0.043	0.098
Fluoranthene	U	0.098	ug/L	1	.2	0.20	0.072	0.098
Pyrene	U	0.098	ug/L	1	.2	0.20	0.058	0.098
Benzo(a)anthracene	U	0.098	ug/L	1	.2	0.20	0.045	0.098
Chrysene	U	0.098	ug/L	1	.2	0.20	0.035	0.098
Benzo(b)Fluoranthene	U	0.098	ug/L	1	.2	0.20	0.087	0.098
Benzo(k)fluoranthene	U	0.098	ug/L	1	.2	0.20	0.048	0.098
Benzo(a)pyrene	U	0.098	ug/L	1	.2	0.20	0.065	0.098
Indeno(1,2,3-cd)pyrene	J	0.14	ug/L	1	.2	0.20	0.051	0.098
Dibenzo(a,h)anthracene	U	0.098	ug/L	1	.2	0.20	0.069	0.098
Benzo(g,h,i)perylene	U	0.098	ug/L	1	.2	0.20	0.064	0.098
2-Methylnaphthalene-D10		52.1	%					
Fluorene-D10		65.9	%					
pyrene-d10		71.2	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI4024-4
Client ID: WTB-GW-FD01-0615
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-2
Lab File ID: G5023.D

Sample Date: 10-JUN-15
Received Date: 10-JUN-15
Extract Date: 11-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164595

Analysis Date: 11-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: AQ
% Solids: NA
Report Date: 29-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	0.12	ug/L	1	.2	0.19	0.062	0.097
Acenaphthylene	U	0.097	ug/L	1	.2	0.19	0.052	0.097
Acenaphthene	U	0.097	ug/L	1	.2	0.19	0.062	0.097
Fluorene	U	0.097	ug/L	1	.2	0.19	0.059	0.097
Phenanthrene	U	0.097	ug/L	1	.2	0.19	0.050	0.097
Anthracene	U	0.097	ug/L	1	.2	0.19	0.043	0.097
Fluoranthene	U	0.097	ug/L	1	.2	0.19	0.071	0.097
Pyrene	U	0.097	ug/L	1	.2	0.19	0.057	0.097
Benzo(a)anthracene	U	0.097	ug/L	1	.2	0.19	0.045	0.097
Chrysene	U	0.097	ug/L	1	.2	0.19	0.035	0.097
Benzo(b)Fluoranthene	U	0.097	ug/L	1	.2	0.19	0.086	0.097
Benzo(k)fluoranthene	U	0.097	ug/L	1	.2	0.19	0.048	0.097
Benzo(a)pyrene	U	0.097	ug/L	1	.2	0.19	0.064	0.097
Indeno(1,2,3-cd)pyrene	J	0.13	ug/L	1	.2	0.19	0.050	0.097
Dibenzo(a,h)anthracene	U	0.097	ug/L	1	.2	0.19	0.068	0.097
Benzo(g,h,i)perylene	U	0.097	ug/L	1	.2	0.19	0.063	0.097
2-Methylnaphthalene-D10		48.6	%					
Fluorene-D10		62.0	%					
pyrene-d10		72.6	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI4024-5
Client ID: WTB-GW-MW04-0615
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-2
Lab File ID: G5024.D

Sample Date: 10-JUN-15
Received Date: 10-JUN-15
Extract Date: 11-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164595

Analysis Date: 11-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: AQ
% Solids: NA
Report Date: 29-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	JMM	0.13	ug/L	1	.2	0.19	0.061	0.095
Acenaphthylene	U	0.095	ug/L	1	.2	0.19	0.051	0.095
Acenaphthene	U	0.095	ug/L	1	.2	0.19	0.061	0.095
Fluorene	U	0.095	ug/L	1	.2	0.19	0.058	0.095
Phenanthrene	U	0.095	ug/L	1	.2	0.19	0.048	0.095
Anthracene	U	0.095	ug/L	1	.2	0.19	0.042	0.095
Fluoranthene	U	0.095	ug/L	1	.2	0.19	0.070	0.095
Pyrene	U	0.095	ug/L	1	.2	0.19	0.056	0.095
Benzo(a)anthracene	U	0.095	ug/L	1	.2	0.19	0.044	0.095
Chrysene	UM	0.095	ug/L	1	.2	0.19	0.034	0.095
Benzo(b)Fluoranthene	U	0.095	ug/L	1	.2	0.19	0.085	0.095
Benzo(k)fluoranthene	U	0.095	ug/L	1	.2	0.19	0.047	0.095
Benzo(a)pyrene	U	0.095	ug/L	1	.2	0.19	0.063	0.095
Indeno(1,2,3-cd)pyrene	UM	0.095	ug/L	1	.2	0.19	0.050	0.095
Dibenzo(a,h)anthracene	U	0.095	ug/L	1	.2	0.19	0.067	0.095
Benzo(g,h,i)perylene	U	0.095	ug/L	1	.2	0.19	0.062	0.095
2-Methylnaphthalene-D10		47.3	%					
Fluorene-D10		56.6	%					
pyrene-d10		67.5	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI4157-1
Client ID: WTB-GW-MW02-0615
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-2
Lab File ID: G5064.D

Sample Date: 10-JUN-15
Received Date: 13-JUN-15
Extract Date: 16-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164890

Analysis Date: 16-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: AQ
% Solids: NA
Report Date: 29-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	0.088	ug/L	1	.2	0.19	0.060	0.094
Acenaphthylene	U	0.094	ug/L	1	.2	0.19	0.051	0.094
Acenaphthene	U	0.094	ug/L	1	.2	0.19	0.060	0.094
Fluorene	U	0.094	ug/L	1	.2	0.19	0.058	0.094
Phenanthrene	U	0.094	ug/L	1	.2	0.19	0.048	0.094
Anthracene	U	0.094	ug/L	1	.2	0.19	0.042	0.094
Fluoranthene	U	0.094	ug/L	1	.2	0.19	0.069	0.094
Pyrene	U	0.094	ug/L	1	.2	0.19	0.056	0.094
Benzo(a)anthracene	U	0.094	ug/L	1	.2	0.19	0.043	0.094
Chrysene	U	0.094	ug/L	1	.2	0.19	0.034	0.094
Benzo(b)Fluoranthene	U	0.094	ug/L	1	.2	0.19	0.084	0.094
Benzo(k)fluoranthene	U	0.094	ug/L	1	.2	0.19	0.046	0.094
Benzo(a)pyrene	U	0.094	ug/L	1	.2	0.19	0.062	0.094
Indeno(1,2,3-cd)pyrene	U	0.094	ug/L	1	.2	0.19	0.049	0.094
Dibenzo(a,h)anthracene	U	0.094	ug/L	1	.2	0.19	0.066	0.094
Benzo(g,h,i)perylene	U	0.094	ug/L	1	.2	0.19	0.061	0.094
2-Methylnaphthalene-D10		61.6	%					
Fluorene-D10		61.3	%					
pyrene-d10		66.6	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI4157-2
Client ID: WTB-GW-MW07-0615
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-2
Lab File ID: G5065.D

Sample Date: 11-JUN-15
Received Date: 13-JUN-15
Extract Date: 16-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164890

Analysis Date: 16-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: AQ
% Solids: NA
Report Date: 29-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	0.085	ug/L	1	.2	0.19	0.060	0.094
Acenaphthylene	U	0.094	ug/L	1	.2	0.19	0.051	0.094
Acenaphthene	U	0.094	ug/L	1	.2	0.19	0.060	0.094
Fluorene	U	0.094	ug/L	1	.2	0.19	0.058	0.094
Phenanthrene	U	0.094	ug/L	1	.2	0.19	0.048	0.094
Anthracene	U	0.094	ug/L	1	.2	0.19	0.042	0.094
Fluoranthene	U	0.094	ug/L	1	.2	0.19	0.069	0.094
Pyrene	U	0.094	ug/L	1	.2	0.19	0.056	0.094
Benzo(a)anthracene	U	0.094	ug/L	1	.2	0.19	0.043	0.094
Chrysene	U	0.094	ug/L	1	.2	0.19	0.034	0.094
Benzo(b)Fluoranthene	U	0.094	ug/L	1	.2	0.19	0.084	0.094
Benzo(k)fluoranthene	U	0.094	ug/L	1	.2	0.19	0.046	0.094
Benzo(a)pyrene	U	0.094	ug/L	1	.2	0.19	0.062	0.094
Indeno(1,2,3-cd)pyrene	U	0.094	ug/L	1	.2	0.19	0.049	0.094
Dibenzo(a,h)anthracene	U	0.094	ug/L	1	.2	0.19	0.066	0.094
Benzo(g,h,i)perylene	U	0.094	ug/L	1	.2	0.19	0.061	0.094
2-Methylnaphthalene-D10		70.6	%					
Fluorene-D10		70.5	%					
pyrene-d10		78.8	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI4157-3
Client ID: WTB-GW-MW06-0615
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-2
Lab File ID: G5066.D

Sample Date: 12-JUN-15
Received Date: 13-JUN-15
Extract Date: 16-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164890

Analysis Date: 16-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: AQ
% Solids: NA
Report Date: 29-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene		0.38	ug/L	1	.2	0.19	0.061	0.095
Acenaphthylene	U	0.095	ug/L	1	.2	0.19	0.051	0.095
Acenaphthene		0.39	ug/L	1	.2	0.19	0.061	0.095
Fluorene	J	0.14	ug/L	1	.2	0.19	0.058	0.095
Phenanthrene	J	0.12	ug/L	1	.2	0.19	0.048	0.095
Anthracene	U	0.095	ug/L	1	.2	0.19	0.042	0.095
Fluoranthene	U	0.095	ug/L	1	.2	0.19	0.070	0.095
Pyrene	U	0.095	ug/L	1	.2	0.19	0.056	0.095
Benzo(a)anthracene	U	0.095	ug/L	1	.2	0.19	0.044	0.095
Chrysene	U	0.095	ug/L	1	.2	0.19	0.034	0.095
Benzo(b)Fluoranthene	U	0.095	ug/L	1	.2	0.19	0.085	0.095
Benzo(k)fluoranthene	U	0.095	ug/L	1	.2	0.19	0.047	0.095
Benzo(a)pyrene	U	0.095	ug/L	1	.2	0.19	0.063	0.095
Indeno(1,2,3-cd)pyrene	U	0.095	ug/L	1	.2	0.19	0.050	0.095
Dibenzo(a,h)anthracene	U	0.095	ug/L	1	.2	0.19	0.067	0.095
Benzo(g,h,i)perylene	U	0.095	ug/L	1	.2	0.19	0.062	0.095
2-Methylnaphthalene-D10		68.7	%					
Fluorene-D10		67.9	%					
pyrene-d10		72.1	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI4024-1
Client ID: WTB-GW-MW01-0615
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-2
Lab File ID: CIF2209.D

Sample Date: 09-JUN-15
Received Date: 10-JUN-15
Extract Date: 11-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164596

Analysis Date: 13-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: AQ
% Solids: NA
Report Date: 24-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	71	ug/L	1	100	94.	47.	71.
C19-C36 Aliphatics	U	71	ug/L	1	100	94.	47.	71.
C11-C22 Aromatics	U	71	ug/L	1	100	94.	47.	71.
5-Alpha Androstane		45.0	%					
o-Terphenyl		58.0	%					
2-Fluorobiphenyl		66.0	%					
2-Bromonaphthalene		65.1	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI4024-2
Client ID: WTB-GW-MW05R-0615
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-2
Lab File ID: CIF2210.D

Sample Date: 09-JUN-15
Received Date: 10-JUN-15
Extract Date: 11-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164596

Analysis Date: 13-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: AQ
% Solids: NA
Report Date: 24-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	71	ug/L	1	100	94.	47.	71.
C19-C36 Aliphatics	U	71	ug/L	1	100	94.	47.	71.
C11-C22 Aromatics	U	71	ug/L	1	100	94.	47.	71.
5-Alpha Androstane		44.0	%					
o-Terphenyl		58.3	%					
2-Fluorobiphenyl		66.5	%					
2-Bromonaphthalene		65.7	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI4024-3
Client ID: WTB-GW-MW03-0615
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-2
Lab File ID: CIF2211.D

Sample Date: 10-JUN-15
Received Date: 10-JUN-15
Extract Date: 11-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164596

Analysis Date: 13-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: AQ
% Solids: NA
Report Date: 24-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	74	ug/L	1	100	98.	49.	74.
C19-C36 Aliphatics	U	74	ug/L	1	100	98.	49.	74.
C11-C22 Aromatics	U	74	ug/L	1	100	98.	49.	74.
5-Alpha Androstane		57.0	%					
o-Terphenyl		62.5	%					
2-Fluorobiphenyl		67.3	%					
2-Bromonaphthalene		66.9	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI4024-4
Client ID: WTB-GW-FD01-0615
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-2
Lab File ID: CIF2212.D

Sample Date: 10-JUN-15
Received Date: 10-JUN-15
Extract Date: 11-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164596

Analysis Date: 13-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: AQ
% Solids: NA
Report Date: 24-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	74	ug/L	1	100	99.	50.	74.
C19-C36 Aliphatics	U	74	ug/L	1	100	99.	50.	74.
C11-C22 Aromatics	U	74	ug/L	1	100	99.	50.	74.
5-Alpha Androstane		50.7	%					
o-Terphenyl		60.5	%					
2-Fluorobiphenyl		61.7	%					
2-Bromonaphthalene		61.3	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI4024-5
Client ID: WTB-GW-MW04-0615
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-2
Lab File ID: CIF2213.D

Sample Date: 10-JUN-15
Received Date: 10-JUN-15
Extract Date: 11-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164596

Analysis Date: 13-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: AQ
% Solids: NA
Report Date: 24-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	71	ug/L	1	100	95.	48.	71.
C19-C36 Aliphatics	U	71	ug/L	1	100	95.	48.	71.
C11-C22 Aromatics	U	71	ug/L	1	100	95.	48.	71.
5-Alpha Androstane		54.4	%					
o-Terphenyl		66.3	%					
2-Fluorobiphenyl		68.6	%					
2-Bromonaphthalene		68.1	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI4157-1
Client ID: WTB-GW-MW02-0615
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-2
Lab File ID: CIF4056.D

Sample Date: 10-JUN-15
Received Date: 13-JUN-15
Extract Date: 17-JUN-15
Extracted By: HG
Extraction Method: SW846 3510
Lab Prep Batch: WG164934

Analysis Date: 19-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: AQ
% Solids: NA
Report Date: 24-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	71	ug/L	1	100	95.	48.	71.
C19-C36 Aliphatics	U	71	ug/L	1	100	95.	48.	71.
C11-C22 Aromatics	U	71	ug/L	1	100	95.	48.	71.
5-Alpha Androstane		44.2	%					
o-Terphenyl		60.3	%					
2-Fluorobiphenyl		70.0	%					
2-Bromonaphthalene		69.8	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI4157-2RA
Client ID: WTB-GW-MW07-0615
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-2
Lab File ID: CIF4068.D

Sample Date: 11-JUN-15
Received Date: 13-JUN-15
Extract Date: 17-JUN-15
Extracted By: HG
Extraction Method: SW846 3510
Lab Prep Batch: WG164934

Analysis Date: 19-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: AQ
% Solids: NA
Report Date: 24-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	71	ug/L	1	100	94.	47.	71.
C19-C36 Aliphatics	U	71	ug/L	1	100	94.	47.	71.
C11-C22 Aromatics	U	71	ug/L	1	100	94.	47.	71.
5-Alpha Androstane		40.3	%					
o-Terphenyl		47.3	%					
2-Fluorobiphenyl		64.4	%					
2-Bromonaphthalene		64.0	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI4157-3
Client ID: WTB-GW-MW06-0615
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-2
Lab File ID: CIF4058.D

Sample Date: 12-JUN-15
Received Date: 13-JUN-15
Extract Date: 17-JUN-15
Extracted By: HG
Extraction Method: SW846 3510
Lab Prep Batch: WG164934

Analysis Date: 19-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: AQ
% Solids: NA
Report Date: 24-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	71	ug/L	1	100	95.	48.	71.
C19-C36 Aliphatics	U	71	ug/L	1	100	95.	48.	71.
C11-C22 Aromatics	U	71	ug/L	1	100	95.	48.	71.
5-Alpha Androstane		42.2	%					
o-Terphenyl		55.4	%					
2-Fluorobiphenyl		64.4	%					
2-Bromonaphthalene		63.8	%					

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INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-GW-MW01-0615

Matrix: WATER **SDG Name:** OU8-2

Percent Solids: 0.00 **Lab Sample ID:** SI4024-001

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	89	J		P	5	1500	75.	500
7440-36-0	ANTIMONY, TOTAL	1.0	J		MS	25	5.0	0.27	2.5
7440-38-2	ARSENIC, TOTAL	17	J		MS	25	25	11.	20
7440-39-3	BARIUM, TOTAL	1100			P	5	25	1.2	15
7440-41-7	BERYLLIUM, TOTAL	1.0	U		MS	25	5.0	0.17	1.0
7440-43-9	CADMIUM, TOTAL	14.5			MS	25	5.0	0.15	1.0
7440-70-2	CALCIUM, TOTAL	862000			P	5	500	55.	400
7440-47-3	CHROMIUM, TOTAL	25.1	J		P	5	50	1.8	20
7440-48-4	COBALT, TOTAL	48.1			MS	25	5.0	0.30	1.5
7440-50-8	COPPER, TOTAL	22	J		P	5	120	3.1	50
7439-89-6	IRON, TOTAL	12300			P	5	500	27.	400
7439-92-1	LEAD, TOTAL	20	U		P	5	25	5.5	20
7439-95-4	MAGNESIUM, TOTAL	54500			P	5	500	39.	400
7439-96-5	MANGANESE, TOTAL	22700			P	25	120	28.	100
7439-97-6	MERCURY, TOTAL	0.10	U		CV	1	0.20	0.013	0.10
7440-02-0	NICKEL, TOTAL	421			P	5	50	1.4	20
7440-09-7	POTASSIUM, TOTAL	41200			P	5	5000	205.	2500
7782-49-2	SELENIUM, TOTAL	15	U		MS	25	25	0.92	15
7440-22-4	SILVER, TOTAL	1.0	J		MS	25	5.0	0.25	2.0
7440-23-5	SODIUM, TOTAL	6450000			P	100	100000	2400.	50000
7440-28-0	THALLIUM, TOTAL	2.0	U		MS	25	5.0	0.30	2.0
7440-62-2	VANADIUM, TOTAL	20	U		MS	25	25	2.5	20
7440-66-6	ZINC, TOTAL	514			P	5	100	3.6	50

Comments:

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INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-GW-MW05R-0615

Matrix: WATER **SDG Name:** OU8-2

Percent Solids: 0.00 **Lab Sample ID:** SI4024-002

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	120	J		P	5	1500	75.	500
7440-36-0	ANTIMONY, TOTAL	0.71	J		MS	25	5.0	0.27	2.5
7440-38-2	ARSENIC, TOTAL	20	J		MS	25	25	11.	20
7440-39-3	BARIUM, TOTAL	293			P	5	25	1.2	15
7440-41-7	BERYLLIUM, TOTAL	1.0	U		MS	25	5.0	0.17	1.0
7440-43-9	CADMIUM, TOTAL	1.0	U		MS	25	5.0	0.15	1.0
7440-70-2	CALCIUM, TOTAL	330000			P	5	500	55.	400
7440-47-3	CHROMIUM, TOTAL	14	J		P	5	50	1.8	20
7440-48-4	COBALT, TOTAL	4.22	J		MS	25	5.0	0.30	1.5
7440-50-8	COPPER, TOTAL	7.3	J		P	5	120	3.1	50
7439-89-6	IRON, TOTAL	417	J		P	5	500	27.	400
7439-92-1	LEAD, TOTAL	20	U		P	5	25	5.5	20
7439-95-4	MAGNESIUM, TOTAL	820000			P	5	500	39.	400
7439-96-5	MANGANESE, TOTAL	2630			P	25	120	28.	100
7439-97-6	MERCURY, TOTAL	0.10	U		CV	1	0.20	0.013	0.10
7440-02-0	NICKEL, TOTAL	8.0	J		P	5	50	1.4	20
7440-09-7	POTASSIUM, TOTAL	337000			P	5	5000	205.	2500
7782-49-2	SELENIUM, TOTAL	3.1	J		MS	25	25	0.92	15
7440-22-4	SILVER, TOTAL	2.0	U		MS	25	5.0	0.25	2.0
7440-23-5	SODIUM, TOTAL	7270000			P	100	100000	2400.	50000
7440-28-0	THALLIUM, TOTAL	2.0	U		MS	25	5.0	0.30	2.0
7440-62-2	VANADIUM, TOTAL	20	U		MS	25	25	2.5	20
7440-66-6	ZINC, TOTAL	14	J		P	5	100	3.6	50

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-GW-MW03-0615

Matrix: WATER **SDG Name:** OU8-2

Percent Solids: 0.00 **Lab Sample ID:** SI4024-003

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	92	J		P	2	600	30.	200
7440-36-0	ANTIMONY, TOTAL	0.696	J		MS	5	1.0	0.055	0.50
7440-38-2	ARSENIC, TOTAL	4.7	J		MS	5	5.0	2.3	4.0
7440-39-3	BARIUM, TOTAL	181			P	1	5.0	0.23	3.0
7440-41-7	BERYLLIUM, TOTAL	0.20	U		MS	5	1.0	0.034	0.20
7440-43-9	CADMIUM, TOTAL	0.065	J		MS	5	1.0	0.030	0.20
7440-70-2	CALCIUM, TOTAL	63100			P	2	200	22.	160
7440-47-3	CHROMIUM, TOTAL	1.2	J		P	1	10	0.36	4.0
7440-48-4	COBALT, TOTAL	0.604	J		MS	5	1.0	0.060	0.30
7440-50-8	COPPER, TOTAL	3.0	J		P	1	25	0.63	10
7439-89-6	IRON, TOTAL	6130			P	1	100	5.4	80
7439-92-1	LEAD, TOTAL	1.5	J		P	1	5.0	1.1	4.0
7439-95-4	MAGNESIUM, TOTAL	15300			P	1	100	7.8	80
7439-96-5	MANGANESE, TOTAL	546			P	2	10	2.2	8.0
7439-97-6	MERCURY, TOTAL	0.10	U		CV	1	0.20	0.013	0.10
7440-02-0	NICKEL, TOTAL	6.06	J		P	1	10	0.28	4.0
7440-09-7	POTASSIUM, TOTAL	10000			P	1	1000	41.	500
7782-49-2	SELENIUM, TOTAL	0.31	J		MS	5	5.0	0.19	3.0
7440-22-4	SILVER, TOTAL	0.40	U		MS	5	1.0	0.050	0.40
7440-23-5	SODIUM, TOTAL	306000			P	2	2000	48.	1000
7440-28-0	THALLIUM, TOTAL	0.40	U		MS	5	1.0	0.060	0.40
7440-62-2	VANADIUM, TOTAL	4.0	U		MS	5	5.0	0.50	4.0
7440-66-6	ZINC, TOTAL	7.69	J		P	1	20	0.72	10

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-GW-FD01-0615

Matrix: WATER **SDG Name:** OU8-2

Percent Solids: 0.00 **Lab Sample ID:** SI4024-004

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	83	J		P	2	600	30.	200
7440-36-0	ANTIMONY, TOTAL	0.653	J		MS	5	1.0	0.055	0.50
7440-38-2	ARSENIC, TOTAL	5.3			MS	5	5.0	2.3	4.0
7440-39-3	BARIUM, TOTAL	181			P	2	10	0.46	6.0
7440-41-7	BERYLLIUM, TOTAL	0.20	U		MS	5	1.0	0.034	0.20
7440-43-9	CADMIUM, TOTAL	0.070	J		MS	5	1.0	0.030	0.20
7440-70-2	CALCIUM, TOTAL	63600			P	2	200	22.	160
7440-47-3	CHROMIUM, TOTAL	1.2	J		P	1	10	0.36	4.0
7440-48-4	COBALT, TOTAL	0.59	J		MS	5	1.0	0.060	0.30
7440-50-8	COPPER, TOTAL	2.6	J		P	1	25	0.63	10
7439-89-6	IRON, TOTAL	5980			P	2	200	11.	160
7439-92-1	LEAD, TOTAL	4.0	U		P	1	5.0	1.1	4.0
7439-95-4	MAGNESIUM, TOTAL	15000			P	1	100	7.8	80
7439-96-5	MANGANESE, TOTAL	492			P	2	10	2.2	8.0
7439-97-6	MERCURY, TOTAL	0.10	U		CV	1	0.20	0.013	0.10
7440-02-0	NICKEL, TOTAL	5.64	J		P	1	10	0.28	4.0
7440-09-7	POTASSIUM, TOTAL	10400			P	2	2000	82.	1000
7782-49-2	SELENIUM, TOTAL	3.0	U		MS	5	5.0	0.19	3.0
7440-22-4	SILVER, TOTAL	0.40	U		MS	5	1.0	0.050	0.40
7440-23-5	SODIUM, TOTAL	290000			P	2	2000	48.	1000
7440-28-0	THALLIUM, TOTAL	0.40	U		MS	5	1.0	0.060	0.40
7440-62-2	VANADIUM, TOTAL	4.0	U		MS	5	5.0	0.50	4.0
7440-66-6	ZINC, TOTAL	7.1	J		P	1	20	0.72	10

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-GW-MW04-0615

Matrix: WATER **SDG Name:** OU8-2

Percent Solids: 0.00 **Lab Sample ID:** SI4024-005

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	69	J		P	2	600	30.	200
7440-36-0	ANTIMONY, TOTAL	0.14	J		MS	5	1.0	0.055	0.50
7440-38-2	ARSENIC, TOTAL	3.6	J		MS	5	5.0	2.3	4.0
7440-39-3	BARIUM, TOTAL	210			P	1	5.0	0.23	3.0
7440-41-7	BERYLLIUM, TOTAL	0.20	U		MS	5	1.0	0.034	0.20
7440-43-9	CADMIUM, TOTAL	0.20	U		MS	5	1.0	0.030	0.20
7440-70-2	CALCIUM, TOTAL	68100		A	P	2	200	22.	160
7440-47-3	CHROMIUM, TOTAL	1.0	J		P	1	10	0.36	4.0
7440-48-4	COBALT, TOTAL	0.55	J		MS	5	1.0	0.060	0.30
7440-50-8	COPPER, TOTAL	4.3	J		P	1	25	0.63	10
7439-89-6	IRON, TOTAL	6990			P	1	100	5.4	80
7439-92-1	LEAD, TOTAL	1.5	J		P	1	5.0	1.1	4.0
7439-95-4	MAGNESIUM, TOTAL	14100			P	1	100	7.8	80
7439-96-5	MANGANESE, TOTAL	455			P	2	10	2.2	8.0
7439-97-6	MERCURY, TOTAL	0.10	U		CV	1	0.20	0.013	0.10
7440-02-0	NICKEL, TOTAL	69.5			P	1	10	0.28	4.0
7440-09-7	POTASSIUM, TOTAL	8800			P	1	1000	41.	500
7782-49-2	SELENIUM, TOTAL	0.29	J		MS	5	5.0	0.19	3.0
7440-22-4	SILVER, TOTAL	0.40	U		MS	5	1.0	0.050	0.40
7440-23-5	SODIUM, TOTAL	210000		A	P	2	2000	48.	1000
7440-28-0	THALLIUM, TOTAL	0.40	U		MS	5	1.0	0.060	0.40
7440-62-2	VANADIUM, TOTAL	4.0	U		MS	5	5.0	0.50	4.0
7440-66-6	ZINC, TOTAL	24.6			P	1	20	0.72	10

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-GW-MW02-0615

Matrix: WATER **SDG Name:** OU8-2

Percent Solids: 0.00 **Lab Sample ID:** SI4157-001

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	46	J		P	1	300	15.	100
7440-36-0	ANTIMONY, TOTAL	0.48	J		MS	25	5.0	0.27	2.5
7440-38-2	ARSENIC, TOTAL	12	J		MS	25	25	11.	20
7440-39-3	BARIUM, TOTAL	44.3			P	1	5.0	0.23	3.0
7440-41-7	BERYLLIUM, TOTAL	1.0	U		MS	25	5.0	0.17	1.0
7440-43-9	CADMIUM, TOTAL	0.47	J		MS	25	5.0	0.15	1.0
7440-70-2	CALCIUM, TOTAL	219000			P	2	200	22.	160
7440-47-3	CHROMIUM, TOTAL	2.9	J		P	2	20	0.72	8.0
7440-48-4	COBALT, TOTAL	0.62	J		MS	25	5.0	0.30	1.5
7440-50-8	COPPER, TOTAL	12	J		P	2	50	1.3	20
7439-89-6	IRON, TOTAL	15	J		P	2	200	11.	160
7439-92-1	LEAD, TOTAL	23.9			P	1	5.0	1.1	4.0
7439-95-4	MAGNESIUM, TOTAL	537000			P	5	500	39.	400
7439-96-5	MANGANESE, TOTAL	4.0	U		P	1	5.0	1.1	4.0
7439-97-6	MERCURY, TOTAL	0.152	J		CV	1	0.20	0.013	0.10
7440-02-0	NICKEL, TOTAL	1.4	J		P	1	10	0.28	4.0
7440-09-7	POTASSIUM, TOTAL	177000			P	1	1000	41.	500
7782-49-2	SELENIUM, TOTAL	15	U		MS	25	25	0.92	15
7440-22-4	SILVER, TOTAL	2.0	U		MS	25	5.0	0.25	2.0
7440-23-5	SODIUM, TOTAL	4620000			P	25	25000	600.	12000
7440-28-0	THALLIUM, TOTAL	2.0	U		MS	25	5.0	0.30	2.0
7440-62-2	VANADIUM, TOTAL	20	U		MS	25	25	2.5	20
7440-66-6	ZINC, TOTAL	126			P	1	20	0.72	10

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-GW-MW07-0615

Matrix: WATER **SDG Name:** OU8-2

Percent Solids: 0.00 **Lab Sample ID:** SI4157-002

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	287	J		P	1	300	15.	100
7440-36-0	ANTIMONY, TOTAL	0.17	J		MS	5	1.0	0.055	0.50
7440-38-2	ARSENIC, TOTAL	15			MS	5	5.0	2.3	4.0
7440-39-3	BARIUM, TOTAL	198			P	1	5.0	0.23	3.0
7440-41-7	BERYLLIUM, TOTAL	0.041	J		MS	5	1.0	0.034	0.20
7440-43-9	CADMIUM, TOTAL	0.12	J		MS	5	1.0	0.030	0.20
7440-70-2	CALCIUM, TOTAL	61800			P	2	200	22.	160
7440-47-3	CHROMIUM, TOTAL	1.6	J		P	1	10	0.36	4.0
7440-48-4	COBALT, TOTAL	3.96			MS	5	1.0	0.060	0.30
7440-50-8	COPPER, TOTAL	2.2	J		P	1	25	0.63	10
7439-89-6	IRON, TOTAL	8050			P	2	200	11.	160
7439-92-1	LEAD, TOTAL	2.3	J		P	1	5.0	1.1	4.0
7439-95-4	MAGNESIUM, TOTAL	89000			P	1	100	7.8	80
7439-96-5	MANGANESE, TOTAL	2260			P	1	5.0	1.1	4.0
7439-97-6	MERCURY, TOTAL	0.10	U		CV	1	0.20	0.013	0.10
7440-02-0	NICKEL, TOTAL	2.5	J		P	1	10	0.28	4.0
7440-09-7	POTASSIUM, TOTAL	45500			P	1	1000	41.	500
7782-49-2	SELENIUM, TOTAL	2.77	J		MS	5	5.0	0.19	3.0
7440-22-4	SILVER, TOTAL	0.40	U		MS	5	1.0	0.050	0.40
7440-23-5	SODIUM, TOTAL	1510000			P	10	10000	240.	5000
7440-28-0	THALLIUM, TOTAL	0.40	U		MS	5	1.0	0.060	0.40
7440-62-2	VANADIUM, TOTAL	4.0	U		MS	5	5.0	0.50	4.0
7440-66-6	ZINC, TOTAL	17.1	J		P	1	20	0.72	10

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-GW-MW06-0615

Matrix: WATER **SDG Name:** OU8-2

Percent Solids: 0.00 **Lab Sample ID:** SI4157-003

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	62	J		P	1	300	15.	100
7440-36-0	ANTIMONY, TOTAL	0.43	J		MS	5	1.0	0.055	0.50
7440-38-2	ARSENIC, TOTAL	3.6	J		MS	5	5.0	2.3	4.0
7440-39-3	BARIUM, TOTAL	1620			P	1	5.0	0.23	3.0
7440-41-7	BERYLLIUM, TOTAL	0.20	U		MS	5	1.0	0.034	0.20
7440-43-9	CADMIUM, TOTAL	0.063	J		MS	5	1.0	0.030	0.20
7440-70-2	CALCIUM, TOTAL	111000			P	2	200	22.	160
7440-47-3	CHROMIUM, TOTAL	2.9	J		P	1	10	0.36	4.0
7440-48-4	COBALT, TOTAL	0.918	J		MS	5	1.0	0.060	0.30
7440-50-8	COPPER, TOTAL	10.7	J		P	1	25	0.63	10
7439-89-6	IRON, TOTAL	6180			P	2	200	11.	160
7439-92-1	LEAD, TOTAL	13.1			P	1	5.0	1.1	4.0
7439-95-4	MAGNESIUM, TOTAL	51400			P	1	100	7.8	80
7439-96-5	MANGANESE, TOTAL	697			P	1	5.0	1.1	4.0
7439-97-6	MERCURY, TOTAL	0.059	J		CV	1	0.20	0.013	0.10
7440-02-0	NICKEL, TOTAL	9.50	J		P	1	10	0.28	4.0
7440-09-7	POTASSIUM, TOTAL	28600			P	1	1000	41.	500
7782-49-2	SELENIUM, TOTAL	1.2	J		MS	5	5.0	0.19	3.0
7440-22-4	SILVER, TOTAL	0.40	U		MS	5	1.0	0.050	0.40
7440-23-5	SODIUM, TOTAL	725000			P	5	5000	120.	2500
7440-28-0	THALLIUM, TOTAL	0.40	U		MS	5	1.0	0.060	0.40
7440-62-2	VANADIUM, TOTAL	0.53	J		MS	5	5.0	0.50	4.0
7440-66-6	ZINC, TOTAL	26.2			P	1	20	0.72	10

Comments:

FORM I - IN

APPENDIX C

REGIONAL WORKSHEETS

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

VOA/SV/Pest/PCB

COMPLETE SDG FILE (CSF) AUDIT

Organic Fractions: _____

Missing Information	Date Lab Contacted	Date Received

Validator: Edward Seidlmayer Date: 8/19/15

See DV Report

EPA-NE - Data Validation
VOA/SV/Pest/PCB-I

Case: PNS Kittery SDG: OU8-2

Sampler: _____ Company: _____ Contacted: Yes No Date: _____

I. PRESERVATION AND HOLDING TIMES - Circle sample numbers with exceeded technical holding times or omitted preservation.
List all required preservation codes and circle omitted preservation codes.
Circle all exceeded technical holding times.
Identify extraction technique after "# of Days"/(*Extraction Code).

Sample No. (TR No.)	Matrix	Pres. Code	Date Sampled	VOA			BNA					PEST/PCB				
				Date Analyzed	# of Days from Sampling to Analysis	Action	Date Extracted	# of Days from Sampling to Extr./(*)	Date Analyzed	# of Days from Sampling to Anal.	Action	Date Extracted	# of Days from Sampling to Extr/.(*)	Date Analyzed	# of Days from Sampling to Anal.	Action

Preservation Code:
1. Cool @ 4°C (± 2°)
2. Preserve with HCl to at least pH 2
3. Protect from light
4. Freeze
5. Room Temperature (Avoid excessive heat)

(*Extraction Code:)
L/L - Liquid/Liquid
SON - Sonication
SEP - Separatory Funnel
SOX - Soxhlet
SPE - Solid Phase Extraction

Action Code:
J - Estimate (J) Detected Values
UJ - Estimate (UJ) Non-Detected Values
R - Reject (R) Non-Detected Values

Validator: Edward Sedlmyer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

VOA/SV-II-A

II A. GC/MS INSTRUMENT PERFORMANCE CHECK – (TUNING) **Note: NOT for Selected Ion Monitoring (SIM) Analysis**

List all Instrument Performance Checks that are outside method QC tuning acceptance criteria.

VOA Instrument Performance Check (Compound Name)	Analysis Date and Time	Instrument	Ions Affected	Percent Relative Abundance	QC Limits	Samples Affected	Action

Comments:

SV Instrument Performance Check (Compound Name)	Analysis Date and Time	Instrument	Ions Affected	Percent Relative Abundance	QC Limits	Samples Affected	Action

Comments:

If tuning compounds and criteria are different from those specified in CLP SOW SOM01.2, the validator should include a copy of the method-specific tuning criteria with this worksheet.

Validator: Edward Seidlmayer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

VOA/SV-II-B

II B. GC/MS INSTRUMENT PERFORMANCE CHECK – 12-hour clock

List all Instrument Performance Checks and/or calibration standards that were analyzed beyond the 12-hour requirement.

Fraction (VOA or SV)	Tune Standard or CCV ID	Injection Date and Time	Time Elapsed (hours)	Samples Affected	Action

Validator: Edward Sedlmayer

Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

Pest/PCB-II-A

II A. GC/ECD INSTRUMENT PERFORMANCE CHECK - Resolution - List all analytes that are outside resolution criteria.

RCM (Section II)	Date/Time	Instr.	Column	Compound	% Resolution	Samples Affected	Action
PEM (Section II and IV)							
INDA & B (Section III)							
INDA & B (Section IV)							

Validator: Edward Sedlmyer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

Pest/PCB-II-B

II B. GC/ECD INSTRUMENT PERFORMANCE CHECK - Retention Times - List all analytes that exceed retention time criteria.

PEM (Section II and IV)	Date/Time	Instr.	Column	Compound	RT Window	RT	Samples Affected	Action
INDA & B (Section IV)								

Validator: Edward Sedlmyer

Date: 8/19/15

See DV Report

EPA NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

Pest/PCB-II-C

II C. GC/ECD INSTRUMENT PERFORMANCE CHECK - Accuracy Check of Initial Calibration

List all analytes that are outside the %D criteria.

PEM Sample ID	Date/Time	Instr.	Column	Compound	%D	Samples Affected	Action

Validator: Edward Seidlmayer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

Pest/PCB-II-D

II D. GC/ECD INSTRUMENT PERFORMANCE CHECK - Pesticide Degradation - List all analytes that exceed degradation criteria.

PEM (Section II)	Date/Time	Instr.	Column	DDT, Endrin, or Combined	% Breakdown	DDD, DDE, Endrin ketone, Endrin aldehyde Present	Samples Affected	Action
PEM (Section IV)								

Validator: Edward Sedlmayer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

Pest/PCB-III

III. INITIAL CALIBRATION - List all analytes that are outside calibration criteria.

INDA/INDB, INDC, or Multicomponent	Date	Instrument	Column	Analytes	Recalculated RT Window	%RSD	Samples Affected	Action
A. % RSD Linearity								
B. Retention Time Windows								

Did the laboratory follow the correct analytical sequence? **Y N**

Did the laboratory analyze the initial calibration at the appropriate concentration levels? **Y N**

Validator: Edward Seidlmayer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

VOA/SV-III

III. INITIAL CALIBRATION - List all analytes that are outside calibration criteria.

Date of ICAL	Instrument	Fraction	Matrix	Compound	%RSD	RRF*	Samples Affected	Action (Detect/ND)

Comments:

* RRF and average RRF

Did the laboratory follow the correct 12-hour clock analytical sequence? If no, fill out Worksheet VOA/SV-II B. **Y N**

Did the laboratory analyze the initial calibration at the appropriate levels? **Y N**

Validator: Edward Seidlmayer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

Pest/PCB-IV-A

IV A. CALIBRATION VERIFICATION - Accuracy Check (%D) - List all analytes that are outside calibration criteria.

Standard ID	Date	Time	Instrument	Column	Analyte	%D	Samples Affected	Action (Detect/ND)

Validator: Edward Sedlmayer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

Pest/PCB-IV-B

IV B. CALIBRATION VERIFICATION – Time Elapsed - List all non-compliant standards.

Fraction (PEST or PCB)	Instrument and Column ID	Instrument Blank or Sample ID	Injection Date and Time	Time Elapsed (hours)	Samples Affected	Action (Detect/ND)

Validator: Edward Seidlmayer

Date: 8/19/15

EPA-NE - Data Validation Worksheet

See DV Report

Case: PNS Kittery SDG: OU8-2

VOA/SV-IV

IV. CONTINUING CALIBRATION - List all analytes that are outside calibration criteria.

Fraction (VOA/SV)	Instrument	Date of ICAL	Date & Time of CCAL	Matrix	Compound	%D	RRF	Samples Affected	Action (Detect/ND)

Comments:

Did the laboratory follow the correct 12-hour clock analytical sequence? If no, fill out Worksheet VOA/SV-II B. **Y N**

Validator: Edward Sedlmyer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

VOA/SV/Pest/PCB-V-A
V. A. BLANK ANALYSIS

List the blank contamination below. Concentration Level:____

Sampler: _____ Company: _____ Contacted: Yes No Date:_____

1. Laboratory: Method, Storage and Instrument Blanks

Fraction/ Matrix	Sample ID (Blank Type)	Date Extracted	Date Analyzed	Instrument/ Column	Compound	Conc. (units)

2. Field: Equipment (Rinsate), Trip and Bottle Blanks

Fraction/ Matrix	Sample ID (Blank Type)	Date Extracted	Date Analyzed	Instrument/ Column	Compound	Conc. (units)

Validator: Edward Sedlmayer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

VOA/SV/Pest/PCB-V-B

V. B. BLANK ACTIONS - List the maximum concentrations of blank compounds.

Compound	Type of Blank	Date Blank Sampled, Originated, or Analyzed	Max. Conc. (unit)	Blank CRQL (unit)	Blank 2xCRQL[1] (unit)	Blank 5xCRQL[2] (unit)	Samples Affected	Action

[1] For methylene chloride, 2-butanone, and acetone only.
[2] For bis(2-ethylhexyl)phthalate only.

Comments: _____

Validator: Edward Sedlmyer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

SV-VI-A

VI A. DEUTERATED MONITORING COMPOUNDs (DMCs) – List all DMC recoveries that are outside the control limits.

Method		Semi-Volatile Method QC Acceptance Criteria															
		Phenol-d_5		BCE		2CP		4MP		NBZ		2NP		DCP		4CA	
SOM01.2		Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil
		39-106	17-103	40-105	12-98	41-106	13-101	25-111	8-100	43-108	16-103	40-108	16-104	37-105	23-104	1-145	1-145
Other:																	
Sample ID	Matrix	% Recovery		% Recovery		% Recovery		% Recovery		% Recovery		% Recovery		% Recovery		% Recovery	

BCE= Bis(2-chloroethyl)ether-d_8
NBZ= Nitrobenzene-d_5
4CA= 4-Chloroaniline-d_4
2CP= 2-Chlorophenol-d_4
2NP= 2-Nitrophenol-d_4
4MP= 4-Methyhlphenol-d_8
DCP= 2,4-Dichlorophenol-d_3

Validator: Edward Sedlmayer

Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

SV-VI-A (Cont'd)

VI A. DEUTERATED MONITORING COMPOUNDs (DMCs) – List all DMC recoveries that are outside the control limits.

Method		Semi-Volatile Method QC Acceptance Criteria															
		DMP		ACY		4NP		FLR		NMP		ANC		PYR		BAP	
SOM01.2		Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil
		47-114	43-111	41-107	20-97	33-116	16-166	42-111	40-108	22-104	1-121	44-110	22-98	52-119	51-120	32-121	43-111
Other:																	
Sample ID	Matrix	% Recovery		% Recovery		% Recovery		% Recovery		% Recovery		% Recovery		% Recovery		% Recovery	

DMP=Dimethylphthalate-d_6 ACY=Acenaphthylene-d_8 4NP=4-Nitrophenol-d_4

FLR=Fluorene-d_{10} NMP=4,6-Dinitro-2-methylphenol-d_2 ANC=Anthracene-d_{10}

PYR=Pyrene-d_{10} BAP=Benzo(a)pyene-d_{12}

Note: Refer to NFG for guidance on actions required for failures in DMC recoveries.

Validator: Edward Seehmyer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

SV-VI-B

VI B. DEUTERATED MONITORING COMPOUNDs (DMCs) for SIM – List all DMC recoveries that are outside the control limits.

Method: SOM01.2		Semi-Volatile Organics by Selected Ion Monitoring Analysis Acceptable QC Criteria					
		Fluoranthene-d_{10} Water 50-150 Soil 50-150	Affected Analytes	Action (Detection/ND)	2-Methylnaphthalene-d_{10} Water 50-150 Soil 50-150	Affected Analytes	Action (Detection/ND)
Sample ID	Matrix	% Recovery			% Recovery		
			Fluoranthene			Naphthalene	
			Pyrene			2-Methylnaphthalene	
			Benzo(a)anthracene			Acenaphthylene	
			Chrysene			Acenaphthene	
			Benzo(b)fluoranthene			Fluorene	
			Benzo(k)fluoranthene			Pentachlorophenol	
			Benzo(a)pyrene			Phenanthrene	
			Indeno(1,2,2-cd)pyrene			Anthracene	
			Dibenzo(a,h)anthracene				
			Benzo(g,h,i)perylene				

Note: Refer to NFG for guidance on actions required for failures in DMC recoveries.

Validator: Edward Sedlmyer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

VOA-VI

VI. DEUTERATED MONITORING COMPOUNDs (DMCs) – List all DMC recoveries that are outside the control limits.

NOTE: The same control limits are applied to the selected ion monitoring (SIM) analysis.

Method		Volatile Method QC Acceptance Criteria													
		Vinyl chloride-d_3		Chloroethane-d_5		DCE		2-Butanone-d_5		Chloroform-d		DCA		Benzene-d_6	
SOM01.2		Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil
		65-131	68-122	71-131	61-130	55-104	45-132	49-155	20-182	78-121	72-123	78-129	79-122	77-124	80-121
Other:															
Sample ID	Matrix	% Recovery		% Recovery		% Recovery		% Recovery		% Recovery		% Recovery		% Recovery	

DCE= 1,1-Dichloroethene –d_2 DCA= 1,2-Dichloroethane-d_4

Validator: Edward Sedlmyer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

VOA-VI (Cont'd)

VI. DEUTERATED MONITORING COMPOUNDs (DMCs) – List all DMC recoveries that are outside the control limits.

NOTE: The same control limits are applied to the selected ion monitoring (SIM) analysis.

Method		Volatile Method QC Acceptance Criteria													
		DPA		Toluene-d_8		TDP		2-Hexanone-d_5		1,4-Dioxane-d_8		TCA		DCZ	
SOM01.2		Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil
		79-124	74-124	77-121	78-121	73-121	72-130	28-135	17-184	50-150	50-150	73-125	56-161	80-131	70-131
Other:															
Sample ID	Matrix	% Recovery		% Recovery		% Recovery		% Recovery		% Recovery		% Recovery		% Recovery	

DPA= 1,2-Dichloropropane –d_6
TCA= 1,1,2,2-Tetracholoroethane-d_2
TDP= trans-1,3-Dichloropropene-d_4
DCZ= 1,2-Dichlorobenzene-d_4

Note: Refer to NFG for guidance on actions required for failures in DMC recoveries.

Validator: Edward Sedlmyer

Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

Pest/PCB-VI

VI. SURROGATE COMPOUNDS: Spike Recoveries and Retention Time Shift

List all surrogate analytes that are outside the percent recovery and retention time criteria.

Method		% Recovery QC Limits				Retention Time Windows				
		Column 1		Column 2		Column 1		Column 2		
		TCX	DCB	TCX	DCB	TCX	DCB	TCX	DCB	
SOM01.2		30-150	30-150	30-150	30-150					
Other:										
Sample Number/Matrix	**Date/Time**	**% Recovery**				**Retention Time Shift**				**Action**

Note: Refer to NFG for guidance on actions required for failures in surrogate recoveries.

Validator: Edward Sedlmyer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

Pest/PCB-VII-C

VII C. PESTICIDE/PCB CLEANUP - Sulfur Cleanup

Sample chromatograms were reviewed and found to be free from interfering sulfur peaks. **Y N**

If no, list the compounds and samples affected by the unacceptable sulfur cleanup.

Samples Affected	Sulfur Interference (Major/Minor/Limited)	Action

Were all target compounds less than QL for the Sulfur blank? **Y N**

Action: Refer to EPA New England Data Review Program Supplement guidance (Section 2.11) for actions to be taken for deficient sulfur cleanup. Comment on any action taken below.

Validator: Edward Sedlmyer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

Pest/PCB-VII-A

VII A. PESTICIDE/PCB CLEANUP - GPC Calibration and Verification

The GPC Calibration data and GPC Calibration Verification Solution recovery data were reviewed and found to meet criteria. **Y N NA**

If no, list the compounds and samples affected by the unacceptable GPC performance.

Date/Time of GPC Calibration or Calib. Verification	GC Analysis Date	Analyte	GPC % Resolution or RT Shift	% Rec	QC Limits	Samples Affected	Action

Were all target compounds less than QL for the GPC blank? **Y N**

Were acceptable GPC Calibration Verifications performed at the correct frequency? **Y N**

Were Aroclor patterns similar to those corresponding Aroclor standards of the Initial Calibration sequence? **Y N**

Action: Refer to National Functional Guidelines for the appropriate action to be taken. Comment on any action taken below:

Validator: Edward Sedlmyer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

VOA/SV-VII

VII. SEMIVOLATILE CLEANUP - GPC Calibration and Verification– List all analytes that are outside method cleanup QC criteria.

Type of Cleanup	Instrument # or Lot #	Date/Time GPC Calibrated or Check Solution Analyzed	Compound	% Rec	QC Limits	Samples Affected	Action

Did the GPC column meet: resolution requirements? Y N

Peak shape requirements? Y N

Retention time shift requirements? Y N

Was the GPC calibration, Silica Gel cleanup checked at the method required frequency with correct compounds and concentrations? Y N

Were all compounds less than QL for the GPC/Silica Gel/Acid-Partition blank? Y N

Did the blank surrogate recoveries and IS area counts and RTs (if added) meet method QC acceptance criteria? Y N

Comments:

Validator: Edward Sedlmayer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

Pest/PCB-VII-B

VII B. PESTICIDE/PCB CLEANUP - Florisil Cartridge Performance Check

The Florisil Cartridge Performance Check recovery data were reviewed and found to meet criteria. **Y N**

If no, list the analytes and samples affected by the unacceptable Florisil Cartridge Check.

Florisil Cartridge Lot #	Date of Florisil Cartridge Check	GC Analysis Date	Analyte	% Rec.	QC Limits	Samples Affected	Action

Were acceptable Florisil Cartridge Performance Checks performed at the correct frequency? **Y N**

Action: Refer to Functional Guidelines for the appropriate action to be taken. Comment on any action taken below:

Validator: Edward Sedlmayer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

VOA/SV/Pest/PCB-VIII

VIII. MATRIX SPIKE/MATRIX SPIKE DUPLICATE - List all MS/MSD analytes that are outside method QC acceptance criteria. Use a separate worksheet for each MS/MSD pair.

Sample # _____ Matrix_____ Concentration Level _____

Fraction	Compound	Column 1			Column 2*			Method QC Limits		Action
		MS % Rec.	MSD % Rec.	RPD	MS % Rec.	MSD % Rec.	RPD	% Recovery	RPD	

* For Pest/PCB only.

Validator: Edward Sedlmayer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

VOA/SV/Pest/PCB-IX

IX. FIELD DUPLICATE PRECISION - List all field duplicate analytes that are outside criteria. Use a separate worksheet for each field duplicate pair.

Sample Number _____ Duplicate Sample Number _____ Matrix _____

Fraction	Compound	Sample Conc.	Sample QL		Duplicate Conc.	Duplicate QL		RPD	QC Acceptance Criteria RPD or NA*	Action
			SQL	2xSQL		SQL	2xSQL			

*For instances where one duplicate result is ND (or reported less than the sample QL).

Does the MS/MSD data indicate acceptable laboratory precision? Y N

Refer to EPA New England Data Review Program Supplemental guidance for field duplicate actions (Section 2.8).

Comments: _____

Sampler Name: _____ Contractor Name: _____ Date Contacted: _____

Reason for Contact and resolution obtained: _____

Validator: Edward Sedlmayer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

VOA/SV/Pest/PCB-X-A

X A. ACCURACY CHECK (Performance Evaluation Results) - List all analytes that are outside criteria.

Are more than one-half of the PES analytes within criteria for each parameter? **Y N**

PE Sample Number	Ampule Number	Fraction	Type of PES	Matrix	Analyte	Conc.	Region I EPA PES Scores*	Non-EPA PES Scores**	Samples Affected	Action

* For Region I PESs indicate the Region I PES Score Report Result: Action High; Action Low; TCL MISS; TCL CONTAMINANT; TIC HIT; TIC MISS; TIC CONTAMINANT

** For Non-EPA PESs indicate the non-EPA PES Score: PES COMPOUND MISS; PES COMPOUND CONTAMINANT; PES COMPOUND HIT (% Recovery Limits)

Refer to EPA New England Data Review Program Supplemental guidance for EPA PES and actions (Section 2.7).

Validator: Edward Seidlmayer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

VOA/SV/Pest/PCB-X-B

X B. ACCURACY CHECK (Laboratory Control Sample [LCS] Results) - List all analytes that are outside criteria.

LCS ID	Matrix	Method	Fraction	Compound	Acceptable %R Range	Column 1 LCS %R	Column 2 LCS %R	Samples Affected	Action

Validator: Edward Sedlmyer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

VOA/SV-XI

XI. INTERNAL STANDARD PERFORMANCE

List the internal standards that are outside the area count and retention time method QC acceptance criteria.

IS Area Count Method QC acceptance criteria: _____

IS Retention Time Method QC acceptance criteria: _____

Sample Number (TRs)	Date and Time Analyzed	Instrument	Fraction	Non-Compliant Internal Standard	Internal Standard Area	RT Shift	Acceptable Range (IS area or RT shift)	Action

Validator: Edward Seidlmayer

Date: 8/19/15

See DV Report

EPA NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

Pest/PCB-XII

XII. ANALYTE IDENTIFICATION

List samples below that contained false positive and/or negative reported results, and samples that contained detected compounds which have a percent difference greater than ±25% between the two columns.

Sample ID	Analyte	Column 1 ID:			Column 2 ID:			%D	Action
		RT	RT Window	Conc.	RT	RT Window	Conc.		

Was GC/MS Confirmation performed for the appropriate samples? **Y N**

Were corresponding Aroclor standards analyzed within 72 hours of the sample(s) with Aroclors detected? **Y N**

Validator: Edward Seidlmayer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

VOA/SV-XII

XII. TARGET COMPOUND IDENTIFICATION – List the analytes that are outside the acceptance criteria.

Sample Number	Compound	MS Ions	RRT	Action

Validator: Edward Seidlmayer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

VOA/SV-XIII

XIII. SAMPLE QUANTITATION AND % SOLIDS

Recalculate, from the raw data, the concentrations for one positive detect and one reported sample quantitation limit for a non-detect in a diluted sample or soil sample per fraction. (Note: Although NFG requires that one calculation for each fraction in each sample be performed, the validator is only required to reproduce an example, for each fraction, of one positive detect and one sample quantitation limit calculation on this worksheet.)

Do all soil/sediment samples have % solids greater than 30%? **Y N**

If no, list sample numbers_____

Refer to EPA New England Data Review Supplemental Program guidance for actions related to %solids (Section 2.10).

Fraction		Calculation
VOA		
Sample No.:		
Reported Compound:		
Reported Value:		
Not Detected Compound:		
Reported Quantitation Limit:		
BNA		
Sample No.:		
Reported Compound:		
Reported Value:		
Not Detected Compound:		
Reported Quantitation Limit:		

Validator: Edward Sedlmayer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

Pest/PCB-XIII

XIII. SAMPLE QUANTITATION AND %SOLIDS

Recalculate, from the raw data, the concentrations for one positive detect and one reported sample quantitation limit for a non-detect in a diluted sample or soil sample per fraction. (Note: Although NFG requires that one calculation for each fraction in each sample be performed, the validator is only required to reproduce an example, for each fraction, of one positive detect and one sample quantitation limit calculation on this worksheet.)

Do all soil/sediment samples have % solids greater than 30%? **Y N**

If no, list sample numbers_____

Refer to EPA New England Data Review Supplemental Program guidance for actions related to %solids (Section 2.10).

Fraction		Calculation
Pesticides		
Sample No.:		
Reported Compound:		
Reported Value:		
Not Detected Compound:		
Reported Quantitation Limit:		
PCB		
Sample No.:		
Reported Compound:		
Reported Value:		
Not Detected Compound:		
Reported Quantitation Limit:		

Validator: Edward Sedlmyer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

Case: PNS Kittery SDG: OU8-2

VOA/SV-XIV

XIV. TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

List the 5 TICs having the highest concentration for each sample parameter.

Sample Number	Fraction	Compound	RRT	Est. Conc.	Action

Validator: Edward Sedlmyer Date: 8/19/15

EPA-NE - Data Validation Worksheet
INORG

Case: PNS Kittery SDG: OU8-2

COMPLETE SDG FILE (CSF) AUDIT

Inorganic Parameters: Metals

Missing Information	Date Lab Contacted	Date Received

Validator: Edward Sedlmyer Date: 8/18/15

See DV Report

EPA-NE - Data Validation Worksheet
INORG-1

Case: PNS Kittery SDG: OU8-2

I. PRESERVATION AND HOLDING TIMES

Circle sample numbers with exceeded technical holding times or omitted preservation.
Circle all exceeded technical holding times.

Sample No.	Matrix	Pres. Code		Date Sampled	Metals		Hg		CN		Action
		Metals	CN		Date Analyzed	# of Days from Samp. to Analysis	Date Analyzed	# of Days from Samp. to Analysis	Date Analyzed	# of Days from Samp. to Analysis	

Preservation Code:
1. Cool (≤ 6°C)
2. pH < 2 with HNO_3
3. pH > 12 with NaOH
4. Room Temperature
5. Freeze
6. Reducing agent (for oxidants)
7. Treated for sulfides
8. Other - _____

Action Code:
J - Estimate (J) Detected Values
UJ - Estimate (UJ) Non-Detected Values
R - Reject (R) Non-Detected Values

Sampler: Edward Sedlmyer ompany: _____ Contacted: Y N Date: _____

Validator: _____ Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet
INORG-II
Case: PNS Kittery SDG: OU8-2

II. ICP-MS TUNE

List all Tunes that are outside method QC acceptance criteria. Use a separate sheet if more than one instrument was used for sample analysis.

Method:_____Instrument ID: _____

Method QC acceptance criteria for mass calibration:_____

Method QC acceptance criteria for resolution check/peak width:_____ at_____% peak height.

Method QC acceptance criteria for % RSD:_____

Analysis Date and Time	Analyte	Mass Calibration			Mass Resolution		% RSD of Absolute Signals	Analyte/Samples Affected	Action
		True Mass (amu)	Measured Mass (amu)	Absolute Difference of Masses (amu)	Peak Width (amu)	% Peak Height			

Comments:

Validator: Edward Seidlmayer

Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet
INORG-III-C/D
Case: PNS Kittery SDG: OU8-2

III. CALIBRATIONS

C. Initial and Continuing Calibration Verifications - List all ICV and CCV analyte recoveries that are outside the method QC acceptance criteria.

ICV method QC acceptance criteria: _____ CCV method QC acceptance criteria: _____

Date/Time	Instrument ID	Analyte	ICV/CCV #	% R	Samples Affected	Action

D. Quantitation Limit Check Standard - List all QL Check Standard analytes that are outside method QC acceptance criteria (for non-CLP methods).

QL Check Standard method QC acceptance criteria: _____

Date	Instr.	Analyte	QL Check Std. #	% R	Affected Range	Samples Affected	Action

Comments: _____

See DV Report

EPA-NE - Data Validation Worksheet

INORG-III-A/B

Case: PNS Kittery SDG: OU8-2

III. CALIBRATIONS

A. Initial Calibration - List all calibration correlation coefficients that are outside the method QC acceptance criteria and/or the y-intercept of the calibration curve that is >CRQL.

Calibration correlation QC acceptance criteria: _____ Calibration Type: _____

Date/Time	Instrument ID	Analyte	Correlation Coefficient.	y-Intercept	CRQL	Samples Affected	Action

B. Initial Calibration Standard Concentration Verifications – Review CLP Form 16-IN and list all calculated %Ds that are >30 of the true value of any non-zero standard.

Date/time	Instrument ID	Analyte	True Conc.	Found Conc.	%D	Samples Affected	Action

Comments: _____

Validator: Edward Sedlmyer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

INORG-IV-C.2

Case: PNS Kittery SDG: OU8-2

IV. BLANKS

C.2 Blank Actions - List the maximum concentrations of each analyte among all blanks associated with each sample.

Analyte	Type of Blank	Date Blank Originated	Max. Conc. (units)	MDL or (-MDL) (units)	CRQL or (-CRQL) (units)	10xCRQL	Samples Affected	Action

Comments:

Refer to EPA I[illegible]gram Supplemental guidance for blank contamination actions (Section 2.6).

Validator: Edward Sedlmayer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

INORG-IV-A/B

Case: PNS Kittery SDG: OU8-2

IV. BLANKS - List the blank contamination and negative blank results below.

Sampler: _____ Company: _____ Contacted: Y N Date: _____

A. Laboratory: Preparation (Method) and Calibration (Instrument) Blanks

Date Prepared	Date Analyzed	Blank Type (ICB/CCB#/Prep Blank)	Matrix	Instrument	Analyte	Concentration	Units

B. Field: Equipment (Rinsate) and Bottle Blanks

Date Sampled	Date Analyzed	Sample No. (Blank Type)	Matrix	Instrument	Analyte	Concentration	Units

Were the proper number of blanks analyzed at the proper frequency? Y N

For ICP MS - Are internal standard responses in all blanks within method QC acceptance criteria? Y N

Comments: _____

Validator: Edward Sedlmyer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet
INORG-IV-C.1

Case: PNS Kittery

SDG: OU8-2

IV. BLANKS

C.1 Blank Contamination Worksheet

Circle or list the highest concentration of each contaminant.

Analyte	Date Analyzed	ICB	CCB							PBW	PBS	EB	BB	Max. Conc.	CRQL
			1	2	3	4	5	6	7						
Aluminum															
Antimony															
Arsenic															
Barium															
Beryllium															
Cadmium															
Calcium															
Chromium															
Cobalt															
Copper															
Iron															
Lead															
Magnesium															
Manganese															
Mercury															
Nickel															
Potassium															
Selenium															
Silver															
Sodium															
Thallium															
Vanadium															
Zinc															
Cyanide															

Validator: Edward Sedlmyer

Date: 8/19/15

See DV Report

EPA NE - Data Validation Worksheet
INORG-V-A
Case: PNS Kittery SDG: OU8-2

V. A. ICP-AES INTERFERENCE CHECK SAMPLE - ICSAB

List all analytes in the ICSAB that are outside ICSAB recovery of 80-120% or outside true value (TV) ± CRQL, whichever is greater.

Date	Analyte	%R	ICSAB Found Conc.	ICSAB True Value	Analyte CRQL	TV ± CRQL	Conc. of Interferents Observed in ICSAB (ug/L)				Associated Samples	Action
							Al	Ca	Fe	Mg		

Comments:

Validator: Edward Sedlmyer

Date: 8/19/15

See DV Report

EPA NE - Data Validation Worksheet
INORG-V-B
Case: PNS Kittery SDG: OU8-2

V. B. ICP-AES INTERFERENCE CHECK SAMPLE - ICSA

List all analytes in the ICSA that are outside ICSA recovery of 80-120% or outside true value (TV) ± CRQL, whichever is greater.

Date	Analyte	%R	ICSA Found Conc.	ICSA True Value	Analyte CRQL	TV ± CRQL	Conc. of Interferents Observed in ICSA (ug/L)				Associated Samples	Action
							Al	Ca	Fe	Mg		

Comments:

Validator: Edward Seidlmayer Date: 8/19/15

See DV Report

EPA NE - Data Validation Worksheet
INORG-VI-A
Case: PNS Kittery SDG: OU8-2

VI. A. ICP-MS INTERFERENCE CHECK SAMPLE - ICSAB

List all analytes in the ICSAB that are outside ICSAB recovery of 80-120% or outside true value (TV) ± 2xCRQL, whichever is greater.

Date	Analyte	%R	ICSAB Found Conc.	ICSAB True Value	Analyte CRQL	TV ± 2xCRQL	Conc. of Interferents Observed in ICSAB (ug/L)				Associated Samples	Action
							Al	Ca	Fe	Mg		

Comments:

Validator: Edward Sedlmyer Date: 8/19/15

See DV Report

EPA NE - Data Validation Worksheet
INORG-VI-B
Case: PNS Kittery SDG: OU8-2

VI. B. ICP-MS INTERFERENCE CHECK SAMPLE - ICSA

List all analytes in the ICSA that are outside ICSA recovery of 80-120% or outside true value (TV) ± 2xCRQL, whichever is greater.

Date	Analyte	%R	ICSA Found Conc.	ICSA True Value	Analyte CRQL	TV ± 2xCRQL	Conc. of Interferents Observed in ICSA (ug/L)				Associated Samples	Action
							Al	Ca	Fe	Mg		

Comments:

Validator: Edward Seidlmayer

Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet
INORG-VII
Case: PNS Kittery SDG: OU8-2

VII. ICP-MS INTERNAL STANDARDS

List all internal standards that are outside method QC acceptance criteria.

Method: _____ Method QC acceptance criteria: _____

Sample Number	Date and Time Analyzed	IS, amu	% RI	Analytes Affected (amu)	Action

Comments:

Validator: Edward Seidlmayer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet
INORG-VIII
Case: PNS Kittery SDG: OU8-2

VIII. MATRIX SPIKES - List all matrix spike analytes that are outside method QC acceptance criteria.

Use a separate worksheet for each matrix spike sample.

Sample No.: _____ Matrix: _____

Method	Analyte	Spiked Sample Result	Sample Result	Amount of Spike Added	MS % Recovery	Method QC Limits % Recovery	Post-Digest Spike % Recovery	Action

Comments:

Refer to EPA New England Data Review Program Supplemental guidance for additional matrix spike actions (Section 2.12).

Validator: Edward Sedlmyer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet
INORG-IX
Case: PNS Kittery SDG: OU8-2

IX. LABORATORY DUPLICATE SAMPLES - List all analytes that are outside method QC acceptance criteria for the specific matrix.

Use a separate worksheet for each laboratory duplicate sample.

Sample No.:_____ Duplicate Sample No.:_____ Matrix:_____

Laboratory duplicate sample method QC acceptance criteria:_____

Method	Analyte	Sample Conc.	Sample		Duplicate Conc.	Duplicate		RPD or Abs. Diff.	QC Acceptance Criteria (RPD or Abs. Diff.)	Action
			SQL	5xSQL		SQL	5xSQL			

Do the field duplicate sample data indicate acceptable field precision? Y N

Comments:_____

Validator: Edward Seidlmayer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet
INORG-X
Case: PNS Kittery SDG: OU8-2

X. FIELD DUPLICATES - List all field duplicate analytes that are outside criteria.

Use a separate worksheet for each field duplicate pair.

Sample No.:_____ Duplicate Sample No.:_____ Matrix:_____

Method	Analyte	Sample Conc.	Sample		Duplicate Conc.	Duplicate		RPD or Abs. Diff.	QC Acceptance Criteria (RPD or Abs. Diff.)	Action
			SQL	5xSQL		SQL	5xSQL			

Do the laboratory duplicate sample data indicate acceptable laboratory precision? Y N
Refer to EPA New England Data Review Program Supplemental guidance for field duplicate actions (Section 2.9).

Comments: _____

Sampler Name: _____ Contractor Name: _____ Date Contacted: _____

Reason for contact and resolution obtained: _____

Validator: Edward Sedlmyer Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

INORG-XI

Case: PNS Kittery SDG: OU8-2

XI. ICP SERIAL DILUTIONS

Use a separate worksheet for each serial dilution sample.

Sample No.:_____ Matrix:_____ Method:_____

List all serial dilution analytes that are outside method QC acceptance criteria.

% Difference method QC acceptance criteria: _____

Minimum concentration required to apply the % D criteria (e.g., 50x MDL): _____

Analyte	MDL	Min. Conc. Required	Sample Result	Serial Dilution Sample Result (corrected for dilution)	% D	Action

Comments:

Validator: Edward Sedlmayer

Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

INORG-XII

Case: PNS Kittery SDG: OU8-2

XII. LABORATORY CONTROL SAMPLES

List all analytes that are outside criteria.

SDG No.:_____ Case:_____

Are more than one-half of the LCS analytes within criteria for each parameter and method? **Y** **N**

Date Prepared	Date Analyzed	Parameter/ Method	Matrix	Analyte	% Recovery (or Observed Conc.)	Method QC Acceptance Criteria	Samples Affected	Action

Comments:

Validator: Edward Seidlmayer

Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

INORG-XIII

Case: PNS Kittery SDG: OU8-2

XIII. PERFORMANCE EVALUATION SAMPLES

List all analytes that are outside criteria.

Indicate the source of the PES: Region 1 EPA PES Non-EPA PES

Are more than one-half of the PES analytes within criteria for each parameter and method? **Y** **N**

PE Sample Number	Ampule Number	Parameter/ Method	Type of PES	Matrix	Analyte	Conc.	PES Score*	Samples Affected	Action

* For Region I PESs indicate the Region I PES Score Report Result: Action High, Action Low, Analyte Missed, Contaminant.
For Non-EPA PESs indicate the Non-EPA PES Score: PES Analyte Missed; PES Analyte Contaminant; PES Analyte Hit (% Recovery Limits).
Refer to EPA New England Data Review Program Supplemental guidance for EPA PES and actions (Section 2.7).

Comments:

Validator: Edward Sedlmyer

Date: 8/19/15

See DV Report

EPA-NE - Data Validation Worksheet

INORG-XIV

Case: PNS Kittery SDG: OU8-2

XIV. ANALYTE QUANTITATION, REPORTED QUANTITATION LIMITS AND % SOLIDS

Recalculate, from the raw data, the concentrations for one positive detect and one reported sample quantitation limit for a non-detect in a diluted sample or soil sample per analytical method

Do all soil/sediment samples have % solids greater than 30%? **Y** **N**

- If no, were any steps employed to address the high moisture content? _____
- Indicate the action and list the affected sample nos.: _____

Refer to EPA New England Data Review Supplemental Program guidance for actions related to %solids (Section 2.10).

Method		Calculation
ICP-AES		
Sample No.:		
Reported Analyte:		
Reported Value:		
Non-Detected Analyte:		
Reported Quantitation Limit:		
ICP-MS		
Sample No.:		
Reported Analyte:		
Reported Value:		
Non-Detected Analyte:		
Reported Quantitation Limit:		
Mercury		
Sample No.:		
Reported Value:		
Sample No.:		
Reported Quantitation Limit:		
Cyanide		
Sample No.:		
Reported Value:		
Sample No.:		
Reported Quantitation Limit:		

Validator: Edward Sedlmyer Date: 8/19/15

APPENDIX D

SUPPORT DOCUMENTATION

ANALYTE	SORT	WTB-GW-MW03-0615	QUAL	WTB-GW-FD01-0615	QUAL	UNITS	RPD	D	RL	QUAL
ALUMINUM	M	200	U	83	J	UG/L	82.68551	117	200	OK
ANTIMONY	M	0.696	J	0.653	J	UG/L	6.375093	0.043	0.5	
ARSENIC	M	4.7	J	5.3		UG/L	12	0.6	4	
BARIUM	M	181		181		UG/L	0	0	3	
CADMIUM	M	0.065	J	0.07	J	UG/L	7.407407	0.005	0.2	
CALCIUM	M	63100		63600		UG/L	0.789266	500	160	
CHROMIUM	M	1.2	J	1.2	J	UG/L	0	0	4	
COBALT	M	0.604	J	0.59	J	UG/L	2.345059	0.014	0.3	
IRON	M	6130		5980		UG/L	2.477291	150	160	
LEAD	M	1.5	J	4	U	UG/L	90.90909	2.5	4	OK
MAGNESIUM	M	15300		15000		UG/L	1.980198	300	80	
MANGANESE	M	546		492		UG/L	10.40462	54	8	
NICKEL	M	6.06	J	5.64	J	UG/L	7.179487	0.42	4	
POTASSIUM	M	10000		10400		UG/L	3.921569	400	500	
SODIUM	M	306000		290000		UG/L	5.369128	16000	1000	
ZINC	M	7.69	J	7.1	J	UG/L	7.978364	0.59	10	
INDENO(1,2,3-CD)PYRENE	SIM	0.14	J	0.13	J	UG/L	7.407407	0.01	0.1	
NAPHTHALENE	SIM	0.11	J	0.12	J	UG/L	8.695652	0.01	0.1	

SAMPLE ID WTB-GW-MW05R-0615

SAMPLE CALC

IS AREA	**DILUTION**	**COMPOUND OF INTEREST**	**IS AMOUNT (NG)**	**Final Extract Volume (UL)**	**AVE RRF**	**CONCENTRATION (UG/L)**
85349	1	95428	0.8	1000	1.2208	0.69

Amt. inj	**Sample Volume (UL)**
1	1060

Phenanthrene = 0.69 ug/L

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SI4024-2
Client ID: WTB-GW-MW05R-0615
Project: Portsmouth Naval Shipyard - WE32 OU
SDG: OU8-2
Lab File ID: G5021.D

Sample Date: 09-JUN-15
Received Date: 10-JUN-15
Extract Date: 11-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164595

Analysis Date: 11-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: AQ
% Solids: NA
Report Date: 29-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	J	0.13	ug/L	1	.2	0.19	0.060	0.094
Acenaphthylene	U	0.094	ug/L	1	.2	0.19	0.051	0.094
Acenaphthene		0.26	ug/L	1	.2	0.19	0.060	0.094
Fluorene	J	0.18	ug/L	1	.2	0.19	0.058	0.094
Phenanthrene		0.69	ug/L	1	.2	0.19	0.048	0.094
Anthracene	J	0.13	ug/L	1	.2	0.19	0.042	0.094
Fluoranthene	J	0.15	ug/L	1	.2	0.19	0.069	0.094
Pyrene	J	0.12	ug/L	1	.2	0.19	0.056	0.094
Benzo(a)anthracene	U	0.094	ug/L	1	.2	0.19	0.043	0.094
Chrysene	U	0.094	ug/L	1	.2	0.19	0.034	0.094
Benzo(b)Fluoranthene	U	0.094	ug/L	1	.2	0.19	0.084	0.094
Benzo(k)fluoranthene	U	0.094	ug/L	1	.2	0.19	0.046	0.094
Benzo(a)pyrene	U	0.094	ug/L	1	.2	0.19	0.062	0.094
Indeno(1,2,3-cd)pyrene	U	0.094	ug/L	1	.2	0.19	0.049	0.094
Dibenzo(a,h)anthracene	U	0.094	ug/L	1	.2	0.19	0.066	0.094
Benzo(g,h,i)perylene	U	0.094	ug/L	1	.2	0.19	0.061	0.094
2-Methylnaphthalene-D10		53.3	%					
Fluorene-D10		61.3	%					
pyrene-d10		89.8	%					

600 Technology Way
P.O. Box 540, Scarborough, ME 04070
Tel:(207) 874-2400 Fax:(207) 775-4029

http://www.katahdinlab.com

Data File: \\target_server\gg\chem\gcms-g.i\G061115.b\G5021.D
Report Date: 29-Jun-2015 10:19

Katahdin Analytical Services

Data file : \\target_server\gg\chem\gcms-g.i\G061115.b\G5021.D
Lab Smp Id: SI4024-2 Client Smp ID: WTB-GW-MW05R-0615
Inj Date : 11-JUN-2015 17:59 MS Autotune Date: 20-DEC-2013 17:08
Operator : JCG Inst ID: gcms-g.i
Smp Info : SI4024-2
Misc Info : WG164598,WG164595,WG164189-4
Comment :
Method : \\target_server\gg\chem\gcms-g.i\G061115.b\GSPSIM42.m
Meth Date : 11-Jun-2015 16:24 cgomez Quant Type: ISTD
Cal Date : 10-JUN-2015 14:05 Cal File: G5013.D
Als bottle: 6
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sw8270sim.sub
Target Version: 4.12
Processing Host: V200T4

Concentration Formula: Amt * DF * Uf*(Vt/Vo*Vi)*1000 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	1.000	Correction Factor
Vt	0.00100	Final Volume (L)
Vo	1.060	Sample Volume (L)
Vi	1.000	Volume injected (uL)
Cpnd Variable		Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/ml)	FINAL (ug/L)	REVIEW CODE
* 9 1,4-Dichlorobenzene-D4	152	6.036	6.037	(1.000)	41550	0.80000	(a)	
* 25 Naphthalene-D8	136	7.866	7.867	(1.000)	145875	0.80000	(a)	
26 Naphthalene	128	7.898	7.899	(1.004)	11717	0.13986	0.132(a)	
$ 31 2-Methylnaphthalene-D10	152	8.939	8.939	(1.136)	106233	1.06653	1.01	
* 46 Acenaphthene-D10	164	10.632	10.633	(1.000)	68375	0.80000	(a)	
47 Acenaphthene	153	10.677	10.678	(1.004)	28315	0.27433	0.259	
$ 54 Fluorene-D10	174	11.456	11.457	(1.077)	90906	1.22546	1.16	
55 Fluorene	166	11.501	11.503	(1.082)	21818	0.19276	0.182(a)	
* 64 Phenanthrene-D10	188	13.004	13.004	(1.000)	85349	0.80000	(a)	
65 Phenanthrene	178	13.035	13.035	(1.002)	95428	0.73272	0.691	
66 Anthracene	178	13.114	13.114	(1.008)	16166	0.13426	0.127(a)	
69 Fluoranthene	202	14.959	14.958	(1.150)	15660	0.15629	0.147(a)	
$ 70 Pyrene-D10	212	15.283	15.282	(0.882)	96014	1.79541	1.69	
71 Pyrene	202	15.307	15.307	(0.883)	10766	0.12452	0.117(a)	
* 75 Chrysene-D12	240	17.333	17.334	(1.000)	29509	0.80000	(a)	
* 82 Perylene-D12	264	19.732	19.732	(1.000)	18856	0.80000	(a)	

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-GW-MW01-0615

Matrix: WATER **SDG Name:** OU8-2

Percent Solids: 0.00 **Lab Sample ID:** SI4024-001

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	89	J		P	5	1500	75.	500
7440-36-0	ANTIMONY, TOTAL	1.0	J		MS	25	5.0	0.27	2.5
7440-38-2	ARSENIC, TOTAL	17	J		MS	25	25	11.	20
7440-39-3	BARIUM, TOTAL	1100			P	5	25	1.2	15
7440-41-7	BERYLLIUM, TOTAL	1.0	U		MS	25	5.0	0.17	1.0
7440-43-9	CADMIUM, TOTAL	14.5			MS	25	5.0	0.15	1.0
7440-70-2	CALCIUM, TOTAL	862000			P	5	500	55.	400
7440-47-3	CHROMIUM, TOTAL	25.1	J		P	5	50	1.8	20
7440-48-4	COBALT, TOTAL	48.1			MS	25	5.0	0.30	1.5
7440-50-8	COPPER, TOTAL	22	J		P	5	120	3.1	50
7439-89-6	IRON, TOTAL	12300			P	5	500	27.	400
7439-92-1	LEAD, TOTAL	20	U		P	5	25	5.5	20
7439-95-4	MAGNESIUM, TOTAL	54500			P	5	500	39.	400
7439-96-5	MANGANESE, TOTAL	22700			P	25	120	28.	100
7439-97-6	MERCURY, TOTAL	0.10	U		CV	1	0.20	0.013	0.10
7440-02-0	NICKEL, TOTAL	421			P	5	50	1.4	20
7440-09-7	POTASSIUM, TOTAL	41200			P	5	5000	205.	2500
7782-49-2	SELENIUM, TOTAL	15	U		MS	25	25	0.92	15
7440-22-4	SILVER, TOTAL	1.0	J		MS	25	5.0	0.25	2.0
7440-23-5	SODIUM, TOTAL	6450000			P	100	100000	2400.	50000
7440-28-0	THALLIUM, TOTAL	2.0	U		MS	25	5.0	0.30	2.0
7440-62-2	VANADIUM, TOTAL	20	U		MS	25	25	2.5	20
7440-66-6	ZINC, TOTAL	514			P	5	100	3.6	50

Comments:

FORM I - IN

SI4024-001

WTB-GW-MW01-0615

Method Name: K6010-2011 Method Revision: 1,854
Analyst Name: GEJ
Acquire Date: 6/23/2015 1:52:54PM Sample Type: Unknown

Elem	Flags	Avg	Units	Stddev	%RSD	Intensity Ratio
Al3961_R		88.99	ug/L	99.65	112.0	11.16
As1891_A		19.39	ug/L	4.082	21.05	0.6010
Au2427_A		286.5	ug/L	2.365	0.8256	99.62
B_2089_A		116.5	ug/L	3.371	2.894	11.19
Ba4554_R		1,098	ug/L	1.930	0.1757	4,517
Be3130_R		-1.112	ug/L	0.9653	86.84	2.091
Ca3158_R	W	861,800	ug/L	4,589	0.5325	118,200
Cd2265_A		19.43	ug/L	0.9850	5.069	35.17
Co2286_A		61.91	ug/L	1.946	3.143	31.19
Cr2677_A		25.11	ug/L	1.734	6.904	59.85
Cu3273_A		22.43	ug/L	7.323	32.65	-41.48
Fe2599_R		12,300	ug/L	145.0	1.179	2,054
K_7664_R		53,430	ug/L	821.9	1.538	2,671
Li6707_R		154.7	ug/L	9.812	6.344	164.6
Mg2025_A		54,490	ug/L	1,215	2.229	835.7
Mn2576_R	W	31,680	ug/L	156.2	0.4931	28,860
Mo2020_A		-5.226	ug/L	0.1271	2.432	-0.8773
Na5895_R	F	7,118,000	ug/L	51,480	0.7232	1,080,000
Ni2316_A		420.8	ug/L	8.115	1.928	109.0
Pb2203_A		0.3161	ug/L	2.616	827.4	-0.1920
Sb2068_A		-2.185	ug/L	0.5383	24.64	1.703
Se1960_A		-14.53	ug/L	52.60	362.0	1.671
Si2516_R		17,080	ug/L	218.2	1.278	835.9
Sn1899_A		-1.152	ug/L	8.685	754.1	1.612
Sr4215_R	W	5,805	ug/L	13.14	0.2264	32,960
Ti3349_A		-1.972	ug/L	3.354	170.1	-26.27
Tl1908_A		-11.76	ug/L	3.798	32.29	-3.630
V_2924_A		-4.106	ug/L	2.786	67.84	-33.63
Zn2062_A		514.1	ug/L	12.56	2.444	145.9
Y_3600_R		9,514.4	Cts/S	35.191	0.36988	9,514.4
Y_2243_A		4,641.7	Cts/S	11.755	0.25325	4,641.7
Y_3600_A		145,460	Cts/S	88.926	0.061136	145,460

SI4024-002

Method Name: K6010-2011 Method Revision: 1,854
Analyst Name: GEJ
Acquire Date: 6/23/2015 1:57:26PM Sample Type: Unknown

Elem	Flags	Avg	Units	Stddev	%RSD	Intensity Ratio
Ag3280_A		1.605	ug/L	4.507	280.9	21.47
Al3961_R		116.8	ug/L	10.34	8.852	-1.765
As1891_A		11.13	ug/L	2.637	23.70	0.4212
Au2427_A		17.05	ug/L	9.931	58.23	5.873
B_2089_A		2,968	ug/L	10.76	0.3625	240.0
Ba4554_R		293.4	ug/L	0.3677	0.1253	1,237
Be3130_R		-0.5731	ug/L	0.006256	1.092	6.530
Ca3158_R	W	330,300	ug/L	2,144	0.6492	44,580
Cd2265_A		-0.5111	ug/L	0.3538	69.22	-0.9509
Co2286_A		6.128	ug/L	0.8251	13.47	8.883
Cr2677_A		14.53	ug/L	3.517	24.21	33.36
Cu3273_A		7.301	ug/L	6.774	92.78	-65.82
Fe2599_R		416.9	ug/L	13.97	3.351	73.14
K_7664_R	W	271,900	ug/L	550.1	0.2023	13,720
Li6707_R		156.0	ug/L	12.56	8.052	163.1
Mg2025_A	W	819,800	ug/L	288.7	0.03522	12,180
Mn2576_R		2,649	ug/L	15.62	0.5896	2,373
Mo2020_A		10.75	ug/L	0.7362	6.850	1.571
Na5895_R	F	5,959,000	ug/L	1,781	0.02989	890,700

TETRA TECH, INC.
PORTSMOUTH NAVAL SHIPYARD
WE32 OU8
SDG: OU8-2
SI4024, SI4157

KATAHDIN ANALYTICAL SERVICES, INC.
600 TECHNOLOGY WAY
SCARBOROUGH, ME 04074

SDG NARRATIVE
KATAHDIN ANALYTICAL SERVICES
TETRA TECH NUS, INC.
PORTSMOUTH NAVAL SHIPYARD – WE32 OU8
OU8-2
SI4024 & SI4157

Sample Receipt

The following samples were received on June 10 and 13, 2015 and were logged in under Katahdin Analytical Services work order numbers SI4024 and SI4157 for a hardcopy due date of July 1, 2015.

KATAHDIN Sample No.	TTNUS Sample Identification
SI4024-1	WTB-GW-MW01-0615
SI4024-2	WTB-GW-MW05R-0615
SI4024-3	WTB-GW-MW03-0615
SI4024-4	WTB-GW-FD01-0615
SI4024-5	WTB-GW-MW04-0615
SI4157-1	WTB-GW-MW02-0615
SI4157-2	WTB-GW-MW07-0615
SI4157-3	WTB-GW-MW06-0615

The samples were logged in for the analyses specified on the chain of custody form. All problems encountered and resolved during sample receipt have been documented on the applicable chain of custody forms.

We certify that the test results provided in this report meet all the requirements of the NELAC standards unless otherwise noted in this narrative or in the Report of Analysis.

Sample analyses have been performed by the methods as noted herein.

Should you have any questions or comments concerning this Report of Analysis, please do not hesitate to contact your Katahdin Analytical Services Project Manager, **Ms. Jennifer Obrin.** This narrative is an integral part of the Report of Analysis.

Organics Analysis

The samples of SDG OU8-2 were analyzed in accordance with "Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods." SW-846, 2nd edition, 1982 (revised 1984), 3rd edition, 1986, and Updates I, II, IIA, III, IIIA, and IIIB 1996, 1998 & 2004, Office of Solid Waste and Emergency Response, U.S. EPA, and/or Method for the Determination of Extractable Petroleum Hydrocarbons (EPH) MADEP, May 2004, Revision 1.1, and/or for the specific methods listed below or on the Report of Analysis.

Sample SI4024-5 was used for the matrix spike (MS) and matrix spike duplicate (MSD), as requested by the client.

EPH Analysis

There were no protocol deviations or observations noted by the organics laboratory staff for this analysis.

8270D SIM Analysis

Samples SI4024-3, 4, 5, and SI4157-2 were manually integrated for the analytes naphthalene and/or indeno(1,2,3-cd)pyrene. The specific reason for the manual integration is indicated on the raw data by the manual integration codes (M1-M11). These codes are further explained in the attachment following this narrative.

The independent check standard (file G5016), associated with the initial calibration analyzed on the G instrument on 06/10/15, had low concentrations for the target analytes benzo(b)fluoranthene and dibenzo(a,h)anthracene, which exceeded the DoD QSM acceptance limit of ±20% of the expected value from the ICAL. The Independent Check Report consists of the full list of spiked analytes, but only the client's list of target analytes are evaluated.

The independent check standard (file G5058), associated with the initial calibration analyzed on the G instrument on 06/16/15, had a low concentrations for the target analyte indeno(1,2,3-cd)pyrene, which exceeded the DoD QSM acceptance limit of ±20% of the expected value from the ICAL.

The CV (file G5017) had a low response for the target analyte naphthalene which resulted in a %D that was greater than the DoD QSM acceptance limit of 20%.

The target analytes chrysene and benzo(k)fluoranthene were detected below ½ of the LOQ, in method blank WG164890-1. According to the DoD QSM section D.1.1.1, a method blank is considered to be contaminated if the concentration of any target analyte in the blank exceeds ½ the reporting limit and is greater than 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Since the method blank was acceptable, no further action was taken.

The reported percent recovery acceptance limits for the aqueous Laboratory Control Samples (LCSs) are statistically derived for the full list of spiked compounds and nominal limits for all additional compounds. The recoveries of the spiked analytes in the LCS, Matrix Spike (MS) and Matrix Spike Duplicate (MSD) are compared to these acceptance limits. Katahdin standard operating procedure is to take corrective action only if the number of spiked analytes in the LCS that are outside of the QC limits is greater than the DoD QSM allowable number of exceedances. If the associated MS/MSD has greater than the allowable number of exceedances, no corrective action is taken, as long the LCS is acceptable.

There were no other protocol deviations or observations noted by the organics laboratory staff.

Metals Analysis

The samples of SDG OU8-2 were prepared and analyzed for metals in accordance with the "Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods" SW-846. 2nd edition, 1982 (revised 1984), 3rd edition, 1986, and Updates I, II, IIA, III, IIIA, and IIIB 1996, 1998 & 2004, Office of Solid Waste and Emergency Response, U.S. EPA.

Inductively-Coupled Plasma Atomic Emission Spectroscopic Analysis (ICP)

Aqueous-matrix Katahdin Sample Numbers SI4024-(1-5) were digested for ICP analysis on 06/11/15 (QC Batch IF11ICW2) in accordance with USEPA Method 3010A. Katahdin Sample Number SI4024-5 was prepared in duplicate and with a matrix-spiked aliquot.

Aqueous-matrix Katahdin Sample Numbers SI4157-(1-3) were digested for ICP analysis on 06/16/15 (QC Batch IF16ICW1) in accordance with USEPA Method 3010A. Duplicate laboratory control samples were prepared in this batch.

ICP analyses of SDG OU8-2 sample digestate was performed using a Thermo ICAP 6500 ICP spectrometer in accordance with USEPA Method 6010C. All samples were analyzed within holding times and all analytical run QC criteria were met.

Inductively-Coupled Plasma Mass Spectrometric Analysis (ICP-MS)

Aqueous-matrix Katahdin Sample Numbers SI4024-(1-5) were digested for ICP-MS analysis on 06/11/15 (QC Batch IF11IMW2) in accordance with USEPA Method 3010A. Katahdin Sample Number SI4024-5 was prepared in duplicate and with a matrix-spiked aliquot.

Aqueous-matrix Katahdin Sample Numbers SI4157-(1-3) were digested for ICP-MS analysis on 06/16/15 (QC Batch IF16IMW1) in accordance with USEPA Method 3010A. Duplicate laboratory control samples were prepared in this batch.

ICP-MS analyses of SDG OU8-2 sample digestates were performed using an Agilent 7500 ICP-MS spectrometer in accordance with USEPA Method 6020A. Results for all standards and samples are reported using the mean of 3 replicate measurements. All sample digestates were diluted by a factor of 5 during analysis to reduce mass interferences from chlorine, which is present in the digestates from the hydrochloric acid used in digesting the samples. All samples were analyzed within holding times and all analytical run QC criteria were met.

Internal standard recoveries for ICP-MS analyses can be found in the raw data section of the accompanying data package. The following table indicates which analytes are associated with each internal standard element.

Internal Standard Element	Associated Analytes
Lithium	Beryllium
Scandium	Sodium, Magnesium, Aluminum, Potassium, Calcium
Germanium	Vanadium, Chromium, Manganese, Iron, Cobalt, Nickel, Copper, Zinc, Arsenic,

	Selenium, Silver, Cadmium
Terbium	Antimony, Barium
Bismuth	Lead, Thallium

Instrument tuning information can also be found in the raw data section in the report labeled "6020 QC Tune Report". The relative standard deviation was determined from 4 replicate measurements. The peak width was measured at 10% of the peak height.

Analysis of Mercury by Cold Vapor Atomic Absorption (CVAA)

Aqueous-matrix Katahdin Sample Numbers SI4024-(1-5) and SI4157-(1-3) were digested for mercury analysis on 06/17/15 (QC Batch IF17HGW3) in accordance with USEPA Method 7470A. Katahdin Sample Number SI4024-5 was prepared in duplicate and with duplicate matrix spiked aliquots. Katahdin Sample Number SI4157-3 was prepared in duplicate and with a matrix spiked aliquot.

Mercury analyses of the SDG OU8-2 sample digestates were performed using a Cetac M6100 automated mercury analyzer in accordance with USEPA Method 7470A. All samples were analyzed within holding times and all analytical run QC criteria were met.

Matrix QC Summary

The measured recoveries of all analytes in the matrix-spiked aliquots of Katahdin Sample Numbers SI4024-5 and SI4157-3 are within the project acceptance criteria (80% - 120% recovery of the added element).

The measured recoveries of calcium and sodium in a post-digestion spike of Katahdin Sample Number SI4024-5 are outside the project acceptance criteria (75% - 125% recovery of the added element). This may be attributable to the native concentration in this sample being much greater than the spike amount added.

The measured recovery of mercury in a post-digestion spike of Katahdin Sample Number SI4157-3 is within the project acceptance criteria (75% - 125% recovery of the added element).

The matrix-spike duplicate analysis of Katahdin Sample Number SI4024-5 is within the laboratory's acceptance limit (<20% relative difference between duplicate matrix-spiked aliquots) for mercury.

The duplicate analyses of Katahdin Sample Numbers SI4024-5 and SI4157-3 are within the laboratory's acceptance limit (<20% relative difference between duplicate aliquots) for all analytes.

The serial dilution analyses of Katahdin Sample Numbers SI4024-5 and SI4157-3 are within the project acceptance limit (<10% relative percent difference, if the concentration in the original sample is greater than 50 times the LOD) for all analytes.

Reporting of Metals Results

Per client request, analytical results for client samples on Form I and preparation blanks on Form IIIP have been reported using the laboratory's limits of detection (LOD). All results were evaluated down to the laboratory's method detection limits (MDLs). Results that fall between the MDL and the LOQ are flagged with "J" in the C-qualifier column, and the measured concentration appears in the concentration column. Results that are less than the MDL are flagged with "U" in the C-qualifier column, and the LOD is listed in the concentration column. These LOQs, MDLs, and LODs have been adjusted for each sample based on the sample amounts used in preparation and analysis.

Analytical results on Forms VA, VD, VII, and IX for client samples, matrix QC samples (duplicates and matrix spikes), and laboratory control samples have been reported down to the laboratory's method detection limits (MDLs). Analytical results that are below the MDLs are flagged with "U" in the C-qualifier column, and the measured concentration is listed in the concentration column.

Analytical results for instrument run QC samples (ICVs, ICBs, etc.) have been reported down to the laboratory's instrument detection limits (IDLs).

IDLs, LODs, MDLs, and LOQs are listed on Form 10 of the accompanying data package.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Operations Manager or the Quality Assurance Officer as verified by the following signature.

Leslie Dimond
07.08.15

Leslie Dimond
Quality Assurance Officer

Katahdin Analytical Services, Inc. **Sample Receipt Condition Report**

Client:	Tetra Tech	KAS PM:	JO	Sampled By:	Client
Project:		KIMS Entry By:	GN	Delivered By:	KAS
KAS Work Order#:	S14024	KIMS Review By:	JO	Received By:	AP
SDG #:	Cooler: 1 of 1			Date/Time Rec.:	6/10/15 1415

Receipt Criteria	Y	N	EX*	NA	Comments and/or Resolution
1. Custody seals present / intact?		✓			
2. Chain of Custody present in cooler?	✓				
3. Chain of Custody signed by client?	✓				
4. Chain of Custody matches samples?	✓				
5. Temperature Blanks present? If not, take temperature of any sample w/ IR gun.	✓				Temp (°C): 2.6
Samples received at <6 °C w/o freezing?	✓				Note: Not required for metals (except Hg) analysis.
Ice packs or ice present?	✓				The lack of ice or ice packs (i.e. no attempt to begin cooling process) or insufficient ice may not meet certain regulatory requirements and may invalidate certain data.
If yes, was there sufficient ice to meet temperature requirements?	✓				
If temp. out, has the cooling process begun (i.e. ice or packs present) and sample collection times <6hrs., but samples are not yet cool?				✓	Note: No cooling process required for metals (except Hg) analysis.
6. Volatiles:					
Aqueous: No bubble larger than a pea?				✓	
Soil/Sediment:					
Received in airtight container?				✓	
Received in methanol?				✓	
Methanol covering soil?				✓	
D.I. Water - Received within 48 hour HT?				✓	
Air: Refer to KAS COC for canister/flow controller requirements.	√ if air included			✓	
7. Trip Blank present in cooler?				✓	
8. Proper sample containers and volume?	✓				
9. Samples within hold time upon receipt?	✓				
10. Aqueous samples properly preserved? Metals, COD, NH3, TKN, O/G, phenol, TPO4, N+N, TOC, DRO, TPH – pH <2	✓				
Sulfide - >9				✓	
Cyanide – pH >12				✓	

* Log-In Notes to Exceptions: document any problems with samples or discrepancies or pH adjustments.

0000008

Katahdin Analytical Services, Inc. **Sample Receipt Condition Report**

Client: T.T.		KAS PM: JO		Sampled By: Client	
Project:		KIMS Entry By: GN		Delivered By: KAS	
KAS Work Order#: 514024		KIMS Review By: JO		Received By: AP	
SDG #:	Cooler: 2 of 4			Date/Time Rec.: 6/10/15 1415	

Receipt Criteria	Y	N	EX*	NA	Comments and/or Resolution
1. Custody seals present / intact?		✓			
2. Chain of Custody present in cooler?	✓				
3. Chain of Custody signed by client?	✓				
4. Chain of Custody matches samples?	✓				
5. Temperature Blanks present? If not, take temperature of any sample w/ IR gun.	✓				Temp (°C): 3.4
Samples received at <6 °C w/o freezing?	✓				Note: Not required for metals (except Hg) analysis.
Ice packs or ice present?	✓				The lack of ice or ice packs (i.e. no attempt to begin cooling process) or insufficient ice may not meet certain regulatory requirements and may invalidate certain data.
If yes, was there sufficient ice to meet temperature requirements?	✓				
If temp. out, has the cooling process begun (i.e. ice or packs present) and sample collection times <6hrs., but samples are not yet cool?				✓	Note: No cooling process required for metals (except Hg) analysis.
6. Volatiles:					
Aqueous: No bubble larger than a pea?				✓	
Soil/Sediment:					
Received in airtight container?				✓	
Received in methanol?				✓	
Methanol covering soil?				✓	
D.I. Water - Received within 48 hour HT?				✓	
Air: Refer to KAS COC for canister/flow controller requirements.	√ if air included				
7. Trip Blank present in cooler?				✓	
8. Proper sample containers and volume?	✓				
9. Samples within hold time upon receipt?	✓				
10. Aqueous samples properly preserved? Metals, COD, NH3, TKN, O/G, phenol, TPO4, N+N, TOC, DRO, TPH – pH <2	✓				
Sulfide - >9				✓	
Cyanide – pH >12				✓	

* Log-In Notes to Exceptions: document any problems with samples or discrepancies or pH adjustments.

0000009

Katahdin Analytical Services, Inc. **Sample Receipt Condition Report**

Client: TT		KAS PM: JC		Sampled By: Client	
Project:		KIMS Entry By: GN		Delivered By: FAS	
KAS Work Order#: S14024		KIMS Review By:		Received By: AP	
SDG #:	Cooler: 3 of 4			Date/Time Rec.: 6/10/15 1415	

Receipt Criteria	Y	N	EX*	NA	Comments and/or Resolution
1. Custody seals present / intact?		✓			
2. Chain of Custody present in cooler?	✓				
3. Chain of Custody signed by client?	✓				
4. Chain of Custody matches samples?	✓				
5. Temperature Blanks present? If not, take temperature of any sample w/ IR gun.	✓				Temp (°C): 1.1
Samples received at <6 °C w/o freezing?	✓				Note: Not required for metals (except Hg) analysis.
Ice packs or ice present?	✓				The lack of ice or ice packs (i.e. no attempt to begin cooling process) or insufficient ice may not meet certain regulatory requirements and may invalidate certain data.
If yes, was there sufficient ice to meet temperature requirements?	✓				
If temp. out, has the cooling process begun (i.e. ice or packs present) and sample collection times <6hrs., but samples are not yet cool?				✓	Note: No cooling process required for metals (except Hg) analysis.
6. Volatiles:					
Aqueous: No bubble larger than a pea?				✓	
Soil/Sediment:					
Received in airtight container?				✓	
Received in methanol?				✓	
Methanol covering soil?				✓	
D.I. Water - Received within 48 hour HT?				✓	
Air: Refer to KAS COC for canister/flow controller requirements.	√ if air included				
7. Trip Blank present in cooler?				✓	
8. Proper sample containers and volume?	✓				
9. Samples within hold time upon receipt?	✓				
10. Aqueous samples properly preserved? Metals, COD, NH3, TKN, O/G, phenol, TPO4, N+N, TOC, DRO, TPH – pH <2	✓				
Sulfide - >9				✓	
Cyanide – pH >12				✓	

* Log-In Notes to Exceptions: document any problems with samples or discrepancies or pH adjustments.

0000010

Katahdin Analytical Services, Inc. **Sample Receipt Condition Report**

Client: TT	KAS PM: JO	Sampled By: Client
Project:	KIMS Entry By: GN	Delivered By: KAS
KAS Work Order#: S14024	KIMS Review By: JO	Received By: AP
SDG #:	Cooler: 4 of 4	Date/Time Rec.: 6/10/15 1545

Receipt Criteria	Y	N	EX*	NA	Comments and/or Resolution
1. Custody seals present / intact?				✓	
2. Chain of Custody present in cooler?	✓				
3. Chain of Custody signed by client?	✓				
4. Chain of Custody matches samples?	✓				
5. Temperature Blanks present? If not, take temperature of any sample w/ IR gun.	✓				Temp (°C): 1.7
Samples received at <6 °C w/o freezing?	✓				Note: Not required for metals (except Hg) analysis.
Ice packs or ice present?	✓				The lack of ice or ice packs (i.e. no attempt to begin cooling process) or insufficient ice may not meet certain regulatory requirements and may invalidate certain data.
If yes, was there sufficient ice to meet temperature requirements?	✓				
If temp. out, has the cooling process begun (i.e. ice or packs present) and sample collection times <6hrs., but samples are not yet cool?				✓	Note: No cooling process required for metals (except Hg) analysis.
6. Volatiles:					
Aqueous: No bubble larger than a pea?				✓	
Soil/Sediment:					
Received in airtight container?				✓	
Received in methanol?				✓	
Methanol covering soil?				✓	
D.I. Water - Received within 48 hour HT?				✓	
Air: Refer to KAS COC for canister/flow controller requirements.	√ if air included			✓	
7. Trip Blank present in cooler?		✓			
8. Proper sample containers and volume?	✓				
9. Samples within hold time upon receipt?	✓				
10. Aqueous samples properly preserved? Metals, COD, NH3, TKN, O/G, phenol, TPO4, N+N, TOC, DRO, TPH – pH <2	✓				
Sulfide - >9				✓	
Cyanide – pH >12				✓	

* Log-In Notes to Exceptions: document any problems with samples or discrepancies or pH adjustments.

0000011

Katahdin Analytical Services, Inc. **Sample Receipt Condition Report**

Client: Tetra Tech	KAS PM: Jo	Sampled By: Client
Project:	KIMS Entry By: GN	Delivered By: Client
KAS Work Order#: SI4157	KIMS Review By:	Received By: GN/
SDG #:	Cooler: 1 of 73 06/13/15	Date/Time Rec.: 6-13-15/10:47

Receipt Criteria	Y	N	EX*	NA	Comments and/or Resolution
1. Custody seals present / intact?		✓			
2. Chain of Custody present in cooler?	✓				
3. Chain of Custody signed by client?	✓				
4. Chain of Custody matches samples?	✓				
5. Temperature Blanks present? If not, take temperature of any sample w/ IR gun.	✓				Temp (°C): -2.2
Samples received at <6 °C w/o freezing?	✓				Note: Not required for metals (except Hg) analysis.
Ice packs or ice present?	✓				The lack of ice or ice packs (i.e. no attempt to begin cooling process) or insufficient ice may not meet certain regulatory requirements and may invalidate certain data.
If yes, was there sufficient ice to meet temperature requirements?	✓				
If temp. out, has the cooling process begun (i.e. ice or packs present) and sample collection times <6hrs., but samples are not yet cool?				✓	Note: No cooling process required for metals (except Hg) analysis.
6. Volatiles:					
Aqueous: No bubble larger than a pea?				✓	
Soil/Sediment:					
Received in airtight container?				✓	
Received in methanol?				✓	
Methanol covering soil?				✓	
D.I. Water - Received within 48 hour HT?				✓	
Air: Refer to KAS COC for canister/flow controller requirements.	√ if air included				
7. Trip Blank present in cooler?				✓	
8. Proper sample containers and volume?	✓				
9. Samples within hold time upon receipt?	✓				
10. Aqueous samples properly preserved? Metals, COD, NH3, TKN, O/G, phenol, TPO4, N+N, TOC, DRO, TPH – pH <2	✓				
Sulfide - >9				✓	
Cyanide – pH >12				✓	

* Log-In Notes to Exceptions: document any problems with samples or discrepancies or pH adjustments.

0000012

Katahdin Analytical Services, Inc. — Sample Receipt Condition Report

Client: Tetra Tech	KAS PM: Jo	Sampled By: Client
Project:	KIMS Entry By: GN	Delivered By: Client
KAS Work Order#: 514157	KIMS Review By: [illegible]	Received By: GN / [illegible]
SDG #:	Cooler: 2 of 3	Date/Time Rec.: 6-13-15 / 10:47

Receipt Criteria	Y	N	EX*	NA	Comments and/or Resolution
1. Custody seals present / intact?		✓			
2. Chain of Custody present in cooler?	✓				
3. Chain of Custody signed by client?	✓				
4. Chain of Custody matches samples?	✓				
5. Temperature Blanks present? If not, take temperature of any sample w/ IR gun.	✓				Temp (°C): 0.2
Samples received at <6 °C w/o freezing?	✓				Note: Not required for metals (except Hg) analysis.
Ice packs or ice present?	✓				The lack of ice or ice packs (i.e. no attempt to begin cooling process) or insufficient ice may not meet certain regulatory requirements and may invalidate certain data.
If yes, was there sufficient ice to meet temperature requirements?	✓				
If temp. out, has the cooling process begun (i.e. ice or packs present) and sample collection times <6hrs., but samples are not yet cool?				✓	Note: No cooling process required for metals (except Hg) analysis.
6. Volatiles:					
Aqueous: No bubble larger than a pea?				✓	
Soil/Sediment:					
Received in airtight container?				✓	
Received in methanol?				✓	
Methanol covering soil?				✓	
D.I. Water - Received within 48 hour HT?				✓	
Air: Refer to KAS COC for canister/flow controller requirements.	√ if air included				
7. Trip Blank present in cooler?				✓	
8. Proper sample containers and volume?	✓				
9. Samples within hold time upon receipt?	✓				
10. Aqueous samples properly preserved? Metals, COD, NH3, TKN, O/G, phenol, TPO4, N+N, TOC, DRO, TPH – pH <2	✓				
Sulfide - >9				✓	
Cyanide – pH >12				✓	

* Log-In Notes to Exceptions: document any problems with samples or discrepancies or pH adjustments.

0000013

Katahdin Analytical Services, Inc. **Sample Receipt Condition Report**

Client: Tetra Tech	KAS PM: Jo	Sampled By: Client
Project:	KIMS Entry By: GN	Delivered By: Client
KAS Work Order#: 5I	KIMS Review By: Jo	Received By: GN
SDG #: Cooler: 3 of 3		Date/Time Rec.: 6-13-15 / 10:47

Receipt Criteria	Y	N	EX*	NA	Comments and/or Resolution
1. Custody seals present / intact?		✓			
2. Chain of Custody present in cooler?	✓				
3. Chain of Custody signed by client?	✓				
4. Chain of Custody matches samples?	✓				
5. Temperature Blanks present? If not, take temperature of any sample w/ IR gun.	✓				Temp (°C): -0.4
Samples received at <6 °C w/o freezing?	✓				Note: Not required for metals (except Hg) analysis.
Ice packs or ice present?	✓				The lack of ice or ice packs (i.e. no attempt to begin cooling process) or insufficient ice may not meet certain regulatory requirements and may invalidate certain data.
If yes, was there sufficient ice to meet temperature requirements?	✓				
If temp. out, has the cooling process begun (i.e. ice or packs present) and sample collection times <6hrs., but samples are not yet cool?				✓	Note: No cooling process required for metals (except Hg) analysis.
6. Volatiles:					
Aqueous: No bubble larger than a pea?				✓	
Soil/Sediment:					
Received in airtight container?				✓	
Received in methanol?				✓	
Methanol covering soil?				✓	
D.I. Water - Received within 48 hour HT?				✓	
Air: Refer to KAS COC for canister/flow controller requirements.	√ if air included				
7. Trip Blank present in cooler?				✓	
8. Proper sample containers and volume?	✓				
9. Samples within hold time upon receipt?	✓				
10. Aqueous samples properly preserved? Metals, COD, NH3, TKN, O/G, phenol, TPO4, N+N, TOC, DRO, TPH – pH <2	✓				
Sulfide - >9				✓	
Cyanide – pH >12				✓	

* Log-In Notes to Exceptions: document any problems with samples or discrepancies or pH adjustments.

0000014

S14024

TETRA TECH NUS, INC. | **CHAIN OF CUSTODY** | **NUMBER** 4915 | **PAGE** 1 **OF** 1

PROJECT NO: 112G03270	FACILITY: OU8 Portsmouth NSY	PROJECT MANAGER: Megan Ved	PHONE NUMBER: 412 921 7271	LABORATORY NAME AND CONTACT: Katahdin Analytical / Jennifer Obrin
SAMPLERS (SIGNATURE): [signature]		FIELD OPERATIONS LEADER: Tim Evans	PHONE NUMBER: 412 921 7281	ADDRESS: 600 Technology Way
		CARRIER/WAYBILL NUMBER		CITY, STATE: Scarborough ME 04074

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G
PRESERVATIVE USED: - HCl HNO3

DATE YEAR 2015	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	PAHs (SIM)	EPH	TAL Metals					COMMENTS
6/9	1208	WTB-GW-MW01-0615	WTB-MW01	—	—	GW	G	5	2	2	1					Sample Salinity = 18.44 ppt
↓	1600	WTB-GW-MW05R-0615	WTB-MW05R	—	—	GW	G	5	2	2	1					= 23.58 ppt
6/10	1000	WTB-GW-MW03-0615	WTB MW03	—	—	GW	G	5	2	2	1					= 1.08 ppt
	0000	WTB-~~GW~~-FD01-061015	—	—	—	QC	G	5	2	2	1					—
↓	1100	WTB-GW-MW04-0615	WTB MW04	—	—	GW	G	15	6	6	3					MS/MSD = 0.41 ppt

1. RELINQUISHED BY [signature]	DATE 6/10/15	TIME 1300	1. RECEIVED BY [signature]	DATE 6-10-15	TIME 1300
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4916 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
112G03270	OU8 Portsmouth NSY	Megan Ved	412 921 7271	Katahdin Analytical Services / Jen Obrin
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
K Joubert		Tim Evans	412 921 7281	600 Technology Way
		CARRIER/WAYBILL NUMBER		CITY, STATE
		Hand deliver @ lab		Scarborough, ME 04074

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G P
PRESERVATIVE USED: – HCL HNO3

DATE YEAR 2015	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	PAHs (SIM) 1 liter amber	EPH 1 liter amber	TAL metals 250 ml				COMMENTS
6/10	1625	WTB-GW-MW02-0615	WTB-MW02	–	–	GW	G	5	2	2	1				Note- Sample Salinity = 12.75ppt
6/11	1755	WTB-GW-MW07-0615	WTB-MW07	–	–	GW	G	5	2	2	1				Sample Salinity = 4.34ppt
6/12	1425	WTB-GW-MW06-0615	WTB-MW06	–	–	GW	G	5	2	2	1				Sample Salinity = 2.53ppt

K Joubert 6/12/15

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
K Joubert	6/13/15	10:47	[illegible]	06/13/15	10:47
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

KATAHDIN ANALYTICAL SERVICES - ORGANIC DATA QUALIFIERS

The sampled date indicated on the attached Report(s) of Analysis (ROA) is the date for which a grab sample was collected or the date for which a composite sample was completed. Beginning and start times for composite samples can be found on the Chain-of-Custody.

U Indicates the compound was analyzed for but not detected above the specified level. This level may be the Limit of Quantitation (LOQ)(previously called Practical Quantitation Level (PQL)), the Limit of Detection (LOD) or Method Detection Limit (MDL) as required by the client.

Note: All results reported as “U” MDL have a 50% rate for false negatives compared to those results reported as “U” PQL/LOQ or “U” LOD, where the rate of false negatives is <1%.

* Compound recovery outside of quality control limits.

D Indicates the result was obtained from analysis of a diluted sample. Surrogate recoveries may not be calculable.

E Estimated value. This flag identifies compounds whose concentrations exceed the upper level of the calibration range of the instrument for that specific analysis.

J Estimated value. The analyte was detected in the sample at a concentration less than the laboratory Limit of Quantitation (LOQ)(previously called Practical Quantitation Limit (PQL)), but above the Method Detection Limit (MDL).

or

J Used for Pesticides, PCBs, Herbicides, Formaldehyde, Explosives and Method 504.1 analytes when there is a greater than 40% difference for detected concentrations between the two GC columns.

B Indicates the analyte was detected in the laboratory method blank analyzed concurrently with the sample.

C Indicates that the flagged compound did not meet DoD criteria in the corresponding daily calibration verification (CV).

L Indicates that the flagged compound did not meet DoD criteria in the corresponding Laboratory Control Sample (LCS) and/or Laboratory Control Sample Duplicate (LCSD) prepared and/or analyzed concurrently with the sample.

M Indicates that the flagged compound did not meet DoD criteria in the Matrix Spike and/or Matrix Spike Duplicate prepared and/or analyzed concurrently with the native sample.

N Presumptive evidence of a compound based on a mass spectral library search.

A Indicates that a tentatively identified compound is a suspected aldol-condensation product.

P Used for Pesticide/Aroclor analyte when there is a greater than 25% difference for detected concentrations between the two GC columns. (for CLP methods only).

METALS SAMPLE FLAGGING

FLAG	SPECIFIED MEANING
E	The reported value is estimated because of the presence of interference (as indicated by serial dilution).
N	The pre-digestion spiked sample recovery is not within control limits.
*	The duplicate sample analysis relative percent difference (RPD) is not within control limits.
B	Indicates the analyte was detected in the laboratory method blank analyzed concurrently with the sample.
A	The post-digestion spiked sample recovery is not within control limits.
•	Analytical run QC sample (e.g. ICV, CCV, ICB, CCB, ICSA, ICSAB) not within control limits.
U	The analyte was not detected above the specified level. This level may be the Limit of Quantitation (LOQ)(previously called Practical Quantitation Level (PQL)), the Limit of Detection (LOD) or Method Detection Limit (MDL) as required by the client. Note: All results reported as “U” MDL have a 50% rate for false negatives compared to those results reported as “U” PQL/LOQ or “U” LOD, where the rate of false negatives is <1%.
J	The analyte was detected in the sample at a concentration less than the laboratory Limit of Quantitation (LOQ) (previously called Practical Quantitation Limit (PQL)), but above the Method Detection Limit (MDL).

KATAHDIN ANALYTICAL SERVICES – INORGANIC DATA QUALIFIERS

The sampled date indicated on the attached Report(s) of Analysis (ROA) is the date for which a grab sample was collected or the date for which a composite sample was completed. Beginning and start times for composite samples can be found on the Chain-of-Custody.

U Indicates the compound was analyzed for but not detected above the specified level. This level may be the Limit of Quantitation (LOQ)(previously called Practical Quantitation Level (PQL)), the Limit of Detection (LOD) or Method Detection Limit (MDL) as required by the client.

Note: All results reported as "U" MDL have a 50% rate for false negatives compared to those results reported as "U" PQL/LOQ or "U" LOD, where the rate of false negatives is <1%.

E Estimated value. This flag identifies compounds whose concentrations exceed the upper level of the calibration range of the instrument for that specific analysis.

J Estimated value. The analyte was detected in the sample at a concentration less than the laboratory Limit of Quantitation (LOQ)(previously called Practical Quantitation Limit (PQL)), but above the Method Detection Limit (MDL).

I-7 The laboratory's Practical Quantitation Level could not be achieved for this parameter due to sample composition, matrix effects, sample volume, or quantity used for analysis.

A-4 Please refer to cover letter or narrative for further information.

H_ Please note that the regulatory holding time for _____ is "analyze immediately". Ideally, this analysis must be performed in the field at the time of sample collection. _____ for this sample was not performed at the time of sample collection. The analysis was performed as soon as possible after receipt by the laboratory.

H1 - pH H2 - DO H3 - sulfide H4 - residual chlorine

T1 The client did not provide the full volume of at least one liter for analysis of TSS. Therefore, the PQL of 2.5 mg/L could not be achieved.

T2 The client provided the required volume of at least one liter for analysis of TSS, but the laboratory could not filter the full one liter volume due to the sample matrix. Therefore, the PQL of 2.5 mg/L could not be achieved.

M1 The matrix spike and/or matrix spike duplicate recovery performed on this sample was outside of the laboratory acceptance criteria. Sample matrix is suspected. The laboratory criteria was met for the Laboratory Control Sample (LCS) analyzed concurrently with this sample.

M2 The matrix spike and/or matrix spike duplicate recovery was outside of the laboratory acceptance criteria. The native sample concentration is greater than four times the spike added concentration so the spike added could not be distinguished from the native sample concentration.

R1 The relative percent difference (RPD) between the duplicate analyses performed on this sample was outside of the laboratory acceptance criteria (when both values are greater than ten times the PQL).

MCL	Maximum Contaminant Level	NL	No limit
NFL	No Free Liquid Present	FLP	Free Liquid Present
NOD	No Odor Detected	TON	Threshold Odor Number

D-1 As required by Method 5210B, APHA Standard Methods for the Examination of Water and Wastewater (21st edition), the BOD value reported for this sample is 'qualified' because the check standard run concurrently with the sample analysis did not meet the criteria specified in the method (198 +/- 30.5 mg/L). These results may not be reportable for compliance purposes.

D-2 The measured final dissolved oxygen concentrations of all dilutions were less than the method-specified limit of 1 mg/L. The reported BOD result was calculated assuming a final oxygen concentration equal to 1 mg/L.

D-3 The dilution water used to prepare this sample did not meet the method and/or regulatory criteria of less than 0.2 or 0.4 mg/L dissolved oxygen (DO) uptake over the five day period of incubation. These results may not be reportable for compliance purposes.

SIM DATA

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 2
System Monitoring Compound Recovery

Lab Name: Katahdin Analytical Services **Project:** Portsmouth Naval Shipyard - WE32 OU8 **Matrix:** AQ
Lab Code: KAS **SDG:** OU8-2

Client Sample ID	Lab Sample ID	Col. ID	2MN	#	FLO	#	PYR	#
WTB-GW-MW01-0615	SI4024-1		48.3		63.7		70.4	
WTB-GW-MW05R-0615	SI4024-2		53.3		61.3		89.8	
WTB-GW-MW03-0615	SI4024-3		52.1		65.9		71.2	
WTB-GW-FD01-0615	SI4024-4		48.6		62.0		72.6	
WTB-GW-MW04-0615	SI4024-5		47.3		56.6		67.5	
WTB-GW-MW02-0615	SI4157-1		61.6		61.3		66.6	
WTB-GW-MW07-0615	SI4157-2		70.6		70.5		78.8	
WTB-GW-MW06-0615	SI4157-3		68.7		67.9		72.1	
Method Blank Sample	WG164595-1		54.6		60.4		100.	
Laboratory Control S	WG164595-2		57.3		60.8		77.0	
Matrix Spike	WG164595-3		56.4		63.6		68.1	
Matrix Spike Duplica	WG164595-4		52.1		60.1		63.7	
Method Blank Sample	WG164890-1		78.5		75.0		100.	
Laboratory Control S	WG164890-2		69.8		69.4		79.4	

		QC Limits
2MN	2-METHYLNAPHTHALENE-D10	43-92
FLO	FLUORENE-D10	29-101
PYR	PYRENE-D10	53-166

= Column to be used to flag recovery limits.
* = Values outside of contract required QC limits.
D= System Monitoring Compound diluted out.

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Method Blank Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : G5018.D
Instrument ID : GCMS-G
Matrix : AQ

SDG : OU8-2
Lab Sample ID : WG164595-1
Date Extracted : 11-JUN-15
Date Analyzed : 11-JUN-15
Time Analyzed : 16:27

This Method Blank applies to the following samples, LCS, MS and MSD:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Laboratory Control S	WG164595-2	G5019.D	06/11/15	16:57
WTB-GW-MW01-0615	SI4024-1	G5020.D	06/11/15	17:28
WTB-GW-MW05R-0615	SI4024-2	G5021.D	06/11/15	17:59
WTB-GW-MW03-0615	SI4024-3	G5022.D	06/11/15	18:30
WTB-GW-FD01-0615	SI4024-4	G5023.D	06/11/15	19:00
WTB-GW-MW04-0615	SI4024-5	G5024.D	06/11/15	19:31
Matrix Spike	WG164595-3	G5025.D	06/11/15	20:01
Matrix Spike Duplica	WG164595-4	G5026.D	06/11/15	20:32

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client:
Lab ID: WG164595-1
Client ID: Method Blank Sample
Project:
SDG: OU8-2
Lab File ID: G5018.D

Sample Date:
Received Date:
Extract Date: 11-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164595

Analysis Date: 11-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: AQ
% Solids: NA
Report Date: 29-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	0.10	ug/L	1	.2	0.20	0.064	0.10
Acenaphthylene	U	0.10	ug/L	1	.2	0.20	0.054	0.10
Acenaphthene	U	0.10	ug/L	1	.2	0.20	0.064	0.10
Fluorene	U	0.10	ug/L	1	.2	0.20	0.061	0.10
Phenanthrene	U	0.10	ug/L	1	.2	0.20	0.051	0.10
Anthracene	U	0.10	ug/L	1	.2	0.20	0.044	0.10
Fluoranthene	U	0.10	ug/L	1	.2	0.20	0.073	0.10
Pyrene	U	0.10	ug/L	1	.2	0.20	0.059	0.10
Benzo(a)anthracene	U	0.10	ug/L	1	.2	0.20	0.046	0.10
Chrysene	U	0.10	ug/L	1	.2	0.20	0.036	0.10
Benzo(b)Fluoranthene	U	0.10	ug/L	1	.2	0.20	0.089	0.10
Benzo(k)fluoranthene	U	0.10	ug/L	1	.2	0.20	0.049	0.10
Benzo(a)pyrene	U	0.10	ug/L	1	.2	0.20	0.066	0.10
Indeno(1,2,3-cd)pyrene	U	0.10	ug/L	1	.2	0.20	0.052	0.10
Dibenzo(a,h)anthracene	U	0.10	ug/L	1	.2	0.20	0.070	0.10
Benzo(g,h,i)perylene	U	0.10	ug/L	1	.2	0.20	0.065	0.10
2-Methylnaphthalene-D10		54.6	%					
Fluorene-D10		60.4	%					
pyrene-d10		100.	%					

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Cert No E87604

LCS Recovery Report

Client:
Lab ID: WG164595-2
Client ID: LCS
Project:
SDG: OU8-2
LCS File ID: G5019.D

Sample Date:
Received Date:
Extract Date: 11-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164595

Analysis Date: 11-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: AQ
% Solids: NA
Report Date: 29-JUN-15

Compound	Recovery (%)	Conc Added	Conc Recovered	Conc Units	Limits
Naphthalene	47.8	2.00	0.956	ug/L	42-96
Acenaphthylene	59.5	2.00	1.19	ug/L	17-92
Acenaphthene	61.0	2.00	1.22	ug/L	34-92
Fluorene	60.5	2.00	1.21	ug/L	22-112
Phenanthrene	71.0	2.00	1.42	ug/L	60-107
Anthracene	72.5	2.00	1.45	ug/L	59-110
Fluoranthene	80.5	2.00	1.61	ug/L	69-119
Pyrene	74.0	2.00	1.48	ug/L	36-118
Benzo(a)anthracene	83.5	2.00	1.67	ug/L	57-107
Chrysene	74.0	2.00	1.48	ug/L	62-119
Benzo(b)Fluoranthene	65.5	2.00	1.31	ug/L	55-111
Benzo(k)fluoranthene	73.5	2.00	1.47	ug/L	47-107
Benzo(a)pyrene	72.5	2.00	1.45	ug/L	53-99
Indeno(1,2,3-cd)pyrene	76.0	2.00	1.52	ug/L	60-110
Dibenzo(a,h)anthracene	75.0	2.00	1.50	ug/L	62-115
Benzo(g,h,i)perylene	78.5	2.00	1.57	ug/L	55-103
2-Methylnaphthalene-D10	57.3				43-92
Fluorene-D10	60.8				29-101
pyrene-d10	77.0				53-166

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Method Blank Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : G5059.D
Instrument ID : GCMS-G
Matrix : AQ

SDG : OU8-2
Lab Sample ID : WG164890-1
Date Extracted : 16-JUN-15
Date Analyzed : 16-JUN-15
Time Analyzed : 18:09

This Method Blank applies to the following samples, LCS, MS and MSD:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Laboratory Control S	WG164890-2	G5060.D	06/16/15	18:39
WTB-GW-MW02-0615	SI4157-1	G5064.D	06/16/15	20:38
WTB-GW-MW07-0615	SI4157-2	G5065.D	06/16/15	21:08
WTB-GW-MW06-0615	SI4157-3	G5066.D	06/16/15	21:38

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client:
Lab ID: WG164890-1
Client ID: Method Blank Sample
Project:
SDG: OU8-2
Lab File ID: G5059.D

Sample Date:
Received Date:
Extract Date: 16-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164890

Analysis Date: 16-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: AQ
% Solids: NA
Report Date: 29-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Naphthalene	U	0.10	ug/L	1	.2	0.20	0.064	0.10
Acenaphthylene	U	0.10	ug/L	1	.2	0.20	0.054	0.10
Acenaphthene	U	0.10	ug/L	1	.2	0.20	0.064	0.10
Fluorene	U	0.10	ug/L	1	.2	0.20	0.061	0.10
Phenanthrene	U	0.10	ug/L	1	.2	0.20	0.051	0.10
Anthracene	U	0.10	ug/L	1	.2	0.20	0.044	0.10
Fluoranthene	U	0.10	ug/L	1	.2	0.20	0.073	0.10
Pyrene	U	0.10	ug/L	1	.2	0.20	0.059	0.10
Benzo(a)anthracene	U	0.10	ug/L	1	.2	0.20	0.046	0.10
Chrysene	J	0.056	ug/L	1	.2	0.20	0.036	0.10
Benzo(b)Fluoranthene	U	0.10	ug/L	1	.2	0.20	0.089	0.10
Benzo(k)fluoranthene	J	0.056	ug/L	1	.2	0.20	0.049	0.10
Benzo(a)pyrene	U	0.10	ug/L	1	.2	0.20	0.066	0.10
Indeno(1,2,3-cd)pyrene	U	0.10	ug/L	1	.2	0.20	0.052	0.10
Dibenzo(a,h)anthracene	U	0.10	ug/L	1	.2	0.20	0.070	0.10
Benzo(g,h,i)perylene	U	0.10	ug/L	1	.2	0.20	0.065	0.10
2-Methylnaphthalene-D10		78.5	%					
Fluorene-D10		75.0	%					
pyrene-d10		100.	%					

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ANALYTICAL SERVICES

Cert No E87604

LCS Recovery Report

Client:
Lab ID: WG164890-2
Client ID: LCS
Project:
SDG: OU8-2
LCS File ID: G5060.D

Sample Date:
Received Date:
Extract Date: 16-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164890

Analysis Date: 16-JUN-15
Analyst: JCG
Analysis Method: SW846 M8270D
Matrix: AQ
% Solids: NA
Report Date: 29-JUN-15

Compound	Recovery (%)	Conc Added	Conc Recovered	Conc Units	Limits
Naphthalene	59.5	2.00	1.19	ug/L	42-96
Acenaphthylene	64.5	2.00	1.29	ug/L	17-92
Acenaphthene	66.0	2.00	1.32	ug/L	34-92
Fluorene	66.5	2.00	1.33	ug/L	22-112
Phenanthrene	76.0	2.00	1.52	ug/L	60-107
Anthracene	80.0	2.00	1.60	ug/L	59-110
Fluoranthene	90.0	2.00	1.80	ug/L	69-119
Pyrene	79.0	2.00	1.58	ug/L	36-118
Benzo(a)anthracene	89.0	2.00	1.78	ug/L	57-107
Chrysene	85.0	2.00	1.70	ug/L	62-119
Benzo(b)Fluoranthene	96.5	2.00	1.93	ug/L	55-111
Benzo(k)fluoranthene	89.0	2.00	1.78	ug/L	47-107
Benzo(a)pyrene	89.0	2.00	1.78	ug/L	53-99
Indeno(1,2,3-cd)pyrene	78.0	2.00	1.56	ug/L	60-110
Dibenzo(a,h)anthracene	79.5	2.00	1.59	ug/L	62-115
Benzo(g,h,i)perylene	87.0	2.00	1.74	ug/L	55-103
2-Methylnaphthalene-D10	69.8				43-92
Fluorene-D10	69.4				29-101
pyrene-d10	79.4				53-166

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Form 5
Semivolatile Organic Instrument Performance Check

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : GD622.D
Instrument ID : GCMS-G

SDG : OU8-2
Date Analyzed : 10-JUN-15
Time Analyzed : 12:16

m/e	Ion Abundance Criteria	% Relative Abundance		
51	30.0 - 60.0% of mass 198	37.3		
68	Less than 2.0% of mass 69	0.5	1.34	1
69	Less than 100.0% of mass 198	36.8		
70	Less than 2.0% of mass 69	0.2	0.61	1
127	40.0 - 60.0% of mass 198	58.9		
197	Less than 1.0% of mass 198	0.0		
198	Base Peak, 100% relative abundance	100		
199	5.0 - 9.0% of mass 198	6.8		
275	10.0 - 30.0% of mass 198	19.4		
365	1.0 - 100.0% of mass 198	2.0		
441	0.0 - 100.0% of mass 443	9.3	74.31	2
442	40.0 - 100.0% of mass 198	63.3		
443	17.0 - 23.0% of mass 442	12.5	19.67	3

1-Value is % mass 69
2-Value is % mass 443
3-Value is % mass 442

This check applies to the following samples, LCS, MS, MSD and standards:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Initial Calibration	WG164189-4	G5010.D	06/10/15	12:34
Initial Calibration	WG164189-2	G5011.D	06/10/15	13:05
Initial Calibration	WG164189-3	G5012.D	06/10/15	13:35
Initial Calibration	WG164189-5	G5013.D	06/10/15	14:05
Initial Calibration	WG164189-6	G5014.D	06/10/15	14:36
Initial Calibration	WG164189-7	G5015.D	06/10/15	15:06
Independent Source	WG164189-8	G5016.D	06/10/15	15:37

Form 6
Initial Calibration Summary

Lab Name : Katahdin Analytical Services
SDG: OU8-2
Project : Portsmouth Naval Shipyard - WE32 OU8
Instrument ID: GCMS-G
Lab File IDs : G5011.D G5012.D G5010.D G5013.D G5014.D G5015.D
Column ID:
Calibration Date(s): 10-JUN-15 12:34
10-JUN-15 15:06

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Crv					Max	
	0.2000000	0.5000000	1.0000	3.0000	7.0000	10.0000	New	b	m1	m2	%RSD	%RSD	
Naphthalene	35605	103276	212855	612913	1283374	1601692	QUA	0.12657	0.59443	0.07739	0.99757	0.99000	O
Acenaphthylene	1.93690	2.04218	2.02449	1.99340	1.73484	1.62322	AVG		1.89250		9.13217	15.00000	O
Acenaphthene	1.33645	1.29149	1.29863	1.17458	1.11462	1.02999	AVG		1.20763		10.01953	15.00000	O
Fluorene	1.28752	1.46557	1.46112	1.34781	1.24830	1.13549	AVG		1.32430		9.67070	15.00000	O
Phenanthrene	1.30882	1.33445	1.32308	1.17710	1.14000	1.04114	AVG		1.22076		9.81893	15.00000	O
Anthracene	1.06683	1.19318	1.22832	1.16475	1.11843	1.00021	AVG		1.12862		7.50011	15.00000	O
Fluoranthene	0.79513	1.00446	1.02159	1.00702	0.97364	0.83312	AVG		0.93916		10.52387	15.00000	O
Pyrene	2.72094	2.57943	2.52586	2.31947	2.01846	1.89930	AVG		2.34391		13.95455	15.00000	O
Benzo(a)anthracene	0.96273	0.85072	0.99797	1.00232	1.01771	0.98472	AVG		0.96936		6.29174	15.00000	O
Chrysene	12469	39969	75142	230256	526568	597435	LNR	-0.32411	1.16631		0.99680	0.99000	O
Benzo(b)fluoranthene	1772	8144	21220	83630	253926	327700	LNR	0.16865	1.20073		0.99746	0.99000	O
Benzo(k)fluoranthene	2.47913	2.30760	2.34452	2.38206	2.03637	1.84712	AVG		2.23280		10.75570	15.00000	O
Benzo(a)pyrene	1.57920	1.03405	1.23972	1.25334	1.20818	1.14972	AVG		1.24404		14.67813	15.00000	O
Indeno(1,2,3-cd)pyrene	1288	1493	3847	13187	51941	83189	QUA	0.10510	5.08748	-0.47357	0.99536	0.99000	O
Dibenzo(a,h)anthracene	656	2259	6522	23375	93441	124380	QUA	0.29309	2.50448	-0.06045	0.99327	0.99000	O
Benzo(g,h,i)perylene	0.56797	0.50114	0.60183	0.67274	0.71942	0.74691	AVG		0.63500		14.87102	15.00000	O
2-Methylnaphthalene-D10	17086	51789	106822	284302	625777	831518	QUA	0.01282	1.67444	0.19030	0.99962	0.99000	
Fluorene-D10	0.86478	0.93245	0.96032	0.89642	0.81014	0.74348	AVG		0.86793		9.26738	15.00000	
Pyrene-D10	1.59688	1.53831	1.55856	1.44030	1.31898	1.24575	AVG		1.44979		9.76126	15.00000	

Legend: O = Kept Original Curve
Y = Failed Minimum RF
W = Failed %RSD Value

Form 5
Semivolatile Organic Instrument Performance Check

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : GD623.D
Instrument ID : GCMS-G

SDG : OU8-2
Date Analyzed : 11-JUN-15
Time Analyzed : 15:38

m/e	Ion Abundance Criteria	% Relative Abundance		
51	30.0 - 60.0% of mass 198	36.3		
68	Less than 2.0% of mass 69	0.5	1.46	1
69	Less than 100.0% of mass 198	35.8		
70	Less than 2.0% of mass 69	0.2	0.64	1
127	40.0 - 60.0% of mass 198	58.2		
197	Less than 1.0% of mass 198	0.4		
198	Base Peak, 100% relative abundance	100		
199	5.0 - 9.0% of mass 198	6.8		
275	10.0 - 30.0% of mass 198	20.4		
365	1.0 - 100.0% of mass 198	2.1		
441	0.0 - 100.0% of mass 443	9.2	70.42	2
442	40.0 - 100.0% of mass 198	64.4		
443	17.0 - 23.0% of mass 442	13.1	20.38	3

1-Value is % mass 69
2-Value is % mass 443
3-Value is % mass 442

This check applies to the following samples, LCS, MS, MSD and standards:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Continuing Calibrati	WG164598-2	G5017.D	06/11/15	15:56
Method Blank Sample	WG164595-1	G5018.D	06/11/15	16:27
Laboratory Control S	WG164595-2	G5019.D	06/11/15	16:57
WTB-GW-MW01-0615	SI4024-1	G5020.D	06/11/15	17:28
WTB-GW-MW05R-0615	SI4024-2	G5021.D	06/11/15	17:59
WTB-GW-MW03-0615	SI4024-3	G5022.D	06/11/15	18:30
WTB-GW-FD01-0615	SI4024-4	G5023.D	06/11/15	19:00
WTB-GW-MW04-0615	SI4024-5	G5024.D	06/11/15	19:31
Matrix Spike	WG164595-3	G5025.D	06/11/15	20:01
Matrix Spike Duplica	WG164595-4	G5026.D	06/11/15	20:32

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8 **SDG:** OU8-2
Lab ID : WG164598-2 **Analytical Date:** 06/11/15 15:56
Lab File ID : G5017.D **Instrument ID:** GCMS-G
Initial Calibration Date(s): 06/10/15 12:34 06/10/15 15:06 **Column ID:**

Compound	RRF/Amount	RF1	CCAL RRF1	Min	%D/ %Drift	Max %D/ %Drift	Curve Type	
26 Naphthalene	1.00000	0.77754	0.98107	0.010	-22.24572	20.00000	Quadratic	*
44 Acenaphthylene	1.89250	2.03076	2.03076	0.010	7.30522	20.00000	Averaged	
47 Acenaphthene	1.20763	1.23508	1.23508	0.010	2.27346	20.01000	Averaged	
55 Fluorene	1.32430	1.28902	1.28902	0.010	-2.66394	20.00000	Averaged	
65 Phenanthrene	1.22076	1.27747	1.27747	0.010	4.64508	20.00000	Averaged	
66 Anthracene	1.12862	1.08992	1.08992	0.010	-3.42862	20.00000	Averaged	
69 Fluoranthene	0.93916	0.95131	0.95131	0.010	1.29387	20.01000	Averaged	
71 Pyrene	2.34391	2.53635	2.53635	0.010	8.21004	20.00000	Averaged	
73 Benzo(a)anthracene	0.96936	0.93501	0.93501	0.010	-3.54360	20.00000	Averaged	
76 Chrysene	1.00000	0.96457	1.42740	0.010	-3.54268	20.00000	Linear	
79 Benzo(b)fluoranthene	1.00000	0.81057	0.81127	0.010	-18.94317	20.00000	Linear	
80 Benzo(k)fluoranthene	2.23280	2.10544	2.10544	0.010	-5.70391	20.00000	Averaged	
81 Benzo(a)pyrene	1.24404	1.14723	1.14723	0.010	-7.78192	20.01000	Averaged	
83 Indeno(1,2,3-cd)pyrene	1.00000	0.93994	0.17166	0.010	-6.00564	20.00000	Quadratic	
84 Dibenzo(a,h)anthracene	1.00000	0.92917	0.27974	0.010	-7.08312	20.00000	Quadratic	
85 Benzo(g,h,i)perylene	0.63500	0.62959	0.62959	0.010	-0.85222	20.00000	Averaged	
31 2-Methylnaphthalene-D10	1.00000	0.82013	0.45434	0.010	-17.98674	20.00000	Quadratic	
54 Fluorene-D10	0.86793	0.82245	0.82245	0.010	-5.24000	20.00000	Averaged	
70 Pyrene-D10	1.44979	1.60594	1.60594	0.010	10.77025	20.00000	Averaged	

*** = Compound out of QC criteria**

Form 5
Semivolatile Organic Instrument Performance Check

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : GD627.D
Instrument ID : GCMS-G

SDG : OU8-2
Date Analyzed : 16-JUN-15
Time Analyzed : 13:46

m/e	Ion Abundance Criteria	% Relative Abundance		
51	30.0 - 60.0% of mass 198	46.7		
68	Less than 2.0% of mass 69	0.6	1.49	1
69	Less than 100.0% of mass 198	40.6		
70	Less than 2.0% of mass 69	0.3	0.62	1
127	40.0 - 60.0% of mass 198	59.9		
197	Less than 1.0% of mass 198	0.6		
198	Base Peak, 100% relative abundance	100		
199	5.0 - 9.0% of mass 198	6.8		
275	10.0 - 30.0% of mass 198	19.5		
365	1.0 - 100.0% of mass 198	2.4		
441	0.0 - 100.0% of mass 443	10.4	73.78	2
442	40.0 - 100.0% of mass 198	72.0		
443	17.0 - 23.0% of mass 442	14.1	19.55	3

1-Value is % mass 69
2-Value is % mass 443
3-Value is % mass 442

This check applies to the following samples, LCS, MS, MSD and standards:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Initial Calibration	WG164853-2	G5052.D	06/16/15	14:38
Initial Calibration	WG164853-3	G5053.D	06/16/15	15:08
Initial Calibration	WG164853-5	G5054.D	06/16/15	15:38
Initial Calibration	WG164853-6	G5055.D	06/16/15	16:08
Initial Calibration	WG164853-7	G5056.D	06/16/15	16:38
Initial Calibration	WG164853-4	G5057.D	06/16/15	17:08
Independent Source	WG164853-8	G5058.D	06/16/15	17:39
Method Blank Sample	WG164890-1	G5059.D	06/16/15	18:09
Laboratory Control S	WG164890-2	G5060.D	06/16/15	18:39
WTB-GW-MW02-0615	SI4157-1	G5064.D	06/16/15	20:38
WTB-GW-MW07-0615	SI4157-2	G5065.D	06/16/15	21:08
WTB-GW-MW06-0615	SI4157-3	G5066.D	06/16/15	21:38

Form 6
Initial Calibration Summary

Lab Name : Katahdin Analytical Services **SDG:** OU8-2
Project : Portsmouth Naval Shipyard - WE32 OU8 **Instrument ID:** GCMS-G
Lab File IDs : G5052.D G5053.D G5057.D G5054.D G5055.D G5056.D **Column ID:**
Calibration Date(s): 16-JUN-15 14:38 16-JUN-15 17:08

	0.200000(Level 1	0.500000(Level 2	1.0000 Level 3	3.0000 Level 4	7.0000 Level 5	10.0000 Level 6	New Crv	b	m1	m2	%RSD	Max %RSD	
Naphthalene	34888	99564	188111	551988	1153217	1472709	QUA	0.09785	0.66873	0.07388	0.99860	0.99000	O
Acenaphthylene	1.87860	1.96531	1.97929	1.85186	1.68462	1.60259	AVG		1.82704		8.34519	15.00000	O
Acenaphthene	1.15050	1.16273	1.17503	1.10409	1.04173	0.99422	AVG		1.10472		6.60051	15.00000	O
Fluorene	1.22091	1.21764	1.24715	1.21420	1.18584	1.11907	AVG		1.20080		3.70900	15.00000	O
Phenanthrene	1.17910	1.16734	1.09830	1.10960	1.06054	1.02796	AVG		1.10714		5.31703	15.00000	O
Anthracene	1.06061	1.06813	1.03875	1.10116	1.07293	0.97171	AVG		1.05221		4.20969	15.00000	O
Fluoranthene	0.79117	0.90502	0.96019	0.97521	0.89792	0.86596	AVG		0.89925		7.42802	15.00000	O
Pyrene	2.64305	2.49777	2.21760	2.20326	1.90351	1.76633	AVG		2.20526		15.19056	15.00000	W(
Benzo(a)anthracene	1.00449	1.02560	1.07841	1.09304	1.06884	1.05614	AVG		1.05442		3.17437	15.00000	O
Chrysene	1.53356	1.38691	1.30469	1.22378	1.09646	1.06336	AVG		1.26812		14.07389	15.00000	O
Benzo(b)fluoranthene	0.78625	0.89846	1.05989	1.15257	1.07470	1.05560	AVG		1.00458		13.45922	15.00000	O
Benzo(k)fluoranthene	1.87921	1.76166	1.84358	1.66175	1.55792	1.52867	AVG		1.70547		8.59191	15.00000	O
Benzo(a)pyrene	1.10045	1.03060	1.02434	1.02738	1.01355	1.00334	AVG		1.03328		3.32970	15.00000	O
Indeno(1,2,3-cd)pyrene	1414	4405	8771	39923	131375	203792	LNR	0.34521	0.51323		0.99541	0.99000	O
Dibenzo(a,h)anthracene	2498	5504	11913	47906	150290	227375	LNR	0.23824	0.57192		0.99722	0.99000	O
Benzo(g,h,i)perylene	0.96169	0.77511	0.66519	0.71725	0.76549	0.75993	AVG		0.77411		12.99028	15.00000	O
2-Methylnaphthalene-D10	0.56917	0.49999	0.49479	0.45922	0.42641	0.38666	AVG		0.47270		13.46846	15.00000	
Fluorene-D10	0.82612	0.83998	0.82591	0.80299	0.77162	0.71412	AVG		0.79679		5.90794	15.00000	
Pyrene-D10	1.65690	1.56171	1.39173	1.39698	1.24145	1.18103	AVG		1.40497		12.93610	15.00000	

Legend: O = Kept Original Curve
Y = Failed Minimum RF
W = Failed %RSD Value

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 8
Internal Standard Area and RT Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164189-4
Lab File ID : G5010.D

SDG: OU8-2
Analytical Date: 06/10/15 12:34
Instrument ID: GCMS-G

		1,4-DICHLOROBENZENE-D4				NAPHTHALENE-D8				ACENAPHTHENE-D10			
		Area	#	RT	#	Area	#	RT	#	Area	#	RT	#
	Std .	42377		6.04		150057		7.87		66531		10.63	
	Upper Limit	84754		6.54		300114		8.37		133062		11.13	
	Lower Limit	21188.5		5.54		75028.5		7.37		33265.5		10.13	
Client Sample ID	Lab Sample ID												
Continuing Calibrati	WG164598-2	39761		6.04		143103		7.87		62857		10.63	
Method Blank Sample	WG164595-1	41208		6.04		147389		7.87		67849		10.63	
Laboratory Control S	WG164595-2	40166		6.04		143145		7.87		64550		10.63	
WTB-GW-MW01-061	SI4024-1	41674		6.04		146892		7.87		64112		10.63	
WTB-GW-MW05R-06	SI4024-2	41550		6.04		145875		7.87		68375		10.63	
WTB-GW-MW03-061	SI4024-3	42744		6.04		146633		7.87		70879		10.63	
WTB-GW-FD01-0615	SI4024-4	44606		6.04		159218		7.87		75108		10.63	
WTB-GW-MW04-061	SI4024-5	45235		6.04		159730		7.87		79085		10.63	
Matrix Spike	WG164595-3	48538		6.04		171302		7.87		77540		10.63	
Matrix Spike Duplica	WG164595-4	43143		6.04		159700		7.87		74041		10.63	

Area Upper Limit = +100% of internal standard area
Area Lower Limit = - 50% of internal standard area
RT Upper Limit = + 0.50 minutes of internal standard RT
RT Lower Limit = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

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ANALYTICAL SERVICES

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Form 8
Internal Standard Area and RT Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164189-4
Lab File ID : G5010.D

SDG: OU8-2
Analytical Date: 06/10/15 12:34
Instrument ID: GCMS-G

		PHENANTHRENE-D10				CHRYSENE-D12				PERYLENE-D12			
		Area	#	RT	#	Area	#	RT	#	Area	#	RT	#
	Std .	84197		13.00		37718		17.35		19567		19.74	
	Upper Limit	168394		13.50		75436		17.85		39134		20.24	
	Lower Limit	42098.5		12.50		18859		16.85		9783.5		19.24	
Client Sample ID	Lab Sample ID												
Continuing Calibrati	WG164598-2	79196		13.00		31778		17.33		19229		19.73	
Method Blank Sample	WG164595-1	87158		13.00		24122		17.33		13610		19.73	
Laboratory Control S	WG164595-2	86186		13.01		39017		17.33		22600		19.73	
WTB-GW-MW01-0615	SI4024-1	71520		13.00		32959		17.33		21317		19.73	
WTB-GW-MW05R-06	SI4024-2	85349		13.00		29509		17.33		18856		19.73	
WTB-GW-MW03-0615	SI4024-3	95196		13.00		49278		17.33		27250		19.73	
WTB-GW-FD01-0615	SI4024-4	104836		13.00		50416		17.33		32784		19.73	
WTB-GW-MW04-0615	SI4024-5	111421		13.01		59675		17.33		34428		19.73	
Matrix Spike	WG164595-3	106876		13.00		57654		17.33		33348		19.72	
Matrix Spike Duplica	WG164595-4	102161		13.01		56675		17.33		33448		19.73	

Area Upper Limit = +100% of internal standard area
Area Lower Limit = - 50% of internal standard area
RT Upper Limit = + 0.50 minutes of internal standard RT
RT Lower Limit = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

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ANALYTICAL SERVICES

Cert No E87604

Form 8
Internal Standard Area and RT Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164853-4
Lab File ID : G5057.D

SDG: OU8-2
Analytical Date: 06/16/15 17:08
Instrument ID: GCMS-G

		1,4-DICHLOROBENZENE-D4				NAPHTHALENE-D8				ACENAPHTHENE-D10			
		Area	#	RT	#	Area	#	RT	#	Area	#	RT	#
	Std .	40154		6.02		139289		7.85		64634		10.62	
	Upper Limit	80308		6.52		278578		8.35		129268		11.12	
	Lower Limit	20077		5.52		69644.5		7.35		32317		10.12	
Client Sample ID	Lab Sample ID												
Method Blank Sample	WG164890-1	39300		6.02		130798		7.85		62969		10.62	
Laboratory Control S	WG164890-2	40472		6.02		142730		7.85		68904		10.62	
WTB-GW-MW02-0615	SI4157-1	40994		6.02		138583		7.85		68713		10.62	
WTB-GW-MW07-0615	SI4157-2	39767		6.02		134470		7.85		66503		10.62	
WTB-GW-MW06-0615	SI4157-3	36484		6.02		122467		7.85		61866		10.62	

Area Upper Limit = +100% of internal standard area
Area Lower Limit = - 50% of internal standard area
RT Upper Limit = + 0.50 minutes of internal standard RT
RT Lower Limit = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

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Form 8
Internal Standard Area and RT Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164853-4
Lab File ID : G5057.D

SDG: OU8-2
Analytical Date: 06/16/15 17:08
Instrument ID: GCMS-G

		PHENANTHRENE-D10				CHRYSENE-D12				PERYLENE-D12			
		Area	#	RT	#	Area	#	RT	#	Area	#	RT	#
	Std .	89923		12.99		41654		17.32		25565		19.72	
	Upper Limit	179846		13.49		83308		17.82		51130		20.22	
	Lower Limit	44961.5		12.49		20827		16.82		12782.5		19.22	
Client Sample ID	Lab Sample ID												
Method Blank Sample	WG164890-1	83274		12.99		29253		17.32		19699		19.72	
Laboratory Control S	WG164890-2	93006		12.99		44395		17.32		30820		19.71	
WTB-GW-MW02-0615	SI4157-1	98082		12.99		51773		17.32		29686		19.71	
WTB-GW-MW07-0615	SI4157-2	91378		12.99		41292		17.32		24884		19.71	
WTB-GW-MW06-0615	SI4157-3	82908		12.99		40628		17.32		29141		19.71	

Area Upper Limit = +100% of internal standard area
Area Lower Limit = - 50% of internal standard area
RT Upper Limit = + 0.50 minutes of internal standard RT
RT Lower Limit = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

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EXTRACTABLE PETROLEUM HYDROCARBON DATA

Form 2
System Monitoring Compound Recovery

Lab Name: Katahdin Analytical Services **Project:** Portsmouth Naval Shipyard - WE32 OU8 **Matrix:** AQ
Lab Code: KAS **SDG:** OU8-2

Client Sample ID	Lab Sample ID	Col. ID	2BN	#	2FBP	#	5AA	#	OTP	#
WTB-GW-MW01-0615	SI4024-1	B	65.1		66.0		45.0		58.0	
WTB-GW-MW05R-0615	SI4024-2	B	65.7		66.5		44.0		58.3	
WTB-GW-MW03-0615	SI4024-3	B	66.9		67.3		57.0		62.5	
WTB-GW-FD01-0615	SI4024-4	B	61.3		61.7		50.7		60.5	
WTB-GW-MW04-0615	SI4024-5	B	68.1		68.6		54.4		66.3	
WTB-GW-MW02-0615	SI4157-1	B	69.8		70.0		44.2		60.3	
WTB-GW-MW07-0615	SI4157-2RA	B	64.0		64.4		40.3		47.3	
WTB-GW-MW06-0615	SI4157-3	B	63.8		64.4		42.2		55.4	
Method Blank Sample	WG164596-1	B	70.8		71.3		59.6		67.0	
Laboratory Control S	WG164596-2	B	70.1		70.9		58.9		67.8	
Laboratory Control S	WG164596-3	B	64.1		65.0		63.3		63.3	
Matrix Spike	WG164596-4	B	65.2		66.7		65.4		67.5	
Matrix Spike Duplica	WG164596-5	B	63.4		64.1		63.6		64.1	
Method Blank Sample	WG164934-1	B	69.7		70.0		57.3		64.7	
Laboratory Control S	WG164934-2	B	66.2		67.1		60.2		67.4	
Laboratory Control S	WG164934-3	B	60.0		60.4		63.6		58.6	

		QC Limits
5AA	5-ALPHA ANDROSTANE	40-140
OTP	O-TERPHENYL	40-140
2FBP	2-FLUOROBIPHENYL	40-140
2BN	2-BROMONAPHTHALENE	40-140

= Column to be used to flag recovery limits.
* = Values outside of contract required QC limits.
D= System Monitoring Compound diluted out.

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Form 4
Method Blank Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : CIF1204.D
Instrument ID : GC12

SDG : OU8-2
Lab Sample ID : WG164596-1
Date Analyzed : 13-JUN-15
Time Analyzed : 00:02
Date Extracted : 11-JUN-15

This Method Blank applies to the following samples, LCS, MS and MSD:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Laboratory Control S	WG164596-2	CIF1205.D	06/13/15	00:48
Laboratory Control S	WG164596-3	CIF1206.D	06/13/15	01:33
WTB-GW-MW01-0615	SI4024-1	CIF1209.D	06/13/15	03:49
WTB-GW-MW05R-0615	SI4024-2	CIF1210.D	06/13/15	04:34
WTB-GW-MW03-0615	SI4024-3	CIF1211.D	06/13/15	05:19
WTB-GW-FD01-0615	SI4024-4	CIF1212.D	06/13/15	06:05
WTB-GW-MW04-0615	SI4024-5	CIF1213.D	06/13/15	06:50
Matrix Spike	WG164596-4	CIF3054.D	06/19/15	02:08
Matrix Spike Duplica	WG164596-5	CIF3055.D	06/19/15	02:53

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Report of Analytical Results

Client:
Lab ID: WG164596-1
Client ID: Method Blank Sample
Project:
SDG: OU8-2
Lab File ID: CIF2204.D

Sample Date:
Received Date:
Extract Date: 11-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164596

Analysis Date: 13-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: AQ
% Solids: NA
Report Date: 24-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	75	ug/L	1	100	100	50.	75.
C19-C36 Aliphatics	U	75	ug/L	1	100	100	50.	75.
C11-C22 Aromatics	U	75	ug/L	1	100	100	50.	75.
5-Alpha Androstane		59.6	%					
o-Terphenyl		67.0	%					
2-Fluorobiphenyl		71.3	%					
2-Bromonaphthalene		70.8	%					

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LCS/LCSD Recovery Report

LCS ID: WG164596-2
LCSD ID: WG164596-3
Project:
SDG: OU8-2
Report Date: 24-JUN-15
LCS File ID: CIF2205.D

Received Date:
Extract Date: 11-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164596
LCSD File ID: CIF1206A.d

Analysis Date: 13-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: AQ
% Solids: NA

Compound	Spike Amt	LCS Conc	LCS Rec (%)	LCSD Conc	LCSD Rec (%)	Conc Units	RPD (%)	RPD Limit	Limits
Unadjusted C11-C22 Aromatics	1530	1020	66.7	946.	61.8	ug/L	8	25	40-140
C9-C18 Aliphatics	540.	274.	50.7	290.	53.7	ug/L	6	25	40-140
C19-C36 Aliphatics	720.	431.	59.9	457.	63.5	ug/L	6	25	40-140
5-Alpha Androstane			58.9		63.3				40-140
o-Terphenyl			67.8		63.3				40-140
2-Fluorobiphenyl			70.9		65.0				40-140
2-Bromonaphthalene			70.1		64.1				40-140

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MS/MSD Recovery Report

MS ID: WG164596-4
MSD ID: WG164596-5
Sample ID: SI4024-5
Client ID: WTB-GW-MW04-0615
Project:
SDG: OU8-2
MS File ID: CIF4054.D

Received Date:
Extract Date: 11-JUN-15
Extracted By: KF
Extraction Method: SW846 3510
Lab Prep Batch: WG164596
Report Date: 24-JUN-15
MSD File ID: CIF4055.d

Analysis Date: 19-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: AQ
% Solids: NA

Compound	MS Spike	MSD Spike	Conc Units	Samp Conc	MS Conc	MSD Conc	MS Rec (%)	MSD Rec (%)	RPD (%)	RPD Limit	Limits
Unadjusted C11-C22 Aromatics	1440	1440	ug/L	U71	966	919	66.9	63.7	5	25	40-140
C9-C18 Aliphatics	509.	509.	ug/L	U71	305	310	59.9	60.8	2	25	40-140
C19-C36 Aliphatics	679.	679.	ug/L	U71	487	463	71.7	68.2	5	25	40-140
5-Alpha Androstane							65.4	63.6			40-140
o-Terphenyl							67.5	64.1			40-140
2-Fluorobiphenyl							66.7	64.1			40-140
2-Bromonaphthalene							65.2	63.4			40-140

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Form 4
Method Blank Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE32 OU8
Lab File ID : CIF3049.D
Instrument ID : GC12

SDG : OU8-2
Lab Sample ID : WG164934-1
Date Analyzed : 18-JUN-15
Time Analyzed : 22:21
Date Extracted : 17-JUN-15

This Method Blank applies to the following samples, LCS, MS and MSD:

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
Laboratory Control S	WG164934-2	CIF3050.D	06/18/15	23:06
Laboratory Control S	WG164934-3	CIF3051.D	06/18/15	23:51
WTB-GW-MW02-0615	SI4157-1	CIF3056.D	06/19/15	03:38
WTB-GW-MW07-0615	SI4157-2	CIF3057.D	06/19/15	04:23
WTB-GW-MW06-0615	SI4157-3	CIF3058.D	06/19/15	05:09

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Report of Analytical Results

Client:
Lab ID: WG164934-1
Client ID: Method Blank Sample
Project:
SDG: OU8-2
Lab File ID: CIF4049.D

Sample Date:
Received Date:
Extract Date: 17-JUN-15
Extracted By: HG
Extraction Method: SW846 3510
Lab Prep Batch: WG164934

Analysis Date: 18-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: AQ
% Solids: NA
Report Date: 24-JUN-15

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
C9-C18 Aliphatics	U	75	ug/L	1	100	100	50.	75.
C19-C36 Aliphatics	U	75	ug/L	1	100	100	50.	75.
C11-C22 Aromatics	U	75	ug/L	1	100	100	50.	75.
5-Alpha Androstane		57.3	%					
o-Terphenyl		64.7	%					
2-Fluorobiphenyl		70.0	%					
2-Bromonaphthalene		69.7	%					

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LCS/LCSD Recovery Report

LCS ID: WG164934-2
LCSD ID: WG164934-3
Project:
SDG: OU8-2
Report Date: 24-JUN-15
LCS File ID: CIF4050.D

Received Date:
Extract Date: 17-JUN-15
Extracted By: HG
Extraction Method: SW846 3510
Lab Prep Batch: WG164934
LCSD File ID: CIF3051A.d

Analysis Date: 18-JUN-15
Analyst: AC
Analysis Method: MA DEP EPH 04-1.1
Matrix: AQ
% Solids: NA

Compound	Spike Amt	LCS Conc	LCS Rec (%)	LCSD Conc	LCSD Rec (%)	Conc Units	RPD (%)	RPD Limit	Limits
Unadjusted C11-C22 Aromatics	1530	1020	66.7	906.	59.2	ug/L	12	25	40-140
C9-C18 Aliphatics	540.	275.	50.9	291.	53.9	ug/L	6	25	40-140
C19-C36 Aliphatics	720.	470.	65.3	472.	65.6	ug/L	0	25	40-140
5-Alpha Androstane			60.2		63.6				40-140
o-Terphenyl			67.4		58.6				40-140
2-Fluorobiphenyl			67.1		60.4				40-140
2-Bromonaphthalene			66.2		60.0				40-140

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Form 6
Initial Calibration Summary

Lab Name : Katahdin Analytical Services **SDG:** OU8-2
Project : Portsmouth Naval Shipyard - WE32 OU8 **Instrument ID:** GC12
Lab File IDs : CIE1031.d CIE1030.d CIE1029.d CIE1028.d CIE1027.d **Calibration Date(s):** 06-MAY-15 17:43 06-MAY-15 20:44

	1.0000 Level 1	10.0000 Level 2	50.0000 Level 3	100.0000 Level 4	200.0000 Level 5		New Crv	b	m1	m2	%RSD	Max %RSD	
Unadjusted C11-C22 Aromatic	8292	9422	7924	7053	8230		AVG		8184		10.3928	25.00000	M (
Naphthalene	8320	9472	7972	7079	8255		AVG		8220		10.4358	25.00000	O
2-Methylnaphthalene	8432	9401	7914	7027	8193		AVG		8193		10.4879	25.00000	O
Acenaphthylene	8247	9367	7875	6989	8143		AVG		8124		10.4971	25.00000	O
Acenaphthene	8967	9596	8062	7150	8331		AVG		8421		10.9980	25.00000	O
Fluorene	8553	9539	7951	7058	8220		AVG		8264		10.9278	25.00000	O
Phenanthrene	7825	9510	7995	7099	8281		AVG		8142		10.8130	25.00000	O
Anthracene	7275	8298	6977	6201	7221		AVG		7194		10.4491	25.00000	O
Fluoranthene	8335	9529	7972	7082	8266		AVG		8237		10.6613	25.00000	O
Pyrene	8508	9725	8152	7243	8452		AVG		8416		10.5753	25.00000	O
Benzo(a)Anthracene	8032	9261	7791	6932	8107		AVG		8024		10.3965	25.00000	O
Chrysene	8287	9363	7871	7004	8151		AVG		8135		10.4301	25.00000	O
Benzo(b)Fluoranthene	8731	9738	8664	7875	9455		AVG		8893		8.23668	25.00000	O
Benzo(k)Fluoranthene	8729	9723	7703	6718	7573		AVG		8089		14.3303	25.00000	O
Benzo(a)Pyrene	8105	9290	7825	6983	8153		AVG		8071		10.2491	25.00000	O
Indeno(1,2,3-cd)Pyrene	8287	9719	8783	7992	9688		AVG		8894		8.89931	25.00000	O
Dibenzo(a,h)Anthracene	8201	9286	7299	6394	7147		AVG		7666		14.4850	25.00000	O
Benzo(g,h,i)Perylene	8125	9365	7908	7076	8280		AVG		8151		10.0906	25.00000	O
2-Fluorobiphenyl	7203	8339	6920	6151	7195		AVG		7161		10.9714	25.00000	
2-Bromonaphthalene	5298	5868	4940	4387	5124		AVG		5123		10.5086	25.00000	
O-Terphenyl	7983	9503	7938	7053	8224		AVG		8140		10.8372	25.00000	

Legend: O = Kept Original Curve
Y = Failed Minimum RF
W = Failed %RSD Value

Form 6
Initial Calibration Summary

Lab Name : Katahdin Analytical Services **SDG:** OU8-2
Project : Portsmouth Naval Shipyard - WE32 OU8 **Instrument ID:** GC12
Lab File IDs : CIE2031.d CIE2030.d CIE2029.d CIE2028.d CIE2027.d **Calibration Date(s):** 06-MAY-15 17:43 06-MAY-15 20:44

	1.0000 Level 1	10.0000 Level 2	50.0000 Level 3	100.0000 Level 4	200.0000 Level 5		New Crv	b	m1	m2	%RSD	Max %RSD	
C9-C18 Aliphatic	5997	6518	5559	5720	5502		AVG		5859		7.08772	25.00000	M (
C19-C36 Aliphatic	5752	6494	5563	5764	5512		AVG		5817		6.78269	25.00000	M (
C-9	6729	6767	5514	5684	5479		AVG		6034		10.87143	30.00000	O
C-10	5822	6463	5553	5717	5510		AVG		5813		6.61974	25.00000	O
C-12	5615	6370	5534	5698	5488		AVG		5741		6.27979	25.00000	O
C-14	5986	6485	5562	5721	5497		AVG		5850		6.87077	25.00000	O
C-16	6137	6505	5576	5734	5502		AVG		5891		7.16686	25.00000	O
C-18	5692	6517	5618	5767	5536		AVG		5826		6.79223	25.00000	O
C-19	5778	6549	5650	5796	5573		AVG		5869		6.65871	25.00000	O
C-20	5678	6480	5599	5746	5536		AVG		5808		6.61234	25.00000	O
C-22	5792	6553	5648	5792	5579		AVG		5873		6.66839	25.00000	O
C-24	5554	6196	5364	5513	5286		AVG		5583		6.44335	25.00000	O
C-26	5826	6698	5778	5929	5677		AVG		5982		6.86752	25.00000	O
C-28	5767	6547	5676	5838	5589		AVG		5884		6.50532	25.00000	O
C-30	5974	6628	5761	5894	5647		AVG		5981		6.40139	25.00000	O
C-36	5647	6301	5030	5604	5212		AVG		5559		8.81526	25.00000	O
5-alpha androstane	5683	6615	5730	5875	5678		AVG		5916		6.73963	25.00000	

Legend: O = Kept Original Curve
Y = Failed Minimum RF
W = Failed %RSD Value

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164234-7
Lab File ID : CIF1201.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-2
Analytical Date: 06/12/15 21:46
Instrument ID: GC12
Column ID: A

	Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
2	Naphthalene	8220	8277	0.010	0.70215	25.00000	Averaged
3	2-Methylnaphthalene	8193	8211	0.010	0.21358	25.00000	Averaged
5	Acenaphthylene	8124	8126	0.010	0.01552	25.00000	Averaged
7	Acenaphthene	8421	8366	0.010	-0.65597	25.00000	Averaged
8	Fluorene	8264	8253	0.010	-0.12760	25.00000	Averaged
9	Phenanthrene	8142	8325	0.010	2.25489	25.00000	Averaged
10	Anthracene	7194	7070	0.010	-1.72720	25.00000	Averaged
12	Fluoranthene	8237	8306	0.010	0.84430	25.00000	Averaged
13	Pyrene	8416	8507	0.010	1.07724	25.00000	Averaged
16	Benzo(a)Anthracene	8024	8110	0.010	1.06471	25.00000	Averaged
17	Chrysene	8135	8252	0.010	1.43404	25.00000	Averaged
18	Benzo(b)Fluoranthene	8893	9289	0.010	4.46116	25.00000	Averaged
19	Benzo(k)Fluoranthene	8089	8900	0.010	10.02483	25.00000	Averaged
20	Benzo(a)Pyrene	8071	8153	0.010	1.01688	25.00000	Averaged
21	Indeno(1,2,3-cd)Pyrene	8894	9407	0.010	5.76579	25.00000	Averaged
22	Dibenzo(a,h)Anthracene	7666	8169	0.010	6.56121	25.00000	Averaged
23	Benzo(g,h,i)Perylene	8151	8276	0.010	1.53356	25.00000	Averaged
4	2-Fluorobiphenyl	7161	7195	0.010	0.46789	25.00000	Averaged
6	2-Bromonaphthalene	5123	5121	0.010	-0.03630	25.00000	Averaged
11	O-Terphenyl	8140	8271	0.010	1.60508	25.00000	Averaged

*** = Compound out of QC criteria**

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Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164234-8
Lab File ID : CIF1218.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-2
Analytical Date: 06/13/15 10:36
Instrument ID: GC12
Column ID: A

Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
2 Naphthalene	8220	8759	0.010	6.56319	25.00000	Averaged
3 2-Methylnaphthalene	8193	8693	0.010	6.09728	25.00000	Averaged
5 Acenaphthylene	8124	8608	0.010	5.95032	25.00000	Averaged
7 Acenaphthene	8421	8855	0.010	5.15502	25.00000	Averaged
8 Fluorene	8264	8731	0.010	5.65239	25.00000	Averaged
9 Phenanthrene	8142	8819	0.010	8.31667	25.00000	Averaged
10 Anthracene	7194	7495	0.010	4.18358	25.00000	Averaged
12 Fluoranthene	8237	8810	0.010	6.96013	25.00000	Averaged
13 Pyrene	8416	9017	0.010	7.14437	25.00000	Averaged
16 Benzo(a)Anthracene	8024	8614	0.010	7.35231	25.00000	Averaged
17 Chrysene	8135	8780	0.010	7.92503	25.00000	Averaged
18 Benzo(b)Fluoranthene	8893	9240	0.010	3.90429	25.00000	Averaged
19 Benzo(k)Fluoranthene	8089	8980	0.010	11.01728	25.00000	Averaged
20 Benzo(a)Pyrene	8071	8691	0.010	7.68031	25.00000	Averaged
21 Indeno(1,2,3-cd)Pyrene	8894	9595	0.010	7.88094	25.00000	Averaged
22 Dibenzo(a,h)Anthracene	7666	8015	0.010	4.55536	25.00000	Averaged
23 Benzo(g,h,i)Perylene	8151	8655	0.010	6.18939	25.00000	Averaged
4 2-Fluorobiphenyl	7161	7624	0.010	6.45830	25.00000	Averaged
6 2-Bromonaphthalene	5123	5427	0.010	5.93444	25.00000	Averaged
11 O-Terphenyl	8140	8806	0.010	8.18313	25.00000	Averaged

*** = Compound out of QC criteria**

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Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164234-17
Lab File ID : CIF2201.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-2
Analytical Date: 06/12/15 21:46
Instrument ID: GC12
Column ID: A

Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
1 C9-C18 Aliphatic	5859	5816	0.010	-0.73951	25.00000	Averaged
2 C19-C36 Aliphatic	5817	5750	0.010	-1.15631	25.00000	Averaged
3 C-9	6034	5765	0.010	-4.46534	30.00000	Averaged
4 C-10	5813	5805	0.010	-0.13995	25.00000	Averaged
5 C-12	5741	5794	0.010	0.91695	25.00000	Averaged
7 C-14	5850	5829	0.010	-0.36839	25.00000	Averaged
8 C-16	5891	5831	0.010	-1.01828	25.00000	Averaged
9 C-18	5826	5873	0.010	0.80507	25.00000	Averaged
10 C-19	5869	5891	0.010	0.37936	25.00000	Averaged
11 C-20	5808	5839	0.010	0.53557	25.00000	Averaged
13 C-22	5873	5880	0.010	0.11916	25.00000	Averaged
14 C-24	5583	5576	0.010	-0.12041	25.00000	Averaged
15 C-26	5982	5981	0.010	-0.01063	25.00000	Averaged
16 C-28	5884	5919	0.010	0.60098	25.00000	Averaged
18 C-30	5981	5939	0.010	-0.69531	25.00000	Averaged
19 C-36	5559	4974	0.010	-10.51803	25.00000	Averaged
44 5-alpha androstane	5916	5980	0.010	1.07112	25.00000	Averaged

*** = Compound out of QC criteria**

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Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG164234-18
Lab File ID : CIF2222.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-2
Analytical Date: 06/13/15 13:37
Instrument ID: GC12
Column ID: A

Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
1 C9-C18 Aliphatic	5859	6025	0.010	2.83254	25.00000	Averaged
2 C19-C36 Aliphatic	5817	5991	0.010	2.99537	25.00000	Averaged
3 C-9	6034	5920	0.010	-1.89841	30.00000	Averaged
4 C-10	5813	6019	0.010	3.53844	25.00000	Averaged
5 C-12	5741	6005	0.010	4.60802	25.00000	Averaged
7 C-14	5850	6038	0.010	3.20376	25.00000	Averaged
8 C-16	5891	6059	0.010	2.86166	25.00000	Averaged
9 C-18	5826	6111	0.010	4.88389	25.00000	Averaged
10 C-19	5869	6138	0.010	4.59096	25.00000	Averaged
11 C-20	5808	6084	0.010	4.75163	25.00000	Averaged
13 C-22	5873	6137	0.010	4.50107	25.00000	Averaged
14 C-24	5583	5827	0.010	4.37064	25.00000	Averaged
15 C-26	5982	6254	0.010	4.56036	25.00000	Averaged
16 C-28	5884	6159	0.010	4.68867	25.00000	Averaged
18 C-30	5981	6186	0.010	3.43568	25.00000	Averaged
19 C-36	5559	5145	0.010	-7.44183	25.00000	Averaged
44 5-alpha androstane	5916	6225	0.010	5.22072	25.00000	Averaged

*** = Compound out of QC criteria**

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Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG165009-3
Lab File ID : CIF3048.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-2
Analytical Date: 06/18/15 21:36
Instrument ID: GC12
Column ID: A

Compound	$\overline{RRF}$/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
2 Naphthalene	8220	8739	0.010	6.32328	25.00000	Averaged
3 2-Methylnaphthalene	8193	8662	0.010	5.72209	25.00000	Averaged
5 Acenaphthylene	8124	8337	0.010	2.62351	25.00000	Averaged
7 Acenaphthene	8421	8790	0.010	4.38269	25.00000	Averaged
8 Fluorene	8264	8686	0.010	5.11052	25.00000	Averaged
9 Phenanthrene	8142	8827	0.010	8.41689	25.00000	Averaged
10 Anthracene	7194	6839	0.010	-4.93945	25.00000	Averaged
12 Fluoranthene	8237	8751	0.010	6.24042	25.00000	Averaged
13 Pyrene	8416	8948	0.010	6.32544	25.00000	Averaged
16 Benzo(a)Anthracene	8024	8471	0.010	5.56625	25.00000	Averaged
17 Chrysene	8135	8687	0.010	6.77743	25.00000	Averaged
18 Benzo(b)Fluoranthene	8893	9266	0.010	4.20274	25.00000	Averaged
19 Benzo(k)Fluoranthene	8089	8748	0.010	8.14698	25.00000	Averaged
20 Benzo(a)Pyrene	8071	8559	0.010	6.04561	25.00000	Averaged
21 Indeno(1,2,3-cd)Pyrene	8894	9689	0.010	8.93424	25.00000	Averaged
22 Dibenzo(a,h)Anthracene	7666	8149	0.010	6.30082	25.00000	Averaged
23 Benzo(g,h,i)Perylene	8151	8786	0.010	7.78951	25.00000	Averaged
4 2-Fluorobiphenyl	7161	7588	0.010	5.95840	25.00000	Averaged
6 2-Bromonaphthalene	5123	5395	0.010	5.30399	25.00000	Averaged
11 O-Terphenyl	8140	8773	0.010	7.77219	25.00000	Averaged

*** = Compound out of QC criteria**

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG165009-4
Lab File ID : CIF3071.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-2
Analytical Date: 06/19/15 15:53
Instrument ID: GC12
Column ID: A

Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
2 Naphthalene	8220	8622	0.010	4.89160	25.00000	Averaged
3 2-Methylnaphthalene	8193	8548	0.010	4.33117	25.00000	Averaged
5 Acenaphthylene	8124	8260	0.010	1.66810	25.00000	Averaged
7 Acenaphthene	8421	8682	0.010	3.10047	25.00000	Averaged
8 Fluorene	8264	8579	0.010	3.80559	25.00000	Averaged
9 Phenanthrene	8142	8711	0.010	6.98503	25.00000	Averaged
10 Anthracene	7194	6731	0.010	-6.44453	25.00000	Averaged
12 Fluoranthene	8237	8630	0.010	4.76943	25.00000	Averaged
13 Pyrene	8416	8824	0.010	4.84846	25.00000	Averaged
16 Benzo(a)Anthracene	8024	8364	0.010	4.23381	25.00000	Averaged
17 Chrysene	8135	8549	0.010	5.08948	25.00000	Averaged
18 Benzo(b)Fluoranthene	8893	9456	0.010	6.33442	25.00000	Averaged
19 Benzo(k)Fluoranthene	8089	8325	0.010	2.91868	25.00000	Averaged
20 Benzo(a)Pyrene	8071	8451	0.010	4.69910	25.00000	Averaged
21 Indeno(1,2,3-cd)Pyrene	8894	9319	0.010	4.77433	25.00000	Averaged
22 Dibenzo(a,h)Anthracene	7666	8401	0.010	9.59110	25.00000	Averaged
23 Benzo(g,h,i)Perylene	8151	8677	0.010	6.45783	25.00000	Averaged
4 2-Fluorobiphenyl	7161	7488	0.010	4.55715	25.00000	Averaged
6 2-Bromonaphthalene	5123	5320	0.010	3.83619	25.00000	Averaged
11 O-Terphenyl	8140	8607	0.010	5.73225	25.00000	Averaged

*** = Compound out of QC criteria**

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WE
Lab ID : WG165009-8
Lab File ID : CIF4048.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-2
Analytical Date: 06/18/15 21:36
Instrument ID: GC12
Column ID: A

Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
1 C9-C18 Aliphatic	5859	6022	0.010	2.78240	25.00000	Averaged
2 C19-C36 Aliphatic	5817	5945	0.010	2.20021	25.00000	Averaged
3 C-9	6034	5993	0.010	-0.68770	30.00000	Averaged
4 C-10	5813	6046	0.010	4.00602	25.00000	Averaged
5 C-12	5741	6019	0.010	4.84771	25.00000	Averaged
7 C-14	5850	6023	0.010	2.95078	25.00000	Averaged
8 C-16	5891	6006	0.010	1.95686	25.00000	Averaged
9 C-18	5826	6047	0.010	3.79330	25.00000	Averaged
10 C-19	5869	6083	0.010	3.64532	25.00000	Averaged
11 C-20	5808	6018	0.010	3.61454	25.00000	Averaged
13 C-22	5873	6068	0.010	3.32616	25.00000	Averaged
14 C-24	5583	5754	0.010	3.07269	25.00000	Averaged
15 C-26	5982	6194	0.010	3.54358	25.00000	Averaged
16 C-28	5884	6090	0.010	3.50129	25.00000	Averaged
18 C-30	5981	6158	0.010	2.96048	25.00000	Averaged
19 C-36	5559	5197	0.010	-6.50529	25.00000	Averaged
44 5-alpha androstane	5916	6185	0.010	4.53955	25.00000	Averaged

*** = Compound out of QC criteria**

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ANALYTICAL SERVICES

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Form 7
Calibration Verification Summary

Lab Name : Katahdin Analytical Services
Project : Portsmouth Naval Shipyard - WI
Lab ID : WG165009-9
Lab File ID : CIF4071.d
Initial Calibration Date(s): 05/06/15 17:43 05/06/15 20:44

SDG: OU8-2
Analytical Date: 06/19/15 15:53
Instrument ID: GC12
Column ID: A

Compound	RRF/Amount	RF50	Min RRF	%D/ %Drift	Max %D/ %Drift	Curve Type
1 C9-C18 Aliphatic	5859	5814	0.010	-0.77968	25.00000	Averaged
2 C19-C36 Aliphatic	5817	5737	0.010	-1.37467	25.00000	Averaged
3 C-9	6034	5813	0.010	-3.67753	30.00000	Averaged
4 C-10	5813	5842	0.010	0.49485	25.00000	Averaged
5 C-12	5741	5808	0.010	1.16116	25.00000	Averaged
7 C-14	5850	5798	0.010	-0.89794	25.00000	Averaged
8 C-16	5891	5797	0.010	-1.58866	25.00000	Averaged
9 C-18	5826	5825	0.010	-0.01879	25.00000	Averaged
10 C-19	5869	5852	0.010	-0.28719	25.00000	Averaged
11 C-20	5808	5805	0.010	-0.04399	25.00000	Averaged
13 C-22	5873	5848	0.010	-0.42028	25.00000	Averaged
14 C-24	5583	5544	0.010	-0.68895	25.00000	Averaged
15 C-26	5982	5979	0.010	-0.04708	25.00000	Averaged
16 C-28	5884	5893	0.010	0.15907	25.00000	Averaged
18 C-30	5981	5956	0.010	-0.41106	25.00000	Averaged
19 C-36	5559	5020	0.010	-9.69483	25.00000	Averaged
44 5-alpha androstane	5916	5968	0.010	0.88266	25.00000	Averaged

*** = Compound out of QC criteria**

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FORM 8
DRO ANALYTICAL SEQUENCE

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-2

GC Column: RTX-5 ID: 0.53 (mm)Init. Calib. Date(s): 05/06/15 05/06/15

Instrument ID: GC12

THE ANALYTICAL SEQUENCE OF PERFORMANCE EVALUATION MIXTURES, BLANKS, SAMPLES, AND STANDARDS IS GIVEN BELOW:

MEAN SURROGATE RT FROM INITIAL CALIBRATION
S1 : 8.98 S2 : 10.36

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S1 RT #	S2 RT #
01		WG162358-5	05/06/15	1743	8.99	10.37
02		WG162358-4	05/06/15	1829	8.98	10.36
03		WG162358-3	05/06/15	1914	8.97	10.35
04		WG162358-2	05/06/15	1959	8.97	10.35
05		WG162358-1	05/06/15	2044	8.98	10.36
06		WG162358-6	05/06/15	2129		
07		WG164234-7	06/12/15	2146	8.94	10.32
08	WG164596-BLANK	WG164596-1	06/13/15	0002	8.94	10.32
09	WG164596-LCS	WG164596-2	06/13/15	0048	8.94	10.32
10	WG164596-LCSD	WG164596-3	06/13/15	0133	8.94	10.32
11	WTB-GW-MW01-0615	SI4024-1	06/13/15	0349	8.95	10.32
12	WTB-GW-MW05R-0615	SI4024-2	06/13/15	0434	8.95	10.32
13	WTB-GW-MW03-0615	SI4024-3	06/13/15	0519	8.95	10.32
14	WTB-GW-FD01-0615	SI4024-4	06/13/15	0605	8.95	10.33
15	WTB-GW-MW04-0615	SI4024-5	06/13/15	0650	8.95	10.33
16		WG164234-8	06/13/15	1036	8.95	10.33
17		WG165009-3	06/18/15	2136	8.93	10.31
18	WG164934-BLANK	WG164934-1	06/18/15	2221	8.93	10.31
19	WG164934-LCS	WG164934-2	06/18/15	2306	8.93	10.31
20	WG164934-LCSD	WG164934-3	06/18/15	2351	8.93	10.31

QC LIMITS
S1 = 2-Fluorobiphenyl (+/- 0.15 MINUTES)
S2 = 2-Bromonaphthalene (+/- 0.15 MINUTES)

Column used to flag retention time values with an asterisk.
* Values outside of QC limits.

Katahdin Analytical Services A0000059

FORM 8
DRO ANALYTICAL SEQUENCE

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: PORTSMOUTH NAVAL SHIPYARD - WE32 SDG No.: OU8-2

GC Column: RTX-5 ID: 0.53 (mm)Init. Calib. Date(s): 05/06/15 05/06/15

Instrument ID: GC12

THE ANALYTICAL SEQUENCE OF PERFORMANCE EVALUATION MIXTURES, BLANKS, SAMPLES, AND STANDARDS IS GIVEN BELOW:

MEAN SURROGATE RT FROM INITIAL CALIBRATION
S1 : 8.98 S2 : 10.36

	CLIENT SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED	S1 RT #	S2 RT #
01	WTB-GW-MW04-0615MS	WG164596-4	06/19/15	0208	8.93	10.31
02	WTB-GW-MW04-0615MSD	WG164596-5	06/19/15	0253	8.93	10.31
03	WTB-GW-MW02-0615	SI4157-1	06/19/15	0338	8.93	10.31
04	WTB-GW-MW07-0615	SI4157-2	06/19/15	0423	8.93	10.31
05	WTB-GW-MW06-0615	SI4157-3	06/19/15	0509	8.93	10.31
06		WG165009-4	06/19/15	1553	8.94	10.31
07						
08						
09						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

QC LIMITS
S1 = 2-Fluorobiphenyl (+/- 0.15 MINUTES)
S2 = 2-Bromonaphthalene (+/- 0.15 MINUTES)

Column used to flag retention time values with an asterisk.
* Values outside of QC limits.

Katahdin Analytical Services A0000060

METALS DATA

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICV

File: HIF23A Jun 23, 2015 10:43

Analyte	True	Found	%R (1)
MERCURY	6.0	6.36	106.0

SAMPLE: CCV

File: HIF23A Jun 23, 2015 10:49

Analyte	True	Found	%R (1)
MERCURY	5.0	5.01	100.2

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: CCV

File: HIF23A Jun 23, 2015 11:16

Analyte	True	Found	%R (1)
MERCURY	5.0	5.06	101.2

SAMPLE: CCV

File: HIF23A Jun 23, 2015 11:43

Analyte	True	Found	%R (1)
MERCURY	5.0	5.06	101.2

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: CCV

File: HIF23A Jun 23, 2015 12:09

Analyte	True	Found	%R (1)
MERCURY	5.0	5.11	102.2

SAMPLE: CCV

File: HIF23A Jun 23, 2015 12:37

Analyte	True	Found	%R (1)
MERCURY	5.0	5.10	102.0

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICV

File: IIF22A Jun 22, 2015 13:05

Analyte	True	Found	%R (1)
ALUMINUM	10000.0	10300.00	103.0
BARIUM	400.0	415.50	103.9
CALCIUM	10000.0	10330.00	103.3
CHROMIUM	400.0	419.50	104.9
COPPER	400.0	421.50	105.4
IRON	10000.0	10410.00	104.1
LEAD	400.0	428.00	107.0
MAGNESIUM	10000.0	10560.00	105.6
NICKEL	400.0	425.20	106.3
POTASSIUM	13600.0	14230.00	104.6
SODIUM	10000.0	10440.00	104.4
ZINC	400.0	422.00	105.5

SAMPLE: CCV

File: IIF22A Jun 22, 2015 13:51

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12400.00	99.2
BARIUM	500.0	489.30	97.9
CALCIUM	12500.0	12500.00	100.0
CHROMIUM	500.0	495.40	99.1
COPPER	500.0	506.70	101.3
IRON	12500.0	12580.00	100.6
LEAD	500.0	509.30	101.9
MAGNESIUM	12500.0	12700.00	101.6
NICKEL	500.0	507.60	101.5
POTASSIUM	12500.0	12520.00	100.2
SODIUM	12500.0	12380.00	99.0
ZINC	500.0	501.70	100.3

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: CCV

File: IIF22A Jun 22, 2015 14:52

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12300.00	98.4
BARIUM	500.0	488.00	97.6
CALCIUM	12500.0	12240.00	97.9
CHROMIUM	500.0	501.10	100.2
COPPER	500.0	509.50	101.9
IRON	12500.0	12300.00	98.4
LEAD	500.0	504.60	100.9
MAGNESIUM	12500.0	12600.00	100.8
NICKEL	500.0	505.30	101.1
POTASSIUM	12500.0	12560.00	100.5
SODIUM	12500.0	12280.00	98.2
ZINC	500.0	499.90	100.0

SAMPLE: CCV

File: IIF22A Jun 22, 2015 15:52

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12220.00	97.8
BARIUM	500.0	482.00	96.4
CALCIUM	12500.0	12200.00	97.6
CHROMIUM	500.0	495.30	99.1
COPPER	500.0	510.80	102.2
IRON	12500.0	12330.00	98.6
LEAD	500.0	507.00	101.4
MAGNESIUM	12500.0	12670.00	101.4
NICKEL	500.0	506.30	101.3
POTASSIUM	12500.0	12460.00	99.7
SODIUM	12500.0	12160.00	97.3
ZINC	500.0	501.00	100.2

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: CCV

File: IIF22A Jun 22, 2015 16:52

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12350.00	98.8
BARIUM	500.0	498.10	99.6
CALCIUM	12500.0	12380.00	99.0
CHROMIUM	500.0	477.20	95.4
COPPER	500.0	495.80	99.2
IRON	12500.0	12520.00	100.2
LEAD	500.0	488.70	97.7
MAGNESIUM	12500.0	12090.00	96.7
NICKEL	500.0	501.70	100.3
POTASSIUM	12500.0	11380.00	91.0
SODIUM	12500.0	11320.00	90.6
ZINC	500.0	482.40	96.5

SAMPLE: CCV

File: IIF22A Jun 22, 2015 17:53

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12050.00	96.4
BARIUM	500.0	485.90	97.2
CALCIUM	12500.0	11960.00	95.7
CHROMIUM	500.0	477.60	95.5
COPPER	500.0	497.70	99.5
IRON	12500.0	12290.00	98.3
LEAD	500.0	489.90	98.0
MAGNESIUM	12500.0	12160.00	97.3
NICKEL	500.0	501.00	100.2
POTASSIUM	12500.0	12420.00	99.4
SODIUM	12500.0	11670.00	93.4
ZINC	500.0	479.00	95.8

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICV

File: IIF23A Jun 23, 2015 12:49

Analyte	True	Found	%R (1)
ALUMINUM	10000.0	10150.00	101.5
BARIUM	400.0	412.00	103.0
CALCIUM	10000.0	9952.00	99.5
CHROMIUM	400.0	416.30	104.1
COPPER	400.0	410.70	102.7
IRON	10000.0	9992.00	99.9
LEAD	400.0	413.70	103.4
MAGNESIUM	10000.0	9971.00	99.7
NICKEL	400.0	416.90	104.2
SODIUM	10000.0	10050.00	100.5
ZINC	400.0	413.60	103.4

SAMPLE: CCV

File: IIF23A Jun 23, 2015 13:33

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12410.00	99.3
BARIUM	500.0	496.50	99.3
CALCIUM	12500.0	12380.00	99.0
CHROMIUM	500.0	493.40	98.7
COPPER	500.0	491.20	98.2
IRON	12500.0	12230.00	97.8
LEAD	500.0	498.10	99.6
MAGNESIUM	12500.0	12440.00	99.5
NICKEL	500.0	501.40	100.3
SODIUM	12500.0	12450.00	99.6
ZINC	500.0	502.90	100.6

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: CCV

File: IIF23A Jun 23, 2015 14:31

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12570.00	100.6
BARIUM	500.0	500.60	100.1
CALCIUM	12500.0	12490.00	99.9
CHROMIUM	500.0	502.10	100.4
COPPER	500.0	500.60	100.1
IRON	12500.0	12540.00	100.3
LEAD	500.0	501.90	100.4
MAGNESIUM	12500.0	12550.00	100.4
NICKEL	500.0	503.10	100.6
SODIUM	12500.0	12520.00	100.2
ZINC	500.0	495.90	99.2

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICV

File: IIF26B Jun 26, 2015 17:25

Analyte	True	Found	%R (1)
ALUMINUM	10000.0	9669.00	96.7
BARIUM	400.0	391.80	98.0
CALCIUM	10000.0	9421.00	94.2
CHROMIUM	400.0	404.50	101.1
COPPER	400.0	401.30	100.3
IRON	10000.0	9457.00	94.6
LEAD	400.0	409.50	102.4
MAGNESIUM	10000.0	9995.00	100.0
MANGANESE	400.0	394.70	98.7
NICKEL	400.0	406.70	101.7
POTASSIUM	13600.0	13150.00	96.7
ZINC	400.0	402.80	100.7

SAMPLE: CCV

File: IIF26B Jun 26, 2015 18:08

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	11890.00	95.1
BARIUM	500.0	478.90	95.8
CALCIUM	12500.0	11860.00	94.9
CHROMIUM	500.0	497.90	99.6
COPPER	500.0	514.10	102.8
IRON	12500.0	12060.00	96.5
LEAD	500.0	501.30	100.3
MAGNESIUM	12500.0	12410.00	99.3
MANGANESE	500.0	497.40	99.5
NICKEL	500.0	500.80	100.2
POTASSIUM	12500.0	12490.00	99.9
ZINC	500.0	491.60	98.3

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: CCV

File: IIF26B Jun 26, 2015 19:07

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	11900.00	95.2
BARIUM	500.0	476.20	95.2
CALCIUM	12500.0	11910.00	95.3
CHROMIUM	500.0	518.40	103.7
COPPER	500.0	532.70	106.5
IRON	12500.0	12550.00	100.4
LEAD	500.0	511.20	102.2
MAGNESIUM	12500.0	12650.00	101.2
MANGANESE	500.0	507.20	101.4
NICKEL	500.0	500.40	100.1
POTASSIUM	12500.0	12700.00	101.6
ZINC	500.0	479.80	96.0

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICV

File: IIF29A Jun 29, 2015 14:54

Analyte	True	Found	%R (1)
ALUMINUM	10000.0	10160.00	101.6
CALCIUM	10000.0	9949.00	99.5
CHROMIUM	400.0	420.40	105.1
COPPER	400.0	419.70	104.9
IRON	10000.0	10090.00	100.9
MAGNESIUM	10000.0	10230.00	102.3
SODIUM	10000.0	10100.00	101.0

SAMPLE: CCV

File: IIF29A Jun 29, 2015 15:37

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12770.00	102.2
CALCIUM	12500.0	12780.00	102.2
CHROMIUM	500.0	510.60	102.1
COPPER	500.0	510.20	102.0
IRON	12500.0	13030.00	104.2
MAGNESIUM	12500.0	13010.00	104.1
SODIUM	12500.0	12730.00	101.8

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: CCV

File: IIF29A Jun 29, 2015 16:36

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12730.00	101.8
CALCIUM	12500.0	12720.00	101.8
CHROMIUM	500.0	504.30	100.9
COPPER	500.0	499.30	99.9
IRON	12500.0	12730.00	101.8
MAGNESIUM	12500.0	12830.00	102.6
SODIUM	12500.0	12730.00	101.8

SAMPLE: CCV

File: IIF29A Jun 29, 2015 17:35

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12450.00	99.6
CALCIUM	12500.0	12490.00	99.9
CHROMIUM	500.0	498.80	99.8
COPPER	500.0	494.70	98.9
IRON	12500.0	12430.00	99.4
MAGNESIUM	12500.0	12760.00	102.1
SODIUM	12500.0	12350.00	98.8

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: CCV

File: IIF29A Jun 29, 2015 18:33

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12480.00	99.8
CALCIUM	12500.0	12600.00	100.8
CHROMIUM	500.0	508.60	101.7
COPPER	500.0	513.20	102.6
IRON	12500.0	12900.00	103.2
MAGNESIUM	12500.0	12880.00	103.0
SODIUM	12500.0	12340.00	98.7

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICV

File: IIF29B Jun 29, 2015 19:32

Analyte	True	Found	%R (1)
ALUMINUM	10000.0	10050.00	100.5
BARIUM	400.0	408.10	102.0
CALCIUM	10000.0	9795.00	98.0
IRON	10000.0	9904.00	99.0
MAGNESIUM	10000.0	10200.00	102.0
POTASSIUM	13600.0	13600.00	100.0
SODIUM	10000.0	10010.00	100.1

SAMPLE: CCV

File: IIF29B Jun 29, 2015 20:15

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12650.00	101.2
BARIUM	500.0	495.30	99.1
CALCIUM	12500.0	12610.00	100.9
IRON	12500.0	12680.00	101.4
MAGNESIUM	12500.0	12800.00	102.4
POTASSIUM	12500.0	12630.00	101.0
SODIUM	12500.0	12580.00	100.6

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: CCV

File: IIF29B Jun 29, 2015 21:14

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12800.00	102.4
BARIUM	500.0	499.20	99.8
CALCIUM	12500.0	12660.00	101.3
IRON	12500.0	12590.00	100.7
MAGNESIUM	12500.0	12760.00	102.1
POTASSIUM	12500.0	12420.00	99.4
SODIUM	12500.0	12800.00	102.4

SAMPLE: CCV

File: IIF29B Jun 29, 2015 22:12

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12880.00	103.0
BARIUM	500.0	504.30	100.9
CALCIUM	12500.0	12720.00	101.8
IRON	12500.0	12600.00	100.8
MAGNESIUM	12500.0	12640.00	101.1
POTASSIUM	12500.0	12410.00	99.3
SODIUM	12500.0	12780.00	102.2

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICV

File: IIF30A Jun 30, 2015 11:19

Analyte	True	Found	%R (1)
ALUMINUM	10000.0	10140.00	101.4
CALCIUM	10000.0	9923.00	99.2
IRON	10000.0	9987.00	99.9
MAGNESIUM	10000.0	10160.00	101.6
MANGANESE	400.0	412.00	103.0
SODIUM	10000.0	10040.00	100.4

SAMPLE: CCV

File: IIF30A Jun 30, 2015 12:02

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12570.00	100.6
CALCIUM	12500.0	12590.00	100.7
IRON	12500.0	12690.00	101.5
MAGNESIUM	12500.0	12740.00	101.9
MANGANESE	500.0	502.60	100.5
SODIUM	12500.0	12550.00	100.4

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: CCV

File: IIF30A Jun 30, 2015 13:01

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12540.00	100.3
CALCIUM	12500.0	12420.00	99.4
IRON	12500.0	12390.00	99.1
MAGNESIUM	12500.0	12610.00	100.9
MANGANESE	500.0	496.40	99.3
SODIUM	12500.0	12490.00	99.9

SAMPLE: CCV

File: IIF30A Jun 30, 2015 14:00

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12580.00	100.6
CALCIUM	12500.0	12430.00	99.4
IRON	12500.0	12450.00	99.6
MAGNESIUM	12500.0	12580.00	100.6
MANGANESE	500.0	497.00	99.4
SODIUM	12500.0	12410.00	99.3

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: CCV

File: IIF30A Jun 30, 2015 15:00

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12470.00	99.8
CALCIUM	12500.0	12390.00	99.1
IRON	12500.0	12400.00	99.2
MAGNESIUM	12500.0	12600.00	100.8
MANGANESE	500.0	490.30	98.1
SODIUM	12500.0	12440.00	99.5

SAMPLE: CCV

File: IIF30A Jun 30, 2015 15:58

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12460.00	99.7
CALCIUM	12500.0	12360.00	98.9
IRON	12500.0	12420.00	99.4
MAGNESIUM	12500.0	12490.00	99.9
MANGANESE	500.0	493.50	98.7
SODIUM	12500.0	12380.00	99.0

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: CCV

File: IIF30A Jun 30, 2015 16:51

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12300.00	98.4
CALCIUM	12500.0	12310.00	98.5
IRON	12500.0	12390.00	99.1
MAGNESIUM	12500.0	12490.00	99.9
MANGANESE	500.0	491.70	98.3
SODIUM	12500.0	12210.00	97.7

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICV

File: JIF18A Jun 18, 2015 17:27

Analyte	True	Found	%R (1)
ALUMINUM	400.0	389.90	97.5
ANTIMONY	20.0	19.86	99.3
ARSENIC	20.0	19.64	98.2
BERYLLIUM	20.0	20.20	101.0
CADMIUM	20.0	19.94	99.7
CALCIUM	4000.0	3915.00	97.9
COBALT	20.0	20.32	101.6
IRON	4000.0	4027.00	100.7
MAGNESIUM	4000.0	4013.00	100.3
MOLYBDENUM	40.0	39.47	98.7
POTASSIUM	4000.0	3911.00	97.8
SELENIUM	20.0	20.20	101.0
SILVER	20.0	18.62	93.1
SODIUM	4000.0	3859.00	96.5
THALLIUM	20.0	20.58	102.9
VANADIUM	20.0	19.75	98.8

SAMPLE: CCV

File: JIF18A Jun 18, 2015 17:57

Analyte	True	Found	%R (1)
ALUMINUM	500.0	526.10	105.2
ANTIMONY	25.0	24.26	97.0
ARSENIC	25.0	24.77	99.1
BERYLLIUM	25.0	25.15	100.6
CADMIUM	25.0	25.15	100.6
CALCIUM	5000.0	5064.00	101.3
COBALT	25.0	24.71	98.8
IRON	5000.0	5055.00	101.1
MAGNESIUM	5000.0	5110.00	102.2
MOLYBDENUM	25.0	25.16	100.6
POTASSIUM	5000.0	4968.00	99.4
SELENIUM	25.0	25.21	100.8
SILVER	25.0	24.95	99.8
SODIUM	5000.0	4963.00	99.3
THALLIUM	25.0	24.36	97.4
VANADIUM	25.0	24.52	98.1

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: CCV

File: JIF18A Jun 18, 2015 18:35

Analyte	True	Found	%R (1)
ALUMINUM	500.0	495.80	99.2
ANTIMONY	25.0	24.37	97.5
ARSENIC	25.0	25.12	100.5
BERYLLIUM	25.0	24.57	98.3
CADMIUM	25.0	25.15	100.6
CALCIUM	5000.0	5051.00	101.0
COBALT	25.0	24.91	99.6
IRON	5000.0	5051.00	101.0
MAGNESIUM	5000.0	5035.00	100.7
MOLYBDENUM	25.0	24.90	99.6
POTASSIUM	5000.0	4925.00	98.5
SELENIUM	25.0	24.91	99.6
SILVER	25.0	25.04	100.2
SODIUM	5000.0	5037.00	100.7
THALLIUM	25.0	24.33	97.3
VANADIUM	25.0	24.50	98.0

SAMPLE: CCV

File: JIF18A Jun 18, 2015 19:15

Analyte	True	Found	%R (1)
ALUMINUM	500.0	515.30	103.1
ANTIMONY	25.0	23.83	95.3
ARSENIC	25.0	24.72	98.9
BERYLLIUM	25.0	23.69	94.8
CADMIUM	25.0	25.11	100.4
CALCIUM	5000.0	5096.00	101.9
COBALT	25.0	24.81	99.2
IRON	5000.0	5064.00	101.3
MAGNESIUM	5000.0	5172.00	103.4
MOLYBDENUM	25.0	25.08	100.3
POTASSIUM	5000.0	4980.00	99.6
SELENIUM	25.0	25.06	100.2
SILVER	25.0	25.07	100.3
SODIUM	5000.0	4978.00	99.6
THALLIUM	25.0	24.37	97.5
VANADIUM	25.0	24.82	99.3

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: CCV

File: JIF18A Jun 18, 2015 19:56

Analyte	True	Found	%R (1)
ALUMINUM	500.0	506.80	101.4
ANTIMONY	25.0	24.04	96.2
ARSENIC	25.0	24.78	99.1
BERYLLIUM	25.0	23.42	93.7
CADMIUM	25.0	25.02	100.1
CALCIUM	5000.0	5068.00	101.4
COBALT	25.0	24.63	98.5
IRON	5000.0	5095.00	101.9
MAGNESIUM	5000.0	5158.00	103.2
MOLYBDENUM	25.0	24.98	99.9
POTASSIUM	5000.0	4928.00	98.6
SELENIUM	25.0	24.99	100.0
SILVER	25.0	24.94	99.8
SODIUM	5000.0	4920.00	98.4
THALLIUM	25.0	24.22	96.9
VANADIUM	25.0	24.52	98.1

SAMPLE: CCV

File: JIF18A Jun 18, 2015 20:37

Analyte	True	Found	%R (1)
ALUMINUM	500.0	509.40	101.9
ANTIMONY	25.0	24.30	97.2
ARSENIC	25.0	24.75	99.0
BERYLLIUM	25.0	23.79	95.2
CADMIUM	25.0	25.06	100.2
CALCIUM	5000.0	5132.00	102.6
COBALT	25.0	24.78	99.1
IRON	5000.0	5068.00	101.4
MAGNESIUM	5000.0	5156.00	103.1
MOLYBDENUM	25.0	24.94	99.8
POTASSIUM	5000.0	4959.00	99.2
SELENIUM	25.0	24.87	99.5
SILVER	25.0	25.04	100.2
SODIUM	5000.0	4964.00	99.3
THALLIUM	25.0	24.43	97.7
VANADIUM	25.0	24.91	99.6

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: PQL

File: HIF23A Jun 23, 2015 10:47

Analyte	TRUE	FOUND	% R
MERCURY	0.2	0.20	100.0

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: PQL

File: IIF22A Jun 22, 2015 13:17

Analyte	TRUE	FOUND	% R
ALUMINUM	300.0	310.40	103.5
BARIUM	5.0	5.61	112.2
CALCIUM	100.0	99.27	99.3
CHROMIUM	10.0	10.35	103.5
COPPER	25.0	26.16	104.6
IRON	100.0	103.50	103.5
LEAD	5.0	4.75	95.0
MAGNESIUM	100.0	107.20	107.2
NICKEL	10.0	11.17	111.7
POTASSIUM	1000.0	1098.00	109.8
SODIUM	1000.0	1028.00	102.8
ZINC	20.0	21.94	109.7

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: PQL

File: IIF23A Jun 23, 2015 13:01

Analyte	TRUE	FOUND	% R
ALUMINUM	300.0	292.60	97.5
BARIUM	5.0	5.86	117.2
CALCIUM	100.0	93.88	93.9
CHROMIUM	10.0	11.80	118.0
COPPER	25.0	27.68	110.7
IRON	100.0	104.50	104.5
LEAD	5.0	5.69	113.8
MAGNESIUM	100.0	109.20	109.2
NICKEL	10.0	11.95	119.5
SODIUM	1000.0	1027.00	102.7
ZINC	20.0	22.53	112.7

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: PQL

File: IIF26B Jun 26, 2015 17:36

Analyte	TRUE	FOUND	% R
ALUMINUM	300.0	282.80	94.3
BARIUM	5.0	4.39	87.8
CALCIUM	100.0	110.20	110.2
CHROMIUM	10.0	10.21	102.1
COPPER	25.0	27.59	110.4
IRON	100.0	94.14	94.1
LEAD	5.0	5.30	106.0
MAGNESIUM	100.0	102.00	102.0
MANGANESE	5.0	5.18	103.6
NICKEL	10.0	10.24	102.4
POTASSIUM	1000.0	889.00	88.9
ZINC	20.0	21.75	108.7

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: PQL

File: IIF29A Jun 29, 2015 15:06

Analyte	TRUE	FOUND	% R
ALUMINUM	300.0	349.40	116.5
CALCIUM	100.0	108.90	108.9
CHROMIUM	10.0	10.85	108.5
COPPER	25.0	25.43	101.7
IRON	100.0	106.70	106.7
MAGNESIUM	100.0	99.92	99.9
SODIUM	1000.0	1033.00	103.3

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: PQL

File: IIF29B Jun 29, 2015 19:44

Analyte	TRUE	FOUND	% R
ALUMINUM	300.0	377.50	125.8•
BARIUM	5.0	4.83	96.6
CALCIUM	100.0	142.50	142.5•
IRON	100.0	104.60	104.6
MAGNESIUM	100.0	115.60	115.6
POTASSIUM	1000.0	976.80	97.7
SODIUM	1000.0	1076.00	107.6

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: PQL

File: IIF30A Jun 30, 2015 11:30

Analyte	TRUE	FOUND	% R
ALUMINUM	300.0	342.20	114.1
CALCIUM	100.0	108.50	108.5
IRON	100.0	69.63	69.6•
MAGNESIUM	100.0	111.50	111.5
MANGANESE	5.0	4.98	99.6
SODIUM	1000.0	1018.00	101.8

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: PQL

File: JIF18A Jun 18, 2015 17:34

Analyte	TRUE	FOUND	% R
ALUMINUM	60.0	58.52	97.5
ANTIMONY	0.2	0.21	105.0
ARSENIC	1.0	1.06	106.0
BERYLLIUM	0.2	0.21	105.0
CADMIUM	0.2	0.22	110.0
CALCIUM	20.0	18.47	92.3
COBALT	0.2	0.22	110.0
IRON	20.0	19.40	97.0
MAGNESIUM	20.0	20.38	101.9
MOLYBDENUM	1.0	1.05	105.0
POTASSIUM	200.0	194.60	97.3
SELENIUM	1.0	1.06	106.0
SILVER	0.2	0.21	105.0
SODIUM	200.0	205.20	102.6
THALLIUM	0.2	0.23	115.0
VANADIUM	1.0	0.93	93.0

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICB

File: HIF23A Jun 23, 2015 10:45

Analyte	Result	C
MERCURY	0.023	U

SAMPLE: CCB

File: HIF23A Jun 23, 2015 10:51

Analyte	Result	C
MERCURY	0.023	U

SAMPLE: CCB

File: HIF23A Jun 23, 2015 11:18

Analyte	Result	C
MERCURY	-0.023	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: CCB

File: HIF23A Jun 23, 2015 11:45

Analyte	Result	C
MERCURY	-0.027	U

SAMPLE: CCB

File: HIF23A Jun 23, 2015 12:11

Analyte	Result	C
MERCURY	0.023	U

SAMPLE: CCB

File: HIF23A Jun 23, 2015 12:39

Analyte	Result	C
MERCURY	0.023	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICB

File: IIF22A Jun 22, 2015 13:12

Analyte	Result	C
ALUMINUM	50.520	J
BARIUM	0.500	U
CALCIUM	46.890	J
CHROMIUM	0.310	U
COPPER	-0.578	U
IRON	15.250	J
LEAD	1.200	U
MAGNESIUM	39.130	J
NICKEL	0.420	U
POTASSIUM	45.000	U
SODIUM	40.000	U
ZINC	0.601	J

SAMPLE: CCB

File: IIF22A Jun 22, 2015 13:56

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	-0.762	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
NICKEL	0.440	J
POTASSIUM	-66.140	U
SODIUM	40.000	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF22A Jun 22, 2015 14:57

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	6.243	J
LEAD	1.200	U
MAGNESIUM	5.200	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SODIUM	40.000	U
ZINC	0.510	U

Blanks not used because they are not associated with any samples.

EWS 8/18/15

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: CCB

File: IIF22A Jun 22, 2015 15:57

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
NICKEL	0.420	U
POTASSIUM	-82.250	U
SODIUM	40.000	U
ZINC	0.510	U

Blank not used because it is not associated with any samples.

EWS 8/18/15

SAMPLE: CCB

File: IIF22A Jun 22, 2015 16:57

Analyte	Result	C
ALUMINUM	25.810	J
BARIUM	0.500	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.785	J
IRON	5.652	J
LEAD	1.200	U
MAGNESIUM	6.279	J
NICKEL	0.420	U
POTASSIUM	548.100	B
SODIUM	371.100	J
ZINC	0.510	U

SAMPLE: CCB

File: IIF22A Jun 22, 2015 17:58

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	6.342	J
LEAD	1.200	U
MAGNESIUM	9.186	J
NICKEL	0.420	U
POTASSIUM	68.010	J
SODIUM	130.800	J
ZINC	0.510	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICB

File: IIF23A Jun 23, 2015 12:56

Analyte	Result	C
ALUMINUM	42.120	J
BARIUM	1.355	J
CALCIUM	51.380	J
CHROMIUM	1.004	J
COPPER	1.687	J
IRON	18.080	J
LEAD	1.200	U
MAGNESIUM	40.510	J
NICKEL	0.420	U
SODIUM	40.000	U
ZINC	0.510	U

Blank not used because it is not associated with any samples.

EWS 8/18/15

SAMPLE: CCB

File: IIF23A Jun 23, 2015 13:37

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.729	J
CALCIUM	9.700	U
CHROMIUM	0.521	J
COPPER	1.292	J
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
NICKEL	0.420	U
SODIUM	63.970	J
ZINC	0.510	U

SAMPLE: CCB

File: IIF23A Jun 23, 2015 14:36

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.873	J
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	2.154	J
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	8.570	J
NICKEL	0.420	U
SODIUM	307.200	J
ZINC	0.510	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICB

File: IIF26B Jun 26, 2015 17:32

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
CALCIUM	9.700	U
CHROMIUM	-0.384	U
COPPER	1.664	J
IRON	5.200	U
LEAD	-1.516	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	-47.820	U
ZINC	0.510	U

Blank not used because it was not associated with any samples.

EWS 8/18/15

SAMPLE: CCB

File: IIF26B Jun 26, 2015 18:13

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.628	J
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	1.923	J
IRON	6.642	J
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	-0.515	U
POTASSIUM	45.000	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF26B Jun 26, 2015 19:12

Analyte	Result	C
ALUMINUM	37.890	J
BARIUM	-0.711	U
CALCIUM	9.700	U
CHROMIUM	-0.984	U
COPPER	0.470	U
IRON	6.001	J
LEAD	1.200	U
MAGNESIUM	-5.303	U
MANGANESE	1.100	U
NICKEL	-0.525	U
POTASSIUM	-191.500	U
ZINC	0.510	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICB

File: IIF29A Jun 29, 2015 15:01

Analyte	Result	C
ALUMINUM	36.230	J
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	-1.171	U
IRON	5.200	U
MAGNESIUM	5.200	U
SODIUM	40.000	U

SAMPLE: CCB

File: IIF29A Jun 29, 2015 15:42

Analyte	Result	C
ALUMINUM	24.000	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	-1.161	U
IRON	6.126	J
MAGNESIUM	5.200	U
SODIUM	40.000	U

SAMPLE: CCB

File: IIF29A Jun 29, 2015 16:41

Analyte	Result	C
ALUMINUM	24.000	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	-0.959	U
IRON	5.200	U
MAGNESIUM	5.200	U
SODIUM	40.000	U

Blanks not used because they were not associated with any samples.

EWS 8/18/15

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: CCB

File: IIF29A Jun 29, 2015 17:40

Analyte	Result	C
ALUMINUM	24.000	U
CALCIUM	9.700	U
CHROMIUM	0.379	J
COPPER	0.470	U
IRON	5.200	U
MAGNESIUM	5.200	U
SODIUM	69.630	J

SAMPLE: CCB

File: IIF29A Jun 29, 2015 18:38

Analyte	Result	C
ALUMINUM	24.000	U
CALCIUM	9.700	U
CHROMIUM	0.786	J
COPPER	0.470	U
IRON	5.482	J
MAGNESIUM	5.200	U
SODIUM	40.000	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICB

File: IIF29B Jun 29, 2015 19:39

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
CALCIUM	9.700	U
IRON	5.200	U
MAGNESIUM	5.200	U
POTASSIUM	45.000	U
SODIUM	40.000	U

Blank not used because no samples were associated with it.

EWS 8/18/15

SAMPLE: CCB

File: IIF29B Jun 29, 2015 20:20

Analyte	Result	C
ALUMINUM	30.960	J
BARIUM	0.500	U
CALCIUM	-13.610	U
IRON	5.200	U
MAGNESIUM	5.200	U
POTASSIUM	45.000	U
SODIUM	40.000	U

SAMPLE: CCB

File: IIF29B Jun 29, 2015 21:19

Analyte	Result	C
ALUMINUM	63.600	J
BARIUM	0.500	U
CALCIUM	-13.260	U
IRON	5.200	U
MAGNESIUM	5.200	U
POTASSIUM	45.000	U
SODIUM	111.100	J

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: CCB

File: IIF29B Jun 29, 2015 22:17

Analyte	Result	C
ALUMINUM	50.620	J
BARIUM	0.500	U
CALCIUM	9.700	U
IRON	5.200	U
MAGNESIUM	6.269	J
POTASSIUM	-73.880	U
SODIUM	120.800	J

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICB

File: IIF30A Jun 30, 2015 11:25

Analyte	Result	C
ALUMINUM	24.000	U
CALCIUM	9.700	U
IRON	-32.620	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
SODIUM	40.000	U

Blank not used because it was not associated with any samples.

EWS 8/18/15

SAMPLE: CCB

File: IIF30A Jun 30, 2015 12:06

Analyte	Result	C
ALUMINUM	24.670	J
CALCIUM	9.700	U
IRON	-28.000	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
SODIUM	40.000	U

SAMPLE: CCB

File: IIF30A Jun 30, 2015 13:06

Analyte	Result	C
ALUMINUM	31.950	J
CALCIUM	9.700	U
IRON	-29.620	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
SODIUM	40.000	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: CCB

File: IIF30A Jun 30, 2015 14:05

Analyte	Result	C
ALUMINUM	52.490	J
CALCIUM	9.700	U
IRON	-29.820	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
SODIUM	40.000	U

SAMPLE: CCB

File: IIF30A Jun 30, 2015 15:05

Analyte	Result	C
ALUMINUM	29.180	J
CALCIUM	9.700	U
IRON	-30.260	U
MAGNESIUM	5.423	J
MANGANESE	1.100	U
SODIUM	40.000	U

SAMPLE: CCB

File: IIF30A Jun 30, 2015 16:03

Analyte	Result	C
ALUMINUM	49.080	J
CALCIUM	9.700	U
IRON	-30.130	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
SODIUM	40.000	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: CCB

File: IIF30A Jun 30, 2015 16:56

Analyte	Result	C
ALUMINUM	27.980	J
CALCIUM	9.700	U
IRON	-28.470	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
SODIUM	96.080	J

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICB

File: JIF18A Jun 18, 2015 17:30

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.013	J
ARSENIC	0.220	U
BERYLLIUM	0.006	J
CADMIUM	0.006	J
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.086	J
POTASSIUM	5.300	U
SELENIUM	0.230	U
SILVER	0.007	J
SODIUM	7.100	U
THALLIUM	0.008	J
VANADIUM	0.110	U

Blank not used because it was not associated with any samples.

EWS 8/18/15

SAMPLE: CCB

File: JIF18A Jun 18, 2015 18:00

Analyte	Result	C
ALUMINUM	1.639	J
ANTIMONY	0.016	J
ARSENIC	0.220	U
BERYLLIUM	0.009	J
CADMIUM	0.010	J
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	2.820	J
MOLYBDENUM	0.185	J
POTASSIUM	5.300	U
SELENIUM	0.230	U
SILVER	0.007	J
SODIUM	7.100	U
THALLIUM	0.014	J
VANADIUM	0.110	U

SAMPLE: CCB

File: JIF18A Jun 18, 2015 18:38

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.010	J
ARSENIC	0.220	U
BERYLLIUM	0.003	U
CADMIUM	0.007	J
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.049	J
POTASSIUM	5.300	U
SELENIUM	0.230	U
SILVER	0.004	U
SODIUM	7.350	J
THALLIUM	0.010	J
VANADIUM	0.110	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: CCB

File: JIF18A Jun 18, 2015 19:19

Analyte	Result	C
ALUMINUM	0.486	J
ANTIMONY	0.015	J
ARSENIC	0.220	U
BERYLLIUM	0.003	U
CADMIUM	0.005	J
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.044	J
POTASSIUM	5.300	U
SELENIUM	0.230	U
SILVER	0.004	U
SODIUM	7.100	U
THALLIUM	0.008	J
VANADIUM	0.110	U

SAMPLE: CCB

File: JIF18A Jun 18, 2015 19:59

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.015	J
ARSENIC	0.220	U
BERYLLIUM	0.005	J
CADMIUM	0.007	J
CALCIUM	4.800	U
COBALT	0.013	J
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.047	J
POTASSIUM	5.300	U
SELENIUM	0.230	U
SILVER	0.007	J
SODIUM	7.100	U
THALLIUM	0.009	J
VANADIUM	0.110	U

SAMPLE: CCB

File: JIF18A Jun 18, 2015 20:40

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.011	J
ARSENIC	0.220	U
BERYLLIUM	0.004	J
CADMIUM	0.006	J
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.040	J
POTASSIUM	5.300	U
SELENIUM	0.230	U
SILVER	0.004	U
SODIUM	7.100	U
THALLIUM	0.006	U
VANADIUM	0.110	U

3P

PREPARATION BLANKS

Lab Name: Katahdin Analytical Services **Sample ID:** PBWIF11ICW2

Matrix: WATER **SDG Name:** OU8-2

QC Batch ID: IF11ICW2

Concentration Units : ug/L

Analyte	RESULT	C
ALUMINUM	18	J
BARIUM	0.43	J
CALCIUM	80	U
CHROMIUM	4.0	U
COPPER	10	U
IRON	6.1	J
LEAD	4.0	U
MAGNESIUM	80	U
MANGANESE	4.0	U
NICKEL	0.41	J
POTASSIUM	500	U
SODIUM	44	J
ZINC	10	U

3P

PREPARATION BLANKS

Lab Name: Katahdin Analytical Services **Sample ID:** PBWIF11IMW2

Matrix: WATER **SDG Name:** OU8-2

QC Batch ID: IF11IMW2

Concentration Units : ug/L

Analyte	RESULT	C
ANTIMONY	0.50	U
ARSENIC	4.0	U
BERYLLIUM	0.20	U
CADMIUM	0.20	U
COBALT	0.30	U
SELENIUM	0.27	J
SILVER	0.40	U
THALLIUM	0.40	U
VANADIUM	4.0	U

3P

PREPARATION BLANKS

Lab Name: Katahdin Analytical Services **Sample ID:** PBWIF16ICW1

Matrix: WATER **SDG Name:** OU8-2

QC Batch ID: IF16ICW1

Concentration Units : ug/L

Analyte	RESULT	C
ALUMINUM	100	U
BARIUM	0.36	J
CALCIUM	80	U
CHROMIUM	4.0	U
COPPER	10	U
IRON	7.6	J
LEAD	4.0	U
MAGNESIUM	12	J
MANGANESE	4.0	U
NICKEL	4.0	U
POTASSIUM	500	U
SODIUM	67	J
ZINC	10	U

3P

PREPARATION BLANKS

Lab Name: Katahdin Analytical Services **Sample ID:** PBWIF16IMW1

Matrix: WATER **SDG Name:** OU8-2

QC Batch ID: IF16IMW1

Concentration Units : ug/L

Analyte	RESULT	C
ANTIMONY	0.50	U
ARSENIC	4.0	U
BERYLLIUM	0.20	U
CADMIUM	0.20	U
COBALT	0.081	J
SELENIUM	3.0	U
SILVER	0.40	U
THALLIUM	0.40	U
VANADIUM	4.0	U

3P

PREPARATION BLANKS

Lab Name: Katahdin Analytical Services **Sample ID:** PBWIF17HGW3

Matrix: WATER **SDG Name:** OU8-2

QC Batch ID: IF17HGW3

Concentration Units : ug/L

Analyte	RESULT	C
MERCURY	0.10	U

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICSA

File: IIF22A Jun 22, 2015 13:39

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	494700	98.9
BARIUM	0	0	
CALCIUM	500000	467900	93.6
CHROMIUM	0	0	
COPPER	0	-1	
IRON	200000	187800	93.9
LEAD	0	-1	
MAGNESIUM	500000	462100	92.4
NICKEL	0	0	
POTASSIUM	0	258	
SODIUM	0	71	
ZINC	0	1	

SAMPLE: ICSAB

File: IIF22A Jun 22, 2015 13:44

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	489700	97.9
BARIUM	500	498	99.6
CALCIUM	500000	456700	91.3
CHROMIUM	500	485	97.0
COPPER	500	523	104.6
IRON	200000	187600	93.8
LEAD	50	46	92.0
MAGNESIUM	500000	462400	92.5
NICKEL	1000	939	93.9
POTASSIUM	20000	21570	107.8
SODIUM	20000	20340	101.7
ZINC	1000	945	94.5

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICSA

File: IIF23A Jun 23, 2015 13:22

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	500800	100.2
BARIUM	0	0	
CALCIUM	500000	472100	94.4
CHROMIUM	0	1	
COPPER	0	3	
IRON	200000	186600	93.3
LEAD	0	-3	
MAGNESIUM	500000	469200	93.8
NICKEL	0	-2	
SODIUM	0	144	
ZINC	0	1	

SAMPLE: ICSAB

File: IIF23A Jun 23, 2015 13:26

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	504300	100.9
BARIUM	500	517	103.4
CALCIUM	500000	466900	93.4
CHROMIUM	500	493	98.6
COPPER	500	506	101.2
IRON	200000	185500	92.8
LEAD	50	47	94.0
MAGNESIUM	500000	471300	94.3
NICKEL	1000	953	95.3
SODIUM	20000	20700	103.5
ZINC	1000	968	96.8

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICSA

File: IIF26B Jun 26, 2015 17:57

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	491700	98.3
BARIUM	0	0	
CALCIUM	500000	457900	91.6
CHROMIUM	0	0	
COPPER	0	1	
IRON	200000	188100	94.0
LEAD	0	-2	
MAGNESIUM	500000	470800	94.2
MANGANESE	0	-2	
NICKEL	0	0	
POTASSIUM	0	254	
ZINC	0	2	

SAMPLE: ICSAB

File: IIF26B Jun 26, 2015 18:02

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	488100	97.6
BARIUM	500	489	97.8
CALCIUM	500000	445600	89.1
CHROMIUM	500	498	99.6
COPPER	500	521	104.2
IRON	200000	185500	92.8
LEAD	50	48	96.0
MAGNESIUM	500000	464600	92.9
MANGANESE	500	480	96.0
NICKEL	1000	936	93.6
POTASSIUM	20000	21490	107.5
ZINC	1000	941	94.1

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICSA

File: IIF29A Jun 29, 2015 15:26

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	488500	97.7
CALCIUM	500000	454000	90.8
CHROMIUM	0	1	
COPPER	0	0	
IRON	200000	186400	93.2
MAGNESIUM	500000	458500	91.7
SODIUM	0	117	

SAMPLE: ICSAB

File: IIF29A Jun 29, 2015 15:30

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	506300	101.3
CALCIUM	500000	473400	94.7
CHROMIUM	500	511	102.2
COPPER	500	525	105.0
IRON	200000	192800	96.4
MAGNESIUM	500000	471500	94.3
SODIUM	20000	20860	104.3

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICSA

File: IIF29B Jun 29, 2015 20:04

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	488700	97.7
BARIUM	0	0	
CALCIUM	500000	457900	91.6
IRON	200000	184300	92.2
MAGNESIUM	500000	450900	90.2
POTASSIUM	0	133	
SODIUM	0	155	

SAMPLE: ICSAB

File: IIF29B Jun 29, 2015 20:09

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	508600	101.7
BARIUM	500	515	103.0
CALCIUM	500000	473600	94.7
IRON	200000	192800	96.4
MAGNESIUM	500000	465200	93.0
POTASSIUM	20000	21590	107.9
SODIUM	20000	20820	104.1

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICSA

File: IIF30A Jun 30, 2015 11:51

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	479900	96.0
CALCIUM	500000	451800	90.4
IRON	200000	184500	92.3
MAGNESIUM	500000	449400	89.9
MANGANESE	0	-2	
SODIUM	0	137	

SAMPLE: ICSAB

File: IIF30A Jun 30, 2015 11:55

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	498100	99.6
CALCIUM	500000	464100	92.8
IRON	200000	189600	94.8
MAGNESIUM	500000	463600	92.7
MANGANESE	500	489	97.8
SODIUM	20000	20480	102.4

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Concentration Units: ug/L

SAMPLE: ICSA

File: JIF18A Jun 18, 2015 17:46

Analyte	TRUE	FOUND	% R
ALUMINUM	100000	91030	91.0
ANTIMONY	0	0	
ARSENIC	0	0	
BERYLLIUM	0	0	
CADMIUM	0	0	
CALCIUM	100000	89990	90.0
COBALT	0	0	
IRON	100000	87380	87.4
MAGNESIUM	100000	91350	91.3
MOLYBDENUM	2000	1905	95.3
POTASSIUM	100000	92060	92.1
SELENIUM	0	0	
SILVER	0	0	
SODIUM	100000	92910	92.9
THALLIUM	0	0	
VANADIUM	0	0	

SAMPLE: ICSAB

File: JIF18A Jun 18, 2015 17:50

Analyte	TRUE	FOUND	% R
ALUMINUM	100000	90170	90.2
ANTIMONY	20	19	95.0
ARSENIC	20	20	100.0
BERYLLIUM	20	20	100.0
CADMIUM	20	18	90.0
CALCIUM	100000	89400	89.4
COBALT	20	19	95.0
IRON	100000	86510	86.5
MAGNESIUM	100000	90940	90.9
MOLYBDENUM	2000	1895	94.8
POTASSIUM	100000	91590	91.6
SELENIUM	20	19	95.0
SILVER	20	18	90.0
SODIUM	100000	92460	92.5
THALLIUM	20	20	100.0
VANADIUM	20	20	100.0

5A

SPIKE SAMPLE RECOVERY

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-GW-MW04-0615S

Matrix: WATER **SDG Name:** OU8-2

Percent Solids: 0.00 **Lab Sample ID:** SI4024-005P

Concentration Units : ug/L

Analyte	Spiked Sample Result	C	Sample Result	C	Spike Added	%R	Q	Control Limits (%R) Low	High	M
MERCURY, TOTAL	1.04		0.10	U	1	104.3		80	120	CV

Comments:

5A

SPIKE SAMPLE RECOVERY

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-GW-MW04-0615S

Matrix: WATER **SDG Name:** OU8-2

Percent Solids: 0.00 **Lab Sample ID:** SI4024-005S

Concentration Units : ug/L

Analyte	Spiked Sample Result	C	Sample Result	C	Spike Added	%R	Q	Control Limits (%R) Low	High	M
ALUMINUM, TOTAL	2340		69	J	2000	113.5		80	120	P
ANTIMONY, TOTAL	99.7		0.14	J	100	99.6		80	120	MS
ARSENIC, TOTAL	107		3.6	J	100	103.0		80	120	MS
BARIUM, TOTAL	2310		210		2000	105.2		80	120	P
BERYLLIUM, TOTAL	49.8		0.20	U	50	99.5		80	120	MS
CADMIUM, TOTAL	253		0.20	U	250	101.2		80	120	MS
CALCIUM, TOTAL	70400		68100		2500	90.8		80	120	P
CHROMIUM, TOTAL	214		1.0	J	200	106.8		80	120	P
COBALT, TOTAL	558		0.55	J	500	111.4		80	120	MS
COPPER, TOTAL	280		4.3	J	250	110.5		80	120	P
IRON, TOTAL	7910		6990		1000	92.2		80	120	P
LEAD, TOTAL	104		1.5	J	100	102.4		80	120	P
MAGNESIUM, TOTAL	19100		14100		5000	100.0		80	120	P
MANGANESE, TOTAL	990		455		500	107.1		80	120	P
MERCURY, TOTAL	1.08		0.10	U	1	108.0		80	120	CV
NICKEL, TOTAL	611		69.5		500	108.4		80	120	P
POTASSIUM, TOTAL	19100		8800		10000	103.4		80	120	P
SELENIUM, TOTAL	100		0.29	J	100	100.0		80	120	MS
SILVER, TOTAL	48.9		0.40	U	50	97.8		80	120	MS
SODIUM, TOTAL	217000		210000		7500	97.3		80	120	P
THALLIUM, TOTAL	102		0.40	U	100	102.3		80	120	MS
VANADIUM, TOTAL	555		4.0	U	500	111.0		80	120	MS
ZINC, TOTAL	554		24.6		500	105.9		80	120	P

Comments:

5A

SPIKE SAMPLE RECOVERY

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-GW-MW06-0615S

Matrix: WATER **SDG Name:** OU8-2

Percent Solids: 0.00 **Lab Sample ID:** SI4157-003S

Concentration Units : ug/L

Analyte	Spiked Sample Result	C	Sample Result	C	Spike Added	%R	Q	Control Limits (%R) Low	High	M
MERCURY, TOTAL	1.07		0.059	J	1	101.1		80	120	CV

Comments:

5B

POST DIGEST SPIKE SAMPLE RECOVERY

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-GW-MW04-0615S

Matrix: WATER **SDG Name:** OU8-2

Percent Solids: 0.00 **Lab Sample ID:** SI4024-005A

Concentration Units : ug/L

Analyte	Spiked Sample Result	C	Sample Result	C	Spike Added	%R	Q	Control Limits (%R) Low	High	M
ALUMINUM, TOTAL	6260		34	J	5250	118.6		75	125	P
ANTIMONY, TOTAL	1.89		0.029	J	2	92.9		75	125	MS
ARSENIC, TOTAL	9.83		0.73	J	10	91.0		75	125	MS
BARIUM, TOTAL	716		210		500	101.2		75	125	P
BERYLLIUM, TOTAL	1.89		0.0067	U	2	94.7		75	125	MS
CADMIUM, TOTAL	1.90		0.0060	U	2	94.8		75	125	MS
CALCIUM, TOTAL	35700		34100		2750	59.5	A	75	125	P
CHROMIUM, TOTAL	405		1.0	J	500	80.8		75	125	P
COBALT, TOTAL	2.02		0.11	J	2	95.3		75	125	MS
COPPER, TOTAL	421		4.3	J	500	83.4		75	125	P
IRON, TOTAL	12600		6990		5500	102.2		75	125	P
LEAD, TOTAL	400		1.5	J	500	79.8		75	125	P
MAGNESIUM, TOTAL	18500		14100		5500	80.5		75	125	P
MANGANESE, TOTAL	471		227		250	97.5		75	125	P
MERCURY, TOTAL	0.997		0.013	U	1	99.7		75	125	CV
NICKEL, TOTAL	484		69.5		500	82.9		75	125	P
POTASSIUM, TOTAL	19100		8800		10000	102.9		75	125	P
SELENIUM, TOTAL	9.38		0.059	J	10	93.2		75	125	MS
SILVER, TOTAL	1.86		0.010	U	2	93.2		75	125	MS
SODIUM, TOTAL	104000		105000		2750	-27.3	A	75	125	P
THALLIUM, TOTAL	1.98		0.012	U	2	98.8		75	125	MS
VANADIUM, TOTAL	9.66		0.10	U	10	96.6		75	125	MS
ZINC, TOTAL	433		24.6		500	81.7		75	125	P

Comments:

5B

POST DIGEST SPIKE SAMPLE RECOVERY

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-GW-MW06-0615S

Matrix: WATER **SDG Name:** OU8-2

Percent Solids: 0.00 **Lab Sample ID:** SI4157-003A

Concentration Units : ug/L

Analyte	Spiked Sample Result	C	Sample Result	C	Spike Added	%R	Q	Control Limits (%R) Low	High	M
MERCURY, TOTAL	0.986		0.059	J	1	92.7		75	125	CV

Comments:

FORM V (Part 2) - IN

5D

SPIKE DUPLICATES

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-GW-MW04-0615

Matrix: WATER **SDG Name:** OU8-2

Percent Solids: 0.00 **Lab Sample ID:** SI4024-005

Concentration Units : ug/L

Analyte	Control Limits	Spike Result	C	Spike Dup. Result	C	RPD	Q	M
MERCURY, TOTAL		1.08		1.04		3.5		CV

Comments:

FORM VD - IN

DUPLICATES

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-GW-MW04-0615D

Matrix: WATER **SDG Name:** OU8-2

Percent Solids: 0.00 **Lab Sample ID:** SI4024-005D

Concentration Units : ug/L

Analyte	Control Limits	Sample Result	C	Duplicate Result	C	RPD	Q	M
ALUMINUM, TOTAL		69.0000	J	85.8000	J	21.7		P
ANTIMONY, TOTAL		0.1455	J	0.1263	J	14.1		MS
ARSENIC, TOTAL		3.6370	J	3.4960	J	4.0		MS
BARIUM, TOTAL		210.2000		207.1000		1.5		P
BERYLLIUM, TOTAL		-0.0074	U	0.0121	U			MS
CADMIUM, TOTAL		0.0275	U	0.0339	J	200.0		MS
CALCIUM, TOTAL		68130.0000		66920.0000		1.8		P
CHROMIUM, TOTAL		1.0040	J	0.5895	J	52.0		P
COBALT, TOTAL		0.5520	J	0.5465	J	1.0		MS
COPPER, TOTAL		4.3310	J	4.3760	J	1.0		P
IRON, TOTAL		6990.0000		6826.0000		2.4		P
LEAD, TOTAL		1.4690	J	1.1060	J	28.2		P
MAGNESIUM, TOTAL		14140.0000		13990.0000		1.1		P
MANGANESE, TOTAL		454.6000		447.3000		1.6		P
MERCURY, TOTAL		-0.0100	U	0.0210	J	200.0		CV
NICKEL, TOTAL		69.5400		68.5600		1.4		P
POTASSIUM, TOTAL		8799.0000		8797.0000		0.0		P
SELENIUM, TOTAL		0.2931	J	0.7760	J	90.3		MS
SILVER, TOTAL		0.0114	U	0.0341	U			MS
SODIUM, TOTAL		209500.0000		198300.0000		5.5		P
THALLIUM, TOTAL		0.0127	U	0.0136	U			MS
VANADIUM, TOTAL		0.1273	U	0.3927	U			MS
ZINC, TOTAL		24.5800		23.8300		3.1		P

Comments:

DUPLICATES

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-GW-MW06-0615D

Matrix: WATER **SDG Name:** OU8-2

Percent Solids: 0.00 **Lab Sample ID:** SI4157-003D

Concentration Units : ug/L

Analyte	Control Limits	Sample Result	C	Duplicate Result	C	RPD	Q	M
MERCURY, TOTAL		0.0590	J	0.0810	J	31.4		CV

Comments:

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LC2WIF16ICW1

Matrix: WATER **SDG Name:** OU8-2

QC Batch ID: IF16ICW1

Concentration Units : ug/L

Analyte	TRUE	FOUND	% R	LIMITS (%)	
ALUMINUM	2000	2020	101.2	80	120
BARIUM	2000	1940	97.3	80	120
CALCIUM	2500	2610	104.4	80	120
CHROMIUM	200	208	104.2	80	120
COPPER	250	268	107.2	80	120
IRON	1000	1090	108.8	80	120
LEAD	100	103	103.3	80	120
MAGNESIUM	5000	5290	105.8	80	120
MANGANESE	500	505	101.0	80	120
NICKEL	500	524	104.8	80	120
POTASSIUM	10000	10200	101.6	80	120
SODIUM	7500	7920	105.5	80	120
ZINC	500	508	101.7	80	120

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LC2WIF16IMW1

Matrix: WATER **SDG Name:** OU8-2

QC Batch ID: IF16IMW1

Concentration Units : ug/L

Analyte	TRUE	FOUND	% R	LIMITS (%)	
ANTIMONY	100	100	100.1	80	120
ARSENIC	100	103	102.9	80	120
BERYLLIUM	50.0	47.3	94.6	80	120
CADMIUM	250	254	101.8	80	120
COBALT	500	558	111.5	80	120
SELENIUM	100	101	101.0	80	120
SILVER	50.0	48.9	97.9	80	120
THALLIUM	100	102	101.7	80	120
VANADIUM	500	538	107.6	80	120

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LCSWIF11ICW2

Matrix: WATER **SDG Name:** OU8-2

QC Batch ID: IF11ICW2

Concentration Units : ug/L

Analyte	TRUE	FOUND	% R	LIMITS (%)	
ALUMINUM	2000	2140	107.1	80	120
BARIUM	2000	2060	103.3	80	120
CALCIUM	2500	2560	102.5	80	120
CHROMIUM	200	214	107.2	80	120
COPPER	250	272	108.6	80	120
IRON	1000	1070	107.1	80	120
LEAD	100	107	107.4	80	120
MAGNESIUM	5000	5300	105.9	80	120
MANGANESE	500	521	104.2	80	120
NICKEL	500	541	108.2	80	120
POTASSIUM	10000	10600	106.4	80	120
SODIUM	7500	7780	103.8	80	120
ZINC	500	530	106.1	80	120

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LCSWIF11IMW2

Matrix: WATER **SDG Name:** OU8-2

QC Batch ID: IF11IMW2

Concentration Units : ug/L

Analyte	TRUE	FOUND	% R	LIMITS (%)	
ANTIMONY	100	97.3	97.3	80	120
ARSENIC	100	100	100.1	80	120
BERYLLIUM	50.0	49.1	98.3	80	120
CADMIUM	250	253	101.2	80	120
COBALT	500	547	109.4	80	120
SELENIUM	100	99.2	99.2	80	120
SILVER	50.0	48.6	97.3	80	120
THALLIUM	100	99.5	99.5	80	120
VANADIUM	500	531	106.2	80	120

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LCSWIF16ICW1

Matrix: WATER **SDG Name:** OU8-2

QC Batch ID: IF16ICW1

Concentration Units : ug/L

Analyte	TRUE	FOUND	% R	LIMITS (%)	
ALUMINUM	2000	2030	101.6	80	120
BARIUM	2000	1980	99.3	80	120
CALCIUM	2500	2630	105.4	80	120
CHROMIUM	200	212	106.0	80	120
COPPER	250	271	108.2	80	120
IRON	1000	1130	112.7	80	120
LEAD	100	105	104.9	80	120
MAGNESIUM	5000	5360	107.1	80	120
MANGANESE	500	510	102.0	80	120
NICKEL	500	529	105.8	80	120
POTASSIUM	10000	10200	102.2	80	120
SODIUM	7500	8080	107.8	80	120
ZINC	500	513	102.5	80	120

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LCSWIF16IMW1

Matrix: WATER **SDG Name:** OU8-2

QC Batch ID: IF16IMW1

Concentration Units : ug/L

Analyte	TRUE	FOUND	% R	LIMITS (%)	
ANTIMONY	100	101	100.8	80	120
ARSENIC	100	104	104.5	80	120
BERYLLIUM	50.0	47.4	94.7	80	120
CADMIUM	250	260	104.0	80	120
COBALT	500	568	113.5	80	120
SELENIUM	100	102	101.9	80	120
SILVER	50.0	50.1	100.2	80	120
THALLIUM	100	105	104.8	80	120
VANADIUM	500	556	111.2	80	120

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LCSWIF17HGW3

Matrix: WATER **SDG Name:** OU8-2

QC Batch ID: IF17HGW3

Concentration Units : ug/L

Analyte	TRUE	FOUND	% R	LIMITS (%)	
MERCURY	5.00	5.17	103.4	80	120

7D

LABORATORY CONTROL SAMPLE DUPLICATES

Lab Name: Katahdin Analytical Services

Matrix: WATER **SDG Name:** OU8-2

QC Batch ID: IF16ICW1 **Lab Sample ID:** LCSWIF16ICW1

Concentration Units: ug/L

Analyte	Control Limit (%)	LCS Result	LCS Dup. Result	RPD(%)	Q
ALUMINUM	20.0	2030	2020	0.5	
BARIUM	20.0	1980	1940	2.0	
CALCIUM	20.0	2630	2610	1.0	
CHROMIUM	20.0	212	208	1.8	
COPPER	20.0	271	268	1.0	
IRON	20.0	1130	1090	3.5	
LEAD	20.0	105	103	1.5	
MAGNESIUM	20.0	5360	5290	1.3	
MANGANESE	20.0	510	505	1.0	
NICKEL	20.0	529	524	1.0	
POTASSIUM	20.0	10200	10200	0.6	
SODIUM	20.0	8080	7920	2.1	
ZINC	20.0	513	508	0.9	

FORM VIID - IN

7D

LABORATORY CONTROL SAMPLE DUPLICATES

Lab Name: Katahdin Analytical Services

Matrix: WATER **SDG Name:** OU8-2

QC Batch ID: IF16IMW1 **Lab Sample ID:** LCSWIF16IMW1

Concentration Units: ug/L

Analyte	Control Limit (%)	LCS Result	LCS Dup. Result	RPD(%)	Q
ANTIMONY	20.0	101	100	0.7	
ARSENIC	20.0	104	103	1.5	
BERYLLIUM	20.0	47.4	47.3	0.1	
CADMIUM	20.0	260	254	2.1	
COBALT	20.0	568	558	1.8	
SELENIUM	20.0	102	101	0.9	
SILVER	20.0	50.1	48.9	2.3	
THALLIUM	20.0	105	102	3.0	
VANADIUM	20.0	556	538	3.3	

ICP SERIAL DILUTION

Lab Name: Katahdin Analytical Services

Matrix: WATER

Client Field ID: WTB-GW-MW04-0615L

SDG Name: OU8-2

Lab Sample ID: SI4024-005L

Concentration Units: ug/L

Analyte	Sample Result	C	Dilution Result	C	% Difference	Q	M
ALUMINUM, TOTAL	34	J	250	J	635.3		P
ANTIMONY, TOTAL	0.029	J	0.055	U	100.0		MS
ARSENIC, TOTAL	0.73	J	2.3	U	100.0		MS
BARIUM, TOTAL	210		228		8.6		P
BERYLLIUM, TOTAL	0.0067	U	0.034	U			MS
CADMIUM, TOTAL	0.0060	U	0.030	U			MS
CALCIUM, TOTAL	34100		35200		3.2		P
CHROMIUM, TOTAL	1.0	J	1.8	U	100.0		P
COBALT, TOTAL	0.11	J	0.10	J	9.1		MS
COPPER, TOTAL	4.3	J	4.7	J	9.3		P
IRON, TOTAL	6990		7370		5.4		P
LEAD, TOTAL	1.5	J	5.5	U	100.0		P
MAGNESIUM, TOTAL	14100		15000		6.4		P
MANGANESE, TOTAL	227		234		3.1		P
MERCURY, TOTAL	0.013	U	0.065	U			CV
NICKEL, TOTAL	69.5		73.0		5.0		P
POTASSIUM, TOTAL	8800		9490		7.8		P
SELENIUM, TOTAL	0.059	J	0.19	U	100.0		MS
SILVER, TOTAL	0.010	U	0.050	U			MS
SODIUM, TOTAL	105000		110000		4.8		P
THALLIUM, TOTAL	0.012	U	0.060	U			MS
VANADIUM, TOTAL	0.10	U	0.50	U			MS
ZINC, TOTAL	24.6		31	J	26.0		P

FORM IX - IN

ICP SERIAL DILUTION

Lab Name: Katahdin Analytical Services

Matrix: WATER

Client Field ID: WTB-GW-MW06-0615L

SDG Name: OU8-2

Lab Sample ID: SI4157-003L

Concentration Units: ug/L

Analyte	Sample Result	C	Dilution Result	C	% Difference	Q	M
MERCURY, TOTAL	0.059	J	0.065	U	100.0		CV

INSTRUMENT DETECTION LIMITS

Lab Name: Katahdin Analytical Services **Instrument Code:** H

Instrument Name: CETAC M6100 **Date:** 4/13/2015

Concentration Units: ug/L

Analyte	CRDL	IDL	M
MERCURY	0.20	0.023	CV

INSTRUMENT DETECTION LIMITS

Lab Name: Katahdin Analytical Services **Instrument Code:** I

Instrument Name: THERMO ICAP 6500 **Date:** 4/13/2015

Concentration Units: ug/L

Analyte	CRDL	IDL	M
ALUMINUM	300	24.	P
ANTIMONY	0.20	1.8	P
ARSENIC	1.0	2.4	P
BARIUM	5.0	0.50	P
BERYLLIUM	0.20	0.13	P
CADMIUM	0.20	0.078	P
CALCIUM	100	9.7	P
CHROMIUM	10	0.31	P
COBALT	0.20	0.25	P
COPPER	25	0.47	P
IRON	100	5.2	P
LEAD	5.0	1.2	P
MAGNESIUM	100	5.2	P
MANGANESE	5.0	1.1	P
MOLYBDENUM	1.0	1.2	P
NICKEL	10	0.42	P
POTASSIUM	1000	45.	P
SELENIUM	1.0	2.8	P
SILVER	0.20	0.41	P
SODIUM	1000	40.	P
THALLIUM	0.20	1.5	P
VANADIUM	1.0	0.25	P
ZINC	20	0.51	P

INSTRUMENT DETECTION LIMITS

Lab Name: Katahdin Analytical Services **Instrument Code:** J

Instrument Name: AGILENT 7500 ICP-MS **Date:** 4/13/2015

Concentration Units: ug/L

Analyte	CRDL	IDL	M
ALUMINUM	300	0.38	MS
ANTIMONY	0.20	0.0058	MS
ARSENIC	1.0	0.22	MS
BARIUM	5.0	0.037	MS
BERYLLIUM	0.20	0.0027	MS
CADMIUM	0.20	0.0031	MS
CALCIUM	100	4.8	MS
CHROMIUM	10	0.043	MS
COBALT	0.20	0.0087	MS
COPPER	25	0.028	MS
IRON	100	6.3	MS
LEAD	5.0	0.0096	MS
MAGNESIUM	100	1.2	MS
MANGANESE	5.0	0.031	MS
MOLYBDENUM	1.0	0.012	MS
NICKEL	10	0.014	MS
POTASSIUM	1000	5.3	MS
SELENIUM	1.0	0.23	MS
SILVER	0.20	0.0039	MS
SODIUM	1000	7.1	MS
THALLIUM	0.20	0.0065	MS
VANADIUM	1.0	0.11	MS
ZINC	20	0.12	MS

LIMITS of DETECTION

Lab Name: Katahdin Analytical Services **Instrument Code:** H

Instrument Name: CETAC M6100 **Date:** 2/9/2011

Analyte	LOD	Units	M	EPA Prep./Anal. Method
MERCURY	0.10	ug/L	CV	SW846 7470A / SW846 7470A

LIMITS of DETECTION

Lab Name: Katahdin Analytical Services **Instrument Code:** I

Instrument Name: THERMO ICAP 6500 **Date:** 1/19/2011

Analyte	LOD	Units	M	EPA Prep./Anal. Method
ALUMINUM	100.	ug/L	P	SW846 3010A / SW846 6010C
BARIUM	3.0	ug/L	P	SW846 3010A / SW846 6010C
CALCIUM	80.	ug/L	P	SW846 3010A / SW846 6010C
CHROMIUM	4.0	ug/L	P	SW846 3010A / SW846 6010C
COPPER	10.	ug/L	P	SW846 3010A / SW846 6010C
IRON	80.	ug/L	P	SW846 3010A / SW846 6010C
LEAD	4.0	ug/L	P	SW846 3010A / SW846 6010C
MAGNESIUM	80.	ug/L	P	SW846 3010A / SW846 6010C
MANGANESE	4.0	ug/L	P	SW846 3010A / SW846 6010C
NICKEL	4.0	ug/L	P	SW846 3010A / SW846 6010C
POTASSIUM	500.	ug/L	P	SW846 3010A / SW846 6010C
SODIUM	500.	ug/L	P	SW846 3010A / SW846 6010C
ZINC	10.	ug/L	P	SW846 3010A / SW846 6010C

LIMITS of DETECTION

Lab Name: Katahdin Analytical Services **Instrument Code:** J

Instrument Name: AGILENT 7500 ICP-MS **Date:** 1/25/2011

Analyte	LOD	Units	M	EPA Prep./Anal. Method
ANTIMONY	0.10	ug/L	MS	SW846 3010A / SW846 6020A
ARSENIC	0.80	ug/L	MS	SW846 3010A / SW846 6020A
BERYLLIUM	0.040	ug/L	MS	SW846 3010A / SW846 6020A
CADMIUM	0.040	ug/L	MS	SW846 3010A / SW846 6020A
COBALT	0.060	ug/L	MS	SW846 3010A / SW846 6020A
SELENIUM	0.60	ug/L	MS	SW846 3010A / SW846 6020A
SILVER	0.080	ug/L	MS	SW846 3010A / SW846 6020A
THALLIUM	0.080	ug/L	MS	SW846 3010A / SW846 6020A
VANADIUM	0.80	ug/L	MS	SW846 3010A / SW846 6020A

METHOD DETECTION LIMITS

Lab Name: Katahdin Analytical Services **Instrument Code:** H

Instrument Name: CETAC M6100 **Date:** 2/9/2011

Analyte	MDL	Units	M	EPA Prep./Anal. Method
MERCURY	0.013	ug/L	CV	SW846 7470A / SW846 7470A

METHOD DETECTION LIMITS

Lab Name: Katahdin Analytical Services **Instrument Code:** I

Instrument Name: THERMO ICAP 6500 **Date:** 1/19/2011

Analyte	MDL	Units	M	EPA Prep./Anal. Method
ALUMINUM	15.	ug/L	P	SW846 3010A / SW846 6010C
BARIUM	0.23	ug/L	P	SW846 3010A / SW846 6010C
CALCIUM	11.	ug/L	P	SW846 3010A / SW846 6010C
CHROMIUM	0.36	ug/L	P	SW846 3010A / SW846 6010C
COPPER	0.63	ug/L	P	SW846 3010A / SW846 6010C
IRON	5.4	ug/L	P	SW846 3010A / SW846 6010C
LEAD	1.1	ug/L	P	SW846 3010A / SW846 6010C
MAGNESIUM	7.8	ug/L	P	SW846 3010A / SW846 6010C
MANGANESE	1.1	ug/L	P	SW846 3010A / SW846 6010C
NICKEL	0.28	ug/L	P	SW846 3010A / SW846 6010C
POTASSIUM	41.	ug/L	P	SW846 3010A / SW846 6010C
SODIUM	24.	ug/L	P	SW846 3010A / SW846 6010C
ZINC	0.72	ug/L	P	SW846 3010A / SW846 6010C

METHOD DETECTION LIMITS

Lab Name: Katahdin Analytical Services **Instrument Code:** J

Instrument Name: AGILENT 7500 ICP-MS **Date:** 1/25/2011

Analyte	MDL	Units	M	EPA Prep./Anal. Method
ANTIMONY	0.011	ug/L	MS	SW846 3010A / SW846 6020A
ARSENIC	0.45	ug/L	MS	SW846 3010A / SW846 6020A
BERYLLIUM	0.0067	ug/L	MS	SW846 3010A / SW846 6020A
CADMIUM	0.0060	ug/L	MS	SW846 3010A / SW846 6020A
COBALT	0.012	ug/L	MS	SW846 3010A / SW846 6020A
SELENIUM	0.037	ug/L	MS	SW846 3010A / SW846 6020A
SILVER	0.010	ug/L	MS	SW846 3010A / SW846 6020A
THALLIUM	0.012	ug/L	MS	SW846 3010A / SW846 6020A
VANADIUM	0.10	ug/L	MS	SW846 3010A / SW846 6020A

ICP INTERELEMENT CORRECTION FACTORS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Instrument Name: THERMO ICAP 6500 **Instrument ID:** I **Date:** 1/8/2015

Analyte	Wavelength (nm)	Interelement Correction Factors for: Al	Ca	Fe	Mg	As	Cr	Co	Cu	Mn	Mo	Ni	Ti	V
ALUMINUM	396.15	0.0	0.0003680	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0300000	0.0	0.0	0.0
ANTIMONY	206.83	0.0000250	0.0	0.0000520	0.0	-0.0001350	0.0078600	0.0	0.0	0.0	-0.0018800	-0.0009470	0.0	-0.0017400
ARSENIC	189.04	0.0000120	0.0	-0.0001310	0.0	0.0	0.0006100	0.0	0.0	0.0	0.0020700	0.0	0.0	0.0
BARIUM	455.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BERYLLIUM	313.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0007160	0.0000820
BORON	208.96	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0296000	0.0	0.0	0.0
CADMIUM	226.50	0.0	0.0	0.0000630	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0000800	0.0000260	0.0
CALCIUM	315.89	0.0	0.0	0.0	0.0	0.0	0.0008850	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHROMIUM	267.72	0.0	0.0	0.0000070	0.0	0.0	0.0	0.0	0.0	0.0001110	0.0	0.0	0.0	0.0000720
COBALT	228.62	0.0	0.0	0.0	0.0	0.0	-0.0000420	0.0	0.0	0.0	0.0	0.0000640	0.0027000	0.0
COPPER	327.40	0.0000110	0.0	-0.0000060	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0005550	0.0003110
GOLD	242.79	0.0	0.0	0.0001410	0.0	0.0	0.0	0.0	0.0	-0.0019000	0.0	0.0	0.0	0.0
IRON	259.94	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LEAD	220.35	-0.0001240	0.0	0.0000190	0.0	0.0	-0.0005800	0.0000540	0.0001360	0.0	-0.0005810	0.0002080	0.0000970	0.0
LITHIUM	670.78	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAGNESIUM	202.58	0.0	0.0	0.0000370	0.0	0.0	0.0	0.2003000	0.0	0.0	0.0277000	0.0	0.0002000	0.0
MANGANESE	257.61	-0.0000010	0.0	0.0000150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MOLYBDENUM	202.03	0.0	0.0	0.0	0.0	0.0	0.0001080	0.0	0.0	0.0000070	0.0	0.0	0.0	-0.0001920
NICKEL	231.60	0.0	0.0	-0.0000380	0.0	0.0	0.0	0.0001270	0.0	0.0	0.0008690	0.0	0.0	0.0
POTASSIUM	766.49	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SELENIUM	196.09	0.0000230	0.0	-0.0000020	0.0	-0.0000500	0.0	0.0000900	0.0	0.0004850	0.0	0.0	0.0	-0.0002080
SILICON	251.61	0.0	0.0	-0.0000080	0.0	0.0	0.0	0.0	0.0	0.0	0.0097100	0.0	0.0009940	0.0
SILVER	328.07	0.0	0.0	-0.0002370	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0002840	0.0
SODIUM	589.59	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
STRONTIUM	421.55	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
THALLIUM	190.86	-0.0000020	0.0	0.0000020	0.0	0.0	0.0	0.0018400	0.0000120	-0.0021900	-0.0000380	0.0	-0.0010500	-0.0093600
TIN	189.99	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TITANIUM	334.90	0.0	0.0	0.0	0.0	0.0	0.0001290	0.0	0.0	0.0	0.0010500	0.0	0.0	0.0
VANADIUM	292.40	0.0	0.0	0.0000210	0.0	0.0	-0.0041100	0.0	0.0	-0.0003220	-0.0062800	0.0	0.0010900	0.0
ZINC	206.20	0.0	0.0	0.0	0.0	0.0	-0.0011400	0.0	0.0	0.0	0.0	0.0	0.0	0.0

FORM XI - IN

ICP LINEAR RANGES

Lab Name: Katahdin Analytical Services **Instrument Code:** I

Instrument Name: THERMO ICAP 6500 **Date:** 4/6/2015

Concentration Units: ug/L

Analyte	Integration Time (sec)	Linear Range	M
ALUMINUM	5.00	500000	P
ANTIMONY	45.00	20000	P
ARSENIC	45.00	20000	P
BARIUM	5.00	20000	P
BERYLLIUM	5.00	20000	P
CADMIUM	45.00	20000	P
CALCIUM	5.00	500000	P
CHROMIUM	10.00	20000	P
COBALT	45.00	20000	P
COPPER	10.00	20000	P
IRON	5.00	250000	P
LEAD	45.00	20000	P
MAGNESIUM	45.00	200000	P
MANGANESE	5.00	20000	P
MOLYBDENUM	45.00	5000	P
NICKEL	10.00	20000	P
POTASSIUM	5.00	300000	P
SELENIUM	45.00	20000	P
SILVER	10.00	2000	P
SODIUM	5.00	200000	P
THALLIUM	45.00	20000	P
VANADIUM	10.00	20000	P
ZINC	45.00	20000	P

ICP LINEAR RANGES

Lab Name: Katahdin Analytical Services **Instrument Code:** J

Instrument Name: AGILENT 7500 ICP-MS **Date:** 4/7/2015

Concentration Units: ug/L

Analyte	Integration Time (sec)	Linear Range	M
ALUMINUM	0.01	200000	MS
ANTIMONY	0.10	1000	MS
ARSENIC	0.30	1000	MS
BARIUM	0.10	2000	MS
BERYLLIUM	0.30	100	MS
CADMIUM	0.10	1000	MS
CALCIUM	0.03	200000	MS
CHROMIUM	0.10	1000	MS
COBALT	0.10	1000	MS
COPPER	0.10	2000	MS
IRON	0.03	100000	MS
LEAD	0.10	2000	MS
MAGNESIUM	0.05	200000	MS
MANGANESE	0.10	2000	MS
MOLYBDENUM	0.10	1000	MS
NICKEL	0.10	1000	MS
POTASSIUM	0.01	200000	MS
SELENIUM	0.30	1000	MS
SILVER	0.10	100	MS
SODIUM	0.01	200000	MS
THALLIUM	0.10	1000	MS
VANADIUM	0.10	1000	MS
ZINC	0.10	2000	MS

PREPARATION LOG

Lab Name: Katahdin Analytical Services **QC Batch ID:** IF11ICW2

Matrix: WATER **SDG Name:** OU8-2

Method: P **Prep Date:** 06/11/2015

Client ID	Lab Sample ID	Initial (L)	Final (L)	Bottle ID
LCSWIF11ICW2	LCSWIF11ICW2	0.05	0.05	
PBWIF11ICW2	PBWIF11ICW2	0.05	0.05	
WTB-GW-MW01-0615	SI4024-001	0.05	0.05	A
WTB-GW-MW05R-0615	SI4024-002	0.05	0.05	A
WTB-GW-MW03-0615	SI4024-003	0.05	0.05	A
WTB-GW-FD01-0615	SI4024-004	0.05	0.05	A
WTB-GW-MW04-0615	SI4024-005	0.05	0.05	A
WTB-GW-MW04-0615D	SI4024-005D	0.05	0.05	A
WTB-GW-MW04-0615S	SI4024-005S	0.05	0.05	A

PREPARATION LOG

Lab Name: Katahdin Analytical Services **QC Batch ID:** IF11IMW2

Matrix: WATER **SDG Name:** OU8-2

Method: MS **Prep Date:** 06/11/2015

Client ID	Lab Sample ID	Initial (L)	Final (L)	Bottle ID
LCSWIF11IMW2	LCSWIF11IMW2	0.05	0.05	
PBWIF11IMW2	PBWIF11IMW2	0.05	0.05	
WTB-GW-MW01-0615	SI4024-001	0.05	0.05	A
WTB-GW-MW05R-0615	SI4024-002	0.05	0.05	A
WTB-GW-MW03-0615	SI4024-003	0.05	0.05	A
WTB-GW-FD01-0615	SI4024-004	0.05	0.05	A
WTB-GW-MW04-0615	SI4024-005	0.05	0.05	A
WTB-GW-MW04-0615D	SI4024-005D	0.05	0.05	A
WTB-GW-MW04-0615S	SI4024-005S	0.05	0.05	A

PREPARATION LOG

Lab Name: Katahdin Analytical Services **QC Batch ID:** IF16ICW1

Matrix: WATER **SDG Name:** OU8-2

Method: P **Prep Date:** 06/16/2015

Client ID	Lab Sample ID	Initial (L)	Final (L)	Bottle ID
LC2WIF16ICW1	LC2WIF16ICW1	0.05	0.05	
LCSWIF16ICW1	LCSWIF16ICW1	0.05	0.05	
PBWIF16ICW1	PBWIF16ICW1	0.05	0.05	
WTB-GW-MW02-0615	SI4157-001	0.05	0.05	A
WTB-GW-MW07-0615	SI4157-002	0.05	0.05	A
WTB-GW-MW06-0615	SI4157-003	0.05	0.05	A

PREPARATION LOG

Lab Name: Katahdin Analytical Services **QC Batch ID:** IF16IMW1

Matrix: WATER **SDG Name:** OU8-2

Method: MS **Prep Date:** 06/16/2015

Client ID	Lab Sample ID	Initial (L)	Final (L)	Bottle ID
LC2WIF16IMW1	LC2WIF16IMW1	0.05	0.05	
LCSWIF16IMW1	LCSWIF16IMW1	0.05	0.05	
PBWIF16IMW1	PBWIF16IMW1	0.05	0.05	
WTB-GW-MW02-0615	SI4157-001	0.05	0.05	A
WTB-GW-MW07-0615	SI4157-002	0.05	0.05	A
WTB-GW-MW06-0615	SI4157-003	0.05	0.05	A

PREPARATION LOG

Lab Name: Katahdin Analytical Services **QC Batch ID:** IF17HGW3

Matrix: WATER **SDG Name:** OU8-2

Method: CV **Prep Date:** 06/17/2015

Client ID	Lab Sample ID	Initial (L)	Final (L)	Bottle ID
LCSWIF17HGW3	LCSWIF17HGW3	0.025	0.025	
PBWIF17HGW3	PBWIF17HGW3	0.025	0.025	
WTB-GW-MW01-0615	SI4024-001	0.025	0.025	A
WTB-GW-MW05R-0615	SI4024-002	0.025	0.025	A
WTB-GW-MW03-0615	SI4024-003	0.025	0.025	A
WTB-GW-FD01-0615	SI4024-004	0.025	0.025	A
WTB-GW-MW04-0615	SI4024-005	0.025	0.025	A
WTB-GW-MW04-0615D	SI4024-005D	0.025	0.025	A
WTB-GW-MW04-0615P	SI4024-005P	0.025	0.025	A
WTB-GW-MW04-0615S	SI4024-005S	0.025	0.025	A
WTB-GW-MW02-0615	SI4157-001	0.025	0.025	A
WTB-GW-MW07-0615	SI4157-002	0.025	0.025	A
WTB-GW-MW06-0615	SI4157-003	0.025	0.025	A
WTB-GW-MW06-0615D	SI4157-003D	0.025	0.025	A
WTB-GW-MW06-0615S	SI4157-003S	0.025	0.025	A

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Instrument ID: CETAC M6100 **File Name:** HIF23A

Date: 6/23/2015 **Method:** CV

Lab Sample ID	Client ID	D.F.	Time	Elements
Calibration Blank		1	10:30	Hg
Standard #1 (0.2 ppb		1	10:32	Hg
Standard #2 (0.5 ppb		1	10:34	Hg
Standard #3 (1.0 ppb		1	10:36	Hg
Standard #4 (5.0 ppb		1	10:38	Hg
Standard #5 (10.0 pp		1	10:40	Hg
ICV		1	10:43	HG
ICB		1	10:45	HG
PQL		1	10:47	HG
CCV		1	10:49	HG
CCB		1	10:51	HG
ZZZZZZ		1	10:53	
ZZZZZZ		1	10:55	
ZZZZZZ		1	10:57	
ZZZZZZ		1	10:59	
ZZZZZZ		1	11:04	
ZZZZZZ		1	11:07	
ZZZZZZ		1	11:09	
ZZZZZZ		1	11:11	
ZZZZZZ		1	11:14	
CCV		1	11:16	HG
CCB		1	11:18	HG
ZZZZZZ		1	11:20	
ZZZZZZ		1	11:22	
ZZZZZZ		5	11:24	
ZZZZZZ		1	11:26	
ZZZZZZ		1	11:28	

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Instrument ID: CETAC M6100 **File Name:** HIF23A

Date: 6/23/2015 **Method:** CV

Lab Sample ID	Client ID	D.F.	Time	Elements
ZZZZZZ		1	11:31	
ZZZZZZ		1	11:33	
LCSWIF17HGW3		1	11:37	HG
PBWIF17HGW3		1	11:39	HG
SI4024-001	WTB-GW-MW01-0615	1	11:41	HG
CCV		1	11:43	HG
CCB		1	11:45	HG
SI4024-002	WTB-GW-MW05R-0615	1	11:47	HG
SI4024-003	WTB-GW-MW03-0615	1	11:49	HG
SI4024-004	WTB-GW-FD01-0615	1	11:52	HG
SI4024-005	WTB-GW-MW04-0615	1	11:54	HG
SI4024-005A	WTB-GW-MW04-0615A	1	11:56	HG
SI4024-005L	WTB-GW-MW04-0615L	5	11:58	HG
SI4024-005D	WTB-GW-MW04-0615D	1	12:00	HG
SI4024-005P	WTB-GW-MW04-0615P	1	12:02	HG
SI4024-005S	WTB-GW-MW04-0615S	1	12:04	HG
ZZZZZZ		1	12:07	
CCV		1	12:09	HG
CCB		1	12:11	HG
ZZZZZZ		1	12:13	
ZZZZZZ		1	12:15	
SI4157-001	WTB-GW-MW02-0615	1	12:17	HG
SI4157-002	WTB-GW-MW07-0615	1	12:19	HG
SI4157-003	WTB-GW-MW06-0615	1	12:21	HG
SI4157-003A	WTB-GW-MW06-0615A	1	12:25	HG
SI4157-003L	WTB-GW-MW06-0615L	5	12:27	HG
SI4157-003D	WTB-GW-MW06-0615D	1	12:29	HG

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Instrument ID: CETAC M6100 **File Name:** HIF23A

Date: 6/23/2015 **Method:** CV

Lab Sample ID	Client ID	D.F.	Time	Elements
SI4157-003S	WTB-GW-MW06-0615S	1	12:31	HG
ZZZZZZ		1	12:33	
CCV		1	12:37	HG
CCB		1	12:39	HG

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Instrument ID: THERMO ICAP 6500 **File Name:** IIF22A

Date: 6/22/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements										
Blank		1	12:55	AL	BA	CA	CR	CU	FE	PB	MG	NI	K	NA	ZN
Std 1		1	13:00	AL	BA	CA	CR	CU	FE	PB	MG	NI	K	NA	ZN
ICV		1	13:05	AL	BA	CA	CR	CU	FE	PB	MG	NI	K	NA	ZN
ICB		1	13:12	AL	BA	CA	CR	CU	FE	PB	MG	NI	K	NA	ZN
PQL		1	13:17	AL	BA	CA	CR	CU	FE	PB	MG	NI	K	NA	ZN
ZZZZZZ		1	13:24												
ZZZZZZ		1	13:30												
ICSA		1	13:39	AL	BA	CA	CR	CU	FE	PB	MG	NI	K	NA	ZN
ICSAB		1	13:44	AL	BA	CA	CR	CU	FE	PB	MG	NI	K	NA	ZN
CCV		1	13:51	AL	BA	CA	CR	CU	FE	PB	MG	NI	K	NA	ZN
CCB		1	13:56	AL	BA	CA	CR	CU	FE	PB	MG	NI	K	NA	ZN
ZZZZZZ		1	14:01												
ZZZZZZ		1	14:06												
ZZZZZZ		1	14:11												
ZZZZZZ		5	14:16												
ZZZZZZ		200	14:21												
ZZZZZZ		1	14:26												
ZZZZZZ		1	14:31												
ZZZZZZ		1	14:36												
ZZZZZZ		1	14:41												
ZZZZZZ		1	14:47												
CCV		1	14:52	AL	BA	CA	CR	CU	FE	PB	MG	NI	K	NA	ZN
CCB		1	14:57	AL	BA	CA	CR	CU	FE	PB	MG	NI	K	NA	ZN
ZZZZZZ		1	15:02												
ZZZZZZ		10	15:07												
ZZZZZZ		1	15:12												
ZZZZZZ		1	15:17												

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Instrument ID: THERMO ICAP 6500 **File Name:** IIF22A

Date: 6/22/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements											
ZZZZZZ		1	15:22												
ZZZZZZ		5	15:27												
ZZZZZZ		5	15:32												
ZZZZZZ		5	15:37												
ZZZZZZ		25	15:42												
ZZZZZZ		5	15:47												
CCV		1	15:52	AL	BA	CA	CR	CU	FE	PB	MG	NI	K	NA	ZN
CCB		1	15:57	AL	BA	CA	CR	CU	FE	PB	MG	NI	K	NA	ZN
ZZZZZZ		1	16:02												
ZZZZZZ		1	16:07												
ZZZZZZ		1	16:12												
ZZZZZZ		1	16:18												
ZZZZZZ		1	16:22												
ZZZZZZ		1	16:28												
ZZZZZZ		1	16:33												
LCSWIF11ICW2		1	16:38	AL	BA	CA	CR	CU	FE	PB	MG	NI	K	NA	ZN
PBWIF11ICW2		1	16:43	AL	BA	CA	CR	CU	FE	PB	MG	NI		NA	ZN
ZZZZZZ		1	16:48												
CCV		1	16:52	AL	BA	CA	CR	CU	FE	PB	MG	NI	K	NA	ZN
CCB		1	16:57	AL	BA	CA	CR	CU	FE	PB	MG	NI	K	NA	ZN
ZZZZZZ		1	17:03												
SI4024-003	WTB-GW-MW03-0615	1	17:08				CR	CU		PB	MG	NI			ZN
SI4024-004	WTB-GW-FD01-0615	1	17:13				CR	CU		PB	MG	NI			ZN
SI4024-005	WTB-GW-MW04-0615	1	17:17				CR	CU		PB	MG	NI			ZN
SI4024-005A	WTB-GW-MW04-0615A	1	17:23				CR	CU		PB	MG	NI			ZN
SI4024-005D	WTB-GW-MW04-0615D	1	17:28				CR	CU		PB	MG	NI			ZN
SI4024-005L	WTB-GW-MW04-0615L	1	17:33												ZN

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Instrument ID: THERMO ICAP 6500 **File Name:** IIF22A

Date: 6/22/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements												
SI4024-005S	WTB-GW-MW04-0615S	1	17:38				CR	CU		PB	MG	NI				ZN
ZZZZZZ		1	17:43													
ZZZZZZ		1	17:48													
CCV		1	17:53	AL	BA	CA	CR	CU	FE	PB	MG	NI	K	NA		ZN
CCB		1	17:58	AL	BA	CA	CR	CU	FE	PB	MG	NI	K	NA		ZN

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Instrument ID: THERMO ICAP 6500 **File Name:** IIF23A

Date: 6/23/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements									
Blank		1	12:40	AL	BA	CA	CR	CU	FE	PB	MG	NI	NA	ZN
Std 1		1	12:45	AL	BA	CA	CR	CU	FE	PB	MG	NI	NA	ZN
ICV		1	12:49	AL	BA	CA	CR	CU	FE	PB	MG	NI	NA	ZN
ICB		1	12:56	AL	BA	CA	CR	CU	FE	PB	MG	NI	NA	ZN
PQL		1	13:01	AL	BA	CA	CR	CU	FE	PB	MG	NI	NA	ZN
ZZZZZZ		1	13:08											
ZZZZZZ		1	13:13											
ICSA		1	13:22	AL	BA	CA	CR	CU	FE	PB	MG	NI	NA	ZN
ICSAB		1	13:26	AL	BA	CA	CR	CU	FE	PB	MG	NI	NA	ZN
CCV		1	13:33	AL	BA	CA	CR	CU	FE	PB	MG	NI	NA	ZN
CCB		1	13:37	AL	BA	CA	CR	CU	FE	PB	MG	NI	NA	ZN
ZZZZZZ		100	13:42											
ZZZZZZ		1	13:47											
SI4024-001	WTB-GW-MW01-0615	5	13:52	AL	BA	CA	CR	CU	FE	PB	MG	NI		ZN
SI4024-002	WTB-GW-MW05R-0615	5	13:57	AL	BA	CA	CR	CU	FE	PB	MG	NI		ZN
SI4024-004	WTB-GW-FD01-0615	2	14:01	AL	BA	CA			FE				NA	
ZZZZZZ		1	14:06											
ZZZZZZ		2	14:11											
ZZZZZZ		2	14:16											
ZZZZZZ		2	14:21											
ZZZZZZ		1	14:26											
CCV		1	14:31	AL	BA	CA	CR	CU	FE	PB	MG	NI	NA	ZN
CCB		1	14:36	AL	BA	CA	CR	CU	FE	PB	MG	NI	NA	ZN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Instrument ID: THERMO ICAP 6500 **File Name:** IIF26B

Date: 6/26/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements											
Blank		1	17:15	AL	BA	CA	CR	CU	FE	PB	MG	MN	NI	K	ZN
Std 1		1	17:20	AL	BA	CA	CR	CU	FE	PB	MG	MN	NI	K	ZN
ICV		1	17:25	AL	BA	CA	CR	CU	FE	PB	MG	MN	NI	K	ZN
ICB		1	17:32	AL	BA	CA	CR	CU	FE	PB	MG	MN	NI	K	ZN
PQL		1	17:36	AL	BA	CA	CR	CU	FE	PB	MG	MN	NI	K	ZN
ZZZZZZ		1	17:43												
ZZZZZZ		1	17:48												
ICSA		1	17:57	AL	BA	CA	CR	CU	FE	PB	MG	MN	NI	K	ZN
ICSAB		1	18:02	AL	BA	CA	CR	CU	FE	PB	MG	MN	NI	K	ZN
CCV		1	18:08	AL	BA	CA	CR	CU	FE	PB	MG	MN	NI	K	ZN
CCB		1	18:13	AL	BA	CA	CR	CU	FE	PB	MG	MN	NI	K	ZN
LC2WIF16ICW1		1	18:18	AL	BA		CR	CU		PB	MG	MN	NI	K	ZN
LCSWIF16ICW1		1	18:23	AL	BA		CR	CU		PB	MG	MN	NI	K	ZN
PBWIF16ICW1		1	18:28	AL	BA		CR	CU		PB	MG	MN	NI	K	ZN
SI4157-001	WTB-GW-MW02-0615	1	18:33	AL	BA					PB		MN	NI	K	ZN
SI4157-002	WTB-GW-MW07-0615	1	18:38	AL	BA		CR	CU		PB	MG	MN	NI	K	ZN
SI4157-003	WTB-GW-MW06-0615	1	18:43	AL	BA		CR	CU		PB	MG	MN	NI	K	ZN
ZZZZZZ		1	18:47												
ZZZZZZ		1	18:52												
ZZZZZZ		1	18:57												
ZZZZZZ		1	19:02												
CCV		1	19:07	AL	BA	CA	CR	CU	FE	PB	MG	MN	NI	K	ZN
CCB		1	19:12	AL	BA	CA	CR	CU	FE	PB	MG	MN	NI	K	ZN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Instrument ID: THERMO ICAP 6500 **File Name:** IIF29A

Date: 6/29/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements						
Blank		1	14:44	AL	CA	CR	CU	FE	MG	NA
Std 1		1	14:49	AL	CA	CR	CU	FE	MG	NA
ICV		1	14:54	AL	CA	CR	CU	FE	MG	NA
ICB		1	15:01	AL	CA	CR	CU	FE	MG	NA
PQL		1	15:06	AL	CA	CR	CU	FE	MG	NA
ZZZZZZ		1	15:13							
ZZZZZZ		1	15:17							
ICSA		1	15:26	AL	CA	CR	CU	FE	MG	NA
ICSAB		1	15:30	AL	CA	CR	CU	FE	MG	NA
CCV		1	15:37	AL	CA	CR	CU	FE	MG	NA
CCB		1	15:42	AL	CA	CR	CU	FE	MG	NA
ZZZZZZ		1	15:47							
ZZZZZZ		1	15:52							
ZZZZZZ		1	15:56							
ZZZZZZ		1	16:01							
ZZZZZZ		1	16:06							
ZZZZZZ		1	16:11							
ZZZZZZ		1	16:16							
ZZZZZZ		1	16:21							
ZZZZZZ		5	16:26							
ZZZZZZ		1	16:31							
CCV		1	16:36	AL	CA	CR	CU	FE	MG	NA
CCB		1	16:41	AL	CA	CR	CU	FE	MG	NA
ZZZZZZ		1	16:45							
ZZZZZZ		1	16:50							
ZZZZZZ		1	16:55							
ZZZZZZ		1	17:00							

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Instrument ID: THERMO ICAP 6500 **File Name:** IIF29A

Date: 6/29/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements							
ZZZZZZ		1	17:05								
ZZZZZZ		1	17:10								
ZZZZZZ		1	17:15								
ZZZZZZ		1	17:20								
ZZZZZZ		1	17:25								
ZZZZZZ		1	17:30								
CCV		1	17:35	AL	CA	CR	CU	FE	MG		NA
CCB		1	17:40	AL	CA	CR	CU	FE	MG		NA
LC2WIF16ICW1		1	17:45		CA			FE			NA
LCSWIF16ICW1		1	17:49		CA			FE			NA
PBWIF16ICW1		1	17:54		CA			FE			NA
SI4157-001	WTB-GW-MW02-0615	2	17:59		CA	CR	CU	FE			
SI4157-001	WTB-GW-MW02-0615	5	18:04						MG		
SI4157-002	WTB-GW-MW07-0615	2	18:09		CA			FE			
SI4157-003	WTB-GW-MW06-0615	2	18:14		CA			FE			
ZZZZZZ		1	18:19								
ZZZZZZ		1	18:24								
ZZZZZZ		1	18:28								
CCV		1	18:33	AL	CA	CR	CU	FE	MG		NA
CCB		1	18:38	AL	CA	CR	CU	FE	MG		NA

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Instrument ID: THERMO ICAP 6500 **File Name:** IIF29B

Date: 6/29/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements						
Blank		1	19:22	AL	BA	CA	FE	MG	K	NA
Std 1		1	19:27	AL	BA	CA	FE	MG	K	NA
ICV		1	19:32	AL	BA	CA	FE	MG	K	NA
ICB		1	19:39	AL	BA	CA	FE	MG	K	NA
PQL		1	19:44	AL	BA	CA	FE	MG	K	NA
ZZZZZZ		1	19:51							
ZZZZZZ		1	19:56							
ICSA		1	20:04	AL	BA	CA	FE	MG	K	NA
ICSAB		1	20:09	AL	BA	CA	FE	MG	K	NA
CCV		1	20:15	AL	BA	CA	FE	MG	K	NA
CCB		1	20:20	AL	BA	CA	FE	MG	K	NA
ZZZZZZ		1	20:25							
ZZZZZZ		1	20:30							
ZZZZZZ		1	20:35							
ZZZZZZ		50	20:40							
ZZZZZZ		1	20:45							
ZZZZZZ		1	20:50							
ZZZZZZ		1	20:55							
ZZZZZZ		1	21:00							
PBWIF11ICW2		1	21:05						K	
SI4024-001	WTB-GW-MW01-0615	5	21:10						K	
CCV		1	21:14	AL	BA	CA	FE	MG	K	NA
CCB		1	21:19	AL	BA	CA	FE	MG	K	NA
SI4024-002	WTB-GW-MW05R-0615	5	21:24						K	
SI4024-003	WTB-GW-MW03-0615	1	21:29		BA		FE		K	
SI4024-004	WTB-GW-FD01-0615	2	21:33						K	
SI4024-005	WTB-GW-MW04-0615	1	21:38		BA		FE		K	

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Instrument ID: THERMO ICAP 6500 **File Name:** IIF29B

Date: 6/29/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements						
SI4024-005A	WTB-GW-MW04-0615A	1	21:43		BA		FE		K	
SI4024-005D	WTB-GW-MW04-0615D	1	21:47		BA		FE		K	NA
SI4024-005L	WTB-GW-MW04-0615L	5	21:52		BA		FE		K	
SI4024-005S	WTB-GW-MW04-0615S	1	21:57		BA		FE		K	
ZZZZZZ		1	22:02							
ZZZZZZ		1	22:07							
CCV		1	22:12	AL	BA	CA	FE	MG	K	NA
CCB		1	22:17	AL	BA	CA	FE	MG	K	NA

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Instrument ID: THERMO ICAP 6500 **File Name:** IIF30A

Date: 6/30/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements					
Blank		1	11:09	AL	CA	FE	MG	MN	NA
Std 1		1	11:14	AL	CA	FE	MG	MN	NA
ICV		1	11:19	AL	CA	FE	MG	MN	NA
ICB		1	11:25	AL	CA	FE	MG	MN	NA
PQL		1	11:30	AL	CA	FE	MG	MN	NA
ZZZZZZ		1	11:37						
ZZZZZZ		1	11:42						
ICSA		1	11:51	AL	CA	FE	MG	MN	NA
ICSAB		1	11:55	AL	CA	FE	MG	MN	NA
CCV		1	12:02	AL	CA	FE	MG	MN	NA
CCB		1	12:06	AL	CA	FE	MG	MN	NA
ZZZZZZ		1	12:11						
ZZZZZZ		1	12:16						
ZZZZZZ		1	12:21						
ZZZZZZ		1	12:26						
ZZZZZZ		1	12:31						
ZZZZZZ		1	12:36						
ZZZZZZ		1	12:41						
LCSWIF11ICW2		1	12:46					MN	
PBWIF11ICW2		1	12:51					MN	
SI4024-001	WTB-GW-MW01-0615	25	12:56					MN	
CCV		1	13:01	AL	CA	FE	MG	MN	NA
CCB		1	13:06	AL	CA	FE	MG	MN	NA
SI4024-002	WTB-GW-MW05R-0615	25	13:11					MN	
SI4024-003	WTB-GW-MW03-0615	2	13:16	AL	CA			MN	NA
SI4024-004	WTB-GW-FD01-0615	2	13:21					MN	
SI4024-005	WTB-GW-MW04-0615	2	13:26	AL	CA			MN	NA

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Instrument ID: THERMO ICAP 6500 **File Name:** IIF30A

Date: 6/30/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements					
SI4024-005A	WTB-GW-MW04-0615A	2	13:31	AL	CA		MN		NA
SI4024-005D	WTB-GW-MW04-0615D	2	13:35	AL	CA		MN		
SI4024-005L	WTB-GW-MW04-0615L	10	13:40	AL	CA		MN		NA
SI4024-005S	WTB-GW-MW04-0615S	2	13:45	AL	CA		MN		NA
ZZZZZZ		10	13:50						
SI4157-002	WTB-GW-MW07-0615	10	13:55						NA
CCV		1	14:00	AL	CA	FE	MG	MN	NA
CCB		1	14:05	AL	CA	FE	MG	MN	NA
SI4157-003	WTB-GW-MW06-0615	5	14:10						NA
ZZZZZZ		1	14:15						
ZZZZZZ		1	14:20						
ZZZZZZ		1	14:25						
ZZZZZZ		1	14:30						
ZZZZZZ		1	14:35						
ZZZZZZ		1	14:40						
ZZZZZZ		1	14:45						
ZZZZZZ		1	14:50						
ZZZZZZ		1	14:55						
CCV		1	15:00	AL	CA	FE	MG	MN	NA
CCB		1	15:05	AL	CA	FE	MG	MN	NA
ZZZZZZ		1	15:10						
ZZZZZZ		10	15:14						
ZZZZZZ		25	15:19						
ZZZZZZ		1	15:24						
ZZZZZZ		1	15:29						
ZZZZZZ		1	15:34						
ZZZZZZ		1	15:39						

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Instrument ID: THERMO ICAP 6500 **File Name:** IIF30A

Date: 6/30/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements				
ZZZZZZ		1	15:44					
ZZZZZZ		1	15:49					
ZZZZZZ		1	15:53					
CCV		1	15:58	AL	CA	FE	MG MN	NA
CCB		1	16:03	AL	CA	FE	MG MN	NA
ZZZZZZ		1	16:08					
ZZZZZZ		1	16:13					
ZZZZZZ		1	16:17					
ZZZZZZ		1	16:22					
SI4024-001	WTB-GW-MW01-0615	100	16:27					NA
SI4024-002	WTB-GW-MW05R-0615	100	16:32					NA
SI4157-001	WTB-GW-MW02-0615	25	16:37					NA
ZZZZZZ		50	16:42					
ZZZZZZ		1	16:47					
CCV		1	16:51	AL	CA	FE	MG MN	NA
CCB		1	16:56	AL	CA	FE	MG MN	NA

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF18A

Date: 6/18/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements															
6020 Tune		1	16:34																
200.8 Tune		1	16:37																
Cal Blank		1	17:11	Al	Sb	As	Be	Cd	Ca	Co	Fe	Mg	Mo	K	Se	Ag	Na	Tl	V
Cal Std 1		1	17:15	Al	Sb	As	Be	Cd	Ca	Co	Fe	Mg	Mo	K	Se	Ag	Na	Tl	V
Cal Std 2		1	17:18	Al	Sb	As	Be	Cd	Ca	Co	Fe	Mg	Mo	K	Se	Ag	Na	Tl	V
Cal Std 3		1	17:21	Al	Sb	As	Be	Cd	Ca	Co	Fe	Mg	Mo	K	Se	Ag	Na	Tl	V
Cal Std 4		1	17:24	Al	Sb	As	Be	Cd	Ca	Co	Fe	Mg	Mo	K	Se	Ag	Na	Tl	V
ICV		1	17:27	Al	Sb	As	Be	Cd	Ca	Co	Fe	Mg	Mo	K	Se	Ag	Na	Tl	V
ICB		1	17:30	Al	Sb	As	Be	Cd	Ca	Co	Fe	Mg	Mo	K	Se	Ag	Na	Tl	V
PQL		1	17:34	Al	Sb	As	Be	Cd	Ca	Co	Fe	Mg	Mo	K	Se	Ag	Na	Tl	V
ZZZZZZ		1	17:37																
ZZZZZZ		1	17:40																
ZZZZZZ		1	17:43																
ICSA		1	17:46	Al	Sb	As	Be	Cd	Ca	Co	Fe	Mg	Mo	K	Se	Ag	Na	Tl	V
ICSAB		1	17:50	Al	Sb	As	Be	Cd	Ca	Co	Fe	Mg	Mo	K	Se	Ag	Na	Tl	V
ZZZZZZ		1	17:53																
CCV		1	17:57	Al	Sb	As	Be	Cd	Ca	Co	Fe	Mg	Mo	K	Se	Ag	Na	Tl	V
CCB		1	18:00	Al	Sb	As	Be	Cd	Ca	Co	Fe	Mg	Mo	K	Se	Ag	Na	Tl	V
ZZZZZZ		5	18:03																
ZZZZZZ		5	18:06																
ZZZZZZ		5	18:09																
ZZZZZZ		5	18:12																
ZZZZZZ		5	18:16																
ZZZZZZ		5	18:19																
PBWIF11IMW2		5	18:22		Sb	As	Be	Cd		Co					Se	Ag		Tl	V
LCSWIF11IMW2		5	18:25		Sb	As	Be	Cd		Co					Se	Ag		Tl	V
SI4024-001	WTB-GW-MW01-0615	25	18:28		Sb	As	Be	Cd		Co					Se	Ag		Tl	V

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF18A

Date: 6/18/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements																
SI4024-002	WTB-GW-MW05R-0615	25	18:32		Sb	As	Be	Cd		Co					Se	Ag		Tl		V
CCV		1	18:35	Al	Sb	As	Be	Cd	Ca	Co	Fe	Mg	Mo	K	Se	Ag	Na	Tl		V
CCB		1	18:38	Al	Sb	As	Be	Cd	Ca	Co	Fe	Mg	Mo	K	Se	Ag	Na	Tl		V
SI4024-003	WTB-GW-MW03-0615	5	18:42		Sb	As	Be	Cd		Co					Se	Ag		Tl		V
SI4024-004	WTB-GW-FD01-0615	5	18:45		Sb	As	Be	Cd		Co					Se	Ag		Tl		V
SI4024-005	WTB-GW-MW04-0615	5	18:49		Sb	As	Be	Cd		Co					Se	Ag		Tl		V
SI4024-005L	WTB-GW-MW04-0615L	25	18:52		Sb	As	Be	Cd		Co					Se	Ag		Tl		V
SI4024-005A	WTB-GW-MW04-0615A	5	18:55		Sb	As	Be	Cd		Co					Se	Ag		Tl		V
SI4024-005D	WTB-GW-MW04-0615D	5	18:59		Sb	As	Be	Cd		Co					Se	Ag		Tl		V
SI4024-005S	WTB-GW-MW04-0615S	5	19:02		Sb	As	Be	Cd		Co					Se	Ag		Tl		V
ZZZZZZ		5	19:05																	
ZZZZZZ		5	19:09																	
ZZZZZZ		5	19:12																	
CCV		1	19:15	Al	Sb	As	Be	Cd	Ca	Co	Fe	Mg	Mo	K	Se	Ag	Na	Tl		V
CCB		1	19:19	Al	Sb	As	Be	Cd	Ca	Co	Fe	Mg	Mo	K	Se	Ag	Na	Tl		V
ZZZZZZ		1	19:22																	
ZZZZZZ		5	19:25																	
ZZZZZZ		1	19:29																	
ZZZZZZ		5	19:32																	
ZZZZZZ		5	19:36																	
ZZZZZZ		5	19:39																	
ZZZZZZ		1	19:43																	
PBWIF16IMW1		5	19:46		Sb	As	Be	Cd		Co					Se	Ag		Tl		V
LCSWIF16IMW1		5	19:49		Sb	As	Be	Cd		Co					Se	Ag		Tl		V
LC2WIF16IMW1		5	19:53		Sb	As	Be	Cd		Co					Se	Ag		Tl		V
CCV		1	19:56	Al	Sb	As	Be	Cd	Ca	Co	Fe	Mg	Mo	K	Se	Ag	Na	Tl		V
CCB		1	19:59	Al	Sb	As	Be	Cd	Ca	Co	Fe	Mg	Mo	K	Se	Ag	Na	Tl		V

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-2

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF18A

Date: 6/18/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements																
SI4157-001	WTB-GW-MW02-0615	25	20:03		Sb	As	Be	Cd		Co					Se	Ag		Tl		V
SI4157-002	WTB-GW-MW07-0615	5	20:06		Sb	As	Be	Cd		Co					Se	Ag		Tl		V
SI4157-003	WTB-GW-MW06-0615	5	20:10		Sb	As	Be	Cd		Co					Se	Ag		Tl		V
ZZZZZZ		5	20:13																	
ZZZZZZ		5	20:17																	
ZZZZZZ		5	20:20																	
ZZZZZZ		5	20:23																	
ZZZZZZ		5	20:27																	
ZZZZZZ		5	20:30																	
ZZZZZZ		5	20:33																	
CCV		1	20:37	Al	Sb	As	Be	Cd	Ca	Co	Fe	Mg	Mo	K	Se	Ag	Na	Tl		V
CCB		1	20:40	Al	Sb	As	Be	Cd	Ca	Co	Fe	Mg	Mo	K	Se	Ag	Na	Tl		V

FORM XIV - IN

Katahdin Analytical Services, Inc. **Metals Preparation Benchsheet**

Reagent Information:

HNO3: 104736 HCL: 99513 H2O2: N/A **Method:** 3010

LCS / Spike **LCS/Spiking Information:**

- ☑ ☑ CLPP-SPK-1 (ID/Vol): MS1928 / 0.05 mL
- ☑ ☑ CLPP-SPK-INT1 (ID/Vol): MW15522 / 0.5 mL
- ☑ ☑ CLPP-SPK-INT2 (ID/Vol): MW15542 / 0.5 mL
- ☐ ☐ _____ Spike (ID/Vol): N/A / _____ mL
- ☐ ☐ CLPP-SPK-4 (ID/Vol): N/A / _____ mL

Hot Plate/Block ID : B
Start Time: 10:30 /Temp.(90-95°C) : 90°
End Time: 16:54 /Temp.(90-95°C) : 90°
Thermometer ID/Pos.: ALC24 / 2.3

Filter Paper: N/A

REVIEWED
Eam 06-12-15
KATAHDIN ANALYTICAL
METALS SECTION

Sample ID	Batch ID	Initial Wt/Vol	Initial Units	Final Vol	Final Units	MX	Meth	Anal.	Date	Initial Color	Initial Clarity	Final Color	Final Clarity	Artifacts	Bottle
LCSWIF11ICW2	IF11ICW2	0.05	L	0.05	L	AQ	IC	TCS	06/11/2015	N/A	N/A	N/A	N/A		N/A
PBWIF11ICW2	IF11ICW2		L		L	AQ	IC	TCS	06/11/2015	N/A	N/A	N/A	N/A		N/A
SI4024-001	IF11ICW2		L		L	AQ	IC	TCS	06/11/2015						A
SI4024-002	IF11ICW2		L		L	AQ	IC	TCS	06/11/2015						A
SI4024-003	IF11ICW2		L		L	AQ	IC	TCS	06/11/2015						A
SI4024-004	IF11ICW2		L		L	AQ	IC	TCS	06/11/2015						A
SI4024-005	IF11ICW2		L		L	AQ	IC	TCS	06/11/2015						A
SI4024-005D	IF11ICW2		L		L	AQ	IC	TCS	06/11/2015						A
SI4024-005S	IF11ICW2		L		L	AQ	IC	TCS	06/11/2015						A

TRS 6/11/15

Katahdin Analytical Services 4000400

Digestion performed by: TRS **On:** 6/11/15

Katahdin Analytical Services, Inc. **Metals Preparation Benchsheet**

Reagent Information:

HNO3: 104736 HCL: 99513 H2O2: N/A **Method:** 3010-MS

LCS / Spike **LCS/Spiking Information:**

- ☑ ☑ CLPP-SPK-1 (ID/Vol): MS1928 / 0.05 mL
- ☑ ☑ CLPP-SPK-INT1 (ID/Vol): MW15522 / 0.5 mL
- ☑ ☑ CLPP-SPK-INT2 (ID/Vol): MW15542 / 0.5 mL
- ☐ ☐ _____ Spike (ID/Vol): N/A / _____ mL
- ☐ ☐ CLPP-SPK-4 (ID/Vol): N/A / _____ mL

Hot Plate/Block ID : B
Start Time: 10:30 Temp.(90-95°C) : 90°
End Time: 16:54 Temp.(90-95°C) : 90°
Thermometer ID/Pos.: ALC 24 / 2.3

Filter Paper: N/A

REVIEWED
Gan 06-12-15
KATAHDIN ANALYTICAL
METALS SECTION

Sample ID	Batch ID	Initial Wt/Vol	Initial Units	Final Vol	Final Units	MX	Meth	Anal.	Date	Initial Color	Initial Clarity	Final Color	Final Clarity	Artifacts	Bottle
LCSWIF11IMW2	IF11IMW2	0.05	L	0.05	L	AQ	IM	TCS	06/11/2015	N/A	N/A	N/A	N/A		N/A
PBWIF11IMW2	IF11IMW2		L		L	AQ	IM	TCS	06/11/2015	N/A	N/A	N/A	N/A		N/A
SI4024-001	IF11IMW2		L		L	AQ	IM	TCS	06/11/2015						A
SI4024-002	IF11IMW2		L		L	AQ	IM	TCS	06/11/2015						A
SI4024-003	IF11IMW2		L		L	AQ	IM	TCS	06/11/2015						A
SI4024-004	IF11IMW2		L		L	AQ	IM	TCS	06/11/2015						A
SI4024-005	IF11IMW2		L		L	AQ	IM	TCS	06/11/2015						A
SI4024-005D	IF11IMW2		L		L	AQ	IM	TCS	06/11/2015						A
SI4024-005S	IF11IMW2		L		L	AQ	IM	TCS	06/11/2015						A

TRS 6/11/15

Digestion performed by: TRS On: 6/11/15

Katahdin Analytical Services 4000401

Katahdin Analytical Services, Inc. **Metals Preparation Benchsheet**

Reagent Information:

HNO3: 1047316 **HCL:** 99513 **H2O2:** N/A **Method:** 3010

LCS / Spike **LCS/Spiking Information:**

- [x] [ ] **CLPP-SPK-1 (ID/Vol):** MS1928 / 0.05 mL
- [x] [ ] **CLPP-SPK-INT1 (ID/Vol):** MW15522 / 0.5 mL
- [x] [ ] **CLPP-SPK-INT2 (ID/Vol):** MW15542 / 0.5 mL
- [ ] [ ] _____ **Spike (ID/Vol):** N/A / _____ mL
- [ ] [ ] **CLPP-SPK-4 (ID/Vol):** N/A / _____ mL

Hot Plate/Block ID B
Start Time: 9:29 **/Temp.(90-95°C) :** 95°
End Time: 15:22 **/Temp.(90-95°C) :** 93°
Thermometer ID/Pos.: AC24 / 2:5

Filter Paper: N/A

REVIEWED
Ean 06-16-15
KATAHDIN ANALYTICAL
METALS SECTION

Sample ID	Batch ID	Initial Wt/Vol	Initial Units	Final Vol	Final Units	MX	Meth	Anal.	Date	Initial Color	Initial Clarity	Final Color	Final Clarity	Artifacts	Bottle
LC2WIF16ICW1	IF16ICW1	0.05	L	0.05	L	AQ	IC	TCS	06/16/2015	N/A	N/A	N/A	N/A	N/A	N/A
LCSWIF16ICW1	IF16ICW1		L		L	AQ	IC	TCS	06/16/2015	N/A	N/A	N/A	N/A		N/A
PBWIF16ICW1	IF16ICW1		L		L	AQ	IC	TCS	06/16/2015	N/A	N/A	N/A	N/A		N/A
SI4157-001	IF16ICW1		L		L	AQ	IC	TCS	06/16/2015						A
SI4157-002	IF16ICW1		L		L	AQ	IC	TCS	06/16/2015						A
SI4157-003	IF16ICW1		L		L	AQ	IC	TCS	06/16/2015						A
SI4178-029	IF16ICW1		L		L	AQ	IC	TCS	06/16/2015						D
SI4178-033	IF16ICW1		L		L	AQ	IC	TCS	06/16/2015						D
SI4178-037	IF16ICW1		L		L	AQ	IC	TCS	06/16/2015						D
SI4178-041	IF16ICW1		L		L	AQ	IC	TCS	06/16/2015						D
SI4178-045	IF16ICW1		L		L	AQ	IC	TCS	06/16/2015						D
SI4178-049	IF16ICW1		L		L	AQ	IC	TCS	06/16/2015						D
SI4178-053	IF16ICW1		L		L	AQ	IC	TCS	06/16/2015						D

TRS 6/16/15

QA-064-Revision 2 - 01/08/2014 **Digestion performed by:** TRS **On:** 6/16/15 **Page:** IF095 **Revision:** 00

Katahdin Analytical Services 4000402

Katahdin Analytical Services, Inc. **Metals Preparation Benchsheet**

Reagent Information:

HNO3: 1047316 HCL 99513 H2O2: N/A **Method:** 3010-MS

LCS / Spike **LCS/Spiking Information:**

- ☑ ☑ CLPP-SPK-1 (ID/Vol): MS1928 / 0.05 mL
- ☑ ☑ CLPP-SPK-INT1 (ID/Vol): MW15522 / 0.5 mL
- ☑ ☑ CLPP-SPK-INT2 (ID/Vol): MW15542 / 0.5 mL
- ☐ ☐ _____ Spike (ID/Vol): N/A / _____ mL
- ☐ ☐ CLPP-SPK-4 (ID/Vol): N/A / _____ mL

Hot Plate/Block ID : B

Start Time: 9:29 /Temp.(90-95°C) : 95°

End Time: 15:22 /Temp.(90-95°C) : 93°

Thermometer ID/Pos.: ALC24 / 215

Filter Paper: N/A

REVIEWED
6-16-15
KATAHDIN ANALYTICAL
METALS SECTION

Sample ID	Batch ID	Initial Wt/Vol	Initial Units	Final Vol	Final Units	MX	Meth	Anal.	Date	Initial Color	Initial Clarity	Final Color	Final Clarity	Artifacts	Bottle
LCSWIF16IMW1	IF16IMW1	0.05	L	0.05	L	AQ	IM	TCS	06/16/2015	N/A	N/A	N/A	N/A		N/A
PBWIF16IMW1	IF16IMW1		L		L	AQ	IM	TCS	06/16/2015	N/A	N/A	N/A	N/A		N/A
SI4157-001	IF16IMW1		L		L	AQ	IM	TCS	06/16/2015						A
SI4157-002	IF16IMW1		L		L	AQ	IM	TCS	06/16/2015						A
SI4157-003	IF16IMW1		L		L	AQ	IM	TCS	06/16/2015						A
SI4178-029	IF16IMW1		L		L	AQ	IM	TCS	06/16/2015						D
SI4178-033	IF16IMW1		L		L	AQ	IM	TCS	06/16/2015						D
SI4178-037	IF16IMW1		L		L	AQ	IM	TCS	06/16/2015						D
SI4178-041	IF16IMW1		L		L	AQ	IM	TCS	06/16/2015						D
SI4178-045	IF16IMW1		L		L	AQ	IM	TCS	06/16/2015						D
SI4178-049	IF16IMW1		L		L	AQ	IM	TCS	06/16/2015						D
SI4178-053	IF16IMW1		L		L	AQ	IM	TCS	06/16/2015						D
SI4184-001	IF16IMW1		L		L	AQ	IM	TCS	06/16/2015						D
SI4184-002	IF16IMW1		L		L	AQ	IM	TCS	06/16/2015						I
SI4184-002P	IF16IMW1		L		L	AQ	IM	TCS	06/16/2015						I
SI4184-002S	IF16IMW1		L		L	AQ	IM	TCS	06/16/2015						I
SI4184-003	IF16IMW1		L		L	AQ	IM	TCS	06/16/2015						D
SI4184-004	IF16IMW1		L		L	AQ	IM	TCS	06/16/2015						A
SI4184-005	IF16IMW1		L		L	AQ	IM	TCS	06/16/2015						D
SI4184-006	IF16IMW1		L		L	AQ	IM	TCS	06/16/2015						D
SI4184-007	IF16IMW1		L		L	AQ	IM	TCS	06/16/2015						D
SI4184-008	IF16IMW1		L		L	AQ	IM	TCS	06/16/2015						A
SI4184-009	IF16IMW1		L		L	AQ	IM	TCS	06/16/2015						D

TRS 6/16/15

Katahdin Analytical Services 4000403

Katahdin Analytical Services, Inc. **Metals Preparation Benchsheet**

Reagent Information:

HNO3: 104117 HCL: N/A H2SO4: 71333 Method: 7470

KMNO4: MR1473/MR1476 K2S2O8: MR1463 NH2OH-HCl: MR1468

Standards/Spiking Information:

1ppm A : MW153521

1ppm B : MW153556

LCSW = 125uL of 1ppm A to 25mL

Spike(S/P) = 25uL of 1ppm A to 25mL

ICV = 600uL of 1ppm A to 100 mL

S0.2 = 20uL of 1ppm B to 100 mL

S0.5 = 50uL of 1ppm B to 100 mL

S1.0 = 100uL of 1ppm B to 100 mL

S5.0 = 500uL of 1ppm B to 100 mL

S10.0 = 1000uL of 1ppm B to 100 mL

REVIEWED
Ea 06-24-15
KATAHDIN ANALYTICAL
METALS SECTION

Water Bath ID : A Thermometer ID : D1G60

Start Time: 13:06 /Temp. 90 °C) End Time: 15:06 /Temp. 93 °C)

Sample ID	Batch ID	Initial Wt/Vol	Initial Units	Final Vol	Final Units	MX	Meth	Anal.	Date	Initial Color	Initial Clarity	Final Color	Final Clarity	Artifacts	Bottle
LCSWIF17HGW3	IF17HGW3	0.025	L	0.025	L	AQ	HG	TCS	06/17/2015	N/A	N/A	N/A	N/A		N/A
PBWIF17HGW3	IF17HGW3		L		L	AQ	HG	TCS	06/17/2015	N/A	N/A	N/A	N/A		N/A
SI4024-001	IF17HGW3		L		L	AQ	HG	TCS	06/17/2015						A
SI4024-002	IF17HGW3		L		L	AQ	HG	TCS	06/17/2015						A
SI4024-003	IF17HGW3		L		L	AQ	HG	TCS	06/17/2015						A
SI4024-004	IF17HGW3		L		L	AQ	HG	TCS	06/17/2015						A
SI4024-005	IF17HGW3		L		L	AQ	HG	TCS	06/17/2015						A
SI4024-005D	IF17HGW3		L		L	AQ	HG	TCS	06/17/2015						A
SI4024-005P	IF17HGW3		L		L	AQ	HG	TCS	06/17/2015						A
SI4024-005S	IF17HGW3		L		L	AQ	HG	TCS	06/17/2015						A
SI4088-009	IF17HGW3		L		L	AQ	HG	TCS	06/17/2015						G
SI4088-010	IF17HGW3		L		L	AQ	HG	TCS	06/17/2015						G
SI4088-011	IF17HGW3		L		L	AQ	HG	TCS	06/17/2015						G
~~SI4126-002~~ Ea 062415	IF17HGW3		L		L	AQ	HG	TCS	06/17/2015						A
SI4157-001	IF17HGW3		L		L	AQ	HG	TCS	06/17/2015						A
SI4157-002	IF17HGW3		L		L	AQ	HG	TCS	06/17/2015						A
SI4157-003	IF17HGW3		L		L	AQ	HG	TCS	06/17/2015						A
SI4157-003D	IF17HGW3		L		L	AQ	HG	TCS	06/17/2015						A
SI4157-003S	IF17HGW3		L		L	AQ	HG	TCS	06/17/2015						A

GES 06.24.15

Katahdin Analytical Services 4000404

TETRA TECH

INTERNAL CORRESPONDENCE

TO: **M. VED** **DATE:** **AUGUST 20, 2015**

FROM: **A. COGNETTI** **COPIES:** **DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION –METALS**
PNS KITTERY
SAMPLE DELIVERY GROUP (SDG) – OU8-1

SAMPLES: 56/Solid/l Metals

WTB-FD01-060315	WTB-FD01-060415	WTB-FD02-060315
WTB-FD02-060415	WTB-FD03-060415	WTB-SB-08-0206
WTB-SB-08-0610	WTB-SB-09-0206	WTB-SB-09-0610
WTB-SB-10-0206	WTB-SB-10-0610	WTB-SB-11-0206
WTB-SB-11-0610	WTB-SB-12-0206	WTB-SB-12-0610
WTB-SB-13-0206	WTB-SB-13-0610	WTB-SB-14-0206
WTB-SB-14-0607	WTB-SB-15-0206	WTB-SB-15-0610
WTB-SB-16-0206	WTB-SB-16-0610	WTB-SB-17-0206
WTB-SB-17-0610	WTB-SB-18-0206	WTB-SB-18-0610
WTB-SB-19-0206	WTB-SB-19-0610	WTB-SB-20-0206
WTB-SB-20-0610	WTB-SB-21-0206	WTB-SB-21-0610
WTB-SB-22-0206	WTB-SB-22-0610	WTB-SB-23-0206
WTB-SB-23-0610	WTB-SB-24-0206	WTB-SB-24-069.7
WTB-SS-08-0002	WTB-SS-09-0002	WTB-SS-10-0002
WTB-SS-11-0002	WTB-SS-12-0002	WTB-SS-13-0002
WTB-SS-14-0002	WTB-SS-15-0002	WTB-SS-16-0002
WTB-SS-17-0002	WTB-SS-18-0002	WTB-SS-19-0002
WTB-SS-20-0002	WTB-SS-21-0002	WTB-SS-22-0002
WTB-SS-23-0002	WTB-SS-24-0002	

1/Aqueous/ Metals

WTB-RB01-060415

Overview

The sample set for PNS Kittery, SDG CTO69-14OU8-1 consisted of fifty six (56) solid environmental samples and a rinsate blank analyzed for metals. There are five (5) field duplicate pairs contained in this SDG: WTB-FD01-060315/WTB-SB-14-0206, WTB-FD01-060415/ WTB-SS-08-0002, WTB-FD02-060315/ WTB-SB-22-0610, WTB-FD02-060415/ WTB-SB-15-0206 and WTB-FD03-060415/ WTB-SS-20-0002.

The samples were collected on June 1, 3, 4 and 5, 2015 and analyzed by Katahdin Analytical Services. The samples were analyzed in accordance with USEPA SW-846 Methods 6020A and 7470A analytical method and reporting protocols. A tier II validation was performed on the data in this SDG.

Data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Initial and Continuing Calibrations
  • Blank Results
  • Matrix Spike Recoveries
  • ICP Serial Dilution
* • Laboratory Control Sample Recoveries
* • Internal Standard Recoveries
* • ICP Interference Check Sample
  • Laboratory Duplicate Results
  • Field Duplicate Precision
* • Detection Limits

The asterisk (*) indicates that all quality control criteria were met for this parameter. Qualified (if applicable) analytical results are summarized in Appendix A. Results as reported by the laboratory are presented in Appendix B. Appendix D contains the documentation to support the findings as discussed in this data validation report. Appendix C contains the regional worksheets. The text of this report has been formulated to address only those problem areas affecting data quality.

BLANK RESULTS

Contamination was detected in the laboratory preparation blanks, initial and continuing calibration blanks at the following maximum concentrations:

Contaminant	Maximum Concentration	Reporting Limit
Beryllium (1)	0.025 mg/kg	<RL, U detection <RL
Calcium (1)	2.2 mg/kg	<RL
Chromium (1)	0.086 mg/kg	<RL
Iron (1)	3.1 mg/kg	<RL
Manganese (1)	0.27 mg/kg	<RL
Nickel (1)	0.083 mg/kg	<RL
Potassium (1)	6.3 mg/kg	<RL
Vanadium (1)	0.041 mg/kg	<RL
Cobalt (2)	0.0075 mg/kg	<RL
Barium (3)	0.028 mg/kg	<RL
Calcium (3)	4.8 mg/kg	<RL
Magnesium (3)	0.98 mg/kg	<RL
Sodium (3)	2 mg/kg	<RL, U detection <RL
Aluminum (4)	3.1 mg/kg	<RL
Barium (4)	0.067 mg/kg	<RL
Calcium (4)	6.7 mg/kg	<RL
Chromium (4)	0.084 mg/kg	<RL
Iron (4)	2.6 mg/kg	<RL
Magnesium (4)	2.5 mg/kg	<RL
Manganese (4)	0.59 mg/kg	>RL
Nickel (4)	0.05 mg/kg	<RL

Aluminum (5)	1.6 mg/kg	<RL
Calcium (5)	5.9 mg/kg	<RL
Chromium (5)	0.093 mg/kg	<RL
Iron (5)	2 mg/kg	<RL
Magnesium (5)	1.7 mg/kg	<RL
Nickel (5)	0.047 mg/kg	<RL
Sodium (5)	2.1 mg/kg	<RL
Antimony (6)	0.035 mg/kg	<RL
Cobalt (6)	0.0093 mg/kg	<RL
Barium (7)	0.054 mg/kg	<RL
Calcium (7)	2.7 mg/kg	<RL
Chromium (7)	0.12 mg/kg	<RL
Iron (7)	4.6 mg/kg	<RL
Magnesium (7)	0.84 mg/kg	<RL
Manganese (7)	0.39 mg/kg	>RL
Nickel (7)	0.072 mg/kg	<RL
Potassium (7)	6.7 mg/kg	<RL
Cobalt (8)	0.016 mg/kg	<RL
Aluminum (9)	27.04 ug/L	<RL
Barium (9)	1.128 ug/L	<RL
Beryllium (9)	0.469 ug/L	<RL
Cadmium (9)	0.09 ug/L	<RL, U detections <RL, Raise result to LOD and U
Calcium (9)	10.28 ug/L	<RL
Chromium (9)	0.542 ug/L	<RL
Potassium (9)	146.50 ug/L	<RL
Sodium (9)	94.78 ug/L	<RL, U detection <RL
Barium (10)	0.623 ug/L	<RL
Beryllium (10)	0.210 ug/L	<RL
Iron (10)	17.81 ug/L	<RL
Potassium (10)	123.7 ug/L	<RL
Vanadium (10)	0.354 ug/L	<RL
Beryllium (11)	0.242 ug/L	<RL, U detection <RL
Selenium (11)	5.183 ug/L	<RL, U detections <RL, Raise result to LOD and U
Vanadium (11)	0.513 ug/L	<RL, U detection <RL
Copper (11)	0.843 ug/L	<RL
Lead (11)	1.353 ug/L	<RL
Magnesium (11)	7.033 ug/L	<RL
Potassium (11)	99.92 ug/L	<RL
Aluminum (12)	50.52 ug/L	<RL
Calcium (12)	46.98 ug/L	<RL
Iron (12)	15.25 ug/L	<RL
Magnesium (12)	39.13 ug/L	<RL
Nickel (12)	0.44 ug/L	<RL

Selenium (12)	5.701 ug/L	<RL
Vanadium (12)	0.314 ug/L	<RL
Zinc (12)	0.601 ug/L	<RL
Aluminum (13)	25.34 ug/L	<RL
Aluminum (14)	50.15 ug/L	<RL
Barium (14)	1.339 ug/L	<RL
Beryllium (14)	0.6 ug/L	<RL, U detections <RL, Raise result to LOD and U
Calcium (14)	25.73 ug/L	<RL
Cadmium (14)	0.186 ug/L	<RL, U detections <RL, Raise result to LOD and U
Copper (14)	0.531 ug/L	<RL
Iron (14)	30.56 ug/L	<RL
Magnesium (14)	18.56 ug/L	<RL
Silver (14)	0.792 ug/L	<RL U detections <RL, Raise result to LOD and U
Vanadium (14)	0.822 ug/L	<RL
Zinc (14)	0.858 ug/L	<RL
Potassium (14)	218.50 ug/L	<RL
Selenium (14)	6.329 ug/L	<RL, U detections <RL, Raise result to LOD and U
Sodium (14)	46.87 ug/L	<RL, U detections <RL, Raise result to LOD and U
Antimony (15)	0.136 ug/L	<RL, U detection <RL
Cobalt (15)	0.009 ug/L	<RL
Thallium (15)	0,012 ug/L	<RL, U detections <RL, Raise result to LOD and U
Antimony (16)	0.239 ug/L	<RL, U detections <RL, Raise result to LOD and U
Cobalt (16)	0.039 ug/L	<RL
Thallium (16)	0.015 ug/L	<RL, U detections <RL, Raise result to LOD and U
Antimony (17)	0.170 ug/L	<RL

(1) Maximum concentration detected in the laboratory prep blank associated with batch IF04ICS1.
(2) Maximum concentration detected in the laboratory prep blank associated with batch IF04IMS1.
(3) Maximum concentration detected in the laboratory prep blank associated with batch IF05ICS1.
(4) Maximum concentration detected in the laboratory prep blank associated with batch IF09ICS1.
(5) Maximum concentration detected in the laboratory prep blank associated with batch IF10ICS1.
(6) Maximum concentration detected in the laboratory prep blank associated with batch IF10IMS1.
(7) Maximum concentration detected in the laboratory prep blank associated with batch IF11IMCS1.
(8) Maximum concentration detected in the laboratory prep blank associated with batch IF11IMS1.
(9) Maximum concentration of contaminant detected in the continuing calibration blank analyzed on June 18, 2015 between 13:52 and 19:26.
(10) Maximum concentration of contaminant detected in the continuing calibration blank analyzed on June 18 and 19, 2015 from 20:11 to 2:41.
(11) Maximum concentration of contaminant detected in the continuing calibration blank analyzed on June 19, 2015 from 9:51 to 12:34.
(12) Maximum concentration of contaminant detected in the continuing calibration blank analyzed on June 22, 2015 from 13:12 to 15:57.
(13) Maximum concentration of contaminant detected in the continuing calibration blank analyzed on June 22, 2015 21:55 to June 23, 2015 at 0:26.
(14) Maximum concentration of contaminant detected in the continuing calibration blank analyzed on June 24, 2015.

(15) Maximum concentration of contaminant detected in the continuing calibration blank analyzed on June 12, 2015.
(16) Maximum concentration of contaminant detected in the continuing calibration blank analyzed on June 17, 2015.
(17) Maximum concentration of contaminant detected in the continuing calibration blank analyzed on June 24, 2015.
(18) Maximum concentration of contaminant detected in the continuing calibration blank analyzed on June 25, 2015.

MATRIX SPIKE

Numerous matrix spike recoveries were outside quality control limits in spiked sample WTB-SS-11-0002. All analytes, except mercury, were analyzed at a 5X dilution. The matrix spike recovery for mercury was greater than the upper 120% quality control limit. The detected mercury results in batch IF12HGS1 were qualified as estimated (J). The post digestion spike recovery for mercury was within quality control limits. No action was taken on the numerous matrix spike recoveries of other metals outside quality control limits.

The matrix spike (MS) percent recoveries (%Rs) of aluminum, antimony and iron were less than the lower quality control limit in spiked sample WTB-SB-24-069.7. The MS %R of manganese and magnesium were greater than the upper 120% quality control limit. The MSD %Rs of aluminum, calcium, chromium, iron, magnesium, manganese, and potassium exceeded the 120% quality control limit. No action was taken on the aluminum, magnesium and iron results because the sample concentration of these analytes were greater than 4X the spike amount. The post digestion spike of manganese was less than the 75% lower quality control limit. The detected manganese results were qualified as biased low (J-) in batch IF09ICS1. The MSD %R was less than the lower quality control limit. The post digestion spike recovery of antimony was within qc limits. The detected antimony results were qualified as estimated (J) in batch IF09IMS1. The post digestion spike recoveries of calcium, chromium and potassium were within quality control limits. The detected calcium, chromium and potassium were qualified as estimated (J).

Numerous metals had MS/MSD %Rs outside quality control limits in spiked sample WTB-SS-16-0002. Antimony, arsenic, cobalt and thallium were analyzed at a 5X dilution. No action was taken on these noncompliances. Several metals had sample concentrations greater than 4X the spike amount as indicated on the form 5. No action was taken on these noncompliances. The MS %R of mercury was greater than the upper quality control limit and the MS %R of zinc was less than the lower 80% quality control limit. The MSD %Rs of chromium and nickel were greater than the 120% quality control limit and the MSD %R of potassium was less than the 80% quality control limit. The post digestion spike recoveries of these analytes were within quality control limits. The detected mercury results in batch IF12HGS2 and the detected zinc, chromium, nickel and zinc results in batch IF10ICS1 were qualified as estimated (J).

The MS/MSD %Rs of antimony, arsenic, and potassium were less than the lower 80% quality control limit in spiked sample WTB-SB-20-0206. The post digestion spike recoveries were within quality control limits. The detected antimony, arsenic, and potassium results were qualified as estimated (J) in batch IF11ICS1 and IF11IMS1. The MS %Rs of chromium and zinc were less than the lower 80% quality control limit. The MS %R of mercury was greater than the upper 120% quality control limit. The post digestion spike recoveries were within quality control limits. The detected chromium and zinc results in batch IF11ICS1 and mercury in batch IF15HGS1 were qualified as estimated (J). Several metals had spike recoveries outside quality control limits. The sample concentrations were greater than 4X the spike amount as indicated on the form 5. No action was taken on these noncompliances.

LABORATORY DUPLICATE

The relative percent differences (RPDs) for copper, iron, manganese, and mercury were greater than the 35% quality control limit in laboratory duplicate sample WTB-SS-11-0002. The variance for potassium was greater than the RL. The detected copper, iron, manganese and potassium results in batch IF04ICS1 and detected mercury results in batch IF12HGS1 were qualified as estimated (J).

The RPD for copper in laboratory duplicate sample WTB-SS-16-0002 exceeded the 35% quality control limit. The detected copper results in batch IF10ICS1 were qualified as estimated (J).

The RPD for copper in laboratory duplicate sample WTB-SB-20-0206 exceeded the 35% quality control limit. The variances for antimony, was greater than 2X the RL. The detected copper and antimony results in batch IF11ICS1 and IF11IMS1.

ICP SERIAL DILUTION

The serial dilution percent differences (%Ds) for beryllium, cadmium, potassium, sodium and vanadium were greater than the 10% quality control limit in sample WTB-SS-11-0002. The original sample results for potassium and vanadium were greater than 50X the IDL. The detected results (Batch IF04ICS1) were qualified as estimated (J).

The serial dilution %Ds for barium, beryllium, cadmium, potassium, silver and sodium were greater than the 10% quality control limit in sample WTB-SB-24-069.7. The original sample results for barium, potassium and sodium were greater than 50X the IDL. The detected barium, potassium and sodium (batch IF09ICS1) were qualified as estimated (J).

The serial dilution %Ds for beryllium and sodium were greater than the 10% quality control limit in sample WTB-S-16-0002. The original sample results were greater than 50X the IDL. The detected and nondetected beryllium and sodium results in batch IF10ICS1 were qualified as estimated (J) and (UJ), respectively.

The serial dilution %Ds for beryllium, cadmium, mercury, potassium, selenium, and sodium were greater than the 10% quality control limit in sample WTB-SB-20-0206. The original sample results for beryllium, potassium, and sodium were greater than 50X the MDL. The detected beryllium, potassium, and sodium results in batch IF11ICS1.

FIELD DUPLICATE PRECISION

Field duplicate imprecision was noted in the field duplicate pair WTB-FD01-060415/ WTB-SS-08-0002. The RPDs for antimony, copper, lead, and zinc exceeded the 50% quality control limit. The detected antimony, copper, lead, and zinc in the field duplicate pair were qualified as estimated (J). There are two field duplicate pairs in batch IF09IMS1 and IF09ICS1, WTB-FD01-060415 and WTB-FD01-060415.

Field duplicate imprecision was noted in the field duplicate pair WTB-FD02-060315/ WTB-SB-22-0610. The RPDs for aluminum, barium, calcium, copper, lead, manganese, and zinc exceeded the 50% quality control limit. The detected aluminum, barium, calcium, copper, lead, manganese, and zinc results in the field duplicate pair were qualified as estimated (J).

Field duplicate imprecision was noted in the field duplicate pair WTB-FD03-060415/ WTB-SS-20-0002. The RPDs for barium and lead exceeded the 50% quality control limit. The variance for silver was greater than 4X the reporting limit. The detected and nondetected barium, lead and silver results in batch IF11ICS1 were qualified as estimated (J) and (UJ), respectively.

NOTES

Contamination was detected in the laboratory prep blank detected in the prep blank associated with batch IF08ICW3 affecting the rinsate blank.

Contaminant	Maximum Concentration (ug/L)
Barium	0.36
Magnesium	13

No action was taken on the field quality blank due to laboratory blank contamination.

The data reviewer examined the raw data for internal standard recoveries. All internal standard recoveries were compliant in all samples.

The rinsate blank did contain contaminants. No action was taken on the environmental sample.

EXECUTIVE SUMMARY

Laboratory Performance: Contamination was detected in several blanks. Laboratory duplicate imprecision was noted for several samples.

Other Factors Affecting Data Quality: The ICP serial dilution %Ds for several metals exceeded the 10% quality control limit. Several spiked samples had recoveries outside of quality control limits. Field duplicate imprecision was noted in several field duplicate pairs.

The data for these analyses were reviewed with reference to the criteria for SW-846 6020 listed in the project specific SAP, the EPA National Functional Guidelines for Inorganic Data Review (January 2010), and the (DOD) QSM document entitled "Quality Systems Manual (QSM) for Environmental Laboratories" (July 2013).

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Data Validation Manager

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Regional Worksheets
4. Appendix D- Support Documentation

Appendix A

Qualified Analytical Results

Data Qualifier Definitions

The following definitions provide brief explanations of the validation qualifiers assigned to results in the data review process.

U	The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted method detection limit for sample and method.
J	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the reporting limit).
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
UJ	The analyte was analyzed for, but was not detected. The reported detection limit is approximate and may be inaccurate or imprecise.
R	The sample result (detected) is unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
UR	The sample result (nondetected) is unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (i.e., % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = ICP PDS Recovery Noncompliance; MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; i.e.chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = RPD between columns/detectors >40% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 standard deviations is greater than sample activity
Z1 = Tentatively Identified Compound considered presumptively present
Z2 = Tentatively Identified Compound column bleed
Z3 = Tentatively Identified Compound aldol condensate

PROJ_NO: 03270	NSAMPLE	WTB-FD01-060315			WTB-FD01-060415			WTB-FD02-060315			WTB-FD02-060415		
SDG: OU8-1	LAB_ID	SI3772-006			SI3897-012			SI3897-007			SI3897-023		
FRACTION: M	SAMP_DATE	6/3/2015			6/4/2015			6/3/2015			6/4/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	95.0			93.2			74.7			85.5		
	DUP_OF	WTB-SB-14-0206			WTB-SS-08-0002			WTB-SB-22-0610			WTB-SB-15-0206		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		8300			6270			5360	J	G	10400		
ANTIMONY		0.11			0.499	J	DG	0.55	J	D	0.12		
ARSENIC		12.4			17.1			15.9			12.5		
BARIUM		41.5			40.2	J	I	274	J	GI	47.7		
BERYLLIUM		0.379	U	A	0.339	J	P	0.642	J	P	0.498	J	I
CADMIUM		0.416	J	P	0.407	J	P	0.204	J	P	0.153	U	A
CALCIUM		1290			1700	J	D	9120	J	DG	1920		
CHROMIUM		52.2			46.3	J	D	27.4	J	D	29	J	D
COBALT		6.33			8.46			7.95			7.09		
COPPER		21.4	J	F	89.7	J	G	190	J	G	30.4	J	F
IRON		16200	J	F	19800			27900			16300		
LEAD		17.9			127	J	G	438	J	G	40.1		
MAGNESIUM		4890			3840			3460			4540		
MANGANESE		225	J	F	286	J-	D	239	J	DG	272		
MERCURY		0.014	J	DFP	1.24			0.485			0.254	J	D
NICKEL		25.3			51.2			24.5			25.7	J	D
POTASSIUM		1830	J	FI	1260	J	D	2030	J	DI	1670	J	DI
SELENIUM		0.32	J	P	0.68	U		0.88	U	A	0.6	U	
SILVER		0.1	J	P	0.14	J	P	0.2	J	P	0.22	J	P
SODIUM		277			177			890			696	J	I
THALLIUM		0.129			0.115			0.149			0.146		
VANADIUM		18.8	J	I	20.8			27.8			23		
ZINC		204			161	J	G	158	J	DG	64.6		

PROJ_NO: 03270	NSAMPLE	WTB-FD03-060415			WTB-SB-08-0206			WTB-SB-08-0610			WTB-SB-09-0206		
SDG: OU8-1	LAB_ID	SI3897-032			SI3897-013			SI3897-014			SI3897-016		
FRACTION: M	SAMP_DATE	6/4/2015			6/4/2015			6/4/2015			6/4/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	82.9			84.1			68.6			89.1		
	DUP_OF	WTB-SS-20-0002											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		17400			7220			6720			5170		
ANTIMONY		0.276	J	DF	3.1	J	D	8.46	J	D	1610	J	D
ARSENIC		13.6	J	D	61.9			34			35.1		
BARIUM		114	J	G	115	J	I	370	J	I	237	J	I
BERYLLIUM		1.06	J	I	0.416	J	P	0.618	J	P	0.262	J	P
CADMIUM		0.752			5.41	J	P	7.29	J	P	6.81	J	P
CALCIUM		2490			3030	J	D	22400	J	D	2660	J	D
CHROMIUM		51.8	J	D	142	J	D	149	J	D	103	J	D
COBALT		11.4			15.2			26.3			17.1		
COPPER		231	J	F	21300			23900			23100		
IRON		27500			208000			203000			208000		
LEAD		363	J	G	1140			1980			20100		
MAGNESIUM		7560			5440			2200			4230		
MANGANESE		375			1480	J-	D	1000	J-	D	701	J-	D
MERCURY		0.38	J	D	1.38			9.53	J	D	0.332	J	D
NICKEL		64.8			1370			2810			735		
POTASSIUM		3700	J	DI	1660	J	DI	897	J	DI	1910	J	DI
SELENIUM		0.62	U		19	U	A	17	U	A	16	U	
SILVER		89300	J	G	3.6	J	P	5.4	J	P	6.86	J	P
SODIUM		749	J	I	349	J	I	722	J	I	642	J	I
THALLIUM		0.281			0.134			0.15			0.122		
VANADIUM		39.4			33.8			22.3	U	A	35.6		
ZINC		416	J	D	3290			3020			7350		

PROJ_NO: 03270	NSAMPLE	WTB-SB-09-0610			WTB-SB-10-0206			WTB-SB-10-0610			WTB-SB-11-0206		
SDG: OU8-1	LAB_ID	SI3897-017			SI3897-043			SI3897-044			SI3772-002		
FRACTION: M	SAMP_DATE	6/4/2015			6/5/2015			6/5/2015			6/1/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	83.8			82.6			86.7			78.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		5610			7450			10300			5560		
ANTIMONY		616			1	J	DF	3.27	J	DF	1340		
ARSENIC		30.9			9.26	J	D	19.4	J	D	29.7		
BARIUM		276			114	J	G	141	J	G	286		
BERYLLIUM		1	UJ	I	0.593	J	I	0.591	J	I	0.41	J	P
CADMIUM		7.63			1.1	J	P	0.423	J	P	7.64		
CALCIUM		3490			5700			1950			7550		
CHROMIUM		116	J	D	31.8	J	D	31.5	J	D	1890		
COBALT		19.5			8.8			9.39			40.7		
COPPER		39600	J	F	502	J	F	123	J	F	9840		
IRON		172000			23900			27600			269000		
LEAD		16900			781	J	G	430	J	G	5760		
MAGNESIUM		3800			4630			5300			2800		
MANGANESE		738			254			324			1430		
MERCURY		3.74	J	D	0.604	J	D	1.92	J	D	18.6	J	DF
NICKEL		1100	J	D	32.6			28.7			944		
POTASSIUM		1560	J	D	1880	J	DI	1690	J	DI	1690	J	D
SELENIUM		7	U		5.8	U		1.3			8.8	U	
SILVER		5.38	U	A	0.58	J	GP	0.35	UJ	G	9.23	U	A
SODIUM		761	U	A	302	J	I	154	J	I	599	U	A
THALLIUM		0.143			0.183			0.254			0.099	U	A
VANADIUM		47.8			26.2			26.6			18.5		
ZINC		5060	J	D	846	J	D	198	J	D	6850		

PROJ_NO: 03270	NSAMPLE	WTB-SB-11-0610			WTB-SB-12-0206			WTB-SB-12-0610			WTB-SB-13-0206		
SDG: OU8-1	LAB_ID	SI3772-003			SI3897-019			SI3897-020			SI3897-040		
FRACTION: M	SAMP_DATE	6/1/2015			6/4/2015			6/4/2015			6/5/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	78.8			85.1			81.3			89.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		8540			8440			5030			12200		
ANTIMONY		52.5			1.13			11.4			0.527	J	DF
ARSENIC		46.2			22.7			8.57			12.1	J	D
BARIUM		207			418			134			98.7	J	G
BERYLLIUM		4.94	U	A	0.507	U	A	0.735	U	A	0.69	J	I
CADMIUM		5.22	U	A	0.697			1.51			0.814	U	A
CALCIUM		20500			2230			9010			5710		
CHROMIUM		5780			21.8	J	D	24.6	J	D	54	J	D
COBALT		39			7.16			9.9			10.7		
COPPER		8100	J	F	818	J	F	958	J	F	141	J	F
IRON		239000	J	F	25500			33900			34600		
LEAD		18700			1580			401			341	J	G
MAGNESIUM		3020			2670			5760			7130		
MANGANESE		12600	J	F	356			440			537		
MERCURY		2.89	J	DF	1.66	J	D	0.548	J	D	1.19	J	D
NICKEL		3260			27.8	J	D	127	J	D	40.8		
POTASSIUM		1390	J	FI	1270	J	D	1200	J	D	3520	J	DI
SELENIUM		8.2	U	A	0.35	J	P	0.68	J	P	1.2	U	
SILVER		6.72	U	A	0.549	J	P	0.54	J	P	0.727	U	A
SODIUM		281	J	IP	2080	J	I	1020			203	J	I
THALLIUM		0.118	U	A	0.111			0.126			0.232		
VANADIUM		49	J	I	21.2			24			41.4		
ZINC		3210			898	J	D	1050	J	D	283	J	D

PROJ_NO: 03270	NSAMPLE	WTB-SB-13-0610			WTB-SB-14-0206			WTB-SB-14-0607			WTB-SB-15-0206		
SDG: OU8-1	LAB_ID	SI3897-041			SI3772-005			SI3772-007			SI3897-022		
FRACTION: M	SAMP_DATE	6/5/2015			6/3/2015			6/3/2015			6/4/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	86.9			95.4			94.4			85.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		10500			7090			5830			11600		
ANTIMONY		0.2	J	DF	0.35			0.551			0.11		
ARSENIC		12.2	J	D	10.9			2.48			11.5		
BARIUM		60.4	J	G	34.3			21.6			43.9		
BERYLLIUM		0.508	J	IP	0.348	U	A	0.18	U	A	0.49	J	I
CADMIUM		0.647			0.254	J	IP	0.276	J	IP	0.263	U	A
CALCIUM		20600			1450			2220			2200		
CHROMIUM		57.8	J	D	50.9			247			38.9	J	D
COBALT		7.7			5.64			6.28			9.51		
COPPER		163	J	F	19.2	J	F	36.8	J	F	45.1	J	F
IRON		18200			14200	J	F	15800	J	F	17500		
LEAD		520	J	G	18.5			48.6			41.3		
MAGNESIUM		7140			3530			4350			6160		
MANGANESE		320			202	J	F	210	J	F	315		
MERCURY		1.07	J	D	0.012	J	DFP	0.286	J	DF	0.209	J	D
NICKEL		32.2			22.1			26.7			35.1	J	D
POTASSIUM		2000	J	DI	1530	J	FI	1830	J	FI	1430	J	D
SELENIUM		0.63	J	P	0.37	J	P	0.22	J	P	0.54	U	
SILVER		0.07	J	GP	0.368	J	P	0.063	J	P	0.31	U	
SODIUM		182	J	I	283			346			637	J	I
THALLIUM		0.149			0.121			0.152			0.138		
VANADIUM		31.7			15.6	J	I	20.9	J	I	27.1		
ZINC		365	J	D	151			464			65.8	J	D

PROJ_NO: 03270	NSAMPLE	WTB-SB-15-0610			WTB-SB-16-0206			WTB-SB-16-0610			WTB-SB-17-0206		
SDG: OU8-1	LAB_ID	SI3897-024			SI3897-026			SI3897-027			SI3772-009		
FRACTION: M	SAMP_DATE	6/4/2015			6/4/2015			6/4/2015			6/3/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	85.4			89.6			82.6			90.7		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		5580			18100			10300			4440		
ANTIMONY		2.76			0.297			4.37	J	DF	0.255		
ARSENIC		10.2			16.6			14	J	D	10.8		
BARIUM		57.2			107			85	J	G	51.6		
BERYLLIUM		0.523	U	A	1	J	I	0.805	J	I	0.558		
CADMIUM		0.856			0.54	U	A	0.729	U	A	0.429	J	P
CALCIUM		3040			3130			2580			2500		
CHROMIUM		28.1	J	D	51.2	J	D	31.1	J	D	18.1		
COBALT		6.45			12.2			8.09			4.28		
COPPER		373	J	F	118	J	F	254	J	F	224	J	F
IRON		15700			25200			8300			9810	J	F
LEAD		270			173			1230	J	G	122		
MAGNESIUM		3230			8880			4600			1940		
MANGANESE		194			391			282			259	J	F
MERCURY		0.726	J	D	0.751	J	D	0.339	J	D	0.213	J	DF
NICKEL		27.2	J	D	48.2	J	D	47			21.2		
POTASSIUM		1450	J	D	2680	J	D	1900	J	DI	980	J	FI
SELENIUM		0.34	J	P	0.66	J	P	1.5	U		0.31	J	P
SILVER		0.518	J	P	0.13	J	P	0.931	U	A	0.12	J	P
SODIUM		711	J	I	155	U	A	200	J	I	188		
THALLIUM		0.095	U	A	0.212			0.167			0.0888	U	A
VANADIUM		17.8			39.7			29.6			11.2	J	I
ZINC		371	J	D	120	J	D	344	J	D	205		

PROJ_NO: 03270	NSAMPLE	WTB-SB-17-0610			WTB-SB-18-0206			WTB-SB-18-0610			WTB-SB-19-0206		
SDG: OU8-1	LAB_ID	SI3772-010			SI3897-029			SI3897-030			SI3772-012		
FRACTION: M	SAMP_DATE	6/3/2015			6/4/2015			6/4/2015			6/3/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	82.5			83.7			82.6			87.5		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		4040			15100			14900			9150		
ANTIMONY		8.26			0.12	J	DF	0.918	J	DF	0.301		
ARSENIC		26.5			13	J	D	9.71	J	D	11.8		
BARIUM		249			71	J	G	95	J	G	57.3		
BERYLLIUM		0.36	U		0.773	J	I	0.864	J	I	0.677		
CADMIUM		4.41			0.284	J	P	1.31			0.299	J	IP
CALCIUM		3850			2210			8320			2420		
CHROMIUM		31			47.8	J	D	36.6	J	D	35.4		
COBALT		10.2			12.5			10			7.49		
COPPER		2360	J	F	74.8	J	F	306	J	F	303	J	F
IRON		102000	J	F	23000			21100			17800	J	F
LEAD		3080			151	J	G	375	J	G	176		
MAGNESIUM		2480			7020			4940			4140		
MANGANESE		139	J	F	344			589			301	J	F
MERCURY		0.484	J	DF	0.17	J	D	0.211	J	D	0.245	J	DF
NICKEL		194			48.1			28.1			26.5		
POTASSIUM		909	J	FI	1810	J	DI	2210	J	DI	1610	J	FI
SELENIUM		5	U		0.71	J	P	0.58	J	P	0.64	U	
SILVER		2.9	U	A	0.39	UJ	G	0.41	UJ	G	0.328	J	P
SODIUM		413	U	A	796	J	I	674	J	I	519		
THALLIUM		0.065	U	A	0.168			0.217			0.128		
VANADIUM		84.4	J	I	32.5			29.1			26.1	J	I
ZINC		2060			108	J	D	764	J	D	173		

PROJ_NO: 03270	NSAMPLE	WTB-SB-19-0610			WTB-SB-20-0206			WTB-SB-20-0206-DL			WTB-SB-20-0610		
SDG: OU8-1	LAB_ID	SI3772-013			SI3897-033			SI3897-033			SI3897-034		
FRACTION: M	SAMP_DATE	6/3/2015			6/4/2015			6/4/2015			6/4/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	88.8			84.5			84.5			82.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		12700			12300						11900		
ANTIMONY		1.29						0.937	J	DF	0.077	U	A
ARSENIC		14.9						11.1	J	D	12.7	J	D
BARIUM		69			72.7	J	G				93.9	J	G
BERYLLIUM		0.621			0.64	J	I				0.77		
CADMIUM		0.305	J	IP	0.32	U	A				0.197	J	P
CALCIUM		2710			2380						1780		
CHROMIUM		46.6			38.5	J	D				29	J	D
COBALT		9.98						8.48			12.4		
COPPER		130	J	F	64.2	J	F				70.2	J	F
IRON		20300	J	F	16500						18600		
LEAD		280			85.9	J	G				131	J	G
MAGNESIUM		7670			5110						4060		
MANGANESE		349	J	F	313						1220		
MERCURY		1.95	J	DF	0.0707	J	D				0.655	J	D
NICKEL		41.3			30.3						23.6		
POTASSIUM		1690	J	FI	2020	J	DI				1730	J	D
SELENIUM		0.78	J	P	0.76	U	A				0.8	J	P
SILVER		0.543	J	P	0.43	UJ	G				0.18	J	GP
SODIUM		392			450	J	I				345		
THALLIUM		0.145						0.161			0.182		
VANADIUM		30.9	J	I	26.9						23.9		
ZINC		217			90.2	J	D				87.7	J	D

PROJ_NO: 03270	NSAMPLE	WTB-SB-21-0206			WTB-SB-21-0610			WTB-SB-22-0206			WTB-SB-22-0610		
SDG: OU8-1	LAB_ID	SI3897-036			SI3897-037			SI3897-005			SI3897-006		
FRACTION: M	SAMP_DATE	6/4/2015			6/4/2015			6/3/2015			6/3/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	92.5			75.5			84.2			75.5		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		7490			6320			2030			2150	J	G
ANTIMONY		40.8	J	DF	5.87	J	DF	0.509	J	D	0.632	J	D
ARSENIC		19.7	J	D	15.1	J	D	8.44			14.9		
BARIUM		959	J	G	74.7	J	G	226	J	I	231	J	GI
BERYLLIUM		0.52	U	A	0.53	U	A	0.764	J	P	0.646		
CADMIUM		3.64	U	A	5.88			0.053	J	P	0.199	J	P
CALCIUM		71900			1580			3290	J	D	3700	J	DG
CHROMIUM		50.1	J	D	37	J	D	19.2	J	D	10.7	J	D
COBALT		10.6			16.6			5.46			5.11		
COPPER		22900	J	F	4070	J	F	72.5			173	J	G
IRON		109000			140000			16700			23500		
LEAD		2350	J	G	1060	J	G	2530			406	J	G
MAGNESIUM		4880			2950			328			1170		
MANGANESE		773			548			49	J-	D	149	J	DG
MERCURY		1.47	J	D	0.627	J	D	0.462			0.818		
NICKEL		52.4			80.4			10.4			12.6		
POTASSIUM		4720	J	DI	1150	J	D	838	J	DI	683	J	DI
SELENIUM		5.4	U	A	7.4	U	A	1.6			0.9	U	
SILVER		4.34	U	A	4.2	U	A	0.24	J	P	0.358	J	P
SODIUM		2300	J	I	1050	J	I	1160	J	I	895	J	I
THALLIUM		0.108			0.098	U	A	0.145			0.12	U	A
VANADIUM		23.4			26.4			8.92			17.1		
ZINC		2220	J	D	3320	J	D	45.3			106	J	G

PROJ_NO: 03270	NSAMPLE	WTB-SB-23-0206			WTB-SB-23-0610			WTB-SB-24-0206			WTB-SB-24-069.7		
SDG: OU8-1	LAB_ID	SI3897-009			SI3897-010			SI3897-003			SI3897-004		
FRACTION: M	SAMP_DATE	6/3/2015			6/3/2015			6/3/2015			6/3/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	87.2			62.9			92.6			86.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		12800			8470			7550			6260		
ANTIMONY		0.654	J	D	1.4	J	D	0.047	U	A	0.049	U	A
ARSENIC		20.8			10.5			11.6			12.8		
BARIUM		119	J	I	442	J	I	33.1	J	I	14.1	J	I
BERYLLIUM		0.616			0.373	J	P	0.447	J	P	0.278	J	P
CADMIUM		0.776			0.482	J	P	0.0869	J	P	0.059	J	P
CALCIUM		6120	J	D	6250	J	D	1110	J	D	652	J	D
CHROMIUM		59.4	J	D	35.3	J	D	25.4	J	D	15.8	J	D
COBALT		10.6			8.67			7.57			5.27		
COPPER		129			1260			17.2			15.2		
IRON		21100			25900			14200			10300		
LEAD		315			2180			4.79			21.2		
MAGNESIUM		8090			5630			4370			2910		
MANGANESE		273	J-	D	186	J-	D	285	J-	D	157	J-	D
MERCURY		0.628			0.516			0.014	U		0.014	U	
NICKEL		42.6			31			26.6			16.5		
POTASSIUM		4360	J	DI	2590	J	DI	1450	J	DI	1000	J	DI
SELENIUM		0.78	U		1	U		0.66	U		0.68	U	
SILVER		0.24	J	P	0.72	J	P	0.38	U		0.063	J	P
SODIUM		467	J	I	157	J	I	286	J	I	865	J	I
THALLIUM		0.219			0.152			0.108			0.078	U	A
VANADIUM		40.6			27.7			22.9			12.8		
ZINC		407			220			33			30.6		

PROJ_NO: 03270	NSAMPLE	WTB-SS-08-0002			WTB-SS-09-0002			WTB-SS-10-0002			WTB-SS-11-0002		
SDG: OU8-1	LAB_ID	SI3897-011			SI3897-015			SI3897-042			SI3772-001		
FRACTION: M	SAMP_DATE	6/4/2015			6/4/2015			6/5/2015			6/1/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	93.2			91.0			92.7			92.3		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		6330			12300			7180			9840		
ANTIMONY		0.965	J	DG	0.25	J	D	0.1	J	DF	0.913		
ARSENIC		18			12.4			18	J	D	13.6		
BARIUM		46	J	I	78.2	J	I	31	J	G	64.2		
BERYLLIUM		0.34	J	P	0.517			0.36	J	IP	0.568	U	A
CADMIUM		0.805	U	A	0.202	J	P	0.108	J	P	0.803	J	P
CALCIUM		1950	J	D	3550	J	D	809			6030		
CHROMIUM		76	J	D	63.8	J	D	17.9	J	D	234		
COBALT		8.94			11.6			9.36			12.7		
COPPER		159	J	G	105			30.1	J	F	232	J	F
IRON		28200			25900			16300			48200	J	F
LEAD		268	J	G	74.4			29	J	G	216		
MAGNESIUM		3650			6970			3480			6970		
MANGANESE		316	J-	D	455	J-	D	303			672	J	F
MERCURY		0.786			0.303	J	D	0.01	J	DP	0.602	J	DF
NICKEL		83.9			46			23.9			260		
POTASSIUM		1140	J	DI	4050	J	DI	1400	J	DI	1370	J	FI
SELENIUM		1.2	U		0.7	J	P	0.69	U		2.2	U	
SILVER		0.44	J	P	0.64	U		0.39	UJ	G	1.3	U	
SODIUM		158	J	I	973	J	I	86.3	J	IP	134	J	P
THALLIUM		0.111			0.281			0.122			0.115		
VANADIUM		23			42			17.8			32.3	J	I
ZINC		278	J	G	112			58	J	D	585		

PROJ_NO: 03270	NSAMPLE	WTB-SS-12-0002			WTB-SS-13-0002			WTB-SS-14-0002			WTB-SS-15-0002		
SDG: OU8-1	LAB_ID	SI3897-018			SI3897-039			SI3772-004			SI3897-021		
FRACTION: M	SAMP_DATE	6/4/2015			6/5/2015			6/3/2015			6/4/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	92.1			89.3			97.1			92.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		16300			8310			5550			15400		
ANTIMONY		0.574			0.07	U	A	0.12			0.938		
ARSENIC		7.84			18	J	D	18.6			12		
BARIUM		117			33.5	J	G	23.8			276		
BERYLLIUM		0.267	U	A	0.467	J	I	0.374			0.602	J	IP
CADMIUM		0.775	U	A	0.062	J	P	0.303	J	P	0.747	J	P
CALCIUM		6670			1140			818			7710		
CHROMIUM		138	J	D	18.6	J	D	34.3			76.7	J	D
COBALT		14.4			7.49			5.01			14.3		
COPPER		181	J	F	14.1	J	F	18.1	J	F	630	J	F
IRON		32400			16700			15600	J	F	38600		
LEAD		204			7.86	J	G	10.8			611		
MAGNESIUM		11400			3720			3210			10600		
MANGANESE		472			254			196	J	F	533		
MERCURY		0.511	J	D	0.018	U		0.026	J	DFP	0.347	J	D
NICKEL		87.6	J	D	22.6			16.6			89.3	J	D
POTASSIUM		6040	J	D	1790	J	DI	1850	J	FI	3690	J	D
SELENIUM		1.1	U		0.33	J	P	0.19	J	P	2.5	U	
SILVER		0.952	U	A	0.049	J	GP	0.13	J	P	0.8	J	P
SODIUM		847	J	I	161	J	I	140			1470	J	I
THALLIUM		0.259			0.14			0.181			0.206		
VANADIUM		69.3			17.3			14.4	J	I	45.2		
ZINC		338	J	D	32.7			72.6			757	J	D

PROJ_NO: 03270	NSAMPLE	WTB-SS-16-0002			WTB-SS-17-0002			WTB-SS-18-0002			WTB-SS-19-0002		
SDG: OU8-1	LAB_ID	SI3897-025			SI3772-008			SI3897-028			SI3772-011		
FRACTION: M	SAMP_DATE	6/4/2015			6/3/2015			6/4/2015			6/3/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	88.7			94.6			85.5			95.8		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		14700			3240			15600			2810		
ANTIMONY		0.356			0.461			0.16	J	DF	0.638		
ARSENIC		12.3			10.7			15.6	J	D	4.09		
BARIUM		83.4			26.8			91.7	J	G	24		
BERYLLIUM		0.729	J	I	0.682			0.803	J	I	0.767		
CADMIUM		0.371	U	A	0.364	J	P	0.278	J	P	0.235	J	P
CALCIUM		3450			898			2670			2060		
CHROMIUM		46.6	J	D	23.7			41.4	J	D	8.48		
COBALT		9.43			3.99			11			2.72		
COPPER		310	J	F	175	J	F	121	J	F	149	J	F
IRON		21000			14700	J	F	25200			8120	J	F
LEAD		178			175			320	J	G	176		
MAGNESIUM		6370			1270			7840			1030		
MANGANESE		345			376	J	F	376			340	J	F
MERCURY		0.242	J	D	0.156	J	DF	1.45	J	D	0.163	J	DF
NICKEL		43.6	J	D	52.5			36.6			7.59		
POTASSIUM		3050	J	D	813	J	FI	2550	J	DI	672	J	FI
SELENIUM		0.78	U		0.54	U		0.75	J	P	0.46	U	
SILVER		0.45	U		0.22	J	P	0.42	UJ	G	0.09	J	P
SODIUM		160	J	I	167			753	J	I	280		
THALLIUM		0.204			0.0938			0.21			0.0759		
VANADIUM		31.6			8.65	J	I	37.7			6.98	J	I
ZINC		143	J	D	173			154	J	D	104		

PROJ_NO: 03270	NSAMPLE	WTB-SS-20-0002			WTB-SS-21-0002			WTB-SS-22-0002			WTB-SS-23-0002		
SDG: OU8-1	LAB_ID	SI3897-031			SI3897-035			SI3897-001			SI3897-008		
FRACTION: M	SAMP_DATE	6/4/2015			6/4/2015			6/3/2015			6/3/2015		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	83.3			95.9			90.4			91.5		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		18600			1730			14900			11400		
ANTIMONY		0.31	J	DF	0.048	U	A	0.22	J	D	1.94	J	D
ARSENIC		13.3	J	D	1.64	J	D	13.6			11.9		
BARIUM		239	J	G	8.02	J	G	97.2	J	I	149	J	I
BERYLLIUM		1.09	J	I	0.662	J	I	0.56			0.526		
CADMIUM		0.636			0.057	J	P	0.39	U	A	1.43		
CALCIUM		2480			448			13200	J	D	9670	J	D
CHROMIUM		47.1	J	D	3.33	J	D	55	J	D	53.1	J	D
COBALT		11.7			1.62			10.8			15.7		
COPPER		291	J	F	4.68	J	F	57			769		
IRON		30200			5280			25600			48500		
LEAD		703	J	G	45	J	G	190			858		
MAGNESIUM		7600			587			9570			8580		
MANGANESE		457			365			404	J-	D	419	J-	D
MERCURY		0.42	J	D	0.014	U		0.192			0.715		
NICKEL		65.9			3.18			41.3			65.4		
POTASSIUM		4560	J	DI	591	J	DI	5160	J	DI	3480	J	DI
SELENIUM		0.52	J	P	0.68	U		0.9	U		1.4	U	
SILVER		0.438	J	GP	0.054	J	GP	0.52	U	A	0.87	U	A
SODIUM		750	J	I	203	J	I	1400	J	I	279	J	I
THALLIUM		0.32			0.072	U	A	0.251			0.183		
VANADIUM		41.6			4.08			37.6			39.8		
ZINC		519	J	D	22.7	J	D	104			620		

PROJ_NO: 03270	NSAMPLE	WTB-SS-24-0002		
SDG: OU8-1	LAB_ID	SI3897-002		
FRACTION: M	SAMP_DATE	6/3/2015		
MEDIA: SOIL	QC_TYPE	NM		
	UNITS	MG/KG		
	PCT_SOLIDS	93.0		
	DUP_OF			
PARAMETER		RESULT	VQL	QLCD
ALUMINUM		5360		
ANTIMONY		0.047	U	A
ARSENIC		11.6		
BARIUM		16.4	J	I
BERYLLIUM		0.269	J	P
CADMIUM		0.038	J	P
CALCIUM		584	J	D
CHROMIUM		16.9	J	D
COBALT		4.85		
COPPER		10.5		
IRON		9530		
LEAD		13.5		
MAGNESIUM		2600		
MANGANESE		162	J-	D
MERCURY		0.0082	J	P
NICKEL		15.7		
POTASSIUM		747	J	DI
SELENIUM		0.65	U	
SILVER		0.061	J	P
SODIUM		62.2	J	IP
THALLIUM		0.079	U	A
VANADIUM		11.4		
ZINC		32.4		

PROJ_NO: 03270	NSAMPLE	WTB-RB01-060415		
SDG: OU8-1	LAB_ID	SI3897-038		
FRACTION: M	SAMP_DATE	6/4/2015		
MEDIA: WATER	QC_TYPE	RB		
	UNITS	UG/L		
	PCT_SOLIDS	0.0		
	DUP_OF			
PARAMETER		RESULT	VQL	QLCD
ALUMINUM		100	U	
ANTIMONY		0.5	U	A
ARSENIC		4	U	
BARIUM		0.61	J	P
BERYLLIUM		0.5	U	
CADMIUM		0.069	J	P
CALCIUM		73	J	P
CHROMIUM		4	U	
COBALT		0.3	U	
COPPER		10	U	
IRON		32	J	P
LEAD		4	U	
MAGNESIUM		22	J	P
MANGANESE		4	U	
MERCURY		0.1	U	
NICKEL		4	U	
POTASSIUM		500	U	
SELENIUM		7	U	
SILVER		4	U	
SODIUM		120	J	P
THALLIUM		0.4	U	
VANADIUM		0.33	J	P
ZINC		1.3	J	P

Appendix B

Results as Reported by the Laboratory

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-11-0002

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 92.3 **Lab Sample ID:** SI3772-001

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	9840		NA	P	5	96	2.3	32
7440-36-0	ANTIMONY, TOTAL	0.913		N	MS	5	0.064	0.013	0.032
7440-38-2	ARSENIC, TOTAL	13.6			MS	5	0.32	0.096	0.26
7440-39-3	BARIUM, TOTAL	64.2			P	5	1.6	0.080	0.96
7440-41-7	BERYLLIUM, TOTAL	0.568	J		P	5	1.6	0.022	0.16
7440-43-9	CADMIUM, TOTAL	0.803	J		P	5	1.6	0.025	0.96
7440-70-2	CALCIUM, TOTAL	6030		N*	P	5	32	5.8	26
7440-47-3	CHROMIUM, TOTAL	234		*	P	5	3.2	0.083	1.3
7440-48-4	COBALT, TOTAL	12.7			MS	5	0.064	0.0035	0.019
7440-50-8	COPPER, TOTAL	232		N*	P	5	8.0	0.51	3.2
7439-89-6	IRON, TOTAL	48200		N*A	P	5	32	4.5	26
7439-92-1	LEAD, TOTAL	216		NA	P	5	1.6	0.28	1.3
7439-95-4	MAGNESIUM, TOTAL	6970		N	P	5	32	2.2	26
7439-96-5	MANGANESE, TOTAL	672		N*B	P	5	1.6	0.51	1.3
7439-97-6	MERCURY, TOTAL	0.602		N*	CV	1	0.032	0.0050	0.016
7440-02-0	NICKEL, TOTAL	260		NA	P	5	3.2	0.14	1.3
7440-09-7	POTASSIUM, TOTAL	1370		N*	P	5	320	9.3	160
7782-49-2	SELENIUM, TOTAL	2.2	U	N	P	5	3.2	0.55	2.2
7440-22-4	SILVER, TOTAL	1.3	U		P	5	3.2	0.087	1.3
7440-23-5	SODIUM, TOTAL	134	J		P	5	320	4.8	160
7440-28-0	THALLIUM, TOTAL	0.115			MS	5	0.064	0.0061	0.026
7440-62-2	VANADIUM, TOTAL	32.3		N	P	5	3.2	0.12	1.3
7440-66-6	ZINC, TOTAL	585		NA	P	5	6.4	0.55	3.2

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-11-0206

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 78.6 **Lab Sample ID:** SI3772-002

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	5560			P	5	190	4.5	63
7440-36-0	ANTIMONY, TOTAL	1340			MS	25	0.63	0.13	0.31
7440-38-2	ARSENIC, TOTAL	29.7			MS	5	0.63	0.19	0.50
7440-39-3	BARIUM, TOTAL	286			P	5	3.1	0.16	1.9
7440-41-7	BERYLLIUM, TOTAL	0.41	J		P	5	3.1	0.043	0.31
7440-43-9	CADMIUM, TOTAL	7.64			P	10	6.3	0.099	3.8
7440-70-2	CALCIUM, TOTAL	7550			P	5	63	11.	50
7440-47-3	CHROMIUM, TOTAL	1890			P	10	12	0.33	5.0
7440-48-4	COBALT, TOTAL	40.7			MS	5	0.12	0.0069	0.038
7440-50-8	COPPER, TOTAL	9840			P	10	31	2.0	12
7439-89-6	IRON, TOTAL	269000			P	10	120	18.	100
7439-92-1	LEAD, TOTAL	5760			P	10	6.3	1.1	5.0
7439-95-4	MAGNESIUM, TOTAL	2800			P	5	63	4.3	50
7439-96-5	MANGANESE, TOTAL	1430			P	10	6.3	2.0	5.0
7439-97-6	MERCURY, TOTAL	18.6			CV	1	0.038	0.0060	0.020
7440-02-0	NICKEL, TOTAL	944			P	10	12	0.55	5.0
7440-09-7	POTASSIUM, TOTAL	1690			P	5	630	18.	310
7782-49-2	SELENIUM, TOTAL	8.8	U		P	10	12	2.1	8.8
7440-22-4	SILVER, TOTAL	9.23	J		P	10	12	0.34	5.0
7440-23-5	SODIUM, TOTAL	599	J		P	10	1200	19.	630
7440-28-0	THALLIUM, TOTAL	0.099	J		MS	5	0.12	0.012	0.050
7440-62-2	VANADIUM, TOTAL	18.5			P	10	12	0.47	5.0
7440-66-6	ZINC, TOTAL	6850			P	5	12	1.1	6.3

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-11-0610

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 78.8 **Lab Sample ID:** SI3772-003

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	8540			P	10	350	8.3	120
7440-36-0	ANTIMONY, TOTAL	52.5			MS	5	0.12	0.023	0.059
7440-38-2	ARSENIC, TOTAL	46.2			MS	5	0.59	0.18	0.47
7440-39-3	BARIUM, TOTAL	207			P	10	5.9	0.29	3.5
7440-41-7	BERYLLIUM, TOTAL	4.94	J		P	10	5.9	0.080	0.59
7440-43-9	CADMIUM, TOTAL	5.22	J		P	10	5.9	0.093	3.5
7440-70-2	CALCIUM, TOTAL	20500			P	10	120	21.	94
7440-47-3	CHROMIUM, TOTAL	5780			P	10	12	0.31	4.7
7440-48-4	COBALT, TOTAL	39.0			MS	5	0.12	0.0065	0.035
7440-50-8	COPPER, TOTAL	8100			P	10	29	1.9	12
7439-89-6	IRON, TOTAL	239000			P	10	120	16.	94
7439-92-1	LEAD, TOTAL	18700			P	10	5.9	1.0	4.7
7439-95-4	MAGNESIUM, TOTAL	3020			P	10	120	8.0	94
7439-96-5	MANGANESE, TOTAL	12600		B	P	10	5.9	1.9	4.7
7439-97-6	MERCURY, TOTAL	2.89			CV	1	0.033	0.0051	0.017
7440-02-0	NICKEL, TOTAL	3260			P	10	12	0.52	4.7
7440-09-7	POTASSIUM, TOTAL	1390			P	10	1200	34.	590
7782-49-2	SELENIUM, TOTAL	2.6	J		P	10	12	2.0	8.2
7440-22-4	SILVER, TOTAL	6.72	J		P	10	12	0.32	4.7
7440-23-5	SODIUM, TOTAL	281	J		P	10	1200	18.	590
7440-28-0	THALLIUM, TOTAL	0.118	J		MS	5	0.12	0.011	0.047
7440-62-2	VANADIUM, TOTAL	49.0			P	10	12	0.43	4.7
7440-66-6	ZINC, TOTAL	3210			P	10	23	2.0	12

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-14-0002

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 97.1 **Lab Sample ID:** SI3772-004

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	5550			P	1	19	0.46	6.4
7440-36-0	ANTIMONY, TOTAL	0.12			MS	5	0.064	0.013	0.032
7440-38-2	ARSENIC, TOTAL	18.6			MS	5	0.32	0.097	0.26
7440-39-3	BARIUM, TOTAL	23.8			P	1	0.32	0.016	0.19
7440-41-7	BERYLLIUM, TOTAL	0.374			P	1	0.32	0.0044	0.032
7440-43-9	CADMIUM, TOTAL	0.303	J		P	1	0.32	0.0051	0.19
7440-70-2	CALCIUM, TOTAL	818			P	1	6.4	1.2	5.2
7440-47-3	CHROMIUM, TOTAL	34.3			P	1	0.64	0.017	0.26
7440-48-4	COBALT, TOTAL	5.01			MS	5	0.064	0.0035	0.019
7440-50-8	COPPER, TOTAL	18.1			P	1	1.6	0.10	0.64
7439-89-6	IRON, TOTAL	15600			P	1	6.4	0.90	5.2
7439-92-1	LEAD, TOTAL	10.8			P	1	0.32	0.056	0.26
7439-95-4	MAGNESIUM, TOTAL	3210			P	1	6.4	0.44	5.2
7439-96-5	MANGANESE, TOTAL	196		B	P	1	0.32	0.10	0.26
7439-97-6	MERCURY, TOTAL	0.026	J		CV	1	0.027	0.0043	0.014
7440-02-0	NICKEL, TOTAL	16.6			P	1	0.64	0.028	0.26
7440-09-7	POTASSIUM, TOTAL	1850			P	1	64	1.9	32
7782-49-2	SELENIUM, TOTAL	0.19	J		P	1	0.64	0.11	0.45
7440-22-4	SILVER, TOTAL	0.13	J		P	1	0.64	0.017	0.26
7440-23-5	SODIUM, TOTAL	140			P	1	64	0.97	32
7440-28-0	THALLIUM, TOTAL	0.181			MS	5	0.064	0.0061	0.026
7440-62-2	VANADIUM, TOTAL	14.4			P	1	0.64	0.024	0.26
7440-66-6	ZINC, TOTAL	72.6			P	1	1.3	0.11	0.64

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-14-0206

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 95.4 **Lab Sample ID:** SI3772-005

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	7090			P	1	21	0.49	6.9
7440-36-0	ANTIMONY, TOTAL	0.350			MS	5	0.069	0.014	0.035
7440-38-2	ARSENIC, TOTAL	10.9			MS	5	0.35	0.10	0.28
7440-39-3	BARIUM, TOTAL	34.3			P	1	0.35	0.017	0.21
7440-41-7	BERYLLIUM, TOTAL	0.348	J		P	1	0.35	0.0047	0.035
7440-43-9	CADMIUM, TOTAL	0.254	J		P	1	0.35	0.0055	0.21
7440-70-2	CALCIUM, TOTAL	1450			P	1	6.9	1.2	5.6
7440-47-3	CHROMIUM, TOTAL	50.9			P	1	0.69	0.018	0.28
7440-48-4	COBALT, TOTAL	5.64			MS	5	0.069	0.0038	0.021
7440-50-8	COPPER, TOTAL	19.2			P	1	1.7	0.11	0.69
7439-89-6	IRON, TOTAL	14200			P	1	6.9	0.97	5.6
7439-92-1	LEAD, TOTAL	18.5			P	1	0.35	0.060	0.28
7439-95-4	MAGNESIUM, TOTAL	3530			P	1	6.9	0.47	5.6
7439-96-5	MANGANESE, TOTAL	202		B	P	1	0.35	0.11	0.28
7439-97-6	MERCURY, TOTAL	0.012	J		CV	1	0.028	0.0043	0.014
7440-02-0	NICKEL, TOTAL	22.1			P	1	0.69	0.031	0.28
7440-09-7	POTASSIUM, TOTAL	1530			P	1	69	2.0	35
7782-49-2	SELENIUM, TOTAL	0.37	J		P	1	0.69	0.12	0.48
7440-22-4	SILVER, TOTAL	0.368	J		P	1	0.69	0.019	0.28
7440-23-5	SODIUM, TOTAL	283			P	1	69	1.0	35
7440-28-0	THALLIUM, TOTAL	0.121			MS	5	0.069	0.0066	0.028
7440-62-2	VANADIUM, TOTAL	15.6			P	1	0.69	0.026	0.28
7440-66-6	ZINC, TOTAL	151			P	1	1.4	0.12	0.69

Comments:

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INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-FD01-060315

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 95.0 **Lab Sample ID:** SI3772-006

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	8300			P	1	26	0.61	8.6
7440-36-0	ANTIMONY, TOTAL	0.11			MS	5	0.086	0.017	0.043
7440-38-2	ARSENIC, TOTAL	12.4			MS	5	0.43	0.13	0.34
7440-39-3	BARIUM, TOTAL	41.5			P	1	0.43	0.022	0.26
7440-41-7	BERYLLIUM, TOTAL	0.379	J		P	1	0.43	0.0059	0.043
7440-43-9	CADMIUM, TOTAL	0.416	J		P	1	0.43	0.0068	0.26
7440-70-2	CALCIUM, TOTAL	1290			P	1	8.6	1.6	6.9
7440-47-3	CHROMIUM, TOTAL	52.2			P	1	0.86	0.022	0.34
7440-48-4	COBALT, TOTAL	6.33			MS	5	0.086	0.0047	0.026
7440-50-8	COPPER, TOTAL	21.4			P	1	2.2	0.14	0.86
7439-89-6	IRON, TOTAL	16200			P	1	8.6	1.2	6.9
7439-92-1	LEAD, TOTAL	17.9			P	1	0.43	0.075	0.34
7439-95-4	MAGNESIUM, TOTAL	4890			P	1	8.6	0.59	6.9
7439-96-5	MANGANESE, TOTAL	225		B	P	1	0.43	0.14	0.34
7439-97-6	MERCURY, TOTAL	0.014	J		CV	1	0.027	0.0041	0.014
7440-02-0	NICKEL, TOTAL	25.3			P	1	0.86	0.038	0.34
7440-09-7	POTASSIUM, TOTAL	1830			P	1	86	2.5	43
7782-49-2	SELENIUM, TOTAL	0.32	J		P	1	0.86	0.15	0.60
7440-22-4	SILVER, TOTAL	0.10	J		P	1	0.86	0.023	0.34
7440-23-5	SODIUM, TOTAL	277			P	1	86	1.3	43
7440-28-0	THALLIUM, TOTAL	0.129			MS	5	0.086	0.0082	0.034
7440-62-2	VANADIUM, TOTAL	18.8			P	1	0.86	0.032	0.34
7440-66-6	ZINC, TOTAL	204			P	1	1.7	0.15	0.86

Comments:

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INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-14-0607

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 94.4 **Lab Sample ID:** SI3772-007

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	5830			P	1	28	0.65	9.2
7440-36-0	ANTIMONY, TOTAL	0.551			MS	5	0.092	0.018	0.046
7440-38-2	ARSENIC, TOTAL	2.48			MS	5	0.46	0.14	0.37
7440-39-3	BARIUM, TOTAL	21.6			P	1	0.46	0.023	0.28
7440-41-7	BERYLLIUM, TOTAL	0.180	J		P	1	0.46	0.0063	0.046
7440-43-9	CADMIUM, TOTAL	0.276	J		P	1	0.46	0.0073	0.28
7440-70-2	CALCIUM, TOTAL	2220			P	1	9.2	1.7	7.4
7440-47-3	CHROMIUM, TOTAL	247			P	1	0.92	0.024	0.37
7440-48-4	COBALT, TOTAL	6.28			MS	5	0.092	0.0051	0.028
7440-50-8	COPPER, TOTAL	36.8			P	1	2.3	0.15	0.92
7439-89-6	IRON, TOTAL	15800			P	1	9.2	1.3	7.4
7439-92-1	LEAD, TOTAL	48.6			P	1	0.46	0.080	0.37
7439-95-4	MAGNESIUM, TOTAL	4350			P	1	9.2	0.63	7.4
7439-96-5	MANGANESE, TOTAL	210		B	P	1	0.46	0.15	0.37
7439-97-6	MERCURY, TOTAL	0.286			CV	1	0.027	0.0042	0.014
7440-02-0	NICKEL, TOTAL	26.7			P	1	0.92	0.041	0.37
7440-09-7	POTASSIUM, TOTAL	1830			P	1	92	2.7	46
7782-49-2	SELENIUM, TOTAL	0.22	J		P	1	0.92	0.16	0.64
7440-22-4	SILVER, TOTAL	0.063	J		P	1	0.92	0.025	0.37
7440-23-5	SODIUM, TOTAL	346			P	1	92	1.4	46
7440-28-0	THALLIUM, TOTAL	0.152			MS	5	0.092	0.0088	0.037
7440-62-2	VANADIUM, TOTAL	20.9			P	1	0.92	0.034	0.37
7440-66-6	ZINC, TOTAL	464			P	1	1.8	0.16	0.92

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-17-0002

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 94.6 **Lab Sample ID:** SI3772-008

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	3240			P	1	23	0.55	7.8
7440-36-0	ANTIMONY, TOTAL	0.461			MS	5	0.078	0.016	0.039
7440-38-2	ARSENIC, TOTAL	10.7			MS	5	0.39	0.12	0.31
7440-39-3	BARIUM, TOTAL	26.8			P	1	0.39	0.019	0.23
7440-41-7	BERYLLIUM, TOTAL	0.682			P	1	0.39	0.0053	0.039
7440-43-9	CADMIUM, TOTAL	0.364	J		P	1	0.39	0.0061	0.23
7440-70-2	CALCIUM, TOTAL	898			P	1	7.8	1.4	6.2
7440-47-3	CHROMIUM, TOTAL	23.7			P	1	0.78	0.020	0.31
7440-48-4	COBALT, TOTAL	3.99			MS	5	0.078	0.0043	0.023
7440-50-8	COPPER, TOTAL	175			P	1	1.9	0.12	0.78
7439-89-6	IRON, TOTAL	14700			P	1	7.8	1.1	6.2
7439-92-1	LEAD, TOTAL	175			P	1	0.39	0.068	0.31
7439-95-4	MAGNESIUM, TOTAL	1270			P	1	7.8	0.53	6.2
7439-96-5	MANGANESE, TOTAL	376		B	P	1	0.39	0.12	0.31
7439-97-6	MERCURY, TOTAL	0.156			CV	1	0.032	0.0049	0.016
7440-02-0	NICKEL, TOTAL	52.5			P	1	0.78	0.034	0.31
7440-09-7	POTASSIUM, TOTAL	813			P	1	78	2.3	39
7782-49-2	SELENIUM, TOTAL	0.54	U		P	1	0.78	0.13	0.54
7440-22-4	SILVER, TOTAL	0.220	J		P	1	0.78	0.021	0.31
7440-23-5	SODIUM, TOTAL	167			P	1	78	1.2	39
7440-28-0	THALLIUM, TOTAL	0.0938			MS	5	0.078	0.0074	0.031
7440-62-2	VANADIUM, TOTAL	8.65			P	1	0.78	0.029	0.31
7440-66-6	ZINC, TOTAL	173			P	1	1.6	0.13	0.78

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-17-0206

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 90.7 **Lab Sample ID:** SI3772-009

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	4440			P	1	27	0.63	8.9
7440-36-0	ANTIMONY, TOTAL	0.255			MS	5	0.089	0.018	0.044
7440-38-2	ARSENIC, TOTAL	10.8			MS	5	0.44	0.13	0.36
7440-39-3	BARIUM, TOTAL	51.6			P	1	0.44	0.022	0.27
7440-41-7	BERYLLIUM, TOTAL	0.558			P	1	0.44	0.0060	0.044
7440-43-9	CADMIUM, TOTAL	0.429	J		P	1	0.44	0.0070	0.27
7440-70-2	CALCIUM, TOTAL	2500			P	1	8.9	1.6	7.1
7440-47-3	CHROMIUM, TOTAL	18.1			P	1	0.89	0.023	0.36
7440-48-4	COBALT, TOTAL	4.28			MS	5	0.089	0.0049	0.027
7440-50-8	COPPER, TOTAL	224			P	1	2.2	0.14	0.89
7439-89-6	IRON, TOTAL	9810			P	1	8.9	1.2	7.1
7439-92-1	LEAD, TOTAL	122			P	1	0.44	0.077	0.36
7439-95-4	MAGNESIUM, TOTAL	1940			P	1	8.9	0.60	7.1
7439-96-5	MANGANESE, TOTAL	259		B	P	1	0.44	0.14	0.36
7439-97-6	MERCURY, TOTAL	0.213			CV	1	0.031	0.0048	0.016
7440-02-0	NICKEL, TOTAL	21.2			P	1	0.89	0.039	0.36
7440-09-7	POTASSIUM, TOTAL	980			P	1	89	2.6	44
7782-49-2	SELENIUM, TOTAL	0.31	J		P	1	0.89	0.15	0.62
7440-22-4	SILVER, TOTAL	0.12	J		P	1	0.89	0.024	0.36
7440-23-5	SODIUM, TOTAL	188			P	1	89	1.3	44
7440-28-0	THALLIUM, TOTAL	0.0888	J		MS	5	0.089	0.0084	0.036
7440-62-2	VANADIUM, TOTAL	11.2			P	1	0.89	0.033	0.36
7440-66-6	ZINC, TOTAL	205			P	1	1.8	0.15	0.89

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-17-0610

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 82.5 **Lab Sample ID:** SI3772-010

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	4040			P	10	220	5.1	72
7440-36-0	ANTIMONY, TOTAL	8.26			MS	5	0.072	0.014	0.036
7440-38-2	ARSENIC, TOTAL	26.5			MS	5	0.36	0.11	0.29
7440-39-3	BARIUM, TOTAL	249			P	10	3.6	0.18	2.2
7440-41-7	BERYLLIUM, TOTAL	0.36	U		P	10	3.6	0.049	0.36
7440-43-9	CADMIUM, TOTAL	4.41			P	10	3.6	0.057	2.2
7440-70-2	CALCIUM, TOTAL	3850			P	10	72	13.	58
7440-47-3	CHROMIUM, TOTAL	31.0			P	10	7.2	0.19	2.9
7440-48-4	COBALT, TOTAL	10.2			MS	5	0.072	0.0040	0.022
7440-50-8	COPPER, TOTAL	2360			P	10	18	1.2	7.2
7439-89-6	IRON, TOTAL	102000			P	10	72	10.	58
7439-92-1	LEAD, TOTAL	3080			P	10	3.6	0.63	2.9
7439-95-4	MAGNESIUM, TOTAL	2480			P	10	72	4.9	58
7439-96-5	MANGANESE, TOTAL	139		B	P	10	3.6	1.2	2.9
7439-97-6	MERCURY, TOTAL	0.484			CV	1	0.038	0.0059	0.019
7440-02-0	NICKEL, TOTAL	194			P	10	7.2	0.32	2.9
7440-09-7	POTASSIUM, TOTAL	909			P	10	720	21.	360
7782-49-2	SELENIUM, TOTAL	5.0	U		P	10	7.2	1.2	5.0
7440-22-4	SILVER, TOTAL	2.53	J		P	10	7.2	0.19	2.9
7440-23-5	SODIUM, TOTAL	413	J		P	10	720	11.	360
7440-28-0	THALLIUM, TOTAL	0.065	J		MS	5	0.072	0.0069	0.029
7440-62-2	VANADIUM, TOTAL	84.4			P	10	7.2	0.27	2.9
7440-66-6	ZINC, TOTAL	2060			P	10	14	1.2	7.2

Comments:

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INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-19-0002

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 95.8 **Lab Sample ID:** SI3772-011

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	2810			P	1	20	0.47	6.6
7440-36-0	ANTIMONY, TOTAL	0.638			MS	5	0.066	0.013	0.033
7440-38-2	ARSENIC, TOTAL	4.09			MS	5	0.33	0.098	0.26
7440-39-3	BARIUM, TOTAL	24.0			P	1	0.33	0.016	0.20
7440-41-7	BERYLLIUM, TOTAL	0.767			P	1	0.33	0.0045	0.033
7440-43-9	CADMIUM, TOTAL	0.235	J		P	1	0.33	0.0052	0.20
7440-70-2	CALCIUM, TOTAL	2060			P	1	6.6	1.2	5.2
7440-47-3	CHROMIUM, TOTAL	8.48			P	1	0.66	0.017	0.26
7440-48-4	COBALT, TOTAL	2.72			MS	5	0.066	0.0036	0.020
7440-50-8	COPPER, TOTAL	149			P	1	1.6	0.11	0.66
7439-89-6	IRON, TOTAL	8120			P	1	6.6	0.92	5.2
7439-92-1	LEAD, TOTAL	176			P	1	0.33	0.057	0.26
7439-95-4	MAGNESIUM, TOTAL	1030			P	1	6.6	0.45	5.2
7439-96-5	MANGANESE, TOTAL	340		B	P	1	0.33	0.11	0.26
7439-97-6	MERCURY, TOTAL	0.163			CV	1	0.030	0.0046	0.015
7440-02-0	NICKEL, TOTAL	7.59			P	1	0.66	0.029	0.26
7440-09-7	POTASSIUM, TOTAL	672			P	1	66	1.9	33
7782-49-2	SELENIUM, TOTAL	0.46	U		P	1	0.66	0.11	0.46
7440-22-4	SILVER, TOTAL	0.090	J		P	1	0.66	0.018	0.26
7440-23-5	SODIUM, TOTAL	280			P	1	66	0.98	33
7440-28-0	THALLIUM, TOTAL	0.0759			MS	5	0.066	0.0062	0.026
7440-62-2	VANADIUM, TOTAL	6.98			P	1	0.66	0.024	0.26
7440-66-6	ZINC, TOTAL	104			P	1	1.3	0.11	0.66

Comments:

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INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-19-0206

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 87.5 **Lab Sample ID:** SI3772-012

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	9150			P	1	27	0.65	9.1
7440-36-0	ANTIMONY, TOTAL	0.301			MS	5	0.091	0.018	0.046
7440-38-2	ARSENIC, TOTAL	11.8			MS	5	0.46	0.14	0.36
7440-39-3	BARIUM, TOTAL	57.3			P	1	0.46	0.023	0.27
7440-41-7	BERYLLIUM, TOTAL	0.677			P	1	0.46	0.0062	0.046
7440-43-9	CADMIUM, TOTAL	0.299	J		P	1	0.46	0.0072	0.27
7440-70-2	CALCIUM, TOTAL	2420			P	1	9.1	1.6	7.3
7440-47-3	CHROMIUM, TOTAL	35.4			P	1	0.91	0.024	0.36
7440-48-4	COBALT, TOTAL	7.49			MS	5	0.091	0.0050	0.027
7440-50-8	COPPER, TOTAL	303			P	1	2.3	0.15	0.91
7439-89-6	IRON, TOTAL	17800			P	1	9.1	1.3	7.3
7439-92-1	LEAD, TOTAL	176			P	1	0.46	0.080	0.36
7439-95-4	MAGNESIUM, TOTAL	4140			P	1	9.1	0.62	7.3
7439-96-5	MANGANESE, TOTAL	301		B	P	1	0.46	0.15	0.36
7439-97-6	MERCURY, TOTAL	0.245			CV	1	0.035	0.0054	0.018
7440-02-0	NICKEL, TOTAL	26.5			P	1	0.91	0.040	0.36
7440-09-7	POTASSIUM, TOTAL	1610			P	1	91	2.7	46
7782-49-2	SELENIUM, TOTAL	0.64	U		P	1	0.91	0.16	0.64
7440-22-4	SILVER, TOTAL	0.328	J		P	1	0.91	0.025	0.36
7440-23-5	SODIUM, TOTAL	519			P	1	91	1.4	46
7440-28-0	THALLIUM, TOTAL	0.128			MS	5	0.091	0.0087	0.036
7440-62-2	VANADIUM, TOTAL	26.1			P	1	0.91	0.034	0.36
7440-66-6	ZINC, TOTAL	173			P	1	1.8	0.16	0.91

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-19-0610

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 88.8 **Lab Sample ID:** SI3772-013

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	12700			P	1	31	0.73	10
7440-36-0	ANTIMONY, TOTAL	1.29			MS	5	0.10	0.021	0.052
7440-38-2	ARSENIC, TOTAL	14.9			MS	5	0.52	0.15	0.41
7440-39-3	BARIUM, TOTAL	69.0			P	1	0.52	0.026	0.31
7440-41-7	BERYLLIUM, TOTAL	0.621			P	1	0.52	0.0070	0.052
7440-43-9	CADMIUM, TOTAL	0.305	J		P	1	0.52	0.0082	0.31
7440-70-2	CALCIUM, TOTAL	2710			P	1	10	1.9	8.3
7440-47-3	CHROMIUM, TOTAL	46.6			P	1	1.0	0.027	0.41
7440-48-4	COBALT, TOTAL	9.98			MS	5	0.10	0.0057	0.031
7440-50-8	COPPER, TOTAL	130			P	1	2.6	0.17	1.0
7439-89-6	IRON, TOTAL	20300			P	1	10	1.4	8.3
7439-92-1	LEAD, TOTAL	280			P	1	0.52	0.090	0.41
7439-95-4	MAGNESIUM, TOTAL	7670			P	1	10	0.70	8.3
7439-96-5	MANGANESE, TOTAL	349		B	P	1	0.52	0.17	0.41
7439-97-6	MERCURY, TOTAL	1.95			CV	1	0.036	0.0056	0.018
7440-02-0	NICKEL, TOTAL	41.3			P	1	1.0	0.045	0.41
7440-09-7	POTASSIUM, TOTAL	1690			P	1	100	3.0	52
7782-49-2	SELENIUM, TOTAL	0.78	J		P	1	1.0	0.18	0.72
7440-22-4	SILVER, TOTAL	0.543	J		P	1	1.0	0.028	0.41
7440-23-5	SODIUM, TOTAL	392			P	1	100	1.5	52
7440-28-0	THALLIUM, TOTAL	0.145			MS	5	0.10	0.0098	0.041
7440-62-2	VANADIUM, TOTAL	30.9			P	1	1.0	0.038	0.41
7440-66-6	ZINC, TOTAL	217			P	1	2.1	0.18	1.0

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-22-0002

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 90.4 **Lab Sample ID:** SI3897-001

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	14900			P	1	19	0.46	6.5
7440-36-0	ANTIMONY, TOTAL	0.220			MS	5	0.065	0.013	0.032
7440-38-2	ARSENIC, TOTAL	13.6			MS	5	0.32	0.097	0.26
7440-39-3	BARIUM, TOTAL	97.2			P	1	0.32	0.016	0.19
7440-41-7	BERYLLIUM, TOTAL	0.560			P	1	0.32	0.0044	0.032
7440-43-9	CADMIUM, TOTAL	0.328	J		P	2	0.65	0.010	0.39
7440-70-2	CALCIUM, TOTAL	13200			P	1	6.5	1.2	5.2
7440-47-3	CHROMIUM, TOTAL	55.0			P	2	1.3	0.034	0.52
7440-48-4	COBALT, TOTAL	10.8			MS	5	0.065	0.0036	0.019
7440-50-8	COPPER, TOTAL	57.0			P	2	3.2	0.21	1.3
7439-89-6	IRON, TOTAL	25600			P	2	13	1.8	10
7439-92-1	LEAD, TOTAL	190			P	2	0.65	0.11	0.52
7439-95-4	MAGNESIUM, TOTAL	9570			P	2	13	0.88	10
7439-96-5	MANGANESE, TOTAL	404		B	P	2	0.65	0.21	0.52
7439-97-6	MERCURY, TOTAL	0.192			CV	1	0.033	0.0051	0.017
7440-02-0	NICKEL, TOTAL	41.3			P	2	1.3	0.057	0.52
7440-09-7	POTASSIUM, TOTAL	5160			P	1	65	1.9	32
7782-49-2	SELENIUM, TOTAL	0.90	U		P	2	1.3	0.22	0.90
7440-22-4	SILVER, TOTAL	0.457	J		P	2	1.3	0.035	0.52
7440-23-5	SODIUM, TOTAL	1400			P	1	65	0.97	32
7440-28-0	THALLIUM, TOTAL	0.251			MS	5	0.065	0.0061	0.026
7440-62-2	VANADIUM, TOTAL	37.6			P	2	1.3	0.048	0.52
7440-66-6	ZINC, TOTAL	104			P	1	1.3	0.11	0.65

Comments:

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INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-24-0002

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 93.0 **Lab Sample ID:** SI3897-002

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	5360			P	1	28	0.66	9.3
7440-36-0	ANTIMONY, TOTAL	0.044	J		MS	5	0.093	0.019	0.047
7440-38-2	ARSENIC, TOTAL	11.6			MS	5	0.47	0.14	0.37
7440-39-3	BARIUM, TOTAL	16.4			P	1	0.47	0.023	0.28
7440-41-7	BERYLLIUM, TOTAL	0.269	J		P	1	0.47	0.0064	0.047
7440-43-9	CADMIUM, TOTAL	0.038	J		P	1	0.47	0.0074	0.28
7440-70-2	CALCIUM, TOTAL	584			P	1	9.3	1.7	7.5
7440-47-3	CHROMIUM, TOTAL	16.9			P	1	0.93	0.024	0.37
7440-48-4	COBALT, TOTAL	4.85			MS	5	0.093	0.0051	0.028
7440-50-8	COPPER, TOTAL	10.5			P	1	2.3	0.15	0.93
7439-89-6	IRON, TOTAL	9530			P	1	9.3	1.3	7.5
7439-92-1	LEAD, TOTAL	13.5			P	1	0.47	0.081	0.37
7439-95-4	MAGNESIUM, TOTAL	2600			P	1	9.3	0.64	7.5
7439-96-5	MANGANESE, TOTAL	162		B	P	1	0.47	0.15	0.37
7439-97-6	MERCURY, TOTAL	0.0082	J		CV	1	0.027	0.0042	0.014
7440-02-0	NICKEL, TOTAL	15.7			P	1	0.93	0.041	0.37
7440-09-7	POTASSIUM, TOTAL	747			P	1	93	2.7	47
7782-49-2	SELENIUM, TOTAL	0.65	U		P	1	0.93	0.16	0.65
7440-22-4	SILVER, TOTAL	0.061	J		P	1	0.93	0.025	0.37
7440-23-5	SODIUM, TOTAL	62.2	J		P	1	93	1.4	47
7440-28-0	THALLIUM, TOTAL	0.079	J		MS	5	0.093	0.0089	0.037
7440-62-2	VANADIUM, TOTAL	11.4			P	1	0.93	0.035	0.37
7440-66-6	ZINC, TOTAL	32.4			P	1	1.9	0.16	0.93

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-24-0206

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 92.6 **Lab Sample ID:** SI3897-003

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	7550			P	1	28	0.67	9.5
7440-36-0	ANTIMONY, TOTAL	0.034	J		MS	5	0.095	0.019	0.047
7440-38-2	ARSENIC, TOTAL	11.6			MS	5	0.47	0.14	0.38
7440-39-3	BARIUM, TOTAL	33.1			P	1	0.47	0.024	0.28
7440-41-7	BERYLLIUM, TOTAL	0.447	J		P	1	0.47	0.0064	0.047
7440-43-9	CADMIUM, TOTAL	0.0869	J		P	1	0.47	0.0075	0.28
7440-70-2	CALCIUM, TOTAL	1110			P	1	9.5	1.7	7.6
7440-47-3	CHROMIUM, TOTAL	25.4			P	1	0.95	0.025	0.38
7440-48-4	COBALT, TOTAL	7.57			MS	5	0.095	0.0052	0.028
7440-50-8	COPPER, TOTAL	17.2			P	1	2.4	0.15	0.95
7439-89-6	IRON, TOTAL	14200			P	1	9.5	1.3	7.6
7439-92-1	LEAD, TOTAL	4.79			P	1	0.47	0.082	0.38
7439-95-4	MAGNESIUM, TOTAL	4370			P	1	9.5	0.64	7.6
7439-96-5	MANGANESE, TOTAL	285		B	P	1	0.47	0.15	0.38
7439-97-6	MERCURY, TOTAL	0.014	U		CV	1	0.028	0.0043	0.014
7440-02-0	NICKEL, TOTAL	26.6			P	1	0.95	0.042	0.38
7440-09-7	POTASSIUM, TOTAL	1450			P	1	95	2.7	47
7782-49-2	SELENIUM, TOTAL	0.66	U		P	1	0.95	0.16	0.66
7440-22-4	SILVER, TOTAL	0.38	U		P	1	0.95	0.026	0.38
7440-23-5	SODIUM, TOTAL	286			P	1	95	1.4	47
7440-28-0	THALLIUM, TOTAL	0.108			MS	5	0.095	0.0090	0.038
7440-62-2	VANADIUM, TOTAL	22.9			P	1	0.95	0.035	0.38
7440-66-6	ZINC, TOTAL	33.0			P	1	1.9	0.16	0.95

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-24-069.7

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 86.1 **Lab Sample ID:** SI3897-004

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	6260		NA	P	1	29	0.69	9.8
7440-36-0	ANTIMONY, TOTAL	0.041	J	N	MS	5	0.098	0.020	0.049
7440-38-2	ARSENIC, TOTAL	12.8			MS	5	0.49	0.15	0.39
7440-39-3	BARIUM, TOTAL	14.1			P	1	0.49	0.024	0.29
7440-41-7	BERYLLIUM, TOTAL	0.278	J		P	1	0.49	0.0066	0.049
7440-43-9	CADMIUM, TOTAL	0.059	J		P	1	0.49	0.0077	0.29
7440-70-2	CALCIUM, TOTAL	652		N	P	1	9.8	1.8	7.8
7440-47-3	CHROMIUM, TOTAL	15.8		N*	P	1	0.98	0.025	0.39
7440-48-4	COBALT, TOTAL	5.27			MS	5	0.098	0.0054	0.029
7440-50-8	COPPER, TOTAL	15.2			P	1	2.4	0.16	0.98
7439-89-6	IRON, TOTAL	10300		NA	P	1	9.8	1.4	7.8
7439-92-1	LEAD, TOTAL	21.2			P	1	0.49	0.085	0.39
7439-95-4	MAGNESIUM, TOTAL	2910		N*A	P	1	9.8	0.66	7.8
7439-96-5	MANGANESE, TOTAL	157		NBA	P	1	0.49	0.16	0.39
7439-97-6	MERCURY, TOTAL	0.014	U		CV	1	0.028	0.0044	0.014
7440-02-0	NICKEL, TOTAL	16.5			P	1	0.98	0.043	0.39
7440-09-7	POTASSIUM, TOTAL	1000		N*	P	1	98	2.8	49
7782-49-2	SELENIUM, TOTAL	0.68	U	A	P	1	0.98	0.17	0.68
7440-22-4	SILVER, TOTAL	0.063	J		P	1	0.98	0.026	0.39
7440-23-5	SODIUM, TOTAL	865			P	1	98	1.5	49
7440-28-0	THALLIUM, TOTAL	0.078	J		MS	5	0.098	0.0093	0.039
7440-62-2	VANADIUM, TOTAL	12.8		*	P	1	0.98	0.036	0.39
7440-66-6	ZINC, TOTAL	30.6			P	1	2.0	0.17	0.98

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-22-0206

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 84.2 **Lab Sample ID:** SI3897-005

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	2030			P	2	69	1.6	23
7440-36-0	ANTIMONY, TOTAL	0.509			MS	5	0.12	0.023	0.058
7440-38-2	ARSENIC, TOTAL	8.44			MS	5	0.58	0.17	0.46
7440-39-3	BARIUM, TOTAL	226			P	2	1.2	0.058	0.69
7440-41-7	BERYLLIUM, TOTAL	0.764	J		P	2	1.2	0.016	0.12
7440-43-9	CADMIUM, TOTAL	0.053	J		P	2	1.2	0.018	0.69
7440-70-2	CALCIUM, TOTAL	3290			P	2	23	4.2	18
7440-47-3	CHROMIUM, TOTAL	19.2			P	2	2.3	0.060	0.92
7440-48-4	COBALT, TOTAL	5.46			MS	5	0.12	0.0063	0.035
7440-50-8	COPPER, TOTAL	72.5			P	2	5.8	0.37	2.3
7439-89-6	IRON, TOTAL	16700			P	2	23	3.2	18
7439-92-1	LEAD, TOTAL	2530			P	2	1.2	0.20	0.92
7439-95-4	MAGNESIUM, TOTAL	328			P	2	23	1.6	18
7439-96-5	MANGANESE, TOTAL	49.0		B	P	1	0.58	0.18	0.46
7439-97-6	MERCURY, TOTAL	0.462			CV	1	0.034	0.0053	0.018
7440-02-0	NICKEL, TOTAL	10.4			P	2	2.3	0.10	0.92
7440-09-7	POTASSIUM, TOTAL	838			P	2	230	6.7	120
7782-49-2	SELENIUM, TOTAL	1.6			P	1	1.2	0.20	0.81
7440-22-4	SILVER, TOTAL	0.24	J		P	2	2.3	0.062	0.92
7440-23-5	SODIUM, TOTAL	1160			P	2	230	3.5	120
7440-28-0	THALLIUM, TOTAL	0.145			MS	5	0.12	0.011	0.046
7440-62-2	VANADIUM, TOTAL	8.92			P	2	2.3	0.085	0.92
7440-66-6	ZINC, TOTAL	45.3			P	2	4.6	0.39	2.3

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-22-0610

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 75.5 **Lab Sample ID:** SI3897-006

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	2150			P	1	38	0.91	13
7440-36-0	ANTIMONY, TOTAL	0.632			MS	5	0.13	0.026	0.064
7440-38-2	ARSENIC, TOTAL	14.9			MS	5	0.64	0.19	0.51
7440-39-3	BARIUM, TOTAL	231			P	1	0.64	0.032	0.38
7440-41-7	BERYLLIUM, TOTAL	0.646			P	1	0.64	0.0087	0.064
7440-43-9	CADMIUM, TOTAL	0.199	J		P	1	0.64	0.010	0.38
7440-70-2	CALCIUM, TOTAL	3700			P	1	13	2.3	10
7440-47-3	CHROMIUM, TOTAL	10.7			P	1	1.3	0.033	0.51
7440-48-4	COBALT, TOTAL	5.11			MS	5	0.13	0.0071	0.038
7440-50-8	COPPER, TOTAL	173			P	1	3.2	0.21	1.3
7439-89-6	IRON, TOTAL	23500			P	1	13	1.8	10
7439-92-1	LEAD, TOTAL	406			P	1	0.64	0.11	0.51
7439-95-4	MAGNESIUM, TOTAL	1170			P	1	13	0.87	10
7439-96-5	MANGANESE, TOTAL	149		B	P	1	0.64	0.21	0.51
7439-97-6	MERCURY, TOTAL	0.818			CV	1	0.042	0.0065	0.021
7440-02-0	NICKEL, TOTAL	12.6			P	1	1.3	0.057	0.51
7440-09-7	POTASSIUM, TOTAL	683			P	1	130	3.7	64
7782-49-2	SELENIUM, TOTAL	0.90	U		P	1	1.3	0.22	0.90
7440-22-4	SILVER, TOTAL	0.358	J		P	1	1.3	0.035	0.51
7440-23-5	SODIUM, TOTAL	895			P	1	130	1.9	64
7440-28-0	THALLIUM, TOTAL	0.12	J		MS	5	0.13	0.012	0.051
7440-62-2	VANADIUM, TOTAL	17.1			P	1	1.3	0.048	0.51
7440-66-6	ZINC, TOTAL	106			P	1	2.6	0.22	1.3

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-FD02-060315

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 74.7 **Lab Sample ID:** SI3897-007

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	5360			P	2	76	1.8	25
7440-36-0	ANTIMONY, TOTAL	0.550			MS	5	0.13	0.025	0.063
7440-38-2	ARSENIC, TOTAL	15.9			MS	5	0.63	0.19	0.50
7440-39-3	BARIUM, TOTAL	274			P	2	1.3	0.063	0.76
7440-41-7	BERYLLIUM, TOTAL	0.642	J		P	2	1.3	0.017	0.13
7440-43-9	CADMIUM, TOTAL	0.204	J		P	2	1.3	0.020	0.76
7440-70-2	CALCIUM, TOTAL	9120			P	2	25	4.5	20
7440-47-3	CHROMIUM, TOTAL	27.4			P	2	2.5	0.066	1.0
7440-48-4	COBALT, TOTAL	7.95			MS	5	0.13	0.0069	0.038
7440-50-8	COPPER, TOTAL	190			P	2	6.3	0.40	2.5
7439-89-6	IRON, TOTAL	27900			P	2	25	3.5	20
7439-92-1	LEAD, TOTAL	438			P	2	1.3	0.22	1.0
7439-95-4	MAGNESIUM, TOTAL	3460			P	2	25	1.7	20
7439-96-5	MANGANESE, TOTAL	239		B	P	1	0.63	0.20	0.50
7439-97-6	MERCURY, TOTAL	0.485			CV	1	0.043	0.0067	0.022
7440-02-0	NICKEL, TOTAL	24.5			P	2	2.5	0.11	1.0
7440-09-7	POTASSIUM, TOTAL	2030			P	2	250	7.3	130
7782-49-2	SELENIUM, TOTAL	0.49	J		P	1	1.3	0.21	0.88
7440-22-4	SILVER, TOTAL	0.20	J		P	2	2.5	0.068	1.0
7440-23-5	SODIUM, TOTAL	890			P	2	250	3.8	130
7440-28-0	THALLIUM, TOTAL	0.149			MS	5	0.13	0.012	0.050
7440-62-2	VANADIUM, TOTAL	27.8			P	2	2.5	0.093	1.0
7440-66-6	ZINC, TOTAL	158			P	2	5.0	0.43	2.5

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-23-0002

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 91.5 **Lab Sample ID:** SI3897-008

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	11400			P	1	31	0.73	10
7440-36-0	ANTIMONY, TOTAL	1.94			MS	5	0.10	0.020	0.051
7440-38-2	ARSENIC, TOTAL	11.9			MS	5	0.51	0.15	0.41
7440-39-3	BARIUM, TOTAL	149			P	1	0.51	0.026	0.31
7440-41-7	BERYLLIUM, TOTAL	0.526			P	1	0.51	0.0069	0.051
7440-43-9	CADMIUM, TOTAL	1.43			P	2	1.0	0.016	0.61
7440-70-2	CALCIUM, TOTAL	9670			P	1	10	1.8	8.2
7440-47-3	CHROMIUM, TOTAL	53.1			P	2	2.0	0.053	0.82
7440-48-4	COBALT, TOTAL	15.7			MS	5	0.10	0.0056	0.031
7440-50-8	COPPER, TOTAL	769			P	2	5.1	0.33	2.0
7439-89-6	IRON, TOTAL	48500			P	2	20	2.9	16
7439-92-1	LEAD, TOTAL	858			P	2	1.0	0.18	0.82
7439-95-4	MAGNESIUM, TOTAL	8580			P	2	20	1.4	16
7439-96-5	MANGANESE, TOTAL	419		B	P	2	1.0	0.33	0.82
7439-97-6	MERCURY, TOTAL	0.715			CV	1	0.030	0.0046	0.015
7440-02-0	NICKEL, TOTAL	65.4			P	2	2.0	0.090	0.82
7440-09-7	POTASSIUM, TOTAL	3480			P	1	100	3.0	51
7782-49-2	SELENIUM, TOTAL	1.4	U		P	2	2.0	0.35	1.4
7440-22-4	SILVER, TOTAL	0.870	J		P	2	2.0	0.055	0.82
7440-23-5	SODIUM, TOTAL	279			P	1	100	1.5	51
7440-28-0	THALLIUM, TOTAL	0.183			MS	5	0.10	0.0097	0.041
7440-62-2	VANADIUM, TOTAL	39.8			P	2	2.0	0.076	0.82
7440-66-6	ZINC, TOTAL	620			P	1	2.0	0.17	1.0

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-23-0206

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 87.2 **Lab Sample ID:** SI3897-009

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	12800			P	1	33	0.79	11
7440-36-0	ANTIMONY, TOTAL	0.654			MS	5	0.11	0.022	0.056
7440-38-2	ARSENIC, TOTAL	20.8			MS	5	0.56	0.17	0.44
7440-39-3	BARIUM, TOTAL	119			P	1	0.56	0.028	0.33
7440-41-7	BERYLLIUM, TOTAL	0.616			P	1	0.56	0.0076	0.056
7440-43-9	CADMIUM, TOTAL	0.776			P	1	0.56	0.0088	0.33
7440-70-2	CALCIUM, TOTAL	6120			P	1	11	2.0	8.9
7440-47-3	CHROMIUM, TOTAL	59.4			P	1	1.1	0.029	0.44
7440-48-4	COBALT, TOTAL	10.6			MS	5	0.11	0.0061	0.033
7440-50-8	COPPER, TOTAL	129			P	1	2.8	0.18	1.1
7439-89-6	IRON, TOTAL	21100			P	1	11	1.6	8.9
7439-92-1	LEAD, TOTAL	315			P	1	0.56	0.097	0.44
7439-95-4	MAGNESIUM, TOTAL	8090			P	1	11	0.76	8.9
7439-96-5	MANGANESE, TOTAL	273		B	P	1	0.56	0.18	0.44
7439-97-6	MERCURY, TOTAL	0.628			CV	1	0.035	0.0055	0.018
7440-02-0	NICKEL, TOTAL	42.6			P	1	1.1	0.049	0.44
7440-09-7	POTASSIUM, TOTAL	4360			P	1	110	3.2	56
7782-49-2	SELENIUM, TOTAL	0.78	U		P	1	1.1	0.19	0.78
7440-22-4	SILVER, TOTAL	0.24	J		P	1	1.1	0.030	0.44
7440-23-5	SODIUM, TOTAL	467			P	1	110	1.7	56
7440-28-0	THALLIUM, TOTAL	0.219			MS	5	0.11	0.011	0.044
7440-62-2	VANADIUM, TOTAL	40.6			P	1	1.1	0.041	0.44
7440-66-6	ZINC, TOTAL	407			P	1	2.2	0.19	1.1

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-23-0610

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 62.9 **Lab Sample ID:** SI3897-010

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	8470			P	1	45	1.1	15
7440-36-0	ANTIMONY, TOTAL	1.40			MS	5	0.15	0.030	0.076
7440-38-2	ARSENIC, TOTAL	10.5			MS	5	0.76	0.23	0.60
7440-39-3	BARIUM, TOTAL	442			P	1	0.76	0.038	0.45
7440-41-7	BERYLLIUM, TOTAL	0.373	J		P	1	0.76	0.010	0.076
7440-43-9	CADMIUM, TOTAL	0.482	J		P	1	0.76	0.012	0.45
7440-70-2	CALCIUM, TOTAL	6250			P	1	15	2.7	12
7440-47-3	CHROMIUM, TOTAL	35.3			P	1	1.5	0.039	0.60
7440-48-4	COBALT, TOTAL	8.67			MS	5	0.15	0.0083	0.045
7440-50-8	COPPER, TOTAL	1260			P	1	3.8	0.24	1.5
7439-89-6	IRON, TOTAL	25900			P	1	15	2.1	12
7439-92-1	LEAD, TOTAL	2180			P	1	0.76	0.13	0.60
7439-95-4	MAGNESIUM, TOTAL	5630			P	1	15	1.0	12
7439-96-5	MANGANESE, TOTAL	186		B	P	1	0.76	0.24	0.60
7439-97-6	MERCURY, TOTAL	0.516			CV	1	0.044	0.0068	0.022
7440-02-0	NICKEL, TOTAL	31.0			P	1	1.5	0.067	0.60
7440-09-7	POTASSIUM, TOTAL	2590			P	1	150	4.4	76
7782-49-2	SELENIUM, TOTAL	1.0	U		P	1	1.5	0.26	1.0
7440-22-4	SILVER, TOTAL	0.720	J		P	1	1.5	0.041	0.60
7440-23-5	SODIUM, TOTAL	157			P	1	150	2.3	76
7440-28-0	THALLIUM, TOTAL	0.152			MS	5	0.15	0.014	0.060
7440-62-2	VANADIUM, TOTAL	27.7			P	1	1.5	0.056	0.60
7440-66-6	ZINC, TOTAL	220			P	1	3.0	0.26	1.5

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-08-0002

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 93.2 **Lab Sample ID:** SI3897-011

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	6330			P	1	26	0.61	8.6
7440-36-0	ANTIMONY, TOTAL	0.965			MS	5	0.086	0.017	0.043
7440-38-2	ARSENIC, TOTAL	18.0			MS	5	0.43	0.13	0.35
7440-39-3	BARIUM, TOTAL	46.0			P	1	0.43	0.022	0.26
7440-41-7	BERYLLIUM, TOTAL	0.340	J		P	1	0.43	0.0059	0.043
7440-43-9	CADMIUM, TOTAL	0.805	J		P	2	0.86	0.014	0.52
7440-70-2	CALCIUM, TOTAL	1950			P	1	8.6	1.6	6.9
7440-47-3	CHROMIUM, TOTAL	76.0			P	2	1.7	0.045	0.69
7440-48-4	COBALT, TOTAL	8.94			MS	5	0.086	0.0048	0.026
7440-50-8	COPPER, TOTAL	159			P	2	4.3	0.28	1.7
7439-89-6	IRON, TOTAL	28200			P	2	17	2.4	14
7439-92-1	LEAD, TOTAL	268			P	2	0.86	0.15	0.69
7439-95-4	MAGNESIUM, TOTAL	3650			P	2	17	1.2	14
7439-96-5	MANGANESE, TOTAL	316		B	P	2	0.86	0.28	0.69
7439-97-6	MERCURY, TOTAL	0.786			CV	1	0.035	0.0055	0.018
7440-02-0	NICKEL, TOTAL	83.9			P	2	1.7	0.076	0.69
7440-09-7	POTASSIUM, TOTAL	1140			P	1	86	2.5	43
7782-49-2	SELENIUM, TOTAL	1.2	U		P	2	1.7	0.29	1.2
7440-22-4	SILVER, TOTAL	0.44	J		P	2	1.7	0.047	0.69
7440-23-5	SODIUM, TOTAL	158			P	1	86	1.3	43
7440-28-0	THALLIUM, TOTAL	0.111			MS	5	0.086	0.0082	0.035
7440-62-2	VANADIUM, TOTAL	23.0			P	2	1.7	0.064	0.69
7440-66-6	ZINC, TOTAL	278			P	1	1.7	0.15	0.86

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-FD01-060415

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 93.2 **Lab Sample ID:** SI3897-012

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	6270			P	1	29	0.69	9.7
7440-36-0	ANTIMONY, TOTAL	0.499			MS	5	0.097	0.019	0.048
7440-38-2	ARSENIC, TOTAL	17.1			MS	5	0.48	0.15	0.39
7440-39-3	BARIUM, TOTAL	40.2			P	1	0.48	0.024	0.29
7440-41-7	BERYLLIUM, TOTAL	0.339	J		P	1	0.48	0.0066	0.048
7440-43-9	CADMIUM, TOTAL	0.407	J		P	1	0.48	0.0076	0.29
7440-70-2	CALCIUM, TOTAL	1700			P	1	9.7	1.7	7.7
7440-47-3	CHROMIUM, TOTAL	46.3			P	1	0.97	0.025	0.39
7440-48-4	COBALT, TOTAL	8.46			MS	5	0.097	0.0053	0.029
7440-50-8	COPPER, TOTAL	89.7			P	1	2.4	0.15	0.97
7439-89-6	IRON, TOTAL	19800			P	1	9.7	1.4	7.7
7439-92-1	LEAD, TOTAL	127			P	1	0.48	0.084	0.39
7439-95-4	MAGNESIUM, TOTAL	3840			P	1	9.7	0.66	7.7
7439-96-5	MANGANESE, TOTAL	286		B	P	1	0.48	0.15	0.39
7439-97-6	MERCURY, TOTAL	1.24			CV	1	0.033	0.0051	0.017
7440-02-0	NICKEL, TOTAL	51.2			P	1	0.97	0.043	0.39
7440-09-7	POTASSIUM, TOTAL	1260			P	1	97	2.8	48
7782-49-2	SELENIUM, TOTAL	0.68	U		P	1	0.97	0.16	0.68
7440-22-4	SILVER, TOTAL	0.14	J		P	1	0.97	0.026	0.39
7440-23-5	SODIUM, TOTAL	177			P	1	97	1.5	48
7440-28-0	THALLIUM, TOTAL	0.115			MS	5	0.097	0.0092	0.039
7440-62-2	VANADIUM, TOTAL	20.8			P	1	0.97	0.036	0.39
7440-66-6	ZINC, TOTAL	161			P	1	1.9	0.16	0.97

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-08-0206

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 84.1 **Lab Sample ID:** SI3897-013

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	7220			P	2	64	1.5	21
7440-36-0	ANTIMONY, TOTAL	3.10			MS	5	0.11	0.021	0.054
7440-38-2	ARSENIC, TOTAL	61.9			MS	5	0.54	0.16	0.43
7440-39-3	BARIUM, TOTAL	115			P	2	1.1	0.054	0.64
7440-41-7	BERYLLIUM, TOTAL	0.416	J		P	2	1.1	0.015	0.11
7440-43-9	CADMIUM, TOTAL	5.41	J		P	25	13	0.21	8.0
7440-70-2	CALCIUM, TOTAL	3030			P	2	21	3.9	17
7440-47-3	CHROMIUM, TOTAL	142			P	25	27	0.70	11
7440-48-4	COBALT, TOTAL	15.2			MS	5	0.11	0.0059	0.032
7440-50-8	COPPER, TOTAL	21300			P	25	67	4.3	27
7439-89-6	IRON, TOTAL	208000			P	25	270	37.	210
7439-92-1	LEAD, TOTAL	1140			P	25	13	2.3	11
7439-95-4	MAGNESIUM, TOTAL	5440			P	25	270	18.	210
7439-96-5	MANGANESE, TOTAL	1480		B	P	25	13	4.3	11
7439-97-6	MERCURY, TOTAL	1.38			CV	1	0.034	0.0053	0.018
7440-02-0	NICKEL, TOTAL	1370			P	25	27	1.2	11
7440-09-7	POTASSIUM, TOTAL	1660			P	2	210	6.2	110
7782-49-2	SELENIUM, TOTAL	10	J		P	25	27	4.6	19
7440-22-4	SILVER, TOTAL	3.6	J		P	25	27	0.72	11
7440-23-5	SODIUM, TOTAL	349			P	2	210	3.2	110
7440-28-0	THALLIUM, TOTAL	0.134			MS	5	0.11	0.010	0.043
7440-62-2	VANADIUM, TOTAL	33.8			P	25	27	0.99	11
7440-66-6	ZINC, TOTAL	3290			P	2	4.3	0.36	2.1

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-08-0610

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 68.6 **Lab Sample ID:** SI3897-014

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	6720			P	2	59	1.4	20
7440-36-0	ANTIMONY, TOTAL	8.46			MS	5	0.098	0.020	0.049
7440-38-2	ARSENIC, TOTAL	34.0			MS	5	0.49	0.15	0.39
7440-39-3	BARIUM, TOTAL	370			P	2	0.98	0.049	0.59
7440-41-7	BERYLLIUM, TOTAL	0.618	J		P	2	0.98	0.013	0.098
7440-43-9	CADMIUM, TOTAL	7.29	J		P	25	12	0.19	7.3
7440-70-2	CALCIUM, TOTAL	22400			P	2	20	3.5	16
7440-47-3	CHROMIUM, TOTAL	149			P	25	24	0.64	9.8
7440-48-4	COBALT, TOTAL	26.3			MS	5	0.098	0.0054	0.029
7440-50-8	COPPER, TOTAL	23900			P	25	61	3.9	24
7439-89-6	IRON, TOTAL	203000			P	25	240	34.	200
7439-92-1	LEAD, TOTAL	1980			P	25	12	2.1	9.8
7439-95-4	MAGNESIUM, TOTAL	2200			P	25	240	17.	200
7439-96-5	MANGANESE, TOTAL	1000		B	P	25	12	3.9	9.8
7439-97-6	MERCURY, TOTAL	9.53			CV	1	0.046	0.0072	0.024
7440-02-0	NICKEL, TOTAL	2810			P	25	24	1.1	9.8
7440-09-7	POTASSIUM, TOTAL	897			P	2	200	5.7	98
7782-49-2	SELENIUM, TOTAL	9.0	J		P	25	24	4.2	17
7440-22-4	SILVER, TOTAL	5.4	J		P	25	24	0.66	9.8
7440-23-5	SODIUM, TOTAL	722			P	2	200	2.9	98
7440-28-0	THALLIUM, TOTAL	0.150			MS	5	0.098	0.0093	0.039
7440-62-2	VANADIUM, TOTAL	22.3	J		P	25	24	0.90	9.8
7440-66-6	ZINC, TOTAL	3020			P	2	3.9	0.33	2.0

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-09-0002

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 91.0 **Lab Sample ID:** SI3897-015

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	12300			P	1	24	0.57	8.0
7440-36-0	ANTIMONY, TOTAL	0.250			MS	5	0.080	0.016	0.040
7440-38-2	ARSENIC, TOTAL	12.4			MS	5	0.40	0.12	0.32
7440-39-3	BARIUM, TOTAL	78.2			P	1	0.40	0.020	0.24
7440-41-7	BERYLLIUM, TOTAL	0.517			P	1	0.40	0.0055	0.040
7440-43-9	CADMIUM, TOTAL	0.202	J		P	2	0.80	0.013	0.48
7440-70-2	CALCIUM, TOTAL	3550			P	1	8.0	1.4	6.4
7440-47-3	CHROMIUM, TOTAL	63.8			P	2	1.6	0.042	0.64
7440-48-4	COBALT, TOTAL	11.6			MS	5	0.080	0.0044	0.024
7440-50-8	COPPER, TOTAL	105			P	2	4.0	0.26	1.6
7439-89-6	IRON, TOTAL	25900			P	20	160	22.	130
7439-92-1	LEAD, TOTAL	74.4			P	2	0.80	0.14	0.64
7439-95-4	MAGNESIUM, TOTAL	6970			P	2	16	1.1	13
7439-96-5	MANGANESE, TOTAL	455		B	P	2	0.80	0.26	0.64
7439-97-6	MERCURY, TOTAL	0.303			CV	1	0.035	0.0055	0.018
7440-02-0	NICKEL, TOTAL	46.0			P	2	1.6	0.071	0.64
7440-09-7	POTASSIUM, TOTAL	4050			P	1	80	2.3	40
7782-49-2	SELENIUM, TOTAL	0.70	J		P	2	1.6	0.27	1.1
7440-22-4	SILVER, TOTAL	0.64	U		P	2	1.6	0.043	0.64
7440-23-5	SODIUM, TOTAL	973			P	1	80	1.2	40
7440-28-0	THALLIUM, TOTAL	0.281			MS	5	0.080	0.0076	0.032
7440-62-2	VANADIUM, TOTAL	42.0			P	2	1.6	0.059	0.64
7440-66-6	ZINC, TOTAL	112			P	1	1.6	0.14	0.80

Comments:

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INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-09-0206

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 89.1 **Lab Sample ID:** SI3897-016

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	5170			P	2	56	1.3	19
7440-36-0	ANTIMONY, TOTAL	1610			MS	25	0.47	0.094	0.23
7440-38-2	ARSENIC, TOTAL	35.1			MS	5	0.47	0.14	0.37
7440-39-3	BARIUM, TOTAL	237			P	2	0.94	0.047	0.56
7440-41-7	BERYLLIUM, TOTAL	0.262	J		P	2	0.94	0.013	0.094
7440-43-9	CADMIUM, TOTAL	6.81	J		P	25	12	0.18	7.0
7440-70-2	CALCIUM, TOTAL	2660			P	2	19	3.4	15
7440-47-3	CHROMIUM, TOTAL	103			P	25	23	0.61	9.4
7440-48-4	COBALT, TOTAL	17.1			MS	5	0.094	0.0051	0.028
7440-50-8	COPPER, TOTAL	23100			P	25	58	3.7	23
7439-89-6	IRON, TOTAL	208000			P	25	230	33.	190
7439-92-1	LEAD, TOTAL	20100			P	25	12	2.0	9.4
7439-95-4	MAGNESIUM, TOTAL	4230			P	25	230	16.	190
7439-96-5	MANGANESE, TOTAL	701		B	P	10	4.7	1.5	3.7
7439-97-6	MERCURY, TOTAL	0.332			CV	1	0.036	0.0056	0.018
7440-02-0	NICKEL, TOTAL	735			P	25	23	1.0	9.4
7440-09-7	POTASSIUM, TOTAL	1910			P	2	190	5.4	94
7782-49-2	SELENIUM, TOTAL	16	U		P	25	23	4.0	16
7440-22-4	SILVER, TOTAL	6.86	J		P	25	23	0.63	9.4
7440-23-5	SODIUM, TOTAL	642			P	2	190	2.8	94
7440-28-0	THALLIUM, TOTAL	0.122			MS	5	0.094	0.0089	0.037
7440-62-2	VANADIUM, TOTAL	35.6			P	2	1.9	0.069	0.75
7440-66-6	ZINC, TOTAL	7350			P	25	47	4.0	23

Comments:

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INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-09-0610

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 83.8 **Lab Sample ID:** SI3897-017

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	5610			P	10	300	7.1	100
7440-36-0	ANTIMONY, TOTAL	616			MS	10	0.20	0.040	0.10
7440-38-2	ARSENIC, TOTAL	30.9			MS	5	0.50	0.15	0.40
7440-39-3	BARIUM, TOTAL	276			P	10	5.0	0.25	3.0
7440-41-7	BERYLLIUM, TOTAL	1.0	U		P	20	10	0.14	1.0
7440-43-9	CADMIUM, TOTAL	7.63			P	10	5.0	0.079	3.0
7440-70-2	CALCIUM, TOTAL	3490			P	10	100	18.	80
7440-47-3	CHROMIUM, TOTAL	116			P	10	10	0.26	4.0
7440-48-4	COBALT, TOTAL	19.5			MS	5	0.10	0.0055	0.030
7440-50-8	COPPER, TOTAL	39600			P	25	63	4.0	25
7439-89-6	IRON, TOTAL	172000			P	25	250	35.	200
7439-92-1	LEAD, TOTAL	16900			P	10	5.0	0.87	4.0
7439-95-4	MAGNESIUM, TOTAL	3800			P	10	100	6.8	80
7439-96-5	MANGANESE, TOTAL	738			P	10	5.0	1.6	4.0
7439-97-6	MERCURY, TOTAL	3.74			CV	1	0.039	0.0061	0.020
7440-02-0	NICKEL, TOTAL	1100			P	10	10	0.44	4.0
7440-09-7	POTASSIUM, TOTAL	1560			P	10	1000	29.	500
7782-49-2	SELENIUM, TOTAL	7.0	U		P	10	10	1.7	7.0
7440-22-4	SILVER, TOTAL	5.38	J		P	10	10	0.27	4.0
7440-23-5	SODIUM, TOTAL	761	J		P	10	1000	15.	500
7440-28-0	THALLIUM, TOTAL	0.143			MS	5	0.10	0.0095	0.040
7440-62-2	VANADIUM, TOTAL	47.8			P	10	10	0.37	4.0
7440-66-6	ZINC, TOTAL	5060			P	10	20	1.7	10

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-12-0002

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 92.0 **Lab Sample ID:** SI3897-018

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	16300			P	2	49	1.2	16
7440-36-0	ANTIMONY, TOTAL	0.574			MS	5	0.082	0.016	0.041
7440-38-2	ARSENIC, TOTAL	7.84			MS	5	0.41	0.12	0.33
7440-39-3	BARIUM, TOTAL	117			P	2	0.82	0.041	0.49
7440-41-7	BERYLLIUM, TOTAL	0.267	J		P	2	0.82	0.011	0.082
7440-43-9	CADMIUM, TOTAL	0.775	J		P	2	0.82	0.013	0.49
7440-70-2	CALCIUM, TOTAL	6670			P	2	16	2.9	13
7440-47-3	CHROMIUM, TOTAL	138			P	2	1.6	0.042	0.65
7440-48-4	COBALT, TOTAL	14.4			MS	5	0.082	0.0045	0.024
7440-50-8	COPPER, TOTAL	181			P	2	4.1	0.26	1.6
7439-89-6	IRON, TOTAL	32400			P	2	16	2.3	13
7439-92-1	LEAD, TOTAL	204			P	2	0.82	0.14	0.65
7439-95-4	MAGNESIUM, TOTAL	11400			P	2	16	1.1	13
7439-96-5	MANGANESE, TOTAL	472			P	2	0.82	0.26	0.65
7439-97-6	MERCURY, TOTAL	0.511			CV	1	0.034	0.0053	0.018
7440-02-0	NICKEL, TOTAL	87.6			P	2	1.6	0.072	0.65
7440-09-7	POTASSIUM, TOTAL	6040			P	2	160	4.7	82
7782-49-2	SELENIUM, TOTAL	1.1	U		P	2	1.6	0.28	1.1
7440-22-4	SILVER, TOTAL	0.952	J		P	2	1.6	0.044	0.65
7440-23-5	SODIUM, TOTAL	847			P	2	160	2.5	82
7440-28-0	THALLIUM, TOTAL	0.259			MS	5	0.082	0.0078	0.033
7440-62-2	VANADIUM, TOTAL	69.3			P	2	1.6	0.060	0.65
7440-66-6	ZINC, TOTAL	338			P	2	3.3	0.28	1.6

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-12-0206

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 85.1 **Lab Sample ID:** SI3897-019

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	8440			P	1	32	0.77	11
7440-36-0	ANTIMONY, TOTAL	1.13			MS	5	0.11	0.022	0.054
7440-38-2	ARSENIC, TOTAL	22.7			MS	5	0.54	0.16	0.43
7440-39-3	BARIUM, TOTAL	418			P	1	0.54	0.027	0.32
7440-41-7	BERYLLIUM, TOTAL	0.507	J		P	1	0.54	0.0073	0.054
7440-43-9	CADMIUM, TOTAL	0.697			P	1	0.54	0.0085	0.32
7440-70-2	CALCIUM, TOTAL	2230			P	1	11	1.9	8.6
7440-47-3	CHROMIUM, TOTAL	21.8			P	1	1.1	0.028	0.43
7440-48-4	COBALT, TOTAL	7.16			MS	5	0.11	0.0059	0.032
7440-50-8	COPPER, TOTAL	818			P	1	2.7	0.17	1.1
7439-89-6	IRON, TOTAL	25500			P	1	11	1.5	8.6
7439-92-1	LEAD, TOTAL	1580			P	1	0.54	0.094	0.43
7439-95-4	MAGNESIUM, TOTAL	2670			P	1	11	0.73	8.6
7439-96-5	MANGANESE, TOTAL	356			P	1	0.54	0.17	0.43
7439-97-6	MERCURY, TOTAL	1.66			CV	1	0.033	0.0051	0.017
7440-02-0	NICKEL, TOTAL	27.8			P	1	1.1	0.047	0.43
7440-09-7	POTASSIUM, TOTAL	1270			P	1	110	3.1	54
7782-49-2	SELENIUM, TOTAL	0.35	J		P	1	1.1	0.18	0.75
7440-22-4	SILVER, TOTAL	0.549	J		P	1	1.1	0.029	0.43
7440-23-5	SODIUM, TOTAL	2080			P	1	110	1.6	54
7440-28-0	THALLIUM, TOTAL	0.111			MS	5	0.11	0.010	0.043
7440-62-2	VANADIUM, TOTAL	21.2			P	1	1.1	0.040	0.43
7440-66-6	ZINC, TOTAL	898			P	1	2.2	0.18	1.1

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-12-0610

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 81.3 **Lab Sample ID:** SI3897-020

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	5030			P	2	68	1.6	23
7440-36-0	ANTIMONY, TOTAL	11.4			MS	5	0.11	0.023	0.057
7440-38-2	ARSENIC, TOTAL	8.57			MS	5	0.57	0.17	0.46
7440-39-3	BARIUM, TOTAL	134			P	2	1.1	0.057	0.68
7440-41-7	BERYLLIUM, TOTAL	0.735	J		P	2	1.1	0.015	0.11
7440-43-9	CADMIUM, TOTAL	1.51			P	2	1.1	0.018	0.68
7440-70-2	CALCIUM, TOTAL	9010			P	2	23	4.1	18
7440-47-3	CHROMIUM, TOTAL	24.6			P	2	2.3	0.059	0.91
7440-48-4	COBALT, TOTAL	9.90			MS	5	0.11	0.0063	0.034
7440-50-8	COPPER, TOTAL	958			P	2	5.7	0.36	2.3
7439-89-6	IRON, TOTAL	33900			P	2	23	3.2	18
7439-92-1	LEAD, TOTAL	401			P	2	1.1	0.20	0.91
7439-95-4	MAGNESIUM, TOTAL	5760			P	2	23	1.5	18
7439-96-5	MANGANESE, TOTAL	440			P	2	1.1	0.36	0.91
7439-97-6	MERCURY, TOTAL	0.548			CV	1	0.036	0.0055	0.018
7440-02-0	NICKEL, TOTAL	127			P	2	2.3	0.10	0.91
7440-09-7	POTASSIUM, TOTAL	1200			P	2	230	6.6	110
7782-49-2	SELENIUM, TOTAL	0.68	J		P	2	2.3	0.39	1.6
7440-22-4	SILVER, TOTAL	0.54	J		P	2	2.3	0.062	0.91
7440-23-5	SODIUM, TOTAL	1020			P	2	230	3.4	110
7440-28-0	THALLIUM, TOTAL	0.126			MS	5	0.11	0.011	0.046
7440-62-2	VANADIUM, TOTAL	24.0			P	2	2.3	0.084	0.91
7440-66-6	ZINC, TOTAL	1050			P	2	4.6	0.39	2.3

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-15-0002

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 92.6 **Lab Sample ID:** SI3897-021

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	15400			P	5	110	2.5	36
7440-36-0	ANTIMONY, TOTAL	0.938			MS	5	0.072	0.014	0.036
7440-38-2	ARSENIC, TOTAL	12.0			MS	5	0.36	0.11	0.29
7440-39-3	BARIUM, TOTAL	276			P	5	1.8	0.089	1.1
7440-41-7	BERYLLIUM, TOTAL	0.602	J		P	5	1.8	0.024	0.18
7440-43-9	CADMIUM, TOTAL	0.747	J		P	5	1.8	0.028	1.1
7440-70-2	CALCIUM, TOTAL	7710			P	5	36	6.4	29
7440-47-3	CHROMIUM, TOTAL	76.7			P	5	3.6	0.093	1.4
7440-48-4	COBALT, TOTAL	14.3			MS	5	0.072	0.0039	0.021
7440-50-8	COPPER, TOTAL	630			P	5	8.9	0.57	3.6
7439-89-6	IRON, TOTAL	38600			P	5	36	5.0	29
7439-92-1	LEAD, TOTAL	611			P	5	1.8	0.31	1.4
7439-95-4	MAGNESIUM, TOTAL	10600			P	5	36	2.4	29
7439-96-5	MANGANESE, TOTAL	533			P	5	1.8	0.57	1.4
7439-97-6	MERCURY, TOTAL	0.347			CV	1	0.031	0.0048	0.016
7440-02-0	NICKEL, TOTAL	89.3			P	5	3.6	0.16	1.4
7440-09-7	POTASSIUM, TOTAL	3690			P	5	360	10.	180
7782-49-2	SELENIUM, TOTAL	2.5	U		P	5	3.6	0.61	2.5
7440-22-4	SILVER, TOTAL	0.80	J		P	5	3.6	0.097	1.4
7440-23-5	SODIUM, TOTAL	1470			P	5	360	5.4	180
7440-28-0	THALLIUM, TOTAL	0.206			MS	5	0.072	0.0068	0.029
7440-62-2	VANADIUM, TOTAL	45.2			P	5	3.6	0.13	1.4
7440-66-6	ZINC, TOTAL	757			P	5	7.2	0.61	3.6

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-15-0206

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 85.1 **Lab Sample ID:** SI3897-022

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	11600			P	1	23	0.55	7.8
7440-36-0	ANTIMONY, TOTAL	0.11			MS	5	0.078	0.016	0.039
7440-38-2	ARSENIC, TOTAL	11.5			MS	5	0.39	0.12	0.31
7440-39-3	BARIUM, TOTAL	43.9			P	1	0.39	0.019	0.23
7440-41-7	BERYLLIUM, TOTAL	0.490			P	1	0.39	0.0053	0.039
7440-43-9	CADMIUM, TOTAL	0.263	J		P	1	0.39	0.0062	0.23
7440-70-2	CALCIUM, TOTAL	2200			P	1	7.8	1.4	6.2
7440-47-3	CHROMIUM, TOTAL	38.9			P	1	0.78	0.020	0.31
7440-48-4	COBALT, TOTAL	9.51			MS	5	0.078	0.0043	0.023
7440-50-8	COPPER, TOTAL	45.1			P	1	1.9	0.12	0.78
7439-89-6	IRON, TOTAL	17500			P	1	7.8	1.1	6.2
7439-92-1	LEAD, TOTAL	41.3			P	1	0.39	0.068	0.31
7439-95-4	MAGNESIUM, TOTAL	6160			P	1	7.8	0.53	6.2
7439-96-5	MANGANESE, TOTAL	315			P	1	0.39	0.12	0.31
7439-97-6	MERCURY, TOTAL	0.209			CV	1	0.035	0.0054	0.018
7440-02-0	NICKEL, TOTAL	35.1			P	1	0.78	0.034	0.31
7440-09-7	POTASSIUM, TOTAL	1430			P	1	78	2.3	39
7782-49-2	SELENIUM, TOTAL	0.54	U		P	1	0.78	0.13	0.54
7440-22-4	SILVER, TOTAL	0.31	U		P	1	0.78	0.021	0.31
7440-23-5	SODIUM, TOTAL	637			P	1	78	1.2	39
7440-28-0	THALLIUM, TOTAL	0.138			MS	5	0.078	0.0074	0.031
7440-62-2	VANADIUM, TOTAL	27.1			P	1	0.78	0.029	0.31
7440-66-6	ZINC, TOTAL	65.8			P	1	1.6	0.13	0.78

Comments:

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INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-FD02-060415

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 85.5 **Lab Sample ID:** SI3897-023

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	10400			P	1	26	0.61	8.5
7440-36-0	ANTIMONY, TOTAL	0.12			MS	5	0.085	0.017	0.043
7440-38-2	ARSENIC, TOTAL	12.5			MS	5	0.43	0.13	0.34
7440-39-3	BARIUM, TOTAL	47.7			P	1	0.43	0.021	0.26
7440-41-7	BERYLLIUM, TOTAL	0.498			P	1	0.43	0.0058	0.043
7440-43-9	CADMIUM, TOTAL	0.153	J		P	1	0.43	0.0067	0.26
7440-70-2	CALCIUM, TOTAL	1920			P	1	8.5	1.5	6.8
7440-47-3	CHROMIUM, TOTAL	29.0			P	1	0.85	0.022	0.34
7440-48-4	COBALT, TOTAL	7.09			MS	5	0.085	0.0047	0.026
7440-50-8	COPPER, TOTAL	30.4			P	1	2.1	0.14	0.85
7439-89-6	IRON, TOTAL	16300			P	1	8.5	1.2	6.8
7439-92-1	LEAD, TOTAL	40.1			P	1	0.43	0.074	0.34
7439-95-4	MAGNESIUM, TOTAL	4540			P	1	8.5	0.58	6.8
7439-96-5	MANGANESE, TOTAL	272			P	1	0.43	0.14	0.34
7439-97-6	MERCURY, TOTAL	0.254			CV	1	0.036	0.0056	0.018
7440-02-0	NICKEL, TOTAL	25.7			P	1	0.85	0.038	0.34
7440-09-7	POTASSIUM, TOTAL	1670			P	1	85	2.5	43
7782-49-2	SELENIUM, TOTAL	0.60	U		P	1	0.85	0.15	0.60
7440-22-4	SILVER, TOTAL	0.22	J		P	1	0.85	0.023	0.34
7440-23-5	SODIUM, TOTAL	696			P	1	85	1.3	43
7440-28-0	THALLIUM, TOTAL	0.146			MS	5	0.085	0.0081	0.034
7440-62-2	VANADIUM, TOTAL	23.0			P	1	0.85	0.032	0.34
7440-66-6	ZINC, TOTAL	64.6			P	1	1.7	0.15	0.85

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-15-0610

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 85.4 **Lab Sample ID:** SI3897-024

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	5580			P	1	35	0.82	12
7440-36-0	ANTIMONY, TOTAL	2.76			MS	5	0.12	0.023	0.058
7440-38-2	ARSENIC, TOTAL	10.2			MS	5	0.58	0.17	0.46
7440-39-3	BARIUM, TOTAL	57.2			P	1	0.58	0.029	0.35
7440-41-7	BERYLLIUM, TOTAL	0.523	J		P	1	0.58	0.0079	0.058
7440-43-9	CADMIUM, TOTAL	0.856			P	1	0.58	0.0092	0.35
7440-70-2	CALCIUM, TOTAL	3040			P	1	12	2.1	9.3
7440-47-3	CHROMIUM, TOTAL	28.1			P	1	1.2	0.030	0.46
7440-48-4	COBALT, TOTAL	6.45			MS	5	0.12	0.0064	0.035
7440-50-8	COPPER, TOTAL	373			P	1	2.9	0.19	1.2
7439-89-6	IRON, TOTAL	15700			P	1	12	1.6	9.3
7439-92-1	LEAD, TOTAL	270			P	1	0.58	0.10	0.46
7439-95-4	MAGNESIUM, TOTAL	3230			P	1	12	0.79	9.3
7439-96-5	MANGANESE, TOTAL	194			P	1	0.58	0.19	0.46
7439-97-6	MERCURY, TOTAL	0.726			CV	1	0.035	0.0055	0.018
7440-02-0	NICKEL, TOTAL	27.2			P	1	1.2	0.051	0.46
7440-09-7	POTASSIUM, TOTAL	1450			P	1	120	3.4	58
7782-49-2	SELENIUM, TOTAL	0.34	J		P	1	1.2	0.20	0.81
7440-22-4	SILVER, TOTAL	0.518	J		P	1	1.2	0.031	0.46
7440-23-5	SODIUM, TOTAL	711			P	1	120	1.7	58
7440-28-0	THALLIUM, TOTAL	0.095	J		MS	5	0.12	0.011	0.046
7440-62-2	VANADIUM, TOTAL	17.8			P	1	1.2	0.043	0.46
7440-66-6	ZINC, TOTAL	371			P	1	2.3	0.20	1.2

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-16-0002

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 88.7 **Lab Sample ID:** SI3897-025

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	14700		N	P	1	33	0.79	11
7440-36-0	ANTIMONY, TOTAL	0.356		N*	MS	5	0.11	0.022	0.056
7440-38-2	ARSENIC, TOTAL	12.3		*	MS	5	0.56	0.17	0.45
7440-39-3	BARIUM, TOTAL	83.4			P	1	0.56	0.028	0.33
7440-41-7	BERYLLIUM, TOTAL	0.729			P	1	0.56	0.0076	0.056
7440-43-9	CADMIUM, TOTAL	0.371	J		P	1	0.56	0.0088	0.33
7440-70-2	CALCIUM, TOTAL	3450		N	P	1	11	2.0	8.9
7440-47-3	CHROMIUM, TOTAL	46.6		N*	P	1	1.1	0.029	0.45
7440-48-4	COBALT, TOTAL	9.43			MS	5	0.11	0.0061	0.033
7440-50-8	COPPER, TOTAL	310		N*	P	1	2.8	0.18	1.1
7439-89-6	IRON, TOTAL	21000		N*A	P	1	11	1.6	8.9
7439-92-1	LEAD, TOTAL	178		N	P	1	0.56	0.097	0.45
7439-95-4	MAGNESIUM, TOTAL	6370		N	P	1	11	0.76	8.9
7439-96-5	MANGANESE, TOTAL	345		N*	P	1	0.56	0.18	0.45
7439-97-6	MERCURY, TOTAL	0.242		N	CV	1	0.034	0.0053	0.017
7440-02-0	NICKEL, TOTAL	43.6		N	P	1	1.1	0.049	0.45
7440-09-7	POTASSIUM, TOTAL	3050		N	P	1	110	3.2	56
7782-49-2	SELENIUM, TOTAL	0.78	U		P	1	1.1	0.19	0.78
7440-22-4	SILVER, TOTAL	0.45	U		P	1	1.1	0.030	0.45
7440-23-5	SODIUM, TOTAL	160		*	P	1	110	1.7	56
7440-28-0	THALLIUM, TOTAL	0.204			MS	5	0.11	0.011	0.045
7440-62-2	VANADIUM, TOTAL	31.6			P	1	1.1	0.041	0.45
7440-66-6	ZINC, TOTAL	143		N	P	1	2.2	0.19	1.1

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-16-0206

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 89.6 **Lab Sample ID:** SI3897-026

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	18100			P	2	54	1.3	18
7440-36-0	ANTIMONY, TOTAL	0.297			MS	5	0.089	0.018	0.045
7440-38-2	ARSENIC, TOTAL	16.6			MS	5	0.45	0.13	0.36
7440-39-3	BARIUM, TOTAL	107			P	2	0.89	0.045	0.54
7440-41-7	BERYLLIUM, TOTAL	1.00			P	2	0.89	0.012	0.089
7440-43-9	CADMIUM, TOTAL	0.443	J		P	2	0.89	0.014	0.54
7440-70-2	CALCIUM, TOTAL	3130			P	2	18	3.2	14
7440-47-3	CHROMIUM, TOTAL	51.2			P	2	1.8	0.046	0.71
7440-48-4	COBALT, TOTAL	12.2			MS	5	0.089	0.0049	0.027
7440-50-8	COPPER, TOTAL	118			P	2	4.5	0.29	1.8
7439-89-6	IRON, TOTAL	25200			P	2	18	2.5	14
7439-92-1	LEAD, TOTAL	173			P	2	0.89	0.16	0.71
7439-95-4	MAGNESIUM, TOTAL	8880			P	2	18	1.2	14
7439-96-5	MANGANESE, TOTAL	391			P	2	0.89	0.29	0.71
7439-97-6	MERCURY, TOTAL	0.751			CV	1	0.035	0.0054	0.018
7440-02-0	NICKEL, TOTAL	48.2			P	2	1.8	0.079	0.71
7440-09-7	POTASSIUM, TOTAL	2680			P	2	180	5.2	89
7782-49-2	SELENIUM, TOTAL	0.66	J		P	2	1.8	0.30	1.2
7440-22-4	SILVER, TOTAL	0.13	J		P	2	1.8	0.048	0.71
7440-23-5	SODIUM, TOTAL	155	J		P	2	180	2.7	89
7440-28-0	THALLIUM, TOTAL	0.212			MS	5	0.089	0.0085	0.036
7440-62-2	VANADIUM, TOTAL	39.7			P	2	1.8	0.066	0.71
7440-66-6	ZINC, TOTAL	120			P	2	3.6	0.30	1.8

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-16-0610

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 82.6 **Lab Sample ID:** SI3897-027

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	10300			P	1	32	0.76	11
7440-36-0	ANTIMONY, TOTAL	4.37			MS	5	0.11	0.021	0.054
7440-38-2	ARSENIC, TOTAL	14.0			MS	5	0.54	0.16	0.43
7440-39-3	BARIUM, TOTAL	85.0			P	1	0.54	0.027	0.32
7440-41-7	BERYLLIUM, TOTAL	0.805			P	1	0.54	0.0073	0.054
7440-43-9	CADMIUM, TOTAL	0.729	J		P	2	1.1	0.017	0.64
7440-70-2	CALCIUM, TOTAL	2580			P	1	11	1.9	8.6
7440-47-3	CHROMIUM, TOTAL	31.1			P	2	2.1	0.056	0.86
7440-48-4	COBALT, TOTAL	8.09			MS	5	0.11	0.0059	0.032
7440-50-8	COPPER, TOTAL	254			P	1	2.7	0.17	1.1
7439-89-6	IRON, TOTAL	8300			P	10	110	15.	86
7439-92-1	LEAD, TOTAL	1230			P	2	1.1	0.19	0.86
7439-95-4	MAGNESIUM, TOTAL	4600			P	2	21	1.5	17
7439-96-5	MANGANESE, TOTAL	282		B	P	2	1.1	0.34	0.86
7439-97-6	MERCURY, TOTAL	0.339			CV	1	0.031	0.0049	0.016
7440-02-0	NICKEL, TOTAL	47.0			P	2	2.1	0.094	0.86
7440-09-7	POTASSIUM, TOTAL	1900			P	1	110	3.1	54
7782-49-2	SELENIUM, TOTAL	1.5	U		P	2	2.1	0.36	1.5
7440-22-4	SILVER, TOTAL	0.931	J		P	2	2.1	0.058	0.86
7440-23-5	SODIUM, TOTAL	200			P	1	110	1.6	54
7440-28-0	THALLIUM, TOTAL	0.167			MS	5	0.11	0.010	0.043
7440-62-2	VANADIUM, TOTAL	29.6			P	2	2.1	0.079	0.86
7440-66-6	ZINC, TOTAL	344			P	1	2.1	0.18	1.1

Comments:

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INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-18-0002

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 85.5 **Lab Sample ID:** SI3897-028

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	15600			P	1	32	0.75	10
7440-36-0	ANTIMONY, TOTAL	0.16			MS	5	0.10	0.021	0.053
7440-38-2	ARSENIC, TOTAL	15.6			MS	5	0.53	0.16	0.42
7440-39-3	BARIUM, TOTAL	91.7			P	1	0.53	0.026	0.32
7440-41-7	BERYLLIUM, TOTAL	0.803			P	1	0.53	0.0072	0.053
7440-43-9	CADMIUM, TOTAL	0.278	J		P	1	0.53	0.0083	0.32
7440-70-2	CALCIUM, TOTAL	2670			P	1	10	1.9	8.4
7440-47-3	CHROMIUM, TOTAL	41.4			P	1	1.0	0.027	0.42
7440-48-4	COBALT, TOTAL	11.0			MS	5	0.10	0.0058	0.032
7440-50-8	COPPER, TOTAL	121			P	1	2.6	0.17	1.0
7439-89-6	IRON, TOTAL	25200			P	1	10	1.5	8.4
7439-92-1	LEAD, TOTAL	320			P	1	0.53	0.092	0.42
7439-95-4	MAGNESIUM, TOTAL	7840			P	1	10	0.72	8.4
7439-96-5	MANGANESE, TOTAL	376		B	P	1	0.53	0.17	0.42
7439-97-6	MERCURY, TOTAL	1.45			CV	1	0.038	0.0058	0.019
7440-02-0	NICKEL, TOTAL	36.6			P	1	1.0	0.046	0.42
7440-09-7	POTASSIUM, TOTAL	2550			P	1	100	3.1	53
7782-49-2	SELENIUM, TOTAL	0.75	J		P	1	1.0	0.18	0.74
7440-22-4	SILVER, TOTAL	0.42	U		P	1	1.0	0.028	0.42
7440-23-5	SODIUM, TOTAL	753			P	1	100	1.6	53
7440-28-0	THALLIUM, TOTAL	0.210			MS	5	0.10	0.010	0.042
7440-62-2	VANADIUM, TOTAL	37.7			P	1	1.0	0.039	0.42
7440-66-6	ZINC, TOTAL	154			P	1	2.1	0.18	1.0

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-18-0206

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 83.7 **Lab Sample ID:** SI3897-029

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	15100			P	1	29	0.70	9.8
7440-36-0	ANTIMONY, TOTAL	0.12			MS	5	0.098	0.020	0.049
7440-38-2	ARSENIC, TOTAL	13.0			MS	5	0.49	0.15	0.39
7440-39-3	BARIUM, TOTAL	71.0			P	1	0.49	0.024	0.29
7440-41-7	BERYLLIUM, TOTAL	0.773			P	1	0.49	0.0067	0.049
7440-43-9	CADMIUM, TOTAL	0.284	J		P	1	0.49	0.0077	0.29
7440-70-2	CALCIUM, TOTAL	2210			P	1	9.8	1.8	7.8
7440-47-3	CHROMIUM, TOTAL	47.8			P	1	0.98	0.025	0.39
7440-48-4	COBALT, TOTAL	12.5			MS	5	0.098	0.0054	0.029
7440-50-8	COPPER, TOTAL	74.8			P	1	2.4	0.16	0.98
7439-89-6	IRON, TOTAL	23000			P	1	9.8	1.4	7.8
7439-92-1	LEAD, TOTAL	151			P	1	0.49	0.085	0.39
7439-95-4	MAGNESIUM, TOTAL	7020			P	1	9.8	0.67	7.8
7439-96-5	MANGANESE, TOTAL	344		B	P	1	0.49	0.16	0.39
7439-97-6	MERCURY, TOTAL	0.170			CV	1	0.031	0.0049	0.016
7440-02-0	NICKEL, TOTAL	48.1			P	1	0.98	0.043	0.39
7440-09-7	POTASSIUM, TOTAL	1810			P	1	98	2.8	49
7782-49-2	SELENIUM, TOTAL	0.71	J		P	1	0.98	0.17	0.68
7440-22-4	SILVER, TOTAL	0.39	U		P	1	0.98	0.026	0.39
7440-23-5	SODIUM, TOTAL	796			P	1	98	1.5	49
7440-28-0	THALLIUM, TOTAL	0.168			MS	5	0.098	0.0093	0.039
7440-62-2	VANADIUM, TOTAL	32.5			P	1	0.98	0.036	0.39
7440-66-6	ZINC, TOTAL	108			P	1	2.0	0.17	0.98

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-18-0610

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 82.6 **Lab Sample ID:** SI3897-030

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	14900			P	1	30	0.72	10
7440-36-0	ANTIMONY, TOTAL	0.918			MS	5	0.10	0.020	0.051
7440-38-2	ARSENIC, TOTAL	9.71			MS	5	0.51	0.15	0.41
7440-39-3	BARIUM, TOTAL	95.0			P	1	0.51	0.025	0.30
7440-41-7	BERYLLIUM, TOTAL	0.864			P	1	0.51	0.0069	0.051
7440-43-9	CADMIUM, TOTAL	1.31			P	1	0.51	0.0080	0.30
7440-70-2	CALCIUM, TOTAL	8320			P	1	10	1.8	8.1
7440-47-3	CHROMIUM, TOTAL	36.6			P	1	1.0	0.026	0.41
7440-48-4	COBALT, TOTAL	10.0			MS	5	0.10	0.0056	0.030
7440-50-8	COPPER, TOTAL	306			P	1	2.5	0.16	1.0
7439-89-6	IRON, TOTAL	21100			P	1	10	1.4	8.1
7439-92-1	LEAD, TOTAL	375			P	1	0.51	0.089	0.41
7439-95-4	MAGNESIUM, TOTAL	4940			P	1	10	0.69	8.1
7439-96-5	MANGANESE, TOTAL	589		B	P	1	0.51	0.16	0.41
7439-97-6	MERCURY, TOTAL	0.211			CV	1	0.038	0.0059	0.019
7440-02-0	NICKEL, TOTAL	28.1			P	1	1.0	0.045	0.41
7440-09-7	POTASSIUM, TOTAL	2210			P	1	100	3.0	51
7782-49-2	SELENIUM, TOTAL	0.58	J		P	1	1.0	0.17	0.71
7440-22-4	SILVER, TOTAL	0.41	U		P	1	1.0	0.027	0.41
7440-23-5	SODIUM, TOTAL	674			P	1	100	1.5	51
7440-28-0	THALLIUM, TOTAL	0.217			MS	5	0.10	0.0097	0.041
7440-62-2	VANADIUM, TOTAL	29.1			P	1	1.0	0.038	0.41
7440-66-6	ZINC, TOTAL	764			P	1	2.0	0.17	1.0

Comments:

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INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-20-0002

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 83.3 **Lab Sample ID:** SI3897-031

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	18600			P	1	32	0.77	11
7440-36-0	ANTIMONY, TOTAL	0.310			MS	5	0.11	0.022	0.054
7440-38-2	ARSENIC, TOTAL	13.3			MS	5	0.54	0.16	0.43
7440-39-3	BARIUM, TOTAL	239			P	1	0.54	0.027	0.32
7440-41-7	BERYLLIUM, TOTAL	1.09			P	1	0.54	0.0074	0.054
7440-43-9	CADMIUM, TOTAL	0.636			P	1	0.54	0.0085	0.32
7440-70-2	CALCIUM, TOTAL	2480			P	1	11	1.9	8.6
7440-47-3	CHROMIUM, TOTAL	47.1			P	1	1.1	0.028	0.43
7440-48-4	COBALT, TOTAL	11.7			MS	5	0.11	0.0059	0.032
7440-50-8	COPPER, TOTAL	291			P	1	2.7	0.17	1.1
7439-89-6	IRON, TOTAL	30200			P	2	22	3.0	17
7439-92-1	LEAD, TOTAL	703			P	1	0.54	0.094	0.43
7439-95-4	MAGNESIUM, TOTAL	7600			P	2	22	1.5	17
7439-96-5	MANGANESE, TOTAL	457		B	P	1	0.54	0.17	0.43
7439-97-6	MERCURY, TOTAL	0.420			CV	1	0.030	0.0047	0.016
7440-02-0	NICKEL, TOTAL	65.9			P	1	1.1	0.048	0.43
7440-09-7	POTASSIUM, TOTAL	4560			P	1	110	3.1	54
7782-49-2	SELENIUM, TOTAL	0.52	J		P	1	1.1	0.18	0.76
7440-22-4	SILVER, TOTAL	0.438	J		P	1	1.1	0.029	0.43
7440-23-5	SODIUM, TOTAL	750			P	1	110	1.6	54
7440-28-0	THALLIUM, TOTAL	0.320			MS	5	0.11	0.010	0.043
7440-62-2	VANADIUM, TOTAL	41.6			P	1	1.1	0.040	0.43
7440-66-6	ZINC, TOTAL	519			P	1	2.2	0.18	1.1

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-FD03-060415

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 82.9 **Lab Sample ID:** SI3897-032

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	17400			P	1	27	0.63	8.9
7440-36-0	ANTIMONY, TOTAL	0.276			MS	5	0.089	0.018	0.045
7440-38-2	ARSENIC, TOTAL	13.6			MS	5	0.45	0.13	0.36
7440-39-3	BARIUM, TOTAL	114			P	1	0.45	0.022	0.27
7440-41-7	BERYLLIUM, TOTAL	1.06			P	1	0.45	0.0061	0.045
7440-43-9	CADMIUM, TOTAL	0.752			P	1	0.45	0.0071	0.27
7440-70-2	CALCIUM, TOTAL	2490			P	1	8.9	1.6	7.1
7440-47-3	CHROMIUM, TOTAL	51.8			P	1	0.89	0.023	0.36
7440-48-4	COBALT, TOTAL	11.4			MS	5	0.089	0.0049	0.027
7440-50-8	COPPER, TOTAL	231			P	1	2.2	0.14	0.89
7439-89-6	IRON, TOTAL	27500			P	2	18	2.5	14
7439-92-1	LEAD, TOTAL	363			P	1	0.45	0.078	0.36
7439-95-4	MAGNESIUM, TOTAL	7560			P	2	18	1.2	14
7439-96-5	MANGANESE, TOTAL	375		B	P	2	0.89	0.29	0.71
7439-97-6	MERCURY, TOTAL	0.380			CV	1	0.038	0.0058	0.019
7440-02-0	NICKEL, TOTAL	64.8			P	1	0.89	0.039	0.36
7440-09-7	POTASSIUM, TOTAL	3700			P	1	89	2.6	45
7782-49-2	SELENIUM, TOTAL	0.62	U		P	1	0.89	0.15	0.62
7440-22-4	SILVER, TOTAL	0.47	J		P	2	1.8	0.048	0.71
7440-23-5	SODIUM, TOTAL	749			P	1	89	1.3	45
7440-28-0	THALLIUM, TOTAL	0.281			MS	5	0.089	0.0085	0.036
7440-62-2	VANADIUM, TOTAL	39.4			P	1	0.89	0.033	0.36
7440-66-6	ZINC, TOTAL	416			P	1	1.8	0.15	0.89

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-20-0206

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 84.5 **Lab Sample ID:** SI3897-033

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	12300		N	P	1	32	0.77	11
7440-36-0	ANTIMONY, TOTAL	0.937		N*	MS	5	0.11	0.022	0.054
7440-38-2	ARSENIC, TOTAL	11.1		N	MS	5	0.54	0.16	0.43
7440-39-3	BARIUM, TOTAL	72.7			P	1	0.54	0.027	0.32
7440-41-7	BERYLLIUM, TOTAL	0.640			P	1	0.54	0.0074	0.054
7440-43-9	CADMIUM, TOTAL	0.158	J		P	1	0.54	0.0086	0.32
7440-70-2	CALCIUM, TOTAL	2380		N	P	1	11	2.0	8.7
7440-47-3	CHROMIUM, TOTAL	38.5		N	P	1	1.1	0.028	0.43
7440-48-4	COBALT, TOTAL	8.48			MS	5	0.11	0.0060	0.032
7440-50-8	COPPER, TOTAL	64.2		N*	P	1	2.7	0.17	1.1
7439-89-6	IRON, TOTAL	16500		NA	P	1	11	1.5	8.7
7439-92-1	LEAD, TOTAL	85.9		N*	P	1	0.54	0.094	0.43
7439-95-4	MAGNESIUM, TOTAL	5110		N	P	1	11	0.74	8.7
7439-96-5	MANGANESE, TOTAL	313		NB	P	1	0.54	0.17	0.43
7439-97-6	MERCURY, TOTAL	0.0707		N	CV	1	0.033	0.0051	0.017
7440-02-0	NICKEL, TOTAL	30.3		*	P	1	1.1	0.048	0.43
7440-09-7	POTASSIUM, TOTAL	2020		N	P	1	110	3.1	54
7782-49-2	SELENIUM, TOTAL	0.45	J		P	1	1.1	0.18	0.76
7440-22-4	SILVER, TOTAL	0.43	U		P	1	1.1	0.029	0.43
7440-23-5	SODIUM, TOTAL	450			P	1	110	1.6	54
7440-28-0	THALLIUM, TOTAL	0.161			MS	5	0.11	0.010	0.043
7440-62-2	VANADIUM, TOTAL	26.9			P	1	1.1	0.040	0.43
7440-66-6	ZINC, TOTAL	90.2		N*	P	1	2.2	0.18	1.1

Comments:

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INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-20-0610

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 82.6 **Lab Sample ID:** SI3897-034

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	11900			P	1	33	0.79	11
7440-36-0	ANTIMONY, TOTAL	0.077	J		MS	5	0.11	0.022	0.056
7440-38-2	ARSENIC, TOTAL	12.7			MS	5	0.56	0.17	0.44
7440-39-3	BARIUM, TOTAL	93.9			P	1	0.56	0.028	0.33
7440-41-7	BERYLLIUM, TOTAL	0.770			P	1	0.56	0.0076	0.056
7440-43-9	CADMIUM, TOTAL	0.197	J		P	1	0.56	0.0088	0.33
7440-70-2	CALCIUM, TOTAL	1780			P	1	11	2.0	8.9
7440-47-3	CHROMIUM, TOTAL	29.0			P	1	1.1	0.029	0.44
7440-48-4	COBALT, TOTAL	12.4			MS	5	0.11	0.0061	0.033
7440-50-8	COPPER, TOTAL	70.2			P	1	2.8	0.18	1.1
7439-89-6	IRON, TOTAL	18600			P	1	11	1.6	8.9
7439-92-1	LEAD, TOTAL	131			P	1	0.56	0.097	0.44
7439-95-4	MAGNESIUM, TOTAL	4060			P	1	11	0.76	8.9
7439-96-5	MANGANESE, TOTAL	1220		B	P	1	0.56	0.18	0.44
7439-97-6	MERCURY, TOTAL	0.655			CV	1	0.031	0.0049	0.016
7440-02-0	NICKEL, TOTAL	23.6			P	1	1.1	0.049	0.44
7440-09-7	POTASSIUM, TOTAL	1730			P	1	110	3.2	56
7782-49-2	SELENIUM, TOTAL	0.80	J		P	1	1.1	0.19	0.78
7440-22-4	SILVER, TOTAL	0.18	J		P	1	1.1	0.030	0.44
7440-23-5	SODIUM, TOTAL	345			P	1	110	1.7	56
7440-28-0	THALLIUM, TOTAL	0.182			MS	5	0.11	0.011	0.044
7440-62-2	VANADIUM, TOTAL	23.9			P	1	1.1	0.041	0.44
7440-66-6	ZINC, TOTAL	87.7			P	1	2.2	0.19	1.1

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-21-0002

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 95.9 **Lab Sample ID:** SI3897-035

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	1730			P	1	29	0.69	9.6
7440-36-0	ANTIMONY, TOTAL	0.042	J		MS	5	0.096	0.019	0.048
7440-38-2	ARSENIC, TOTAL	1.64			MS	5	0.48	0.14	0.39
7440-39-3	BARIUM, TOTAL	8.02			P	1	0.48	0.024	0.29
7440-41-7	BERYLLIUM, TOTAL	0.662			P	1	0.48	0.0066	0.048
7440-43-9	CADMIUM, TOTAL	0.057	J		P	1	0.48	0.0076	0.29
7440-70-2	CALCIUM, TOTAL	448			P	1	9.6	1.7	7.7
7440-47-3	CHROMIUM, TOTAL	3.33			P	1	0.96	0.025	0.39
7440-48-4	COBALT, TOTAL	1.62			MS	5	0.096	0.0053	0.029
7440-50-8	COPPER, TOTAL	4.68			P	1	2.4	0.15	0.96
7439-89-6	IRON, TOTAL	5280			P	1	9.6	1.4	7.7
7439-92-1	LEAD, TOTAL	45.0			P	1	0.48	0.084	0.39
7439-95-4	MAGNESIUM, TOTAL	587			P	1	9.6	0.66	7.7
7439-96-5	MANGANESE, TOTAL	365		B	P	1	0.48	0.15	0.39
7439-97-6	MERCURY, TOTAL	0.014	U		CV	1	0.028	0.0043	0.014
7440-02-0	NICKEL, TOTAL	3.18			P	1	0.96	0.042	0.39
7440-09-7	POTASSIUM, TOTAL	591			P	1	96	2.8	48
7782-49-2	SELENIUM, TOTAL	0.68	U		P	1	0.96	0.16	0.68
7440-22-4	SILVER, TOTAL	0.054	J		P	1	0.96	0.026	0.39
7440-23-5	SODIUM, TOTAL	203			P	1	96	1.4	48
7440-28-0	THALLIUM, TOTAL	0.072	J		MS	5	0.096	0.0092	0.039
7440-62-2	VANADIUM, TOTAL	4.08			P	1	0.96	0.036	0.39
7440-66-6	ZINC, TOTAL	22.7			P	1	1.9	0.16	0.96

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-21-0206

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 92.5 **Lab Sample ID:** SI3897-036

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	7490			P	1	23	0.55	7.7
7440-36-0	ANTIMONY, TOTAL	40.8			MS	5	0.077	0.015	0.039
7440-38-2	ARSENIC, TOTAL	19.7			MS	5	0.39	0.12	0.31
7440-39-3	BARIUM, TOTAL	959			P	10	3.9	0.19	2.3
7440-41-7	BERYLLIUM, TOTAL	0.52	J		P	10	3.9	0.053	0.39
7440-43-9	CADMIUM, TOTAL	3.64	J		P	10	3.9	0.061	2.3
7440-70-2	CALCIUM, TOTAL	71900			P	10	77	14.	62
7440-47-3	CHROMIUM, TOTAL	50.1			P	10	7.7	0.20	3.1
7440-48-4	COBALT, TOTAL	10.6			MS	5	0.077	0.0042	0.023
7440-50-8	COPPER, TOTAL	22900			P	25	48	3.1	19
7439-89-6	IRON, TOTAL	109000			P	10	77	11.	62
7439-92-1	LEAD, TOTAL	2350			P	10	3.9	0.67	3.1
7439-95-4	MAGNESIUM, TOTAL	4880			P	10	77	5.3	62
7439-96-5	MANGANESE, TOTAL	773		B	P	10	3.9	1.2	3.1
7439-97-6	MERCURY, TOTAL	1.47			CV	10	0.29	0.045	0.15
7440-02-0	NICKEL, TOTAL	52.4			P	10	7.7	0.34	3.1
7440-09-7	POTASSIUM, TOTAL	4720			P	1	77	2.2	39
7782-49-2	SELENIUM, TOTAL	2.2	J		P	10	7.7	1.3	5.4
7440-22-4	SILVER, TOTAL	4.34	J		P	10	7.7	0.21	3.1
7440-23-5	SODIUM, TOTAL	2300			P	1	77	1.2	39
7440-28-0	THALLIUM, TOTAL	0.108			MS	5	0.077	0.0073	0.031
7440-62-2	VANADIUM, TOTAL	23.4			P	10	7.7	0.29	3.1
7440-66-6	ZINC, TOTAL	2220			P	10	15	1.3	7.7

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-21-0610

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 75.5 **Lab Sample ID:** SI3897-037

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	6320			P	1	32	0.75	11
7440-36-0	ANTIMONY, TOTAL	5.87			MS	5	0.11	0.021	0.053
7440-38-2	ARSENIC, TOTAL	15.1			MS	5	0.53	0.16	0.42
7440-39-3	BARIUM, TOTAL	74.7			P	10	5.3	0.27	3.2
7440-41-7	BERYLLIUM, TOTAL	0.22	J		P	10	5.3	0.072	0.53
7440-43-9	CADMIUM, TOTAL	5.88			P	10	5.3	0.084	3.2
7440-70-2	CALCIUM, TOTAL	1580			P	1	11	1.9	8.5
7440-47-3	CHROMIUM, TOTAL	37.0			P	10	11	0.28	4.2
7440-48-4	COBALT, TOTAL	16.6			MS	5	0.11	0.0058	0.032
7440-50-8	COPPER, TOTAL	4070			P	10	26	1.7	11
7439-89-6	IRON, TOTAL	140000			P	10	110	15.	85
7439-92-1	LEAD, TOTAL	1060			P	10	5.3	0.92	4.2
7439-95-4	MAGNESIUM, TOTAL	2950			P	10	110	7.2	85
7439-96-5	MANGANESE, TOTAL	548		B	P	10	5.3	1.7	4.2
7439-97-6	MERCURY, TOTAL	0.627			CV	1	0.035	0.0054	0.018
7440-02-0	NICKEL, TOTAL	80.4			P	10	11	0.47	4.2
7440-09-7	POTASSIUM, TOTAL	1150			P	1	110	3.1	53
7782-49-2	SELENIUM, TOTAL	2.3	J		P	10	11	1.8	7.4
7440-22-4	SILVER, TOTAL	2.4	J		P	10	11	0.29	4.2
7440-23-5	SODIUM, TOTAL	1050			P	1	110	1.6	53
7440-28-0	THALLIUM, TOTAL	0.098	J		MS	5	0.11	0.010	0.042
7440-62-2	VANADIUM, TOTAL	26.4			P	10	11	0.39	4.2
7440-66-6	ZINC, TOTAL	3320			P	10	21	1.8	11

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-RB01-060415

Matrix: WATER **SDG Name:** OU8-1

Percent Solids: 0.00 **Lab Sample ID:** SI3897-038

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	100	U		P	1	300	15.	100
7440-36-0	ANTIMONY, TOTAL	0.15	J		MS	5	1.0	0.055	0.50
7440-38-2	ARSENIC, TOTAL	4.0	U		MS	5	5.0	2.3	4.0
7440-39-3	BARIUM, TOTAL	0.61	J		P	1	5.0	0.23	3.0
7440-41-7	BERYLLIUM, TOTAL	0.50	U		P	1	5.0	0.10	0.50
7440-43-9	CADMIUM, TOTAL	0.069	J		P	1	5.0	0.049	3.0
7440-70-2	CALCIUM, TOTAL	73	J		P	1	100	11.	80
7440-47-3	CHROMIUM, TOTAL	4.0	U		P	1	10	0.36	4.0
7440-48-4	COBALT, TOTAL	0.30	U		MS	5	1.0	0.060	0.30
7440-50-8	COPPER, TOTAL	10	U		P	1	25	0.63	10
7439-89-6	IRON, TOTAL	32	J		P	1	100	5.4	80
7439-92-1	LEAD, TOTAL	4.0	U		P	1	5.0	1.1	4.0
7439-95-4	MAGNESIUM, TOTAL	22	J		P	1	100	7.8	80
7439-96-5	MANGANESE, TOTAL	4.0	U		P	1	5.0	1.1	4.0
7439-97-6	MERCURY, TOTAL	0.10	U		CV	1	0.20	0.013	0.10
7440-02-0	NICKEL, TOTAL	4.0	U		P	1	10	0.28	4.0
7440-09-7	POTASSIUM, TOTAL	500	U		P	1	1000	41.	500
7782-49-2	SELENIUM, TOTAL	7.0	U		P	1	10	2.4	7.0
7440-22-4	SILVER, TOTAL	4.0	U		P	1	10	0.27	4.0
7440-23-5	SODIUM, TOTAL	120	J		P	1	1000	24.	500
7440-28-0	THALLIUM, TOTAL	0.40	U		MS	5	1.0	0.060	0.40
7440-62-2	VANADIUM, TOTAL	0.33	J		P	1	10	0.23	4.0
7440-66-6	ZINC, TOTAL	1.3	J		P	1	20	0.72	10

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-13-0002

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 89.3 **Lab Sample ID:** SI3897-039

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	8310			P	1	27	0.64	9.0
7440-36-0	ANTIMONY, TOTAL	0.070	J		MS	5	0.090	0.018	0.045
7440-38-2	ARSENIC, TOTAL	18.0			MS	5	0.45	0.13	0.36
7440-39-3	BARIUM, TOTAL	33.5			P	1	0.45	0.022	0.27
7440-41-7	BERYLLIUM, TOTAL	0.467			P	1	0.45	0.0061	0.045
7440-43-9	CADMIUM, TOTAL	0.062	J		P	1	0.45	0.0071	0.27
7440-70-2	CALCIUM, TOTAL	1140			P	1	9.0	1.6	7.2
7440-47-3	CHROMIUM, TOTAL	18.6			P	1	0.90	0.023	0.36
7440-48-4	COBALT, TOTAL	7.49			MS	5	0.090	0.0049	0.027
7440-50-8	COPPER, TOTAL	14.1			P	1	2.2	0.14	0.90
7439-89-6	IRON, TOTAL	16700			P	10	90	13.	72
7439-92-1	LEAD, TOTAL	7.86			P	1	0.45	0.078	0.36
7439-95-4	MAGNESIUM, TOTAL	3720			P	10	90	6.1	72
7439-96-5	MANGANESE, TOTAL	254		B	P	1	0.45	0.14	0.36
7439-97-6	MERCURY, TOTAL	0.018	U		CV	1	0.036	0.0055	0.018
7440-02-0	NICKEL, TOTAL	22.6			P	1	0.90	0.039	0.36
7440-09-7	POTASSIUM, TOTAL	1790			P	1	90	2.6	45
7782-49-2	SELENIUM, TOTAL	0.33	J		P	1	0.90	0.15	0.63
7440-22-4	SILVER, TOTAL	0.049	J		P	1	0.90	0.024	0.36
7440-23-5	SODIUM, TOTAL	161			P	1	90	1.3	45
7440-28-0	THALLIUM, TOTAL	0.140			MS	5	0.090	0.0085	0.036
7440-62-2	VANADIUM, TOTAL	17.3			P	1	0.90	0.033	0.36
7440-66-6	ZINC, TOTAL	32.7			P	1	1.8	0.15	0.90

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-13-0206

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 89.2 **Lab Sample ID:** SI3897-040

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	12200			P	1	25	0.60	8.5
7440-36-0	ANTIMONY, TOTAL	0.527			MS	5	0.085	0.017	0.042
7440-38-2	ARSENIC, TOTAL	12.1			MS	5	0.42	0.13	0.34
7440-39-3	BARIUM, TOTAL	98.7			P	1	0.42	0.021	0.25
7440-41-7	BERYLLIUM, TOTAL	0.690			P	1	0.42	0.0058	0.042
7440-43-9	CADMIUM, TOTAL	0.814	J		P	2	0.85	0.013	0.51
7440-70-2	CALCIUM, TOTAL	5710			P	1	8.5	1.5	6.8
7440-47-3	CHROMIUM, TOTAL	54.0			P	2	1.7	0.044	0.68
7440-48-4	COBALT, TOTAL	10.7			MS	5	0.085	0.0047	0.025
7440-50-8	COPPER, TOTAL	141			P	2	4.2	0.27	1.7
7439-89-6	IRON, TOTAL	34600			P	2	17	2.4	14
7439-92-1	LEAD, TOTAL	341			P	2	0.85	0.15	0.68
7439-95-4	MAGNESIUM, TOTAL	7130			P	2	17	1.2	14
7439-96-5	MANGANESE, TOTAL	537		B	P	2	0.85	0.27	0.68
7439-97-6	MERCURY, TOTAL	1.19			CV	1	0.034	0.0053	0.018
7440-02-0	NICKEL, TOTAL	40.8			P	2	1.7	0.075	0.68
7440-09-7	POTASSIUM, TOTAL	3520			P	1	85	2.5	42
7782-49-2	SELENIUM, TOTAL	1.2	U		P	2	1.7	0.29	1.2
7440-22-4	SILVER, TOTAL	0.727	J		P	2	1.7	0.046	0.68
7440-23-5	SODIUM, TOTAL	203			P	1	85	1.3	42
7440-28-0	THALLIUM, TOTAL	0.232			MS	5	0.085	0.0081	0.034
7440-62-2	VANADIUM, TOTAL	41.4			P	2	1.7	0.063	0.68
7440-66-6	ZINC, TOTAL	283			P	1	1.7	0.14	0.85

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-13-0610

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 86.9 **Lab Sample ID:** SI3897-041

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	10500			P	1	32	0.75	10
7440-36-0	ANTIMONY, TOTAL	0.20			MS	5	0.10	0.021	0.053
7440-38-2	ARSENIC, TOTAL	12.2			MS	5	0.53	0.16	0.42
7440-39-3	BARIUM, TOTAL	60.4			P	1	0.53	0.026	0.32
7440-41-7	BERYLLIUM, TOTAL	0.508	J		P	1	0.53	0.0072	0.053
7440-43-9	CADMIUM, TOTAL	0.647			P	1	0.53	0.0083	0.32
7440-70-2	CALCIUM, TOTAL	20600			P	1	10	1.9	8.4
7440-47-3	CHROMIUM, TOTAL	57.8			P	1	1.0	0.027	0.42
7440-48-4	COBALT, TOTAL	7.70			MS	5	0.10	0.0058	0.032
7440-50-8	COPPER, TOTAL	163			P	1	2.6	0.17	1.0
7439-89-6	IRON, TOTAL	18200			P	1	10	1.5	8.4
7439-92-1	LEAD, TOTAL	520			P	1	0.53	0.092	0.42
7439-95-4	MAGNESIUM, TOTAL	7140			P	1	10	0.72	8.4
7439-96-5	MANGANESE, TOTAL	320		B	P	1	0.53	0.17	0.42
7439-97-6	MERCURY, TOTAL	1.07			CV	1	0.033	0.0051	0.017
7440-02-0	NICKEL, TOTAL	32.2			P	1	1.0	0.046	0.42
7440-09-7	POTASSIUM, TOTAL	2000			P	1	100	3.1	53
7782-49-2	SELENIUM, TOTAL	0.63	J		P	1	1.0	0.18	0.74
7440-22-4	SILVER, TOTAL	0.070	J		P	1	1.0	0.029	0.42
7440-23-5	SODIUM, TOTAL	182			P	1	100	1.6	53
7440-28-0	THALLIUM, TOTAL	0.149			MS	5	0.10	0.010	0.042
7440-62-2	VANADIUM, TOTAL	31.7			P	1	1.0	0.039	0.42
7440-66-6	ZINC, TOTAL	365			P	1	2.1	0.18	1.0

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-10-0002

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 92.7 **Lab Sample ID:** SI3897-042

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	7180			P	1	29	0.70	9.8
7440-36-0	ANTIMONY, TOTAL	0.10			MS	5	0.098	0.020	0.049
7440-38-2	ARSENIC, TOTAL	18.0			MS	5	0.49	0.15	0.39
7440-39-3	BARIUM, TOTAL	31.0			P	1	0.49	0.025	0.29
7440-41-7	BERYLLIUM, TOTAL	0.360	J		P	1	0.49	0.0067	0.049
7440-43-9	CADMIUM, TOTAL	0.108	J		P	1	0.49	0.0077	0.29
7440-70-2	CALCIUM, TOTAL	809			P	1	9.8	1.8	7.8
7440-47-3	CHROMIUM, TOTAL	17.9			P	1	0.98	0.025	0.39
7440-48-4	COBALT, TOTAL	9.36			MS	5	0.098	0.0054	0.029
7440-50-8	COPPER, TOTAL	30.1			P	1	2.4	0.16	0.98
7439-89-6	IRON, TOTAL	16300			P	1	9.8	1.4	7.8
7439-92-1	LEAD, TOTAL	29.0			P	1	0.49	0.085	0.39
7439-95-4	MAGNESIUM, TOTAL	3480			P	1	9.8	0.67	7.8
7439-96-5	MANGANESE, TOTAL	303		B	P	1	0.49	0.16	0.39
7439-97-6	MERCURY, TOTAL	0.010	J		CV	1	0.028	0.0044	0.014
7440-02-0	NICKEL, TOTAL	23.9			P	1	0.98	0.043	0.39
7440-09-7	POTASSIUM, TOTAL	1400			P	1	98	2.8	49
7782-49-2	SELENIUM, TOTAL	0.69	U		P	1	0.98	0.17	0.69
7440-22-4	SILVER, TOTAL	0.39	U		P	1	0.98	0.026	0.39
7440-23-5	SODIUM, TOTAL	86.3	J		P	1	98	1.5	49
7440-28-0	THALLIUM, TOTAL	0.122			MS	5	0.098	0.0093	0.039
7440-62-2	VANADIUM, TOTAL	17.8			P	1	0.98	0.036	0.39
7440-66-6	ZINC, TOTAL	58.0			P	1	2.0	0.17	0.98

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-10-0206

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 82.6 **Lab Sample ID:** SI3897-043

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	7450			P	1	25	0.59	8.3
7440-36-0	ANTIMONY, TOTAL	1.00			MS	5	0.083	0.017	0.041
7440-38-2	ARSENIC, TOTAL	9.26			MS	5	0.41	0.12	0.33
7440-39-3	BARIUM, TOTAL	114			P	1	0.41	0.021	0.25
7440-41-7	BERYLLIUM, TOTAL	0.593			P	1	0.41	0.0056	0.041
7440-43-9	CADMIUM, TOTAL	1.10	J		P	10	4.1	0.066	2.5
7440-70-2	CALCIUM, TOTAL	5700			P	1	8.3	1.5	6.6
7440-47-3	CHROMIUM, TOTAL	31.8			P	10	8.3	0.22	3.3
7440-48-4	COBALT, TOTAL	8.80			MS	5	0.083	0.0046	0.025
7440-50-8	COPPER, TOTAL	502			P	10	21	1.3	8.3
7439-89-6	IRON, TOTAL	23900			P	2	16	2.3	13
7439-92-1	LEAD, TOTAL	781			P	10	4.1	0.72	3.3
7439-95-4	MAGNESIUM, TOTAL	4630			P	10	83	5.6	66
7439-96-5	MANGANESE, TOTAL	254		B	P	2	0.83	0.27	0.66
7439-97-6	MERCURY, TOTAL	0.604			CV	1	0.038	0.0060	0.020
7440-02-0	NICKEL, TOTAL	32.6			P	10	8.3	0.37	3.3
7440-09-7	POTASSIUM, TOTAL	1880			P	1	83	2.4	41
7782-49-2	SELENIUM, TOTAL	5.8	U		P	10	8.3	1.4	5.8
7440-22-4	SILVER, TOTAL	0.58	J		P	10	8.3	0.22	3.3
7440-23-5	SODIUM, TOTAL	302			P	1	83	1.2	41
7440-28-0	THALLIUM, TOTAL	0.183			MS	5	0.083	0.0079	0.033
7440-62-2	VANADIUM, TOTAL	26.2			P	10	8.3	0.31	3.3
7440-66-6	ZINC, TOTAL	846			P	1	1.6	0.14	0.83

Comments:

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-10-0610

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 86.7 **Lab Sample ID:** SI3897-044

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	10300			P	1	26	0.63	8.8
7440-36-0	ANTIMONY, TOTAL	3.27			MS	5	0.088	0.018	0.044
7440-38-2	ARSENIC, TOTAL	19.4			MS	5	0.44	0.13	0.35
7440-39-3	BARIUM, TOTAL	141			P	1	0.44	0.022	0.26
7440-41-7	BERYLLIUM, TOTAL	0.591			P	1	0.44	0.0060	0.044
7440-43-9	CADMIUM, TOTAL	0.423	J		P	1	0.44	0.0070	0.26
7440-70-2	CALCIUM, TOTAL	1950			P	1	8.8	1.6	7.0
7440-47-3	CHROMIUM, TOTAL	31.5			P	1	0.88	0.023	0.35
7440-48-4	COBALT, TOTAL	9.39			MS	5	0.088	0.0048	0.026
7440-50-8	COPPER, TOTAL	123			P	1	2.2	0.14	0.88
7439-89-6	IRON, TOTAL	27600			P	5	44	6.2	35
7439-92-1	LEAD, TOTAL	430			P	1	0.44	0.077	0.35
7439-95-4	MAGNESIUM, TOTAL	5300			P	5	44	3.0	35
7439-96-5	MANGANESE, TOTAL	324		B	P	1	0.44	0.14	0.35
7439-97-6	MERCURY, TOTAL	1.92			CV	10	0.37	0.057	0.19
7440-02-0	NICKEL, TOTAL	28.7			P	1	0.88	0.039	0.35
7440-09-7	POTASSIUM, TOTAL	1690			P	1	88	2.6	44
7782-49-2	SELENIUM, TOTAL	1.3			P	1	0.88	0.15	0.62
7440-22-4	SILVER, TOTAL	0.35	U		P	1	0.88	0.024	0.35
7440-23-5	SODIUM, TOTAL	154			P	1	88	1.3	44
7440-28-0	THALLIUM, TOTAL	0.254			MS	5	0.088	0.0084	0.035
7440-62-2	VANADIUM, TOTAL	26.6			P	1	0.88	0.033	0.35
7440-66-6	ZINC, TOTAL	198			P	1	1.8	0.15	0.88

Comments:

Appendix C

Support Documentation

SDG NARRATIVE
KATAHDIN ANALYTICAL SERVICES
TETRA TECH NUS, INC.
PORTSMOUTH NAVAL SHIPYARD – WE32 OU8
OU8-1
SI3772 & SI3897

Sample Receipt

The following samples were received on June 03 and 05, 2015 and were logged in under Katahdin Analytical Services work order numbers SI3772 and SI3897 for a hardcopy due date of June 24, 2015.

KATAHDIN Sample No.	TTNUS Sample Identification
SI3772-1	WTB-SS-11-0002
SI3772-2	WTB-SB-11-0206
SI3772-3	WTB-SB-11-0610
SI3772-4	WTB-SS-14-0002
SI3772-5	WTB-SB-14-0206
SI3772-6	WTB-FD01-060315
SI3772-7	WTB-SB-14-0607
SI3772-8	WTB-SS-17-0002
SI3772-9	WTB-SB-17-0206
SI3772-10	WTB-SB-17-0610
SI3772-11	WTB-SS-19-0002
SI3772-12	WTB-SB-19-0206
SI3772-13	WTB-SB-19-0610
SI3897-1	WTB-SS-22-0002
SI3897-2	WTB-SS-24-0002
SI3897-3	WTB-SB-24-0206
SI3897-4	WTB-SB-24-069.7
SI3897-5	WTB-SB-22-0206
SI3897-6	WTB-SB-22-0610
SI3897-7	WTB-FD02-060315
SI3897-8	WTB-SS-23-0002
SI3897-9	WTB-SB-23-0206
SI3897-10	WTB-SB-23-0610
SI3897-11	WTB-SS-08-0002
SI3897-12	WTB-FD01-060415
SI3897-13	WTB-SB-08-0206
SI3897-14	WTB-SB-08-0610
SI3897-15	WTB-SS-09-0002
SI3897-16	WTB-SB-09-0206
SI3897-17	WTB-SB-09-0610
SI3897-18	WTB-SS-12-0002
SI3897-19	WTB-SB-12-0206
SI3897-20	WTB-SB-12-0610

SI3897-21	WTB-SS-15-0002
SI3897-22	WTB-SB-15-0206
SI3897-23	WTB-FD02-060415
SI3897-24	WTB-SB-15-0610
SI3897-25	WTB-SS-16-0002
SI3897-26	WTB-SB-16-0206
SI3897-27	WTB-SB-16-0610
SI3897-28	WTB-SS-18-0002
SI3897-29	WTB-SB-18-0206
SI3897-30	WTB-SB-18-0610
SI3897-31	WTB-SS-20-0002
SI3897-32	WTB-FD03-060415
SI3897-33	WTB-SB-20-0206
SI3897-34	WTB-SB-20-0610
SI3897-35	WTB-SS-21-0002
SI3897-36	WTB-SB-21-0206
SI3897-37	WTB-SB-21-0610
SI3897-38	WTB-RB01-060415
SI3897-39	WTB-SS-13-0002
SI3897-40	WTB-SB-13-0206
SI3897-41	WTB-SB-13-0610
SI3897-42	WTB-SS-10-0002
SI3897-43	WTB-SB-10-0206
SI3897-44	WTB-SB-10-0610

The samples were logged in for the analyses specified on the chain of custody form. All problems encountered and resolved during sample receipt have been documented on the applicable chain of custody forms.

We certify that the test results provided in this report meet all the requirements of the NELAC standards unless otherwise noted in this narrative or in the Report of Analysis.

Sample analyses have been performed by the methods as noted herein.

Should you have any questions or comments concerning this Report of Analysis, please do not hesitate to contact your Katahdin Analytical Services Project Manager, **Ms. Jennifer Obrin.** This narrative is an integral part of the Report of Analysis.

Organics Analysis

The samples of SDG OU8-1 were analyzed in accordance with "Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods." SW-846, 2nd edition, 1982 (revised 1984), 3rd edition, 1986, and Updates I, II, IIA, III, IIIA, and IIIB 1996, 1998 & 2004, Office of Solid Waste and Emergency Response, U.S. EPA, and/or Method for the Determination of Extractable Petroleum Hydrocarbons (EPH) MADEP, May 2004, Revision 1.1, and/or for the specific methods listed below or on the Report of Analysis.

Samples SI3897-4, 25, and 33 were used for the matrix spike (MS) and matrix spike duplicate (MSD), as requested by the client.

EPH Analysis

Sample SI3897-18 had low recoveries for the extraction surrogates o-terphenyl and 5-alpha androstane that were outside of method acceptance limits. The sample was reextracted within hold time and had similar surrogate deviations. The results from both extractions are reported.

Sample SI3772-3DL had a low recovery for the extraction surrogate 5-alpha androstane that were outside of method acceptance limits. Since the surrogate recovery was acceptable in the undiluted analysis, no further action was taken.

The LCS WG164506-2 had a low recovery for C9-C18 aliphatic range that was outside of method acceptance limits. Since the LCSD was acceptable, no further action was taken.

Samples SI3772-1, 2DL, 3DL, 7, 9, 10, 11, and 12, SI3897-4 through 7, 13DL, 14, 17DL, 18, 18RE, 20, 24, 25, 27, 30, 36DL, 37DL, 40, 41, 43, and 44RE were manually integrated for the extraction surrogates, the C11-C22 aromatic range, the C19-C36 aliphatic range and the fractionation surrogates 2-bromonaphthalene and/or 2-fluorobiphenyl. The specific reasons for the manual integrations are indicated on the raw data by the manual integration codes (M1-M11). These codes are further explained in the attachment following this narrative.

All samples in work order SI3772, samples SI3897-1, 4, 6, 7, 13, 14, 15, 17, 19, 20, 21, 24, 25, 26, 28 and the MS/MSD's WG164370-4 and 5 and WG164430-4 and 5 were diluted 1:2 prior to fractionating due to the sample matrix. Consequently, the samples PQLs are elevated by a factor of 2.

Samples SI3897-8, 9, 10RE, 18, 18RE, 40, and 41 were diluted 1:5 prior to fractionating due to the sample matrix. Consequently, the samples PQLs are elevated by a factor of 5.

8270D SIM Analysis

All samples except SI3897-2, 3, and 38 were manually integrated for the analytes acenaphthylene, acenaphthene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)perylene, benzo(g,h,i)perylene, the surrogates 2-methylnaphthalene-d10, fluorene-d10, pyrene-d10, the internal standards phenanthrene,d10, chrysene-d12, and/or perylene-d12. The specific reason for the manual integration is indicated on the raw data by the manual integration codes (M1-M11). These codes are further explained in the attachment following this narrative.

Samples SI3897-10DL2 and 40 had high recoveries for one surrogate that were outside DoD QSM acceptance limits. Since each sample had a second analysis with acceptable surrogate recoveries, no further action was taken.

Samples SI3772-1, 2, 2DL, 3, 3DL, 5, 5RA, 7, 7RA, 8, 8DL, 12, SI3897-1, 4, 6, 12, 13, 14, 15, 17, 18DL, 24, 24DL, 25, 31, 36, 40, 41, and 44DL had low responses for one or more internal standards that resulted in %D's which were outside -50% to +100% the response of the internal

standard of the midpoint of the ICAL.

The CV (file N6451) had a low response for the target analyte benzo(g,h,i)perylene. The CV (file N6525) had a low response for the target analyte benzo(k)fluoranthene. The CV (file N6661) had low responses for the target analyte pyrene and surrogate pyrene-d10. The CV (file N6700) had a high response for the target analyte chrysene. These responses resulted in a %D's that were greater than the DoD QSM acceptance limit of 20%.

The target analyte fluoranthene, pyrene and benzo(a)anthracene were detected below ½ of the LOQ in the method blanks WG164507-1, and WG164585-1. According to the DoD QSM section D.1.1.1, a method blank is considered to be contaminated if the concentration of any target analyte in the blank exceeds ½ the reporting limit and is greater than 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Since the method blanks were acceptable, no further action was taken.

The reported percent recovery acceptance limits for the aqueous Laboratory Control Samples (LCSs) are statistically derived for the full list of spiked compounds and nominal limits for all additional compounds. The recoveries of the spiked analytes in the LCS, Matrix Spike (MS) and Matrix Spike Duplicate (MSD) are compared to these acceptance limits. Katahdin standard operating procedure is to take corrective action only if the number of spiked analytes in the LCS that are outside of the QC limits is greater than the DoD QSM allowable number of exceedances. If the associated MS/MSD has greater than the allowable number of exceedances, no corrective action is taken, as long the LCS is acceptable.

The MS/MSD WG164585-3 and 4 and the MSD WG164585-6 had several spiked target analytes with recoveries that were non-calculable and reported as 0% recovery due to the concentration in the native sample being higher than in the MS and MSD. This is likely due to a non-homogeneous sample.

There were no other protocol deviations or observations noted by the organics laboratory staff.

Metals Analysis

The samples of SDG OU8-1 were prepared and analyzed for metals in accordance with the "Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods" SW-846. 2nd edition, 1982 (revised 1984), 3rd edition, 1986, and Updates I, II, IIA, III, IIIA, and IIIB 1996, 1998 & 2004, Office of Solid Waste and Emergency Response, U.S. EPA.

Inductively-Coupled Plasma Atomic Emission Spectroscopic Analysis (ICP)

Solid-matrix Katahdin Sample Numbers SI3772-(1 and 3-13) were digested for ICP analysis on 06/04/15 (QC Batch IF04ICS1) in accordance with USEPA Method 3050B. Katahdin Sample Number SI3772-1 was prepared in duplicate and with a matrix-spiked aliquot. The measured manganese concentration (0.27 mg/Kg) of the preparation blank in this batch exceed the project acceptance limit (> ½ LOQ). However, because the measured manganese concentrations of all of the samples in this batch are greater than ten times that of the preparation blank, no corrective action was necessary. The manganese results for these samples appear with a "B" flag on the accompanying Form I's.

Solid-matrix Katahdin Sample Number SI3772-2 was digested for ICP analysis on 06/05/15 (QC Batch IF05ICS1) in accordance with USEPA Method 3050B.

Aqueous-matrix Katahdin Sample Number SI3897-38 was digested for ICP analysis on 06/08/15 (QC Batch IF08ICW3) in accordance with USEPA Method 3010A. Katahdin Sample Number SI3897-38 was prepared in duplicate and with a matrix-spiked aliquot.

Solid-matrix Katahdin Sample Numbers SI3897-(1-16) were digested for ICP analysis on 06/09/15 (QC Batch IF09ICS1) in accordance with USEPA Method 3050B. Katahdin Sample Number SI3897-4 was prepared in duplicate and with duplicate matrix-spiked aliquots. The measured manganese concentration (0.59 mg/Kg) of the preparation blank in this batch exceed the project acceptance limit (> ½ LOQ). However, because the measured manganese concentrations of all of the samples in this batch are greater than ten times that of the preparation blank, no corrective action was necessary. The manganese results for these samples appear with a "B" flag on the accompanying Form I's.

Solid-matrix Katahdin Sample Numbers SI3897-(17-26) were digested for ICP analysis on 06/10/15 (QC Batch IF10ICS1) in accordance with USEPA Method 3050B. Katahdin Sample Number SI3897-25 was prepared in duplicate and with duplicate matrix-spiked aliquots.

Solid-matrix Katahdin Sample Numbers SI3897-(27-37 and 39-44) were digested for ICP analysis on 06/11/15 (QC Batch IF11ICS1) in accordance with USEPA Method 3050B. Katahdin Sample Number SI3897-33 was prepared in duplicate and with duplicate matrix-spiked aliquots. The measured manganese concentration (0.39 mg/Kg) of the preparation blank in this batch exceed the project acceptance limit (> ½ LOQ). However, because the measured manganese concentrations of all of the samples in this batch are greater than ten times that of the preparation blank, no corrective action was necessary. The manganese results for these samples appear with a "B" flag on the accompanying Form I's.

ICP analyses of SDG OU8-1 sample digestate was performed using a Thermo ICAP 6500 ICP spectrometer in accordance with USEPA Method 6010C. All samples were analyzed within holding times and all analytical run QC criteria were met, with the following exception:

Due to instrument run QC failure, antimony results for all samples in this SDG were reported using ICP-MS data.

The measured lead recovery of the PQL (LOQ) standard analyzed in ICP analysis sequence IIE30A is below the project acceptance limit. The only result accepted from this sequence was for Katahdin Sample Number SI3357-17. The measured lead result for this sample was greater than ten times the true value of the PQL standard, and minimally affected by the small low bias in the PQL standard.

<u>Inductively-Coupled Plasma Mass Spectrometric Analysis (ICP-MS)</u>

Solid-matrix Katahdin Sample Numbers SI3772-(1 and 3-13) were digested for ICP-MS analysis on 06/04/15 (QC Batch IF04IMS1) in accordance with USEPA Method 3050B. Katahdin Sample Number SI3772-1 was prepared in duplicate and with a matrix-spiked aliquot.

Solid-matrix Katahdin Sample Number SI3772-2 was digested for ICP-MS analysis on 06/05/15 (QC Batch IF05IMS1) in accordance with USEPA Method 3050B.

Aqueous-matrix Katahdin Sample Number SI3897-38 was digested for ICP-MS analysis on 06/08/15 (QC Batch IF08IMW2) in accordance with USEPA Method 3010A. Katahdin Sample Number SI3897-38 was prepared in duplicate and with a matrix-spiked aliquot.

Solid-matrix Katahdin Sample Numbers SI3897-(1-16) were digested for ICP-MS analysis on 06/09/15 (QC Batch IF09IMS1) in accordance with USEPA Method 3050B. Katahdin Sample Number SI3897-4 was prepared in duplicate and with duplicate matrix-spiked aliquots.

Solid-matrix Katahdin Sample Numbers SI3897-(17-26) were digested for ICP-MS analysis on 06/10/15 (QC Batch IF10IMS1) in accordance with USEPA Method 3050B. Katahdin Sample Number SI3897-25 was prepared in duplicate and with duplicate matrix-spiked aliquots.

Solid-matrix Katahdin Sample Numbers SI3897-(27-37 and 39-44) were digested for ICP-MS analysis on 06/11/15 (QC Batch IF11IMS1) in accordance with USEPA Method 3050B. Katahdin Sample Number SI3897-33 was prepared in duplicate and with duplicate matrix-spiked aliquots.

ICP-MS analyses of SDG OU8-1 sample digestates were performed using an Agilent 7500 ICP-MS spectrometer in accordance with USEPA Method 6020A. Results for all standards and samples are reported using the mean of 3 replicate measurements. All sample digestates were diluted by a factor of 5 during analysis to reduce mass interferences from chlorine, which is present in the digestates from the hydrochloric acid used in digesting the samples. All samples were analyzed within holding times and all analytical run QC criteria were met, with the following exception:

The measured antimony concentration (0.17 ug/L) of the CCB analyzed at 16:22 in ICP-MS analytical sequence JIF24C is above the DoD acceptance criteria (> LOD). However, because the level of contamination in the CCB is well below the project PQL goal, no corrective action was taken.

Internal standard recoveries for ICP-MS analyses can be found in the raw data section of the accompanying data package. The following table indicates which analytes are associated with each internal standard element.

Internal Standard Element	Associated Analytes
Lithium	Beryllium
Scandium	Sodium, Magnesium, Aluminum, Potassium, Calcium
Germanium	Vanadium, Chromium, Manganese, Iron, Cobalt, Nickel, Copper, Zinc, Arsenic, Selenium, Silver, Cadmium
Terbium	Antimony, Barium
Bismuth	Lead, Thallium

Instrument tuning information can also be found in the raw data section in the report labeled "6020 QC Tune Report". The relative standard deviation was determined from 4 replicate measurements. The peak width was measured at 10% of the peak height.

Analysis of Mercury by Cold Vapor Atomic Absorption (CVAA)

Solid-matrix Katahdin Sample Numbers SI3897-(1-13) were digested for mercury analysis on 06/10/15 (QC Batch IF10HGS1) in accordance with USEPA Method 7471B. Katahdin Sample Number SI3897-4 was prepared in duplicate and with duplicate matrix spiked aliquots.

Solid-matrix Katahdin Sample Numbers SI3772-(1-13) were digested for mercury analysis on 06/12/15 (QC Batch IF12HGS1) in accordance with USEPA Method 7471B. Katahdin Sample Number SI3772-1 was prepared in duplicate and with a matrix spiked aliquot.

Solid-matrix Katahdin Sample Numbers SI3897-(14-30) were digested for mercury analysis on 06/12/15 (QC Batch IF12HGS2) in accordance with USEPA Method 7471B. Katahdin Sample Number SI3897-25 was prepared in duplicate and with duplicate matrix spiked aliquots.

Aqueous-matrix Katahdin Sample Number SI3897-38 was digested for mercury analysis on 06/12/15 (QC Batch IF12HGW4) in accordance with USEPA Method 7470A.

Solid-matrix Katahdin Sample Numbers SI3897-(31-37 and 39-44) were digested for mercury analysis on 06/15/15 (QC Batch IF15HGS1) in accordance with USEPA Method 7471B. Katahdin Sample Number SI3897-33 was prepared in duplicate and with duplicate matrix spiked aliquots.

Mercury analyses of the SDG OU8-1 sample digestates were performed using a Cetac M6100 automated mercury analyzer in accordance with USEPA Methods 7470A and 7471B. All samples were analyzed within holding times and all analytical run QC criteria were met.

Matrix QC Summary

The measured recoveries of aluminum, antimony, calcium, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, vanadium and zinc in the matrix-spiked aliquots of Katahdin Sample Number SI3772-1 are outside the project acceptance criteria (80% - 120% recovery of the added element). For aluminum, calcium, copper, iron, lead, magnesium, manganese, nickel, and zinc, this may be attributable to the native concentration in this sample being much greater than the spike amount added.

The measured recoveries of aluminum, antimony, calcium, chromium, iron, magnesium, manganese, and potassium in the matrix-spiked aliquots of Katahdin Sample Number SI3897-4 are outside the project acceptance criteria (80% - 120% recovery of the added element). For aluminum, iron, and magnesium, this may be attributable to the native concentration in this sample being much greater than the spike amount added.

The measured recoveries of aluminum, antimony, calcium, chromium, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, and zinc in the matrix-spiked aliquots of Katahdin Sample Number SI3897-25 are outside the project acceptance criteria (80% - 120%

recovery of the added element). For aluminum, calcium, copper, iron, lead, magnesium, and manganese, this may be attributable to the native concentration in this sample being much greater than the spike amount added.

The measured recoveries of aluminum, antimony, arsenic, calcium, chromium, copper, iron, lead, magnesium, manganese, mercury, potassium, and zinc in the matrix-spiked aliquots of Katahdin Sample Number SI3897-33 are outside the project acceptance criteria (80% - 120% recovery of the added element). For aluminum, calcium, iron, lead, magnesium, and manganese, this may be attributable to the native concentration in this sample being much greater than the spike amount added.

The measured recoveries of all analytes in the matrix-spiked aliquot of Katahdin Sample Number SI3897-38 are within the project acceptance criteria (80% - 120% recovery of the added element).

The measured recoveries of aluminum, iron, lead, nickel, and zinc in a post-digestion spike of Katahdin Sample Number SI3772-1 are outside the project acceptance criteria (75% - 125% recovery of the added element). This may be attributable to the native concentration in this sample being much greater than the spike amount added.

The measured recoveries of aluminum, iron, magnesium, manganese, and selenium in a post-digestion spike of Katahdin Sample Number SI3897-4 are outside the project acceptance criteria (75% - 125% recovery of the added element). For aluminum, iron, and magnesium, this may be attributable to the native concentration in this sample being much greater than the spike amount added.

The measured recovery of iron in a post-digestion spike of Katahdin Sample Number SI3897-25 is outside the project acceptance criteria (75% - 125% recovery of the added element). This may be attributable to the native concentration in this sample being much greater than the spike amount added.

The measured recovery of iron in a post-digestion spike of Katahdin Sample Number SI3897-33 is outside the project acceptance criteria (75% - 125% recovery of the added element). This may be attributable to the native concentration in this sample being much greater than the spike amount added.

The measured recoveries of all analytes in post-digestion spike of Katahdin Sample Number SI3897-38 are within the project acceptance criteria (75% - 125% recovery of the added element).

The matrix-spike duplicate analysis of Katahdin Sample Number SI3897-4 is outside the laboratory's acceptance limit (<20% relative difference between duplicate matrix-spiked aliquots) for magnesium.

The matrix-spike duplicate analysis of Katahdin Sample Number SI3897-25 is outside the laboratory's acceptance limit (<20% relative difference between duplicate matrix-spiked aliquots) for chromium, iron, and manganese.

The matrix-spike duplicate analysis of Katahdin Sample Number SI3897-33 is outside the laboratory's acceptance limit (<20% relative difference between duplicate matrix-spiked aliquots)

for lead.

The duplicate analysis of Katahdin Sample Number SI3772-1 is outside the laboratory's acceptance limit (<20% relative difference between duplicate aliquots) for calcium, chromium, copper, iron, manganese, mercury, and potassium.

The duplicate analysis of Katahdin Sample Number SI3897-4 is outside the laboratory's acceptance limit (<20% relative difference between duplicate aliquots) for chromium, magnesium, potassium, and vanadium.

The duplicate analysis of Katahdin Sample Number SI3897-25 is outside the laboratory's acceptance limit (<20% relative difference between duplicate aliquots) for antimony, arsenic, chromium, copper, and sodium.

The duplicate analysis of Katahdin Sample Number SI3897-33 is outside the laboratory's acceptance limit (<20% relative difference between duplicate aliquots) for antimony, copper, nickel, and zinc.

The duplicate analysis of Katahdin Sample Number SI3897-38 is within the laboratory's acceptance limit (<20% relative difference between duplicate aliquots) for all analytes.

The serial dilution analyses of Katahdin Sample Numbers SI3772-1 and SI3897-(4, 25, 33, and 38) are within the project acceptance limit (<10% relative percent difference, if the concentration in the original sample is greater than 50 times the LOD) for all analytes.

Reporting of Metals Results

Per client request, analytical results for client samples on Form I and preparation blanks on Form IIIP have been reported using the laboratory's limits of detection (LOD). All results were evaluated down to the laboratory's method detection limits (MDLs). Results that fall between the MDL and the LOQ are flagged with "J" in the C-qualifier column, and the measured concentration appears in the concentration column. Results that are less than the MDL are flagged with "U" in the C-qualifier column, and the LOD is listed in the concentration column. These LOQs, MDLs, and LODs have been adjusted for each sample based on the sample amounts used in preparation and analysis.

Analytical results on Forms VA, VD, VII, and IX for client samples, matrix QC samples (duplicates and matrix spikes), and laboratory control samples have been reported down to the laboratory's method detection limits (MDLs). Analytical results that are below the MDLs are flagged with "U" in the C-qualifier column, and the measured concentration is listed in the concentration column.

Analytical results for instrument run QC samples (ICVs, ICBs, etc.) have been reported down to the laboratory's instrument detection limits (IDLs).

IDLs, LODs, MDLs, and LOQs are listed on Form 10 of the accompanying data package.

Wet Chemistry Analysis

The samples SDG OU8-1 were analyzed in accordance with the specific methods listed on the Report of Analysis.

Analyses for total solids were performed according to "Standard Methods for the Examination of Water and Wastewater", 15th, 16th, 17th, 18th, 19th, and 20th editions, 1980, 1985, 1989, 1992, 1995, 1999. APHA-AWWA-WPCF.

All Wet Chemistry results were evaluated to Katahdin Analytical Services' Method Detection Limits (MDL). Measured concentrations that fall between the MDL and Katahdin's Limit of Quantitation (LOQ) are flagged "J". Measured concentrations that are below the MDL are flagged "U" and reported as "U LOD", where "LOD" is the numerical value of the Limit of Detection.

All analyses were performed within holding times. All quality control criteria were met.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Operations Manager or the Quality Assurance Officer as verified by the following signature.

Leslie Dimond
07.02.15

Leslie Dimond
Quality Assurance Officer

Katahdin Analytical Services, Inc. **Sample Receipt Condition Report**

Client:	TetraTech	KAS PM:	JO	Sampled By:	Client
Project:		KIMS Entry By:	AP GN	Delivered By:	KAS
KAS Work Order#:	S13772	KIMS Review By:	JO	Received By:	AP
SDG #:	Cooler: 1 of 1			Date/Time Rec.:	6/3/15 1100

Receipt Criteria	Y	N	EX*	NA	Comments and/or Resolution
1. Custody seals present / intact?		✓			
2. Chain of Custody present in cooler?	✓				
3. Chain of Custody signed by client?	✓				
4. Chain of Custody matches samples?	✓				
5. Temperature Blanks present? If not, take temperature of any sample w/ IR gun.					Temp (°C): 2.9
Samples received at <6 °C w/o freezing?	✓				Note: Not required for metals (except Hg) analysis.
Ice packs or ice present?	✓				The lack of ice or ice packs (i.e. no attempt to begin cooling process) or insufficient ice may not meet certain regulatory requirements and may invalidate certain data.
If yes, was there sufficient ice to meet temperature requirements?	✓				
If temp. out, has the cooling process begun (i.e. ice or packs present) and sample collection times <6hrs., but samples are not yet cool?				✓	Note: No cooling process required for metals (except Hg) analysis.
6. Volatiles:					
Aqueous: No bubble larger than a pea?				✓	
Soil/Sediment:					
Received in airtight container?				✓	
Received in methanol?				✓	
Methanol covering soil?				✓	
D.I. Water - Received within 48 hour HT?				✓	
Air: Refer to KAS COC for canister/flow controller requirements.	√ if air included			✓	
7. Trip Blank present in cooler?		✓		✓	
8. Proper sample containers and volume?	✓				
9. Samples within hold time upon receipt?	✓				
10. Aqueous samples properly preserved? Metals, COD, NH3, TKN, O/G, phenol, TPO4, N+N, TOC, DRO, TPH – pH <2				✓	
Sulfide - >9				✓	
Cyanide – pH >12				✓	

* Log-In Notes to Exceptions: document any problems with samples or discrepancies or pH adjustments.

Katahdin Analytical Services, Inc. **Sample Receipt Condition Report**

Client:	Tetra	KAS PM:	JO	Sampled By:	Client
Project:		KIMS Entry By:	GN	Delivered By:	KAS
KAS Work Order#:	S1389~~67~~ AP	KIMS Review By:		Received By:	AP
SDG #:	Cooler: 1 of 2			Date/Time Rec.:	6/5/15 1530

Receipt Criteria	Y	N	EX*	NA	Comments and/or Resolution
1. Custody seals present / intact?		✓			
2. Chain of Custody present in cooler?	✓				
3. Chain of Custody signed by client?	✓				
4. Chain of Custody matches samples?	✓				
5. Temperature Blanks present? If not, take temperature of any sample w/ IR gun.	✓				Temp (°C): 5.7
Samples received at <6 °C w/o freezing?	✓				Note: Not required for metals (except Hg) analysis
Ice packs or ice present?	✓				The lack of ice or ice packs (i.e. no attempt to begin cooling process) or insufficient ice may not meet certain regulatory requirements and may invalidate certain data.
If yes, was there sufficient ice to meet temperature requirements?	✓				
If temp. out, has the cooling process begun (i.e. ice or packs present) and sample collection times <6hrs., but samples are not yet cool?				✓	Note: No cooling process required for metals (except Hg) analysis.
6. Volatiles:					
Aqueous: No bubble larger than a pea?				✓	
Soil/Sediment:					
Received in airtight container?				✓	
Received in methanol?				✓	
Methanol covering soil?				✓	
D.I. Water - Received within 48 hour HT?				✓	
Air: Refer to KAS COC for canister/flow controller requirements.	√ if air included				
7. Trip Blank present in cooler?				✓	
8. Proper sample containers and volume?	✓				
9. Samples within hold time upon receipt?	✓				
10. Aqueous samples properly preserved? Metals, COD, NH3, TKN, O/G, phenol, TPO4, N+N, TOC, DRO, TPH – pH <2				✓	
Sulfide - >9				✓	
Cyanide – pH >12				✓	

* Log-In Notes to Exceptions: document any problems with samples or discrepancies or pH adjustments.

SD38~~7-08~~ SB-18-0002 on chain, should be SS

Katahdin Analytical Services, Inc. **Sample Receipt Condition Report**

Client: Tetra		KAS PM: JO		Sampled By: Client	
Project:		KIMS Entry By:		Delivered By: KAS	
KAS Work Order#: S1 3897		KIMS Review By:		Received By: AP	
SDG #:	Cooler: 2 of 2			Date/Time Rec.: 6/5/15 1530	

Receipt Criteria	Y	N	EX*	NA	Comments and/or Resolution
1. Custody seals present / intact?					
2. Chain of Custody present in cooler?					
3. Chain of Custody signed by client?					
4. Chain of Custody matches samples?					
5. Temperature Blanks present? If not, take temperature of any sample w/ IR gun.					Temp (°C): 5.1
Samples received at <6 °C w/o freezing?					Note: Not required for metals (except Hg) analysis
Ice packs or ice present?					The lack of ice or ice packs (i.e. no attempt to begin cooling process) or insufficient ice may not meet certain regulatory requirements and may invalidate certain data.
If yes, was there sufficient ice to meet temperature requirements?					
If temp. out, has the cooling process begun (i.e. ice or packs present) and sample collection times <6hrs., but samples are not yet cool?					Note: No cooling process required for metals (except Hg) analysis.
6. Volatiles:					
Aqueous: No bubble larger than a pea?					
Soil/Sediment:					
Received in airtight container?					
Received in methanol?					
Methanol covering soil?					
D.I. Water - Received within 48 hour HT?					
Air: Refer to KAS COC for canister/flow controller requirements.	√ if air included				
7. Trip Blank present in cooler?					
8. Proper sample containers and volume?					
9. Samples within hold time upon receipt?					
10. Aqueous samples properly preserved? Metals, COD, NH3, TKN, O/G, phenol, TPO4, N+N, TOC, DRO, TPH – pH <2					
Sulfide - >9					
Cyanide – pH >12					

* Log-In Notes to Exceptions: document any problems with samples or discrepancies or pH adjustments.

Jennifer Obrin

From: Samchuck, Joseph [Joseph.Samchuck@tetratech.com]
Sent: Wednesday, June 24, 2015 1:34 PM
To: Jennifer Obrin; Thomson, Amy; Ved, Megan; Evans, Tim
Subject: RE: Login COC for the samples received 06/05 - PNSY WE32 OU8 -SI3897

Hi Jennifer,

I'm OK with using method 6020. Your note didn't identify the QC issue that affected the 6010 analysis but if switching to method 6020 is possible then that would be acceptable. As for the limits, I think you can use the limits associated with method 6020.

Thanks.

Joe

From: Jennifer Obrin [mailto:jobrin@katahdinlab.com]
Sent: Wednesday, June 24, 2015 12:52 PM
To: Thomson, Amy; Samchuck, Joseph; Ved, Megan; Evans, Tim
Subject: RE: Login COC for the samples received 06/05 - PNSY WE32 OU8 -SI3897

Good Afternoon,

The lab has come to me with a question regarding the soil samples for PNS under the SDG: OU8-1. They were wondering if it would be okay to report Antimony by SW6020 instead of SW6010. The limits are lower but we can change the limits to match the SW6010 limits that are in the QAPP if you would like to make things easier on your end. They are having issues with the QC passing which will delay the report if you need to keep it by SW6010.

Target List	EPA Method	Soil LOQ	Soil LODs	Soil MDLs
Metals -ICP		**mg/Kg**	**mg/Kg**	**mg/Kg**
Antimony	6010	0.80	0.50	0.070
Metals -ICPMS		**mg/Kg**	**mg/Kg**	**mg/Kg**
Antimony	6020	0.1	0.05	0.020

Please let me know what you think.
Thank you,

Jennifer Obrin
Federal Programs Project Manager

000006

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 4908 | PAGE 1 OF 1

215442

PROJECT NO: 1126-03270	FACILITY: OU8 / PNSY	PROJECT MANAGER: Megan Ved	PHONE NUMBER: 412 921-7271
LABORATORY NAME AND CONTACT: Katahdin Analytical / Jennifer Obrin			
SAMPLERS (SIGNATURE): [signature]		FIELD OPERATIONS LEADER: Tim Evans	PHONE NUMBER: 412 921 7281
ADDRESS: 600 Technology Way			
CARRIER/WAYBILL NUMBER:		CITY, STATE: Scarborough ME 04074	

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: 1

DATE YEAR 2015	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: PAHs (SIM) TAL Metals EPH	COMMENTS
6/1	1100	WTB-SS-11-0002	SB11	0	2	SO	G	1	1	
	1115	WTB-SB-11-0206	SB11	2	6	SO	G	1	1	
	1125	WTB-SB-11-0610	SB11	6	10	SO	G	1	1	
6/3	0915	WTB-~~SB~~ SS-14-0002	SB14	0	2	SO	G	1	1	
	0925	WTB-SB-14-0206	SB14	2	6	SO	G	1	1	
	0000	WTB-FD01-060315	—	—	—	QC	G	1	1	
	1020	WTB-SB-14-0607	SB14	6	7	SO	G	1	1	
	1035	WTB-SS-17-0002	SB17	0	2	SO	G	1	1	
	1040	WTB-SB-17-0206	SB17	2	6	SO	G	1	1	
	1045	WTB-SB-17-0610	SB17	6	10	SO	G	1	1	
	1100	WTB-SS-19-0002	SB19	0	2	SO	G	1	1	
	1105	WTB-SB-19-0206	SB19	2	6	SO	G	1	1	
	1115	WTB-SB-19-0610	SB19	6	10	SO	G	1	1	

1. RELINQUISHED BY [signature]	DATE 6/3/15	TIME 12:45	1. RECEIVED BY [signature]	DATE 6/3/15	TIME 12:45
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

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4/02R
FORM NO. TtNUS-001

000011

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 4909 | PAGE 1 OF 4 513897

PROJECT NO: 112G03270	FACILITY: 048 / PNSY	PROJECT MANAGER Megan Ved	PHONE NUMBER 412 921 7271
LABORATORY NAME AND CONTACT: Katahdin Analytical / Jennifer Obrin			
SAMPLERS (SIGNATURE) [signature] K Jarbut		FIELD OPERATIONS LEADER Tim Evans	PHONE NUMBER 412 921 7281
ADDRESS 600 Technology Way			
CARRIER/WAYBILL NUMBER		CITY, STATE Scarborough ME 04074	

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: -

DATE YEAR 2015	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: PAHs (SIM), EPH, TPH, metals	COMMENTS
6/3	1310	WTB-SS-22-0002	SB22	0	2	SO	G	1	1	
	1325	WTB-SS-24-0002	SB24	0	2	SO	G	1	1	
	1330	WTB-SB-24-0206	SB24	2	6	SO	G	1	1	
	1335	WTB-SB-24-06~~10~~ 9.7 (TC)	SB24	6	9.7	SO	G	3	3	+ ~~[illegible]~~ (TC) MS/MSD
	1405	WTB-SB-22-0206	SB22	2	6	SO	G	1	1	
	1410	WTB-SB-22-0610	SB22	6	10	SO	G	1	1	
	0000	WTB-FD02-060315	—	—	—	QC	G	1	1	
	1430	WTB-SS-23-0002	SB23	0	2	SO	G	1	1	*
	1435	WTB-SB-23-0206	SB23	2	6	SO	G	1	1	
	1440	WTB-SB-23-0610	SB23	6	10	SO	G	1	1	
6/4	0820	WTB-SS-08-0002	SB08	0	2	SO	G	1	1	
	0000	WTB-FD01-060415	—	—	—	QC	G	1	1	
	0825	WTB-SB-08-0206	SB08	2	6	SO	G	1	1	

1. RELINQUISHED BY [signature]	DATE 6/5/15	TIME 1250	1. RECEIVED BY [signature]	DATE 6/5/15	TIME ~~1250~~ 1300
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

000018

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FORM NO. TtNUS-001

S13897

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 4910 | PAGE 2 OF 4

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
112G03270	OU8 / PNSY	Megan Ved	412-921 7271	Katahdin Analytical / Jennifer O'brien
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
[signature] K Jalbert		Tim Evans	412 921 7281	600 Technology Way
		CARRIER/WAYBILL NUMBER		CITY, STATE
				Scarborough ME 04074

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: /
TYPE OF ANALYSIS: PAHs (SIM), EPH, TPH, metals

DATE YEAR 2015	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS									COMMENTS
6/4	0830	WTB-SB-08-0610	SB08	6	10	SO	G	1	1								
	0840	WTB-SBSS-09-0002	SB09	0	2	SO	G	1	1								
	0845	WTB-SB-09-0206	SB09	2	6	SO	G	1	1								
	0850	WTB-SB-09-0610	SB09	6	10	SO	G	1	1								*
	1005	WTB-SS-12-0002	SB12	0	2	SO	G	1	1								
	1008	WTB-SB-12-0206	↓	2	6	↓	↓	1	1								
	1015	WTB-SB-12-0610	↓	6	10	↓	↓	1	1								
	1025	WTB-SS-15-0002	SB15	0	2	SO	G	1	1								
	1030	WTB-SB-15-0206	SB15	2	6	↓	↓	1	1								
	0000	WTB-FD02-060415	—	—	—	QC	G	1	1								
	1035	WTB-SB-15-0610	SB15	6	10	SO	G	1	1								
	1105	WTB-SS-16-0002	SB16	0	2	SO	G	3	3								+MS/MSD
	1110	WTB-SB-16-0206	SB16	2	6	SO	G	1	1								

1. RELINQUISHED BY [signature]	DATE 6/5/15	TIME 1250	1. RECEIVED BY [signature]	DATE 6/5/15	TIME ~~1250~~ 1300
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME
COMMENTS					

00009

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4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 4911 | PAGE 3 OF 4

513847

PROJECT NO: 112G03270	FACILITY: OU8 / PNSY	PROJECT MANAGER: Megan Ved	PHONE NUMBER: 412-921-7281
LABORATORY NAME AND CONTACT: Katahdin Analytical / Jennifer O'Brien			
SAMPLERS (SIGNATURE): [signature] K Jarbut	FIELD OPERATIONS LEADER: Jim Evans	PHONE NUMBER: 412 921-7281	ADDRESS: 600 Technology Way
CARRIER/WAYBILL NUMBER			CITY, STATE: Scarborough ME 04074

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2015	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	PAHs (SIM), EPH, TAL metals	PAHs (SIM)	EPH	TAL metals					COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									G	G	G	P					
PRESERVATIVE USED									-	-	HCl	HNO_3					
6/4	1115	WTB-SB-16-0610	SB16	6	10	SO	G	1	1								
	1310	WTB-SB-18-0002	SB18	0	2	SO	G	1	1								*
	1315	WTB-SB-18-0206	SB18	2	6	SO	G	1	1								
	1320	WTB-SB-18-0610	SB18	6	10	SO	G	1	1								
	1335	WTB-SB-20-0002	SB20	0	2	SO	G	1	1								
	0000	WTB-FD03-060415	—	—	—	QC	G	1	1								
	1340	WTB-SB-20-0206	SB20	2	6	SO	G	3	3								+ MS/MSD
	1345	WTB-SB-20-0610	SB20	6	10	SO	G	1	1								
	1405	WTB-SS-21-0002	SB21	0	2	SO	G	1	1								
	1410	WTB-SB-21-0206	SB21	2	6	SO	G	1	1								
	1415	WTB-SB-21-0610	SB21	6	10	SO	G	1	1								
	1600	WTB-RB01-060415	Rinsate	—	—	QC	G	5		2	2	1					
6/5	0830	WTB-SS-13-0002	SB13	0	2	SO	G	1	1								

1. RELINQUISHED BY [signature]	DATE 6/5/15	TIME 1300	1. RECEIVED BY [signature]	DATE 6/5/15	TIME 1300
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

000002

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FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 4913 | PAGE 4 OF 4 S13897

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
112G03270	OU8/PNSY	Megan Ved	412 921 7271	Katahdin Analytical / Jennifer Obrien
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		Tim Evans	412 921-7281	600 Technology Way
		CARRIER/WAYBILL NUMBER		CITY, STATE
				Scarborough ME 04074

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2015	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED	TYPE OF ANALYSIS: PAHs (SIM), EPH, TPH, Metals	COMMENTS
6/5	0833	WTB-SB-13-0206	SB13	2	6	SO	G	1	G	1	1	
	0840	WTB-SB-13-0610	SB13	6	10	SO	G	1			1	
	0850	WTB-SB-10-0002	SB10	0	2	SO	G	1			1	
	0855	WTB-SB-10-0206	SB10	2	6	SO	G	1			1	
	1000	WTB-SB-10-0610	SB10	6	10	SO	G	1			1	

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	6/5/15	1300	1. RECEIVED BY	6/5/15	1300
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS

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4/02R
FORM NO. TtNUS-001

120000

METALS SAMPLE FLAGGING

FLAG	SPECIFIED MEANING
E	The reported value is estimated because of the presence of interference (as indicated by serial dilution).
N	The pre-digestion spiked sample recovery is not within control limits.
*	The duplicate sample analysis relative percent difference (RPD) is not within control limits.
B	Indicates the analyte was detected in the laboratory method blank analyzed concurrently with the sample.
A	The post-digestion spiked sample recovery is not within control limits.
•	Analytical run QC sample (e.g. ICV, CCV, ICB, CCB, ICSA, ICSAB) not within control limits.
U	The analyte was not detected above the specified level. This level may be the Limit of Quantitation (LOQ)(previously called Practical Quantitation Level (PQL)), the Limit of Detection (LOD) or Method Detection Limit (MDL) as required by the client. Note: All results reported as “U” MDL have a 50% rate for false negatives compared to those results reported as “U” PQL/LOQ or “U” LOD, where the rate of false negatives is <1%.
J	The analyte was detected in the sample at a concentration less than the laboratory Limit of Quantitation (LOQ) (previously called Practical Quantitation Limit (PQL)), but above the Method Detection Limit (MDL).

KATAHDIN ANALYTICAL SERVICES – INORGANIC DATA QUALIFIERS

The sampled date indicated on the attached Report(s) of Analysis (ROA) is the date for which a grab sample was collected or the date for which a composite sample was completed. Beginning and start times for composite samples can be found on the Chain-of-Custody.

U Indicates the compound was analyzed for but not detected above the specified level. This level may be the Limit of Quantitation (LOQ)(previously called Practical Quantitation Level (PQL)), the Limit of Detection (LOD) or Method Detection Limit (MDL) as required by the client.

Note: All results reported as "U" MDL have a 50% rate for false negatives compared to those results reported as "U" PQL/LOQ or "U" LOD, where the rate of false negatives is <1%.

E Estimated value. This flag identifies compounds whose concentrations exceed the upper level of the calibration range of the instrument for that specific analysis.

J Estimated value. The analyte was detected in the sample at a concentration less than the laboratory Limit of Quantitation (LOQ)(previously called Practical Quantitation Limit (PQL)), but above the Method Detection Limit (MDL).

I-7 The laboratory's Practical Quantitation Level could not be achieved for this parameter due to sample composition, matrix effects, sample volume, or quantity used for analysis.

A-4 Please refer to cover letter or narrative for further information.

H_ Please note that the regulatory holding time for _____ is "analyze immediately". Ideally, this analysis must be performed in the field at the time of sample collection. _____ for this sample was not performed at the time of sample collection. The analysis was performed as soon as possible after receipt by the laboratory.

H1 - pH H2 - DO H3 - sulfide H4 - residual chlorine

T1 The client did not provide the full volume of at least one liter for analysis of TSS. Therefore, the PQL of 2.5 mg/L could not be achieved.

T2 The client provided the required volume of at least one liter for analysis of TSS, but the laboratory could not filter the full one liter volume due to the sample matrix. Therefore, the PQL of 2.5 mg/L could not be achieved.

M1 The matrix spike and/or matrix spike duplicate recovery performed on this sample was outside of the laboratory acceptance criteria. Sample matrix is suspected. The laboratory criteria was met for the Laboratory Control Sample (LCS) analyzed concurrently with this sample.

M2 The matrix spike and/or matrix spike duplicate recovery was outside of the laboratory acceptance criteria. The native sample concentration is greater than four times the spike added concentration so the spike added could not be distinguished from the native sample concentration.

R1 The relative percent difference (RPD) between the duplicate analyses performed on this sample was outside of the laboratory acceptance criteria (when both values are greater than ten times the PQL).

MCL	Maximum Contaminant Level	NL	No limit
NFL	No Free Liquid Present	FLP	Free Liquid Present
NOD	No Odor Detected	TON	Threshold Odor Number

D-1 As required by Method 5210B, APHA Standard Methods for the Examination of Water and Wastewater (21st edition), the BOD value reported for this sample is 'qualified' because the check standard run concurrently with the sample analysis did not meet the criteria specified in the method (198 +/- 30.5 mg/L). These results may not be reportable for compliance purposes.

D-2 The measured final dissolved oxygen concentrations of all dilutions were less than the method-specified limit of 1 mg/L. The reported BOD result was calculated assuming a final oxygen concentration equal to 1 mg/L.

D-3 The dilution water used to prepare this sample did not meet the method and/or regulatory criteria of less than 0.2 or 0.4 mg/L dissolved oxygen (DO) uptake over the five day period of incubation. These results may not be reportable for compliance purposes.

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: Katahdin Analytical Services

SDG Name: OU8-1 **SOW No.** SW846

Client Field ID	Lab Sample ID
WTB-FD01-060315	SI3772-006
WTB-FD01-060415	SI3897-012
WTB-FD02-060315	SI3897-007
WTB-FD02-060415	SI3897-023
WTB-FD03-060415	SI3897-032
WTB-RB01-060415	SI3897-038
WTB-RB01-060415	SI3897-038D
WTB-RB01-060415	SI3897-038S
WTB-SB-08-0206	SI3897-013
WTB-SB-08-0610	SI3897-014
WTB-SB-09-0206	SI3897-016
WTB-SB-09-0610	SI3897-017
WTB-SB-10-0206	SI3897-043
WTB-SB-10-0610	SI3897-044
WTB-SB-11-0206	SI3772-002
WTB-SB-11-0610	SI3772-003
WTB-SB-12-0206	SI3897-019
WTB-SB-12-0610	SI3897-020
WTB-SB-13-0206	SI3897-040
WTB-SB-13-0610	SI3897-041
WTB-SB-14-0206	SI3772-005
WTB-SB-14-0607	SI3772-007
WTB-SB-15-0206	SI3897-022
WTB-SB-15-0610	SI3897-024

Were ICP interelement corrections applied ?	Yes
Were ICP background corrections applied ?	Yes
If yes - were raw data generated before application of background corrections ?	No

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Edward A. Morgan Name: Edward A. Morgan

Date: June 30, 2015 Title: Senior Analyst

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: Katahdin Analytical Services

SDG Name: OU8-1 **SOW No.** SW846

Client Field ID	Lab Sample ID
WTB-SB-16-0206	SI3897-026
WTB-SB-16-0610	SI3897-027
WTB-SB-17-0206	SI3772-009
WTB-SB-17-0610	SI3772-010
WTB-SB-18-0206	SI3897-029
WTB-SB-18-0610	SI3897-030
WTB-SB-19-0206	SI3772-012
WTB-SB-19-0610	SI3772-013
WTB-SB-20-0206	SI3897-033
WTB-SB-20-0206	SI3897-033D
WTB-SB-20-0206	SI3897-033P
WTB-SB-20-0206	SI3897-033S
WTB-SB-20-0610	SI3897-034
WTB-SB-21-0206	SI3897-036
WTB-SB-21-0610	SI3897-037
WTB-SB-22-0206	SI3897-005
WTB-SB-22-0610	SI3897-006
WTB-SB-23-0206	SI3897-009
WTB-SB-23-0610	SI3897-010
WTB-SB-24-0206	SI3897-003
WTB-SB-24-069.7	SI3897-004
WTB-SB-24-069.7	SI3897-004D
WTB-SB-24-069.7	SI3897-004P
WTB-SB-24-069.7	SI3897-004S

Were ICP interelement corrections applied ?	Yes
Were ICP background corrections applied ?	Yes
If yes - were raw data generated before application of background corrections ?	No

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Edward A. Morgan Name: Edward A. Morgan

Date: June 30, 2015 Title: Senior Analyst

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: Katahdin Analytical Services

SDG Name: OU8-1 **SOW No.** SW846

Client Field ID	Lab Sample ID
WTB-SS-08-0002	SI3897-011
WTB-SS-09-0002	SI3897-015
WTB-SS-10-0002	SI3897-042
WTB-SS-11-0002	SI3772-001
WTB-SS-11-0002	SI3772-001D
WTB-SS-11-0002	SI3772-001S
WTB-SS-12-0002	SI3897-018
WTB-SS-13-0002	SI3897-039
WTB-SS-14-0002	SI3772-004
WTB-SS-15-0002	SI3897-021
WTB-SS-16-0002	SI3897-025
WTB-SS-16-0002	SI3897-025D
WTB-SS-16-0002	SI3897-025P
WTB-SS-16-0002	SI3897-025S
WTB-SS-17-0002	SI3772-008
WTB-SS-18-0002	SI3897-028
WTB-SS-19-0002	SI3772-011
WTB-SS-20-0002	SI3897-031
WTB-SS-21-0002	SI3897-035
WTB-SS-22-0002	SI3897-001
WTB-SS-23-0002	SI3897-008
WTB-SS-24-0002	SI3897-002

Were ICP interelement corrections applied ?	Yes
Were ICP background corrections applied ?	Yes
If yes - were raw data generated before application of background corrections ?	No

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Edward A. Morgan Name: Edward A. Morgan

Date: June 30, 2015 Title: Senior Analyst

ANALYTE	WTB-SB-14-0206	DUPLICATE	RL	RPD	STATUS	ORIGINAL SAMPLE CONC >5xRL	DUPLICATE SAMPLE CONC >5xRL	DIFFERENCE >4XRL
ALUMINUM	7090	8300	26	15.7245	FALSE	TRUE	TRUE	TRUE
ANTIMONY	0.35	0.11	0.086	104.3478	TRUE	FALSE	FALSE	FALSE
ARSENIC	10.9	12.4	0.43	12.87554	FALSE	TRUE	TRUE	FALSE
BARIUM	34.3	41.5	0.43	18.99736	FALSE	TRUE	TRUE	TRUE
BERYLLIUM	0.348	0.379	0.43	8.528198	FALSE	FALSE	FALSE	FALSE
CADMIUM	0.254	0.416	0.43	48.35821	FALSE	FALSE	FALSE	FALSE
CALCIUM	1450	1290	8.6	11.67883	FALSE	TRUE	TRUE	TRUE
CHROMIUM	50.9	52.2	0.86	2.521823	FALSE	TRUE	TRUE	FALSE
COBALT	5.64	6.33	0.086	11.52882	FALSE	TRUE	TRUE	TRUE
COPPER	19.2	21.4	2.2	10.83744	FALSE	TRUE	TRUE	FALSE
IRON	14200	16200	8.6	13.15789	FALSE	TRUE	TRUE	TRUE
LEAD	18.5	17.9	0.43	3.296703	FALSE	TRUE	TRUE	FALSE
MAGNESIUM	3530	4890	8.6	32.30404	FALSE	TRUE	TRUE	TRUE
MANGANESE	202	225	0.43	10.77283	FALSE	TRUE	TRUE	TRUE
MERCURY	0.012	0.014	0.027	15.38462	FALSE	FALSE	FALSE	FALSE
NICKEL	22.1	25.3	0.86	13.50211	FALSE	TRUE	TRUE	FALSE
POTASSIUM	1530	1830	86	17.85714	FALSE	TRUE	TRUE	FALSE
SELENIUM	0.37	0.32	0.86	14.49275	FALSE	FALSE	FALSE	FALSE
SILVER	0.368	0.1	0.86	114.5299	TRUE	FALSE	FALSE	FALSE
SODIUM	283	277	86	2.142857	FALSE	FALSE	FALSE	FALSE
THALLIUM	0.121	0.129	0.086	6.4	FALSE	FALSE	FALSE	FALSE
VANADIUM	15.6	18.8	0.86	18.60465	FALSE	TRUE	TRUE	FALSE
ZINC	151	204	1.7	29.85915	FALSE	TRUE	TRUE	TRUE

ANALYTE	WTB-SS-08-0002	DUPLICATE	RL	RPD	STATUS	ORIGINAL SAMPLE CONC >5xRL	DUPLICATE SAMPLE CONC >5xRL	DIFFERENCE >4XRL
ALUMINUM	6330	6270	29	0.952381	FALSE	TRUE	TRUE	FALSE
ANTIMONY	0.965	0.499	0.097	63.6612	TRUE	TRUE	TRUE	TRUE
ARSENIC	18	17.1	0.48	5.128205	FALSE	TRUE	TRUE	FALSE
BARIUM	46	40.2	0.48	13.45708	FALSE	TRUE	TRUE	TRUE
BERYLLIUM	0.34	0.339	0.48	0.294551	FALSE	FALSE	FALSE	FALSE
CADMIUM	0.805	0.407	0.48	65.67657	TRUE	FALSE	FALSE	FALSE
CALCIUM	1950	1700	9.7	13.69863	FALSE	TRUE	TRUE	TRUE
CHROMIUM	76	46.3	0.97	48.56909	FALSE	TRUE	TRUE	TRUE
COBALT	8.94	8.46	0.097	5.517241	FALSE	TRUE	TRUE	TRUE
COPPER	159	89.7	2.4	55.72979	TRUE	TRUE	TRUE	TRUE
IRON	28200	19800	9.7	35	FALSE	TRUE	TRUE	TRUE
LEAD	268	127	0.48	71.39241	TRUE	TRUE	TRUE	TRUE
MAGNESIUM	3650	3840	9.7	5.073431	FALSE	TRUE	TRUE	TRUE
MANGANESE	316	286	0.48	9.966777	FALSE	TRUE	TRUE	TRUE
MERCURY	0.786	1.24	0.033	44.81737	FALSE	TRUE	TRUE	TRUE
NICKEL	83.9	51.2	0.97	48.40859	FALSE	TRUE	TRUE	TRUE
POTASSIUM	1140	1260	97	10	FALSE	TRUE	TRUE	FALSE
SELENIUM	1.2	0.68	0.97	55.31915	TRUE	FALSE	FALSE	FALSE
SILVER	0.44	0.14	0.97	103.4483	TRUE	FALSE	FALSE	FALSE
SODIUM	158	177	97	11.34328	FALSE	FALSE	FALSE	FALSE
THALLIUM	0.111	0.115	0.097	3.539823	FALSE	FALSE	FALSE	FALSE
VANADIUM	23	20.8	0.97	10.04566	FALSE	TRUE	TRUE	FALSE
ZINC	278	161	1.9	53.30296	TRUE	TRUE	TRUE	TRUE

ANALYTE	WTB-SB-22-0610	DUPLICATE	RL	RPD	STATUS	ORIGINAL SAMPLE CONC >5xRL	DUPLICATE SAMPLE CONC >5xRL	DIFFERENCE >4XRL
ALUMINUM	11900	5360	76	75.78216	TRUE	TRUE	TRUE	TRUE
ANTIMONY	0.077	0.55	0.13	150.8772	TRUE	FALSE	FALSE	FALSE
ARSENIC	12.7	15.9	0.63	22.37762	FALSE	TRUE	TRUE	TRUE
BARIUM	93.9	274	1.3	97.90704	TRUE	TRUE	TRUE	TRUE
BERYLLIUM	0.77	0.642	1.3	18.13031	FALSE	FALSE	FALSE	FALSE
CADMIUM	0.197	0.204	1.3	3.491272	FALSE	FALSE	FALSE	FALSE
CALCIUM	1780	9120	25	134.6789	TRUE	TRUE	TRUE	TRUE
CHROMIUM	29	27.4	2.5	5.673759	FALSE	TRUE	TRUE	FALSE
COBALT	12.4	7.95	0.13	43.73464	FALSE	TRUE	TRUE	TRUE
COPPER	70.2	190	6.3	92.08301	TRUE	TRUE	TRUE	TRUE
IRON	18600	27900	25	40	FALSE	TRUE	TRUE	TRUE
LEAD	131	438	1.3	107.9086	TRUE	TRUE	TRUE	TRUE
MAGNESIUM	4060	3460	25	15.95745	FALSE	TRUE	TRUE	TRUE
MANGANESE	1220	239	0.63	134.4757	TRUE	TRUE	TRUE	TRUE
MERCURY	0.655	0.485	0.043	29.82456	FALSE	TRUE	TRUE	FALSE
NICKEL	23.6	24.5	2.5	3.742204	FALSE	TRUE	TRUE	FALSE
POTASSIUM	1730	2030	250	15.95745	FALSE	TRUE	TRUE	FALSE
SELENIUM	0.8	0.49	1.3	48.06202	FALSE	FALSE	FALSE	FALSE
SILVER	0.18	0.2	2.5	10.52632	FALSE	FALSE	FALSE	FALSE
SODIUM	345	890	250	88.25911	TRUE	FALSE	FALSE	FALSE
THALLIUM	0.182	0.149	0.13	19.93958	FALSE	FALSE	FALSE	FALSE
VANADIUM	23.9	27.8	2.5	15.08704	FALSE	TRUE	TRUE	FALSE
ZINC	87.7	158	5	57.22426	TRUE	TRUE	TRUE	TRUE

ANALYTE	WTB-SB-15-0206	DUPLICATE	RL	RPD	STATUS	ORIGINAL SAMPLE CONC >5xRL	DUPLICATE SAMPLE CONC >5xRL	DIFFERENCE >4XRL
ALUMINUM	11600	10400	26	10.90909	FALSE	TRUE	TRUE	TRUE
ANTIMONY	0.11	0.12	0.085	8.695652	FALSE	FALSE	FALSE	FALSE
ARSENIC	11.5	12.5	0.43	8.333333	FALSE	TRUE	TRUE	FALSE
BARIUM	43.9	47.7	0.43	8.296943	FALSE	TRUE	TRUE	TRUE
BERYLLIUM	0.49	0.498	0.43	1.619433	FALSE	FALSE	FALSE	FALSE
CADMIUM	0.263	0.153	0.43	52.88462	TRUE	FALSE	FALSE	FALSE
CALCIUM	2200	1920	8.5	13.59223	FALSE	TRUE	TRUE	TRUE
CHROMIUM	38.9	29	0.85	29.16053	FALSE	TRUE	TRUE	TRUE
COBALT	9.51	7.09	0.085	29.15663	FALSE	TRUE	TRUE	TRUE
COPPER	45.1	30.4	2.1	38.9404	FALSE	TRUE	TRUE	TRUE
IRON	17500	16300	8.5	7.100592	FALSE	TRUE	TRUE	TRUE
LEAD	41.3	40.1	0.43	2.948403	FALSE	TRUE	TRUE	FALSE
MAGNESIUM	6160	4540	8.5	30.28037	FALSE	TRUE	TRUE	TRUE
MANGANESE	315	272	0.43	14.65077	FALSE	TRUE	TRUE	TRUE
MERCURY	0.209	0.254	0.036	19.43844	FALSE	TRUE	TRUE	FALSE
NICKEL	35.1	25.7	0.85	30.92105	FALSE	TRUE	TRUE	TRUE
POTASSIUM	1430	1670	85	15.48387	FALSE	TRUE	TRUE	FALSE
SELENIUM	0.54	0.6	0.85	10.52632	FALSE	FALSE	FALSE	FALSE
SILVER	0.31	0.22	0.85	33.96226	FALSE	FALSE	FALSE	FALSE
SODIUM	637	696	85	8.852213	FALSE	TRUE	TRUE	FALSE
THALLIUM	0.138	0.146	0.085	5.633803	FALSE	FALSE	FALSE	FALSE
VANADIUM	27.1	23	0.85	16.36727	FALSE	TRUE	TRUE	TRUE
ZINC	65.8	64.6	1.7	1.840491	FALSE	TRUE	TRUE	FALSE

ANALYTE	WTB-SS-20-0002	DUPLICATE	RL	RPD	STATUS	ORIGINAL SAMPLE CONC >5xRL	DUPLICATE SAMPLE CONC >5xRL	DIFFERENCE >4XRL
ALUMINUM	18600	17400	32	6.666667	FALSE	TRUE	TRUE	TRUE
ANTIMONY	0.31	0.276	0.11	11.6041	FALSE	FALSE	FALSE	FALSE
ARSENIC	13.3	13.6	0.54	2.230483	FALSE	TRUE	TRUE	FALSE
BARIUM	239	114	0.54	70.82153	TRUE	TRUE	TRUE	TRUE
BERYLLIUM	1.09	1.06	0.54	2.790698	FALSE	FALSE	FALSE	FALSE
CADMIUM	0.636	0.752	0.54	16.7147	FALSE	FALSE	FALSE	FALSE
CALCIUM	2480	2490	11	0.402414	FALSE	TRUE	TRUE	FALSE
CHROMIUM	47.1	51.8	1.1	9.50455	FALSE	TRUE	TRUE	TRUE
COBALT	11.7	11.4	0.11	2.597403	FALSE	TRUE	TRUE	FALSE
COPPER	291	231	2.7	22.98851	FALSE	TRUE	TRUE	TRUE
IRON	30200	27500	22	9.358752	FALSE	TRUE	TRUE	TRUE
LEAD	703	363	0.54	63.78987	TRUE	TRUE	TRUE	TRUE
MAGNESIUM	7600	7560	22	0.527704	FALSE	TRUE	TRUE	FALSE
MANGANESE	457	375	0.54	19.71154	FALSE	TRUE	TRUE	TRUE
MERCURY	0.42	0.38	0.03	10	FALSE	TRUE	TRUE	FALSE
NICKEL	65.9	64.8	1.1	1.683244	FALSE	TRUE	TRUE	FALSE
POTASSIUM	4560	3700	110	20.82324	FALSE	TRUE	TRUE	TRUE
SELENIUM	0.52	0.62	1.1	17.54386	FALSE	FALSE	FALSE	FALSE
SILVER	0.438	89300	1.1	199.998	TRUE	FALSE	TRUE	TRUE
SODIUM	750	749	110	0.133422	FALSE	TRUE	TRUE	FALSE
THALLIUM	0.32	0.281	0.11	12.97837	FALSE	FALSE	FALSE	FALSE
VANADIUM	41.6	39.4	1.1	5.432099	FALSE	TRUE	TRUE	FALSE
ZINC	519	416	2.2	22.03209	FALSE	TRUE	TRUE	TRUE

PREPARATION LOG

Lab Name: Katahdin Analytical Services **QC Batch ID:** IF04ICS1

Matrix: SOIL **SDG Name:** OU8-1

Method: P **Prep Date:** 06/04/2015

Client ID	Lab Sample ID	Initial (g)	Final (L)	Bottle ID
LCSOIF04ICS1	LCSOIF04ICS1	1	0.1	
PBSIF04ICS1	PBSIF04ICS1	1	0.1	
WTB-SS-11-0002	SI3772-001	1.69	0.1	A
WTB-SS-11-0002D	SI3772-001D	1.71	0.1	A
WTB-SS-11-0002S	SI3772-001S	1.69	0.1	A
WTB-SB-11-0610	SI3772-003	1.08	0.1	A
WTB-SS-14-0002	SI3772-004	1.6	0.1	A
WTB-SB-14-0206	SI3772-005	1.51	0.1	A
WTB-FD01-060315	SI3772-006	1.22	0.1	A
WTB-SB-14-0607	SI3772-007	1.15	0.1	A
WTB-SS-17-0002	SI3772-008	1.36	0.1	A
WTB-SB-17-0206	SI3772-009	1.24	0.1	A
WTB-SB-17-0610	SI3772-010	1.68	0.1	A
WTB-SS-19-0002	SI3772-011	1.59	0.1	A
WTB-SB-19-0206	SI3772-012	1.25	0.1	A
WTB-SB-19-0610	SI3772-013	1.09	0.1	A

PREPARATION LOG

Lab Name: Katahdin Analytical Services **QC Batch ID:** IF04IMS1

Matrix: SOIL **SDG Name:** OU8-1

Method: MS **Prep Date:** 06/04/2015

Client ID	Lab Sample ID	Initial (g)	Final (L)	Bottle ID
LCSOIF04IMS1	LCSOIF04IMS1	1	0.1	
PBSIF04IMS1	PBSIF04IMS1	1	0.1	
WTB-SS-11-0002	SI3772-001	1.69	0.1	A
WTB-SS-11-0002D	SI3772-001D	1.71	0.1	A
WTB-SS-11-0002S	SI3772-001S	1.69	0.1	A
WTB-SB-11-0610	SI3772-003	1.08	0.1	A
WTB-SS-14-0002	SI3772-004	1.6	0.1	A
WTB-SB-14-0206	SI3772-005	1.51	0.1	A
WTB-FD01-060315	SI3772-006	1.22	0.1	A
WTB-SB-14-0607	SI3772-007	1.15	0.1	A
WTB-SS-17-0002	SI3772-008	1.36	0.1	A
WTB-SB-17-0206	SI3772-009	1.24	0.1	A
WTB-SB-17-0610	SI3772-010	1.68	0.1	A
WTB-SS-19-0002	SI3772-011	1.59	0.1	A
WTB-SB-19-0206	SI3772-012	1.25	0.1	A
WTB-SB-19-0610	SI3772-013	1.09	0.1	A

PREPARATION LOG

Lab Name: Katahdin Analytical Services **QC Batch ID:** IF05ICS1

Matrix: SOIL **SDG Name:** OU8-1

Method: P **Prep Date:** 06/05/2015

Client ID	Lab Sample ID	Initial (g)	Final (L)	Bottle ID
LCSOIF05ICS1	LCSOIF05ICS1	1	0.1	
PBSIF05ICS1	PBSIF05ICS1	1	0.1	
WTB-SB-11-0206	SI3772-002	1.01	0.1	A

PREPARATION LOG

Lab Name: Katahdin Analytical Services **QC Batch ID:** IF05IMS1

Matrix: SOIL **SDG Name:** OU8-1

Method: MS **Prep Date:** 06/05/2015

Client ID	Lab Sample ID	Initial (g)	Final (L)	Bottle ID
LCSOIF05IMS1	LCSOIF05IMS1	1	0.1	
PBSIF05IMS1	PBSIF05IMS1	1	0.1	
WTB-SB-11-0206	SI3772-002	1.01	0.1	A

PREPARATION LOG

Lab Name: Katahdin Analytical Services **QC Batch ID:** IF08ICW3

Matrix: WATER **SDG Name:** OU8-1

Method: P **Prep Date:** 06/08/2015

Client ID	Lab Sample ID	Initial (L)	Final (L)	Bottle ID
LCSWIF08ICW3	LCSWIF08ICW3	0.05	0.05	
PBWIF08ICW3	PBWIF08ICW3	0.05	0.05	
WTB-RB01-060415	SI3897-038	0.05	0.05	A
WTB-RB01-060415D	SI3897-038D	0.05	0.05	A
WTB-RB01-060415S	SI3897-038S	0.05	0.05	A

PREPARATION LOG

Lab Name: Katahdin Analytical Services **QC Batch ID:** IF08IMW2

Matrix: WATER **SDG Name:** OU8-1

Method: MS **Prep Date:** 06/08/2015

Client ID	Lab Sample ID	Initial (L)	Final (L)	Bottle ID
LCSWIF08IMW2	LCSWIF08IMW2	0.05	0.05	
PBWIF08IMW2	PBWIF08IMW2	0.05	0.05	
WTB-RB01-060415	SI3897-038	0.05	0.05	A
WTB-RB01-060415D	SI3897-038D	0.05	0.05	A
WTB-RB01-060415S	SI3897-038S	0.05	0.05	A

PREPARATION LOG

Lab Name: Katahdin Analytical Services **QC Batch ID:** IF09ICS1

Matrix: SOIL **SDG Name:** OU8-1

Method: P **Prep Date:** 06/09/2015

Client ID	Lab Sample ID	Initial (g)	Final (L)	Bottle ID
LCSOIF09ICS1	LCSOIF09ICS1	1	0.1	
PBSIF09ICS1	PBSIF09ICS1	1	0.1	
WTB-SS-22-0002	SI3897-001	1.71	0.1	A
WTB-SS-24-0002	SI3897-002	1.15	0.1	A
WTB-SB-24-0206	SI3897-003	1.14	0.1	A
WTB-SB-24-069.7	SI3897-004	1.19	0.1	A
WTB-SB-24-069.7D	SI3897-004D	1.2	0.1	A
WTB-SB-24-069.7P	SI3897-004P	1.2	0.1	A
WTB-SB-24-069.7S	SI3897-004S	1.21	0.1	A
WTB-SB-22-0206	SI3897-005	1.03	0.1	A
WTB-SB-22-0610	SI3897-006	1.03	0.1	A
WTB-FD02-060315	SI3897-007	1.06	0.1	A
WTB-SS-23-0002	SI3897-008	1.07	0.1	A
WTB-SB-23-0206	SI3897-009	1.03	0.1	A
WTB-SB-23-0610	SI3897-010	1.05	0.1	A
WTB-SS-08-0002	SI3897-011	1.24	0.1	A
WTB-FD01-060415	SI3897-012	1.11	0.1	A
WTB-SB-08-0206	SI3897-013	1.11	0.1	A
WTB-SB-08-0610	SI3897-014	1.49	0.1	A
WTB-SS-09-0002	SI3897-015	1.37	0.1	A
WTB-SB-09-0206	SI3897-016	1.2	0.1	A

PREPARATION LOG

Lab Name: Katahdin Analytical Services **QC Batch ID:** IF09IMS1

Matrix: SOIL **SDG Name:** OU8-1

Method: MS **Prep Date:** 06/09/2015

Client ID	Lab Sample ID	Initial (g)	Final (L)	Bottle ID
LCSOIF09IMS1	LCSOIF09IMS1	1	0.1	
PBSIF09IMS1	PBSIF09IMS1	1	0.1	
WTB-SS-22-0002	SI3897-001	1.71	0.1	A
WTB-SS-24-0002	SI3897-002	1.15	0.1	A
WTB-SB-24-0206	SI3897-003	1.14	0.1	A
WTB-SB-24-069.7	SI3897-004	1.19	0.1	A
WTB-SB-24-069.7D	SI3897-004D	1.2	0.1	A
WTB-SB-24-069.7P	SI3897-004P	1.2	0.1	A
WTB-SB-24-069.7S	SI3897-004S	1.21	0.1	A
WTB-SB-22-0206	SI3897-005	1.03	0.1	A
WTB-SB-22-0610	SI3897-006	1.03	0.1	A
WTB-FD02-060315	SI3897-007	1.06	0.1	A
WTB-SS-23-0002	SI3897-008	1.07	0.1	A
WTB-SB-23-0206	SI3897-009	1.03	0.1	A
WTB-SB-23-0610	SI3897-010	1.05	0.1	A
WTB-SS-08-0002	SI3897-011	1.24	0.1	A
WTB-FD01-060415	SI3897-012	1.11	0.1	A
WTB-SB-08-0206	SI3897-013	1.11	0.1	A
WTB-SB-08-0610	SI3897-014	1.49	0.1	A
WTB-SS-09-0002	SI3897-015	1.37	0.1	A
WTB-SB-09-0206	SI3897-016	1.2	0.1	A

PREPARATION LOG

Lab Name: Katahdin Analytical Services **QC Batch ID:** IF10HGS1

Matrix: SOIL **SDG Name:** OU8-1

Method: CV **Prep Date:** 06/10/2015

Client ID	Lab Sample ID	Initial (g)	Final (L)	Bottle ID
LCSOIF10HGS1	LCSOIF10HGS1	0.6	0.1	
PBSIF10HGS1	PBSIF10HGS1	0.6	0.1	
WTB-SS-22-0002	SI3897-001	0.67	0.1	A
WTB-SS-24-0002	SI3897-002	0.79	0.1	A
WTB-SB-24-0206	SI3897-003	0.78	0.1	A
WTB-SB-24-069.7	SI3897-004	0.82	0.1	A
WTB-SB-24-069.7D	SI3897-004D	0.83	0.1	A
WTB-SB-24-069.7P	SI3897-004P	0.82	0.1	A
WTB-SB-24-069.7S	SI3897-004S	0.83	0.1	A
WTB-SB-22-0206	SI3897-005	0.69	0.1	A
WTB-SB-22-0610	SI3897-006	0.63	0.1	A
WTB-FD02-060315	SI3897-007	0.62	0.1	A
WTB-SS-23-0002	SI3897-008	0.74	0.1	A
WTB-SB-23-0206	SI3897-009	0.65	0.1	A
WTB-SB-23-0610	SI3897-010	0.72	0.1	A
WTB-SS-08-0002	SI3897-011	0.61	0.1	A
WTB-FD01-060415	SI3897-012	0.65	0.1	A
WTB-SB-08-0206	SI3897-013	0.69	0.1	A

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PREPARATION LOG

Lab Name: Katahdin Analytical Services **QC Batch ID:** IF10ICS1

Matrix: SOIL **SDG Name:** OU8-1

Method: P **Prep Date:** 06/10/2015

Client ID	Lab Sample ID	Initial (g)	Final (L)	Bottle ID
LCSOIF10ICS1	LCSOIF10ICS1	1	0.1	
PBSIF10ICS1	PBSIF10ICS1	1	0.1	
WTB-SB-09-0610	SI3897-017	1.19	0.1	A
WTB-SS-12-0002	SI3897-018	1.33	0.1	A
WTB-SB-12-0206	SI3897-019	1.09	0.1	A
WTB-SB-12-0610	SI3897-020	1.08	0.1	A
WTB-SS-15-0002	SI3897-021	1.51	0.1	A
WTB-SB-15-0206	SI3897-022	1.51	0.1	A
WTB-FD02-060415	SI3897-023	1.37	0.1	A
WTB-SB-15-0610	SI3897-024	1.01	0.1	A
WTB-SS-16-0002	SI3897-025	1.01	0.1	B
WTB-SS-16-0002D	SI3897-025D	1.01	0.1	B
WTB-SS-16-0002P	SI3897-025P	1	0.1	B
WTB-SS-16-0002S	SI3897-025S	1.02	0.1	B
WTB-SB-16-0206	SI3897-026	1.25	0.1	A

PREPARATION LOG

Lab Name: Katahdin Analytical Services **QC Batch ID:** IF10IMS1

Matrix: SOIL **SDG Name:** OU8-1

Method: MS **Prep Date:** 06/10/2015

Client ID	Lab Sample ID	Initial (g)	Final (L)	Bottle ID
LCSOIF10IMS1	LCSOIF10IMS1	1	0.1	
PBSIF10IMS1	PBSIF10IMS1	1	0.1	
WTB-SB-09-0610	SI3897-017	1.19	0.1	A
WTB-SS-12-0002	SI3897-018	1.33	0.1	A
WTB-SB-12-0206	SI3897-019	1.09	0.1	A
WTB-SB-12-0610	SI3897-020	1.08	0.1	A
WTB-SS-15-0002	SI3897-021	1.51	0.1	A
WTB-SB-15-0206	SI3897-022	1.51	0.1	A
WTB-FD02-060415	SI3897-023	1.37	0.1	A
WTB-SB-15-0610	SI3897-024	1.01	0.1	A
WTB-SS-16-0002	SI3897-025	1.01	0.1	B
WTB-SS-16-0002D	SI3897-025D	1.01	0.1	B
WTB-SS-16-0002P	SI3897-025P	1	0.1	B
WTB-SS-16-0002S	SI3897-025S	1.02	0.1	B
WTB-SB-16-0206	SI3897-026	1.25	0.1	A

PREPARATION LOG

Lab Name: Katahdin Analytical Services **QC Batch ID:** IF11ICS1

Matrix: SOIL **SDG Name:** OU8-1

Method: P **Prep Date:** 06/11/2015

Client ID	Lab Sample ID	Initial (g)	Final (L)	Bottle ID
LCSOIF11ICS1	LCSOIF11ICS1	1	0.1	
PBSIF11ICS1	PBSIF11ICS1	1	0.1	
WTB-SB-16-0610	SI3897-027	1.13	0.1	A
WTB-SS-18-0002	SI3897-028	1.11	0.1	A
WTB-SB-18-0206	SI3897-029	1.22	0.1	A
WTB-SB-18-0610	SI3897-030	1.19	0.1	A
WTB-SS-20-0002	SI3897-031	1.11	0.1	A
WTB-FD03-060415	SI3897-032	1.35	0.1	A
WTB-SB-20-0206	SI3897-033	1.09	0.1	A
WTB-SB-20-0206D	SI3897-033D	1.08	0.1	A
WTB-SB-20-0206P	SI3897-033P	1.1	0.1	A
WTB-SB-20-0206S	SI3897-033S	1.09	0.1	A
WTB-SB-20-0610	SI3897-034	1.09	0.1	A
WTB-SS-21-0002	SI3897-035	1.08	0.1	A
WTB-SB-21-0206	SI3897-036	1.4	0.1	A
WTB-SB-21-0610	SI3897-037	1.25	0.1	A
WTB-SS-13-0002	SI3897-039	1.25	0.1	A
WTB-SB-13-0206	SI3897-040	1.32	0.1	A
WTB-SB-13-0610	SI3897-041	1.09	0.1	A
WTB-SS-10-0002	SI3897-042	1.1	0.1	A
WTB-SB-10-0206	SI3897-043	1.46	0.1	A
WTB-SB-10-0610	SI3897-044	1.31	0.1	A

PREPARATION LOG

Lab Name: Katahdin Analytical Services **QC Batch ID:** IF11IMS1

Matrix: SOIL **SDG Name:** OU8-1

Method: MS **Prep Date:** 06/11/2015

Client ID	Lab Sample ID	Initial (g)	Final (L)	Bottle ID
LCSOIF11IMS1	LCSOIF11IMS1	1	0.1	
PBSIF11IMS1	PBSIF11IMS1	1	0.1	
WTB-SB-16-0610	SI3897-027	1.13	0.1	A
WTB-SS-18-0002	SI3897-028	1.11	0.1	A
WTB-SB-18-0206	SI3897-029	1.22	0.1	A
WTB-SB-18-0610	SI3897-030	1.19	0.1	A
WTB-SS-20-0002	SI3897-031	1.11	0.1	A
WTB-FD03-060415	SI3897-032	1.35	0.1	A
WTB-SB-20-0206	SI3897-033	1.09	0.1	A
WTB-SB-20-0206D	SI3897-033D	1.08	0.1	A
WTB-SB-20-0206P	SI3897-033P	1.1	0.1	A
WTB-SB-20-0206S	SI3897-033S	1.09	0.1	A
WTB-SB-20-0610	SI3897-034	1.09	0.1	A
WTB-SS-21-0002	SI3897-035	1.08	0.1	A
WTB-SB-21-0206	SI3897-036	1.4	0.1	A
WTB-SB-21-0610	SI3897-037	1.25	0.1	A
WTB-SS-13-0002	SI3897-039	1.25	0.1	A
WTB-SB-13-0206	SI3897-040	1.32	0.1	A
WTB-SB-13-0610	SI3897-041	1.09	0.1	A
WTB-SS-10-0002	SI3897-042	1.1	0.1	A
WTB-SB-10-0206	SI3897-043	1.46	0.1	A
WTB-SB-10-0610	SI3897-044	1.31	0.1	A

PREPARATION LOG

Lab Name: Katahdin Analytical Services **QC Batch ID:** IF12HGS1

Matrix: SOIL **SDG Name:** OU8-1

Method: CV **Prep Date:** 06/12/2015

Client ID	Lab Sample ID	Initial (g)	Final (L)	Bottle ID
LCSOIF12HGS1	LCSOIF12HGS1	0.6	0.1	
PBSIF12HGS1	PBSIF12HGS1	0.6	0.1	
WTB-SS-11-0002	SI3772-001	0.67	0.1	A
WTB-SS-11-0002D	SI3772-001D	0.68	0.1	A
WTB-SS-11-0002S	SI3772-001S	0.66	0.1	A
WTB-SB-11-0206	SI3772-002	0.66	0.1	A
WTB-SB-11-0610	SI3772-003	0.77	0.1	A
WTB-SS-14-0002	SI3772-004	0.75	0.1	A
WTB-SB-14-0206	SI3772-005	0.76	0.1	A
WTB-FD01-060315	SI3772-006	0.79	0.1	A
WTB-SB-14-0607	SI3772-007	0.78	0.1	A
WTB-SS-17-0002	SI3772-008	0.67	0.1	A
WTB-SB-17-0206	SI3772-009	0.71	0.1	A
WTB-SB-17-0610	SI3772-010	0.64	0.1	A
WTB-SS-19-0002	SI3772-011	0.7	0.1	A
WTB-SB-19-0206	SI3772-012	0.66	0.1	A
WTB-SB-19-0610	SI3772-013	0.62	0.1	A

PREPARATION LOG

Lab Name: Katahdin Analytical Services **QC Batch ID:** IF12HGS2

Matrix: SOIL **SDG Name:** OU8-1

Method: CV **Prep Date:** 06/12/2015

Client ID	Lab Sample ID	Initial (g)	Final (L)	Bottle ID
LCSOIF12HGS2	LCSOIF12HGS2	0.6	0.1	
PBSIF12HGS2	PBSIF12HGS2	0.6	0.1	
WTB-SB-08-0610	SI3897-014	0.63	0.1	A
WTB-SS-09-0002	SI3897-015	0.62	0.1	A
WTB-SB-09-0206	SI3897-016	0.62	0.1	A
WTB-SB-09-0610	SI3897-017	0.61	0.1	A
WTB-SS-12-0002	SI3897-018	0.63	0.1	A
WTB-SB-12-0206	SI3897-019	0.71	0.1	A
WTB-SB-12-0610	SI3897-020	0.69	0.1	A
WTB-SS-15-0002	SI3897-021	0.7	0.1	A
WTB-SB-15-0206	SI3897-022	0.67	0.1	A
WTB-FD02-060415	SI3897-023	0.65	0.1	A
WTB-SB-15-0610	SI3897-024	0.66	0.1	A
WTB-SS-16-0002	SI3897-025	0.66	0.1	A
WTB-SS-16-0002D	SI3897-025D	0.66	0.1	A
WTB-SS-16-0002P	SI3897-025P	0.66	0.1	A
WTB-SS-16-0002S	SI3897-025S	0.66	0.1	A
WTB-SB-16-0206	SI3897-026	0.64	0.1	A
WTB-SB-16-0610	SI3897-027	0.77	0.1	A
WTB-SS-18-0002	SI3897-028	0.62	0.1	A
WTB-SB-18-0206	SI3897-029	0.76	0.1	A
WTB-SB-18-0610	SI3897-030	0.64	0.1	A

PREPARATION LOG

Lab Name: Katahdin Analytical Services **QC Batch ID:** IF12HGW4

Matrix: WATER **SDG Name:** OU8-1

Method: CV **Prep Date:** 06/12/2015

Client ID	Lab Sample ID	Initial (L)	Final (L)	Bottle ID
LCSWIF12HGW4	LCSWIF12HGW4	0.025	0.025	
PBWIF12HGW4	PBWIF12HGW4	0.025	0.025	
WTB-RB01-060415	SI3897-038	0.025	0.025	A

PREPARATION LOG

Lab Name: Katahdin Analytical Services **QC Batch ID:** IF15HGS1

Matrix: SOIL **SDG Name:** OU8-1

Method: CV **Prep Date:** 06/15/2015

Client ID	Lab Sample ID	Initial (g)	Final (L)	Bottle ID
LCSOIF15HGS1	LCSOIF15HGS1	0.6	0.1	
PBSIF15HGS1	PBSIF15HGS1	0.6	0.1	
WTB-SS-20-0002	SI3897-031	0.79	0.1	A
WTB-FD03-060415	SI3897-032	0.64	0.1	A
WTB-SB-20-0206	SI3897-033	0.72	0.1	A
WTB-SB-20-0206D	SI3897-033D	0.74	0.1	A
WTB-SB-20-0206P	SI3897-033P	0.73	0.1	A
WTB-SB-20-0206S	SI3897-033S	0.74	0.1	A
WTB-SB-20-0610	SI3897-034	0.77	0.1	A
WTB-SS-21-0002	SI3897-035	0.75	0.1	A
WTB-SB-21-0206	SI3897-036	0.74	0.1	A
WTB-SB-21-0610	SI3897-037	0.76	0.1	A
WTB-SS-13-0002	SI3897-039	0.63	0.1	A
WTB-SB-13-0206	SI3897-040	0.65	0.1	A
WTB-SB-13-0610	SI3897-041	0.7	0.1	A
WTB-SS-10-0002	SI3897-042	0.76	0.1	A
WTB-SB-10-0206	SI3897-043	0.63	0.1	A
WTB-SB-10-0610	SI3897-044	0.63	0.1	A

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: CETAC M6100 **File Name:** HIF11A

Date: 6/11/2015 **Method:** CV

Lab Sample ID	Client ID	D.F.	Time	Elements
Calibration Blank		1	16:49	Hg
Standard #1 (0.2 ppb		1	16:51	Hg
Standard #2 (0.5 ppb		1	16:53	Hg
Standard #3 (1.0 ppb		1	16:55	Hg
Standard #4 (5.0 ppb		1	16:57	Hg
Standard #5 (10.0 pp		1	16:59	Hg
ICV		1	17:01	HG
ICB		1	17:03	HG
PQL		1	17:05	HG
CCV		1	17:08	HG
CCB		1	17:10	HG
ZZZZZZ		1	17:12	
ZZZZZZ		1	17:14	
PBSIF10HGS1		1	17:16	HG
LCSOIF10HGS1		1	17:19	HG
CCV		1	17:21	HG
CCB		1	17:23	HG
ZZZZZZ		1	17:25	
ZZZZZZ		1	17:27	
ZZZZZZ		1	17:29	
ZZZZZZ		1	17:31	
ZZZZZZ		1	17:34	
SI3897-001	WTB-SS-22-0002	1	17:36	HG
SI3897-002	WTB-SS-24-0002	1	17:38	HG
CCV		1	17:40	HG
CCB		1	17:42	HG
SI3897-003	WTB-SB-24-0206	1	17:44	HG

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: CETAC M6100 **File Name:** HIF11A

Date: 6/11/2015 **Method:** CV

Lab Sample ID	Client ID	D.F.	Time	Elements
SI3897-004	WTB-SB-24-069.7	1	17:46	HG
SI3897-004A	WTB-SB-24-069.7A	1	17:48	HG
SI3897-004L	WTB-SB-24-069.7L	5	17:51	HG
SI3897-004D	WTB-SB-24-069.7D	1	17:53	HG
SI3897-004P	WTB-SB-24-069.7P	1	17:55	HG
SI3897-004S	WTB-SB-24-069.7S	1	17:57	HG
SI3897-005	WTB-SB-22-0206	1	17:59	HG
SI3897-006	WTB-SB-22-0610	1	18:01	HG
SI3897-007	WTB-FD02-060315	1	18:03	HG
CCV		1	18:05	HG
CCB		1	18:08	HG
SI3897-008	WTB-SS-23-0002	1	18:10	HG
SI3897-009	WTB-SB-23-0206	1	18:12	HG
SI3897-010	WTB-SB-23-0610	1	18:14	HG
SI3897-011	WTB-SS-08-0002	1	18:16	HG
SI3897-012	WTB-FD01-060415	1	18:18	HG
SI3897-013	WTB-SB-08-0206	1	18:20	HG
ZZZZZZ		1	18:23	
CCV		1	18:25	HG
CCB		1	18:27	HG

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: CETAC M6100 **File Name:** HIF12B

Date: 6/12/2015 **Method:** CV

Lab Sample ID	Client ID	D.F.	Time	Elements
Calibration Blank		1	18:21	Hg
Standard #1 (0.2 ppb		1	18:23	Hg
Standard #2 (0.5 ppb		1	18:25	Hg
Standard #3 (1.0 ppb		1	18:27	Hg
Standard #4 (5.0 ppb		1	18:29	Hg
Standard #5 (10.0 pp		1	18:31	Hg
ICV		1	18:33	HG
ICB		1	18:35	HG
PQL		1	18:38	HG
CCV		1	18:40	HG
CCB		1	18:42	HG
LCSWIF12HGW4		1	18:44	HG
PBWIF12HGW4		1	18:46	HG
ZZZZZZ		1	18:48	
ZZZZZZ		1	18:50	
ZZZZZZ		1	18:52	
ZZZZZZ		1	18:54	
ZZZZZZ		1	18:57	
ZZZZZZ		1	19:01	
ZZZZZZ		1	19:03	
CCV		1	19:05	HG
CCB		1	19:07	HG
ZZZZZZ		1	19:09	
ZZZZZZ		1	19:12	
ZZZZZZ		1	19:14	
ZZZZZZ		1	19:16	
ZZZZZZ		1	19:18	

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: CETAC M6100 **File Name:** HIF12B

Date: 6/12/2015 **Method:** CV

Lab Sample ID	Client ID	D.F.	Time	Elements
SI3897-038	WTB-RB01-060415	1	19:20	HG
ZZZZZZ		1	19:22	
ZZZZZZ		1	19:24	
ZZZZZZ		1	19:26	
ZZZZZZ		1	19:29	
CCV		1	19:32	HG
CCB		1	19:34	HG

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: CETAC M6100 **File Name:** HIF15A

Date: 6/15/2015 **Method:** CV

Lab Sample ID	Client ID	D.F.	Time	Elements
Calibration Blank		1	13:23	Hg
Standard #1 (0.2 ppb		1	13:25	Hg
Standard #2 (0.5 ppb		1	13:27	Hg
Standard #3 (1.0 ppb		1	13:30	Hg
Standard #4 (5.0 ppb		1	13:32	Hg
Standard #5 (10.0 pp		1	13:34	Hg
ICV		1	13:36	HG
ICB		1	13:38	HG
PQL		1	13:40	HG
CCV		1	13:42	HG
CCB		1	13:44	HG
LCSOIF12HGS1		1	13:46	HG
PBSIF12HGS1		1	13:49	HG
SI3772-001	WTB-SS-11-0002	1	13:51	HG
SI3772-001A	WTB-SS-11-0002A	1	13:53	HG
SI3772-001L	WTB-SS-11-0002L	5	13:55	HG
SI3772-001D	WTB-SS-11-0002D	1	13:57	HG
SI3772-001S	WTB-SS-11-0002S	1	13:59	HG
SI3772-002	WTB-SB-11-0206	1	14:01	HG
SI3772-003	WTB-SB-11-0610	1	14:06	HG
CCV		1	14:09	HG
CCB		1	14:11	HG
SI3772-004	WTB-SS-14-0002	1	14:13	HG
SI3772-005	WTB-SB-14-0206	1	14:15	HG
SI3772-006	WTB-FD01-060315	1	14:19	HG
SI3772-007	WTB-SB-14-0607	1	14:21	HG
SI3772-008	WTB-SS-17-0002	1	14:23	HG

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: CETAC M6100 **File Name:** HIF15A

Date: 6/15/2015 **Method:** CV

Lab Sample ID	Client ID	D.F.	Time	Elements
SI3772-009	WTB-SB-17-0206	1	14:25	HG
SI3772-010	WTB-SB-17-0610	1	14:27	HG
SI3772-011	WTB-SS-19-0002	1	14:29	HG
SI3772-012	WTB-SB-19-0206	1	14:31	HG
SI3772-013	WTB-SB-19-0610	1	14:33	HG
CCV		1	14:36	HG
CCB		1	14:38	HG
ZZZZZZ		1	14:40	
ZZZZZZ		1	14:42	
ZZZZZZ		1	14:46	
ZZZZZZ		1	14:48	
ZZZZZZ		1	14:50	
ZZZZZZ		1	14:52	
ZZZZZZ		1	14:54	
LCSOIF12HGS2		1	14:56	HG
PBSIF12HGS2		1	14:58	HG
SI3897-014	WTB-SB-08-0610	1	15:01	HG
CCV		1	15:04	HG
CCB		1	15:06	HG
SI3897-015	WTB-SS-09-0002	1	15:08	HG
SI3897-016	WTB-SB-09-0206	1	15:10	HG
SI3897-017	WTB-SB-09-0610	1	15:13	HG
SI3897-018	WTB-SS-12-0002	1	15:17	HG
SI3897-019	WTB-SB-12-0206	1	15:19	HG
SI3897-020	WTB-SB-12-0610	1	15:21	HG
SI3897-021	WTB-SS-15-0002	1	15:23	HG
SI3897-022	WTB-SB-15-0206	1	15:25	HG

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: CETAC M6100 **File Name:** HIF15A

Date: 6/15/2015 **Method:** CV

Lab Sample ID	Client ID	D.F.	Time	Elements
SI3897-023	WTB-FD02-060415	1	15:27	HG
SI3897-024	WTB-SB-15-0610	1	15:30	HG
CCV		1	15:32	HG
CCB		1	15:34	HG
SI3897-025	WTB-SS-16-0002	1	15:38	HG
SI3897-025A	WTB-SS-16-0002A	1	15:40	HG
SI3897-025L	WTB-SS-16-0002L	5	15:42	HG
SI3897-025D	WTB-SS-16-0002D	1	15:44	HG
SI3897-025P	WTB-SS-16-0002P	1	15:46	HG
SI3897-025S	WTB-SS-16-0002S	1	15:48	HG
SI3897-026	WTB-SB-16-0206	1	15:51	HG
SI3897-027	WTB-SB-16-0610	1	15:53	HG
SI3897-028	WTB-SS-18-0002	1	15:55	HG
SI3897-029	WTB-SB-18-0206	1	15:57	HG
CCV		1	15:59	HG
CCB		1	16:01	HG
ZZZZZZ		1	16:03	
ZZZZZZ		20	16:06	
ZZZZZZ		20	16:08	
ZZZZZZ		20	16:10	
ZZZZZZ		20	16:12	
ZZZZZZ		20	16:22	
CCV		1	16:24	HG
CCB		1	16:36	HG
ZZZZZZ		1	16:38	
ZZZZZZ		20	16:41	
ZZZZZZ		20	16:43	

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: CETAC M6100 **File Name:** HIF15A

Date: 6/15/2015 **Method:** CV

Lab Sample ID	Client ID	D.F.	Time	Elements
ZZZZZZ		20	16:45	
ZZZZZZ		20	16:47	
ZZZZZZ		20	16:49	
ZZZZZZ		20	16:51	
ZZZZZZ		50	16:54	
CCV		1	16:56	HG
CCB		1	16:58	HG
CCV		1	17:02	HG
CCB		1	17:04	HG
SI3897-030	WTB-SB-18-0610	1	17:06	HG
ZZZZZZ		20	17:08	
ZZZZZZ		20	17:10	
ZZZZZZ		20	17:12	
ZZZZZZ		20	17:14	
ZZZZZZ		20	17:17	
ZZZZZZ		20	17:19	
ZZZZZZ		50	17:21	
CCV		1	17:23	HG
CCB		1	17:27	HG

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: CETAC M6100 **File Name:** HIF16B

Date: 6/16/2015 **Method:** CV

Lab Sample ID	Client ID	D.F.	Time	Elements
Calibration Blank		1	12:41	Hg
Standard #1 (0.2 ppb		1	12:43	Hg
Standard #2 (0.5 ppb		1	12:45	Hg
Standard #3 (1.0 ppb		1	12:48	Hg
Standard #4 (5.0 ppb		1	12:50	Hg
Standard #5 (10.0 pp		1	12:52	Hg
ICV		1	12:54	HG
ICB		1	12:56	HG
PQL		1	12:58	HG
CCV		1	13:00	HG
CCB		1	13:02	HG
LCSOIF15HGS1		1	13:04	HG
PBSIF15HGS1		1	13:07	HG
SI3897-031	WTB-SS-20-0002	1	13:09	HG
SI3897-032	WTB-FD03-060415	1	13:11	HG
SI3897-033	WTB-SB-20-0206	1	13:13	HG
SI3897-033A	WTB-SB-20-0206A	1	13:15	HG
SI3897-033L	WTB-SB-20-0206L	5	13:17	HG
SI3897-033D	WTB-SB-20-0206D	1	13:19	HG
SI3897-033P	WTB-SB-20-0206P	1	13:21	HG
CCV		1	13:24	HG
CCB		1	13:26	HG
SI3897-033S	WTB-SB-20-0206S	1	13:28	HG
SI3897-034	WTB-SB-20-0610	1	13:30	HG
SI3897-035	WTB-SS-21-0002	1	13:32	HG
ZZZZZZ		1	13:34	
SI3897-037	WTB-SB-21-0610	1	13:36	HG

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: CETAC M6100 **File Name:** HIF16B

Date: 6/16/2015 **Method:** CV

Lab Sample ID	Client ID	D.F.	Time	Elements
SI3897-039	WTB-SS-13-0002	1	13:38	HG
SI3897-040	WTB-SB-13-0206	1	13:41	HG
SI3897-041	WTB-SB-13-0610	1	13:43	HG
SI3897-042	WTB-SS-10-0002	1	13:45	HG
SI3897-043	WTB-SB-10-0206	1	13:47	HG
CCV		1	13:49	HG
CCB		1	13:51	HG
ZZZZZZ		1	13:53	
ZZZZZZ		1	13:55	
ZZZZZZ		1	13:58	
ZZZZZZ		1	14:00	
CCV		1	14:02	HG
CCB		1	14:04	HG
CCV		1	16:36	HG
CCB		1	16:38	HG
SI3897-036	WTB-SB-21-0206	10	16:40	HG
SI3897-044	WTB-SB-10-0610	10	16:42	HG
CCV		1	16:44	HG
CCB		1	16:46	HG

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF09B

Date: 6/9/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																		
Blank		1	18:57	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
Std 1		1	19:02	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ICV		1	19:07	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ICB		1	19:14	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
PQL		1	19:19	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ZZZZZZ		1	19:26																			
ZZZZZZ		1	19:31																			
ICSA		1	19:40	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ICSAB		1	19:45	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
CCV		1	19:52	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
CCB		1	19:57	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ZZZZZZ		1	20:02																			
ZZZZZZ		1	20:07																			
ZZZZZZ		1	20:12																			
ZZZZZZ		1	20:17																			
ZZZZZZ		1	20:21																			
ZZZZZZ		1	20:27																			
ZZZZZZ		1	20:32																			
ZZZZZZ		5	20:37																			
ZZZZZZ		1	20:42																			
ZZZZZZ		1	20:47																			
CCV		1	20:52	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
CCB		1	20:57	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ZZZZZZ		1	21:02																			
ZZZZZZ		1	21:07																			
ZZZZZZ		10	21:12																			
ZZZZZZ		500	21:17																			

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF09B

Date: 6/9/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements															
ZZZZZZ		1000	21:22																
ZZZZZZ		500	21:27																
ZZZZZZ		1000	21:32																
ZZZZZZ		1	21:37																
ZZZZZZ		1	21:43																
ZZZZZZ		1	21:47																
CCV		1	21:52	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN
CCB		1	21:57	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN
LCSWIF08ICW3		1	22:02	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN
ZZZZZZ		1	22:08																
PBWIF08ICW3		1	22:13	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN
ZZZZZZ		1	22:18																
ZZZZZZ		1	22:23																
ZZZZZZ		1	22:28																
ZZZZZZ		1	22:33																
ZZZZZZ		1	22:38																
ZZZZZZ		1	22:43																
ZZZZZZ		1	22:48																
CCV		1	22:53	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN
CCB		1	22:58	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN
ZZZZZZ		1	23:03																
ZZZZZZ		1	23:08																
ZZZZZZ		1	23:14																
ZZZZZZ		50	23:19																
LCSOIF09ICS1		1	23:24	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN
PBSIF09ICS1		1	23:29	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN
ZZZZZZ		1	23:34																

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF09B

Date: 6/9/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																		
ZZZZZZ		1	23:39																			
ZZZZZZ		1	23:44																			
ZZZZZZ		1	23:49																			
CCV		1	23:54	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN	
CCB		1	23:59	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN	

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF11A

Date: 6/11/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements															
Blank		1	12:09	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	AG	NA	V	ZN
Std 1		1	12:14	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	AG	NA	V	ZN
ICV		1	12:19	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	AG	NA	V	ZN
ICB		1	12:26	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	AG	NA	V	ZN
PQL		1	12:31	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	AG	NA	V	ZN
ZZZZZZ		1	12:38																	
ZZZZZZ		1	12:43																	
ICSA		1	12:52	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	AG	NA	V	ZN
ICSAB		1	12:57	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	AG	NA	V	ZN
CCV		1	13:03	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	AG	NA	V	ZN
CCB		1	13:08	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	AG	NA	V	ZN
ZZZZZZ		1	13:13																	
ZZZZZZ		1	13:18																	
ZZZZZZ		1	13:23																	
ZZZZZZ		5	13:28																	
ZZZZZZ		1	13:34																	
ZZZZZZ		1	13:38																	
ZZZZZZ		1	13:44																	
ZZZZZZ		1	13:49																	
ZZZZZZ		1	13:53																	
ZZZZZZ		1	13:58																	
CCV		1	14:03	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	AG	NA	V	ZN
CCB		1	14:08	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	AG	NA	V	ZN
ZZZZZZ		1	14:13																	
ZZZZZZ		1	14:18																	
ZZZZZZ		1	14:23																	
ZZZZZZ		1	14:28																	

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF11A

Date: 6/11/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements															
ZZZZZZ		1	14:33																
ZZZZZZ		5	14:38																
ZZZZZZ		1	14:43																
ZZZZZZ		1	14:48																
ZZZZZZ		1	14:53																
LCSOIF10ICS1		1	14:58	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	AG	NA	V	ZN
CCV		1	15:03	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	AG	NA	V	ZN
CCB		1	15:08	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	AG	NA	V	ZN
PBSIF10ICS1		1	15:13	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	AG	NA	V	ZN
ZZZZZZ		1	15:18																
ZZZZZZ		1	15:23																
ZZZZZZ		1	15:28																
CCV		1	15:33	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	AG	NA	V	ZN
CCB		1	15:38	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	AG	NA	V	ZN

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF15A

Date: 6/15/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																		
Blank		1	13:52	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
Std 1		1	13:57	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ICV		1	14:02	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ICB		1	14:09	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
PQL		1	14:14	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ZZZZZZ		1	14:21																			
ZZZZZZ		1	14:26																			
ICSA		1	14:35	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ICSAB		1	14:39	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
CCV		1	14:46	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
CCB		1	14:51	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ZZZZZZ		1	14:56																			
ZZZZZZ		5	15:01																			
ZZZZZZ		1	15:06																			
ZZZZZZ		1	15:11																			
ZZZZZZ		1	15:16																			
ZZZZZZ		1	15:21																			
ZZZZZZ		5	15:26																			
ZZZZZZ		1	15:31																			
ZZZZZZ		1	15:36																			
ZZZZZZ		1	15:41																			
CCV		1	15:46	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
CCB		1	15:51	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ZZZZZZ		1	15:56																			
ZZZZZZ		1	16:01																			
ZZZZZZ		1	16:06																			
ZZZZZZ		1	16:11																			

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF15A

Date: 6/15/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																
ZZZZZZ		1	16:16																	
ZZZZZZ		1	16:21																	
LCSOIF05ICS1		1	16:26	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA	V	ZN
PBSIF05ICS1		1	16:31	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN
ZZZZZZ		1	16:37																	
ZZZZZZ		1	16:41																	
CCV		1	16:46	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN
CCB		1	16:51	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN
ZZZZZZ		1	16:56																	
ZZZZZZ		1	17:00																	
ZZZZZZ		1	17:05																	
ZZZZZZ		1	17:10																	
ZZZZZZ		1	17:15																	
ZZZZZZ		100	17:20																	
ZZZZZZ		100	17:25																	
ZZZZZZ		1	17:31																	
ZZZZZZ		1	17:35																	
ZZZZZZ		1	17:40																	
CCV		1	17:45	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN
CCB		1	17:50	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN
ZZZZZZ		1	17:55																	
ZZZZZZ		1	18:00																	
ZZZZZZ		100	18:05																	
ZZZZZZ		1	18:10																	
ZZZZZZ		1	18:15																	
ZZZZZZ		1	18:20																	
ZZZZZZ		1	18:25																	

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF15A

Date: 6/15/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																	
ZZZZZZ		1	18:30																		
ZZZZZZ		1	18:35																		
ZZZZZZ		1	18:40																		
CCV		1	18:45	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN
CCB		1	18:50	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN
ZZZZZZ		1	18:55																		
ZZZZZZ		1	19:00																		
ZZZZZZ		1	19:05																		
ZZZZZZ		1	19:10																		
PBSIF10ICS1		1	19:15														SE				
LCSOIF10ICS1		1	19:20														SE				
ZZZZZZ		1	19:25																		
ZZZZZZ		1	19:30																		
ZZZZZZ		1	19:35																		
CCV		1	19:40	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN
CCB		1	19:45	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF16B

Date: 6/16/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements														
Blank		1	18:16	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	AG	NA	V	ZN
Std 1		1	18:21	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	AG	NA	V	ZN
ICV		1	18:26	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	AG	NA	V	ZN
ICB		1	18:33	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	AG	NA	V	ZN
PQL		1	18:38	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	AG	NA	V	ZN
ZZZZZZ		1	18:45																
ZZZZZZ		1	18:51																
ICSA		1	19:00	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	AG	NA	V	ZN
ICSAB		1	19:04	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	AG	NA	V	ZN
CCV		1	19:11	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	AG	NA	V	ZN
CCB		1	19:16	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	AG	NA	V	ZN
ZZZZZZ		1	19:21																
ZZZZZZ		1	19:26																
ZZZZZZ		1	19:31																
ZZZZZZ		5	19:36																
ZZZZZZ		1	19:41																
ZZZZZZ		1	19:46																
ZZZZZZ		1	19:51																
ZZZZZZ		1	19:56																
ZZZZZZ		1	20:01																
ZZZZZZ		1	20:06																
CCV		1	20:11	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	AG	NA	V	ZN
CCB		1	20:16	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	AG	NA	V	ZN
ZZZZZZ		1	20:21																
ZZZZZZ		1	20:26																
ZZZZZZ		1	20:31																
ZZZZZZ		1	20:36																

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF16B

Date: 6/16/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																	
ZZZZZZ		1	20:40																		
ZZZZZZ		1	20:45																		
ZZZZZZ		1	20:50																		
SI3897-001	WTB-SS-22-0002	1	20:55	AL	BA	BE		CA							K		NA				ZN
SI3897-002	WTB-SS-24-0002	1	21:00	AL	BA	BE	CD	CA	CR	CU	FE	PB		NI	K	AG	NA			V	ZN
SI3897-003	WTB-SB-24-0206	1	21:05	AL	BA	BE	CD	CA	CR	CU	FE	PB		NI	K	AG	NA			V	ZN
CCV		1	21:10	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	AG	NA			V	ZN
CCB		1	21:15	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	AG	NA			V	ZN
SI3897-004	WTB-SB-24-069.7	1	21:20		BA	BE	CD		CR	CU		PB		NI	K	AG	NA			V	ZN
SI3897-004A	WTB-SB-24-069.7A	1	21:25	AL	BA	BE	CD	CA	CR	CU	FE	PB		NI	K	AG	NA			V	ZN
ZZZZZZ		3	21:30																		
SI3897-004D	WTB-SB-24-069.7D	1	21:35	AL	BA	BE	CD	CA	CR	CU	FE	PB		NI	K	AG	NA			V	ZN
SI3897-004S	WTB-SB-24-069.7S	1	21:40	AL	BA	BE	CD	CA	CR	CU	FE	PB		NI	K	AG	NA			V	ZN
SI3897-005	WTB-SB-22-0206	2	21:45	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	AG	NA			V	ZN
SI3897-006	WTB-SB-22-0610	1	21:50	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	AG	NA			V	ZN
SI3897-007	WTB-FD02-060315	2	21:55	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	AG	NA			V	ZN
SI3897-008	WTB-SS-23-0002	1	22:00	AL	BA	BE		CA							K		NA				ZN
SI3897-009	WTB-SB-23-0206	1	22:05	AL	BA	BE	CD	CA	CR	CU	FE	PB		NI	K	AG	NA			V	ZN
CCV		1	22:10	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	AG	NA			V	ZN
CCB		1	22:15	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	AG	NA			V	ZN
SI3897-010	WTB-SB-23-0610	1	22:20	AL	BA	BE	CD	CA	CR	CU	FE	PB		NI	K	AG	NA			V	ZN
SI3897-011	WTB-SS-08-0002	1	22:25	AL	BA	BE		CA							K		NA				ZN
SI3897-012	WTB-FD01-060415	1	22:30	AL	BA	BE	CD	CA	CR	CU	FE	PB		NI	K	AG	NA			V	ZN
SI3897-013	WTB-SB-08-0206	2	22:35	AL	BA	BE		CA							K		NA				ZN
SI3897-014	WTB-SB-08-0610	2	22:40	AL	BA	BE		CA							K		NA				ZN
SI3897-015	WTB-SS-09-0002	1	22:44	AL	BA	BE		CA							K		NA				ZN
SI3897-016	WTB-SB-09-0206	2	22:49	AL	BA	BE		CA							K		NA			V	

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF16B

Date: 6/16/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements															
SI3897-004P	WTB-SB-24-069.7P	1	22:54	AL	BA	BE	CD	CA	CR	CU	FE	PB		NI	K	AG	NA	V	ZN
ZZZZZZ		1	22:59																
ZZZZZZ		1	23:04																
CCV		1	23:09	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	AG	NA	V	ZN
CCB		1	23:14	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	AG	NA	V	ZN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF18B

Date: 6/18/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																		
Blank		1	13:35	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA		V	ZN
Std 1		1	13:40	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA		V	ZN
ICV		1	13:45	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA		V	ZN
ICB		1	13:52	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA		V	ZN
PQL		1	13:57	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA		V	ZN
ZZZZZZ		1	14:04																		
ZZZZZZ		1	14:09																		
ICSA		1	14:18	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA		V	ZN
ICSAB		1	14:23	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA		V	ZN
CCV		1	14:29	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA		V	ZN
CCB		1	14:34	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA		V	ZN
ZZZZZZ		5	14:39																		
ZZZZZZ		25	14:44																		
ZZZZZZ		5	14:49																		
ZZZZZZ		5	14:54																		
ZZZZZZ		100	14:59																		
ZZZZZZ		1	15:05																		
ZZZZZZ		1	15:10																		
ZZZZZZ		2	15:15																		
ZZZZZZ		5	15:19																		
ZZZZZZ		1	15:24																		
CCV		1	15:29	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA		V	ZN
CCB		1	15:34	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA		V	ZN
ZZZZZZ		1	15:40																		
SI3897-004L	WTB-SB-24-069.7L	5	15:45				CD									SE	AG				
SI3897-011	WTB-SS-08-0002	2	15:50				CD		CR	CU		PB	MG	NI		SE	AG			V	
ZZZZZZ		10	15:55																		

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF18B

Date: 6/18/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																
ZZZZZZ		10	16:00																	
ZZZZZZ		2	16:05																	
ZZZZZZ		10	16:10																	
ZZZZZZ		1	16:15																	
ZZZZZZ		1	16:20																	
ZZZZZZ		10	16:25																	
CCV		1	16:30	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA	V	ZN
CCB		1	16:35	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA	V	ZN
ZZZZZZ		5	16:40																	
SI3897-019	WTB-SB-12-0206	1	16:45		BA	BE	CD	CA	CR	CU		PB	MG	NI	K	SE	AG	NA	V	ZN
SI3897-020	WTB-SB-12-0610	2	16:50	AL	BA	BE	CD		CR	CU		PB		NI	K	SE	AG	NA	V	ZN
ZZZZZZ		40	16:55																	
SI3897-022	WTB-SB-15-0206	1	17:00		BA	BE	CD		CR	CU		PB		NI	K	SE	AG	NA	V	ZN
SI3897-023	WTB-FD02-060415	1	17:05		BA	BE	CD	CA	CR	CU		PB		NI	K	SE	AG	NA	V	ZN
SI3897-024	WTB-SB-15-0610	1	17:10		BA	BE	CD		CR	CU		PB		NI	K	SE	AG	NA	V	ZN
SI3897-025	WTB-SS-16-0002	1	17:15		BA	BE	CD		CR	CU				NI		SE	AG	NA	V	ZN
ZZZZZZ		1	17:20																	
SI3897-025D	WTB-SS-16-0002D	1	17:25		BA	BE	CD		CR	CU		PB		NI		SE	AG	NA	V	ZN
CCV		1	17:30	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA	V	ZN
CCB		1	17:35	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA	V	ZN
ZZZZZZ		1	17:40																	
SI3897-025P	WTB-SS-16-0002P	1	17:45		BA	BE	CD		CR	CU		PB		NI		SE	AG	NA	V	ZN
SI3897-025S	WTB-SS-16-0002S	2	17:50		BA	BE	CD	CA	CR	CU		PB		NI	K	SE	AG	NA	V	ZN
SI3897-026	WTB-SB-16-0206	2	17:55		BA	BE	CD	CA	CR	CU		PB		NI	K	SE	AG	NA	V	ZN
ZZZZZZ		1	18:00																	
ZZZZZZ		1	18:05																	
ZZZZZZ		1	18:11																	

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF18B

Date: 6/18/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																	
ZZZZZZ		1	18:16																		
ZZZZZZ		1	18:21																		
SI3897-038	WTB-RB01-060415	1	18:26	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA	V	ZN	
CCV		1	18:31	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA	V	ZN	
CCB		1	18:36	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA	V	ZN	
SI3897-038A	WTB-RB01-060415A	1	18:41	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA	V	ZN	
ZZZZZZ		5	18:46																		
SI3897-038D	WTB-RB01-060415D	1	18:51	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA	V	ZN	
SI3897-038S	WTB-RB01-060415S	1	18:56	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA	V	ZN	
ZZZZZZ		1	19:01																		
ZZZZZZ		1	19:06																		
ZZZZZZ		1	19:11																		
ZZZZZZ		20	19:16																		
CCV		1	19:21	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA	V	ZN	
CCB		1	19:26	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA	V	ZN	

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF18C

Date: 6/18/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																			
Blank		1	19:54	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
Std 1		1	19:59	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ICV		1	20:04	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ICB		1	20:11	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
PQL		1	20:16	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ZZZZZZ		1	20:23																			
ZZZZZZ		1	20:28																			
ICSA		1	20:37	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ICSAB		1	20:42	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
CCV		1	20:48	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
CCB		1	20:53	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ZZZZZZ		1	20:58																			
LCSOIF04ICS1		1	21:03	AL			CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
PBSIF04ICS1		1	21:08	AL	BA		CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ZZZZZZ		5	21:13																			
ZZZZZZ		5	21:18																			
ZZZZZZ		5	21:23																			
ZZZZZZ		25	21:28																			
ZZZZZZ		5	21:34																			
SI3772-003	WTB-SB-11-0610	10	21:39			BE								MN								
SI3772-004	WTB-SS-14-0002	1	21:44	AL		BE	CD	CA	CR	CU		PB		MN	NI	K	SE	AG	NA		V	ZN
CCV		1	21:49	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
CCB		1	21:54	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
SI3772-005	WTB-SB-14-0206	1	21:59	AL		BE	CD	CA	CR	CU		PB		MN	NI	K	SE	AG	NA		V	ZN
SI3772-006	WTB-FD01-060315	1	22:04	AL		BE	CD	CA	CR	CU		PB		MN	NI	K	SE	AG	NA		V	ZN
SI3772-007	WTB-SB-14-0607	1	22:09	AL		BE	CD	CA	CR	CU		PB		MN	NI	K	SE	AG	NA		V	ZN
SI3772-008	WTB-SS-17-0002	1	22:14	AL		BE	CD	CA	CR	CU		PB	MG	MN	NI	K	SE	AG	NA		V	ZN

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF18C

Date: 6/18/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																				
SI3772-009	WTB-SB-17-0206	1	22:19	AL		BE	CD	CA	CR	CU		PB	MG	MN	NI	K	SE	AG	NA			V	ZN
SI3772-010	WTB-SB-17-0610	10	22:24			BE								MN									
SI3772-011	WTB-SS-19-0002	1	22:29	AL		BE	CD	CA	CR	CU		PB	MG	MN	NI	K	SE	AG	NA			V	ZN
SI3772-012	WTB-SB-19-0206	1	22:34	AL		BE	CD	CA	CR	CU		PB		MN	NI	K	SE	AG	NA			V	ZN
SI3772-013	WTB-SB-19-0610	1	22:39	AL		BE	CD	CA	CR	CU		PB		MN	NI	K	SE	AG	NA			V	ZN
LCSOIF11ICS1		1	22:44	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
CCV		1	22:49	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
CCB		1	22:54	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
PBSIF11ICS1		1	22:59	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
SI3897-027	WTB-SB-16-0610	1	23:04	AL	BA	BE		CA		CU						K			NA				ZN
SI3897-028	WTB-SS-18-0002	1	23:09	AL	BA	BE	CD	CA	CR	CU		PB		MN	NI	K	SE	AG	NA			V	ZN
SI3897-029	WTB-SB-18-0206	1	23:14	AL	BA	BE	CD	CA	CR	CU		PB		MN	NI	K	SE	AG	NA			V	ZN
SI3897-030	WTB-SB-18-0610	1	23:19	AL	BA	BE	CD	CA	CR	CU		PB		MN	NI	K	SE	AG	NA			V	ZN
SI3897-031	WTB-SS-20-0002	1	23:24	AL	BA	BE	CD	CA	CR	CU		PB		MN	NI	K	SE	AG	NA			V	ZN
SI3897-032	WTB-FD03-060415	1	23:29	AL	BA	BE	CD	CA	CR	CU		PB			NI	K	SE	AG	NA			V	ZN
SI3897-033	WTB-SB-20-0206	1	23:34		BA	BE	CD		CR	CU		PB		MN		K	SE	AG	NA			V	ZN
ZZZZZZ		1	23:39																				
SI3897-033D	WTB-SB-20-0206D	1	23:44	AL	BA	BE	CD	CA	CR	CU		PB		MN	NI	K	SE	AG	NA			V	ZN
CCV		1	23:49	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
CCB		1	23:54	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
ZZZZZZ		1	23:59																				
SI3897-033P	WTB-SB-20-0206P	1	0:05	AL	BA	BE	CD	CA	CR	CU		PB		MN	NI	K	SE	AG	NA			V	ZN
SI3897-033S	WTB-SB-20-0206S	1	0:10	AL	BA	BE	CD	CA	CR	CU		PB		MN	NI	K	SE	AG	NA			V	ZN
SI3897-034	WTB-SB-20-0610	1	0:15	AL	BA	BE	CD	CA	CR	CU		PB		MN	NI	K	SE	AG	NA			V	ZN
SI3897-035	WTB-SS-21-0002	1	0:20	AL	BA	BE	CD	CA	CR	CU		PB	MG	MN	NI	K	SE	AG	NA			V	ZN
SI3897-036	WTB-SB-21-0206	1	0:25	AL												K			NA				
SI3897-037	WTB-SB-21-0610	1	0:30	AL				CA								K			NA				

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF18C

Date: 6/19/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																		
SI3897-039	WTB-SS-13-0002	1	0:35	AL	BA	BE	CD	CA	CR	CU	PB	MN	NI	K	SE	AG	NA	V	ZN
SI3897-040	WTB-SB-13-0206	1	0:40	AL	BA	BE	CA						K			NA	ZN		
SI3897-041	WTB-SB-13-0610	1	0:44	AL	BA	BE	CD	CA	CR	CU	PB	MN	NI	K	SE	AG	NA	V	ZN
CCV		1	0:49	AL	BA	BE	CD	CA	CR	CU	FE PB	MG MN	NI	K	SE	AG	NA	V	ZN
CCB		1	0:54	AL	BA	BE	CD	CA	CR	CU	FE PB	MG MN	NI	K	SE	AG	NA	V	ZN
SI3897-042	WTB-SS-10-0002	1	1:00	AL	BA	BE	CD	CA	CR	CU	PB	MN	NI	K	SE	AG	NA	V	ZN
SI3897-043	WTB-SB-10-0206	1	1:05	AL	BA	BE	CA						K			NA	ZN		
SI3897-044	WTB-SB-10-0610	1	1:10	AL	BA	BE	CD	CA	CR	CU	PB	MN	NI	K	SE	AG	NA	V	ZN
ZZZZZZ		1	1:15																
ZZZZZZ		1	1:20																
ZZZZZZ		1	1:25																
ZZZZZZ		1	1:30																
SI3897-017	WTB-SB-09-0610	10	1:35									MN		K					
ZZZZZZ		5	1:40																
SI3897-021	WTB-SS-15-0002	5	1:45	AL	BA	BE	CD	CA	CR	CU	PB	MN	NI	K	SE	AG	NA	V	ZN
CCV		1	1:50	AL	BA	BE	CD	CA	CR	CU	FE PB	MG MN	NI	K	SE	AG	NA	V	ZN
CCB		1	1:55	AL	BA	BE	CD	CA	CR	CU	FE PB	MG MN	NI	K	SE	AG	NA	V	ZN
SI3897-017	WTB-SB-09-0610	20	2:00			BE													
ZZZZZZ		10	2:06																
ZZZZZZ		10	2:11																
SI3897-016	WTB-SB-09-0206	10	2:16									MN							
SI3897-015	WTB-SS-09-0002	20	2:21								FE								
ZZZZZZ		5	2:26																
SI3897-015	WTB-SS-09-0002	2	2:31				CD		CR	CU	PB	MN	NI		SE	AG		V	
CCV		1	2:36	AL	BA	BE	CD	CA	CR	CU	FE PB	MG MN	NI	K	SE	AG	NA	V	ZN
CCB		1	2:41	AL	BA	BE	CD	CA	CR	CU	FE PB	MG MN	NI	K	SE	AG	NA	V	ZN

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF19A

Date: 6/19/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																			
Blank		1	9:34	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA			V	ZN
Std 1		1	9:39	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA			V	ZN
ICV		1	9:44	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA			V	ZN
ICB		1	9:51	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA			V	ZN
PQL		1	9:56	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA			V	ZN
ZZZZZZ		1	10:03																			
ZZZZZZ		1	10:08																			
ICSA		1	10:17	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA			V	ZN
ICSAB		1	10:22	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA			V	ZN
CCV		1	10:28	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA			V	ZN
CCB		1	10:33	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA			V	ZN
LCSOIF04ICS1		1	10:38		BA	BE																
PBSIF04ICS1		1	10:43			BE																
SI3772-001	WTB-SS-11-0002	5	10:48			BE	CD					PB		NI	K	SE	AG	NA			V	ZN
ZZZZZZ		5	10:53																			
SI3772-001D	WTB-SS-11-0002D	5	10:58	AL		BE	CD	CA	CR	CU		PB	MG	NI	K	SE	AG	NA			V	ZN
SI3772-001L	WTB-SS-11-0002L	25	11:03			BE	CD									SE	AG	NA				
SI3772-001S	WTB-SS-11-0002S	5	11:08	AL		BE	CD		CR	CU		PB		NI	K	SE	AG	NA			V	ZN
ZZZZZZ		10	11:13																			
ZZZZZZ		10	11:18																			
ZZZZZZ		200	11:23																			
CCV		1	11:28	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA			V	ZN
CCB		1	11:33	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA			V	ZN
ZZZZZZ		25	11:38																			
SI3897-013	WTB-SB-08-0206	25	11:44				CD		CR	CU		PB	MG	NI		SE	AG				V	
SI3897-014	WTB-SB-08-0610	25	11:49				CD		CR	CU		PB	MG	NI		SE	AG				V	
SI3897-016	WTB-SB-09-0206	25	11:54				CD		CR	CU		PB	MG	NI		SE	AG					ZN

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF19A

Date: 6/19/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																				
SI3897-027	WTB-SB-16-0610	10	11:59								FE													
ZZZZZZ		10	12:04																					
ZZZZZZ		10	12:09																					
ZZZZZZ		10	12:14																					
SI3897-043	WTB-SB-10-0206	10	12:19				CD	CR	CU		PB	MG		NI		SE	AG			V				
ZZZZZZ		1	12:24																					
CCV		1	12:29	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA		V	ZN			
CCB		1	12:34	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	NI	K	SE	AG	NA		V	ZN			

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF22A

Date: 6/22/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																			
Blank		1	12:55	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
Std 1		1	13:00	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
ICV		1	13:05	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
ICB		1	13:12	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
PQL		1	13:17	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
ZZZZZZ		1	13:24																				
ZZZZZZ		1	13:30																				
ICSA		1	13:39	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
ICSAB		1	13:44	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
CCV		1	13:51	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
CCB		1	13:56	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
LCSOIF05ICS1		1	14:01											MN									
ZZZZZZ		1	14:06																				
ZZZZZZ		1	14:11																				
SI3772-002	WTB-SB-11-0206	5	14:16	AL	BA	BE		CA					MG			K							ZN
ZZZZZZ		200	14:21																				
SI3772-004	WTB-SS-14-0002	1	14:26		BA						FE		MG										
SI3772-005	WTB-SB-14-0206	1	14:31		BA						FE		MG										
SI3772-006	WTB-FD01-060315	1	14:36		BA						FE		MG										
SI3772-007	WTB-SB-14-0607	1	14:41		BA						FE		MG										
SI3772-008	WTB-SS-17-0002	1	14:47		BA						FE												
CCV		1	14:52	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
CCB		1	14:57	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
SI3772-009	WTB-SB-17-0206	1	15:02		BA						FE												
ZZZZZZ		10	15:07																				
SI3772-011	WTB-SS-19-0002	1	15:12		BA						FE												
SI3772-012	WTB-SB-19-0206	1	15:17		BA						FE		MG										

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF22A

Date: 6/22/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																					
SI3772-013	WTB-SB-19-0610	1	15:22		BA						FE		MG												
SI3772-001	WTB-SS-11-0002	5	15:27	AL	BA			CA	CR	CU	FE		MG	MN											
SI3772-001A	WTB-SS-11-0002A	5	15:32	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN		
SI3772-001D	WTB-SS-11-0002D	5	15:37		BA						FE			MN											
SI3772-001L	WTB-SS-11-0002L	25	15:42	AL	BA			CA	CR	CU	FE		MG	MN											
SI3772-001S	WTB-SS-11-0002S	5	15:47		BA			CA			FE		MG	MN											
CCV		1	15:52	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN		
CCB		1	15:57	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN		

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF22B

Date: 6/22/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																		
Blank		1	18:54	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
Std 1		1	18:59	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ICV		1	19:04	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ICB		1	19:11	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
PQL		1	19:16	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ZZZZZZ		1	19:23																			
ZZZZZZ		1	19:29																			
ICSA		1	19:38	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ICSAB		1	19:43	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
CCV		1	19:50	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
CCB		1	19:55	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ZZZZZZ		25	20:00																			
ZZZZZZ		1	20:05																			
ZZZZZZ		1	20:10																			
ZZZZZZ		1	20:15																			
ZZZZZZ		1	20:20																			
ZZZZZZ		5	20:25																			
ZZZZZZ		1	20:30																			
ZZZZZZ		1	20:35																			
ZZZZZZ		1	20:40																			
ZZZZZZ		1	20:45																			
CCV		1	20:50	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
CCB		1	20:54	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ZZZZZZ		1	21:00																			
ZZZZZZ		1	21:04																			
ZZZZZZ		1	21:09																			
ZZZZZZ		1	21:15																			

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF22B

Date: 6/22/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																			
ZZZZZZ		1	21:20																				
ZZZZZZ		10	21:25																				
ZZZZZZ		1	21:30																				
ZZZZZZ		1	21:35																				
ZZZZZZ		1	21:40																				
ZZZZZZ		50	21:45																				
CCV		1	21:50	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN		
CCB		1	21:55	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN		
ZZZZZZ		1	22:00																				
ZZZZZZ		1	22:05																				
ZZZZZZ		10	22:10																				
ZZZZZZ		25	22:16																				
SI3897-038	WTB-RB01-060415	1	22:21											MN									
SI3897-038A	WTB-RB01-060415A	1	22:26											MN									
SI3897-038D	WTB-RB01-060415D	1	22:31											MN									
SI3897-038L	WTB-RB01-060415L	5	22:36	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN		
SI3897-038S	WTB-RB01-060415S	1	22:41											MN									
ZZZZZZ		1	22:46																				
CCV		1	22:51	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN		
CCB		1	22:56	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA	V	ZN		
ZZZZZZ		1	23:01																				
ZZZZZZ		1	23:06																				
ZZZZZZ		2	23:11																				
ZZZZZZ		1	23:16																				
ZZZZZZ		1	23:21																				
ZZZZZZ		5	23:26																				
SI3897-002	WTB-SS-24-0002	1	23:31											MG	MN			SE					

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF22B

Date: 6/22/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																			
SI3897-003	WTB-SB-24-0206	1	23:36										MG	MN				SE					
SI3897-004	WTB-SB-24-069.7	1	23:41	AL				CA				FE	MG	MN				SE					
SI3897-004A	WTB-SB-24-069.7A	1	23:46										MG	MN				SE					
CCV		1	23:51	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN	
CCB		1	23:56	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN	
SI3897-004D	WTB-SB-24-069.7D	1	0:01										MG	MN				SE					
ZZZZZZ		5	0:06																				
SI3897-004P	WTB-SB-24-069.7P	1	0:11										MG	MN				SE					
SI3897-004S	WTB-SB-24-069.7S	1	0:16										MG	MN				SE					
CCV		1	0:21	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN	
CCB		1	0:26	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN	

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF24A

Date: 6/24/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																		
Blank		1	10:19	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
Std 1		1	10:23	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ICV		1	10:28	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ICB		1	10:35	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
PQL		1	10:40	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ZZZZZZ		1	10:49																			
ZZZZZZ		1	10:54																			
ICSA		1	11:02	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ICSAB		1	11:07	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
CCV		1	11:13	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
CCB		1	11:18	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ZZZZZZ		1	11:23																			
ZZZZZZ		1	11:28																			
ZZZZZZ		2	11:33																			
ZZZZZZ		2	11:38																			
ZZZZZZ		2	11:43																			
SI3897-001	WTB-SS-22-0002	2	11:48														SE					
ZZZZZZ		5	11:53																			
ZZZZZZ		1	11:58																			
ZZZZZZ		1	12:02																			
ZZZZZZ		1	12:07																			
CCV		1	12:12	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
CCB		1	12:17	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA		V	ZN
ZZZZZZ		2	12:22																			
SI3897-009	WTB-SB-23-0206	1	12:27														SE					
SI3897-010	WTB-SB-23-0610	1	12:32														SE					
ZZZZZZ		2	12:37																			

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF24A

Date: 6/24/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																					
ZZZZZZ		1	12:42																						
SI3897-013	WTB-SB-08-0206	25	12:47											MN											
ZZZZZZ		25	12:52																						
ZZZZZZ		2	12:57																						
ZZZZZZ		25	13:02																						
SI3897-017	WTB-SB-09-0610	10	13:07	AL	BA		CD	CA	CR			PB	MG		NI		SE		AG	NA				V	ZN
CCV		1	13:12	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE		AG	NA				V	ZN
CCB		1	13:17	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE		AG	NA				V	ZN
SI3897-017	WTB-SB-09-0610	25	13:22							CU	FE														
SI3897-018	WTB-SS-12-0002	2	13:27	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE		AG	NA				V	ZN
SI3897-019	WTB-SB-12-0206	1	13:32	AL							FE			MN											
SI3897-020	WTB-SB-12-0610	2	13:37					CA			FE		MG	MN											
SI3897-021	WTB-SS-15-0002	5	13:42								FE		MG												
SI3897-022	WTB-SB-15-0206	1	13:47	AL				CA			FE		MG	MN											
SI3897-023	WTB-FD02-060415	1	13:52	AL							FE		MG	MN											
SI3897-024	WTB-SB-15-0610	1	13:56	AL				CA			FE		MG	MN											
SI3897-025	WTB-SS-16-0002	1	14:01	AL				CA			FE	PB	MG	MN		K									
SI3897-025A	WTB-SS-16-0002A	1	14:06	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE		AG	NA				V	ZN
CCV		1	14:11	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE		AG	NA				V	ZN
CCB		1	14:16	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE		AG	NA				V	ZN
SI3897-025D	WTB-SS-16-0002D	1	14:21	AL				CA			FE		MG	MN		K									
SI3897-025L	WTB-SS-16-0002L	5	14:26	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE		AG	NA				V	ZN
SI3897-025P	WTB-SS-16-0002P	1	14:31	AL				CA			FE		MG	MN		K									
ZZZZZZ		1	14:36																						
SI3897-026	WTB-SB-16-0206	2	14:40	AL							FE		MG	MN											
SI3897-027	WTB-SB-16-0610	2	14:45				CD		CR			PB	MG	MN	NI		SE		AG					V	
SI3897-028	WTB-SS-18-0002	1	14:50								FE		MG												

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF24A

Date: 6/24/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																					
SI3897-029	WTB-SB-18-0206	1	14:55									FE		MG											
SI3897-030	WTB-SB-18-0610	1	15:00									FE		MG											
SI3897-031	WTB-SS-20-0002	2	15:05									FE		MG											
CCV		1	15:10	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN		
CCB		1	15:15	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN		
SI3897-032	WTB-FD03-060415	2	15:20								FE		MG	MN											
SI3897-033	WTB-SB-20-0206	1	15:25	AL				CA			FE		MG		NI										
SI3897-033A	WTB-SB-20-0206A	1	15:30	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN		
SI3897-033D	WTB-SB-20-0206D	1	15:35								FE		MG												
SI3897-033L	WTB-SB-20-0206L	5	15:40	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN		
SI3897-033P	WTB-SB-20-0206P	1	15:45								FE		MG												
SI3897-033S	WTB-SB-20-0206S	1	15:50								FE		MG												
SI3897-034	WTB-SB-20-0610	1	15:55								FE		MG												
SI3897-035	WTB-SS-21-0002	1	16:00								FE														
SI3897-036	WTB-SB-21-0206	10	16:05		BA	BE	CD	CA	CR		FE	PB	MG	MN	NI		SE	AG				V	ZN		
CCV		1	16:10	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN		
CCB		1	16:15	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN		
SI3897-036	WTB-SB-21-0206	25	16:20							CU															
SI3897-037	WTB-SB-21-0610	10	16:25		BA	BE	CD		CR	CU	FE	PB	MG	MN	NI		SE	AG				V	ZN		
SI3897-039	WTB-SS-13-0002	10	16:30								FE		MG												
SI3897-040	WTB-SB-13-0206	2	16:35				CD		CR	CU	FE	PB	MG	MN	NI		SE	AG				V			
SI3897-041	WTB-SB-13-0610	1	16:40								FE		MG												
SI3897-042	WTB-SS-10-0002	1	16:45								FE		MG												
SI3897-043	WTB-SB-10-0206	2	16:50								FE			MN											
ZZZZZZ		2	16:55																						
ZZZZZZ		10	16:59																						
ZZZZZZ		1	17:05																						

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF24A

Date: 6/24/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																				
CCV		1	17:09	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
CCB		1	17:14	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
ZZZZZZ		1	17:19																				
SI3772-001L	WTB-SS-11-0002L	25	17:24									PB			NI	K						V	ZN
SI3772-002	WTB-SB-11-0206	10	17:29				CD		CR	CU	FE	PB		MN	NI		SE	AG	NA			V	
SI3772-003	WTB-SB-11-0610	10	17:34	AL	BA		CD	CA	CR	CU	FE	PB	MG		NI	K	SE	AG	NA			V	ZN
SI3772-010	WTB-SB-17-0610	10	17:39	AL	BA		CD	CA	CR	CU	FE	PB	MG		NI	K	SE	AG	NA			V	ZN
SI3897-001	WTB-SS-22-0002	2	17:44				CD		CR	CU	FE	PB	MG	MN	NI			AG				V	
SI3897-004L	WTB-SB-24-069.7L	5	17:49	AL	BA	BE		CA	CR	CU	FE	PB	MG	MN	NI	K			NA			V	ZN
SI3897-005	WTB-SB-22-0206	1	17:54											MN			SE						
SI3897-006	WTB-SB-22-0610	1	17:58											MN			SE						
SI3897-007	WTB-FD02-060315	1	18:03											MN			SE						
CCV		1	18:08	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
CCB		1	18:13	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
SI3897-008	WTB-SS-23-0002	2	18:18				CD		CR	CU	FE	PB	MG	MN	NI		SE	AG				V	
SI3897-009	WTB-SB-23-0206	1	18:23										MG	MN									
SI3897-010	WTB-SB-23-0610	1	18:28										MG	MN									
SI3897-011	WTB-SS-08-0002	2	18:33								FE			MN									
SI3897-012	WTB-FD01-060415	1	18:37										MG	MN			SE						
SI3897-013	WTB-SB-08-0206	25	18:42								FE												
SI3897-014	WTB-SB-08-0610	25	18:47								FE			MN									
SI3897-015	WTB-SS-09-0002	2	18:52										MG										
SI3897-016	WTB-SB-09-0206	25	18:57								FE												
ZZZZZZ		1	19:02																				
CCV		1	19:07	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
CCB		1	19:12	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN
ZZZZZZ		1	19:17																				

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: THERMO ICAP 6500 **File Name:** IIF24A

Date: 6/24/2015 **Method:** P

Lab Sample ID	Client ID	D.F.	Time	Elements																				
ZZZZZZ		1	19:22																					
ZZZZZZ		1	19:27																					
ZZZZZZ		1	19:32																					
SI3897-044	WTB-SB-10-0610	5	19:37								FE		MG											
SI3897-025S	WTB-SS-16-0002S	2	19:42	AL							FE		MG	MN										
CCV		1	19:47	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN	
CCB		1	19:51	AL	BA	BE	CD	CA	CR	CU	FE	PB	MG	MN	NI	K	SE	AG	NA			V	ZN	

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF08A

Date: 6/8/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements										
6020 Tune		1	15:22											
200.8 Tune		1	15:25											
Cal Blank		1	16:00	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
Cal Std 1		1	16:03	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
Cal Std 2		1	16:06	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
Cal Std 3		1	16:09	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
Cal Std 4		1	16:12	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
ICV		1	16:15	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
ICB		1	16:19	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
PQL		1	16:22	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
ZZZZZZ		1	16:25											
ZZZZZZ		1	16:28											
ZZZZZZ		1	16:31											
ICSA		1	16:34	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
ICSAB		1	16:38	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
ZZZZZZ		1	16:41											
CCV		1	16:45	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
CCB		1	16:48	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
PQL		1	16:51	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
CCV		1	16:54	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
CCB		1	16:57	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
ZZZZZZ		5	17:01											
ZZZZZZ		1	17:04											
ZZZZZZ		1	17:07											
ZZZZZZ		1	17:11											
ZZZZZZ		1	17:14											
ZZZZZZ		1	17:17											

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ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF08A

Date: 6/8/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements									
ZZZZZZ		1	17:20										
ZZZZZZ		1	17:24										
ZZZZZZ		1	17:27										
ZZZZZZ		1	17:30										
CCV		1	17:34	Al Sb As	Ca	Co	Fe	Mg	Mo	K	Na	Tl	
CCB		1	17:37	Al Sb As	Ca	Co	Fe	Mg	Mo	K	Na	Tl	
ZZZZZZ		1	17:40										
ZZZZZZ		1	17:43										
ZZZZZZ		5	17:47										
ZZZZZZ		1	17:50										
ZZZZZZ		1	17:53										
ZZZZZZ		1	17:56										
ZZZZZZ		1	18:00										
ZZZZZZ		1	18:03										
ZZZZZZ		5	18:06										
ZZZZZZ		5	18:10										
CCV		1	18:13	Al Sb As	Ca	Co	Fe	Mg	Mo	K	Na	Tl	
CCB		1	18:16	Al Sb As	Ca	Co	Fe	Mg	Mo	K	Na	Tl	
ZZZZZZ		5	18:20										
ZZZZZZ		5	18:23										
ZZZZZZ		5	18:26										
ZZZZZZ		5	18:30										
ZZZZZZ		5	18:33										
ZZZZZZ		5	18:36										
ZZZZZZ		5	18:40										
ZZZZZZ		5	18:43										
ZZZZZZ		1	18:46										

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF08A

Date: 6/8/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements										
ZZZZZZ		5	18:50											
CCV		1	18:53	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
CCB		1	18:56	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
ZZZZZZ		1	19:00											
ZZZZZZ		1	19:03											
ZZZZZZ		1	19:07											
ZZZZZZ		1	19:10											
ZZZZZZ		1	19:14											
ZZZZZZ		1	19:17											
ZZZZZZ		1	19:20											
ZZZZZZ		5	19:24											
ZZZZZZ		1	19:27											
ZZZZZZ		1	19:31											
CCV		1	19:34	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
CCB		1	19:37	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
ZZZZZZ		5	19:41											
ZZZZZZ		5	19:44											
ZZZZZZ		5	19:48											
ZZZZZZ		1	19:51											
ZZZZZZ		1	19:55											
ZZZZZZ		1	19:58											
ZZZZZZ		5	20:01											
ZZZZZZ		5	20:05											
ZZZZZZ		5	20:08											
ZZZZZZ		5	20:12											
CCV		1	20:15	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
CCB		1	20:19	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF08A

Date: 6/8/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements									
ZZZZZZ		1	20:22										
ZZZZZZ		5	20:26										
ZZZZZZ		1	20:29										
ZZZZZZ		5	20:32										
ZZZZZZ		5	20:36										
ZZZZZZ		5	20:39										
ZZZZZZ		25	20:42										
ZZZZZZ		5	20:46										
ZZZZZZ		5	20:49										
ZZZZZZ		5	20:53										
CCV		1	20:56	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
CCB		1	20:59	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
ZZZZZZ		5	21:03										
ZZZZZZ		1	21:06										
ZZZZZZ		5	21:10										
ZZZZZZ		1	21:13										
ZZZZZZ		1	21:17										
ZZZZZZ		1	21:20										
ZZZZZZ		5	21:24										
ZZZZZZ		5	21:27										
ZZZZZZ		5	21:31										
ZZZZZZ		100	21:34										
CCV		1	21:38	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
CCB		1	21:41	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
ZZZZZZ		1	21:44										
ZZZZZZ		1	21:48										
ZZZZZZ		1	21:51										

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF08A

Date: 6/8/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements												
ZZZZZZ		1	21:55													
ZZZZZZ		1	21:58													
PBWIF08IMW2		5	22:02		Sb	As			Co							Tl
LCSWIF08IMW2		5	22:05		Sb	As			Co							Tl
ZZZZZZ		5	22:08													
CCV		1	22:12	Al	Sb	As		Ca	Co		Fe	Mg	Mo	K	Na	Tl
CCB		1	22:15	Al	Sb	As		Ca	Co		Fe	Mg	Mo	K	Na	Tl

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF11B

Date: 6/11/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements						
6020 Tune		1	11:12							
200.8 Tune		1	11:15							
Cal Blank		1	13:10	Al Sb	Ca	Fe	Mg	Mo	K	Na
Cal Std 1		1	13:14	Al Sb	Ca	Fe	Mg	Mo	K	Na
Cal Std 2		1	13:17	Al Sb	Ca	Fe	Mg	Mo	K	Na
Cal Std 3		1	13:20	Al Sb	Ca	Fe	Mg	Mo	K	Na
Cal Std 4		1	13:23	Al Sb	Ca	Fe	Mg	Mo	K	Na
ICV		1	13:27	Al Sb	Ca	Fe	Mg	Mo	K	Na
ICB		1	13:30	Al Sb	Ca	Fe	Mg	Mo	K	Na
PQL		1	13:33	Al Sb	Ca	Fe	Mg	Mo	K	Na
ZZZZZZ		1	13:36							
ZZZZZZ		1	13:39							
ZZZZZZ		1	13:43							
ICSA		1	13:46	Al Sb	Ca	Fe	Mg	Mo	K	Na
ICSAB		1	13:50	Al Sb	Ca	Fe	Mg	Mo	K	Na
ZZZZZZ		1	13:53							
CCV		1	13:56	Al Sb	Ca	Fe	Mg	Mo	K	Na
CCB		1	14:00	Al Sb	Ca	Fe	Mg	Mo	K	Na
ZZZZZZ		1	14:03							
ZZZZZZ		1	14:06							
ZZZZZZ		5	14:10							
ZZZZZZ		5	14:13							
ZZZZZZ		5	14:16							
ZZZZZZ		25	14:20							
ZZZZZZ		5	14:23							
ZZZZZZ		5	14:26							
ZZZZZZ		5	14:29							

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF11B

Date: 6/11/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements					
ZZZZZZ		5	14:33						
CCV		1	14:36	Al Sb	Ca	Fe	Mg	Mo K	Na
CCB		1	14:40	Al Sb	Ca	Fe	Mg	Mo K	Na
ZZZZZZ		5	14:43						
ZZZZZZ		5	14:46						
ZZZZZZ		5	14:50						
ZZZZZZ		5	14:53						
ZZZZZZ		5	14:56						
ZZZZZZ		5	15:00						
ZZZZZZ		5	15:03						
ZZZZZZ		5	15:06						
ZZZZZZ		5	15:10						
ZZZZZZ		5	15:13						
CCV		1	15:16	Al Sb	Ca	Fe	Mg	Mo K	Na
CCB		1	15:20	Al Sb	Ca	Fe	Mg	Mo K	Na
ZZZZZZ		5	15:23						
ZZZZZZ		5	15:27						
ZZZZZZ		5	15:30						
ZZZZZZ		25	15:33						
ZZZZZZ		5	15:36						
ZZZZZZ		5	15:40						
ZZZZZZ		5	15:43						
ZZZZZZ		5	15:46						
ZZZZZZ		1	15:50						
ZZZZZZ		5	15:53						
CCV		1	15:56	Al Sb	Ca	Fe	Mg	Mo K	Na
CCB		1	16:00	Al Sb	Ca	Fe	Mg	Mo K	Na

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF11B

Date: 6/11/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements					
ZZZZZZ		1	16:03						
ZZZZZZ		1	16:06						
ZZZZZZ		1	16:10						
ZZZZZZ		1	16:13						
ZZZZZZ		25	16:17						
ZZZZZZ		1	16:20						
ZZZZZZ		1	16:24						
ZZZZZZ		5	16:27						
ZZZZZZ		5	16:31						
ZZZZZZ		1	16:34						
CCV		1	16:37	Al Sb	Ca	Fe	Mg	Mo	K	Na
CCB		1	16:41	Al Sb	Ca	Fe	Mg	Mo	K	Na
ZZZZZZ		5	16:44						
ZZZZZZ		5	16:48						
ZZZZZZ		5	16:51						
ZZZZZZ		1	16:54						
ZZZZZZ		1	16:58						
ZZZZZZ		1	17:01						
ZZZZZZ		1	17:05						
ZZZZZZ		1	17:08						
ZZZZZZ		1	17:12						
ZZZZZZ		1	17:15						
CCV		1	17:18	Al Sb	Ca	Fe	Mg	Mo	K	Na
CCB		1	17:22	Al Sb	Ca	Fe	Mg	Mo	K	Na
ZZZZZZ		1	17:25						
ZZZZZZ		5	17:29						
ZZZZZZ		1	17:32						

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF11B

Date: 6/11/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements							
ZZZZZZ		5	17:36								
PBSIF09IMS1		5	17:39		Sb						
LCSOIF09IMS1		5	17:42		Sb						
ZZZZZZ		5	17:46								
CCV		1	17:49	Al	Sb	Ca	Fe	Mg	Mo	K	Na
CCB		1	17:53	Al	Sb	Ca	Fe	Mg	Mo	K	Na

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF12A

Date: 6/12/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements										
6020 Tune		1	14:54											
200.8 Tune		1	14:57											
Cal Blank		1	15:31	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
Cal Std 1		1	15:35	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
Cal Std 2		1	15:38	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
Cal Std 3		1	15:41	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
Cal Std 4		1	15:44	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
ICV		1	15:47	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
ICB		1	15:50	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
PQL		1	15:53	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
ZZZZZZ		1	15:57											
ZZZZZZ		1	15:59											
ZZZZZZ		1	16:03											
ICSA		1	16:06	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
ICSAB		1	16:09	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
ZZZZZZ		1	16:13											
CCV		1	16:16	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
CCB		1	16:19	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
PBSIF05IMS1		5	16:22		Sb	As		Co						Tl
LCSOIF05IMS1		5	16:26		Sb	As		Co						Tl
SI3772-002	WTB-SB-11-0206	5	16:29			As		Co						Tl
ZZZZZZ		5	16:32											
ZZZZZZ		25	16:35											
ZZZZZZ		5	16:38											
ZZZZZZ		5	16:42											
ZZZZZZ		5	16:45											
ZZZZZZ		5	16:48											

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF12A

Date: 6/12/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements										
ZZZZZZ		5	16:52											
CCV		1	16:55	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
CCB		1	16:58	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
ZZZZZZ		5	17:02											
ZZZZZZ		5	17:05											
ZZZZZZ		5	17:08											
ZZZZZZ		5	17:12											
ZZZZZZ		5	17:15											
ZZZZZZ		1	17:18											
ZZZZZZ		1	17:22											
ZZZZZZ		1	17:25											
ZZZZZZ		5	17:29											
ZZZZZZ		100	17:32											
CCV		1	17:35	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
CCB		1	17:39	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
ZZZZZZ		1	17:42											
ZZZZZZ		5	17:45											
ZZZZZZ		5	17:49											
ZZZZZZ		5	17:52											
ZZZZZZ		1	17:56											
ZZZZZZ		1	17:59											
ZZZZZZ		1	18:02											
ZZZZZZ		1	18:06											
ZZZZZZ		5	18:09											
ZZZZZZ		5	18:12											
CCV		1	18:16	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
CCB		1	18:19	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF12A

Date: 6/12/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements											
ZZZZZZ		1	18:22												
ZZZZZZ		5	18:26												
ZZZZZZ		5	18:29												
ZZZZZZ		50	18:33												
ZZZZZZ		50	18:36												
PBSIF04IMS1		5	18:39			As			Co						Tl
LCSOIF04IMS1		5	18:43			As			Co						Tl
SI3772-001	WTB-SS-11-0002	5	18:46			As			Co						Tl
SI3772-001L	WTB-SS-11-0002L	25	18:50			As			Co						Tl
SI3772-001A	WTB-SS-11-0002A	5	18:53			As			Co						Tl
CCV		1	18:56	Al	Sb	As		Ca	Co	Fe	Mg	Mo	K	Na	Tl
CCB		1	18:59	Al	Sb	As		Ca	Co	Fe	Mg	Mo	K	Na	Tl
SI3772-001D	WTB-SS-11-0002D	5	19:03			As			Co						Tl
SI3772-001S	WTB-SS-11-0002S	5	19:07			As			Co						Tl
SI3772-003	WTB-SB-11-0610	5	19:10			As			Co						Tl
SI3772-004	WTB-SS-14-0002	5	19:13			As			Co						Tl
SI3772-005	WTB-SB-14-0206	5	19:17			As			Co						Tl
SI3772-006	WTB-FD01-060315	5	19:20			As			Co						Tl
SI3772-007	WTB-SB-14-0607	5	19:24			As			Co						Tl
SI3772-008	WTB-SS-17-0002	5	19:27			As			Co						Tl
SI3772-009	WTB-SB-17-0206	5	19:30			As			Co						Tl
SI3772-010	WTB-SB-17-0610	5	19:34			As			Co						Tl
CCV		1	19:37	Al	Sb	As		Ca	Co	Fe	Mg	Mo	K	Na	Tl
CCB		1	19:41	Al	Sb	As		Ca	Co	Fe	Mg	Mo	K	Na	Tl
SI3772-011	WTB-SS-19-0002	5	19:44		Sb	As			Co						Tl
SI3772-012	WTB-SB-19-0206	5	19:48		Sb	As			Co						Tl
SI3772-013	WTB-SB-19-0610	5	19:51		Sb	As			Co						Tl

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF12A

Date: 6/12/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements												
ZZZZZZ		5	19:55													
ZZZZZZ		5	19:58													
SI3897-038	WTB-RB01-060415	5	20:02		Sb	As			Co							Tl
SI3897-038L	WTB-RB01-060415L	25	20:05		Sb	As			Co							Tl
SI3897-038A	WTB-RB01-060415A	5	20:08		Sb	As			Co							Tl
SI3897-038D	WTB-RB01-060415D	5	20:12		Sb	As			Co							Tl
SI3897-038S	WTB-RB01-060415S	5	20:15		Sb	As			Co							Tl
CCV		1	20:18	Al	Sb	As		Ca	Co	Fe	Mg	Mo	K		Na	Tl
CCB		1	20:22	Al	Sb	As		Ca	Co	Fe	Mg	Mo	K		Na	Tl

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF17A

Date: 6/17/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements											
6020 Tune		1	12:03												
200.8 Tune		1	12:05												
Cal Blank		1	12:40	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl	
Cal Std 1		1	12:43	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl	
Cal Std 2		1	12:46	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl	
Cal Std 3		1	12:49	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl	
Cal Std 4		1	12:52	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl	
ICV		1	12:56	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl	
ICB		1	12:59	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl	
PQL		1	13:02	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl	
ZZZZZZ		1	13:05												
ZZZZZZ		1	13:08												
ZZZZZZ		1	13:11												
ICSA		1	13:14	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl	
ICSAB		1	13:18	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl	
ZZZZZZ		1	13:21												
CCV		1	13:25	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl	
CCB		1	13:28	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl	
ZZZZZZ		1	13:31												
ZZZZZZ		1	13:34												
ZZZZZZ		1	13:37												
ZZZZZZ		1	13:41												
PBSIF09IMS1		5	13:44			As		Co						Tl	
LCSOIF09IMS1		5	13:47			As		Co						Tl	
SI3897-001	WTB-SS-22-0002	5	13:50		Sb	As		Co						Tl	
SI3897-002	WTB-SS-24-0002	5	13:54		Sb	As		Co						Tl	
SI3897-003	WTB-SB-24-0206	5	13:57		Sb	As		Co						Tl	

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF17A

Date: 6/17/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements											
SI3897-004	WTB-SB-24-069.7	5	14:00		Sb	As		Co							Tl
CCV		1	14:04	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na		Tl
CCB		1	14:07	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na		Tl
SI3897-004L	WTB-SB-24-069.7L	25	14:10		Sb	As		Co							Tl
SI3897-004A	WTB-SB-24-069.7A	5	14:13		Sb	As		Co							Tl
SI3897-004D	WTB-SB-24-069.7D	5	14:17		Sb	As		Co							Tl
SI3897-004S	WTB-SB-24-069.7S	5	14:20		Sb	As		Co							Tl
SI3897-004P	WTB-SB-24-069.7P	5	14:23		Sb	As		Co							Tl
SI3897-005	WTB-SB-22-0206	5	14:27		Sb	As		Co							Tl
SI3897-006	WTB-SB-22-0610	5	14:30		Sb	As		Co							Tl
SI3897-007	WTB-FD02-060315	5	14:33		Sb	As		Co							Tl
SI3897-008	WTB-SS-23-0002	5	14:37		Sb	As		Co							Tl
SI3897-009	WTB-SB-23-0206	5	14:40		Sb	As		Co							Tl
CCV		1	14:43	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na		Tl
CCB		1	14:47	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na		Tl
SI3897-010	WTB-SB-23-0610	5	14:50			As		Co							Tl
SI3897-011	WTB-SS-08-0002	5	14:53			As		Co							Tl
SI3897-012	WTB-FD01-060415	5	14:57			As		Co							Tl
SI3897-013	WTB-SB-08-0206	5	15:00			As		Co							Tl
SI3897-014	WTB-SB-08-0610	5	15:03			As		Co							Tl
SI3897-015	WTB-SS-09-0002	5	15:07			As		Co							Tl
SI3897-016	WTB-SB-09-0206	5	15:10			As		Co							Tl
PBSIF10IMS1		5	15:14			As		Co							Tl
LCSOIF10IMS1		5	15:17			As		Co							Tl
SI3897-017	WTB-SB-09-0610	5	15:20			As		Co							Tl
CCV		1	15:23	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na		Tl
CCB		1	15:27	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na		Tl

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF17A

Date: 6/17/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements											
SI3897-018	WTB-SS-12-0002	5	15:30			As		Co						Tl
SI3897-019	WTB-SB-12-0206	5	15:34			As		Co						Tl
SI3897-020	WTB-SB-12-0610	5	15:37			As		Co						Tl
SI3897-021	WTB-SS-15-0002	5	15:40			As		Co						Tl
SI3897-022	WTB-SB-15-0206	5	15:44			As		Co						Tl
SI3897-023	WTB-FD02-060415	5	15:47			As		Co						Tl
SI3897-024	WTB-SB-15-0610	5	15:51			As		Co						Tl
SI3897-025	WTB-SS-16-0002	5	15:54			As		Co						Tl
SI3897-025L	WTB-SS-16-0002L	25	15:58			As		Co						Tl
SI3897-025A	WTB-SS-16-0002A	5	16:01			As		Co						Tl
CCV		1	16:05	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
CCB		1	16:08	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
SI3897-025D	WTB-SS-16-0002D	5	16:12		Sb	As		Co						Tl
SI3897-025S	WTB-SS-16-0002S	5	16:15		Sb	As		Co						Tl
SI3897-025P	WTB-SS-16-0002P	5	16:18		Sb	As		Co						Tl
SI3897-026	WTB-SB-16-0206	5	16:22		Sb	As		Co						Tl
PBSIF11IMS1		5	16:25		Sb	As		Co						Tl
LCSOIF11IMS1		5	16:29		Sb	As		Co						Tl
SI3897-027	WTB-SB-16-0610	5	16:32		Sb	As		Co						Tl
SI3897-028	WTB-SS-18-0002	5	16:36		Sb	As		Co						Tl
SI3897-029	WTB-SB-18-0206	5	16:39		Sb	As		Co						Tl
SI3897-030	WTB-SB-18-0610	5	16:42		Sb	As		Co						Tl
CCV		1	16:46	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
CCB		1	16:49	Al	Sb	As	Ca	Co	Fe	Mg	Mo	K	Na	Tl
SI3897-031	WTB-SS-20-0002	5	16:53		Sb	As		Co						Tl
SI3897-032	WTB-FD03-060415	5	16:56		Sb	As		Co						Tl
SI3897-033	WTB-SB-20-0206	5	17:00		Sb	As		Co						Tl

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF17A

Date: 6/17/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements												
SI3897-033L	WTB-SB-20-0206L	25	17:03		Sb	As			Co							Tl
SI3897-033A	WTB-SB-20-0206A	5	17:07		Sb	As			Co							Tl
SI3897-033D	WTB-SB-20-0206D	5	17:10		Sb	As			Co							Tl
SI3897-033S	WTB-SB-20-0206S	5	17:14		Sb	As			Co							Tl
SI3897-033P	WTB-SB-20-0206P	5	17:17		Sb	As			Co							Tl
SI3897-034	WTB-SB-20-0610	5	17:20		Sb	As			Co							Tl
SI3897-035	WTB-SS-21-0002	5	17:24		Sb	As			Co							Tl
CCV		1	17:27	Al	Sb	As		Ca	Co	Fe	Mg	Mo	K		Na	Tl
CCB		1	17:31	Al	Sb	As		Ca	Co	Fe	Mg	Mo	K		Na	Tl
SI3897-036	WTB-SB-21-0206	5	17:34		Sb	As			Co							Tl
SI3897-037	WTB-SB-21-0610	5	17:38		Sb	As			Co							Tl
SI3897-039	WTB-SS-13-0002	5	17:41		Sb	As			Co							Tl
SI3897-040	WTB-SB-13-0206	5	17:45		Sb	As			Co							Tl
SI3897-041	WTB-SB-13-0610	5	17:48		Sb	As			Co							Tl
SI3897-042	WTB-SS-10-0002	5	17:51		Sb	As			Co							Tl
SI3897-043	WTB-SB-10-0206	5	17:55		Sb	As			Co							Tl
SI3897-044	WTB-SB-10-0610	5	17:58		Sb	As			Co							Tl
ZZZZZZ		1	18:02													
ZZZZZZ		5	18:05													
CCV		1	18:09	Al	Sb	As		Ca	Co	Fe	Mg	Mo	K		Na	Tl
CCB		1	18:12	Al	Sb	As		Ca	Co	Fe	Mg	Mo	K		Na	Tl

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF18A

Date: 6/18/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements							
6020 Tune		1	16:34								
200.8 Tune		1	16:37								
Cal Blank		1	17:11	Al	Sb	Ca	Fe	Mg	Mo	K	Na
Cal Std 1		1	17:15	Al	Sb	Ca	Fe	Mg	Mo	K	Na
Cal Std 2		1	17:18	Al	Sb	Ca	Fe	Mg	Mo	K	Na
Cal Std 3		1	17:21	Al	Sb	Ca	Fe	Mg	Mo	K	Na
Cal Std 4		1	17:24	Al	Sb	Ca	Fe	Mg	Mo	K	Na
ICV		1	17:27	Al	Sb	Ca	Fe	Mg	Mo	K	Na
ICB		1	17:30	Al	Sb	Ca	Fe	Mg	Mo	K	Na
PQL		1	17:34	Al	Sb	Ca	Fe	Mg	Mo	K	Na
ZZZZZZ		1	17:37								
ZZZZZZ		1	17:40								
ZZZZZZ		1	17:43								
ICSA		1	17:46	Al	Sb	Ca	Fe	Mg	Mo	K	Na
ICSAB		1	17:50	Al	Sb	Ca	Fe	Mg	Mo	K	Na
ZZZZZZ		1	17:53								
CCV		1	17:57	Al	Sb	Ca	Fe	Mg	Mo	K	Na
CCB		1	18:00	Al	Sb	Ca	Fe	Mg	Mo	K	Na
PBSIF10IMS1		5	18:03		Sb						
LCSOIF10IMS1		5	18:06		Sb						
ZZZZZZ		5	18:09								
ZZZZZZ		5	18:12								
ZZZZZZ		5	18:16								
ZZZZZZ		5	18:19								
ZZZZZZ		5	18:22								
ZZZZZZ		5	18:25								
ZZZZZZ		25	18:28								

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF18A

Date: 6/18/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements						
ZZZZZZ		25	18:32							
CCV		1	18:35	Al Sb	Ca	Fe	Mg	Mo	K	Na
CCB		1	18:38	Al Sb	Ca	Fe	Mg	Mo	K	Na

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF24C

Date: 6/24/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements						
6020 Tune		1	14:18							
200.8 Tune		1	14:30							
Cal Blank		1	14:55	Al Sb	Ca	Fe	Mg	Mo	K	Na
Cal Std 1		1	14:59	Al Sb	Ca	Fe	Mg	Mo	K	Na
Cal Std 2		1	15:02	Al Sb	Ca	Fe	Mg	Mo	K	Na
Cal Std 3		1	15:05	Al Sb	Ca	Fe	Mg	Mo	K	Na
Cal Std 4		1	15:08	Al Sb	Ca	Fe	Mg	Mo	K	Na
ICV		1	15:11	Al Sb	Ca	Fe	Mg	Mo	K	Na
ICB		1	15:14	Al Sb	Ca	Fe	Mg	Mo	K	Na
PQL		1	15:17	Al Sb	Ca	Fe	Mg	Mo	K	Na
ZZZZZZ		1	15:21							
ZZZZZZ		1	15:23							
ZZZZZZ		1	15:27							
ICSA		1	15:30	Al Sb	Ca	Fe	Mg	Mo	K	Na
ICSAB		1	15:33	Al Sb	Ca	Fe	Mg	Mo	K	Na
ZZZZZZ		1	15:37							
CCV		1	15:40	Al Sb	Ca	Fe	Mg	Mo	K	Na
CCB		1	15:43	Al Sb	Ca	Fe	Mg	Mo	K	Na
ZZZZZZ		5	15:47							
ZZZZZZ		5	15:50							
SI3897-010	WTB-SB-23-0610	5	15:53	Sb						
SI3897-011	WTB-SS-08-0002	5	15:56	Sb						
SI3897-012	WTB-FD01-060415	5	15:59	Sb						
SI3897-013	WTB-SB-08-0206	5	16:03	Sb						
SI3897-014	WTB-SB-08-0610	5	16:06	Sb						
SI3897-015	WTB-SS-09-0002	5	16:09	Sb						
SI3897-016	WTB-SB-09-0206	25	16:12	Sb						

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF24C

Date: 6/24/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements									
SI3897-017	WTB-SB-09-0610	10	16:15		Sb								
CCV		1	16:19	Al	Sb		Ca		Fe	Mg	Mo	K	Na
CCB		1	16:22	Al	Sb		Ca		Fe	Mg	Mo	K	Na
SI3897-018	WTB-SS-12-0002	5	16:25		Sb								
SI3897-019	WTB-SB-12-0206	5	16:29		Sb								
SI3897-020	WTB-SB-12-0610	5	16:32		Sb								
SI3897-021	WTB-SS-15-0002	5	16:35		Sb								
SI3897-022	WTB-SB-15-0206	5	16:38		Sb								
SI3897-023	WTB-FD02-060415	5	16:42		Sb								
SI3897-024	WTB-SB-15-0610	5	16:45		Sb								
SI3897-025	WTB-SS-16-0002	5	16:48		Sb								
SI3897-025L	WTB-SS-16-0002L	25	16:52		Sb								
SI3897-025A	WTB-SS-16-0002A	5	16:55		Sb								
CCV		1	16:59	Al	Sb		Ca		Fe	Mg	Mo	K	Na
CCB		1	17:02	Al	Sb		Ca		Fe	Mg	Mo	K	Na

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF25A

Date: 6/25/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements						
6020 Tune		1	12:30							
200.8 Tune		1	12:42							
Cal Blank		1	13:08	Al Sb	Ca	Fe	Mg	Mo	K	Na
Cal Std 1		1	13:11	Al Sb	Ca	Fe	Mg	Mo	K	Na
Cal Std 2		1	13:15	Al Sb	Ca	Fe	Mg	Mo	K	Na
Cal Std 3		1	13:18	Al Sb	Ca	Fe	Mg	Mo	K	Na
Cal Std 4		1	13:21	Al Sb	Ca	Fe	Mg	Mo	K	Na
ICV		1	13:24	Al Sb	Ca	Fe	Mg	Mo	K	Na
ICB		1	13:28	Al Sb	Ca	Fe	Mg	Mo	K	Na
PQL		1	13:31	Al Sb	Ca	Fe	Mg	Mo	K	Na
ZZZZZZ		1	13:34							
ZZZZZZ		1	13:37							
ZZZZZZ		1	13:40							
ICSA		1	13:44	Al Sb	Ca	Fe	Mg	Mo	K	Na
ICSAB		1	13:47	Al Sb	Ca	Fe	Mg	Mo	K	Na
ZZZZZZ		1	13:51							
CCV		1	13:54	Al Sb	Ca	Fe	Mg	Mo	K	Na
CCB		1	13:57	Al Sb	Ca	Fe	Mg	Mo	K	Na
PQL		1	14:00	Al Sb	Ca	Fe	Mg	Mo	K	Na
CCV		1	14:04	Al Sb	Ca	Fe	Mg	Mo	K	Na
CCB		1	14:07	Al Sb	Ca	Fe	Mg	Mo	K	Na
CCV		1	14:10	Al Sb	Ca	Fe	Mg	Mo	K	Na
CCB		1	14:14	Al Sb	Ca	Fe	Mg	Mo	K	Na
ZZZZZZ		1	14:17							
ZZZZZZ		1	14:20							
ZZZZZZ		1	14:24							
ZZZZZZ		1	14:27							

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF25A

Date: 6/25/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements						
ZZZZZZ		1	14:30							
ZZZZZZ		1	14:34							
ZZZZZZ		1	14:37							
ZZZZZZ		1	14:40							
ZZZZZZ		1	14:43							
ZZZZZZ		1	14:47							
CCV		1	14:50	Al Sb	Ca	Fe	Mg	Mo	K	Na
CCB		1	14:53	Al Sb	Ca	Fe	Mg	Mo	K	Na
ZZZZZZ		1	14:57							
ZZZZZZ		1	15:00							
ZZZZZZ		1	15:03							
ZZZZZZ		5	15:07							
ZZZZZZ		5	15:10							
ZZZZZZ		5	15:13							
ZZZZZZ		5	15:17							
ZZZZZZ		5	15:20							
ZZZZZZ		5	15:23							
ZZZZZZ		5	15:26							
CCV		1	15:30	Al Sb	Ca	Fe	Mg	Mo	K	Na
CCB		1	15:33	Al Sb	Ca	Fe	Mg	Mo	K	Na
ZZZZZZ		5	15:36							
ZZZZZZ		5	15:40							
ZZZZZZ		5	15:43							
ZZZZZZ		25	15:46							
ZZZZZZ		5	15:50							
ZZZZZZ		5	15:53							
ZZZZZZ		5	15:56							

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF25A

Date: 6/25/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements						
ZZZZZZ		5	15:59							
ZZZZZZ		1	16:03							
ZZZZZZ		10	16:06							
CCV		1	16:09	Al Sb	Ca	Fe	Mg	Mo	K	Na
CCB		1	16:13	Al Sb	Ca	Fe	Mg	Mo	K	Na
ZZZZZZ		25	16:16							
ZZZZZZ		5	16:19							
ZZZZZZ		5	16:23							
ZZZZZZ		5	16:26							
ZZZZZZ		1	16:29							
ZZZZZZ		5	16:33							
ZZZZZZ		5	16:36							
ZZZZZZ		5	16:40							
ZZZZZZ		1	16:43							
ZZZZZZ		5	16:47							
CCV		1	16:50	Al Sb	Ca	Fe	Mg	Mo	K	Na
CCB		1	16:53	Al Sb	Ca	Fe	Mg	Mo	K	Na
ZZZZZZ		5	16:57							
ZZZZZZ		1	17:00							
ZZZZZZ		1	17:04							
ZZZZZZ		10	17:07							
ZZZZZZ		1	17:11							
ZZZZZZ		5	17:14							
ZZZZZZ		1	17:17							
ZZZZZZ		1	17:21							
ZZZZZZ		1	17:24							
ZZZZZZ		1	17:28							

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF25A

Date: 6/25/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements							
CCV		1	17:31	Al	Sb	Ca	Fe	Mg	Mo	K	Na
CCB		1	17:34	Al	Sb	Ca	Fe	Mg	Mo	K	Na
ZZZZZZ		1	17:38								
ZZZZZZ		1	17:42								
ZZZZZZ		1	17:45								
ZZZZZZ		1	17:48								
ZZZZZZ		5	17:52								
ZZZZZZ		5	17:55								
ZZZZZZ		5	17:59								
PBSIF04IMS1		5	18:02		Sb						
LCSOIF04IMS1		5	18:05		Sb						
SI3772-002	WTB-SB-11-0206	25	18:09		Sb						
CCV		1	18:12	Al	Sb	Ca	Fe	Mg	Mo	K	Na
CCB		1	18:15	Al	Sb	Ca	Fe	Mg	Mo	K	Na
ZZZZZZ		5	18:19								
ZZZZZZ		25	18:23								
ZZZZZZ		5	18:26								
ZZZZZZ		5	18:29								
ZZZZZZ		5	18:33								
ZZZZZZ		5	18:36								
ZZZZZZ		5	18:39								
ZZZZZZ		5	18:43								
ZZZZZZ		5	18:46								
ZZZZZZ		5	18:50								
CCV		1	18:53	Al	Sb	Ca	Fe	Mg	Mo	K	Na
CCB		1	18:57	Al	Sb	Ca	Fe	Mg	Mo	K	Na
ZZZZZZ		5	19:00								

FORM XIV - IN

ANALYSIS RUN LOG

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument ID: AGILENT 7500 ICP-MS **File Name:** JIF25A

Date: 6/25/2015 **Method:** MS

Lab Sample ID	Client ID	D.F.	Time	Elements							
ZZZZZZ		1	19:04								
ZZZZZZ		5	19:07								
ZZZZZZ		5	19:11								
ZZZZZZ		5	19:14								
ZZZZZZ		5	19:18								
ZZZZZZ		25	19:21								
SI3772-001	WTB-SS-11-0002	5	19:24		Sb						
SI3772-001L	WTB-SS-11-0002L	25	19:28		Sb						
SI3772-001A	WTB-SS-11-0002A	5	19:31		Sb						
CCV		1	19:35	Al	Sb	Ca	Fe	Mg	Mo	K	Na
CCB		1	19:38	Al	Sb	Ca	Fe	Mg	Mo	K	Na
SI3772-001D	WTB-SS-11-0002D	5	19:42		Sb						
SI3772-001S	WTB-SS-11-0002S	5	19:45		Sb						
SI3772-003	WTB-SB-11-0610	5	19:49		Sb						
SI3772-004	WTB-SS-14-0002	5	19:52		Sb						
SI3772-005	WTB-SB-14-0206	5	19:56		Sb						
SI3772-006	WTB-FD01-060315	5	19:59		Sb						
SI3772-007	WTB-SB-14-0607	5	20:03		Sb						
SI3772-008	WTB-SS-17-0002	5	20:06		Sb						
SI3772-009	WTB-SB-17-0206	5	20:10		Sb						
SI3772-010	WTB-SB-17-0610	5	20:13		Sb						
CCV		1	20:17	Al	Sb	Ca	Fe	Mg	Mo	K	Na
CCB		1	20:20	Al	Sb	Ca	Fe	Mg	Mo	K	Na

FORM XIV - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICV

File: HIF11A Jun 11, 2015 17:01

Analyte	True	Found	%R (1)
MERCURY	6.0	6.12	102.0

SAMPLE: CCV

File: HIF11A Jun 11, 2015 17:08

Analyte	True	Found	%R (1)
MERCURY	5.0	5.26	105.2

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: HIF11A Jun 11, 2015 17:21

Analyte	True	Found	%R (1)
MERCURY	5.0	4.98	99.6

SAMPLE: CCV

File: HIF11A Jun 11, 2015 17:40

Analyte	True	Found	%R (1)
MERCURY	5.0	5.01	100.2

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: HIF11A Jun 11, 2015 18:05

Analyte	True	Found	%R (1)
MERCURY	5.0	5.13	102.6

SAMPLE: CCV

File: HIF11A Jun 11, 2015 18:25

Analyte	True	Found	%R (1)
MERCURY	5.0	4.99	99.8

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICV

File: HIF12B Jun 12, 2015 18:33

Analyte	True	Found	%R (1)
MERCURY	6.0	6.12	102.0

SAMPLE: CCV

File: HIF12B Jun 12, 2015 18:40

Analyte	True	Found	%R (1)
MERCURY	5.0	5.05	101.0

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: HIF12B Jun 12, 2015 19:05

Analyte	True	Found	%R (1)
MERCURY	5.0	4.88	97.6

SAMPLE: CCV

File: HIF12B Jun 12, 2015 19:32

Analyte	True	Found	%R (1)
MERCURY	5.0	5.03	100.6

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICV

File: HIF15A Jun 15, 2015 13:36

Analyte	True	Found	%R (1)
MERCURY	6.0	5.94	99.0

SAMPLE: CCV

File: HIF15A Jun 15, 2015 13:42

Analyte	True	Found	%R (1)
MERCURY	5.0	5.54	110.8

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: HIF15A Jun 15, 2015 14:09

Analyte	True	Found	%R (1)
MERCURY	5.0	5.00	100.0

SAMPLE: CCV

File: HIF15A Jun 15, 2015 14:36

Analyte	True	Found	%R (1)
MERCURY	5.0	5.15	103.0

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: HIF15A Jun 15, 2015 15:04

Analyte	True	Found	%R (1)
MERCURY	5.0	5.04	100.8

SAMPLE: CCV

File: HIF15A Jun 15, 2015 15:32

Analyte	True	Found	%R (1)
MERCURY	5.0	4.66	93.2

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

No sample results were reported between 15:59 and 16:56.

SAMPLE: CCV

File: HIF15A Jun 15, 2015 15:59

Analyte	True	Found	%R (1)
MERCURY	5.0	4.92	98.4

SAMPLE: CCV

File: HIF15A Jun 15, 2015 16:24

Analyte	True	Found	%R (1)
MERCURY	5.0	0.16	3.2•

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: HIF15A Jun 15, 2015 16:56

Analyte	True	Found	%R (1)
MERCURY	5.0	4.98	99.6

SAMPLE: CCV

File: HIF15A Jun 15, 2015 17:02

Analyte	True	Found	%R (1)
MERCURY	5.0	4.89	97.8

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: HIF15A Jun 15, 2015 17:23

Analyte	True	Found	%R (1)
MERCURY	5.0	5.68	113.6

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICV

File: HIF16B Jun 16, 2015 12:54

Analyte	True	Found	%R (1)
MERCURY	6.0	6.16	102.7

SAMPLE: CCV

File: HIF16B Jun 16, 2015 13:00

Analyte	True	Found	%R (1)
MERCURY	5.0	4.88	97.6

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: HIF16B Jun 16, 2015 13:24

Analyte	True	Found	%R (1)
MERCURY	5.0	5.02	100.4

SAMPLE: CCV

File: HIF16B Jun 16, 2015 13:49

Analyte	True	Found	%R (1)
MERCURY	5.0	5.35	107.0

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: HIF16B Jun 16, 2015 14:02

Analyte	True	Found	%R (1)
MERCURY	5.0	4.95	99.0

SAMPLE: CCV

File: HIF16B Jun 16, 2015 16:36

Analyte	True	Found	%R (1)
MERCURY	5.0	4.54	90.8

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: HIF16B Jun 16, 2015 16:44

Analyte	True	Found	%R (1)
MERCURY	5.0	4.65	93.0

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICV

File: IIF09B Jun 09, 2015 19:07

Analyte	True	Found	%R (1)
ALUMINUM	10000.0	10030.00	100.3
BARIUM	400.0	424.20	106.1
BERYLLIUM	400.0	430.00	107.5
CADMIUM	400.0	419.60	104.9
CALCIUM	10000.0	10100.00	101.0
CHROMIUM	400.0	418.50	104.6
COPPER	400.0	419.10	104.8
IRON	10000.0	10160.00	101.6
LEAD	400.0	426.50	106.6
MAGNESIUM	10000.0	10200.00	102.0
MANGANESE	400.0	423.10	105.8
NICKEL	400.0	425.50	106.4
POTASSIUM	13600.0	13740.00	101.0
SELENIUM	400.0	415.70	103.9
SILVER	400.0	415.90	104.0
SODIUM	10000.0	10170.00	101.7
VANADIUM	400.0	420.00	105.0
ZINC	400.0	423.70	105.9

SAMPLE: CCV

File: IIF09B Jun 09, 2015 19:52

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12920.00	103.4
BARIUM	500.0	505.60	101.1
BERYLLIUM	500.0	521.40	104.3
CADMIUM	500.0	510.30	102.1
CALCIUM	12500.0	12950.00	103.6
CHROMIUM	500.0	513.50	102.7
COPPER	500.0	516.40	103.3
IRON	12500.0	13120.00	105.0
LEAD	500.0	515.10	103.0
MAGNESIUM	12500.0	13070.00	104.6
MANGANESE	500.0	516.40	103.3
NICKEL	500.0	510.00	102.0
POTASSIUM	12500.0	13030.00	104.2
SELENIUM	500.0	507.60	101.5
SILVER	500.0	509.50	101.9
SODIUM	12500.0	12920.00	103.4
VANADIUM	500.0	504.30	100.9
ZINC	500.0	517.00	103.4

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF09B Jun 09, 2015 20:52

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12720.00	101.8
BARIUM	500.0	498.30	99.7
BERYLLIUM	500.0	510.90	102.2
CADMIUM	500.0	511.40	102.3
CALCIUM	12500.0	12740.00	101.9
CHROMIUM	500.0	516.30	103.3
COPPER	500.0	521.80	104.4
IRON	12500.0	12840.00	102.7
LEAD	500.0	516.10	103.2
MAGNESIUM	12500.0	13060.00	104.5
MANGANESE	500.0	508.00	101.6
NICKEL	500.0	510.50	102.1
POTASSIUM	12500.0	12810.00	102.5
SELENIUM	500.0	507.40	101.5
SILVER	500.0	515.90	103.2
SODIUM	12500.0	12810.00	102.5
VANADIUM	500.0	509.20	101.8
ZINC	500.0	517.50	103.5

SAMPLE: CCV

File: IIF09B Jun 09, 2015 21:52

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12850.00	102.8
BARIUM	500.0	502.40	100.5
BERYLLIUM	500.0	508.50	101.7
CADMIUM	500.0	510.40	102.1
CALCIUM	12500.0	12710.00	101.7
CHROMIUM	500.0	515.60	103.1
COPPER	500.0	518.30	103.7
IRON	12500.0	12810.00	102.5
LEAD	500.0	514.10	102.8
MAGNESIUM	12500.0	13130.00	105.0
MANGANESE	500.0	507.90	101.6
NICKEL	500.0	511.30	102.3
POTASSIUM	12500.0	12850.00	102.8
SELENIUM	500.0	502.20	100.4
SILVER	500.0	518.00	103.6
SODIUM	12500.0	12930.00	103.4
VANADIUM	500.0	510.90	102.2
ZINC	500.0	515.10	103.0

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF09B Jun 09, 2015 22:53

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12520.00	100.2
BARIUM	500.0	492.70	98.5
BERYLLIUM	500.0	501.40	100.3
CADMIUM	500.0	512.60	102.5
CALCIUM	12500.0	12560.00	100.5
CHROMIUM	500.0	513.30	102.7
COPPER	500.0	510.10	102.0
IRON	12500.0	12670.00	101.4
LEAD	500.0	516.80	103.4
MAGNESIUM	12500.0	13020.00	104.2
MANGANESE	500.0	499.00	99.8
NICKEL	500.0	512.20	102.4
POTASSIUM	12500.0	12630.00	101.0
SELENIUM	500.0	506.40	101.3
SILVER	500.0	507.50	101.5
SODIUM	12500.0	12750.00	102.0
VANADIUM	500.0	505.60	101.1
ZINC	500.0	518.80	103.8

SAMPLE: CCV

File: IIF09B Jun 09, 2015 23:54

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12750.00	102.0
BARIUM	500.0	499.90	100.0
BERYLLIUM	500.0	509.20	101.8
CADMIUM	500.0	513.60	102.7
CALCIUM	12500.0	12750.00	102.0
CHROMIUM	500.0	516.10	103.2
COPPER	500.0	518.20	103.6
IRON	12500.0	12820.00	102.6
LEAD	500.0	518.00	103.6
MAGNESIUM	12500.0	12970.00	103.8
MANGANESE	500.0	507.90	101.6
NICKEL	500.0	514.40	102.9
POTASSIUM	12500.0	12820.00	102.6
SELENIUM	500.0	506.60	101.3
SILVER	500.0	512.90	102.6
SODIUM	12500.0	12870.00	103.0
VANADIUM	500.0	508.30	101.7
ZINC	500.0	520.00	104.0

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICV

File: IIF11A Jun 11, 2015 12:19

Analyte	True	Found	%R (1)
ALUMINUM	10000.0	9818.00	98.2
BARIUM	400.0	414.20	103.5
BERYLLIUM	400.0	417.90	104.5
CADMIUM	400.0	416.30	104.1
CALCIUM	10000.0	9810.00	98.1
CHROMIUM	400.0	422.20	105.5
COPPER	400.0	424.00	106.0
IRON	10000.0	9852.00	98.5
LEAD	400.0	422.80	105.7
MAGNESIUM	10000.0	10150.00	101.5
MANGANESE	400.0	416.90	104.2
NICKEL	400.0	421.70	105.4
POTASSIUM	13600.0	13570.00	99.8
SILVER	400.0	419.50	104.9
SODIUM	10000.0	9903.00	99.0
VANADIUM	400.0	422.30	105.6
ZINC	400.0	419.30	104.8

SAMPLE: CCV

File: IIF11A Jun 11, 2015 13:03

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12660.00	101.3
BARIUM	500.0	499.30	99.9
BERYLLIUM	500.0	511.50	102.3
CADMIUM	500.0	500.80	100.2
CALCIUM	12500.0	12640.00	101.1
CHROMIUM	500.0	505.80	101.2
COPPER	500.0	509.70	101.9
IRON	12500.0	12840.00	102.7
LEAD	500.0	509.40	101.9
MAGNESIUM	12500.0	12820.00	102.6
MANGANESE	500.0	507.70	101.5
NICKEL	500.0	504.40	100.9
POTASSIUM	12500.0	12780.00	102.2
SILVER	500.0	504.00	100.8
SODIUM	12500.0	12530.00	100.2
VANADIUM	500.0	500.20	100.0
ZINC	500.0	507.20	101.4

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF11A Jun 11, 2015 14:03

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12720.00	101.8
BARIUM	500.0	498.50	99.7
BERYLLIUM	500.0	513.30	102.7
CADMIUM	500.0	500.50	100.1
CALCIUM	12500.0	12660.00	101.3
CHROMIUM	500.0	503.60	100.7
COPPER	500.0	511.80	102.4
IRON	12500.0	12840.00	102.7
LEAD	500.0	508.60	101.7
MAGNESIUM	12500.0	12800.00	102.4
MANGANESE	500.0	510.30	102.1
NICKEL	500.0	505.00	101.0
POTASSIUM	12500.0	12930.00	103.4
SILVER	500.0	506.10	101.2
SODIUM	12500.0	12520.00	100.2
VANADIUM	500.0	499.70	99.9
ZINC	500.0	505.80	101.2

SAMPLE: CCV

File: IIF11A Jun 11, 2015 15:03

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12530.00	100.2
BARIUM	500.0	492.90	98.6
BERYLLIUM	500.0	502.60	100.5
CADMIUM	500.0	499.40	99.9
CALCIUM	12500.0	12450.00	99.6
CHROMIUM	500.0	499.30	99.9
COPPER	500.0	502.20	100.4
IRON	12500.0	12560.00	100.5
LEAD	500.0	507.10	101.4
MAGNESIUM	12500.0	12810.00	102.5
MANGANESE	500.0	500.50	100.1
NICKEL	500.0	504.00	100.8
POTASSIUM	12500.0	12690.00	101.5
SILVER	500.0	496.30	99.3
SODIUM	12500.0	12390.00	99.1
VANADIUM	500.0	491.80	98.4
ZINC	500.0	505.40	101.1

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF11A Jun 11, 2015 15:33

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12610.00	100.9
BARIUM	500.0	495.10	99.0
BERYLLIUM	500.0	506.50	101.3
CADMIUM	500.0	499.30	99.9
CALCIUM	12500.0	12530.00	100.2
CHROMIUM	500.0	501.70	100.3
COPPER	500.0	510.70	102.1
IRON	12500.0	12700.00	101.6
LEAD	500.0	506.10	101.2
MAGNESIUM	12500.0	12740.00	101.9
MANGANESE	500.0	504.90	101.0
NICKEL	500.0	504.30	100.9
POTASSIUM	12500.0	12800.00	102.4
SILVER	500.0	505.50	101.1
SODIUM	12500.0	12430.00	99.4
VANADIUM	500.0	499.90	100.0
ZINC	500.0	505.10	101.0

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICV

File: IIF15A Jun 15, 2015 14:02

Analyte	True	Found	%R (1)
ALUMINUM	10000.0	9995.00	100.0
BARIUM	400.0	408.40	102.1
BERYLLIUM	400.0	413.70	103.4
CADMIUM	400.0	406.40	101.6
CALCIUM	10000.0	9846.00	98.5
CHROMIUM	400.0	408.70	102.2
COPPER	400.0	407.30	101.8
IRON	10000.0	9933.00	99.3
LEAD	400.0	415.10	103.8
MAGNESIUM	10000.0	10160.00	101.6
MANGANESE	400.0	413.00	103.3
NICKEL	400.0	413.50	103.4
POTASSIUM	13600.0	13480.00	99.1
SELENIUM	400.0	399.40	99.8
SILVER	400.0	408.10	102.0
SODIUM	10000.0	9960.00	99.6
VANADIUM	400.0	408.10	102.0
ZINC	400.0	408.70	102.2

SAMPLE: CCV

File: IIF15A Jun 15, 2015 14:46

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12150.00	97.2
BARIUM	500.0	484.80	97.0
BERYLLIUM	500.0	483.80	96.8
CADMIUM	500.0	484.90	97.0
CALCIUM	12500.0	12170.00	97.4
CHROMIUM	500.0	494.40	98.9
COPPER	500.0	497.80	99.6
IRON	12500.0	12300.00	98.4
LEAD	500.0	494.00	98.8
MAGNESIUM	12500.0	12570.00	100.6
MANGANESE	500.0	489.50	97.9
NICKEL	500.0	489.10	97.8
POTASSIUM	12500.0	12250.00	98.0
SELENIUM	500.0	474.10	94.8
SILVER	500.0	491.10	98.2
SODIUM	12500.0	12130.00	97.0
VANADIUM	500.0	482.80	96.6
ZINC	500.0	480.60	96.1

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF15A Jun 15, 2015 15:46

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12310.00	98.5
BARIUM	500.0	488.00	97.6
BERYLLIUM	500.0	486.40	97.3
CADMIUM	500.0	485.20	97.0
CALCIUM	12500.0	12210.00	97.7
CHROMIUM	500.0	493.20	98.6
COPPER	500.0	497.00	99.4
IRON	12500.0	12270.00	98.2
LEAD	500.0	494.20	98.8
MAGNESIUM	12500.0	12620.00	101.0
MANGANESE	500.0	489.70	97.9
NICKEL	500.0	489.00	97.8
POTASSIUM	12500.0	12340.00	98.7
SELENIUM	500.0	478.00	95.6
SILVER	500.0	492.70	98.5
SODIUM	12500.0	12280.00	98.2
VANADIUM	500.0	487.40	97.5
ZINC	500.0	481.90	96.4

SAMPLE: CCV

File: IIF15A Jun 15, 2015 16:46

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12130.00	97.0
BARIUM	500.0	489.30	97.9
BERYLLIUM	500.0	484.60	96.9
CADMIUM	500.0	485.20	97.0
CALCIUM	12500.0	12670.00	101.4
CHROMIUM	500.0	481.50	96.3
COPPER	500.0	506.80	101.4
IRON	12500.0	12110.00	96.9
LEAD	500.0	492.90	98.6
MAGNESIUM	12500.0	12840.00	102.7
MANGANESE	500.0	483.30	96.7
NICKEL	500.0	488.60	97.7
POTASSIUM	12500.0	12190.00	97.5
SELENIUM	500.0	483.10	96.6
SILVER	500.0	495.80	99.2
SODIUM	12500.0	12250.00	98.0
VANADIUM	500.0	479.60	95.9
ZINC	500.0	471.20	94.2

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF15A Jun 15, 2015 17:45

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12210.00	97.7
BARIUM	500.0	485.50	97.1
BERYLLIUM	500.0	483.80	96.8
CADMIUM	500.0	487.40	97.5
CALCIUM	12500.0	12050.00	96.4
CHROMIUM	500.0	486.10	97.2
COPPER	500.0	507.70	101.5
IRON	12500.0	12080.00	96.6
LEAD	500.0	498.80	99.8
MAGNESIUM	12500.0	13060.00	104.5
MANGANESE	500.0	479.70	95.9
NICKEL	500.0	491.00	98.2
POTASSIUM	12500.0	12660.00	101.3
SELENIUM	500.0	479.80	96.0
SILVER	500.0	498.10	99.6
SODIUM	12500.0	12240.00	97.9
VANADIUM	500.0	482.70	96.5
ZINC	500.0	473.60	94.7

SAMPLE: CCV

File: IIF15A Jun 15, 2015 18:45

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12130.00	97.0
BARIUM	500.0	481.40	96.3
BERYLLIUM	500.0	478.80	95.8
CADMIUM	500.0	480.80	96.2
CALCIUM	12500.0	11880.00	95.0
CHROMIUM	500.0	489.00	97.8
COPPER	500.0	513.80	102.8
IRON	12500.0	12110.00	96.9
LEAD	500.0	490.10	98.0
MAGNESIUM	12500.0	12700.00	101.6
MANGANESE	500.0	476.00	95.2
NICKEL	500.0	479.50	95.9
POTASSIUM	12500.0	12530.00	100.2
SELENIUM	500.0	462.10	92.4
SILVER	500.0	497.30	99.5
SODIUM	12500.0	12060.00	96.5
VANADIUM	500.0	481.30	96.3
ZINC	500.0	457.20	91.4

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF15A Jun 15, 2015 19:40

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12110.00	96.9
BARIUM	500.0	482.20	96.4
BERYLLIUM	500.0	475.10	95.0
CADMIUM	500.0	485.30	97.1
CALCIUM	12500.0	11960.00	95.7
CHROMIUM	500.0	493.00	98.6
COPPER	500.0	517.60	103.5
IRON	12500.0	12260.00	98.1
LEAD	500.0	494.60	98.9
MAGNESIUM	12500.0	12820.00	102.6
MANGANESE	500.0	475.50	95.1
NICKEL	500.0	482.10	96.4
POTASSIUM	12500.0	12730.00	101.8
SELENIUM	500.0	461.70	92.3
SILVER	500.0	500.00	100.0
SODIUM	12500.0	12090.00	96.7
VANADIUM	500.0	480.10	96.0
ZINC	500.0	457.70	91.5

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICV

File: IIF16B Jun 16, 2015 18:26

Analyte	True	Found	%R (1)
ALUMINUM	10000.0	9792.00	97.9
BARIUM	400.0	402.20	100.6
BERYLLIUM	400.0	409.40	102.3
CADMIUM	400.0	405.80	101.4
CALCIUM	10000.0	9720.00	97.2
CHROMIUM	400.0	411.90	103.0
COPPER	400.0	410.50	102.6
IRON	10000.0	9773.00	97.7
LEAD	400.0	412.90	103.2
MAGNESIUM	10000.0	10020.00	100.2
NICKEL	400.0	410.70	102.7
POTASSIUM	13600.0	13380.00	98.4
SILVER	400.0	409.90	102.5
SODIUM	10000.0	9904.00	99.0
VANADIUM	400.0	410.00	102.5
ZINC	400.0	405.60	101.4

SAMPLE: CCV

File: IIF16B Jun 16, 2015 19:11

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12210.00	97.7
BARIUM	500.0	488.20	97.6
BERYLLIUM	500.0	515.00	103.0
CADMIUM	500.0	492.90	98.6
CALCIUM	12500.0	12430.00	99.4
CHROMIUM	500.0	509.20	101.8
COPPER	500.0	510.30	102.1
IRON	12500.0	12740.00	101.9
LEAD	500.0	502.00	100.4
MAGNESIUM	12500.0	12610.00	100.9
NICKEL	500.0	494.80	99.0
POTASSIUM	12500.0	12690.00	101.5
SILVER	500.0	495.20	99.0
SODIUM	12500.0	12210.00	97.7
VANADIUM	500.0	487.00	97.4
ZINC	500.0	481.30	96.3

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF16B Jun 16, 2015 20:11

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	11880.00	95.0
BARIUM	500.0	470.90	94.2
BERYLLIUM	500.0	498.80	99.8
CADMIUM	500.0	484.90	97.0
CALCIUM	12500.0	12060.00	96.5
CHROMIUM	500.0	494.50	98.9
COPPER	500.0	496.90	99.4
IRON	12500.0	12360.00	98.9
LEAD	500.0	495.10	99.0
MAGNESIUM	12500.0	12420.00	99.4
NICKEL	500.0	486.60	97.3
POTASSIUM	12500.0	12270.00	98.2
SILVER	500.0	485.00	97.0
SODIUM	12500.0	11920.00	95.4
VANADIUM	500.0	478.30	95.7
ZINC	500.0	477.20	95.4

SAMPLE: CCV

File: IIF16B Jun 16, 2015 21:10

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12010.00	96.1
BARIUM	500.0	478.50	95.7
BERYLLIUM	500.0	505.80	101.2
CADMIUM	500.0	485.70	97.1
CALCIUM	12500.0	12180.00	97.4
CHROMIUM	500.0	500.60	100.1
COPPER	500.0	502.90	100.6
IRON	12500.0	12490.00	99.9
LEAD	500.0	495.20	99.0
MAGNESIUM	12500.0	12380.00	99.0
NICKEL	500.0	487.30	97.5
POTASSIUM	12500.0	12560.00	100.5
SILVER	500.0	490.90	98.2
SODIUM	12500.0	12070.00	96.6
VANADIUM	500.0	482.20	96.4
ZINC	500.0	476.30	95.3

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF16B Jun 16, 2015 22:10

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	11880.00	95.0
BARIUM	500.0	476.10	95.2
BERYLLIUM	500.0	493.40	98.7
CADMIUM	500.0	483.20	96.6
CALCIUM	12500.0	11990.00	95.9
CHROMIUM	500.0	495.30	99.1
COPPER	500.0	501.50	100.3
IRON	12500.0	12180.00	97.4
LEAD	500.0	492.70	98.5
MAGNESIUM	12500.0	12390.00	99.1
NICKEL	500.0	486.00	97.2
POTASSIUM	12500.0	12440.00	99.5
SILVER	500.0	489.30	97.9
SODIUM	12500.0	12000.00	96.0
VANADIUM	500.0	480.50	96.1
ZINC	500.0	477.50	95.5

SAMPLE: CCV

File: IIF16B Jun 16, 2015 23:09

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12010.00	96.1
BARIUM	500.0	482.80	96.6
BERYLLIUM	500.0	493.50	98.7
CADMIUM	500.0	483.60	96.7
CALCIUM	12500.0	12000.00	96.0
CHROMIUM	500.0	489.80	98.0
COPPER	500.0	496.40	99.3
IRON	12500.0	12130.00	97.0
LEAD	500.0	491.50	98.3
MAGNESIUM	12500.0	12390.00	99.1
NICKEL	500.0	486.00	97.2
POTASSIUM	12500.0	12660.00	101.3
SILVER	500.0	485.20	97.0
SODIUM	12500.0	12140.00	97.1
VANADIUM	500.0	475.10	95.0
ZINC	500.0	477.00	95.4

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICV

File: IIF18B Jun 18, 2015 13:45

Analyte	True	Found	%R (1)
ALUMINUM	10000.0	9933.00	99.3
BARIUM	400.0	408.80	102.2
BERYLLIUM	400.0	410.70	102.7
CADMIUM	400.0	407.40	101.8
CALCIUM	10000.0	9816.00	98.2
CHROMIUM	400.0	411.30	102.8
COPPER	400.0	410.80	102.7
IRON	10000.0	9811.00	98.1
LEAD	400.0	414.80	103.7
MAGNESIUM	10000.0	10120.00	101.2
NICKEL	400.0	414.10	103.5
POTASSIUM	13600.0	13450.00	98.9
SELENIUM	400.0	404.80	101.2
SILVER	400.0	411.40	102.8
SODIUM	10000.0	9963.00	99.6
VANADIUM	400.0	413.40	103.3
ZINC	400.0	409.20	102.3

SAMPLE: CCV

File: IIF18B Jun 18, 2015 14:29

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	11610.00	92.9
BARIUM	500.0	484.00	96.8
BERYLLIUM	500.0	482.20	96.4
CADMIUM	500.0	481.00	96.2
CALCIUM	12500.0	11730.00	93.8
CHROMIUM	500.0	491.90	98.4
COPPER	500.0	489.40	97.9
IRON	12500.0	11630.00	93.0
LEAD	500.0	489.60	97.9
MAGNESIUM	12500.0	11840.00	94.7
NICKEL	500.0	484.90	97.0
POTASSIUM	12500.0	11670.00	93.4
SELENIUM	500.0	467.20	93.4
SILVER	500.0	486.90	97.4
SODIUM	12500.0	11650.00	93.2
VANADIUM	500.0	486.00	97.2
ZINC	500.0	480.90	96.2

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF18B Jun 18, 2015 15:29

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	11450.00	91.6
BARIUM	500.0	474.50	94.9
BERYLLIUM	500.0	473.80	94.8
CADMIUM	500.0	481.00	96.2
CALCIUM	12500.0	11650.00	93.2
CHROMIUM	500.0	491.20	98.2
COPPER	500.0	488.80	97.8
IRON	12500.0	11550.00	92.4
LEAD	500.0	488.00	97.6
MAGNESIUM	12500.0	11860.00	94.9
NICKEL	500.0	483.50	96.7
POTASSIUM	12500.0	11690.00	93.5
SELENIUM	500.0	477.30	95.5
SILVER	500.0	483.50	96.7
SODIUM	12500.0	11670.00	93.4
VANADIUM	500.0	482.20	96.4
ZINC	500.0	477.70	95.5

SAMPLE: CCV

File: IIF18B Jun 18, 2015 16:30

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	11450.00	91.6
BARIUM	500.0	472.90	94.6
BERYLLIUM	500.0	471.20	94.2
CADMIUM	500.0	481.70	96.3
CALCIUM	12500.0	11550.00	92.4
CHROMIUM	500.0	487.90	97.6
COPPER	500.0	486.30	97.3
IRON	12500.0	11500.00	92.0
LEAD	500.0	489.10	97.8
MAGNESIUM	12500.0	11950.00	95.6
NICKEL	500.0	484.60	96.9
POTASSIUM	12500.0	11730.00	93.8
SELENIUM	500.0	471.10	94.2
SILVER	500.0	481.90	96.4
SODIUM	12500.0	11550.00	92.4
VANADIUM	500.0	480.20	96.0
ZINC	500.0	474.70	94.9

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF18B Jun 18, 2015 17:30

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	11430.00	91.4
BARIUM	500.0	480.70	96.1
BERYLLIUM	500.0	469.90	94.0
CADMIUM	500.0	479.00	95.8
CALCIUM	12500.0	11500.00	92.0
CHROMIUM	500.0	489.20	97.8
COPPER	500.0	486.60	97.3
IRON	12500.0	11410.00	91.3
LEAD	500.0	486.90	97.4
MAGNESIUM	12500.0	11850.00	94.8
NICKEL	500.0	481.40	96.3
POTASSIUM	12500.0	11680.00	93.4
SELENIUM	500.0	467.60	93.5
SILVER	500.0	481.40	96.3
SODIUM	12500.0	11530.00	92.2
VANADIUM	500.0	480.50	96.1
ZINC	500.0	473.80	94.8

SAMPLE: CCV

File: IIF18B Jun 18, 2015 18:31

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	11440.00	91.5
BARIUM	500.0	481.10	96.2
BERYLLIUM	500.0	469.20	93.8
CADMIUM	500.0	481.90	96.4
CALCIUM	12500.0	11580.00	92.6
CHROMIUM	500.0	489.60	97.9
COPPER	500.0	490.60	98.1
IRON	12500.0	11610.00	92.9
LEAD	500.0	490.50	98.1
MAGNESIUM	12500.0	12010.00	96.1
NICKEL	500.0	481.30	96.3
POTASSIUM	12500.0	11890.00	95.1
SELENIUM	500.0	477.20	95.4
SILVER	500.0	479.90	96.0
SODIUM	12500.0	11590.00	92.7
VANADIUM	500.0	475.60	95.1
ZINC	500.0	466.30	93.3

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF18B Jun 18, 2015 19:21

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	11240.00	89.9
BARIUM	500.0	474.20	94.8
BERYLLIUM	500.0	459.90	92.0
CADMIUM	500.0	489.30	97.9
CALCIUM	12500.0	11590.00	92.7
CHROMIUM	500.0	520.30	104.1
COPPER	500.0	526.40	105.3
IRON	12500.0	12120.00	97.0
LEAD	500.0	502.40	100.5
MAGNESIUM	12500.0	12180.00	97.4
NICKEL	500.0	482.70	96.5
POTASSIUM	12500.0	12490.00	99.9
SELENIUM	500.0	488.90	97.8
SILVER	500.0	501.10	100.2
SODIUM	12500.0	11460.00	91.7
VANADIUM	500.0	482.60	96.5
ZINC	500.0	455.10	91.0

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICV

File: IIF18C Jun 18, 2015 20:04

Analyte	True	Found	%R (1)
ALUMINUM	10000.0	10240.00	102.4
BARIUM	400.0	424.50	106.1
BERYLLIUM	400.0	424.50	106.1
CADMIUM	400.0	409.90	102.5
CALCIUM	10000.0	10030.00	100.3
CHROMIUM	400.0	409.60	102.4
COPPER	400.0	405.30	101.3
IRON	10000.0	10060.00	100.6
LEAD	400.0	414.00	103.5
MAGNESIUM	10000.0	10060.00	100.6
MANGANESE	400.0	423.00	105.8
NICKEL	400.0	412.20	103.1
POTASSIUM	13600.0	14030.00	103.2
SELENIUM	400.0	413.00	103.3
SILVER	400.0	405.00	101.3
SODIUM	10000.0	10230.00	102.3
VANADIUM	400.0	409.00	102.3
ZINC	400.0	409.70	102.4

SAMPLE: CCV

File: IIF18C Jun 18, 2015 20:48

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	11960.00	95.7
BARIUM	500.0	499.70	99.9
BERYLLIUM	500.0	500.90	100.2
CADMIUM	500.0	493.60	98.7
CALCIUM	12500.0	12080.00	96.6
CHROMIUM	500.0	495.60	99.1
COPPER	500.0	491.40	98.3
IRON	12500.0	11950.00	95.6
LEAD	500.0	497.20	99.4
MAGNESIUM	12500.0	12030.00	96.2
MANGANESE	500.0	495.90	99.2
NICKEL	500.0	492.30	98.5
POTASSIUM	12500.0	12280.00	98.2
SELENIUM	500.0	486.30	97.3
SILVER	500.0	487.90	97.6
SODIUM	12500.0	12070.00	96.6
VANADIUM	500.0	488.30	97.7
ZINC	500.0	489.40	97.9

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF18C Jun 18, 2015 21:49

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12000.00	96.0
BARIUM	500.0	507.30	101.5
BERYLLIUM	500.0	502.60	100.5
CADMIUM	500.0	493.70	98.7
CALCIUM	12500.0	12070.00	96.6
CHROMIUM	500.0	499.40	99.9
COPPER	500.0	493.20	98.6
IRON	12500.0	12000.00	96.0
LEAD	500.0	498.30	99.7
MAGNESIUM	12500.0	12060.00	96.5
MANGANESE	500.0	497.90	99.6
NICKEL	500.0	493.00	98.6
POTASSIUM	12500.0	12160.00	97.3
SELENIUM	500.0	491.20	98.2
SILVER	500.0	490.40	98.1
SODIUM	12500.0	12130.00	97.0
VANADIUM	500.0	491.00	98.2
ZINC	500.0	487.60	97.5

SAMPLE: CCV

File: IIF18C Jun 18, 2015 22:49

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	11990.00	95.9
BARIUM	500.0	503.40	100.7
BERYLLIUM	500.0	500.30	100.1
CADMIUM	500.0	493.00	98.6
CALCIUM	12500.0	11990.00	95.9
CHROMIUM	500.0	492.00	98.4
COPPER	500.0	489.20	97.8
IRON	12500.0	11870.00	95.0
LEAD	500.0	495.90	99.2
MAGNESIUM	12500.0	12050.00	96.4
MANGANESE	500.0	495.10	99.0
NICKEL	500.0	493.40	98.7
POTASSIUM	12500.0	12200.00	97.6
SELENIUM	500.0	492.70	98.5
SILVER	500.0	485.10	97.0
SODIUM	12500.0	12090.00	96.7
VANADIUM	500.0	483.90	96.8
ZINC	500.0	489.00	97.8

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF18C Jun 18, 2015 23:49

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	11930.00	95.4
BARIUM	500.0	499.30	99.9
BERYLLIUM	500.0	495.10	99.0
CADMIUM	500.0	497.80	99.6
CALCIUM	12500.0	12040.00	96.3
CHROMIUM	500.0	500.40	100.1
COPPER	500.0	495.80	99.2
IRON	12500.0	11940.00	95.5
LEAD	500.0	501.50	100.3
MAGNESIUM	12500.0	12060.00	96.5
MANGANESE	500.0	491.60	98.3
NICKEL	500.0	494.50	98.9
POTASSIUM	12500.0	12350.00	98.8
SELENIUM	500.0	493.90	98.8
SILVER	500.0	489.20	97.8
SODIUM	12500.0	12200.00	97.6
VANADIUM	500.0	489.10	97.8
ZINC	500.0	486.30	97.3

SAMPLE: CCV

File: IIF18C Jun 19, 2015 0:49

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	11860.00	94.9
BARIUM	500.0	496.80	99.4
BERYLLIUM	500.0	491.00	98.2
CADMIUM	500.0	497.40	99.5
CALCIUM	12500.0	12070.00	96.6
CHROMIUM	500.0	500.90	100.2
COPPER	500.0	497.70	99.5
IRON	12500.0	11960.00	95.7
LEAD	500.0	501.80	100.4
MAGNESIUM	12500.0	12140.00	97.1
MANGANESE	500.0	487.90	97.6
NICKEL	500.0	494.80	99.0
POTASSIUM	12500.0	12380.00	99.0
SELENIUM	500.0	492.60	98.5
SILVER	500.0	490.10	98.0
SODIUM	12500.0	12260.00	98.1
VANADIUM	500.0	490.90	98.2
ZINC	500.0	485.00	97.0

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF18C Jun 19, 2015 1:50

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	11830.00	94.6
BARIUM	500.0	499.90	100.0
BERYLLIUM	500.0	490.80	98.2
CADMIUM	500.0	496.50	99.3
CALCIUM	12500.0	11950.00	95.6
CHROMIUM	500.0	497.50	99.5
COPPER	500.0	491.50	98.3
IRON	12500.0	11850.00	94.8
LEAD	500.0	501.80	100.4
MAGNESIUM	12500.0	12090.00	96.7
MANGANESE	500.0	487.20	97.4
NICKEL	500.0	493.80	98.8
POTASSIUM	12500.0	12360.00	98.9
SELENIUM	500.0	495.20	99.0
SILVER	500.0	484.40	96.9
SODIUM	12500.0	12170.00	97.4
VANADIUM	500.0	484.80	97.0
ZINC	500.0	483.70	96.7

SAMPLE: CCV

File: IIF18C Jun 19, 2015 2:36

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	11860.00	94.9
BARIUM	500.0	503.10	100.6
BERYLLIUM	500.0	488.60	97.7
CADMIUM	500.0	497.00	99.4
CALCIUM	12500.0	11980.00	95.8
CHROMIUM	500.0	502.10	100.4
COPPER	500.0	495.60	99.1
IRON	12500.0	11820.00	94.6
LEAD	500.0	500.20	100.0
MAGNESIUM	12500.0	12100.00	96.8
MANGANESE	500.0	487.50	97.5
NICKEL	500.0	493.60	98.7
POTASSIUM	12500.0	12300.00	98.4
SELENIUM	500.0	494.10	98.8
SILVER	500.0	487.30	97.5
SODIUM	12500.0	12230.00	97.8
VANADIUM	500.0	486.70	97.3
ZINC	500.0	483.20	96.6

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICV

File: IIF19A Jun 19, 2015 9:44

Analyte	True	Found	%R (1)
ALUMINUM	10000.0	9862.00	98.6
BARIUM	400.0	405.90	101.5
BERYLLIUM	400.0	410.80	102.7
CADMIUM	400.0	407.20	101.8
CALCIUM	10000.0	9823.00	98.2
CHROMIUM	400.0	409.60	102.4
COPPER	400.0	406.50	101.6
IRON	10000.0	9803.00	98.0
LEAD	400.0	413.90	103.5
MAGNESIUM	10000.0	10050.00	100.5
NICKEL	400.0	413.10	103.3
POTASSIUM	13600.0	13430.00	98.8
SELENIUM	400.0	405.90	101.5
SILVER	400.0	406.00	101.5
SODIUM	10000.0	9970.00	99.7
VANADIUM	400.0	409.50	102.4
ZINC	400.0	409.30	102.3

SAMPLE: CCV

File: IIF19A Jun 19, 2015 10:28

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	11270.00	90.2
BARIUM	500.0	472.10	94.4
BERYLLIUM	500.0	475.10	95.0
CADMIUM	500.0	479.10	95.8
CALCIUM	12500.0	11560.00	92.5
CHROMIUM	500.0	474.30	94.9
COPPER	500.0	477.30	95.5
IRON	12500.0	11500.00	92.0
LEAD	500.0	487.80	97.6
MAGNESIUM	12500.0	11810.00	94.5
NICKEL	500.0	486.30	97.3
POTASSIUM	12500.0	11640.00	93.1
SELENIUM	500.0	484.50	96.9
SILVER	500.0	473.60	94.7
SODIUM	12500.0	11500.00	92.0
VANADIUM	500.0	473.20	94.6
ZINC	500.0	478.20	95.6

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF19A Jun 19, 2015 11:28

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	11270.00	90.2
BARIUM	500.0	474.30	94.9
BERYLLIUM	500.0	474.40	94.9
CADMIUM	500.0	479.70	95.9
CALCIUM	12500.0	11470.00	91.8
CHROMIUM	500.0	475.10	95.0
COPPER	500.0	479.20	95.8
IRON	12500.0	11430.00	91.4
LEAD	500.0	487.40	97.5
MAGNESIUM	12500.0	11830.00	94.6
NICKEL	500.0	485.90	97.2
POTASSIUM	12500.0	11620.00	93.0
SELENIUM	500.0	476.50	95.3
SILVER	500.0	475.10	95.0
SODIUM	12500.0	11500.00	92.0
VANADIUM	500.0	473.80	94.8
ZINC	500.0	477.40	95.5

SAMPLE: CCV

File: IIF19A Jun 19, 2015 12:29

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	11370.00	91.0
BARIUM	500.0	480.60	96.1
BERYLLIUM	500.0	477.50	95.5
CADMIUM	500.0	480.10	96.0
CALCIUM	12500.0	11540.00	92.3
CHROMIUM	500.0	479.80	96.0
COPPER	500.0	485.10	97.0
IRON	12500.0	11550.00	92.4
LEAD	500.0	487.80	97.6
MAGNESIUM	12500.0	11840.00	94.7
NICKEL	500.0	486.50	97.3
POTASSIUM	12500.0	11850.00	94.8
SELENIUM	500.0	478.30	95.7
SILVER	500.0	478.40	95.7
SODIUM	12500.0	11550.00	92.4
VANADIUM	500.0	477.10	95.4
ZINC	500.0	476.50	95.3

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICV

File: IIF22A Jun 22, 2015 13:05

Analyte	True	Found	%R (1)
ALUMINUM	10000.0	10300.00	103.0
BARIUM	400.0	415.50	103.9
BERYLLIUM	400.0	419.90	105.0
CADMIUM	400.0	420.10	105.0
CALCIUM	10000.0	10330.00	103.3
CHROMIUM	400.0	419.50	104.9
COPPER	400.0	421.50	105.4
IRON	10000.0	10410.00	104.1
LEAD	400.0	428.00	107.0
MAGNESIUM	10000.0	10560.00	105.6
MANGANESE	400.0	419.40	104.8
NICKEL	400.0	425.20	106.3
POTASSIUM	13600.0	14230.00	104.6
SELENIUM	400.0	418.70	104.7
SILVER	400.0	414.60	103.6
SODIUM	10000.0	10440.00	104.4
VANADIUM	400.0	422.60	105.7
ZINC	400.0	422.00	105.5

SAMPLE: CCV

File: IIF22A Jun 22, 2015 13:51

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12400.00	99.2
BARIUM	500.0	489.30	97.9
BERYLLIUM	500.0	495.90	99.2
CADMIUM	500.0	502.10	100.4
CALCIUM	12500.0	12500.00	100.0
CHROMIUM	500.0	495.40	99.1
COPPER	500.0	506.70	101.3
IRON	12500.0	12580.00	100.6
LEAD	500.0	509.30	101.9
MAGNESIUM	12500.0	12700.00	101.6
MANGANESE	500.0	501.10	100.2
NICKEL	500.0	507.60	101.5
POTASSIUM	12500.0	12520.00	100.2
SELENIUM	500.0	501.30	100.3
SILVER	500.0	500.40	100.1
SODIUM	12500.0	12380.00	99.0
VANADIUM	500.0	495.50	99.1
ZINC	500.0	501.70	100.3

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF22A Jun 22, 2015 14:52

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12300.00	98.4
BARIUM	500.0	488.00	97.6
BERYLLIUM	500.0	490.30	98.1
CADMIUM	500.0	500.50	100.1
CALCIUM	12500.0	12240.00	97.9
CHROMIUM	500.0	501.10	100.2
COPPER	500.0	509.50	101.9
IRON	12500.0	12300.00	98.4
LEAD	500.0	504.60	100.9
MAGNESIUM	12500.0	12600.00	100.8
MANGANESE	500.0	492.00	98.4
NICKEL	500.0	505.30	101.1
POTASSIUM	12500.0	12560.00	100.5
SELENIUM	500.0	496.00	99.2
SILVER	500.0	505.20	101.0
SODIUM	12500.0	12280.00	98.2
VANADIUM	500.0	499.60	99.9
ZINC	500.0	499.90	100.0

SAMPLE: CCV

File: IIF22A Jun 22, 2015 15:52

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12220.00	97.8
BARIUM	500.0	482.00	96.4
BERYLLIUM	500.0	486.30	97.3
CADMIUM	500.0	497.70	99.5
CALCIUM	12500.0	12200.00	97.6
CHROMIUM	500.0	495.30	99.1
COPPER	500.0	510.80	102.2
IRON	12500.0	12330.00	98.6
LEAD	500.0	507.00	101.4
MAGNESIUM	12500.0	12670.00	101.4
MANGANESE	500.0	490.80	98.2
NICKEL	500.0	506.30	101.3
POTASSIUM	12500.0	12460.00	99.7
SELENIUM	500.0	492.10	98.4
SILVER	500.0	505.70	101.1
SODIUM	12500.0	12160.00	97.3
VANADIUM	500.0	498.40	99.7
ZINC	500.0	501.00	100.2

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICV

File: IIF22B Jun 22, 2015 19:04

Analyte	True	Found	%R (1)
ALUMINUM	10000.0	10550.00	105.5
BARIUM	400.0	426.80	106.7
BERYLLIUM	400.0	428.90	107.2
CADMIUM	400.0	420.90	105.2
CALCIUM	10000.0	10620.00	106.2
CHROMIUM	400.0	427.00	106.7
COPPER	400.0	420.20	105.1
IRON	10000.0	10710.00	107.1
LEAD	400.0	429.20	107.3
MAGNESIUM	10000.0	10580.00	105.8
MANGANESE	400.0	429.40	107.3
NICKEL	400.0	425.80	106.5
POTASSIUM	13600.0	14570.00	107.1
SELENIUM	400.0	415.80	104.0
SILVER	400.0	413.20	103.3
SODIUM	10000.0	10730.00	107.3
VANADIUM	400.0	425.90	106.5
ZINC	400.0	420.40	105.1

SAMPLE: CCV

File: IIF22B Jun 22, 2015 19:50

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	13170.00	105.4
BARIUM	500.0	522.00	104.4
BERYLLIUM	500.0	521.80	104.4
CADMIUM	500.0	523.40	104.7
CALCIUM	12500.0	13310.00	106.5
CHROMIUM	500.0	536.10	107.2
COPPER	500.0	533.10	106.6
IRON	12500.0	13400.00	107.2
LEAD	500.0	531.30	106.3
MAGNESIUM	12500.0	13210.00	105.7
MANGANESE	500.0	528.20	105.6
NICKEL	500.0	525.50	105.1
POTASSIUM	12500.0	13210.00	105.7
SELENIUM	500.0	519.50	103.9
SILVER	500.0	527.40	105.5
SODIUM	12500.0	13120.00	105.0
VANADIUM	500.0	527.80	105.6
ZINC	500.0	521.10	104.2

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF22B Jun 22, 2015 20:50

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	13170.00	105.4
BARIUM	500.0	523.80	104.8
BERYLLIUM	500.0	521.70	104.3
CADMIUM	500.0	521.00	104.2
CALCIUM	12500.0	13350.00	106.8
CHROMIUM	500.0	531.50	106.3
COPPER	500.0	533.20	106.6
IRON	12500.0	13460.00	107.7
LEAD	500.0	530.10	106.0
MAGNESIUM	12500.0	13230.00	105.8
MANGANESE	500.0	530.30	106.1
NICKEL	500.0	525.50	105.1
POTASSIUM	12500.0	13460.00	107.7
SELENIUM	500.0	515.30	103.1
SILVER	500.0	523.80	104.8
SODIUM	12500.0	12760.00	102.1
VANADIUM	500.0	523.30	104.7
ZINC	500.0	520.60	104.1

SAMPLE: CCV

File: IIF22B Jun 22, 2015 21:50

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	13060.00	104.5
BARIUM	500.0	516.20	103.2
BERYLLIUM	500.0	520.50	104.1
CADMIUM	500.0	517.80	103.6
CALCIUM	12500.0	13090.00	104.7
CHROMIUM	500.0	521.10	104.2
COPPER	500.0	521.20	104.2
IRON	12500.0	13120.00	105.0
LEAD	500.0	526.30	105.3
MAGNESIUM	12500.0	13110.00	104.9
MANGANESE	500.0	521.20	104.2
NICKEL	500.0	524.40	104.9
POTASSIUM	12500.0	13040.00	104.3
SELENIUM	500.0	507.50	101.5
SILVER	500.0	518.30	103.7
SODIUM	12500.0	12990.00	103.9
VANADIUM	500.0	519.60	103.9
ZINC	500.0	525.10	105.0

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF22B Jun 22, 2015 22:51

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	13180.00	105.4
BARIUM	500.0	522.20	104.4
BERYLLIUM	500.0	520.70	104.1
CADMIUM	500.0	517.90	103.6
CALCIUM	12500.0	13150.00	105.2
CHROMIUM	500.0	523.10	104.6
COPPER	500.0	517.80	103.6
IRON	12500.0	13230.00	105.8
LEAD	500.0	527.10	105.4
MAGNESIUM	12500.0	13050.00	104.4
MANGANESE	500.0	523.10	104.6
NICKEL	500.0	522.00	104.4
POTASSIUM	12500.0	13160.00	105.3
SELENIUM	500.0	509.70	101.9
SILVER	500.0	514.70	102.9
SODIUM	12500.0	13190.00	105.5
VANADIUM	500.0	517.10	103.4
ZINC	500.0	522.20	104.4

SAMPLE: CCV

File: IIF22B Jun 22, 2015 23:51

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	13040.00	104.3
BARIUM	500.0	513.90	102.8
BERYLLIUM	500.0	516.50	103.3
CADMIUM	500.0	515.20	103.0
CALCIUM	12500.0	12960.00	103.7
CHROMIUM	500.0	516.90	103.4
COPPER	500.0	519.70	103.9
IRON	12500.0	13140.00	105.1
LEAD	500.0	521.70	104.3
MAGNESIUM	12500.0	13010.00	104.1
MANGANESE	500.0	520.20	104.0
NICKEL	500.0	520.60	104.1
POTASSIUM	12500.0	13020.00	104.2
SELENIUM	500.0	506.10	101.2
SILVER	500.0	515.70	103.1
SODIUM	12500.0	12890.00	103.1
VANADIUM	500.0	517.30	103.5
ZINC	500.0	523.20	104.6

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF22B Jun 23, 2015 0:21

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	13030.00	104.2
BARIUM	500.0	515.20	103.0
BERYLLIUM	500.0	513.90	102.8
CADMIUM	500.0	515.20	103.0
CALCIUM	12500.0	13020.00	104.2
CHROMIUM	500.0	520.50	104.1
COPPER	500.0	521.30	104.3
IRON	12500.0	13110.00	104.9
LEAD	500.0	524.40	104.9
MAGNESIUM	12500.0	13010.00	104.1
MANGANESE	500.0	518.00	103.6
NICKEL	500.0	521.00	104.2
POTASSIUM	12500.0	13060.00	104.5
SELENIUM	500.0	507.10	101.4
SILVER	500.0	515.60	103.1
SODIUM	12500.0	12920.00	103.4
VANADIUM	500.0	517.80	103.6
ZINC	500.0	519.90	104.0

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICV

File: IIF24A Jun 24, 2015 10:28

Analyte	True	Found	%R (1)
ALUMINUM	10000.0	10090.00	100.9
BARIUM	400.0	408.70	102.2
BERYLLIUM	400.0	407.80	102.0
CADMIUM	400.0	414.00	103.5
CALCIUM	10000.0	9824.00	98.2
CHROMIUM	400.0	415.60	103.9
COPPER	400.0	414.10	103.5
IRON	10000.0	9840.00	98.4
LEAD	400.0	420.40	105.1
MAGNESIUM	10000.0	10300.00	103.0
MANGANESE	400.0	409.00	102.3
NICKEL	400.0	420.70	105.2
POTASSIUM	13600.0	13570.00	99.8
SELENIUM	400.0	409.00	102.3
SILVER	400.0	414.20	103.5
SODIUM	10000.0	10030.00	100.3
VANADIUM	400.0	417.70	104.4
ZINC	400.0	414.40	103.6

SAMPLE: CCV

File: IIF24A Jun 24, 2015 11:13

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12460.00	99.7
BARIUM	500.0	497.80	99.6
BERYLLIUM	500.0	513.40	102.7
CADMIUM	500.0	504.30	100.9
CALCIUM	12500.0	12650.00	101.2
CHROMIUM	500.0	506.90	101.4
COPPER	500.0	512.00	102.4
IRON	12500.0	12850.00	102.8
LEAD	500.0	512.10	102.4
MAGNESIUM	12500.0	12880.00	103.0
MANGANESE	500.0	509.30	101.9
NICKEL	500.0	511.50	102.3
POTASSIUM	12500.0	12820.00	102.6
SELENIUM	500.0	516.40	103.3
SILVER	500.0	505.30	101.1
SODIUM	12500.0	12510.00	100.1
VANADIUM	500.0	502.30	100.5
ZINC	500.0	498.90	99.8

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

No sample results for Be and Fe were reported between 11:13 and 13:12.

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF24A Jun 24, 2015 12:12

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	13380.00	107.0
BARIUM	500.0	542.20	108.4
BERYLLIUM	500.0	555.40	111.1•
CADMIUM	500.0	508.00	101.6
CALCIUM	12500.0	13680.00	109.4
CHROMIUM	500.0	514.40	102.9
COPPER	500.0	521.90	104.4
IRON	12500.0	13860.00	110.9•
LEAD	500.0	513.60	102.7
MAGNESIUM	12500.0	12850.00	102.8
MANGANESE	500.0	547.30	109.5
NICKEL	500.0	512.60	102.5
POTASSIUM	12500.0	13810.00	110.5
SELENIUM	500.0	508.80	101.8
SILVER	500.0	508.10	101.6
SODIUM	12500.0	13550.00	108.4
VANADIUM	500.0	502.40	100.5
ZINC	500.0	496.90	99.4

SAMPLE: CCV

File: IIF24A Jun 24, 2015 13:12

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12150.00	97.2
BARIUM	500.0	504.00	100.8
BERYLLIUM	500.0	507.80	101.6
CADMIUM	500.0	510.50	102.1
CALCIUM	12500.0	12270.00	98.2
CHROMIUM	500.0	510.10	102.0
COPPER	500.0	515.20	103.0
IRON	12500.0	12320.00	98.6
LEAD	500.0	515.80	103.2
MAGNESIUM	12500.0	12550.00	100.4
MANGANESE	500.0	505.00	101.0
NICKEL	500.0	514.40	102.9
POTASSIUM	12500.0	12600.00	100.8
SELENIUM	500.0	512.70	102.5
SILVER	500.0	507.00	101.4
SODIUM	12500.0	12240.00	97.9
VANADIUM	500.0	504.20	100.8
ZINC	500.0	503.20	100.6

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF24A Jun 24, 2015 14:11

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12270.00	98.2
BARIUM	500.0	508.30	101.7
BERYLLIUM	500.0	514.40	102.9
CADMIUM	500.0	508.80	101.8
CALCIUM	12500.0	12340.00	98.7
CHROMIUM	500.0	511.40	102.3
COPPER	500.0	519.20	103.8
IRON	12500.0	12440.00	99.5
LEAD	500.0	512.40	102.5
MAGNESIUM	12500.0	12590.00	100.7
MANGANESE	500.0	507.60	101.5
NICKEL	500.0	512.70	102.5
POTASSIUM	12500.0	12830.00	102.6
SELENIUM	500.0	505.50	101.1
SILVER	500.0	510.00	102.0
SODIUM	12500.0	12410.00	99.3
VANADIUM	500.0	508.00	101.6
ZINC	500.0	499.80	100.0

SAMPLE: CCV

File: IIF24A Jun 24, 2015 15:10

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12320.00	98.6
BARIUM	500.0	508.10	101.6
BERYLLIUM	500.0	525.20	105.0
CADMIUM	500.0	513.10	102.6
CALCIUM	12500.0	12410.00	99.3
CHROMIUM	500.0	514.30	102.9
COPPER	500.0	522.70	104.5
IRON	12500.0	12690.00	101.5
LEAD	500.0	516.20	103.2
MAGNESIUM	12500.0	12550.00	100.4
MANGANESE	500.0	515.90	103.2
NICKEL	500.0	514.60	102.9
POTASSIUM	12500.0	12850.00	102.8
SELENIUM	500.0	509.70	101.9
SILVER	500.0	512.20	102.4
SODIUM	12500.0	12280.00	98.2
VANADIUM	500.0	509.50	101.9
ZINC	500.0	499.10	99.8

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF24A Jun 24, 2015 16:10

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12160.00	97.3
BARIUM	500.0	503.70	100.7
BERYLLIUM	500.0	518.70	103.7
CADMIUM	500.0	510.90	102.2
CALCIUM	12500.0	12340.00	98.7
CHROMIUM	500.0	511.90	102.4
COPPER	500.0	519.70	103.9
IRON	12500.0	12520.00	100.2
LEAD	500.0	515.30	103.1
MAGNESIUM	12500.0	12470.00	99.8
MANGANESE	500.0	511.10	102.2
NICKEL	500.0	515.00	103.0
POTASSIUM	12500.0	12760.00	102.1
SELENIUM	500.0	511.00	102.2
SILVER	500.0	508.90	101.8
SODIUM	12500.0	12200.00	97.6
VANADIUM	500.0	505.30	101.1
ZINC	500.0	500.60	100.1

SAMPLE: CCV

File: IIF24A Jun 24, 2015 17:09

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12670.00	101.4
BARIUM	500.0	523.90	104.8
BERYLLIUM	500.0	544.00	108.8
CADMIUM	500.0	494.50	98.9
CALCIUM	12500.0	12900.00	103.2
CHROMIUM	500.0	500.20	100.0
COPPER	500.0	509.20	101.8
IRON	12500.0	13150.00	105.2
LEAD	500.0	502.20	100.4
MAGNESIUM	12500.0	12100.00	96.8
MANGANESE	500.0	533.80	106.8
NICKEL	500.0	500.30	100.1
POTASSIUM	12500.0	13230.00	105.8
SELENIUM	500.0	502.60	100.5
SILVER	500.0	497.00	99.4
SODIUM	12500.0	12710.00	101.7
VANADIUM	500.0	492.60	98.5
ZINC	500.0	483.20	96.6

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF24A Jun 24, 2015 18:08

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	11770.00	94.2
BARIUM	500.0	486.40	97.3
BERYLLIUM	500.0	500.70	100.1
CADMIUM	500.0	491.90	98.4
CALCIUM	12500.0	11940.00	95.5
CHROMIUM	500.0	497.00	99.4
COPPER	500.0	505.00	101.0
IRON	12500.0	12100.00	96.8
LEAD	500.0	498.40	99.7
MAGNESIUM	12500.0	12180.00	97.4
MANGANESE	500.0	495.30	99.1
NICKEL	500.0	497.20	99.4
POTASSIUM	12500.0	12280.00	98.2
SELENIUM	500.0	496.00	99.2
SILVER	500.0	492.60	98.5
SODIUM	12500.0	11800.00	94.4
VANADIUM	500.0	489.10	97.8
ZINC	500.0	481.50	96.3

SAMPLE: CCV

File: IIF24A Jun 24, 2015 19:07

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	11350.00	90.8
BARIUM	500.0	477.00	95.4
BERYLLIUM	500.0	508.30	101.7
CADMIUM	500.0	494.70	98.9
CALCIUM	12500.0	11950.00	95.6
CHROMIUM	500.0	515.60	103.1
COPPER	500.0	521.60	104.3
IRON	12500.0	12230.00	97.8
LEAD	500.0	503.50	100.7
MAGNESIUM	12500.0	12380.00	99.0
MANGANESE	500.0	492.70	98.5
NICKEL	500.0	495.40	99.1
POTASSIUM	12500.0	12470.00	99.8
SELENIUM	500.0	501.80	100.4
SILVER	500.0	494.70	98.9
SODIUM	12500.0	11770.00	94.2
VANADIUM	500.0	480.00	96.0
ZINC	500.0	465.10	93.0

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: IIF24A Jun 24, 2015 19:47

Analyte	True	Found	%R (1)
ALUMINUM	12500.0	12010.00	96.1
BARIUM	500.0	503.30	100.7
BERYLLIUM	500.0	549.10	109.8
CADMIUM	500.0	500.70	100.1
CALCIUM	12500.0	12730.00	101.8
CHROMIUM	500.0	525.30	105.1
COPPER	500.0	528.30	105.7
IRON	12500.0	13270.00	106.2
LEAD	500.0	510.00	102.0
MAGNESIUM	12500.0	12540.00	100.3
MANGANESE	500.0	529.80	106.0
NICKEL	500.0	497.80	99.6
POTASSIUM	12500.0	13290.00	106.3
SELENIUM	500.0	504.50	100.9
SILVER	500.0	494.30	98.9
SODIUM	12500.0	12450.00	99.6
VANADIUM	500.0	475.20	95.0
ZINC	500.0	464.20	92.8

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICV

File: JIF08A Jun 08, 2015 16:15

Analyte	True	Found	%R (1)
ALUMINUM	400.0	407.50	101.9
ANTIMONY	20.0	20.36	101.8
ARSENIC	20.0	19.38	96.9
CALCIUM	4000.0	4031.00	100.8
COBALT	20.0	20.35	101.8
IRON	4000.0	4084.00	102.1
MAGNESIUM	4000.0	4070.00	101.8
MOLYBDENUM	40.0	39.55	98.9
POTASSIUM	4000.0	4081.00	102.0
SODIUM	4000.0	4088.00	102.2
THALLIUM	20.0	20.65	103.3

SAMPLE: CCV

File: JIF08A Jun 08, 2015 16:45

Analyte	True	Found	%R (1)
ALUMINUM	500.0	504.40	100.9
ANTIMONY	25.0	24.73	98.9
ARSENIC	25.0	24.88	99.5
CALCIUM	5000.0	5044.00	100.9
COBALT	25.0	24.57	98.3
IRON	5000.0	4999.00	100.0
MAGNESIUM	5000.0	4977.00	99.5
MOLYBDENUM	25.0	24.92	99.7
POTASSIUM	5000.0	5112.00	102.2
SODIUM	5000.0	4919.00	98.4
THALLIUM	25.0	24.37	97.5

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF08A Jun 08, 2015 16:54

Analyte	True	Found	%R (1)
ALUMINUM	500.0	498.80	99.8
ANTIMONY	25.0	25.03	100.1
ARSENIC	25.0	24.80	99.2
CALCIUM	5000.0	5026.00	100.5
COBALT	25.0	24.69	98.8
IRON	5000.0	5037.00	100.7
MAGNESIUM	5000.0	5010.00	100.2
MOLYBDENUM	25.0	24.79	99.2
POTASSIUM	5000.0	4995.00	99.9
SODIUM	5000.0	4918.00	98.4
THALLIUM	25.0	24.68	98.7

SAMPLE: CCV

File: JIF08A Jun 08, 2015 17:34

Analyte	True	Found	%R (1)
ALUMINUM	500.0	514.80	103.0
ANTIMONY	25.0	24.64	98.6
ARSENIC	25.0	24.87	99.5
CALCIUM	5000.0	5053.00	101.1
COBALT	25.0	24.67	98.7
IRON	5000.0	5125.00	102.5
MAGNESIUM	5000.0	5113.00	102.3
MOLYBDENUM	25.0	24.76	99.0
POTASSIUM	5000.0	5064.00	101.3
SODIUM	5000.0	5036.00	100.7
THALLIUM	25.0	24.92	99.7

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF08A Jun 08, 2015 18:13

Analyte	True	Found	%R (1)
ALUMINUM	500.0	505.90	101.2
ANTIMONY	25.0	24.58	98.3
ARSENIC	25.0	24.73	98.9
CALCIUM	5000.0	5026.00	100.5
COBALT	25.0	24.64	98.6
IRON	5000.0	5057.00	101.1
MAGNESIUM	5000.0	5027.00	100.5
MOLYBDENUM	25.0	24.43	97.7
POTASSIUM	5000.0	5088.00	101.8
SODIUM	5000.0	4980.00	99.6
THALLIUM	25.0	24.52	98.1

SAMPLE: CCV

File: JIF08A Jun 08, 2015 18:53

Analyte	True	Found	%R (1)
ALUMINUM	500.0	505.00	101.0
ANTIMONY	25.0	24.86	99.4
ARSENIC	25.0	24.68	98.7
CALCIUM	5000.0	5065.00	101.3
COBALT	25.0	24.42	97.7
IRON	5000.0	5017.00	100.3
MAGNESIUM	5000.0	5122.00	102.4
MOLYBDENUM	25.0	24.48	97.9
POTASSIUM	5000.0	5099.00	102.0
SODIUM	5000.0	5049.00	101.0
THALLIUM	25.0	24.35	97.4

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF08A Jun 08, 2015 19:34

Analyte	True	Found	%R (1)
ALUMINUM	500.0	515.80	103.2
ANTIMONY	25.0	24.97	99.9
ARSENIC	25.0	24.55	98.2
CALCIUM	5000.0	5084.00	101.7
COBALT	25.0	24.67	98.7
IRON	5000.0	5112.00	102.2
MAGNESIUM	5000.0	5098.00	102.0
MOLYBDENUM	25.0	24.62	98.5
POTASSIUM	5000.0	5226.00	104.5
SODIUM	5000.0	5107.00	102.1
THALLIUM	25.0	24.95	99.8

SAMPLE: CCV

File: JIF08A Jun 08, 2015 20:15

Analyte	True	Found	%R (1)
ALUMINUM	500.0	517.40	103.5
ANTIMONY	25.0	25.07	100.3
ARSENIC	25.0	24.87	99.5
CALCIUM	5000.0	5052.00	101.0
COBALT	25.0	24.83	99.3
IRON	5000.0	5075.00	101.5
MAGNESIUM	5000.0	5168.00	103.4
MOLYBDENUM	25.0	24.60	98.4
POTASSIUM	5000.0	5140.00	102.8
SODIUM	5000.0	5111.00	102.2
THALLIUM	25.0	24.56	98.2

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF08A Jun 08, 2015 20:56

Analyte	True	Found	%R (1)
ALUMINUM	500.0	512.00	102.4
ANTIMONY	25.0	24.84	99.4
ARSENIC	25.0	24.62	98.5
CALCIUM	5000.0	5057.00	101.1
COBALT	25.0	24.42	97.7
IRON	5000.0	5071.00	101.4
MAGNESIUM	5000.0	5126.00	102.5
MOLYBDENUM	25.0	24.41	97.6
POTASSIUM	5000.0	5131.00	102.6
SODIUM	5000.0	5057.00	101.1
THALLIUM	25.0	24.33	97.3

SAMPLE: CCV

File: JIF08A Jun 08, 2015 21:38

Analyte	True	Found	%R (1)
ALUMINUM	500.0	517.30	103.5
ANTIMONY	25.0	24.86	99.4
ARSENIC	25.0	24.62	98.5
CALCIUM	5000.0	5039.00	100.8
COBALT	25.0	24.35	97.4
IRON	5000.0	5059.00	101.2
MAGNESIUM	5000.0	5166.00	103.3
MOLYBDENUM	25.0	24.55	98.2
POTASSIUM	5000.0	5118.00	102.4
SODIUM	5000.0	5006.00	100.1
THALLIUM	25.0	24.52	98.1

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF08A Jun 08, 2015 22:12

Analyte	True	Found	%R (1)
ALUMINUM	500.0	524.00	104.8
ANTIMONY	25.0	25.29	101.2
ARSENIC	25.0	25.34	101.4
CALCIUM	5000.0	5145.00	102.9
COBALT	25.0	25.12	100.5
IRON	5000.0	5171.00	103.4
MAGNESIUM	5000.0	5269.00	105.4
MOLYBDENUM	25.0	25.30	101.2
POTASSIUM	5000.0	5119.00	102.4
SODIUM	5000.0	5131.00	102.6
THALLIUM	25.0	25.18	100.7

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICV

File: JIF11B Jun 11, 2015 13:27

Analyte	True	Found	%R (1)
ALUMINUM	400.0	399.90	100.0
ANTIMONY	20.0	20.09	100.4
CALCIUM	4000.0	4034.00	100.8
IRON	4000.0	4067.00	101.7
MAGNESIUM	4000.0	4002.00	100.1
MOLYBDENUM	40.0	39.49	98.7
POTASSIUM	4000.0	3917.00	97.9
SODIUM	4000.0	3911.00	97.8

SAMPLE: CCV

File: JIF11B Jun 11, 2015 13:56

Analyte	True	Found	%R (1)
ALUMINUM	500.0	509.60	101.9
ANTIMONY	25.0	23.48	93.9
CALCIUM	5000.0	4995.00	99.9
IRON	5000.0	5062.00	101.2
MAGNESIUM	5000.0	5078.00	101.6
MOLYBDENUM	25.0	24.98	99.9
POTASSIUM	5000.0	4920.00	98.4
SODIUM	5000.0	4971.00	99.4

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF11B Jun 11, 2015 14:36

Analyte	True	Found	%R (1)
ALUMINUM	500.0	501.10	100.2
ANTIMONY	25.0	23.45	93.8
CALCIUM	5000.0	4996.00	99.9
IRON	5000.0	5075.00	101.5
MAGNESIUM	5000.0	5035.00	100.7
MOLYBDENUM	25.0	24.58	98.3
POTASSIUM	5000.0	4864.00	97.3
SODIUM	5000.0	4978.00	99.6

SAMPLE: CCV

File: JIF11B Jun 11, 2015 15:16

Analyte	True	Found	%R (1)
ALUMINUM	500.0	501.10	100.2
ANTIMONY	25.0	23.01	92.0
CALCIUM	5000.0	4980.00	99.6
IRON	5000.0	5023.00	100.5
MAGNESIUM	5000.0	5040.00	100.8
MOLYBDENUM	25.0	24.31	97.2
POTASSIUM	5000.0	4857.00	97.1
SODIUM	5000.0	5000.00	100.0

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF11B Jun 11, 2015 15:56

Analyte	True	Found	%R (1)
ALUMINUM	500.0	504.60	100.9
ANTIMONY	25.0	23.24	93.0
CALCIUM	5000.0	5032.00	100.6
IRON	5000.0	5067.00	101.3
MAGNESIUM	5000.0	5089.00	101.8
MOLYBDENUM	25.0	24.40	97.6
POTASSIUM	5000.0	4803.00	96.1
SODIUM	5000.0	4949.00	99.0

SAMPLE: CCV

File: JIF11B Jun 11, 2015 16:37

Analyte	True	Found	%R (1)
ALUMINUM	500.0	503.20	100.6
ANTIMONY	25.0	23.49	94.0
CALCIUM	5000.0	5006.00	100.1
IRON	5000.0	5077.00	101.5
MAGNESIUM	5000.0	5012.00	100.2
MOLYBDENUM	25.0	24.42	97.7
POTASSIUM	5000.0	4820.00	96.4
SODIUM	5000.0	4958.00	99.2

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF11B Jun 11, 2015 17:18

Analyte	True	Found	%R (1)
ALUMINUM	500.0	512.50	102.5
ANTIMONY	25.0	23.06	92.2
CALCIUM	5000.0	5045.00	100.9
IRON	5000.0	5094.00	101.9
MAGNESIUM	5000.0	5123.00	102.5
MOLYBDENUM	25.0	24.70	98.8
POTASSIUM	5000.0	4852.00	97.0
SODIUM	5000.0	5058.00	101.2

SAMPLE: CCV

File: JIF11B Jun 11, 2015 17:49

Analyte	True	Found	%R (1)
ALUMINUM	500.0	500.20	100.0
ANTIMONY	25.0	23.43	93.7
CALCIUM	5000.0	4999.00	100.0
IRON	5000.0	5163.00	103.3
MAGNESIUM	5000.0	4994.00	99.9
MOLYBDENUM	25.0	24.50	98.0
POTASSIUM	5000.0	4837.00	96.7
SODIUM	5000.0	4902.00	98.0

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICV

File: JIF12A Jun 12, 2015 15:47

Analyte	True	Found	%R (1)
ALUMINUM	400.0	394.60	98.7
ANTIMONY	20.0	20.15	100.7
ARSENIC	20.0	19.61	98.0
CALCIUM	4000.0	4023.00	100.6
COBALT	20.0	20.43	102.2
IRON	4000.0	4024.00	100.6
MAGNESIUM	4000.0	3950.00	98.8
MOLYBDENUM	40.0	39.50	98.8
POTASSIUM	4000.0	3834.00	95.9
SODIUM	4000.0	3832.00	95.8
THALLIUM	20.0	20.49	102.5

SAMPLE: CCV

File: JIF12A Jun 12, 2015 16:16

Analyte	True	Found	%R (1)
ALUMINUM	500.0	498.50	99.7
ANTIMONY	25.0	24.64	98.6
ARSENIC	25.0	24.54	98.2
CALCIUM	5000.0	5060.00	101.2
COBALT	25.0	24.52	98.1
IRON	5000.0	5031.00	100.6
MAGNESIUM	5000.0	4906.00	98.1
MOLYBDENUM	25.0	24.86	99.4
POTASSIUM	5000.0	4932.00	98.6
SODIUM	5000.0	4808.00	96.2
THALLIUM	25.0	23.78	95.1

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF12A Jun 12, 2015 16:55

Analyte	True	Found	%R (1)
ALUMINUM	500.0	501.60	100.3
ANTIMONY	25.0	24.30	97.2
ARSENIC	25.0	24.54	98.2
CALCIUM	5000.0	5083.00	101.7
COBALT	25.0	24.86	99.4
IRON	5000.0	5055.00	101.1
MAGNESIUM	5000.0	4981.00	99.6
MOLYBDENUM	25.0	24.71	98.8
POTASSIUM	5000.0	4906.00	98.1
SODIUM	5000.0	4843.00	96.9
THALLIUM	25.0	24.46	97.8

SAMPLE: CCV

File: JIF12A Jun 12, 2015 17:35

Analyte	True	Found	%R (1)
ALUMINUM	500.0	506.70	101.3
ANTIMONY	25.0	24.14	96.6
ARSENIC	25.0	24.63	98.5
CALCIUM	5000.0	5030.00	100.6
COBALT	25.0	24.77	99.1
IRON	5000.0	5140.00	102.8
MAGNESIUM	5000.0	5040.00	100.8
MOLYBDENUM	25.0	24.69	98.8
POTASSIUM	5000.0	4844.00	96.9
SODIUM	5000.0	4833.00	96.7
THALLIUM	25.0	24.28	97.1

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF12A Jun 12, 2015 18:16

Analyte	True	Found	%R (1)
ALUMINUM	500.0	510.20	102.0
ANTIMONY	25.0	23.96	95.8
ARSENIC	25.0	24.73	98.9
CALCIUM	5000.0	5112.00	102.2
COBALT	25.0	24.74	99.0
IRON	5000.0	5072.00	101.4
MAGNESIUM	5000.0	5055.00	101.1
MOLYBDENUM	25.0	24.54	98.2
POTASSIUM	5000.0	4931.00	98.6
SODIUM	5000.0	4955.00	99.1
THALLIUM	25.0	24.57	98.3

SAMPLE: CCV

File: JIF12A Jun 12, 2015 18:56

Analyte	True	Found	%R (1)
ALUMINUM	500.0	506.50	101.3
ANTIMONY	25.0	23.99	96.0
ARSENIC	25.0	24.57	98.3
CALCIUM	5000.0	5133.00	102.7
COBALT	25.0	24.66	98.6
IRON	5000.0	5114.00	102.3
MAGNESIUM	5000.0	5056.00	101.1
MOLYBDENUM	25.0	24.64	98.6
POTASSIUM	5000.0	4897.00	97.9
SODIUM	5000.0	4850.00	97.0
THALLIUM	25.0	24.34	97.4

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF12A Jun 12, 2015 19:37

Analyte	True	Found	%R (1)
ALUMINUM	500.0	501.60	100.3
ANTIMONY	25.0	23.27	93.1
ARSENIC	25.0	24.55	98.2
CALCIUM	5000.0	5036.00	100.7
COBALT	25.0	24.63	98.5
IRON	5000.0	5104.00	102.1
MAGNESIUM	5000.0	5024.00	100.5
MOLYBDENUM	25.0	24.69	98.8
POTASSIUM	5000.0	4894.00	97.9
SODIUM	5000.0	4934.00	98.7
THALLIUM	25.0	24.36	97.4

SAMPLE: CCV

File: JIF12A Jun 12, 2015 20:18

Analyte	True	Found	%R (1)
ALUMINUM	500.0	495.00	99.0
ANTIMONY	25.0	23.74	95.0
ARSENIC	25.0	24.68	98.7
CALCIUM	5000.0	5047.00	100.9
COBALT	25.0	24.64	98.6
IRON	5000.0	5168.00	103.4
MAGNESIUM	5000.0	4993.00	99.9
MOLYBDENUM	25.0	24.85	99.4
POTASSIUM	5000.0	4837.00	96.7
SODIUM	5000.0	4862.00	97.2
THALLIUM	25.0	24.16	96.6

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICV

File: JIF17A Jun 17, 2015 12:56

Analyte	True	Found	%R (1)
ALUMINUM	400.0	392.50	98.1
ANTIMONY	20.0	20.03	100.2
ARSENIC	20.0	19.31	96.5
CALCIUM	4000.0	3989.00	99.7
COBALT	20.0	20.27	101.4
IRON	4000.0	4009.00	100.2
MAGNESIUM	4000.0	3945.00	98.6
MOLYBDENUM	40.0	39.21	98.0
POTASSIUM	4000.0	3888.00	97.2
SODIUM	4000.0	3910.00	97.8
THALLIUM	20.0	20.87	104.4

SAMPLE: CCV

File: JIF17A Jun 17, 2015 13:25

Analyte	True	Found	%R (1)
ALUMINUM	500.0	495.70	99.1
ANTIMONY	25.0	24.22	96.9
ARSENIC	25.0	24.19	96.8
CALCIUM	5000.0	4987.00	99.7
COBALT	25.0	24.38	97.5
IRON	5000.0	4990.00	99.8
MAGNESIUM	5000.0	4897.00	97.9
MOLYBDENUM	25.0	24.77	99.1
POTASSIUM	5000.0	4864.00	97.3
SODIUM	5000.0	4869.00	97.4
THALLIUM	25.0	24.37	97.5

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF17A Jun 17, 2015 14:04

Analyte	True	Found	%R (1)
ALUMINUM	500.0	491.10	98.2
ANTIMONY	25.0	24.24	97.0
ARSENIC	25.0	24.57	98.3
CALCIUM	5000.0	5040.00	100.8
COBALT	25.0	24.49	98.0
IRON	5000.0	5081.00	101.6
MAGNESIUM	5000.0	4964.00	99.3
MOLYBDENUM	25.0	24.60	98.4
POTASSIUM	5000.0	4873.00	97.5
SODIUM	5000.0	4860.00	97.2
THALLIUM	25.0	24.50	98.0

SAMPLE: CCV

File: JIF17A Jun 17, 2015 14:43

Analyte	True	Found	%R (1)
ALUMINUM	500.0	499.80	100.0
ANTIMONY	25.0	24.40	97.6
ARSENIC	25.0	24.64	98.6
CALCIUM	5000.0	5040.00	100.8
COBALT	25.0	24.65	98.6
IRON	5000.0	5062.00	101.2
MAGNESIUM	5000.0	4970.00	99.4
MOLYBDENUM	25.0	24.64	98.6
POTASSIUM	5000.0	4906.00	98.1
SODIUM	5000.0	4911.00	98.2
THALLIUM	25.0	24.19	96.8

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF17A Jun 17, 2015 15:23

Analyte	True	Found	%R (1)
ALUMINUM	500.0	504.40	100.9
ANTIMONY	25.0	25.04	100.2
ARSENIC	25.0	24.40	97.6
CALCIUM	5000.0	5084.00	101.7
COBALT	25.0	24.48	97.9
IRON	5000.0	5070.00	101.4
MAGNESIUM	5000.0	5024.00	100.5
MOLYBDENUM	25.0	24.70	98.8
POTASSIUM	5000.0	4948.00	99.0
SODIUM	5000.0	5032.00	100.6
THALLIUM	25.0	24.51	98.0

SAMPLE: CCV

File: JIF17A Jun 17, 2015 16:05

Analyte	True	Found	%R (1)
ALUMINUM	500.0	512.80	102.6
ANTIMONY	25.0	24.02	96.1
ARSENIC	25.0	24.60	98.4
CALCIUM	5000.0	5058.00	101.2
COBALT	25.0	24.48	97.9
IRON	5000.0	5078.00	101.6
MAGNESIUM	5000.0	5021.00	100.4
MOLYBDENUM	25.0	24.67	98.7
POTASSIUM	5000.0	4957.00	99.1
SODIUM	5000.0	4945.00	98.9
THALLIUM	25.0	24.68	98.7

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF17A Jun 17, 2015 16:46

Analyte	True	Found	%R (1)
ALUMINUM	500.0	503.70	100.7
ANTIMONY	25.0	24.08	96.3
ARSENIC	25.0	24.61	98.4
CALCIUM	5000.0	5049.00	101.0
COBALT	25.0	24.59	98.4
IRON	5000.0	5107.00	102.1
MAGNESIUM	5000.0	5046.00	100.9
MOLYBDENUM	25.0	24.63	98.5
POTASSIUM	5000.0	4914.00	98.3
SODIUM	5000.0	4935.00	98.7
THALLIUM	25.0	24.67	98.7

SAMPLE: CCV

File: JIF17A Jun 17, 2015 17:27

Analyte	True	Found	%R (1)
ALUMINUM	500.0	513.50	102.7
ANTIMONY	25.0	23.97	95.9
ARSENIC	25.0	24.27	97.1
CALCIUM	5000.0	5011.00	100.2
COBALT	25.0	24.44	97.8
IRON	5000.0	5068.00	101.4
MAGNESIUM	5000.0	5012.00	100.2
MOLYBDENUM	25.0	24.44	97.8
POTASSIUM	5000.0	4900.00	98.0
SODIUM	5000.0	4929.00	98.6
THALLIUM	25.0	24.29	97.2

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF17A Jun 17, 2015 18:09

Analyte	True	Found	%R (1)
ALUMINUM	500.0	494.90	99.0
ANTIMONY	25.0	23.93	95.7
ARSENIC	25.0	24.38	97.5
CALCIUM	5000.0	4945.00	98.9
COBALT	25.0	24.22	96.9
IRON	5000.0	5029.00	100.6
MAGNESIUM	5000.0	4936.00	98.7
MOLYBDENUM	25.0	24.45	97.8
POTASSIUM	5000.0	4846.00	96.9
SODIUM	5000.0	4923.00	98.5
THALLIUM	25.0	23.95	95.8

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICV

File: JIF18A Jun 18, 2015 17:27

Analyte	True	Found	%R (1)
ALUMINUM	400.0	389.90	97.5
ANTIMONY	20.0	19.86	99.3
CALCIUM	4000.0	3915.00	97.9
IRON	4000.0	4027.00	100.7
MAGNESIUM	4000.0	4013.00	100.3
MOLYBDENUM	40.0	39.47	98.7
POTASSIUM	4000.0	3911.00	97.8
SODIUM	4000.0	3859.00	96.5

SAMPLE: CCV

File: JIF18A Jun 18, 2015 17:57

Analyte	True	Found	%R (1)
ALUMINUM	500.0	526.10	105.2
ANTIMONY	25.0	24.26	97.0
CALCIUM	5000.0	5064.00	101.3
IRON	5000.0	5055.00	101.1
MAGNESIUM	5000.0	5110.00	102.2
MOLYBDENUM	25.0	25.16	100.6
POTASSIUM	5000.0	4968.00	99.4
SODIUM	5000.0	4963.00	99.3

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF18A Jun 18, 2015 18:35

Analyte	True	Found	%R (1)
ALUMINUM	500.0	495.80	99.2
ANTIMONY	25.0	24.37	97.5
CALCIUM	5000.0	5051.00	101.0
IRON	5000.0	5051.00	101.0
MAGNESIUM	5000.0	5035.00	100.7
MOLYBDENUM	25.0	24.90	99.6
POTASSIUM	5000.0	4925.00	98.5
SODIUM	5000.0	5037.00	100.7

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICV

File: JIF24C Jun 24, 2015 15:11

Analyte	True	Found	%R (1)
ALUMINUM	400.0	397.10	99.3
ANTIMONY	20.0	20.17	100.9
CALCIUM	4000.0	3998.00	100.0
IRON	4000.0	4093.00	102.3
MAGNESIUM	4000.0	3979.00	99.5
MOLYBDENUM	40.0	39.43	98.6
POTASSIUM	4000.0	3966.00	99.2
SODIUM	4000.0	3907.00	97.7

SAMPLE: CCV

File: JIF24C Jun 24, 2015 15:40

Analyte	True	Found	%R (1)
ALUMINUM	500.0	495.50	99.1
ANTIMONY	25.0	24.62	98.5
CALCIUM	5000.0	5037.00	100.7
IRON	5000.0	5080.00	101.6
MAGNESIUM	5000.0	4940.00	98.8
MOLYBDENUM	25.0	25.57	102.3
POTASSIUM	5000.0	4942.00	98.8
SODIUM	5000.0	4876.00	97.5

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF24C Jun 24, 2015 16:19

Analyte	True	Found	%R (1)
ALUMINUM	500.0	504.10	100.8
ANTIMONY	25.0	24.77	99.1
CALCIUM	5000.0	4987.00	99.7
IRON	5000.0	5138.00	102.8
MAGNESIUM	5000.0	5006.00	100.1
MOLYBDENUM	25.0	24.93	99.7
POTASSIUM	5000.0	4923.00	98.5
SODIUM	5000.0	4910.00	98.2

SAMPLE: CCV

File: JIF24C Jun 24, 2015 16:59

Analyte	True	Found	%R (1)
ALUMINUM	500.0	491.40	98.3
ANTIMONY	25.0	24.13	96.5
CALCIUM	5000.0	4924.00	98.5
IRON	5000.0	5000.00	100.0
MAGNESIUM	5000.0	4854.00	97.1
MOLYBDENUM	25.0	24.73	98.9
POTASSIUM	5000.0	4914.00	98.3
SODIUM	5000.0	4794.00	95.9

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICV

File: JIF25A Jun 25, 2015 13:24

Analyte	True	Found	%R (1)
ALUMINUM	400.0	410.30	102.6
ANTIMONY	20.0	20.70	103.5
CALCIUM	4000.0	4126.00	103.2
IRON	4000.0	4131.00	103.3
MAGNESIUM	4000.0	4148.00	103.7
MOLYBDENUM	40.0	40.32	100.8
POTASSIUM	4000.0	4020.00	100.5
SODIUM	4000.0	4048.00	101.2

SAMPLE: CCV

File: JIF25A Jun 25, 2015 13:54

Analyte	True	Found	%R (1)
ALUMINUM	500.0	540.20	108.0
ANTIMONY	25.0	25.23	100.9
CALCIUM	5000.0	5220.00	104.4
IRON	5000.0	5153.00	103.1
MAGNESIUM	5000.0	5107.00	102.1
MOLYBDENUM	25.0	26.44	105.8
POTASSIUM	5000.0	5161.00	103.2
SODIUM	5000.0	5118.00	102.4

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF25A Jun 25, 2015 14:04

Analyte	True	Found	%R (1)
ALUMINUM	500.0	509.10	101.8
ANTIMONY	25.0	25.30	101.2
CALCIUM	5000.0	5116.00	102.3
IRON	5000.0	5155.00	103.1
MAGNESIUM	5000.0	5084.00	101.7
MOLYBDENUM	25.0	25.44	101.8
POTASSIUM	5000.0	5053.00	101.1
SODIUM	5000.0	5027.00	100.5

SAMPLE: CCV

File: JIF25A Jun 25, 2015 14:10

Analyte	True	Found	%R (1)
ALUMINUM	500.0	521.90	104.4
ANTIMONY	25.0	25.45	101.8
CALCIUM	5000.0	5193.00	103.9
IRON	5000.0	5186.00	103.7
MAGNESIUM	5000.0	5127.00	102.5
MOLYBDENUM	25.0	25.72	102.9
POTASSIUM	5000.0	5109.00	102.2
SODIUM	5000.0	5101.00	102.0

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF25A Jun 25, 2015 14:50

Analyte	True	Found	%R (1)
ALUMINUM	500.0	513.40	102.7
ANTIMONY	25.0	24.72	98.9
CALCIUM	5000.0	5201.00	104.0
IRON	5000.0	5182.00	103.6
MAGNESIUM	5000.0	5111.00	102.2
MOLYBDENUM	25.0	25.49	102.0
POTASSIUM	5000.0	5108.00	102.2
SODIUM	5000.0	5109.00	102.2

SAMPLE: CCV

File: JIF25A Jun 25, 2015 15:30

Analyte	True	Found	%R (1)
ALUMINUM	500.0	525.30	105.1
ANTIMONY	25.0	25.14	100.6
CALCIUM	5000.0	5244.00	104.9
IRON	5000.0	5186.00	103.7
MAGNESIUM	5000.0	5260.00	105.2
MOLYBDENUM	25.0	25.26	101.0
POTASSIUM	5000.0	5058.00	101.2
SODIUM	5000.0	5161.00	103.2

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF25A Jun 25, 2015 16:09

Analyte	True	Found	%R (1)
ALUMINUM	500.0	532.50	106.5
ANTIMONY	25.0	25.13	100.5
CALCIUM	5000.0	5245.00	104.9
IRON	5000.0	5184.00	103.7
MAGNESIUM	5000.0	5258.00	105.2
MOLYBDENUM	25.0	25.48	101.9
POTASSIUM	5000.0	5053.00	101.1
SODIUM	5000.0	5239.00	104.8

SAMPLE: CCV

File: JIF25A Jun 25, 2015 16:50

Analyte	True	Found	%R (1)
ALUMINUM	500.0	511.20	102.2
ANTIMONY	25.0	24.69	98.8
CALCIUM	5000.0	5115.00	102.3
IRON	5000.0	5238.00	104.8
MAGNESIUM	5000.0	5144.00	102.9
MOLYBDENUM	25.0	25.28	101.1
POTASSIUM	5000.0	5099.00	102.0
SODIUM	5000.0	5177.00	103.5

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF25A Jun 25, 2015 17:31

Analyte	True	Found	%R (1)
ALUMINUM	500.0	514.90	103.0
ANTIMONY	25.0	24.73	98.9
CALCIUM	5000.0	5166.00	103.3
IRON	5000.0	5173.00	103.5
MAGNESIUM	5000.0	5224.00	104.5
MOLYBDENUM	25.0	25.43	101.7
POTASSIUM	5000.0	5077.00	101.5
SODIUM	5000.0	5174.00	103.5

SAMPLE: CCV

File: JIF25A Jun 25, 2015 18:12

Analyte	True	Found	%R (1)
ALUMINUM	500.0	497.30	99.5
ANTIMONY	25.0	24.33	97.3
CALCIUM	5000.0	4992.00	99.8
IRON	5000.0	5062.00	101.2
MAGNESIUM	5000.0	4966.00	99.3
MOLYBDENUM	25.0	24.57	98.3
POTASSIUM	5000.0	4904.00	98.1
SODIUM	5000.0	4892.00	97.8

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF25A Jun 25, 2015 18:53

Analyte	True	Found	%R (1)
ALUMINUM	500.0	501.60	100.3
ANTIMONY	25.0	24.49	98.0
CALCIUM	5000.0	5065.00	101.3
IRON	5000.0	5088.00	101.8
MAGNESIUM	5000.0	5048.00	101.0
MOLYBDENUM	25.0	24.46	97.8
POTASSIUM	5000.0	4933.00	98.7
SODIUM	5000.0	4996.00	99.9

SAMPLE: CCV

File: JIF25A Jun 25, 2015 19:35

Analyte	True	Found	%R (1)
ALUMINUM	500.0	513.30	102.7
ANTIMONY	25.0	24.22	96.9
CALCIUM	5000.0	5025.00	100.5
IRON	5000.0	5056.00	101.1
MAGNESIUM	5000.0	5063.00	101.3
MOLYBDENUM	25.0	24.50	98.0
POTASSIUM	5000.0	4917.00	98.3
SODIUM	5000.0	4975.00	99.5

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCV

File: JIF25A Jun 25, 2015 20:17

Analyte	True	Found	%R (1)
ALUMINUM	500.0	522.50	104.5
ANTIMONY	25.0	23.56	94.2
CALCIUM	5000.0	5026.00	100.5
IRON	5000.0	5124.00	102.5
MAGNESIUM	5000.0	5182.00	103.6
MOLYBDENUM	25.0	24.29	97.2
POTASSIUM	5000.0	4976.00	99.5
SODIUM	5000.0	5133.00	102.7

(1) Control Limits: Mercury 80-120; Other Metals 90-110

FORM II (Part 1) - IN

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: PQL

File: HIF11A Jun 11, 2015 17:05

Analyte	TRUE	FOUND	% R
MERCURY	0.2	0.21	105.0

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: PQL

File: HIF12B Jun 12, 2015 18:38

Analyte	TRUE	FOUND	% R
MERCURY	0.2	0.20	100.0

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: PQL

File: HIF15A Jun 15, 2015 13:40

Analyte	TRUE	FOUND	% R
MERCURY	0.2	0.19	95.0

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: PQL

File: HIF16B Jun 16, 2015 12:58

Analyte	TRUE	FOUND	% R
MERCURY	0.2	0.20	100.0

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: PQL

File: IIF09B Jun 09, 2015 19:19

Analyte	TRUE	FOUND	% R
ALUMINUM	300.0	307.10	102.4
BARIUM	5.0	5.43	108.6
BERYLLIUM	5.0	5.46	109.2
CADMIUM	5.0	5.16	103.2
CALCIUM	100.0	103.10	103.1
CHROMIUM	10.0	10.62	106.2
COPPER	25.0	26.33	105.3
IRON	100.0	103.40	103.4
LEAD	5.0	4.65	93.0
MAGNESIUM	100.0	106.90	106.9
MANGANESE	5.0	5.35	107.0
NICKEL	10.0	10.63	106.3
POTASSIUM	1000.0	1020.00	102.0
SELENIUM	10.0	9.29	92.9
SILVER	10.0	10.90	109.0
SODIUM	1000.0	942.20	94.2
VANADIUM	10.0	10.23	102.3
ZINC	20.0	21.91	109.6

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: PQL

File: IIF11A Jun 11, 2015 12:31

Analyte	TRUE	FOUND	% R
ALUMINUM	300.0	297.60	99.2
BARIUM	5.0	5.38	107.6
BERYLLIUM	5.0	5.32	106.4
CADMIUM	5.0	5.04	100.8
CALCIUM	100.0	99.20	99.2
CHROMIUM	10.0	10.35	103.5
COPPER	25.0	25.69	102.8
IRON	100.0	101.50	101.5
LEAD	5.0	5.60	112.0
MAGNESIUM	100.0	101.20	101.2
MANGANESE	5.0	5.10	102.0
NICKEL	10.0	10.77	107.7
POTASSIUM	1000.0	1020.00	102.0
SILVER	10.0	10.93	109.3
SODIUM	1000.0	997.70	99.8
VANADIUM	10.0	9.88	98.8
ZINC	20.0	21.40	107.0

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: PQL

File: IIF15A Jun 15, 2015 14:14

Analyte	TRUE	FOUND	% R
ALUMINUM	300.0	289.40	96.5
BARIUM	5.0	5.60	112.0
BERYLLIUM	5.0	5.07	101.4
CADMIUM	5.0	4.87	97.4
CALCIUM	100.0	92.24	92.2
CHROMIUM	10.0	10.28	102.8
COPPER	25.0	25.40	101.6
IRON	100.0	93.18	93.2
LEAD	5.0	4.49	89.8
MAGNESIUM	100.0	105.70	105.7
MANGANESE	5.0	4.39	87.8
NICKEL	10.0	10.52	105.2
POTASSIUM	1000.0	923.40	92.3
SELENIUM	10.0	11.05	110.5
SILVER	10.0	10.82	108.2
SODIUM	1000.0	979.80	98.0
VANADIUM	10.0	9.57	95.7
ZINC	20.0	20.85	104.3

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: PQL

File: IIF16B Jun 16, 2015 18:38

Analyte	TRUE	FOUND	% R
ALUMINUM	300.0	265.40	88.5
BARIUM	5.0	5.38	107.6
BERYLLIUM	5.0	5.21	104.2
CADMIUM	5.0	4.94	98.8
CALCIUM	100.0	90.71	90.7
CHROMIUM	10.0	9.49	94.9
COPPER	25.0	25.89	103.6
IRON	100.0	102.20	102.2
LEAD	5.0	4.74	94.8
MAGNESIUM	100.0	104.90	104.9
NICKEL	10.0	10.34	103.4
POTASSIUM	1000.0	936.00	93.6
SILVER	10.0	10.16	101.6
SODIUM	1000.0	981.30	98.1
VANADIUM	10.0	9.26	92.6
ZINC	20.0	20.11	100.6

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: PQL

File: IIF18B Jun 18, 2015 13:57

Analyte	TRUE	FOUND	% R
ALUMINUM	300.0	282.20	94.1
BARIUM	5.0	5.29	105.8
BERYLLIUM	5.0	4.86	97.2
CADMIUM	5.0	5.00	100.0
CALCIUM	100.0	86.33	86.3
CHROMIUM	10.0	9.87	98.7
COPPER	25.0	24.54	98.2
IRON	100.0	88.05	88.0
LEAD	5.0	5.18	103.6
MAGNESIUM	100.0	98.25	98.3
NICKEL	10.0	10.28	102.8
POTASSIUM	1000.0	985.30	98.5
SELENIUM	10.0	10.92	109.2
SILVER	10.0	10.59	105.9
SODIUM	1000.0	954.10	95.4
VANADIUM	10.0	9.78	97.8
ZINC	20.0	20.98	104.9

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: PQL

File: IIF18C Jun 18, 2015 20:16

Analyte	TRUE	FOUND	% R
ALUMINUM	300.0	309.40	103.1
BARIUM	5.0	5.51	110.2
BERYLLIUM	5.0	4.93	98.6
CADMIUM	5.0	4.89	97.8
CALCIUM	100.0	95.97	96.0
CHROMIUM	10.0	9.78	97.8
COPPER	25.0	24.55	98.2
IRON	100.0	93.74	93.7
LEAD	5.0	5.24	104.8
MAGNESIUM	100.0	90.63	90.6
MANGANESE	5.0	5.53	110.6
NICKEL	10.0	10.35	103.5
POTASSIUM	1000.0	996.00	99.6
SELENIUM	10.0	10.55	105.5
SILVER	10.0	9.83	98.3
SODIUM	1000.0	955.40	95.5
VANADIUM	10.0	10.02	100.2
ZINC	20.0	20.20	101.0

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: PQL

File: IIF19A Jun 19, 2015 09:56

Analyte	TRUE	FOUND	% R
ALUMINUM	300.0	255.70	85.2
BARIUM	5.0	4.12	82.4
BERYLLIUM	5.0	5.03	100.6
CADMIUM	5.0	4.90	98.0
CALCIUM	100.0	82.49	82.5
CHROMIUM	10.0	9.73	97.3
COPPER	25.0	24.59	98.4
IRON	100.0	91.25	91.3
LEAD	5.0	5.49	109.8
MAGNESIUM	100.0	104.30	104.3
NICKEL	10.0	10.58	105.8
POTASSIUM	1000.0	918.10	91.8
SELENIUM	10.0	10.77	107.7
SILVER	10.0	9.89	98.9
SODIUM	1000.0	931.60	93.2
VANADIUM	10.0	9.75	97.5
ZINC	20.0	20.11	100.6

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: PQL

File: IIF22A Jun 22, 2015 13:17

Analyte	TRUE	FOUND	% R
ALUMINUM	300.0	310.40	103.5
BARIUM	5.0	5.61	112.2
BERYLLIUM	5.0	5.16	103.2
CADMIUM	5.0	5.11	102.2
CALCIUM	100.0	99.27	99.3
CHROMIUM	10.0	10.35	103.5
COPPER	25.0	26.16	104.6
IRON	100.0	103.50	103.5
LEAD	5.0	4.75	95.0
MAGNESIUM	100.0	107.20	107.2
MANGANESE	5.0	5.03	100.6
NICKEL	10.0	11.17	111.7
POTASSIUM	1000.0	1098.00	109.8
SELENIUM	10.0	9.71	97.1
SILVER	10.0	11.20	112.0
SODIUM	1000.0	1028.00	102.8
VANADIUM	10.0	10.51	105.1
ZINC	20.0	21.94	109.7

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: PQL

File: IIF22B Jun 22, 2015 19:16

Analyte	TRUE	FOUND	% R
ALUMINUM	300.0	343.80	114.6
BARIUM	5.0	5.13	102.6
BERYLLIUM	5.0	5.56	111.2
CADMIUM	5.0	5.31	106.2
CALCIUM	100.0	109.90	109.9
CHROMIUM	10.0	11.56	115.6
COPPER	25.0	26.84	107.4
IRON	100.0	109.10	109.1
LEAD	5.0	5.15	103.0
MAGNESIUM	100.0	109.60	109.6
MANGANESE	5.0	5.49	109.8
NICKEL	10.0	10.85	108.5
POTASSIUM	1000.0	1122.00	112.2
SELENIUM	10.0	9.56	95.6
SILVER	10.0	10.97	109.7
SODIUM	1000.0	1085.00	108.5
VANADIUM	10.0	10.71	107.1
ZINC	20.0	22.11	110.6

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: PQL

File: IIF24A Jun 24, 2015 10:40

Analyte	TRUE	FOUND	% R
ALUMINUM	300.0	291.30	97.1
BARIUM	5.0	5.39	107.8
BERYLLIUM	5.0	5.16	103.2
CADMIUM	5.0	5.17	103.4
CALCIUM	100.0	111.70	111.7
CHROMIUM	10.0	10.32	103.2
COPPER	25.0	24.70	98.8
IRON	100.0	97.54	97.5
LEAD	5.0	4.43	88.6
MAGNESIUM	100.0	107.40	107.4
MANGANESE	5.0	5.18	103.6
NICKEL	10.0	11.15	111.5
POTASSIUM	1000.0	1110.00	111.0
SELENIUM	10.0	11.41	114.1
SILVER	10.0	11.14	111.4
SODIUM	1000.0	1000.00	100.0
VANADIUM	10.0	10.56	105.6
ZINC	20.0	21.40	107.0

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: PQL

File: JIF08A Jun 08, 2015 16:22

Analyte	TRUE	FOUND	% R
ALUMINUM	60.0	59.69	99.5
ANTIMONY	0.2	0.21	105.0
ARSENIC	1.0	0.88	88.0
CALCIUM	20.0	18.40	92.0
COBALT	0.2	0.21	105.0
IRON	20.0	19.58	97.9
MAGNESIUM	20.0	21.07	105.4
MOLYBDENUM	1.0	1.03	103.0
POTASSIUM	200.0	197.60	98.8
SODIUM	200.0	208.20	104.1
THALLIUM	0.2	0.20	100.0

SAMPLE: PQL

File: JIF08A Jun 08, 2015 16:51

Analyte	TRUE	FOUND	% R
ALUMINUM	60.0	58.56	97.6
ANTIMONY	0.2	0.22	110.0
ARSENIC	1.0	0.92	92.0
CALCIUM	20.0	21.08	105.4
COBALT	0.2	0.20	100.0
IRON	20.0	16.78	83.9
MAGNESIUM	20.0	20.22	101.1
MOLYBDENUM	1.0	1.10	110.0
POTASSIUM	200.0	204.20	102.1
SODIUM	200.0	207.90	104.0
THALLIUM	0.2	0.21	105.0

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: PQL

File: JIF11B Jun 11, 2015 13:33

Analyte	TRUE	FOUND	% R
ALUMINUM	60.0	58.61	97.7
ANTIMONY	0.2	0.20	100.0
CALCIUM	20.0	17.54	87.7
IRON	20.0	19.74	98.7
MAGNESIUM	20.0	20.70	103.5
MOLYBDENUM	1.0	1.01	101.0
POTASSIUM	200.0	194.50	97.3
SODIUM	200.0	203.10	101.6

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: PQL

File: JIF12A Jun 12, 2015 15:53

Analyte	TRUE	FOUND	% R
ALUMINUM	60.0	58.91	98.2
ANTIMONY	0.2	0.21	105.0
ARSENIC	1.0	0.92	92.0
CALCIUM	20.0	21.79	108.9
COBALT	0.2	0.22	110.0
IRON	20.0	18.82	94.1
MAGNESIUM	20.0	20.21	101.1
MOLYBDENUM	1.0	1.00	100.0
POTASSIUM	200.0	197.20	98.6
SODIUM	200.0	202.30	101.2
THALLIUM	0.2	0.20	100.0

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: PQL

File: JIF17A Jun 17, 2015 13:02

Analyte	TRUE	FOUND	% R
ALUMINUM	60.0	58.56	97.6
ANTIMONY	0.2	0.21	105.0
ARSENIC	1.0	0.86	86.0
CALCIUM	20.0	19.01	95.1
COBALT	0.2	0.21	105.0
IRON	20.0	16.07	80.3
MAGNESIUM	20.0	20.46	102.3
MOLYBDENUM	1.0	1.03	103.0
POTASSIUM	200.0	196.00	98.0
SODIUM	200.0	208.50	104.3
THALLIUM	0.2	0.21	105.0

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: PQL

File: JIF18A Jun 18, 2015 17:34

Analyte	TRUE	FOUND	% R
ALUMINUM	60.0	58.52	97.5
ANTIMONY	0.2	0.21	105.0
CALCIUM	20.0	18.47	92.3
IRON	20.0	19.40	97.0
MAGNESIUM	20.0	20.38	101.9
MOLYBDENUM	1.0	1.05	105.0
POTASSIUM	200.0	194.60	97.3
SODIUM	200.0	205.20	102.6

2C

PQL STANDARD FOR AA AND ICP

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: PQL

File: JIF24C Jun 24, 2015 15:17

Analyte	TRUE	FOUND	% R
ALUMINUM	60.0	59.56	99.3
ANTIMONY	0.2	0.21	105.0
CALCIUM	20.0	19.64	98.2
IRON	20.0	22.29	111.5
MAGNESIUM	20.0	20.26	101.3
MOLYBDENUM	1.0	1.07	107.0
POTASSIUM	200.0	201.40	100.7
SODIUM	200.0	207.00	103.5

2C

PQL STANDARD FOR AA AND ICP

No calcium results were reported from this date.

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: PQL

File: JIF25A Jun 25, 2015 13:31

Analyte	TRUE	FOUND	% R
ALUMINUM	60.0	59.19	98.6
ANTIMONY	0.2	0.21	105.0
CALCIUM	20.0	27.65	138.2•
IRON	20.0	20.10	100.5
MAGNESIUM	20.0	20.23	101.2
MOLYBDENUM	1.0	1.03	103.0
POTASSIUM	200.0	205.40	102.7
SODIUM	200.0	211.30	105.7

SAMPLE: PQL

File: JIF25A Jun 25, 2015 14:00

Analyte	TRUE	FOUND	% R
ALUMINUM	60.0	57.33	95.5
ANTIMONY	0.2	0.21	105.0
CALCIUM	20.0	25.85	129.3•
IRON	20.0	16.76	83.8
MAGNESIUM	20.0	20.93	104.7
MOLYBDENUM	1.0	1.24	124.0•
POTASSIUM	200.0	197.10	98.5
SODIUM	200.0	205.50	102.8

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICB

File: HIF11A Jun 11, 2015 17:03

Analyte	Result	C
MERCURY	-0.089	U

SAMPLE: CCB

File: HIF11A Jun 11, 2015 17:10

Analyte	Result	C
MERCURY	-0.081	U

SAMPLE: CCB

File: HIF11A Jun 11, 2015 17:23

Analyte	Result	C
MERCURY	-0.092	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: HIF11A Jun 11, 2015 17:42

Analyte	Result	C
MERCURY	-0.077	U

SAMPLE: CCB

File: HIF11A Jun 11, 2015 18:08

Analyte	Result	C
MERCURY	-0.076	U

SAMPLE: CCB

File: HIF11A Jun 11, 2015 18:27

Analyte	Result	C
MERCURY	-0.065	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICB

File: HIF12B Jun 12, 2015 18:35

Analyte	Result	C
MERCURY	-0.031	U

SAMPLE: CCB

File: HIF12B Jun 12, 2015 18:42

Analyte	Result	C
MERCURY	0.023	U

SAMPLE: CCB

File: HIF12B Jun 12, 2015 19:07

Analyte	Result	C
MERCURY	0.023	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: HIF12B Jun 12, 2015 19:34

Analyte	Result	C
MERCURY	0.023	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICB

File: HIF15A Jun 15, 2015 13:38

Analyte	Result	C
MERCURY	0.023	U

SAMPLE: CCB

File: HIF15A Jun 15, 2015 13:44

Analyte	Result	C
MERCURY	0.023	U

SAMPLE: CCB

File: HIF15A Jun 15, 2015 14:11

Analyte	Result	C
MERCURY	-0.029	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: HIF15A Jun 15, 2015 14:38

Analyte	Result	C
MERCURY	0.023	U

SAMPLE: CCB

File: HIF15A Jun 15, 2015 15:06

Analyte	Result	C
MERCURY	0.023	U

SAMPLE: CCB

File: HIF15A Jun 15, 2015 15:34

Analyte	Result	C
MERCURY	0.023	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: HIF15A Jun 15, 2015 16:01

Analyte	Result	C
MERCURY	0.023	U

SAMPLE: CCB

File: HIF15A Jun 15, 2015 16:36

Analyte	Result	C
MERCURY	0.023	U

SAMPLE: CCB

File: HIF15A Jun 15, 2015 16:58

Analyte	Result	C
MERCURY	0.023	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: HIF15A Jun 15, 2015 17:04

Analyte	Result	C
MERCURY	0.023	U

SAMPLE: CCB

File: HIF15A Jun 15, 2015 17:27

Analyte	Result	C
MERCURY	0.023	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICB

File: HIF16B Jun 16, 2015 12:56

Analyte	Result	C
MERCURY	-0.025	U

SAMPLE: CCB

File: HIF16B Jun 16, 2015 13:02

Analyte	Result	C
MERCURY	0.023	U

SAMPLE: CCB

File: HIF16B Jun 16, 2015 13:26

Analyte	Result	C
MERCURY	0.023	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: HIF16B Jun 16, 2015 13:51

Analyte	Result	C
MERCURY	-0.028	U

SAMPLE: CCB

File: HIF16B Jun 16, 2015 14:04

Analyte	Result	C
MERCURY	-0.023	U

SAMPLE: CCB

File: HIF16B Jun 16, 2015 16:38

Analyte	Result	C
MERCURY	0.023	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: HIF16B Jun 16, 2015 16:46

Analyte	Result	C
MERCURY	-0.033	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

LCS and MB affected

SAMPLE: ICB

File: IIF09B Jun 09, 2015 19:14

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	-48.950	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF09B Jun 09, 2015 19:57

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	-0.499	U
IRON	9.529	J
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SELENIUM	3.679	J
SILVER	0.410	U
SODIUM	-124.500	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF09B Jun 09, 2015 20:57

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	5.527	J
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	-156.100	U
VANADIUM	0.250	U
ZINC	0.510	U

LCS and MB affected

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB
File: IIF09B Jun 09, 2015 21:57

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	8.863	J
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	-184.700	U
VANADIUM	0.250	U
ZINC	1.207	J

SAMPLE: CCB
File: IIF09B Jun 09, 2015 22:58

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.325	J
COPPER	0.470	U
IRON	6.419	J
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	-57.160	U
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	-214.600	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB
File: IIF09B Jun 09, 2015 23:59

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	-179.800	U
VANADIUM	0.250	U
ZINC	0.510	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

No analytes in environmental samples were reported form this day.

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICB

File: IIF11A Jun 11, 2015 12:26

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	-61.680	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF11A Jun 11, 2015 13:08

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	8.842	J
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF11A Jun 11, 2015 14:08

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.389	J
COPPER	0.470	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

No analytes in environmental samples were reported form this day.

SAMPLE: CCB

File: IIF11A Jun 11, 2015 15:08

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	6.024	J
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SILVER	0.437	J
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF11A Jun 11, 2015 15:38

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	5.458	J
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

No analytes in environmental samples were reported form this day.

Concentration Units: ug/L

SAMPLE: ICB

File: IIF15A Jun 15, 2015 14:09

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	-0.488	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.462	J
POTASSIUM	45.000	U
SELENIUM	2.800	U
SILVER	0.412	J
SODIUM	40.000	U
VANADIUM	-0.270	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF15A Jun 15, 2015 14:51

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	-0.603	U
IRON	6.923	J
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	-1.530	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SELENIUM	4.342	J
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF15A Jun 15, 2015 15:51

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.529	J
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	7.470	J
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	-1.314	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SELENIUM	-3.834	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	-0.416	U
ZINC	0.510	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

No analytes in environmental samples were reported form this day.

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: IIF15A Jun 15, 2015 16:51

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	6.837	J
MANGANESE	-1.586	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF15A Jun 15, 2015 17:50

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	9.422	J
LEAD	1.200	U
MAGNESIUM	6.033	J
MANGANESE	-1.544	U
NICKEL	0.420	U
POTASSIUM	172.900	J
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	124.000	J
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF15A Jun 15, 2015 18:50

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.278	J
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	11.230	J
LEAD	1.200	U
MAGNESIUM	10.390	J
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	100.400	J
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	85.400	J
VANADIUM	0.250	U
ZINC	0.510	U

No analytes in environmental samples were reported form this day.

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: IIF15A Jun 15, 2015 19:45

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	-0.579	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	7.887	J
MANGANESE	-1.305	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	61.530	J
VANADIUM	0.250	U
ZINC	0.510	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICB

File: IIF16B Jun 16, 2015 18:33

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
NICKEL	0.420	U
POTASSIUM	-56.900	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF16B Jun 16, 2015 19:16

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.136	J
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	10.470	J
LEAD	1.200	U
MAGNESIUM	5.200	U
NICKEL	0.420	U
POTASSIUM	-60.110	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	-0.363	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF16B Jun 16, 2015 20:16

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.912	J
BERYLLIUM	0.176	J
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	11.850	J
LEAD	1.200	U
MAGNESIUM	5.200	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	-0.460	U
ZINC	0.510	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: IIF16B Jun 16, 2015 21:15

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.581	J
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	9.044	J
LEAD	1.200	U
MAGNESIUM	5.200	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	-0.252	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF16B Jun 16, 2015 22:15

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	1.128	J
BERYLLIUM	0.180	J
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	8.754	J
LEAD	1.200	U
MAGNESIUM	5.200	U
NICKEL	0.420	U
POTASSIUM	-78.020	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF16B Jun 16, 2015 23:14

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.945	J
BERYLLIUM	0.469	J
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.321	J
COPPER	0.470	U
IRON	16.740	J
LEAD	1.200	U
MAGNESIUM	5.765	J
NICKEL	0.420	U
POTASSIUM	45.000	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICB

File: IIF18B Jun 18, 2015 13:52

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	-24.390	U
CHROMIUM	-0.414	U
COPPER	-1.528	U
IRON	-5.686	U
LEAD	1.200	U
MAGNESIUM	5.200	U
NICKEL	0.420	U
POTASSIUM	91.520	J
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF18B Jun 18, 2015 14:34

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.541	J
BERYLLIUM	0.132	J
CADMIUM	0.078	U
CALCIUM	10.280	J
CHROMIUM	0.310	U
COPPER	-1.427	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	-0.291	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF18B Jun 18, 2015 15:34

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	-10.680	U
CHROMIUM	0.542	J
COPPER	0.470	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
NICKEL	-0.573	U
POTASSIUM	146.500	J
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	94.780	J
VANADIUM	0.250	U
ZINC	0.510	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: IIF18B Jun 18, 2015 16:35

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	-0.195	U
CADMIUM	0.090	J
CALCIUM	-10.080	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
NICKEL	0.420	U
POTASSIUM	61.460	J
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	-43.880	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF18B Jun 18, 2015 17:35

Analyte	Result	C
ALUMINUM	27.040	J
BARIUM	-0.642	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	-11.340	U
CHROMIUM	0.310	U
COPPER	-0.972	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
NICKEL	0.420	U
POTASSIUM	-58.950	U
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	-66.900	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF18B Jun 18, 2015 18:36

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	-11.190	U
CHROMIUM	0.310	U
COPPER	-0.590	U
IRON	-6.183	U
LEAD	1.200	U
MAGNESIUM	5.200	U
NICKEL	0.420	U
POTASSIUM	76.840	J
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	-45.060	U
VANADIUM	-0.297	U
ZINC	0.510	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: IIF18B Jun 18, 2015 19:26

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	-0.148	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	-1.026	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
NICKEL	-0.549	U
POTASSIUM	134.100	J
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICB

File: IIF18C Jun 18, 2015 20:11

Analyte	Result	C
ALUMINUM	-36.590	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	-19.060	U
CHROMIUM	-0.384	U
COPPER	0.470	U
IRON	5.200	U
LEAD	-1.787	U
MAGNESIUM	-6.550	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	99.400	J
SELENIUM	2.800	U
SILVER	-0.774	U
SODIUM	40.000	U
VANADIUM	0.354	J
ZINC	-0.530	U

SAMPLE: CCB

File: IIF18C Jun 18, 2015 20:53

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	-0.535	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	-11.690	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	5.200	U
LEAD	-1.764	U
MAGNESIUM	-5.354	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	123.700	J
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF18C Jun 18, 2015 21:54

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	-11.180	U
CHROMIUM	0.310	U
COPPER	-0.493	U
IRON	15.630	J
LEAD	1.200	U
MAGNESIUM	-12.000	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: IIF18C Jun 18, 2015 22:54

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	-0.141	U
CADMIUM	0.078	U
CALCIUM	-14.130	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	5.638	J
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF18C Jun 18, 2015 23:54

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	-0.326	U
COPPER	-1.116	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	-6.838	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	56.570	J
SELENIUM	2.800	U
SILVER	-0.712	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF18C Jun 19, 2015 0:54

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	13.610	J
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	-51.710	U
VANADIUM	0.250	U
ZINC	-0.543	U

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: IIF18C Jun 19, 2015 1:55

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.210	J
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	17.120	J
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	71.750	J
SELENIUM	2.800	U
SILVER	-0.445	U
SODIUM	-40.880	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF18C Jun 19, 2015 2:41

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.623	J
BERYLLIUM	-0.141	U
CADMIUM	0.078	U
CALCIUM	-12.360	U
CHROMIUM	0.310	U
COPPER	-0.899	U
IRON	17.810	J
LEAD	1.200	U
MAGNESIUM	-8.201	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	74.780	J
SELENIUM	2.800	U
SILVER	-0.656	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICB

File: IIF19A Jun 19, 2015 9:51

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	-13.600	U
CHROMIUM	0.310	U
COPPER	0.685	J
IRON	5.200	U
LEAD	1.353	J
MAGNESIUM	7.033	J
NICKEL	0.420	U
POTASSIUM	45.000	U
SELENIUM	2.951	J
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF19A Jun 19, 2015 10:33

Analyte	Result	C
ALUMINUM	-39.670	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	-12.830	U
CHROMIUM	-0.357	U
COPPER	0.470	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.541	J
NICKEL	0.420	U
POTASSIUM	99.920	J
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.592	J
ZINC	0.510	U

SAMPLE: CCB

File: IIF19A Jun 19, 2015 11:33

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.242	J
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
NICKEL	0.420	U
POTASSIUM	46.550	J
SELENIUM	5.183	J
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.307	J
ZINC	0.510	U

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: IIF19A Jun 19, 2015 12:34

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.843	J
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
NICKEL	0.420	U
POTASSIUM	126.200	J
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.513	J
ZINC	0.510	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICB

File: IIF22A Jun 22, 2015 13:12

Analyte	Result	C
ALUMINUM	50.520	J
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	46.890	J
CHROMIUM	0.310	U
COPPER	-0.578	U
IRON	15.250	J
LEAD	1.200	U
MAGNESIUM	39.130	J
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.601	J

SAMPLE: CCB

File: IIF22A Jun 22, 2015 13:56

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	-0.762	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.440	J
POTASSIUM	-66.140	U
SELENIUM	5.701	J
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF22A Jun 22, 2015 14:57

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	6.243	J
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.314	J
ZINC	0.510	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: IIF22A Jun 22, 2015 15:57

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	-82.250	U
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

Al, Ca, Fe, Mg, Mn, Se were reported from this sequence.

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICB

File: IIF22B Jun 22, 2015 19:11

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	-0.669	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	-9.880	U
CHROMIUM	0.372	J
COPPER	0.470	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	-6.552	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF22B Jun 22, 2015 19:55

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	-0.568	U

SAMPLE: CCB

File: IIF22B Jun 22, 2015 20:54

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	-0.609	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	-5.729	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	119.900	J
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	89.180	J
VANADIUM	0.250	U
ZINC	0.510	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Al, Ca, Fe, Mg, Mn, Se were reported from this sequence.

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: IIF22B Jun 22, 2015 21:55

Analyte	Result	C
ALUMINUM	24.130	J
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	65.620	J
SELENIUM	3.022	J
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	-0.543	U

SAMPLE: CCB

File: IIF22B Jun 22, 2015 22:56

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	3.715	J
COPPER	0.470	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	65.740	J
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	-49.230	U
VANADIUM	0.348	J
ZINC	0.510	U

SAMPLE: CCB

File: IIF22B Jun 22, 2015 23:56

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	-0.542	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	1.837	J
COPPER	0.470	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	87.490	J
SELENIUM	2.800	U
SILVER	0.421	J
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Al, Ca, Fe, Mg, Mn, Se were reported from this sequence.

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: IIF22B Jun 23, 2015 0:26

Analyte	Result	C
ALUMINUM	25.340	J
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	9.700	U
CHROMIUM	1.706	J
COPPER	0.470	U
IRON	5.200	U
LEAD	1.200	U
MAGNESIUM	5.200	U
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	47.780	J
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	-59.180	U
VANADIUM	0.426	J
ZINC	0.510	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICB

File: IIF24A Jun 24, 2015 10:35

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	-0.080	U
CALCIUM	9.700	U
CHROMIUM	0.310	U
COPPER	-0.671	U
IRON	5.200	U
LEAD	-1.457	U
MAGNESIUM	5.200	U
MANGANESE	-1.780	U
NICKEL	0.580	J
POTASSIUM	45.000	U
SELENIUM	4.223	J
SILVER	0.540	J
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF24A Jun 24, 2015 11:18

Analyte	Result	C
ALUMINUM	33.050	J
BARIUM	0.591	J
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	12.520	J
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	5.321	J
LEAD	1.200	U
MAGNESIUM	7.055	J
MANGANESE	1.100	U
NICKEL	0.793	J
POTASSIUM	218.500	J
SELENIUM	4.323	J
SILVER	0.422	J
SODIUM	46.870	J
VANADIUM	0.281	J
ZINC	0.510	U

SAMPLE: CCB

File: IIF24A Jun 24, 2015 12:17

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	1.339	J
BERYLLIUM	0.130	U
CADMIUM	-0.150	U
CALCIUM	11.890	J
CHROMIUM	0.310	U
COPPER	-1.303	U
IRON	9.252	J
LEAD	-2.299	U
MAGNESIUM	10.620	J
MANGANESE	-1.335	U
NICKEL	0.544	J
POTASSIUM	117.800	J
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: IIF24A Jun 24, 2015 13:17

Analyte	Result	C
ALUMINUM	24.810	J
BARIUM	1.152	J
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	18.490	J
CHROMIUM	0.310	U
COPPER	-1.365	U
IRON	11.640	J
LEAD	-1.824	U
MAGNESIUM	6.439	J
MANGANESE	1.100	U
NICKEL	0.575	J
POTASSIUM	163.400	J
SELENIUM	6.329	J
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF24A Jun 24, 2015 14:16

Analyte	Result	C
ALUMINUM	50.150	J
BARIUM	1.326	J
BERYLLIUM	0.130	U
CADMIUM	0.078	U
CALCIUM	14.590	J
CHROMIUM	-0.412	U
COPPER	0.470	U
IRON	8.566	J
LEAD	1.200	U
MAGNESIUM	12.600	J
MANGANESE	1.100	U
NICKEL	0.457	J
POTASSIUM	214.000	J
SELENIUM	2.852	J
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.427	J
ZINC	0.510	U

SAMPLE: CCB

File: IIF24A Jun 24, 2015 15:15

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	1.008	J
BERYLLIUM	0.229	J
CADMIUM	0.078	U
CALCIUM	23.480	J
CHROMIUM	-0.512	U
COPPER	0.531	J
IRON	10.650	J
LEAD	1.200	U
MAGNESIUM	12.750	J
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	109.200	J
SELENIUM	2.800	U
SILVER	0.546	J
SODIUM	40.000	U
VANADIUM	0.822	J
ZINC	0.510	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: IIF24A Jun 24, 2015 16:15

Analyte	Result	C
ALUMINUM	40.980	J
BARIUM	0.797	J
BERYLLIUM	0.190	J
CADMIUM	0.078	U
CALCIUM	21.520	J
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	10.570	J
LEAD	1.200	U
MAGNESIUM	9.610	J
MANGANESE	1.100	U
NICKEL	0.521	J
POTASSIUM	125.200	J
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.695	J
ZINC	0.858	J

SAMPLE: CCB

File: IIF24A Jun 24, 2015 17:14

Analyte	Result	C
ALUMINUM	25.040	J
BARIUM	1.134	J
BERYLLIUM	0.211	J
CADMIUM	0.078	U
CALCIUM	16.510	J
CHROMIUM	-0.419	U
COPPER	0.470	U
IRON	18.290	J
LEAD	1.200	U
MAGNESIUM	14.320	J
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	114.700	J
SELENIUM	2.800	U
SILVER	0.550	J
SODIUM	40.000	U
VANADIUM	0.250	U
ZINC	0.510	U

SAMPLE: CCB

File: IIF24A Jun 24, 2015 18:13

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.788	J
BERYLLIUM	0.215	J
CADMIUM	0.078	U
CALCIUM	25.730	J
CHROMIUM	0.310	U
COPPER	0.470	U
IRON	16.920	J
LEAD	1.200	U
MAGNESIUM	15.350	J
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	119.200	J
SELENIUM	2.800	U
SILVER	0.792	J
SODIUM	40.000	U
VANADIUM	0.569	J
ZINC	0.510	U

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: IIF24A Jun 24, 2015 19:12

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.500	U
BERYLLIUM	0.130	U
CADMIUM	0.082	J
CALCIUM	20.030	J
CHROMIUM	-0.422	U
COPPER	-0.536	U
IRON	21.670	J
LEAD	-2.132	U
MAGNESIUM	11.260	J
MANGANESE	1.100	U
NICKEL	0.420	U
POTASSIUM	45.000	U
SELENIUM	2.800	U
SILVER	0.698	J
SODIUM	40.000	U
VANADIUM	0.348	J
ZINC	0.677	J

SAMPLE: CCB

File: IIF24A Jun 24, 2015 19:51

Analyte	Result	C
ALUMINUM	24.000	U
BARIUM	0.768	J
BERYLLIUM	0.600	B
CADMIUM	0.186	J
CALCIUM	24.360	J
CHROMIUM	0.310	U
COPPER	-0.752	U
IRON	30.560	J
LEAD	-1.650	U
MAGNESIUM	18.560	J
MANGANESE	1.100	U
NICKEL	0.457	J
POTASSIUM	45.000	U
SELENIUM	2.800	U
SILVER	0.410	U
SODIUM	40.000	U
VANADIUM	0.653	J
ZINC	0.510	U

No environmental samples were reported from this analytical sequence.

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICB

File: JIF08A Jun 08, 2015 16:19

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.018	J
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.075	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.006	U

SAMPLE: CCB

File: JIF08A Jun 08, 2015 16:48

Analyte	Result	C
ALUMINUM	3.121	J
ANTIMONY	0.025	J
ARSENIC	0.220	U
CALCIUM	5.601	J
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	3.751	J
MOLYBDENUM	0.177	J
POTASSIUM	5.300	U
SODIUM	7.799	J
THALLIUM	0.007	J

SAMPLE: CCB

File: JIF08A Jun 08, 2015 16:57

Analyte	Result	C
ALUMINUM	2.118	J
ANTIMONY	0.016	J
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	2.766	J
MOLYBDENUM	0.110	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.006	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

No environmental samples were reported from this analytical sequence.

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: JIF08A Jun 08, 2015 17:37

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.016	J
ARSENIC	0.220	U
CALCIUM	5.597	J
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.045	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.014	J

SAMPLE: CCB

File: JIF08A Jun 08, 2015 18:16

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.013	J
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.040	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.007	J

SAMPLE: CCB

File: JIF08A Jun 08, 2015 18:56

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.012	J
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.040	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.006	U

No environmental samples were reported from this analytical sequence.

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: JIF08A Jun 08, 2015 19:37

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.011	J
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.039	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.008	J

SAMPLE: CCB

File: JIF08A Jun 08, 2015 20:19

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.007	J
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.033	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.006	U

SAMPLE: CCB

File: JIF08A Jun 08, 2015 20:59

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.017	J
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.012	J
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.036	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.008	J

No environmental samples were reported from this analytical sequence.

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: JIF08A Jun 08, 2015 21:41

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.015	J
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.033	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.008	J

SAMPLE: CCB

File: JIF08A Jun 08, 2015 22:15

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.018	J
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.044	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.006	U

No environmental samples were reported from this analytical sequence.

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICB

File: JIF11B Jun 11, 2015 13:30

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.007	J
CALCIUM	4.800	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.049	J
POTASSIUM	5.300	U
SODIUM	7.100	U

SAMPLE: CCB

File: JIF11B Jun 11, 2015 14:00

Analyte	Result	C
ALUMINUM	7.561	J
ANTIMONY	0.015	J
CALCIUM	7.420	J
IRON	6.300	U
MAGNESIUM	8.202	J
MOLYBDENUM	0.235	J
POTASSIUM	7.251	J
SODIUM	11.740	J

SAMPLE: CCB

File: JIF11B Jun 11, 2015 14:40

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.012	J
CALCIUM	4.800	U
IRON	6.300	U
MAGNESIUM	1.710	J
MOLYBDENUM	0.043	J
POTASSIUM	5.300	U
SODIUM	7.353	J

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

No environmental samples were reported from this analytical sequence.

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: JIF11B Jun 11, 2015 15:20

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.006	U
CALCIUM	4.800	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.015	J
POTASSIUM	5.300	U
SODIUM	7.100	U

SAMPLE: CCB

File: JIF11B Jun 11, 2015 16:00

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.006	U
CALCIUM	4.800	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.021	J
POTASSIUM	5.300	U
SODIUM	7.100	U

SAMPLE: CCB

File: JIF11B Jun 11, 2015 16:41

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.006	U
CALCIUM	4.800	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.038	J
POTASSIUM	5.300	U
SODIUM	12.190	J

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

No environmental samples were reported from this analytical sequence.

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: JIF11B Jun 11, 2015 17:22

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.006	U
CALCIUM	4.800	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.015	J
POTASSIUM	5.300	U
SODIUM	7.100	U

SAMPLE: CCB

File: JIF11B Jun 11, 2015 17:53

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.006	U
CALCIUM	-4.827	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.013	J
POTASSIUM	5.300	U
SODIUM	7.100	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Antimony, arsenic, cobalt and thallium reported.

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICB

File: JIF12A Jun 12, 2015 15:50

Analyte	Result	C
ALUMINUM	0.408	J
ANTIMONY	0.019	J
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.009	J
IRON	6.300	U
MAGNESIUM	1.392	J
MOLYBDENUM	0.086	J
POTASSIUM	5.782	J
SODIUM	7.100	U
THALLIUM	0.012	J

SAMPLE: CCB

File: JIF12A Jun 12, 2015 16:19

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.019	J
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.135	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.006	U

SAMPLE: CCB

File: JIF12A Jun 12, 2015 16:58

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.038	J
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.043	J
POTASSIUM	6.096	J
SODIUM	7.100	U
THALLIUM	0.006	U

Antimony, arsenic, cobalt and thallium reported.

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: JIF12A Jun 12, 2015 17:39

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.030	J
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.039	J
POTASSIUM	5.439	J
SODIUM	7.100	U
THALLIUM	0.006	U

SAMPLE: CCB

File: JIF12A Jun 12, 2015 18:19

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.018	J
ARSENIC	0.220	U
CALCIUM	-4.953	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.041	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.006	U

SAMPLE: CCB

File: JIF12A Jun 12, 2015 18:59

Analyte	Result	C
ALUMINUM	1.220	J
ANTIMONY	0.136	B
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.009	U
IRON	8.707	J
MAGNESIUM	1.523	J
MOLYBDENUM	0.046	J
POTASSIUM	5.395	J
SODIUM	7.100	U
THALLIUM	0.006	U

Antimony, arsenic, cobalt and thallium reported.

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: JIF12A Jun 12, 2015 19:41

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.037	J
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.033	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.006	U

SAMPLE: CCB

File: JIF12A Jun 12, 2015 20:22

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.026	J
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.036	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.010	J

Antimony, arsenic, cobalt and thallium reported.

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICB

File: JIF17A Jun 17, 2015 12:59

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.010	J
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.072	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.006	U

SAMPLE: CCB

File: JIF17A Jun 17, 2015 13:28

Analyte	Result	C
ALUMINUM	2.431	J
ANTIMONY	0.024	J
ARSENIC	0.220	U
CALCIUM	4.903	J
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	3.392	J
MOLYBDENUM	0.166	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.008	J

SAMPLE: CCB

File: JIF17A Jun 17, 2015 14:07

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.007	J
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.036	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.006	U

Antimony, arsenic, cobalt and thallium reported.

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: JIF17A Jun 17, 2015 14:47

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.012	J
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.029	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.008	J

SAMPLE: CCB

File: JIF17A Jun 17, 2015 15:27

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.239	B
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.041	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.006	U

SAMPLE: CCB

File: JIF17A Jun 17, 2015 16:08

Analyte	Result	C
ALUMINUM	5.288	J
ANTIMONY	0.038	J
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.009	U
IRON	9.574	J
MAGNESIUM	2.305	J
MOLYBDENUM	0.035	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.006	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Antimony, arsenic, cobalt and thallium reported.

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: JIF17A Jun 17, 2015 16:49

Analyte	Result	C
ALUMINUM	0.445	J
ANTIMONY	0.020	J
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.009	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.031	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.006	U

SAMPLE: CCB

File: JIF17A Jun 17, 2015 17:31

Analyte	Result	C
ALUMINUM	20.490	B
ANTIMONY	0.027	J
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.039	J
IRON	32.000	B
MAGNESIUM	8.541	J
MOLYBDENUM	0.042	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.015	J

SAMPLE: CCB

File: JIF17A Jun 17, 2015 18:12

Analyte	Result	C
ALUMINUM	2.073	J
ANTIMONY	0.015	J
ARSENIC	0.220	U
CALCIUM	4.800	U
COBALT	0.011	J
IRON	8.976	J
MAGNESIUM	1.659	J
MOLYBDENUM	0.033	J
POTASSIUM	5.300	U
SODIUM	7.100	U
THALLIUM	0.009	J

No environmental sample results reported from this sequence.

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICB

File: JIF18A Jun 18, 2015 17:30

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.013	J
CALCIUM	4.800	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.086	J
POTASSIUM	5.300	U
SODIUM	7.100	U

SAMPLE: CCB

File: JIF18A Jun 18, 2015 18:00

Analyte	Result	C
ALUMINUM	1.639	J
ANTIMONY	0.016	J
CALCIUM	4.800	U
IRON	6.300	U
MAGNESIUM	2.820	J
MOLYBDENUM	0.185	J
POTASSIUM	5.300	U
SODIUM	7.100	U

SAMPLE: CCB

File: JIF18A Jun 18, 2015 18:38

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.010	J
CALCIUM	4.800	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.049	J
POTASSIUM	5.300	U
SODIUM	7.350	J

Antimony reported

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICB

File: JIF24C Jun 24, 2015 15:14

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.019	J
CALCIUM	4.800	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.125	J
POTASSIUM	5.300	U
SODIUM	7.100	U

SAMPLE: CCB

File: JIF24C Jun 24, 2015 15:43

Analyte	Result	C
ALUMINUM	27.600	B
ANTIMONY	0.026	J
CALCIUM	27.860	B
IRON	23.110	B
MAGNESIUM	40.120	B
MOLYBDENUM	0.894	B
POTASSIUM	21.610	J
SODIUM	26.790	J

SAMPLE: CCB

File: JIF24C Jun 24, 2015 16:22

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.170	B
CALCIUM	4.800	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.094	J
POTASSIUM	5.300	U
SODIUM	7.100	U

Antimony reported

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: JIF24C Jun 24, 2015 17:02

Analyte	Result	C
ALUMINUM	4.975	J
ANTIMONY	0.021	J
CALCIUM	4.800	U
IRON	7.239	J
MAGNESIUM	2.755	J
MOLYBDENUM	0.066	J
POTASSIUM	5.300	U
SODIUM	7.100	U

Antimony reported

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICB

File: JIF25A Jun 25, 2015 13:28

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.015	J
CALCIUM	4.800	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.115	J
POTASSIUM	5.300	U
SODIUM	7.100	U

SAMPLE: CCB

File: JIF25A Jun 25, 2015 13:57

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.019	J
CALCIUM	9.248	J
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.354	J
POTASSIUM	5.300	U
SODIUM	7.100	U

SAMPLE: CCB

File: JIF25A Jun 25, 2015 14:07

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.021	J
CALCIUM	5.738	J
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.181	J
POTASSIUM	5.300	U
SODIUM	7.100	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: JIF25A Jun 25, 2015 14:14

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.020	J
CALCIUM	5.619	J
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.149	J
POTASSIUM	5.300	U
SODIUM	7.100	U

SAMPLE: CCB

File: JIF25A Jun 25, 2015 14:53

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.020	J
CALCIUM	11.470	J
IRON	6.300	U
MAGNESIUM	2.972	J
MOLYBDENUM	0.075	J
POTASSIUM	5.300	U
SODIUM	7.100	U

SAMPLE: CCB

File: JIF25A Jun 25, 2015 15:33

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.023	J
CALCIUM	10.640	J
IRON	6.300	U
MAGNESIUM	2.445	J
MOLYBDENUM	0.071	J
POTASSIUM	5.300	U
SODIUM	7.100	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Antimony reported

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: JIF25A Jun 25, 2015 16:13

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.017	J
CALCIUM	4.800	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.064	J
POTASSIUM	6.371	J
SODIUM	7.100	U

SAMPLE: CCB

File: JIF25A Jun 25, 2015 16:53

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.018	J
CALCIUM	4.800	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.054	J
POTASSIUM	5.300	U
SODIUM	7.100	U

SAMPLE: CCB

File: JIF25A Jun 25, 2015 17:34

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.013	J
CALCIUM	4.813	J
IRON	6.300	U
MAGNESIUM	2.318	J
MOLYBDENUM	0.054	J
POTASSIUM	5.300	U
SODIUM	9.684	J

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Antimony reported

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: JIF25A Jun 25, 2015 18:15

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.096	J
CALCIUM	4.800	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.057	J
POTASSIUM	5.300	U
SODIUM	7.100	U

SAMPLE: CCB

File: JIF25A Jun 25, 2015 18:57

Analyte	Result	C
ALUMINUM	0.439	J
ANTIMONY	0.027	J
CALCIUM	8.056	J
IRON	6.300	U
MAGNESIUM	4.211	J
MOLYBDENUM	0.052	J
POTASSIUM	5.300	U
SODIUM	7.100	U

SAMPLE: CCB

File: JIF25A Jun 25, 2015 19:38

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.020	J
CALCIUM	4.800	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.063	J
POTASSIUM	5.300	U
SODIUM	7.100	U

3A

INITIAL AND CONTINUING CALIBRATION BLANKS

Antimony reported

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: CCB

File: JIF25A Jun 25, 2015 20:20

Analyte	Result	C
ALUMINUM	0.380	U
ANTIMONY	0.014	J
CALCIUM	4.800	U
IRON	6.300	U
MAGNESIUM	1.200	U
MOLYBDENUM	0.039	J
POTASSIUM	5.300	U
SODIUM	7.100	U

3P

PREPARATION BLANKS

Lab Name: Katahdin Analytical Services **Sample ID:** PBSIF04ICS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF04ICS1

Concentration Units : mg/Kg drywt

Analyte	RESULT	C
ALUMINUM	10	U
BARIUM	0.30	U
BERYLLIUM	0.025	J
CADMIUM	0.30	U
CALCIUM	2.2	J
CHROMIUM	0.086	J
COPPER	1.0	U
IRON	3.1	J
LEAD	0.40	U
MAGNESIUM	8.0	U
MANGANESE	0.27	B
NICKEL	0.083	J
POTASSIUM	6.3	J
SELENIUM	0.70	U
SILVER	0.40	U
SODIUM	50	U
VANADIUM	0.041	J
ZINC	1.0	U

3P

PREPARATION BLANKS

Lab Name: Katahdin Analytical Services **Sample ID:** PBSIF04IMS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF04IMS1

Concentration Units : mg/Kg drywt

Analyte	RESULT	C
ANTIMONY	0.050	U
ARSENIC	0.40	U
COBALT	0.0075	J
THALLIUM	0.040	U

3P

PREPARATION BLANKS

Lab Name: Katahdin Analytical Services **Sample ID:** PBSIF05ICS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF05ICS1

Concentration Units : mg/Kg drywt

Analyte	RESULT	C
ALUMINUM	10	U
BARIUM	0.028	J
BERYLLIUM	0.050	U
CADMIUM	0.30	U
CALCIUM	4.8	J
CHROMIUM	0.40	U
COPPER	1.0	U
IRON	8.0	U
LEAD	0.40	U
MAGNESIUM	0.98	J
MANGANESE	0.40	U
NICKEL	0.40	U
POTASSIUM	50	U
SELENIUM	0.70	U
SILVER	0.40	U
SODIUM	2.0	J
VANADIUM	0.40	U
ZINC	1.0	U

3P

PREPARATION BLANKS

Lab Name: Katahdin Analytical Services **Sample ID:** PBSIF05IMS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF05IMS1

Concentration Units : mg/Kg drywt

Analyte	RESULT	C
ANTIMONY	0.050	U
ARSENIC	0.40	U
COBALT	0.030	U
THALLIUM	0.040	U

3P

PREPARATION BLANKS

Lab Name: Katahdin Analytical Services **Sample ID:** PBSIF09ICS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF09ICS1

Concentration Units : mg/Kg drywt

Analyte	RESULT	C
ALUMINUM	3.1	J
BARIUM	0.067	J
BERYLLIUM	0.050	U
CADMIUM	0.30	U
CALCIUM	6.7	J
CHROMIUM	0.084	J
COPPER	1.0	U
IRON	2.6	J
LEAD	0.40	U
MAGNESIUM	2.5	J
MANGANESE	0.59	B
NICKEL	0.050	J
POTASSIUM	50	U
SELENIUM	0.70	U
SILVER	0.40	U
SODIUM	50	U
VANADIUM	0.40	U
ZINC	1.0	U

3P

PREPARATION BLANKS

Lab Name: Katahdin Analytical Services **Sample ID:** PBSIF09IMS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF09IMS1

Concentration Units : mg/Kg drywt

Analyte	RESULT	C
ANTIMONY	0.050	U
ARSENIC	0.40	U
COBALT	0.030	U
THALLIUM	0.040	U

3P

PREPARATION BLANKS

Lab Name: Katahdin Analytical Services **Sample ID:** PBSIF10HGS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF10HGS1

Concentration Units : mg/Kg drywt

Analyte	RESULT	C
MERCURY	0.017	U

3P

PREPARATION BLANKS

Lab Name: Katahdin Analytical Services **Sample ID:** PBSIF10ICS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF10ICS1

Concentration Units : mg/Kg drywt

Analyte	RESULT	C
ALUMINUM	1.6	J
BARIUM	0.30	U
BERYLLIUM	0.050	U
CADMIUM	0.30	U
CALCIUM	5.9	J
CHROMIUM	0.093	J
COPPER	1.0	U
IRON	2.0	J
LEAD	0.40	U
MAGNESIUM	1.7	J
MANGANESE	0.40	U
NICKEL	0.047	J
POTASSIUM	50	U
SELENIUM	0.70	U
SILVER	0.40	U
SODIUM	2.1	J
VANADIUM	0.40	U
ZINC	1.0	U

3P

PREPARATION BLANKS

Lab Name: Katahdin Analytical Services **Sample ID:** PBSIF10IMS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF10IMS1

Concentration Units : mg/Kg drywt

Analyte	RESULT	C
ANTIMONY	0.035	J
ARSENIC	0.40	U
COBALT	0.0093	J
THALLIUM	0.040	U

3P

PREPARATION BLANKS

Lab Name: Katahdin Analytical Services **Sample ID:** PBSIF11ICS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF11ICS1

Concentration Units : mg/Kg drywt

Analyte	RESULT	C
ALUMINUM	10	U
BARIUM	0.054	J
BERYLLIUM	0.050	U
CADMIUM	0.30	U
CALCIUM	2.7	J
CHROMIUM	0.12	J
COPPER	1.0	U
IRON	4.6	J
LEAD	0.40	U
MAGNESIUM	0.84	J
MANGANESE	0.39	B
NICKEL	0.072	J
POTASSIUM	6.7	J
SELENIUM	0.70	U
SILVER	0.40	U
SODIUM	50	U
VANADIUM	0.40	U
ZINC	1.0	U

3P

PREPARATION BLANKS

Lab Name: Katahdin Analytical Services **Sample ID:** PBSIF11IMS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF11IMS1

Concentration Units : mg/Kg drywt

Analyte	RESULT	C
ANTIMONY	0.050	U
ARSENIC	0.40	U
COBALT	0.016	J
THALLIUM	0.040	U

3P

PREPARATION BLANKS

Lab Name: Katahdin Analytical Services **Sample ID:** PBSIF12HGS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF12HGS1

Concentration Units : mg/Kg drywt

Analyte	RESULT	C
MERCURY	0.017	U

3P

PREPARATION BLANKS

Lab Name: Katahdin Analytical Services **Sample ID:** PBSIF12HGS2

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF12HGS2

Concentration Units : mg/Kg drywt

Analyte	RESULT	C
MERCURY	0.017	U

3P

PREPARATION BLANKS

Lab Name: Katahdin Analytical Services **Sample ID:** PBSIF15HGS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF15HGS1

Concentration Units : mg/Kg drywt

Analyte	RESULT	C
MERCURY	0.017	U

3P

PREPARATION BLANKS

Lab Name: Katahdin Analytical Services **Sample ID:** PBWIF08ICW3

Matrix: WATER **SDG Name:** OU8-1

QC Batch ID: IF08ICW3

Concentration Units : ug/L

Analyte	RESULT	C
ALUMINUM	100	U
BARIUM	0.36	J
BERYLLIUM	0.50	U
CADMIUM	3.0	U
CALCIUM	80	U
CHROMIUM	4.0	U
COPPER	10	U
IRON	80	U
LEAD	4.0	U
MAGNESIUM	13	J
MANGANESE	4.0	U
NICKEL	4.0	U
POTASSIUM	500	U
SELENIUM	7.0	U
SILVER	4.0	U
SODIUM	500	U
VANADIUM	4.0	U
ZINC	10	U

3P

PREPARATION BLANKS

Lab Name: Katahdin Analytical Services **Sample ID:** PBWIF08IMW2

Matrix: WATER **SDG Name:** OU8-1

QC Batch ID: IF08IMW2

Concentration Units : ug/L

Analyte	RESULT	C
ANTIMONY	0.50	U
ARSENIC	4.0	U
COBALT	0.30	U
THALLIUM	0.40	U

3P

PREPARATION BLANKS

Lab Name: Katahdin Analytical Services **Sample ID:** PBWIF12HGW4

Matrix: WATER **SDG Name:** OU8-1

QC Batch ID: IF12HGW4

Concentration Units : ug/L

Analyte	RESULT	C
MERCURY	0.10	U

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICSA

File: IIF09B Jun 09, 2015 19:40

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	490000	98.0
BARIUM	0	0	
BERYLLIUM	0	0	
CADMIUM	0	0	
CALCIUM	500000	463900	92.8
CHROMIUM	0	0	
COPPER	0	1	
IRON	200000	190300	95.2
LEAD	0	0	
MAGNESIUM	500000	434300	86.9
MANGANESE	0	2	
NICKEL	0	-3	
POTASSIUM	0	149	
SELENIUM	0	1	
SILVER	0	0	
SODIUM	0	173	
VANADIUM	0	0	
ZINC	0	1	

SAMPLE: ICSAB

File: IIF09B Jun 09, 2015 19:45

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	482500	96.5
BARIUM	500	508	101.6
BERYLLIUM	500	513	102.6
CADMIUM	1000	940	94.0
CALCIUM	500000	436700	87.3
CHROMIUM	500	491	98.2
COPPER	500	517	103.4
IRON	200000	181100	90.5
LEAD	50	47	94.0
MAGNESIUM	500000	422000	84.4
MANGANESE	500	506	101.2
NICKEL	1000	910	91.0
POTASSIUM	20000	22280	111.4
SELENIUM	50	60	120.0
SILVER	200	214	107.0
SODIUM	20000	21380	106.9
VANADIUM	500	501	100.2
ZINC	1000	944	94.4

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICSA

File: IIF11A Jun 11, 2015 12:52

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	488700	97.7
BARIUM	0	0	
BERYLLIUM	0	0	
CADMIUM	0	-1	
CALCIUM	500000	442900	88.6
CHROMIUM	0	0	
COPPER	0	1	
IRON	200000	184000	92.0
LEAD	0	-3	
MAGNESIUM	500000	431100	86.2
MANGANESE	0	0	
NICKEL	0	2	
POTASSIUM	0	259	
SILVER	0	2	
SODIUM	0	159	
VANADIUM	0	-1	
ZINC	0	2	

SAMPLE: ICSAB

File: IIF11A Jun 11, 2015 12:57

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	463400	92.7
BARIUM	500	492	98.4
BERYLLIUM	500	495	99.0
CADMIUM	1000	910	91.0
CALCIUM	500000	426500	85.3
CHROMIUM	500	471	94.2
COPPER	500	495	99.0
IRON	200000	174000	87.0
LEAD	50	43	86.0
MAGNESIUM	500000	409600	81.9
MANGANESE	500	476	95.2
NICKEL	1000	887	88.7
POTASSIUM	20000	21630	108.1
SILVER	200	207	103.5
SODIUM	20000	20340	101.7
VANADIUM	500	483	96.6
ZINC	1000	911	91.1

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICSA

File: IIF15A Jun 15, 2015 14:35

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	450600	90.1
BARIUM	0	0	
BERYLLIUM	0	0	
CADMIUM	0	-2	
CALCIUM	500000	429000	85.8
CHROMIUM	0	0	
COPPER	0	0	
IRON	200000	169800	84.9
LEAD	0	0	
MAGNESIUM	500000	411900	82.4
MANGANESE	0	-3	
NICKEL	0	2	
POTASSIUM	0	286	
SELENIUM	0	5	
SILVER	0	2	
SODIUM	0	129	
VANADIUM	0	-1	
ZINC	0	1	

SAMPLE: ICSAB

File: IIF15A Jun 15, 2015 14:39

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	449100	89.8
BARIUM	500	480	96.0
BERYLLIUM	500	478	95.6
CADMIUM	1000	923	92.3
CALCIUM	500000	430100	86.0
CHROMIUM	500	481	96.2
COPPER	500	495	99.0
IRON	200000	169800	84.9
LEAD	50	45	90.0
MAGNESIUM	500000	414100	82.8
MANGANESE	500	457	91.4
NICKEL	1000	901	90.1
POTASSIUM	20000	19930	99.7
SELENIUM	50	55	110.0
SILVER	200	206	103.0
SODIUM	20000	18910	94.5
VANADIUM	500	488	97.6
ZINC	1000	909	90.9

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICSA

File: IIF16B Jun 16, 2015 19:00

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	460900	92.2
BARIUM	0	0	
BERYLLIUM	0	0	
CADMIUM	0	0	
CALCIUM	500000	441000	88.2
CHROMIUM	0	0	
COPPER	0	2	
IRON	200000	179900	90.0
LEAD	0	3	
MAGNESIUM	500000	422200	84.4
NICKEL	0	2	
POTASSIUM	0	370	
SILVER	0	1	
SODIUM	0	115	
VANADIUM	0	-1	
ZINC	0	2	

SAMPLE: ICSAB

File: IIF16B Jun 16, 2015 19:04

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	452500	90.5
BARIUM	500	484	96.8
BERYLLIUM	500	507	101.4
CADMIUM	1000	946	94.6
CALCIUM	500000	438100	87.6
CHROMIUM	500	492	98.4
COPPER	500	513	102.6
IRON	200000	177200	88.6
LEAD	50	50	100.0
MAGNESIUM	500000	419100	83.8
NICKEL	1000	919	91.9
POTASSIUM	20000	20930	104.7
SILVER	200	210	105.0
SODIUM	20000	19090	95.5
VANADIUM	500	493	98.6
ZINC	1000	919	91.9

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICSA

File: IIF18B Jun 18, 2015 14:18

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	448400	89.7
BARIUM	0	0	
BERYLLIUM	0	0	
CADMIUM	0	1	
CALCIUM	500000	428500	85.7
CHROMIUM	0	0	
COPPER	0	-1	
IRON	200000	168900	84.5
LEAD	0	0	
MAGNESIUM	500000	417900	83.6
NICKEL	0	0	
POTASSIUM	0	329	
SELENIUM	0	1	
SILVER	0	0	
SODIUM	0	182	
VANADIUM	0	-2	
ZINC	0	1	

SAMPLE: ICSAB

File: IIF18B Jun 18, 2015 14:23

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	443500	88.7
BARIUM	500	477	95.4
BERYLLIUM	500	471	94.2
CADMIUM	1000	932	93.2
CALCIUM	500000	424500	84.9
CHROMIUM	500	484	96.8
COPPER	500	501	100.2
IRON	200000	167200	83.6
LEAD	50	48	96.0
MAGNESIUM	500000	419400	83.9
NICKEL	1000	903	90.3
POTASSIUM	20000	19690	98.5
SELENIUM	50	54	108.0
SILVER	200	209	104.5
SODIUM	20000	18910	94.5
VANADIUM	500	495	99.0
ZINC	1000	921	92.1

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICSA

File: IIF18C Jun 18, 2015 20:37

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	459300	91.9
BARIUM	0	-1	
BERYLLIUM	0	0	
CADMIUM	0	0	
CALCIUM	500000	436700	87.3
CHROMIUM	0	0	
COPPER	0	0	
IRON	200000	171700	85.9
LEAD	0	-2	
MAGNESIUM	500000	417100	83.4
MANGANESE	0	0	
NICKEL	0	0	
POTASSIUM	0	390	
SELENIUM	0	5	
SILVER	0	0	
SODIUM	0	131	
VANADIUM	0	-1	
ZINC	0	0	

SAMPLE: ICSAB

File: IIF18C Jun 18, 2015 20:42

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	459000	91.8
BARIUM	500	497	99.4
BERYLLIUM	500	492	98.4
CADMIUM	1000	940	94.0
CALCIUM	500000	438000	87.6
CHROMIUM	500	477	95.4
COPPER	500	491	98.2
IRON	200000	172600	86.3
LEAD	50	44	88.0
MAGNESIUM	500000	418200	83.6
MANGANESE	500	471	94.2
NICKEL	1000	909	90.9
POTASSIUM	20000	20310	101.6
SELENIUM	50	47	94.0
SILVER	200	207	103.5
SODIUM	20000	19390	97.0
VANADIUM	500	487	97.4
ZINC	1000	927	92.7

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICSA

File: IIF19A Jun 19, 2015 10:17

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	447500	89.5
BARIUM	0	-1	
BERYLLIUM	0	0	
CADMIUM	0	0	
CALCIUM	500000	430500	86.1
CHROMIUM	0	0	
COPPER	0	0	
IRON	200000	168400	84.2
LEAD	0	-1	
MAGNESIUM	500000	427500	85.5
NICKEL	0	0	
POTASSIUM	0	380	
SELENIUM	0	-1	
SILVER	0	0	
SODIUM	0	50	
VANADIUM	0	-1	
ZINC	0	0	

SAMPLE: ICSAB

File: IIF19A Jun 19, 2015 10:22

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	446600	89.3
BARIUM	500	479	95.8
BERYLLIUM	500	483	96.6
CADMIUM	1000	926	92.6
CALCIUM	500000	431300	86.3
CHROMIUM	500	465	93.0
COPPER	500	482	96.4
IRON	200000	169600	84.8
LEAD	50	45	90.0
MAGNESIUM	500000	425500	85.1
NICKEL	1000	904	90.4
POTASSIUM	20000	19690	98.5
SELENIUM	50	52	104.0
SILVER	200	201	100.5
SODIUM	20000	18930	94.7
VANADIUM	500	478	95.6
ZINC	1000	913	91.3

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICSA

File: IIF22A Jun 22, 2015 13:39

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	494700	98.9
BARIUM	0	0	
BERYLLIUM	0	0	
CADMIUM	0	0	
CALCIUM	500000	467900	93.6
CHROMIUM	0	0	
COPPER	0	-1	
IRON	200000	187800	93.9
LEAD	0	-1	
MAGNESIUM	500000	462100	92.4
MANGANESE	0	-1	
NICKEL	0	0	
POTASSIUM	0	258	
SELENIUM	0	3	
SILVER	0	1	
SODIUM	0	71	
VANADIUM	0	0	
ZINC	0	1	

SAMPLE: ICSAB

File: IIF22A Jun 22, 2015 13:44

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	489700	97.9
BARIUM	500	498	99.6
BERYLLIUM	500	504	100.8
CADMIUM	1000	955	95.5
CALCIUM	500000	456700	91.3
CHROMIUM	500	485	97.0
COPPER	500	523	104.6
IRON	200000	187600	93.8
LEAD	50	46	92.0
MAGNESIUM	500000	462400	92.5
MANGANESE	500	488	97.6
NICKEL	1000	939	93.9
POTASSIUM	20000	21570	107.8
SELENIUM	50	48	96.0
SILVER	200	220	110.0
SODIUM	20000	20340	101.7
VANADIUM	500	502	100.4
ZINC	1000	945	94.5

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICSA

File: IIF22B Jun 22, 2015 19:38

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	508100	101.6
BARIUM	0	-1	
BERYLLIUM	0	0	
CADMIUM	0	-1	
CALCIUM	500000	475800	95.2
CHROMIUM	0	0	
COPPER	0	1	
IRON	200000	190800	95.4
LEAD	0	-1	
MAGNESIUM	500000	482700	96.5
MANGANESE	0	-1	
NICKEL	0	0	
POTASSIUM	0	196	
SELENIUM	0	1	
SILVER	0	0	
SODIUM	0	131	
VANADIUM	0	0	
ZINC	0	0	

SAMPLE: ICSAB

File: IIF22B Jun 22, 2015 19:43

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	509300	101.9
BARIUM	500	533	106.6
BERYLLIUM	500	528	105.6
CADMIUM	1000	982	98.2
CALCIUM	500000	488200	97.6
CHROMIUM	500	518	103.6
COPPER	500	552	110.4
IRON	200000	197300	98.7
LEAD	50	50	100.0
MAGNESIUM	500000	486500	97.3
MANGANESE	500	513	102.6
NICKEL	1000	959	95.9
POTASSIUM	20000	22870	114.3
SELENIUM	50	56	112.0
SILVER	200	229	114.5
SODIUM	20000	21840	109.2
VANADIUM	500	523	104.6
ZINC	1000	962	96.2

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICSA

File: IIF24A Jun 24, 2015 11:02

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	490400	98.1
BARIUM	0	0	
BERYLLIUM	0	0	
CADMIUM	0	1	
CALCIUM	500000	463000	92.6
CHROMIUM	0	0	
COPPER	0	-1	
IRON	200000	189700	94.8
LEAD	0	-1	
MAGNESIUM	500000	470900	94.2
MANGANESE	0	-2	
NICKEL	0	0	
POTASSIUM	0	403	
SELENIUM	0	6	
SILVER	0	2	
SODIUM	0	141	
VANADIUM	0	-1	
ZINC	0	1	

SAMPLE: ICSAB

File: IIF24A Jun 24, 2015 11:07

Analyte	TRUE	FOUND	% R
ALUMINUM	500000	501300	100.3
BARIUM	500	516	103.2
BERYLLIUM	500	532	106.4
CADMIUM	1000	978	97.8
CALCIUM	500000	485500	97.1
CHROMIUM	500	507	101.4
COPPER	500	527	105.4
IRON	200000	195500	97.8
LEAD	50	50	100.0
MAGNESIUM	500000	469800	94.0
MANGANESE	500	500	100.0
NICKEL	1000	952	95.2
POTASSIUM	20000	21990	109.9
SELENIUM	50	54	108.0
SILVER	200	219	109.5
SODIUM	20000	20990	105.0
VANADIUM	500	513	102.6
ZINC	1000	951	95.1

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICSA

File: JIF08A Jun 08, 2015 16:34

Analyte	TRUE	FOUND	% R
ALUMINUM	100000	91380	91.4
ANTIMONY	0	0	
ARSENIC	0	0	
CALCIUM	100000	89410	89.4
COBALT	0	0	
IRON	100000	89200	89.2
MAGNESIUM	100000	89980	90.0
MOLYBDENUM	2000	1921	96.0
POTASSIUM	100000	94030	94.0
SODIUM	100000	92110	92.1
THALLIUM	0	0	

SAMPLE: ICSAB

File: JIF08A Jun 08, 2015 16:38

Analyte	TRUE	FOUND	% R
ALUMINUM	100000	91040	91.0
ANTIMONY	20	19	95.0
ARSENIC	20	20	100.0
CALCIUM	100000	89920	89.9
COBALT	20	19	95.0
IRON	100000	90680	90.7
MAGNESIUM	100000	90770	90.8
MOLYBDENUM	2000	1962	98.1
POTASSIUM	100000	94500	94.5
SODIUM	100000	92730	92.7
THALLIUM	20	20	100.0

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICSA

File: JIF11B Jun 11, 2015 13:46

Analyte	TRUE	FOUND	% R
ALUMINUM	100000	91540	91.5
ANTIMONY	0	0	
CALCIUM	100000	90270	90.3
IRON	100000	89170	89.2
MAGNESIUM	100000	91440	91.4
MOLYBDENUM	2000	1910	95.5
POTASSIUM	100000	91700	91.7
SODIUM	100000	93350	93.3

SAMPLE: ICSAB

File: JIF11B Jun 11, 2015 13:50

Analyte	TRUE	FOUND	% R
ALUMINUM	100000	90660	90.7
ANTIMONY	20	19	95.0
CALCIUM	100000	89840	89.8
IRON	100000	88610	88.6
MAGNESIUM	100000	91000	91.0
MOLYBDENUM	2000	1946	97.3
POTASSIUM	100000	90930	90.9
SODIUM	100000	92100	92.1

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICSA

File: JIF12A Jun 12, 2015 16:06

Analyte	TRUE	FOUND	% R
ALUMINUM	100000	91930	91.9
ANTIMONY	0	0	
ARSENIC	0	0	
CALCIUM	100000	90800	90.8
COBALT	0	0	
IRON	100000	88460	88.5
MAGNESIUM	100000	91270	91.3
MOLYBDENUM	2000	1901	95.0
POTASSIUM	100000	91520	91.5
SODIUM	100000	91960	92.0
THALLIUM	0	0	

SAMPLE: ICSAB

File: JIF12A Jun 12, 2015 16:09

Analyte	TRUE	FOUND	% R
ALUMINUM	100000	89380	89.4
ANTIMONY	20	19	95.0
ARSENIC	20	20	100.0
CALCIUM	100000	89700	89.7
COBALT	20	19	95.0
IRON	100000	88950	88.9
MAGNESIUM	100000	88920	88.9
MOLYBDENUM	2000	1914	95.7
POTASSIUM	100000	91280	91.3
SODIUM	100000	89070	89.1
THALLIUM	20	20	100.0

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICSA

File: JIF17A Jun 17, 2015 13:14

Analyte	TRUE	FOUND	% R
ALUMINUM	100000	91520	91.5
ANTIMONY	0	0	
ARSENIC	0	0	
CALCIUM	100000	90750	90.8
COBALT	0	0	
IRON	100000	89110	89.1
MAGNESIUM	100000	91490	91.5
MOLYBDENUM	2000	1911	95.5
POTASSIUM	100000	92330	92.3
SODIUM	100000	92930	92.9
THALLIUM	0	0	

SAMPLE: ICSAB

File: JIF17A Jun 17, 2015 13:18

Analyte	TRUE	FOUND	% R
ALUMINUM	100000	90550	90.5
ANTIMONY	20	19	95.0
ARSENIC	20	20	100.0
CALCIUM	100000	90720	90.7
COBALT	20	19	95.0
IRON	100000	88370	88.4
MAGNESIUM	100000	90990	91.0
MOLYBDENUM	2000	1909	95.5
POTASSIUM	100000	91220	91.2
SODIUM	100000	92650	92.7
THALLIUM	20	20	100.0

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICSA

File: JIF18A Jun 18, 2015 17:46

Analyte	TRUE	FOUND	% R
ALUMINUM	100000	91030	91.0
ANTIMONY	0	0	
CALCIUM	100000	89990	90.0
IRON	100000	87380	87.4
MAGNESIUM	100000	91350	91.3
MOLYBDENUM	2000	1905	95.3
POTASSIUM	100000	92060	92.1
SODIUM	100000	92910	92.9

SAMPLE: ICSAB

File: JIF18A Jun 18, 2015 17:50

Analyte	TRUE	FOUND	% R
ALUMINUM	100000	90170	90.2
ANTIMONY	20	19	95.0
CALCIUM	100000	89400	89.4
IRON	100000	86510	86.5
MAGNESIUM	100000	90940	90.9
MOLYBDENUM	2000	1895	94.8
POTASSIUM	100000	91590	91.6
SODIUM	100000	92460	92.5

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICSA

File: JIF24C Jun 24, 2015 15:30

Analyte	TRUE	FOUND	% R
ALUMINUM	100000	90430	90.4
ANTIMONY	0	0	
CALCIUM	100000	90560	90.6
IRON	100000	88350	88.3
MAGNESIUM	100000	89830	89.8
MOLYBDENUM	2000	1914	95.7
POTASSIUM	100000	93870	93.9
SODIUM	100000	91920	91.9

SAMPLE: ICSAB

File: JIF24C Jun 24, 2015 15:33

Analyte	TRUE	FOUND	% R
ALUMINUM	100000	88650	88.6
ANTIMONY	20	19	95.0
CALCIUM	100000	88500	88.5
IRON	100000	88790	88.8
MAGNESIUM	100000	88570	88.6
MOLYBDENUM	2000	1943	97.2
POTASSIUM	100000	91330	91.3
SODIUM	100000	89370	89.4

ICP INTERFERENCE CHECK SAMPLE

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Concentration Units: ug/L

SAMPLE: ICSA

File: JIF25A Jun 25, 2015 13:44

Analyte	TRUE	FOUND	% R
ALUMINUM	100000	90930	90.9
ANTIMONY	0	0	
CALCIUM	100000	91380	91.4
IRON	100000	89630	89.6
MAGNESIUM	100000	91430	91.4
MOLYBDENUM	2000	1915	95.8
POTASSIUM	100000	93280	93.3
SODIUM	100000	94100	94.1

SAMPLE: ICSAB

File: JIF25A Jun 25, 2015 13:47

Analyte	TRUE	FOUND	% R
ALUMINUM	100000	89830	89.8
ANTIMONY	20	19	95.0
CALCIUM	100000	90110	90.1
IRON	100000	87870	87.9
MAGNESIUM	100000	89250	89.3
MOLYBDENUM	2000	1922	96.1
POTASSIUM	100000	92960	93.0
SODIUM	100000	91300	91.3

Sample was diluted 5X for analysis except for mercury.

5A

SPIKE SAMPLE RECOVERY

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-11-0002S

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 92.3 **Lab Sample ID:** SI3772-001S

Concentration Units : mg/Kg drywt

Analyte	Spiked Sample Result	C	Sample Result	C	Spike Added	%R	Q	Control Limits (%R) Low	High	M
ALUMINUM, TOTAL	11300		9840		128.27	1133.6	N	80	120	P
ANTIMONY, TOTAL	2.35		0.913		6.41	22.4	N	80	120	MS
ARSENIC, TOTAL	19.2		13.6		6.41	88.2		80	120	MS
BARIUM, TOTAL	184		64.2		128.27	93.1		80	120	P
BERYLLIUM, TOTAL	4.20		0.568	J	3.21	113.3		80	120	P
CADMIUM, TOTAL	16.9		0.803	J	16.03	100.5		80	120	P
CALCIUM, TOTAL	11600		6030		160.34	3491.1	N	80	120	P
CHROMIUM, TOTAL	249		234		12.83	115.2		80	120	P
COBALT, TOTAL	45.0		12.7		32.07	100.9		80	120	MS
COPPER, TOTAL	349		232		16.03	729.6	N	80	120	P
IRON, TOTAL	50300		48200		64.13	3265.4	N	80	120	P
LEAD, TOTAL	227		216		6.41	166.2	N	80	120	P
MAGNESIUM, TOTAL	10600		6970		320.67	1138.4	N	80	120	P
MANGANESE, TOTAL	537		672		32.07	-422.2	N	80	120	P
MERCURY, TOTAL	0.831		0.602		0.16	143.2	N	80	120	CV
NICKEL, TOTAL	363		260		32.07	322.0	N	80	120	P
POTASSIUM, TOTAL	3560		1370		641.34	341.0	N	80	120	P
SELENIUM, TOTAL	4.8		2.2	U	6.41	75.1	N	80	120	P
SILVER, TOTAL	3.79		1.3	U	3.21	118.1		80	120	P
SODIUM, TOTAL	681		134	J	481.01	113.7		80	120	P
THALLIUM, TOTAL	5.97		0.115		6.41	91.4		80	120	MS
VANADIUM, TOTAL	73.4		32.3		32.07	128.1	N	80	120	P
ZINC, TOTAL	588		585		32.07	8.9	N	80	120	P

Comments:

5A

SPIKE SAMPLE RECOVERY

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-24-069.7S

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 86.1 **Lab Sample ID:** SI3897-004P

Concentration Units : mg/Kg drywt

Analyte	Spiked Sample Result	C	Sample Result	C	Spike Added	%R	Q	Control Limits (%R) Low	High	M
ALUMINUM, TOTAL	6300		6260		193.56	22.8	N	80	120	P
ANTIMONY, TOTAL	4.99		0.041	J	9.68	51.1	N	80	120	MS
ARSENIC, TOTAL	21.3		12.8		9.68	88.2		80	120	MS
BARIUM, TOTAL	193		14.1		193.56	92.5		80	120	P
BERYLLIUM, TOTAL	5.00		0.278	J	4.84	97.5		80	120	P
CADMIUM, TOTAL	22.6		0.059	J	24.19	93.0		80	120	P
CALCIUM, TOTAL	902		652		241.95	103.6		80	120	P
CHROMIUM, TOTAL	35.9		15.8		19.36	104.0		80	120	P
COBALT, TOTAL	55.9		5.27		48.39	104.7		80	120	MS
COPPER, TOTAL	40.9		15.2		24.19	106.4		80	120	P
IRON, TOTAL	9670		10300		96.78	-649.8	N	80	120	P
LEAD, TOTAL	29.7		21.2		9.68	87.4		80	120	P
MAGNESIUM, TOTAL	3560		2910		483.89	135.0	N	80	120	P
MANGANESE, TOTAL	224		157		48.39	137.7	N	80	120	P
MERCURY, TOTAL	0.157		0.014	U	0.14	111.9		80	120	CV
NICKEL, TOTAL	61.3		16.5		48.39	92.6		80	120	P
POTASSIUM, TOTAL	2160		1000		967.79	119.7		80	120	P
SELENIUM, TOTAL	9.56		0.68	U	9.68	98.8		80	120	P
SILVER, TOTAL	4.50		0.063	J	4.84	91.7		80	120	P
SODIUM, TOTAL	1570		865		725.84	97.4		80	120	P
THALLIUM, TOTAL	9.68		0.078	J	9.68	99.2		80	120	MS
VANADIUM, TOTAL	62.8		12.8		48.39	103.3		80	120	P
ZINC, TOTAL	75.9		30.6		48.39	93.6		80	120	P

Comments:

5A

SPIKE SAMPLE RECOVERY

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-24-069.7S

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 86.1 **Lab Sample ID:** SI3897-004S

Concentration Units : mg/Kg drywt

Analyte	Spiked Sample Result	C	Sample Result	C	Spike Added	%R	Q	Control Limits (%R) Low	High	M
ALUMINUM, TOTAL	7160		6260		191.96	471.9	N	80	120	P
ANTIMONY, TOTAL	4.74		0.041	J	9.6	49.0	N	80	120	MS
ARSENIC, TOTAL	21.0		12.8		9.6	85.8		80	120	MS
BARIUM, TOTAL	189		14.1		191.96	91.4		80	120	P
BERYLLIUM, TOTAL	4.96		0.278	J	4.8	97.6		80	120	P
CADMIUM, TOTAL	22.4		0.059	J	23.99	93.0		80	120	P
CALCIUM, TOTAL	1010		652		239.95	150.7	N	80	120	P
CHROMIUM, TOTAL	39.6		15.8		19.2	124.0	N	80	120	P
COBALT, TOTAL	54.5		5.27		47.99	102.6		80	120	MS
COPPER, TOTAL	39.0		15.2		23.99	99.2		80	120	P
IRON, TOTAL	11400		10300		95.98	1128.5	N	80	120	P
LEAD, TOTAL	32.2		21.2		9.6	115.1		80	120	P
MAGNESIUM, TOTAL	4660		2910		479.89	363.8	N	80	120	P
MANGANESE, TOTAL	239		157		47.99	171.2	N	80	120	P
MERCURY, TOTAL	0.150		0.014	U	0.14	106.9		80	120	CV
NICKEL, TOTAL	62.4		16.5		47.99	95.8		80	120	P
POTASSIUM, TOTAL	2220		1000		959.79	127.5	N	80	120	P
SELENIUM, TOTAL	9.41		0.68	U	9.6	98.0		80	120	P
SILVER, TOTAL	4.46		0.063	J	4.8	91.6		80	120	P
SODIUM, TOTAL	1540		865		719.84	94.0		80	120	P
THALLIUM, TOTAL	9.52		0.078	J	9.6	98.4		80	120	MS
VANADIUM, TOTAL	61.6		12.8		47.99	101.6		80	120	P
ZINC, TOTAL	76.7		30.6		47.99	96.1		80	120	P

Comments:

Sb, As, Co, Tl analzyed at a 5X dilution.

5A

SPIKE SAMPLE RECOVERY

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-16-0002S

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 88.7 **Lab Sample ID:** SI3897-025P

Concentration Units : mg/Kg drywt

Analyte	Spiked Sample Result	C	Sample Result	C	Spike Added	%R	Q	Control Limits (%R) Low	High	M
ALUMINUM, TOTAL	14800		14700		225.47	30.3	N	4X 80	120	P
ANTIMONY, TOTAL	3.29		0.356		11.27	26.0	N	80	120	MS
ARSENIC, TOTAL	24.0		12.3		11.27	103.7		80	120	MS
BARIUM, TOTAL	279		83.4		225.47	86.7		80	120	P
BERYLLIUM, TOTAL	5.78		0.729		5.64	89.6		80	120	P
CADMIUM, TOTAL	25.7		0.371	J	28.18	89.9		80	120	P
CALCIUM, TOTAL	3950		3450		281.84	177.9	N	4X 80	120	P
CHROMIUM, TOTAL	72.5		46.6		22.55	115.0		80	120	P
COBALT, TOTAL	65.6		9.43		56.37	99.7		80	120	MS
COPPER, TOTAL	254		310		28.18	-200.0	N	4X 80	120	P
IRON, TOTAL	21400		21000		112.73	312.2	N	4X 80	120	P
LEAD, TOTAL	199		178		11.27	188.1	N	4X 80	120	P
MAGNESIUM, TOTAL	7660		6370		563.67	228.3	N	4X 80	120	P
MANGANESE, TOTAL	383		345		56.37	67.5	N	4X 80	120	P
MERCURY, TOTAL	0.470		0.242		0.17	133.9	N	80	120	CV
NICKEL, TOTAL	93.8		43.6		56.37	89.0		80	120	P
POTASSIUM, TOTAL	4000		3050		1127.34	83.9		80	120	P
SELENIUM, TOTAL	10.7		0.78	U	11.27	95.3		80	120	P
SILVER, TOTAL	5.21		0.45	U	5.64	92.4		80	120	P
SODIUM, TOTAL	916		160		845.51	89.4		80	120	P
THALLIUM, TOTAL	10.8		0.204		11.27	94.1		80	120	MS
VANADIUM, TOTAL	85.8		31.6		56.37	96.1		80	120	P
ZINC, TOTAL	184		143		56.37	73.1	N	80	120	P

Comments:

5A

SPIKE SAMPLE RECOVERY

Sb, As, Co, Tl analzyed at a 5X dilution.

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-16-0002S

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 88.7 **Lab Sample ID:** SI3897-025S

Concentration Units : mg/Kg drywt

Analyte	Spiked Sample Result	C	Sample Result	C	Spike Added	%R	Q	Control Limits (%R) Low	High	M
ALUMINUM, TOTAL	17600		14700		221.05	1334.8	N	4X 80	120	P
ANTIMONY, TOTAL	3.50		0.356		11.05	28.4	N	80	120	MS
ARSENIC, TOTAL	22.4		12.3		11.05	91.4		80	120	MS
BARIUM, TOTAL	282		83.4		221.05	90.0		80	120	P
BERYLLIUM, TOTAL	5.87		0.729		5.53	93.0		80	120	P
CADMIUM, TOTAL	26.2		0.371	J	27.63	93.3		4X 80	120	P
CALCIUM, TOTAL	4310		3450		276.31	313.0	N	80	120	P
CHROMIUM, TOTAL	91.2		46.6		22.1	202.0	N	80	120	P
COBALT, TOTAL	69.6		9.43		55.26	108.9		80	120	MS
COPPER, TOTAL	222		310		27.63	-316.3	N	4X 80	120	P
IRON, TOTAL	32100		21000		110.52	10010.0	N	4X 80	120	P
LEAD, TOTAL	193		178		11.05	134.5	N	4X 80	120	P
MAGNESIUM, TOTAL	9270		6370		552.62	525.5	N	4X 80	120	P
MANGANESE, TOTAL	567		345		55.26	401.3	N	4X 80	120	P
MERCURY, TOTAL	0.405		0.242		0.17	95.9		80	120	CV
NICKEL, TOTAL	114		43.6		55.26	127.1	N	80	120	P
POTASSIUM, TOTAL	3520		3050		1105.24	42.7	N	80	120	P
SELENIUM, TOTAL	9.98		0.78	U	11.05	90.3		80	120	P
SILVER, TOTAL	5.40		0.45	U	5.53	97.7		80	120	P
SODIUM, TOTAL	933		160		828.93	93.2		80	120	P
THALLIUM, TOTAL	10.3		0.204		11.05	91.3		80	120	MS
VANADIUM, TOTAL	93.9		31.6		55.26	112.7		80	120	P
ZINC, TOTAL	196		143		55.26	95.6		80	120	P

Comments:

5A

SPIKE SAMPLE RECOVERY

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-20-0206S

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 84.5 **Lab Sample ID:** SI3897-033P

Concentration Units : mg/Kg drywt

Analyte	Spiked Sample Result	C	Sample Result	C	Spike Added	%R	Q		Control Limits (%R) Low	High	M
ALUMINUM, TOTAL	13800		12300		215.19	704.2	N	4X	80	120	P
ANTIMONY, TOTAL	2.84		0.937		10.76	17.7	N		80	120	MS
ARSENIC, TOTAL	19.1		11.1		10.76	74.5	N		80	120	MS
BARIUM, TOTAL	286		72.7		215.19	99.0			80	120	P
BERYLLIUM, TOTAL	5.85		0.640		5.38	96.8			80	120	P
CADMIUM, TOTAL	25.0		0.158	J	26.9	92.2			80	120	P
CALCIUM, TOTAL	2990		2380		268.99	228.0	N	4X	80	120	P
CHROMIUM, TOTAL	54.4		38.5		21.52	73.8	N		80	120	P
COBALT, TOTAL	63.0		8.48		53.8	101.4			80	120	MS
COPPER, TOTAL	99.8		64.2		26.9	132.4	N		80	120	P
IRON, TOTAL	17700		16500		107.6	1084.8	N	4X	80	120	P
LEAD, TOTAL	120		85.9		10.76	321.6	N	4X	80	120	P
MAGNESIUM, TOTAL	5330		5110		537.98	40.8	N	4X	80	120	P
MANGANESE, TOTAL	328		313		53.8	27.8	N	4X	80	120	P
MERCURY, TOTAL	0.268		0.0707		0.16	123.1	N		80	120	CV
NICKEL, TOTAL	75.4		30.3		53.8	83.9			80	120	P
POTASSIUM, TOTAL	2700		2020		1075.96	63.3	N		80	120	P
SELENIUM, TOTAL	10.0		0.45	J	10.76	88.9			80	120	P
SILVER, TOTAL	4.99		0.43	U	5.38	92.8			80	120	P
SODIUM, TOTAL	1280		450		806.97	103.2			80	120	P
THALLIUM, TOTAL	10.1		0.161		10.76	92.0			80	120	MS
VANADIUM, TOTAL	78.0		26.9		53.8	95.0			80	120	P
ZINC, TOTAL	131		90.2		53.8	76.7	N		80	120	P

Comments:

5A

SPIKE SAMPLE RECOVERY

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-20-0206S

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 84.5 **Lab Sample ID:** SI3897-033S

Concentration Units : mg/Kg drywt

Analyte	Spiked Sample Result	C	Sample Result	C	Spike Added	%R	Q	Control Limits (%R) Low	High	M
ALUMINUM, TOTAL	13300		12300		217.17	451.1	N	4X 80	120	P
ANTIMONY, TOTAL	2.50		0.937		10.86	14.4	N	80	120	MS
ARSENIC, TOTAL	19.7		11.1		10.86	79.0	N	80	120	MS
BARIUM, TOTAL	276		72.7		217.17	93.6		80	120	P
BERYLLIUM, TOTAL	5.80		0.640		5.43	95.0		80	120	P
CADMIUM, TOTAL	25.0		0.158	J	27.15	91.5		80	120	P
CALCIUM, TOTAL	2700		2380		271.46	118.1		80	120	P
CHROMIUM, TOTAL	58.0		38.5		21.72	89.6		80	120	P
COBALT, TOTAL	62.4		8.48		54.29	99.4		80	120	MS
COPPER, TOTAL	109		64.2		27.15	166.7	N	80	120	P
IRON, TOTAL	19200		16500		108.58	2444.4	N	4X 80	120	P
LEAD, TOTAL	95.9		85.9		10.86	92.4		80	120	P
MAGNESIUM, TOTAL	5590		5110		542.92	88.6		80	120	P
MANGANESE, TOTAL	349		313		54.29	65.7	N	4X 80	120	P
MERCURY, TOTAL	0.247		0.0707		0.16	110.4		80	120	CV
NICKEL, TOTAL	75.7		30.3		54.29	83.6		80	120	P
POTASSIUM, TOTAL	2540		2020		1085.83	48.0	N	80	120	P
SELENIUM, TOTAL	10.4		0.45	J	10.86	91.6		80	120	P
SILVER, TOTAL	4.77		0.43	U	5.43	87.9		80	120	P
SODIUM, TOTAL	1240		450		814.37	97.4		80	120	P
THALLIUM, TOTAL	9.90		0.161		10.86	89.7		80	120	MS
VANADIUM, TOTAL	82.3		26.9		54.29	102.0		80	120	P
ZINC, TOTAL	135		90.2		54.29	82.5		80	120	P

Comments:

5A

SPIKE SAMPLE RECOVERY

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-RB01-060415S

Matrix: WATER **SDG Name:** OU8-1

Percent Solids: 0.00 **Lab Sample ID:** SI3897-038S

Concentration Units : ug/L

Analyte	Spiked Sample Result	C	Sample Result	C	Spike Added	%R	Q	Control Limits (%R) Low	High	M
ALUMINUM, TOTAL	1920		100	U	2000	95.9		80	120	P
ANTIMONY, TOTAL	96.7		0.15	J	100	96.5		80	120	MS
ARSENIC, TOTAL	98.8		4.0	U	100	98.8		80	120	MS
BARIUM, TOTAL	1980		0.61	J	2000	98.8		80	120	P
BERYLLIUM, TOTAL	48.5		0.50	U	50	97.0		80	120	P
CADMIUM, TOTAL	252		0.069	J	250	101.0		80	120	P
CALCIUM, TOTAL	2410		73	J	2500	93.6		80	120	P
CHROMIUM, TOTAL	213		4.0	U	200	106.3		80	120	P
COBALT, TOTAL	541		0.30	U	500	108.2		80	120	MS
COPPER, TOTAL	270		10	U	250	107.9		80	120	P
IRON, TOTAL	1050		32	J	1000	102.0		80	120	P
LEAD, TOTAL	104		4.0	U	100	104.1		80	120	P
MAGNESIUM, TOTAL	5130		22	J	5000	102.1		80	120	P
MANGANESE, TOTAL	519		4.0	U	500	103.7		80	120	P
NICKEL, TOTAL	512		4.0	U	500	102.4		80	120	P
POTASSIUM, TOTAL	10200		500	U	10000	101.7		80	120	P
SELENIUM, TOTAL	98.0		7.0	U	100	98.0		80	120	P
SILVER, TOTAL	50.7		4.0	U	50	101.5		80	120	P
SODIUM, TOTAL	7240		120	J	7500	95.0		80	120	P
THALLIUM, TOTAL	99.8		0.40	U	100	99.8		80	120	MS
VANADIUM, TOTAL	502		0.33	J	500	100.4		80	120	P
ZINC, TOTAL	482		1.3	J	500	96.1		80	120	P

Comments:

5B

POST DIGEST SPIKE SAMPLE RECOVERY

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-11-0002S

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 92.3 **Lab Sample ID:** SI3772-001A

Concentration Units : ug/L

Analyte	Spiked Sample Result	C	Sample Result	C	Spike Added	%R	Q	Control Limits (%R) Low	High	M
ALUMINUM, TOTAL	32200		30700		1100	138.2	A	75	125	P
ANTIMONY, TOTAL	4.79		2.85		2	97.1		75	125	MS
ARSENIC, TOTAL	51.6		42.5		10	91.3		75	125	MS
BARIUM, TOTAL	299		200		100	98.8		75	125	P
BERYLLIUM, TOTAL	104		1.77	J	100	102.2		75	125	P
CADMIUM, TOTAL	102		2.50	J	100	99.5		75	125	P
CALCIUM, TOTAL	19800		18800		1100	90.9		75	125	P
CHROMIUM, TOTAL	821		729		100	92.2		75	125	P
COBALT, TOTAL	41.1		39.6		2	76.0		75	125	MS
COPPER, TOTAL	810		722		100	88.0		75	125	P
IRON, TOTAL	152000		150000		1100	147.3	A	75	125	P
LEAD, TOTAL	826		673		100	153.0	A	75	125	P
MAGNESIUM, TOTAL	22600		21700		1100	78.2		75	125	P
MANGANESE, TOTAL	2210		2100		100	114.0		75	125	P
MERCURY, TOTAL	4.60		3.72		1	87.8		75	125	CV
NICKEL, TOTAL	974		810		100	164.0	A	75	125	P
POTASSIUM, TOTAL	8210		4280		5000	78.6		75	125	P
SELENIUM, TOTAL	101		1.7	U	100	101.0		75	125	P
SILVER, TOTAL	105		0.27	U	100	105.0		75	125	P
SODIUM, TOTAL	1640		418	J	1100	111.1		75	125	P
THALLIUM, TOTAL	2.38		0.360		2	101.0		75	125	MS
VANADIUM, TOTAL	220		101		100	119.2		75	125	P
ZINC, TOTAL	2070		1820		100	246.4	A	75	125	P

Comments:

5B

POST DIGEST SPIKE SAMPLE RECOVERY

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-24-069.7S

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 86.1 **Lab Sample ID:** SI3897-004A

Concentration Units : ug/L

Analyte	Spiked Sample Result	C	Sample Result	C	Spike Added	%R	Q	Control Limits (%R) Low	High	M
ALUMINUM, TOTAL	64000		64100		10500	-1.2	A	75	125	P
ANTIMONY, TOTAL	2.08		0.084	J	2	99.8		75	125	MS
ARSENIC, TOTAL	35.8		26.2		10	96.4		75	125	MS
BARIUM, TOTAL	616		144		500	94.4		75	125	P
BERYLLIUM, TOTAL	505		2.85	J	500	100.4		75	125	P
CADMIUM, TOTAL	492		0.60	J	500	98.2		75	125	P
CALCIUM, TOTAL	11000		6680		5500	79.3		75	125	P
CHROMIUM, TOTAL	665		161		500	100.9		75	125	P
COBALT, TOTAL	12.7		10.8		2	94.0		75	125	MS
COPPER, TOTAL	664		156		500	101.6		75	125	P
IRON, TOTAL	99000		106000		5500	-128.2	A	75	125	P
LEAD, TOTAL	710		217		500	98.5		75	125	P
MAGNESIUM, TOTAL	33200		29800		5500	61.3	A	75	125	P
MANGANESE, TOTAL	1900		1610		500	57.6	A	75	125	P
MERCURY, TOTAL	0.923		0.031	U	1	92.3		75	125	CV
NICKEL, TOTAL	658		169		500	97.9		75	125	P
POTASSIUM, TOTAL	20000		10300		10000	97.5		75	125	P
SELENIUM, TOTAL	324		1.7	U	500	64.8	A	75	125	P
SILVER, TOTAL	496		0.65	J	500	99.0		75	125	P
SODIUM, TOTAL	14000		8860		5500	94.4		75	125	P
THALLIUM, TOTAL	2.20		0.16	J	2	101.8		75	125	MS
VANADIUM, TOTAL	624		131		500	98.6		75	125	P
ZINC, TOTAL	798		313		500	97.0		75	125	P

Comments:

5B

POST DIGEST SPIKE SAMPLE RECOVERY

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-16-0002S

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 88.7 **Lab Sample ID:** SI3897-025A

Concentration Units : ug/L

Analyte	Spiked Sample Result	C	Sample Result	C	Spike Added	%R	Q	Control Limits (%R) Low	High	M
ALUMINUM, TOTAL	144000		132000		10500	111.4		75	125	P
ANTIMONY, TOTAL	2.52		0.638		2	94.0		75	125	MS
ARSENIC, TOTAL	31.4		22.0		10	93.9		75	125	MS
BARIUM, TOTAL	1270		747		500	104.6		75	125	P
BERYLLIUM, TOTAL	531		6.53		500	105.0		75	125	P
CADMIUM, TOTAL	515		3.32	J	500	102.3		75	125	P
CALCIUM, TOTAL	36100		30900		5500	94.5		75	125	P
CHROMIUM, TOTAL	943		417		500	105.3		75	125	P
COBALT, TOTAL	18.8		16.9		2	93.0		75	125	MS
COPPER, TOTAL	3330		2780		500	109.6		75	125	P
IRON, TOTAL	189000		188000		5500	20.0	A	75	125	P
LEAD, TOTAL	2080		1600		500	95.2		75	125	P
MAGNESIUM, TOTAL	61500		57000		5500	82.4		75	125	P
MANGANESE, TOTAL	3520		3090		500	86.2		75	125	P
MERCURY, TOTAL	2.32		1.42		1	90.4		75	125	CV
NICKEL, TOTAL	908		391		500	103.5		75	125	P
POTASSIUM, TOTAL	37700		27300		10000	103.6		75	125	P
SELENIUM, TOTAL	504		1.7	U	500	100.9		75	125	P
SILVER, TOTAL	524		0.27	U	500	104.9		75	125	P
SODIUM, TOTAL	7520		1440		5500	110.6		75	125	P
THALLIUM, TOTAL	2.36		0.365		2	99.8		75	125	MS
VANADIUM, TOTAL	816		284		500	106.4		75	125	P
ZINC, TOTAL	1820		1280		500	107.2		75	125	P

Comments:

5B

POST DIGEST SPIKE SAMPLE RECOVERY

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-20-0206S

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 84.5 **Lab Sample ID:** SI3897-033A

Concentration Units : ug/L

Analyte	Spiked Sample Result	C	Sample Result	C	Spike Added	%R	Q	Control Limits (%R) Low	High	M
ALUMINUM, TOTAL	122000		113000		10500	86.7		75	125	P
ANTIMONY, TOTAL	3.63		1.72		2	95.5		75	125	MS
ARSENIC, TOTAL	29.9		20.5		10	94.4		75	125	MS
BARIUM, TOTAL	1180		669		500	103.0		75	125	P
BERYLLIUM, TOTAL	537		5.89		500	106.3		75	125	P
CADMIUM, TOTAL	522		1.46	J	500	104.2		75	125	P
CALCIUM, TOTAL	27400		22000		5500	97.5		75	125	P
CHROMIUM, TOTAL	898		355		500	108.7		75	125	P
COBALT, TOTAL	17.3		15.6		2	84.5		75	125	MS
COPPER, TOTAL	1160		592		500	114.4		75	125	P
IRON, TOTAL	156000		152000		5500	70.9	A	75	125	P
LEAD, TOTAL	1340		791		500	109.4		75	125	P
MAGNESIUM, TOTAL	51600		47100		5500	82.7		75	125	P
MANGANESE, TOTAL	3510		2890		500	123.4		75	125	P
MERCURY, TOTAL	1.29		0.430		1	86.1		75	125	CV
NICKEL, TOTAL	793		279		500	102.7		75	125	P
POTASSIUM, TOTAL	30400		18600		10000	117.8		75	125	P
SELENIUM, TOTAL	524		4.2	J	500	103.9		75	125	P
SILVER, TOTAL	530		0.27	U	500	106.1		75	125	P
SODIUM, TOTAL	10200		4140		5500	110.7		75	125	P
THALLIUM, TOTAL	2.27		0.297		2	98.7		75	125	MS
VANADIUM, TOTAL	792		248		500	108.8		75	125	P
ZINC, TOTAL	1360		830		500	106.0		75	125	P

Comments:

5B

POST DIGEST SPIKE SAMPLE RECOVERY

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-RB01-060415S

Matrix: WATER **SDG Name:** OU8-1

Percent Solids: 0.00 **Lab Sample ID:** SI3897-038A

Concentration Units : ug/L

Analyte	Spiked Sample Result	C	Sample Result	C	Spike Added	%R	Q	Control Limits (%R) Low	High	M
ALUMINUM, TOTAL	9620		15.	U	10500	91.6		75	125	P
ANTIMONY, TOTAL	1.94		0.030	J	2	95.3		75	125	MS
ARSENIC, TOTAL	9.52		0.45	U	10	95.2		75	125	MS
BARIUM, TOTAL	492		0.61	J	500	98.4		75	125	P
BERYLLIUM, TOTAL	482		0.10	U	500	96.4		75	125	P
CADMIUM, TOTAL	505		0.069	J	500	100.9		75	125	P
CALCIUM, TOTAL	5440		73	J	5500	97.6		75	125	P
CHROMIUM, TOTAL	526		0.36	U	500	105.2		75	125	P
COBALT, TOTAL	1.99		0.012	U	2	99.5		75	125	MS
COPPER, TOTAL	532		0.63	U	500	106.5		75	125	P
IRON, TOTAL	5520		32	J	5500	99.7		75	125	P
LEAD, TOTAL	519		1.1	U	500	103.8		75	125	P
MAGNESIUM, TOTAL	5860		22	J	5500	106.1		75	125	P
MANGANESE, TOTAL	550		1.1	U	500	110.1		75	125	P
NICKEL, TOTAL	507		0.28	U	500	101.4		75	125	P
POTASSIUM, TOTAL	10200		41.	U	10000	102.3		75	125	P
SELENIUM, TOTAL	496		2.4	U	500	99.2		75	125	P
SILVER, TOTAL	511		0.27	U	500	102.2		75	125	P
SODIUM, TOTAL	5640		120	J	5500	100.4		75	125	P
THALLIUM, TOTAL	1.89		0.012	U	2	94.5		75	125	MS
VANADIUM, TOTAL	510		0.33	J	500	101.9		75	125	P
ZINC, TOTAL	487		1.3	J	500	97.1		75	125	P

Comments:

5D

SPIKE DUPLICATES

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-24-069.7

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 86.1 **Lab Sample ID:** SI3897-004

Concentration Units : mg/Kg drywt

Analyte	Control Limits	Spike Result	C	Spike Dup. Result	C	RPD	Q	M
ALUMINUM, TOTAL		7160		6300		12.8		P
ANTIMONY, TOTAL		4.74		4.99		5.1		MS
ARSENIC, TOTAL		21.0		21.3		1.4		MS
BARIUM, TOTAL		189		193		1.9		P
BERYLLIUM, TOTAL		4.96		5.00		0.7		P
CADMIUM, TOTAL		22.4		22.6		0.8		P
CALCIUM, TOTAL		1010		902		11.6		P
CHROMIUM, TOTAL		39.6		35.9		9.7		P
COBALT, TOTAL		54.5		55.9		2.6		MS
COPPER, TOTAL		39.0		40.9		4.8		P
IRON, TOTAL		11400		9670		16.3		P
LEAD, TOTAL		32.2		29.7		8.4		P
MAGNESIUM, TOTAL		4660		3560		26.6	*	P
MANGANESE, TOTAL		239		224		6.7		P
MERCURY, TOTAL		0.150		0.157		4.5		CV
NICKEL, TOTAL		62.4		61.3		1.8		P
POTASSIUM, TOTAL		2220		2160		3.0		P
SELENIUM, TOTAL		9.41		9.56		1.6		P
SILVER, TOTAL		4.46		4.50		0.9		P
SODIUM, TOTAL		1540		1570		1.9		P
THALLIUM, TOTAL		9.52		9.68		1.6		MS
VANADIUM, TOTAL		61.6		62.8		2.0		P
ZINC, TOTAL		76.7		75.9		1.1		P

Comments:

FORM VD - IN

5D

SPIKE DUPLICATES

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-16-0002

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 88.7 **Lab Sample ID:** SI3897-025

Concentration Units : mg/Kg drywt

Analyte	Control Limits	Spike Result	C	Spike Dup. Result	C	RPD	Q	M
ALUMINUM, TOTAL		17600		14800		17.8		P
ANTIMONY, TOTAL		3.50		3.29		6.0		MS
ARSENIC, TOTAL		22.4		24.0		6.8		MS
BARIUM, TOTAL		282		279		1.2		P
BERYLLIUM, TOTAL		5.87		5.78		1.5		P
CADMIUM, TOTAL		26.2		25.7		1.7		P
CALCIUM, TOTAL		4310		3950		8.8		P
CHROMIUM, TOTAL		91.2		72.5		22.9	*	P
COBALT, TOTAL		69.6		65.6		5.9		MS
COPPER, TOTAL		222		254		13.0		P
IRON, TOTAL		32100		21400		40.1	*	P
LEAD, TOTAL		193		199		3.2		P
MAGNESIUM, TOTAL		9270		7660		19.1		P
MANGANESE, TOTAL		567		383		38.7	*	P
MERCURY, TOTAL		0.405		0.470		14.8		CV
NICKEL, TOTAL		114		93.8		19.4		P
POTASSIUM, TOTAL		3520		4000		12.6		P
SELENIUM, TOTAL		9.98		10.7		7.4		P
SILVER, TOTAL		5.40		5.21		3.5		P
SODIUM, TOTAL		933		916		1.8		P
THALLIUM, TOTAL		10.3		10.8		4.8		MS
VANADIUM, TOTAL		93.9		85.8		9.1		P
ZINC, TOTAL		196		184		6.1		P

Comments:

5D

SPIKE DUPLICATES

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-20-0206

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 84.5 **Lab Sample ID:** SI3897-033

Concentration Units : mg/Kg drywt

Analyte	Control Limits	Spike Result	C	Spike Dup. Result	C	RPD	Q	M
ALUMINUM, TOTAL		13300		13800		4.0		P
ANTIMONY, TOTAL		2.50		2.84		12.7		MS
ARSENIC, TOTAL		19.7		19.1		2.9		MS
BARIUM, TOTAL		276		286		3.5		P
BERYLLIUM, TOTAL		5.80		5.85		0.9		P
CADMIUM, TOTAL		25.0		25.0		0.2		P
CALCIUM, TOTAL		2700		2990		10.3		P
CHROMIUM, TOTAL		58.0		54.4		6.3		P
COBALT, TOTAL		62.4		63.0		1.0		MS
COPPER, TOTAL		109		99.8		9.2		P
IRON, TOTAL		19200		17700		8.1		P
LEAD, TOTAL		95.9		120		22.7	*	P
MAGNESIUM, TOTAL		5590		5330		4.8		P
MANGANESE, TOTAL		349		328		6.1		P
MERCURY, TOTAL		0.247		0.268		7.9		CV
NICKEL, TOTAL		75.7		75.4		0.4		P
POTASSIUM, TOTAL		2540		2700		6.1		P
SELENIUM, TOTAL		10.4		10.0		3.8		P
SILVER, TOTAL		4.77		4.99		4.6		P
SODIUM, TOTAL		1240		1280		3.1		P
THALLIUM, TOTAL		9.90		10.1		1.6		MS
VANADIUM, TOTAL		82.3		78.0		5.4		P
ZINC, TOTAL		135		131		2.6		P

Comments:

FORM VD - IN

DUPLICATES

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-11-0002D

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 92.3 **Lab Sample ID:** SI3772-001D

Concentration Units : mg/Kg drywt

Analyte	Control Limits	Sample Result	C	Duplicate Result	C	RPD	Q	M
ALUMINUM, TOTAL		9838.2029		9279.4470		5.8		P
ANTIMONY, TOTAL		0.9133		0.8636		5.6		MS
ARSENIC, TOTAL		13.6446		13.4628		1.3		MS
BARIUM, TOTAL		64.1984		62.3701		2.9		P
BERYLLIUM, TOTAL		0.5679	J	0.5781	J	1.8		P
CADMIUM, TOTAL		0.8030	J	0.6006	J	28.8		P
CALCIUM, TOTAL		6028.6250		4336.7470		32.6	*	P
CHROMIUM, TOTAL		233.7054		182.8000		24.4	*	P
COBALT, TOTAL		12.6922		11.0384		13.9		MS
COPPER, TOTAL		231.5249		905.7602		118.6	*	P
IRON, TOTAL		48222.5867		33422.4889		36.3	*	P
LEAD, TOTAL		215.8119		200.8011		7.2		P
MAGNESIUM, TOTAL		6971.3994		6323.8417		9.7		P
MANGANESE, TOTAL		672.1276		424.9911		45.1	*	P
MERCURY, TOTAL		0.6018		1.1464		62.3	*	CV
NICKEL, TOTAL		259.7440		241.6840		7.2		P
POTASSIUM, TOTAL		1373.1155		2287.5358		50.0	*	P
SELENIUM, TOTAL		-0.7767	U	0.3758	U			P
SILVER, TOTAL		-0.0268	U	0.2554	J	200.0		P
SODIUM, TOTAL		134.1690	J	206.5691	J	42.5		P
THALLIUM, TOTAL		0.1154		0.1275		10.0		MS
VANADIUM, TOTAL		32.3301		33.1563		2.5		P
ZINC, TOTAL		584.7766		527.8636		10.2		P

Comments:

DUPLICATES

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-24-069.7D

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 86.1 **Lab Sample ID:** SI3897-004D

Concentration Units : mg/Kg drywt

Analyte	Control Limits	Sample Result	C	Duplicate Result	C	RPD	Q	M
ALUMINUM, TOTAL		6257.6039		6634.1874		5.8		P
ANTIMONY, TOTAL		0.0408	J	0.0378	J	7.6		MS
ARSENIC, TOTAL		12.7992		12.1119		5.5		MS
BARIUM, TOTAL		14.0923		16.2395		14.2		P
BERYLLIUM, TOTAL		0.2779	J	0.2869	J	3.2		P
CADMIUM, TOTAL		0.0590	J	0.0575	J	2.6		P
CALCIUM, TOTAL		651.9151		615.0293		5.8		P
CHROMIUM, TOTAL		15.7514		20.4978		26.2	*	P
COBALT, TOTAL		5.2749		5.4632		3.5		MS
COPPER, TOTAL		15.2341		15.7846		3.5		P
IRON, TOTAL		10325.2416		10732.7699		3.9		P
LEAD, TOTAL		21.2165		21.0010		1.0		P
MAGNESIUM, TOTAL		2911.1716		4031.8052		32.3	*	P
MANGANESE, TOTAL		157.4160		166.3628		5.5		P
MERCURY, TOTAL		-0.0023	U	-0.0001	U			CV
NICKEL, TOTAL		16.4638		16.9847		3.1		P
POTASSIUM, TOTAL		1001.2947		1301.6750		26.1	*	P
SELENIUM, TOTAL		-0.1055	U	-0.0639	U			P
SILVER, TOTAL		0.0632	J	0.0474	J	28.6		P
SODIUM, TOTAL		864.7634		910.2047		5.1		P
THALLIUM, TOTAL		0.0779	J	0.0823	J	5.5		MS
VANADIUM, TOTAL		12.8236		16.5879		25.6	*	P
ZINC, TOTAL		30.5658		33.3016		8.6		P

Comments:

DUPLICATES

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-16-0002D

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 88.7 **Lab Sample ID:** SI3897-025D

Concentration Units : mg/Kg drywt

Analyte	Control Limits	Sample Result	C	Duplicate Result	C	RPD	Q	M
ALUMINUM, TOTAL		14711.2925		17010.6296		14.5		P
ANTIMONY, TOTAL		0.3560		0.5137		36.3	*	MS
ARSENIC, TOTAL		12.2948		16.2628		27.8	*	MS
BARIUM, TOTAL		83.4012		96.2485		14.3		P
BERYLLIUM, TOTAL		0.7289		0.8032		9.7		P
CADMIUM, TOTAL		0.3710	J	0.4442	J	18.0		P
CALCIUM, TOTAL		3450.1218		3981.4249		14.3		P
CHROMIUM, TOTAL		46.5560		57.8294		21.6	*	P
COBALT, TOTAL		9.4317		10.7991		13.5		MS
COPPER, TOTAL		309.8524		180.7100		52.7	*	P
IRON, TOTAL		21040.0504		25315.0314		18.4		P
LEAD, TOTAL		178.1428		202.0291		12.6		P
MAGNESIUM, TOTAL		6366.7081		7715.0572		19.2		P
MANGANESE, TOTAL		345.0122		382.1811		10.2		P
MERCURY, TOTAL		0.2419		0.2873		17.2		CV
NICKEL, TOTAL		43.6093		49.1790		12.0		P
POTASSIUM, TOTAL		3048.2959		3505.9309		14.0		P
SELENIUM, TOTAL		-0.0856	U	0.1291	U			P
SILVER, TOTAL		-0.0809	U	-0.0429	U			P
SODIUM, TOTAL		160.1723		214.1955		28.9	*	P
THALLIUM, TOTAL		0.2039		0.2163		5.9		MS
VANADIUM, TOTAL		31.6438		38.6757		20.0		P
ZINC, TOTAL		142.8714		147.1129		2.9		P

Comments:

DUPLICATES

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-20-0206D

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 84.5 **Lab Sample ID:** SI3897-033D

Concentration Units : mg/Kg drywt

Analyte	Control Limits	Sample Result	C	Duplicate Result	C	RPD	Q	M
ALUMINUM, TOTAL		12291.6302		11605.4439		5.7		P
ANTIMONY, TOTAL		0.9371		0.3831		83.9	*	MS
ARSENIC, TOTAL		11.1406		9.5726		15.1		MS
BARIUM, TOTAL		72.6639		81.3148		11.2		P
BERYLLIUM, TOTAL		0.6400		0.6107		4.7		P
CADMIUM, TOTAL		0.1582	J	0.1719	J	8.3		P
CALCIUM, TOTAL		2384.4894		2115.0620		12.0		P
CHROMIUM, TOTAL		38.5471		39.2547		1.8		P
COBALT, TOTAL		8.4858		7.6493		10.4		MS
COPPER, TOTAL		64.2487		109.4243		52.0	*	P
IRON, TOTAL		16537.2374		16668.4421		0.8		P
LEAD, TOTAL		85.9220		102.8490		17.9		P
MAGNESIUM, TOTAL		5111.0162		4917.2452		3.9		P
MANGANESE, TOTAL		313.4800		285.0402		9.5		P
MERCURY, TOTAL		0.0707		0.0820		14.8		CV
NICKEL, TOTAL		30.2622		24.5588		20.8	*	P
POTASSIUM, TOTAL		2025.0786		2313.4176		13.3		P
SELENIUM, TOTAL		0.4513	J	0.6164	J	30.9		P
SILVER, TOTAL		-0.0691	U	0.0770	J	200.0		P
SODIUM, TOTAL		449.5349		478.1355		6.2		P
THALLIUM, TOTAL		0.1611		0.1658		2.9		MS
VANADIUM, TOTAL		26.9178		29.3698		8.7		P
ZINC, TOTAL		90.1676		112.9860		22.5	*	P

Comments:

DUPLICATES

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-RB01-060415D

Matrix: WATER **SDG Name:** OU8-1

Percent Solids: 0.00 **Lab Sample ID:** SI3897-038D

Concentration Units : ug/L

Analyte	Control Limits	Sample Result	C	Duplicate Result	C	RPD	Q	M
ALUMINUM, TOTAL		10.6700	U	27.5900	J	200.0		P
ANTIMONY, TOTAL		0.1507	J	0.0845	J	56.3		MS
ARSENIC, TOTAL		-0.3067	U	0.5960	U			MS
BARIUM, TOTAL		0.6089	J	0.8997	J	38.6		P
BERYLLIUM, TOTAL		-0.0849	U	-0.0129	U			P
CADMIUM, TOTAL		0.0693	J	-0.0208	U	200.0		P
CALCIUM, TOTAL		72.7400	J	61.2300	J	17.2		P
CHROMIUM, TOTAL		0.0827	U	-0.2136	U			P
COBALT, TOTAL		0.0446	U	0.0295	U			MS
COPPER, TOTAL		-0.2511	U	-0.4689	U			P
IRON, TOTAL		32.4900	J	22.2400	J	37.5		P
LEAD, TOTAL		0.0040	U	1.4050	J	200.0		P
MAGNESIUM, TOTAL		22.2100	J	23.5600	J	5.9		P
MANGANESE, TOTAL		1.0230	U	0.9333	U			P
NICKEL, TOTAL		-0.2708	U	-0.4105	U			P
POTASSIUM, TOTAL		-14.5200	U	8.1280	U			P
SELENIUM, TOTAL		-2.7820	U	-3.1930	U			P
SILVER, TOTAL		0.2184	U	0.0005	U			P
SODIUM, TOTAL		122.6000	J	130.2000	J	6.0		P
THALLIUM, TOTAL		-0.0052	U	-0.0104	U			MS
VANADIUM, TOTAL		0.3298	J	0.3668	J	10.6		P
ZINC, TOTAL		1.3280	J	1.2480	J	6.2		P

Comments:

ANALYTE	WTB-SS-11-0002	DUPLICATE	RL	RPD	STATUS	ORIGINAL SAMPLE CONC >5xRL	DUPLICATE SAMPLE CONC >5xRL	DIFFERENCE >2XRL
ALUMINUM	9840	9280	96	5.857741	FALSE	TRUE	TRUE	TRUE
ANTIMONY	0.913	0.864	0.064	5.514913	FALSE	TRUE	TRUE	FALSE
ARSENIC	13.6	13.5	0.32	0.738007	FALSE	TRUE	TRUE	FALSE
BARIUM	64.2	62.4	1.6	2.843602	FALSE	TRUE	TRUE	FALSE
BERYLLIUM	0.568	0.578	1.6	1.745201	FALSE	FALSE	FALSE	FALSE
CADMIUM	0.803	0.601	1.6	28.77493	FALSE	FALSE	FALSE	FALSE
CALCIUM	6030	4340	32	32.59402	FALSE	TRUE	TRUE	TRUE
CHROMIUM	234	183	3.2	24.46043	FALSE	TRUE	TRUE	TRUE
COBALT	12.7	11	0.064	14.34599	FALSE	TRUE	TRUE	TRUE
COPPER	232	906	8	118.4534	TRUE	TRUE	TRUE	TRUE
IRON	48200	33400	32	36.27451	TRUE	TRUE	TRUE	TRUE
LEAD	216	201	1.6	7.194245	FALSE	TRUE	TRUE	TRUE
MAGNESIUM	6970	6320	32	9.781791	FALSE	TRUE	TRUE	TRUE
MANGANESE	672	425	1.6	45.03191	TRUE	TRUE	TRUE	TRUE
MERCURY	0.602	1.15	0.032	62.55708	TRUE	TRUE	TRUE	TRUE
NICKEL	260	242	3.2	7.171315	FALSE	TRUE	TRUE	TRUE
POTASSIUM	1370	2290	320	50.27322	TRUE	FALSE	TRUE	TRUE
SELENIUM	2.2	2.2	3.2	0	FALSE	FALSE	FALSE	FALSE
SILVER	1.3	0.26	3.2	133.3333	TRUE	FALSE	FALSE	FALSE
SODIUM	134	206	320	42.35294	TRUE	FALSE	FALSE	FALSE
THALLIUM	0.115	0.128	0.064	10.69959	FALSE	FALSE	FALSE	FALSE
VANADIUM	32.3	33.2	3.2	2.748092	FALSE	TRUE	TRUE	FALSE
ZINC	585	528	6.4	10.24259	FALSE	TRUE	TRUE	TRUE

ANALYTE	WTB-SB-24-069.7	DUPLICATE	RL	RPD	STATUS	ORIGINAL SAMPLE CONC >5xRL	DUPLICATE SAMPLE CONC >5xRL	DIFFERENCE >2XRL
ALUMINUM	6260	6630	29	5.740884	FALSE	TRUE	TRUE	TRUE
ANTIMONY	0.041	0.038	0.098	7.594937	FALSE	FALSE	FALSE	FALSE
ARSENIC	12.8	12.1	0.49	5.62249	FALSE	TRUE	TRUE	FALSE
BARIUM	14.1	16.2	0.49	13.86139	FALSE	TRUE	TRUE	TRUE
BERYLLIUM	0.278	0.287	0.49	3.185841	FALSE	FALSE	FALSE	FALSE
CADMIUM	0.059	0.058	0.49	1.709402	FALSE	FALSE	FALSE	FALSE
CALCIUM	652	615	9.8	5.840568	FALSE	TRUE	TRUE	TRUE
CHROMIUM	15.8	20.5	0.98	25.89532	FALSE	TRUE	TRUE	TRUE
COBALT	5.27	5.46	0.098	3.541473	FALSE	TRUE	TRUE	FALSE
COPPER	15.2	15.8	2.4	3.870968	FALSE	TRUE	TRUE	FALSE
IRON	10300	10700	9.8	3.809524	FALSE	TRUE	TRUE	TRUE
LEAD	21.2	21	0.49	0.947867	FALSE	TRUE	TRUE	FALSE
MAGNESIUM	2910	4030	9.8	32.27666	FALSE	TRUE	TRUE	TRUE
MANGANESE	157	166	0.49	5.572755	FALSE	TRUE	TRUE	TRUE
MERCURY	0.014	0.014	0.028	0	FALSE	FALSE	FALSE	FALSE
NICKEL	16.5	17	0.98	2.985075	FALSE	TRUE	TRUE	FALSE
POTASSIUM	1000	1300	98	26.08696	FALSE	TRUE	TRUE	TRUE
SELENIUM	0.68	0.68	0.98	0	FALSE	FALSE	FALSE	FALSE
SILVER	0.063	0.047	0.98	29.09091	FALSE	FALSE	FALSE	FALSE
SODIUM	865	910	98	5.070423	FALSE	TRUE	TRUE	FALSE
THALLIUM	0.078	0.082	0.098	5	FALSE	FALSE	FALSE	FALSE
VANADIUM	12.8	16.6	0.98	25.85034	FALSE	TRUE	TRUE	TRUE
ZINC	30.6	33.3	2	8.450704	FALSE	TRUE	TRUE	FALSE

ANALYTE	WTB-SS-16-0002	DUPLICATE	RL	RPD	STATUS	ORIGINAL SAMPLE CONC >5xRL	DUPLICATE SAMPLE CONC >5xRL	DIFFERENCE >2XRL
ALUMINUM	14700	17000	33	14.51104	FALSE	TRUE	TRUE	TRUE
ANTIMONY	0.356	0.514	0.11	36.32184	TRUE	FALSE	FALSE	FALSE
ARSENIC	12.3	16.3	0.56	27.97203	FALSE	TRUE	TRUE	TRUE
BARIUM	83.4	96.2	0.56	14.2539	FALSE	TRUE	TRUE	TRUE
BERYLLIUM	0.729	0.803	0.56	9.660574	FALSE	FALSE	FALSE	FALSE
CADMIUM	0.371	0.444	0.56	17.91411	FALSE	FALSE	FALSE	FALSE
CALCIUM	3450	3980	11	14.26649	FALSE	TRUE	TRUE	TRUE
CHROMIUM	46.6	57.8	1.1	21.45594	FALSE	TRUE	TRUE	TRUE
COBALT	9.43	10.8	0.11	13.54424	FALSE	TRUE	TRUE	TRUE
COPPER	310	181	2.8	52.54582	TRUE	TRUE	TRUE	TRUE
IRON	21000	25300	11	18.57451	FALSE	TRUE	TRUE	TRUE
LEAD	178	202	0.56	12.63158	FALSE	TRUE	TRUE	TRUE
MAGNESIUM	6370	7720	11	19.16253	FALSE	TRUE	TRUE	TRUE
MANGANESE	345	382	0.56	10.17882	FALSE	TRUE	TRUE	TRUE
MERCURY	0.242	0.287	0.034	17.01323	FALSE	TRUE	TRUE	FALSE
NICKEL	43.6	49.2	1.1	12.06897	FALSE	TRUE	TRUE	TRUE
POTASSIUM	3050	3500	110	13.74046	FALSE	TRUE	TRUE	TRUE
SELENIUM	0.78	0.78	1.1	0	FALSE	FALSE	FALSE	FALSE
SILVER	0.45	0.45	1.1	0	FALSE	FALSE	FALSE	FALSE
SODIUM	160	214	110	28.87701	FALSE	FALSE	FALSE	FALSE
THALLIUM	0.204	0.216	0.11	5.714286	FALSE	FALSE	FALSE	FALSE
VANADIUM	31.6	38.7	1.1	20.19915	FALSE	TRUE	TRUE	TRUE
ZINC	143	147	2.2	2.758621	FALSE	TRUE	TRUE	FALSE

ANALYTE	WTB-SB-20-0206	DUPLICATE	RL	RPD	STATUS	ORIGINAL SAMPLE CONC >5xRL	DUPLICATE SAMPLE CONC >5xRL	DIFFERENCE >2XRL
ALUMINUM	12300	11600	33	5.857741	FALSE	TRUE	TRUE	TRUE
ANTIMONY	0.937	0.383	0.11	83.93939	TRUE	TRUE	FALSE	TRUE
ARSENIC	11.1	9.57	0.55	14.80406	FALSE	TRUE	TRUE	TRUE
BARIUM	72.7	81.3	0.55	11.16883	FALSE	TRUE	TRUE	TRUE
BERYLLIUM	0.64	0.611	0.55	4.636291	FALSE	FALSE	FALSE	FALSE
CADMIUM	0.32	0.172	0.55	60.1626	TRUE	FALSE	FALSE	FALSE
CALCIUM	2380	2120	11	11.55556	FALSE	TRUE	TRUE	TRUE
CHROMIUM	38.5	39.2	1.1	1.801802	FALSE	TRUE	TRUE	FALSE
COBALT	8.48	7.65	0.11	10.29138	FALSE	TRUE	TRUE	TRUE
COPPER	64.2	109	2.7	51.7321	TRUE	TRUE	TRUE	TRUE
IRON	16500	16700	11	1.204819	FALSE	TRUE	TRUE	TRUE
LEAD	85.9	103	0.55	18.10482	FALSE	TRUE	TRUE	TRUE
MAGNESIUM	5100	4920	11	3.592814	FALSE	TRUE	TRUE	TRUE
MANGANESE	313	285	0.55	9.364548	FALSE	TRUE	TRUE	TRUE
MERCURY	0.0707	0.082	0.032	14.80026	FALSE	FALSE	FALSE	FALSE
NICKEL	30.3	24.6	1.1	20.76503	FALSE	TRUE	TRUE	TRUE
POTASSIUM	2020	2310	110	13.39492	FALSE	TRUE	TRUE	TRUE
SELENIUM	0.76	0.62	1.1	20.28986	FALSE	FALSE	FALSE	FALSE
SILVER	0.43	0.077	1.1	139.2505	TRUE	FALSE	FALSE	FALSE
SODIUM	450	478	110	6.034483	FALSE	FALSE	FALSE	FALSE
THALLIUM	0.161	0.166	0.11	3.058104	FALSE	FALSE	FALSE	FALSE
VANADIUM	26.9	29.4	1.1	8.880995	FALSE	TRUE	TRUE	TRUE
ZINC	90.2	113	2.2	22.44094	FALSE	TRUE	TRUE	TRUE

ANALYTE	ORIGINAL	DUPLICATE	RL	RPD	STATUS	ORIGINAL SAMPLE CONC >5xRL	DUPLICATE SAMPLE CONC >5xRL	DIFFERENCE >RL
ALUMINUM	100	28	300	112.5	TRUE	FALSE	FALSE	FALSE
ANTIMONY	0.15	0.084	1	56.41026	TRUE	FALSE	FALSE	FALSE
ARSENIC	4	4	5	0	FALSE	FALSE	FALSE	FALSE
BARIUM	0.61	0.9	5	38.4106	TRUE	FALSE	FALSE	FALSE
BERYLLIUM	0.5	0.5	5	0	FALSE	FALSE	FALSE	FALSE
CADMIUM	0.069	3	5	191.0068	TRUE	FALSE	FALSE	FALSE
CALCIUM	73	61	100	17.91045	FALSE	FALSE	FALSE	FALSE
CHROMIUM	4	4	10	0	FALSE	FALSE	FALSE	FALSE
COBALT	0.3	0.3	1	0	FALSE	FALSE	FALSE	FALSE
COPPER	10	10	25	0	FALSE	FALSE	FALSE	FALSE
IRON	32	22	100	37.03704	TRUE	FALSE	FALSE	FALSE
LEAD	4	1.4	5	96.2963	TRUE	FALSE	FALSE	FALSE
MAGNESIUM	22	24	100	8.695652	FALSE	FALSE	FALSE	FALSE
MANGANESE	4	4	5	0	FALSE	FALSE	FALSE	FALSE
NICKEL	4	4	10	0	FALSE	FALSE	FALSE	FALSE
POTASSIUM	500	500	1000	0	FALSE	FALSE	FALSE	FALSE
SELENIUM	7	7	10	0	FALSE	FALSE	FALSE	FALSE
SILVER	4	4	10	0	FALSE	FALSE	FALSE	FALSE
SODIUM	120	130	1000	8	FALSE	FALSE	FALSE	FALSE
THALLIUM	0.4	0.4	1	0	FALSE	FALSE	FALSE	FALSE
VANADIUM	0.33	0.37	10	11.42857	FALSE	FALSE	FALSE	FALSE
ZINC	1.3	1.2	20	8	FALSE	FALSE	FALSE	FALSE

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LCSOIF04ICS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF04ICS1

Concentration Units : mg/Kg drywt

Analyte	TRUE	FOUND	% R	LIMITS (%)	
ALUMINUM	200	190	95.1	80	120
BARIUM	200	194	97.3	80	120
BERYLLIUM	5.00	5.00	100.0	80	120
CADMIUM	25.0	24.4	97.6	80	120
CALCIUM	250	228	91.3	80	120
CHROMIUM	20.0	19.8	99.1	80	120
COPPER	25.0	24.5	97.8	80	120
IRON	100	96.5	96.5	80	120
LEAD	10.0	9.95	99.5	80	120
MAGNESIUM	500	482	96.4	80	120
MANGANESE	50.0	49.2	98.3	80	120
NICKEL	50.0	50.1	100.2	80	120
POTASSIUM	1000	948	94.8	80	120
SELENIUM	10.0	10.0	100.0	80	120
SILVER	5.00	4.73	94.6	80	120
SODIUM	750	698	93.0	80	120
VANADIUM	50.0	48.4	96.7	80	120
ZINC	50.0	49.1	98.1	80	120

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LCSOIF04IMS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF04IMS1

Concentration Units : mg/Kg drywt

Analyte	TRUE	FOUND	% R	LIMITS (%)	
ANTIMONY	10.0	9.53	95.3	80	120
ARSENIC	10.0	9.71	97.1	80	120
COBALT	50.0	53.2	106.3	80	120
THALLIUM	10.0	9.80	98.0	80	120

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LCSOIF05ICS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF05ICS1

Concentration Units : mg/Kg drywt

Analyte	TRUE	FOUND	% R	LIMITS (%)	
ALUMINUM	200	192	95.8	80	120
BARIUM	200	195	97.5	80	120
BERYLLIUM	5.00	4.95	99.0	80	120
CADMIUM	25.0	24.5	98.1	80	120
CALCIUM	250	233	93.4	80	120
CHROMIUM	20.0	20.1	100.6	80	120
COPPER	25.0	25.3	101.2	80	120
IRON	100	98.5	98.5	80	120
LEAD	10.0	9.92	99.2	80	120
MAGNESIUM	500	492	98.5	80	120
MANGANESE	50.0	53.0	106.0	80	120
NICKEL	50.0	50.3	100.5	80	120
POTASSIUM	1000	954	95.4	80	120
SELENIUM	10.0	9.55	95.5	80	120
SILVER	5.00	4.85	97.0	80	120
SODIUM	750	705	94.0	80	120
VANADIUM	50.0	49.0	98.0	80	120
ZINC	50.0	48.9	97.8	80	120

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LCSOIF05IMS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF05IMS1

Concentration Units : mg/Kg drywt

Analyte	TRUE	FOUND	% R	LIMITS (%)	
ANTIMONY	10.0	9.50	95.0	80	120
ARSENIC	10.0	9.46	94.6	80	120
COBALT	50.0	52.4	104.8	80	120
THALLIUM	10.0	9.68	96.8	80	120

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LCSOIF09ICS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF09ICS1

Concentration Units : mg/Kg drywt

Analyte	TRUE	FOUND	% R	LIMITS (%)	
ALUMINUM	200	202	101.2	80	120
BARIUM	200	203	101.6	80	120
BERYLLIUM	5.00	5.24	104.8	80	120
CADMIUM	25.0	25.7	102.7	80	120
CALCIUM	250	249	99.5	80	120
CHROMIUM	20.0	20.8	104.3	80	120
COPPER	25.0	26.3	105.2	80	120
IRON	100	102	102.4	80	120
LEAD	10.0	10.4	103.7	80	120
MAGNESIUM	500	503	100.7	80	120
MANGANESE	50.0	52.3	104.6	80	120
NICKEL	50.0	51.8	103.6	80	120
POTASSIUM	1000	1010	101.0	80	120
SELENIUM	10.0	10.3	103.0	80	120
SILVER	5.00	5.04	100.8	80	120
SODIUM	750	748	99.7	80	120
VANADIUM	50.0	51.3	102.7	80	120
ZINC	50.0	51.9	103.8	80	120

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LCSOIF09IMS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF09IMS1

Concentration Units : mg/Kg drywt

Analyte	TRUE	FOUND	% R	LIMITS (%)	
ANTIMONY	10.0	9.14	91.4	80	120
ARSENIC	10.0	9.85	98.5	80	120
COBALT	50.0	52.4	104.8	80	120
THALLIUM	10.0	9.87	98.7	80	120

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LCSOIF10HGS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF10HGS1

Concentration Units : mg/Kg drywt

Analyte	TRUE	FOUND	% R	LIMITS (%)	
MERCURY	0.833	0.917	110.8	80	120

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LCSOIF10ICS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF10ICS1

Concentration Units : mg/Kg drywt

Analyte	TRUE	FOUND	% R	LIMITS (%)	
ALUMINUM	200	193	96.6	80	120
BARIUM	200	197	98.4	80	120
BERYLLIUM	5.00	5.09	101.8	80	120
CADMIUM	25.0	24.7	98.8	80	120
CALCIUM	250	241	96.2	80	120
CHROMIUM	20.0	20.1	100.6	80	120
COPPER	25.0	25.2	100.9	80	120
IRON	100	100	100.5	80	120
LEAD	10.0	10.2	101.6	80	120
MAGNESIUM	500	490	98.1	80	120
MANGANESE	50.0	50.4	100.8	80	120
NICKEL	50.0	50.3	100.6	80	120
POTASSIUM	1000	986	98.6	80	120
SELENIUM	10.0	9.29	92.9	80	120
SILVER	5.00	4.79	95.8	80	120
SODIUM	750	717	95.6	80	120
VANADIUM	50.0	48.9	97.7	80	120
ZINC	50.0	50.0	99.9	80	120

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LCSOIF10IMS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF10IMS1

Concentration Units : mg/Kg drywt

Analyte	TRUE	FOUND	% R	LIMITS (%)	
ANTIMONY	10.0	9.46	94.7	80	120
ARSENIC	10.0	9.62	96.3	80	120
COBALT	50.0	52.0	104.0	80	120
THALLIUM	10.0	9.77	97.7	80	120

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LCSOIF11ICS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF11ICS1

Concentration Units : mg/Kg drywt

Analyte	TRUE	FOUND	% R	LIMITS (%)	
ALUMINUM	200	191	95.7	80	120
BARIUM	200	201	100.7	80	120
BERYLLIUM	5.00	5.07	101.4	80	120
CADMIUM	25.0	24.9	99.6	80	120
CALCIUM	250	235	93.9	80	120
CHROMIUM	20.0	20.2	100.9	80	120
COPPER	25.0	25.3	101.0	80	120
IRON	100	102	101.5	80	120
LEAD	10.0	10.2	101.6	80	120
MAGNESIUM	500	487	97.4	80	120
MANGANESE	50.0	49.8	99.7	80	120
NICKEL	50.0	50.1	100.2	80	120
POTASSIUM	1000	989	98.9	80	120
SELENIUM	10.0	9.59	95.9	80	120
SILVER	5.00	4.80	96.0	80	120
SODIUM	750	715	95.4	80	120
VANADIUM	50.0	49.5	99.0	80	120
ZINC	50.0	49.0	97.9	80	120

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LCSOIF11IMS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF11IMS1

Concentration Units : mg/Kg drywt

Analyte	TRUE	FOUND	% R	LIMITS (%)	
ANTIMONY	10.0	9.70	97.1	80	120
ARSENIC	10.0	9.84	98.4	80	120
COBALT	50.0	53.2	106.5	80	120
THALLIUM	10.0	9.98	99.8	80	120

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LCSOIF12HGS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF12HGS1

Concentration Units : mg/Kg drywt

Analyte	TRUE	FOUND	% R	LIMITS (%)	
MERCURY	0.833	0.929	112.0	80	120

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LCSOIF12HGS2

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF12HGS2

Concentration Units : mg/Kg drywt

Analyte	TRUE	FOUND	% R	LIMITS (%)	
MERCURY	0.833	0.906	109.6	80	120

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LCSOIF15HGS1

Matrix: SOIL **SDG Name:** OU8-1

QC Batch ID: IF15HGS1

Concentration Units : mg/Kg drywt

Analyte	TRUE	FOUND	% R	LIMITS (%)	
MERCURY	0.833	0.929	112.0	80	120

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LCSWIF08ICW3

Matrix: WATER **SDG Name:** OU8-1

QC Batch ID: IF08ICW3

Concentration Units : ug/L

Analyte	TRUE	FOUND	% R	LIMITS (%)	
ALUMINUM	2000	2050	102.6	80	120
BARIUM	2000	2080	104.3	80	120
BERYLLIUM	50.0	53.4	106.9	80	120
CADMIUM	250	266	106.6	80	120
CALCIUM	2500	2510	100.5	80	120
CHROMIUM	200	217	108.6	80	120
COPPER	250	270	108.1	80	120
IRON	1000	1140	114.2	80	120
LEAD	100	107	106.8	80	120
MAGNESIUM	5000	5230	104.7	80	120
MANGANESE	500	530	106.1	80	120
NICKEL	500	541	108.3	80	120
POTASSIUM	10000	10200	102.1	80	120
SELENIUM	100	102	101.8	80	120
SILVER	50.0	51.8	103.7	80	120
SODIUM	7500	7570	101.0	80	120
VANADIUM	500	532	106.4	80	120
ZINC	500	539	107.8	80	120

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LCSWIF08IMW2

Matrix: WATER **SDG Name:** OU8-1

QC Batch ID: IF08IMW2

Concentration Units : ug/L

Analyte	TRUE	FOUND	% R	LIMITS (%)	
ANTIMONY	100	100	100.4	80	120
ARSENIC	100	98.8	98.8	80	120
COBALT	500	549	109.8	80	120
THALLIUM	100	103	102.8	80	120

LABORATORY CONTROL SAMPLES

Lab Name: Katahdin Analytical Services **Sample ID:** LCSWIF12HGW4

Matrix: WATER **SDG Name:** OU8-1

QC Batch ID: IF12HGW4

Concentration Units : ug/L

Analyte	TRUE	FOUND	% R	LIMITS (%)	
MERCURY	5.00	5.02	100.4	80	120

ICP SERIAL DILUTION

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-11-0002L

Matrix: SOIL **SDG Name:** OU8-1

Lab Sample ID: SI3772-001L

Concentration Units: ug/L

Analyte	Sample Result	C	Dilution Result	C	% Difference	Q	M
ALUMINUM, TOTAL	30700		31900		3.9		P
ANTIMONY, TOTAL	2.85		2.98		4.6		MS
ARSENIC, TOTAL	42.5		43.3		1.9		MS
BARIUM, TOTAL	200		204		2.0		P
BERYLLIUM, TOTAL	1.77	J	3.3	J	86.4		P
CADMIUM, TOTAL	2.50	J	2.0	J	20.0		P
CALCIUM, TOTAL	18800		19500		3.7		P
CHROMIUM, TOTAL	729		751		3.0		P
COBALT, TOTAL	39.6		40.8		3.0		MS
COPPER, TOTAL	722		736		1.9		P
IRON, TOTAL	150000		157000		4.7		P
LEAD, TOTAL	673		734		9.1		P
MAGNESIUM, TOTAL	21700		22900		5.5		P
MANGANESE, TOTAL	2100		2190		4.3		P
MERCURY, TOTAL	3.72		3.94		5.9		CV
NICKEL, TOTAL	810		882		8.9		P
POTASSIUM, TOTAL	4280		6510		52.1		P
SELENIUM, TOTAL	1.7	U	8.5	U			P
SILVER, TOTAL	0.27	U	4.0	J			P
SODIUM, TOTAL	418	J	620	J	48.3		P
THALLIUM, TOTAL	0.360		0.36	J	0.0		MS
VANADIUM, TOTAL	101		116		14.9		P
ZINC, TOTAL	1820		1930		6.0		P

ICP SERIAL DILUTION

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-24-069.7L

Matrix: SOIL **SDG Name:** OU8-1

Lab Sample ID: SI3897-004L

Concentration Units: ug/L

Analyte	Sample Result	C	Dilution Result	C	% Difference	Q	M
ALUMINUM, TOTAL	64100		63400		1.1		P
ANTIMONY, TOTAL	0.084	J	0.20	U	100.0		MS
ARSENIC, TOTAL	26.2		27.0		3.1		MS
BARIUM, TOTAL	144		167		16.0		P
BERYLLIUM, TOTAL	2.85	J	2.5	J	12.3		P
CADMIUM, TOTAL	0.60	J	1.2	J	100.0		P
CALCIUM, TOTAL	6680		6860		2.7		P
CHROMIUM, TOTAL	161		171		6.2		P
COBALT, TOTAL	10.8		11.2		3.7		MS
COPPER, TOTAL	156		164		5.1		P
IRON, TOTAL	106000		108000		1.9		P
LEAD, TOTAL	217		233		7.4		P
MAGNESIUM, TOTAL	29800		31500		5.7		P
MANGANESE, TOTAL	1610		1640		1.9		P
MERCURY, TOTAL	0.031	U	0.16	U			CV
NICKEL, TOTAL	169		183		8.3		P
POTASSIUM, TOTAL	10300		11900		15.5		P
SELENIUM, TOTAL	1.7	U	8.5	U			P
SILVER, TOTAL	0.65	J	1.4	J	115.4		P
SODIUM, TOTAL	8860		10200		15.1		P
THALLIUM, TOTAL	0.16	J	0.16	J	0.0		MS
VANADIUM, TOTAL	131		140		6.9		P
ZINC, TOTAL	313		329		5.1		P

ICP SERIAL DILUTION

Lab Name: Katahdin Analytical Services

Matrix: SOIL

Client Field ID: WTB-SS-16-0002L

SDG Name: OU8-1

Lab Sample ID: SI3897-025L

Concentration Units: ug/L

Analyte	Sample Result	C	Dilution Result	C	% Difference	Q	M
ALUMINUM, TOTAL	132000		137000		3.8		P
ANTIMONY, TOTAL	0.638		0.70	J	9.7		MS
ARSENIC, TOTAL	22.0		22.3		1.4		MS
BARIUM, TOTAL	747		803		7.5		P
BERYLLIUM, TOTAL	6.53		5.08	J	22.2		P
CADMIUM, TOTAL	3.32	J	3.4	J	2.4		P
CALCIUM, TOTAL	30900		32300		4.5		P
CHROMIUM, TOTAL	417		436		4.6		P
COBALT, TOTAL	16.9		17.2		1.8		MS
COPPER, TOTAL	2780		2880		3.6		P
IRON, TOTAL	188000		197000		4.8		P
LEAD, TOTAL	1600		1680		5.0		P
MAGNESIUM, TOTAL	57000		61500		7.9		P
MANGANESE, TOTAL	3090		3200		3.6		P
MERCURY, TOTAL	1.42		1.3		8.5		CV
NICKEL, TOTAL	391		428		9.5		P
POTASSIUM, TOTAL	27300		28800		5.5		P
SELENIUM, TOTAL	1.7	U	27	J			P
SILVER, TOTAL	0.27	U	7.1	J			P
SODIUM, TOTAL	1440		1670	J	16.0		P
THALLIUM, TOTAL	0.365		0.36	J	1.4		MS
VANADIUM, TOTAL	284		298		4.9		P
ZINC, TOTAL	1280		1380		7.8		P

FORM IX - IN

ICP SERIAL DILUTION

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SB-20-0206L

Matrix: SOIL **SDG Name:** OU8-1

Lab Sample ID: SI3897-033L

Concentration Units: ug/L

Analyte	Sample Result	C	Dilution Result	C	% Difference	Q	M
ALUMINUM, TOTAL	113000		119000		5.3		P
ANTIMONY, TOTAL	1.72		1.8		4.7		MS
ARSENIC, TOTAL	20.5		20.7		1.0		MS
BARIUM, TOTAL	669		715		6.9		P
BERYLLIUM, TOTAL	5.89		5.13	J	12.9		P
CADMIUM, TOTAL	1.46	J	2.2	J	50.7		P
CALCIUM, TOTAL	22000		22900		4.1		P
CHROMIUM, TOTAL	355		379		6.8		P
COBALT, TOTAL	15.6		16.1		3.2		MS
COPPER, TOTAL	592		645		9.0		P
IRON, TOTAL	152000		160000		5.3		P
LEAD, TOTAL	791		869		9.9		P
MAGNESIUM, TOTAL	47100		50700		7.6		P
MANGANESE, TOTAL	2890		3180		10.0		P
MERCURY, TOTAL	0.430		0.28	J	34.9		CV
NICKEL, TOTAL	279		295		5.7		P
POTASSIUM, TOTAL	18600		21700		16.7		P
SELENIUM, TOTAL	4.2	J	8.6	J	104.8		P
SILVER, TOTAL	0.27	U	4.2	J			P
SODIUM, TOTAL	4140		4620	J	11.6		P
THALLIUM, TOTAL	0.297		0.32	J	7.7		MS
VANADIUM, TOTAL	248		269		8.5		P
ZINC, TOTAL	830		894		7.7		P

ICP SERIAL DILUTION

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-RB01-060415L

Matrix: WATER **SDG Name:** OU8-1

Lab Sample ID: SI3897-038L

Concentration Units: ug/L

Analyte	Sample Result	C	Dilution Result	C	% Difference	Q	M
ALUMINUM, TOTAL	15.	U	75.	U			P
ANTIMONY, TOTAL	0.030	J	0.080	J	166.7		MS
ARSENIC, TOTAL	0.45	U	2.3	U			MS
BARIUM, TOTAL	0.61	J	1.2	U	100.0		P
BERYLLIUM, TOTAL	0.10	U	0.50	U			P
CADMIUM, TOTAL	0.069	J	0.25	U	100.0		P
CALCIUM, TOTAL	73	J	130	J	78.1		P
CHROMIUM, TOTAL	0.36	U	33.6	J			P
COBALT, TOTAL	0.012	U	0.077	J			MS
COPPER, TOTAL	0.63	U	3.1	U			P
IRON, TOTAL	32	J	27.	U	100.0		P
LEAD, TOTAL	1.1	U	5.5	U			P
MAGNESIUM, TOTAL	22	J	50	J	127.3		P
MANGANESE, TOTAL	1.1	U	5.5	U			P
NICKEL, TOTAL	0.28	U	1.4	U			P
POTASSIUM, TOTAL	41.	U	480	J			P
SELENIUM, TOTAL	2.4	U	12.	U			P
SILVER, TOTAL	0.27	U	1.4	U			P
SODIUM, TOTAL	120	J	120.	U	100.0		P
THALLIUM, TOTAL	0.012	U	0.060	U			MS
VANADIUM, TOTAL	0.33	J	3.1	J	839.4		P
ZINC, TOTAL	1.3	J	3.6	U	100.0		P

INSTRUMENT DETECTION LIMITS

Lab Name: Katahdin Analytical Services **Instrument Code:** H

Instrument Name: CETAC M6100 **Date:** 4/13/2015

Concentration Units: ug/L

Analyte	CRDL	IDL	M
MERCURY	0.20	0.023	CV

INSTRUMENT DETECTION LIMITS

Lab Name: Katahdin Analytical Services **Instrument Code:** I

Instrument Name: THERMO ICAP 6500 **Date:** 4/13/2015

Concentration Units: ug/L

Analyte	CRDL	IDL	M
ALUMINUM	300	24.	P
ANTIMONY	0.20	1.8	P
ARSENIC	1.0	2.4	P
BARIUM	5.0	0.50	P
BERYLLIUM	5.0	0.13	P
CADMIUM	5.0	0.078	P
CALCIUM	100	9.7	P
CHROMIUM	10	0.31	P
COBALT	0.20	0.25	P
COPPER	25	0.47	P
IRON	100	5.2	P
LEAD	5.0	1.2	P
MAGNESIUM	100	5.2	P
MANGANESE	5.0	1.1	P
MOLYBDENUM	1.0	1.2	P
NICKEL	10	0.42	P
POTASSIUM	1000	45.	P
SELENIUM	10	2.8	P
SILVER	10	0.41	P
SODIUM	1000	40.	P
THALLIUM	0.20	1.5	P
VANADIUM	10	0.25	P
ZINC	20	0.51	P

INSTRUMENT DETECTION LIMITS

Lab Name: Katahdin Analytical Services **Instrument Code:** J

Instrument Name: AGILENT 7500 ICP-MS **Date:** 4/13/2015

Concentration Units: ug/L

Analyte	CRDL	IDL	M
ALUMINUM	300	0.38	MS
ANTIMONY	0.20	0.0058	MS
ARSENIC	1.0	0.22	MS
BARIUM	5.0	0.037	MS
BERYLLIUM	5.0	0.0027	MS
CADMIUM	5.0	0.0031	MS
CALCIUM	100	4.8	MS
CHROMIUM	10	0.043	MS
COBALT	0.20	0.0087	MS
COPPER	25	0.028	MS
IRON	100	6.3	MS
LEAD	5.0	0.0096	MS
MAGNESIUM	100	1.2	MS
MANGANESE	5.0	0.031	MS
MOLYBDENUM	1.0	0.012	MS
NICKEL	10	0.014	MS
POTASSIUM	1000	5.3	MS
SELENIUM	10	0.23	MS
SILVER	10	0.0039	MS
SODIUM	1000	7.1	MS
THALLIUM	0.20	0.0065	MS
VANADIUM	10	0.11	MS
ZINC	20	0.12	MS

LIMITS of DETECTION

Lab Name: Katahdin Analytical Services **Instrument Code:** H

Instrument Name: CETAC M6100 **Date:** 1/7/2011

Analyte	LOD	Units	M	EPA Prep./Anal. Method
MERCURY	0.017	mg/Kg	CV	SW846 7471B / SW846 7471B

FORM X - IN

LIMITS of DETECTION

Lab Name: Katahdin Analytical Services **Instrument Code:** H

Instrument Name: CETAC M6100 **Date:** 2/9/2011

Analyte	LOD	Units	M	EPA Prep./Anal. Method
MERCURY	0.10	ug/L	CV	SW846 7470A / SW846 7470A

LIMITS of DETECTION

Lab Name: Katahdin Analytical Services **Instrument Code:** I

Instrument Name: THERMO ICAP 6500 **Date:** 1/19/2011

Analyte	LOD	Units	M	EPA Prep./Anal. Method
ALUMINUM	100.	ug/L	P	SW846 3010A / SW846 6010C
BARIUM	3.0	ug/L	P	SW846 3010A / SW846 6010C
BERYLLIUM	0.50	ug/L	P	SW846 3010A / SW846 6010C
CADMIUM	3.0	ug/L	P	SW846 3010A / SW846 6010C
CALCIUM	80.	ug/L	P	SW846 3010A / SW846 6010C
CHROMIUM	4.0	ug/L	P	SW846 3010A / SW846 6010C
COPPER	10.	ug/L	P	SW846 3010A / SW846 6010C
IRON	80.	ug/L	P	SW846 3010A / SW846 6010C
LEAD	4.0	ug/L	P	SW846 3010A / SW846 6010C
MAGNESIUM	80.	ug/L	P	SW846 3010A / SW846 6010C
MANGANESE	4.0	ug/L	P	SW846 3010A / SW846 6010C
NICKEL	4.0	ug/L	P	SW846 3010A / SW846 6010C
POTASSIUM	500.	ug/L	P	SW846 3010A / SW846 6010C
SELENIUM	7.0	ug/L	P	SW846 3010A / SW846 6010C
SILVER	4.0	ug/L	P	SW846 3010A / SW846 6010C
SODIUM	500.	ug/L	P	SW846 3010A / SW846 6010C
VANADIUM	4.0	ug/L	P	SW846 3010A / SW846 6010C
ZINC	10.	ug/L	P	SW846 3010A / SW846 6010C

LIMITS of DETECTION

Lab Name: Katahdin Analytical Services **Instrument Code:** I

Instrument Name: THERMO ICAP 6500 **Date:** 1/20/2011

Analyte	LOD	Units	M	EPA Prep./Anal. Method
ALUMINUM	10.	mg/Kg	P	SW846 3050B / SW846 6010C
BARIUM	0.30	mg/Kg	P	SW846 3050B / SW846 6010C
BERYLLIUM	0.050	mg/Kg	P	SW846 3050B / SW846 6010C
CADMIUM	0.30	mg/Kg	P	SW846 3050B / SW846 6010C
CALCIUM	8.0	mg/Kg	P	SW846 3050B / SW846 6010C
CHROMIUM	0.40	mg/Kg	P	SW846 3050B / SW846 6010C
COPPER	1.0	mg/Kg	P	SW846 3050B / SW846 6010C
IRON	8.0	mg/Kg	P	SW846 3050B / SW846 6010C
LEAD	0.40	mg/Kg	P	SW846 3050B / SW846 6010C
MAGNESIUM	8.0	mg/Kg	P	SW846 3050B / SW846 6010C
MANGANESE	0.40	mg/Kg	P	SW846 3050B / SW846 6010C
NICKEL	0.40	mg/Kg	P	SW846 3050B / SW846 6010C
POTASSIUM	50.	mg/Kg	P	SW846 3050B / SW846 6010C
SELENIUM	0.70	mg/Kg	P	SW846 3050B / SW846 6010C
SILVER	0.40	mg/Kg	P	SW846 3050B / SW846 6010C
SODIUM	50.	mg/Kg	P	SW846 3050B / SW846 6010C
VANADIUM	0.40	mg/Kg	P	SW846 3050B / SW846 6010C
ZINC	1.0	mg/Kg	P	SW846 3050B / SW846 6010C

LIMITS of DETECTION

Lab Name: Katahdin Analytical Services **Instrument Code:** J

Instrument Name: AGILENT 7500 ICP-MS **Date:** 1/25/2011

Analyte	LOD	Units	M	EPA Prep./Anal. Method
ANTIMONY	0.10	ug/L	MS	SW846 3010A / SW846 6020A
ARSENIC	0.80	ug/L	MS	SW846 3010A / SW846 6020A
COBALT	0.060	ug/L	MS	SW846 3010A / SW846 6020A
THALLIUM	0.080	ug/L	MS	SW846 3010A / SW846 6020A

LIMITS of DETECTION

Lab Name: Katahdin Analytical Services **Instrument Code:** J

Instrument Name: AGILENT 7500 ICP-MS **Date:** 1/26/2011

Analyte	LOD	Units	M	EPA Prep./Anal. Method
ANTIMONY	0.010	mg/kg	MS	SW846 3050B / SW846 6020A
ARSENIC	0.080	mg/kg	MS	SW846 3050B / SW846 6020A
COBALT	0.0060	mg/kg	MS	SW846 3050B / SW846 6020A
THALLIUM	0.0080	mg/kg	MS	SW846 3050B / SW846 6020A

METHOD DETECTION LIMITS

Lab Name: Katahdin Analytical Services **Instrument Code:** H

Instrument Name: CETAC M6100 **Date:** 1/7/2011

Analyte	MDL	Units	M	EPA Prep./Anal. Method
MERCURY	0.0052	mg/Kg	CV	SW846 7471B / SW846 7471B

METHOD DETECTION LIMITS

Lab Name: Katahdin Analytical Services **Instrument Code:** H

Instrument Name: CETAC M6100 **Date:** 2/9/2011

Analyte	MDL	Units	M	EPA Prep./Anal. Method
MERCURY	0.013	ug/L	CV	SW846 7470A / SW846 7470A

METHOD DETECTION LIMITS

Lab Name: Katahdin Analytical Services **Instrument Code:** I

Instrument Name: THERMO ICAP 6500 **Date:** 1/19/2011

Analyte	MDL	Units	M	EPA Prep./Anal. Method
ALUMINUM	15.	ug/L	P	SW846 3010A / SW846 6010C
BARIUM	0.23	ug/L	P	SW846 3010A / SW846 6010C
BERYLLIUM	0.10	ug/L	P	SW846 3010A / SW846 6010C
CADMIUM	0.049	ug/L	P	SW846 3010A / SW846 6010C
CALCIUM	11.	ug/L	P	SW846 3010A / SW846 6010C
CHROMIUM	0.36	ug/L	P	SW846 3010A / SW846 6010C
COPPER	0.63	ug/L	P	SW846 3010A / SW846 6010C
IRON	5.4	ug/L	P	SW846 3010A / SW846 6010C
LEAD	1.1	ug/L	P	SW846 3010A / SW846 6010C
MAGNESIUM	7.8	ug/L	P	SW846 3010A / SW846 6010C
MANGANESE	1.1	ug/L	P	SW846 3010A / SW846 6010C
NICKEL	0.28	ug/L	P	SW846 3010A / SW846 6010C
POTASSIUM	41.	ug/L	P	SW846 3010A / SW846 6010C
SELENIUM	2.4	ug/L	P	SW846 3010A / SW846 6010C
SILVER	0.27	ug/L	P	SW846 3010A / SW846 6010C
SODIUM	24.	ug/L	P	SW846 3010A / SW846 6010C
VANADIUM	0.23	ug/L	P	SW846 3010A / SW846 6010C
ZINC	0.72	ug/L	P	SW846 3010A / SW846 6010C

METHOD DETECTION LIMITS

Lab Name: Katahdin Analytical Services **Instrument Code:** I

Instrument Name: THERMO ICAP 6500 **Date:** 1/20/2011

Analyte	MDL	Units	M	EPA Prep./Anal. Method
ALUMINUM	0.71	mg/Kg	P	SW846 3050B / SW846 6010C
BARIUM	0.025	mg/Kg	P	SW846 3050B / SW846 6010C
BERYLLIUM	0.0068	mg/Kg	P	SW846 3050B / SW846 6010C
CADMIUM	0.0079	mg/Kg	P	SW846 3050B / SW846 6010C
CALCIUM	1.8	mg/Kg	P	SW846 3050B / SW846 6010C
CHROMIUM	0.026	mg/Kg	P	SW846 3050B / SW846 6010C
COPPER	0.16	mg/Kg	P	SW846 3050B / SW846 6010C
IRON	1.4	mg/Kg	P	SW846 3050B / SW846 6010C
LEAD	0.087	mg/Kg	P	SW846 3050B / SW846 6010C
MAGNESIUM	0.68	mg/Kg	P	SW846 3050B / SW846 6010C
MANGANESE	0.16	mg/Kg	P	SW846 3050B / SW846 6010C
NICKEL	0.044	mg/Kg	P	SW846 3050B / SW846 6010C
POTASSIUM	2.9	mg/Kg	P	SW846 3050B / SW846 6010C
SELENIUM	0.17	mg/Kg	P	SW846 3050B / SW846 6010C
SILVER	0.027	mg/Kg	P	SW846 3050B / SW846 6010C
SODIUM	1.5	mg/Kg	P	SW846 3050B / SW846 6010C
VANADIUM	0.037	mg/Kg	P	SW846 3050B / SW846 6010C
ZINC	0.17	mg/Kg	P	SW846 3050B / SW846 6010C

METHOD DETECTION LIMITS

Lab Name: Katahdin Analytical Services **Instrument Code:** J

Instrument Name: AGILENT 7500 ICP-MS **Date:** 1/25/2011

Analyte	MDL	Units	M	EPA Prep./Anal. Method
ANTIMONY	0.011	ug/L	MS	SW846 3010A / SW846 6020A
ARSENIC	0.45	ug/L	MS	SW846 3010A / SW846 6020A
COBALT	0.012	ug/L	MS	SW846 3010A / SW846 6020A
THALLIUM	0.012	ug/L	MS	SW846 3010A / SW846 6020A

METHOD DETECTION LIMITS

Lab Name: Katahdin Analytical Services **Instrument Code:** J

Instrument Name: AGILENT 7500 ICP-MS **Date:** 1/26/2011

Analyte	MDL	Units	M	EPA Prep./Anal. Method
ANTIMONY	0.0040	mg/kg	MS	SW846 3050B / SW846 6020A
ARSENIC	0.030	mg/kg	MS	SW846 3050B / SW846 6020A
COBALT	0.0011	mg/kg	MS	SW846 3050B / SW846 6020A
THALLIUM	0.0019	mg/kg	MS	SW846 3050B / SW846 6020A

ICP INTERELEMENT CORRECTION FACTORS

Lab Name: Katahdin Analytical Services **SDG Name:** OU8-1

Instrument Name: THERMO ICAP 6500 **Instrument ID:** I **Date:** 1/8/2015

Analyte	Wavelength (nm)	Interelement Correction Factors for: Al	Ca	Fe	Mg	As	Cr	Co	Cu	Mn	Mo	Ni	Ti	V
ALUMINUM	396.15	0.0	0.0003680	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0300000	0.0	0.0	0.0
ANTIMONY	206.83	0.0000250	0.0	0.0000520	0.0	-0.0001350	0.0078600	0.0	0.0	0.0	-0.0018800	-0.0009470	0.0	-0.0017400
ARSENIC	189.04	0.0000120	0.0	-0.0001310	0.0	0.0	0.0006100	0.0	0.0	0.0	0.0020700	0.0	0.0	0.0
BARIUM	455.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BERYLLIUM	313.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0007160	0.0000820
BORON	208.96	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0296000	0.0	0.0	0.0
CADMIUM	226.50	0.0	0.0	0.0000630	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0000800	0.0000260	0.0
CALCIUM	315.89	0.0	0.0	0.0	0.0	0.0	0.0008850	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHROMIUM	267.72	0.0	0.0	0.0000070	0.0	0.0	0.0	0.0	0.0	0.0001110	0.0	0.0	0.0	0.0000720
COBALT	228.62	0.0	0.0	0.0	0.0	0.0	-0.0000420	0.0	0.0	0.0	0.0	0.0000640	0.0027000	0.0
COPPER	327.40	0.0000110	0.0	-0.0000060	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0005550	0.0003110
GOLD	242.79	0.0	0.0	0.0001410	0.0	0.0	0.0	0.0	0.0	-0.0019000	0.0	0.0	0.0	0.0
IRON	259.94	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LEAD	220.35	-0.0001240	0.0	0.0000190	0.0	0.0	-0.0005800	0.0000540	0.0001360	0.0	-0.0005810	0.0002080	0.0000970	0.0
LITHIUM	670.78	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAGNESIUM	202.58	0.0	0.0	0.0000370	0.0	0.0	0.0	0.2003000	0.0	0.0	0.0277000	0.0	0.0002000	0.0
MANGANESE	257.61	-0.0000010	0.0	0.0000150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MOLYBDENUM	202.03	0.0	0.0	0.0	0.0	0.0	0.0001080	0.0	0.0	0.0000070	0.0	0.0	0.0	-0.0001920
NICKEL	231.60	0.0	0.0	-0.0000380	0.0	0.0	0.0	0.0001270	0.0	0.0	0.0008690	0.0	0.0	0.0
POTASSIUM	766.49	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SELENIUM	196.09	0.0000230	0.0	-0.0000020	0.0	-0.0000500	0.0	0.0000900	0.0	0.0004850	0.0	0.0	0.0	-0.0002080
SILICON	251.61	0.0	0.0	-0.0000080	0.0	0.0	0.0	0.0	0.0	0.0	0.0097100	0.0	0.0009940	0.0
SILVER	328.07	0.0	0.0	-0.0002370	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0002840	0.0
SODIUM	589.59	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
STRONTIUM	421.55	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
THALLIUM	190.86	-0.0000020	0.0	0.0000020	0.0	0.0	0.0	0.0018400	0.0000120	-0.0021900	-0.0000380	0.0	-0.0010500	-0.0093600
TIN	189.99	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TITANIUM	334.90	0.0	0.0	0.0	0.0	0.0	0.0001290	0.0	0.0	0.0	0.0010500	0.0	0.0	0.0
VANADIUM	292.40	0.0	0.0	0.0000210	0.0	0.0	-0.0041100	0.0	0.0	-0.0003220	-0.0062800	0.0	0.0010900	0.0
ZINC	206.20	0.0	0.0	0.0	0.0	0.0	-0.0011400	0.0	0.0	0.0	0.0	0.0	0.0	0.0

FORM XI - IN

ICP LINEAR RANGES

Lab Name: Katahdin Analytical Services **Instrument Code:** I

Instrument Name: THERMO ICAP 6500 **Date:** 4/6/2015

Concentration Units: ug/L

Analyte	Integration Time (sec)	Linear Range	M
ALUMINUM	5.00	500000	P
ANTIMONY	45.00	20000	P
ARSENIC	45.00	20000	P
BARIUM	5.00	20000	P
BERYLLIUM	5.00	20000	P
CADMIUM	45.00	20000	P
CALCIUM	5.00	500000	P
CHROMIUM	10.00	20000	P
COBALT	45.00	20000	P
COPPER	10.00	20000	P
IRON	5.00	250000	P
LEAD	45.00	20000	P
MAGNESIUM	45.00	200000	P
MANGANESE	5.00	20000	P
MOLYBDENUM	45.00	5000	P
NICKEL	10.00	20000	P
POTASSIUM	5.00	300000	P
SELENIUM	45.00	20000	P
SILVER	10.00	2000	P
SODIUM	5.00	200000	P
THALLIUM	45.00	20000	P
VANADIUM	10.00	20000	P
ZINC	45.00	20000	P

ICP LINEAR RANGES

Lab Name: Katahdin Analytical Services **Instrument Code:** J

Instrument Name: AGILENT 7500 ICP-MS **Date:** 4/7/2015

Concentration Units: ug/L

Analyte	Integration Time (sec)	Linear Range	M
ALUMINUM	0.01	200000	MS
ANTIMONY	0.10	1000	MS
ARSENIC	0.30	1000	MS
BARIUM	0.10	2000	MS
BERYLLIUM	0.30	100	MS
CADMIUM	0.10	1000	MS
CALCIUM	0.03	200000	MS
CHROMIUM	0.10	1000	MS
COBALT	0.10	1000	MS
COPPER	0.10	2000	MS
IRON	0.03	100000	MS
LEAD	0.10	2000	MS
MAGNESIUM	0.05	200000	MS
MANGANESE	0.10	2000	MS
MOLYBDENUM	0.10	1000	MS
NICKEL	0.10	1000	MS
POTASSIUM	0.01	200000	MS
SELENIUM	0.30	1000	MS
SILVER	0.10	100	MS
SODIUM	0.01	200000	MS
THALLIUM	0.10	1000	MS
VANADIUM	0.10	1000	MS
ZINC	0.10	2000	MS

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** WTB-SS-11-0002

Matrix: SOIL **SDG Name:** OU8-1

Percent Solids: 92.3 **Lab Sample ID:** SI3772-001

Concentration Units : mg/Kg drywt

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7429-90-5	ALUMINUM, TOTAL	9840		NA	P	5	96	2.3	32
7440-36-0	ANTIMONY, TOTAL	0.913		N	MS	5	0.064	0.013	0.032
7440-38-2	ARSENIC, TOTAL	13.6			MS	5	0.32	0.096	0.26
7440-39-3	BARIUM, TOTAL	64.2			P	5	1.6	0.080	0.96
7440-41-7	BERYLLIUM, TOTAL	0.568	J		P	5	1.6	0.022	0.16
7440-43-9	CADMIUM, TOTAL	0.803	J		P	5	1.6	0.025	0.96
7440-70-2	CALCIUM, TOTAL	6030		N*	P	5	32	5.8	26
7440-47-3	CHROMIUM, TOTAL	234		*	P	5	3.2	0.083	1.3
7440-48-4	COBALT, TOTAL	12.7			MS	5	0.064	0.0035	0.019
7440-50-8	COPPER, TOTAL	232		N*	P	5	8.0	0.51	3.2
7439-89-6	IRON, TOTAL	48200		N*A	P	5	32	4.5	26
7439-92-1	LEAD, TOTAL	216		NA	P	5	1.6	0.28	1.3
7439-95-4	MAGNESIUM, TOTAL	6970		N	P	5	32	2.2	26
7439-96-5	MANGANESE, TOTAL	672		N*B	P	5	1.6	0.51	1.3
7439-97-6	MERCURY, TOTAL	0.602		N*	CV	1	0.032	0.0050	0.016
7440-02-0	NICKEL, TOTAL	260		NA	P	5	3.2	0.14	1.3
7440-09-7	POTASSIUM, TOTAL	1370		N*	P	5	320	9.3	160
7782-49-2	SELENIUM, TOTAL	2.2	U	N	P	5	3.2	0.55	2.2
7440-22-4	SILVER, TOTAL	1.3	U		P	5	3.2	0.087	1.3
7440-23-5	SODIUM, TOTAL	134	J		P	5	320	4.8	160
7440-28-0	THALLIUM, TOTAL	0.115			MS	5	0.064	0.0061	0.026
7440-62-2	VANADIUM, TOTAL	32.3		N	P	5	3.2	0.12	1.3
7440-66-6	ZINC, TOTAL	585		NA	P	5	6.4	0.55	3.2

14.155 * 0.1mL/1.69g* 1/0.923= 0.907 mg/kg

Comments:

Sample QC Report

Data File: C:\ICPCHEM\1\DATA\JIF25A.B\127SMPL.D\127SMPL.D#
Date Acquired: Jun 25 2015 07:24 pm
Acq. Method: K2008ES2.M
Operator: EAM
Sample Name: SI3772-001
Misc Info: DILUTION 1.6/8
Vial Number: 2101
Current Method: C:\ICPCHEM\1\METHODS\K2008ES2.M
Calibration File: C:\ICPCHEM\1\CALIB\K2008ES2.C
Last Cal. Update: Jun 25 2015 01:23 pm
Sample Type: Sample
Dilution Factor: 5.00
Autodil Factor: Undiluted
Final Dil Factor: 5.00

QC Elements

Element	Corr Conc	Raw Conc	Units	RSD(%)	High Limit	Flag
9 Be	8.04	1.608	ppb	0.62	100.	
11 B	29.39	5.878	ppb	1.19	1000.	
23 Na	2,760.5	552.1	ppb	2.99	200000.	
25 Mg	100,550.	20,110.	ppb	0.88	200000.	
27 Al	141,000.	28,200.	ppb	1.86	200000.	
28 Si	3,098.	619.6	ppb	9.38	#VALUE!	
29 Si	1,785.5	357.1	ppb	40.83	10000.	
39 K	27,065.	5,413.	ppb	1.35	200000.	
43 Ca	86,600.	17,320.	ppb	1.87	#VALUE!	
44 Ca	84,900.	16,980.	ppb	1.55	200000.	
51 V	651.5	130.3	ppb	2.25	1000.	
52 Cr	3,393.5	678.7	ppb	0.98	2000.	
53 Cr	3,338.	667.6	ppb	0.85	#VALUE!	
55 Mn	9,615.	1,923.	ppb	0.24	2000.	
56 Fe	705,000.	141,000.	ppb	1.25	#VALUE!	
57 Fe	674,000.	134,800.	ppb	1.20	100000.	>LDR
59 Co	192.55	38.51	ppb	0.98	1000.	
60 Ni	4,030.5	806.1	ppb	1.51	1000.	
63 Cu	3,106.	621.2	ppb	1.16	#VALUE!	
65 Cu	3,194.5	638.9	ppb	0.69	2000.	
66 Zn	8,960.	1,792.	ppb	0.74	2000.	
68 Zn	8,990.	1,798.	ppb	0.83	#VALUE!	
75 As	209.9	41.98	ppb	0.68	1000.	
82 Se	5.975	1.195	ppb	12.75	1000.	
88 Sr	446.35	89.27	ppb	1.90	2000.	
89 Y	----	--------	--- ---		#VALUE!	
98 Mo	279.45	55.89	ppb	0.70	1000.	
107 Ag	2.065	0.413	ppb	2.31	100.	
109 Ag	1.8695	0.3739	ppb	3.32	#VALUE!	
111 Cd	8.165	1.633	ppb	2.88	#VALUE!	
114 Cd	7.325	1.465	ppb	2.07	1000.	
115 In	----	--------	--- ---		#VALUE!	
118 Sn	337.25	67.45	ppb	1.20	1000.	
120 Sn	336.7	67.34	ppb	0.33	#VALUE!	
121 Sb	14.155	2.831	ppb	3.09	#VALUE!	
123 Sb	14.24	2.848	ppb	2.08	1000.	
135 Ba	969.	193.8	ppb	0.84	2000.	
137 Ba	966.5	193.3	ppb	0.59	#VALUE!	
182 W	10.465	2.093	ppb	0.64	1000.	
203 Tl	1.8355	0.3671	ppb	3.20	1000.	
205 Tl	1.85	0.37	ppb	1.17	#VALUE!	
208 Pb	3,485.5	697.1	ppb	0.55	2000.	
232 Th	60.3	12.06	ppb	0.75	1000.	
238 U	45.96	9.192	ppb	0.45	1000.	

ISTD Elements

Element	CPS Mean	RSD(%)	Ref Value	Rec(%)	QC Range(%)	Flag
6 Li	2366640.00	1.11	2276853.30	103.9	69.5 - 130	
45 Sc	2525244.30	0.74	2544664.80	99.2	69.5 - 130	
72 Ge	523151.03	0.67	533822.75	98.0	69.5 - 130	
159 Tb	4566409.50	0.74	4490434.50	101.7	69.5 - 130	
209 Bi	2689579.30	0.75	2704189.50	99.5	69.5 - 130	

ISTD Ref File : C:\ICPCHEM\1\DATA\JIF25A.B\015CALB.D\015CALB.D#

1 :Element Failures 0 :Max. Number of Failures Allowed
0 :ISTD Failures 0 :Max. Number of ISTD Failures Allowed

Data Results:
Analytes: Fail
ISTD: Pass

Katahdin Analytical Services 4001553

Katahdin Analytical Services, Inc. **Metals Preparation Benchsheet**

Reagent Information:

HNO3: 104736 HCL: 99513 H2O2: 403AP1423 **Method:** 3050H

LCS / Spike **LCS/Spiking Information:**

- [x] [x] CLPP-SPK-1 (ID/Vol): MS1928 / 0.1 mL
- [x] [x] CLPP-SPK-INT1 (ID/Vol): MW15522 / 1.0 mL
- [x] [x] CLPP-SPK-INT2 (ID/Vol): MW15498 / 1.0 mL
- [ ] [ ] _____ Spike (ID/Vol): N/A / _____ mL
- [ ] [ ] CLPP-SPK-4 (ID/Vol): N/A / _____ mL

LCSS: N/A Balance ID: BAL 15

Hot Plate/Block ID: A
Start Time/Temp.: 9:17 / 91 °C
End Time/Temp.: 15:16 / 95 °C
Thermometer ID/Pos.: ALC11 / 4:7

Filter Paper: 9627499A

REVIEWED
EGM 06-05-15
KATAHDIN ANALYTICAL
METALS SECTION

Sample ID	Batch ID	Initial Wt/Vol	Initial Units	Final Vol	Final Units	MX	Meth	Anal.	Date	Initial Color	Initial Texture	Final Color	Final Clarity	Artifacts	Bottle
LCSOIF04ICS1	IF04ICS1	1.0	g	0.10	L	SL	IC	TCS	06/04/2015	N/A	N/A	N/A	N/A		N/A
PBSIF04ICS1	IF04ICS1	1.0	g		L	SL	IC	TCS	06/04/2015	N/A	N/A	N/A	N/A		N/A
SI3772-001	IF04ICS1	1.69	g		L	SL	IC	TCS	06/04/2015						A
SI3772-001D	IF04ICS1	1.71	g		L	SL	IC	TCS	06/04/2015						A
SI3772-001S	IF04ICS1	1.69	g		L	SL	IC	TCS	06/04/2015						A
~~SI3772-002~~	~~IF04ICS1~~	~~1.24~~	~~g~~		~~L~~	~~SL~~	~~IC~~	~~TCS~~	~~06/04/2015~~						~~A~~
SI3772-003	IF04ICS1	1.08	g		L	SL	IC	TCS	06/04/2015						A
SI3772-004	IF04ICS1	1.60	g		L	SL	IC	TCS	06/04/2015						A
SI3772-005	IF04ICS1	1.51	g		L	SL	IC	TCS	06/04/2015						A
SI3772-006	IF04ICS1	1.22	g		L	SL	IC	TCS	06/04/2015						A
SI3772-007	IF04ICS1	1.15	g		L	SL	IC	TCS	06/04/2015						A
SI3772-008	IF04ICS1	1.36	g		L	SL	IC	TCS	06/04/2015						A
SI3772-009	IF04ICS1	1.24	g		L	SL	IC	TCS	06/04/2015						A
SI3772-010	IF04ICS1	1.68	g		L	SL	IC	TCS	06/04/2015						A
SI3772-011	IF04ICS1	1.59	g		L	SL	IC	TCS	06/04/2015						A
SI3772-012	IF04ICS1	1.25	g		L	SL	IC	TCS	06/04/2015						A
SI3772-013	IF04ICS1	1.09	g		L	SL	IC	TCS	06/04/2015						A

JRS 6/4/15

Digestion performed by: JRS On: 6/4/15

Katahdin Analytical Services 4001571

B.4 2015 DATA QUALITY REVIEW

PNS Kittery, CTO WE32, OU8

DATA QUALITY REVIEW AND USABILITY

1.0 Data Quality Review

The data quality review summarizes the overall data quality to determine whether sample data are of acceptable quality for the dataset for Operable Unit (OU) 8 at Portsmouth Naval Shipyard (PNS), Kittery, Maine. The process of data review begins with data verification and data validation. Data verification is the process of evaluating correctness and compliance of a specific data set against procedural or contract requirements. Data validation is the process of comparing data quality indicators (DQIs) to prescribed acceptance criteria to assess analytical method performance. Data verification and validation provide a basis for initiating the process of evaluating DQIs of completeness, sensitivity, precision, comparability, and representativeness.

1.1 Data Verification and Validation Process

The data verification and validation process was performed in accordance with the project specific Remedial Investigation (RI) Sampling and Analysis Plan (SAP) (Tetra Tech, May 2015). As part of the data verification process, sample data were reviewed for correctness and completeness of the analytical deliverables, the electronic deliverable, and project contract requirements. The process of data validation evaluated sample data in accordance measurement performance criteria specified in the project SAP. The product of the data validation process is summarized in a technical memorandum presenting qualification of the data, if necessary, and the rationale for making such qualifications.

A brief summary of the validation findings are included in this DQR for information purposes and are detailed within this section.

The holding time from sample collection to extraction was exceeded for two samples in the extractable petroleum hydrocarbon (EPH) fraction. The holding time criterion of 7 days from collection to extraction was exceeded by several days in the affected samples. Detected and nondetected results were qualified as estimated. The net effect on data quality is considered minimal because the samples were stored under proper conditions at the laboratory.

Laboratory blank contamination was observed in some polycyclic aromatic hydrocarbon (PAH) method blanks. The net effect of the presence of low level contamination (all contaminant concentrations were less than the Limit of Quantitation [LOQ]) in the method blanks resulted in the qualification of low levels of PAHs in environmental samples and slightly elevated detection limits. Affected contaminants were fluoranthene, pyrene, and benzo(a)anthracene. The elevated non-detect values prevent a direct comparison of sample PAH concentrations to Project Screening Levels (PSLs) for fluoranthene, pyrene, and benzo(a)anthracene.

Several metal results were qualified due to laboratory blank contamination. The net effect of the presence of low level contamination (all contaminant concentrations were less than the LOQ) in the method or calibration blanks resulted in the qualification of low levels of metals in

environmental samples and slightly elevated detection limits. The elevated non-detect values prevent a direct comparison of sample metal concentrations to PSLs for the sample results qualified due to blank contamination.

Calibration noncompliances were noted for four PAHs; benzo(k)fluoranthene, chrysene, naphthalene and pyrene. The calibration noncompliances were considered minor and the detected results were qualified as estimated (J). No sample results were qualified as rejected due to calibration noncompliance.

Internal standards were added to the samples before PAH analysis to ensure chromatographic sensitivity and responses remain stable. Slightly more than half the samples analyzed for PAHs had internal standard recovery noncompliances. The internal standards, perylene-d12 and/or chrysene-d12, had low recoveries in these affected samples. The internal standard noncompliance suggests some quantitative uncertainty. The lower recoveries imply a potential low bias in the reported results. All results affected by the internal standard noncompliances were qualified as estimated (J flag). No results were qualified as rejected.

All aforementioned non-compliances are not significant enough to render the affected data as unusable according to data validation guidelines used for this project.

1.2 Completeness

Completeness is a measure of the number of valid samples or measurements that are available relative to the number of samples or measurements that were intended to be generated. For this project, completeness was measured on samples collected compared to those intended to be collected.

Comparing the collected groundwater samples compared to the groundwater samples proposed for collection, the sample collection was 100%. The sample collection for the surface soil, shallow and deeper subsurface soil samples was 94%. No samples were collected from the proposed location WTB-SB25 because of refusal during collection.

No data collected at OU8 was rejected therefore the laboratory measurement completeness was 100% for all analytical fractions.

1.3 Sensitivity

Sensitivity is the comparison of project actions levels (PALs) for each analyte to the method detection limits of each analyte measured by the analytical laboratory.

Several soil samples required dilution of 2 to 5 fold in the EPH analysis because of matrix interference. No nondetected results exceeded PAL because of elevated detection limits.

Several soil samples required dilution of 2 to 200 fold for PAH analysis because of matrix interference. All of the diluted sample results were detections.

Numerous groundwater and soil samples required dilution of 2 to 25 fold because of matrix interference. None of the soil samples nondetected beryllium, selenium or silver results

exceeded PAL because of elevated detection limits. The metal nondetected results were below the PSL brackish water criteria.

1.4 Precision

Precision is a measure of the degree to which two or more measurements are in agreement and describes the reproducibility of measurements of the same parameter for samples analyzed under similar conditions. Precision for chemical parameters is expressed as a Relative Percent Difference (RPD), which is defined as the ratio of the difference to the mean for the two values being evaluated.

Approximately 18 percent of the detected PAH analytes, 12 percent of the EPH analytes and 8 percent of the metal analytes were qualified in the soil samples due to uncertainty near the detection limit. In the groundwater samples, only 8 percent of the PAH analytes and 24 percent of the metal analytes were qualified due to uncertainty near the detection limit. Results qualified due to uncertainty near the detection limit are considered imprecise; therefore qualified as estimated, because relative error increases as analyte concentrations approach corresponding instrument detection limits (IDLs). However, such non-compliances are not egregious enough to quality the affected data as rejected according to data validation guidelines used for this project; therefore, data precision is not considered unacceptable due to those data points qualified because of uncertainty near the detection limit.

Field duplicate imprecision was noted in numerous samples for aluminum, antimony, barium, calcium, copper, lead, manganese, silver and zinc. Field duplicate noncompliance in the inorganic analytes is qualified by media and Sample Delivery Group (SDG). This means, for example, that if the RPD for analyte “A” is outside Quality Control (QC) criterion then analyte “A” results are qualified for field duplicate imprecision in sample 1 and all other samples in the same SDG of the same media. Therefore, the outcome is qualification of more samples for a particular analyte.

Two field duplicate pairs had target organic analytes qualified due to field duplicate imprecision. Field duplicate imprecision was noted for only one target PAH analyte in sample WTB-SS-08-0002, phenanthrene. Field duplicate imprecision was noted in sample WTB-SB-22-0601 for twelve target PAH analytes.

Lab duplicate imprecision was noted in several samples for antimony, copper, iron, manganese, mercury and potassium. Qualification was done in the same manner as field duplicate noncompliance in the inorganic analytes.

The inductively coupled plasma (ICP) Interference Check Sample (ICS) is evaluated to verify the laboratory’s inter-element and background correction factors, and to account for potential spectral overlaps and stray light interferences caused by interfering analytes aluminum, calcium, iron, and magnesium. If more than one soil sample was analyzed for serial dilution within the same SDG, qualification to the sample data was done as per preparation batch. The noncompliances were found in four samples representing four batches in the data. The serial dilution percent differences for barium, beryllium, cadmium, potassium, sodium and vanadium exceeded the 10% quality control limit.

All noncompliant results were qualified as estimated (J flag) and were not egregious enough to qualify the affected data as rejected according to data validation guidelines used for this project. The results are considered to be usable for this project.

1.5 Accuracy

Accuracy was assessed by monitoring the analytical recovery of select surrogate compounds added to samples that are analyzed by organic chromatographic methods and the analytical recovery of calibration standards for all analyses. Matrix spike/matrix spike duplicate (MS/MSD) and surrogate compound analyses measure the combined accuracy effects of the sample matrix, sample preparation, and sample measurement. Laboratory accuracy was assessed by comparing calculated %R values to accuracy control limits specified by the laboratory.

Only two samples had parameters qualified due to surrogate noncompliances. In the PAH fraction, sample WTB-SB-13-0206 had a low surrogate recovery of pyrene-d10 which resulted in the qualification of detected acenaphthalene and pyrene results as estimated (J). Samples WTB-SB-13-0206 and WTB-SB-12-0002 had low surrogate recovery in the EPH fraction resulting in the qualification of results as estimated (J flag).

Matrix spike noncompliances resulted in the qualification of eleven PAH results in two samples. Sample WTB-SB-24-069.7 had low recoveries of benzo(a)pyrene and benzo(g,h,i)perylene. Sample WTB-SB-20-0206 had 9 PAHs with recoveries outside quality control limits. All noncompliant results were qualified as estimated (J flag) and were not egregious enough to qualify the affected data as rejected according to data validation guidelines used for this project.

Numerous metals had MS recoveries outside quality limits. Qualification was done in the same manner as field duplicate noncompliance in the inorganic analytes. Therefore, the outcome is qualification of more samples for a particular analyte.

All of the MS noncompliances for metals resulted in the qualification of detected results as estimated (J flag). Manganese results were qualified as biased low (J-) for the detected manganese results implying a potential low bias in the reported results.

No results were qualified as rejected due to surrogate or matrix spike noncompliances. The results are considered to be usable for this project.

1.6 Comparability

Comparability is defined as the confidence with which one data set can be compared with another (e.g., among sampling points and among sampling events). Comparability was achieved by using standardized sampling and analysis methods, as well as standardized data reporting formats. Comparability of laboratory measurements was achieved primarily through the use and documentation of standard sampling and analytical methods. Results were reported in units that ensured comparability with previous data and with current state and federal standards and guidelines. Comparability of laboratory measurements was assessed primarily through the use of QC samples and through adherence to the quality assurance (QA) plan.

In general, the results of the data described in this review are comparable in quality to the data typically observed for soil and groundwater sample PAHs, EPH and metal analyses. The analytical methods used and the observed analytical performance are typical of methods used throughout the environmental industry.

As indicated in Section 1.4 and 1.5, precision and accuracy are typical for soil and groundwater sample analyses for the analytical methods that were used. As described in Section 1.3, the greatest deficiency observed for these results is the inability to directly compare reported target analyte concentrations to PSLs for analytes with elevated non-detect values.

1.7 Representativeness

Representativeness is an expression of the degree to which data accurately and precisely depict the actual characteristics of a population or environmental condition existing at the site. The use of standardized sampling, sample handling, sample analysis, and data reporting procedures were designed so that the final data would be accurate representations of actual site conditions. Because no data points were rejected and all sample collection and laboratory protocols were conducted in a manner consistent with the planning document, the data is considered representative of site conditions and intended populations.

1.8 Usability

The overall data quality of the analytical suite in support of the 2015 OU8 sampling event is considered acceptable and satisfies the data quality objectives for the project. Sample data qualifications summarized in the preceding sections were considered minor in nature because none of the data was rejected or unusable. The quality of the analytical data is acceptable for use in decision making.

APPENDIX C

HUMAN HEALTH RISK ASSESSMENT SUPPORTING INFORMATION

APPENDIX C.1

RAGS PART D TABLES

RAGS Part D Table 1

Selection of Exposure Pathways

TABLE 1
SELECTION OF EXPOSURE PATHWAYS
OU8, PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface Soil	Surface Soil	OU8	Construction Workers	Adult	Ingestion Dermal	Quant Quant	Construction workers may have contact with surface soil during excavation activities.
		Air	OU8	Construction Workers	Adult	Inhalation	Quant	Construction workers may inhale air/dust particulates and vapors from surface soil during excavation activities.
	Subsurface Soil	Subsurface Soil	OU8	Construction Workers	Adult	Ingestion Dermal	Quant Quant	Construction workers may have contact with subsurface soil during excavation activities.
		Air	OU8	Construction Workers	Adult	Inhalation	Quant	Construction workers may inhale air/dust particulates and vapors from subsurface soil during excavation activities.
	Groundwater	Groundwater	OU8	Construction Workers	Adult	Ingestion Dermal	Quant Quant	Construction workers may contact with groundwater during excavation activities.
		Air	OU8	Construction Workers	Adult	Inhalation	None	No volatile COPCs were selected for groundwater.
Future	Surface Soil	Surface Soil	OU8	Occupational Workers	Adult	Ingestion Dermal	Quant Quant	Occupational workers may have contact with surface soil while working at the site.
				Recreational Users	Child	Ingestion Dermal	Quant Quant	Recreational users may contact surface soil while at the site.
					Adult	Ingestion Dermal	Quant Quant	Recreational users may contact surface soil while at the site.
				Residents	Child	Ingestion Dermal	Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Ingestion Dermal	Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
		Air	OU8	Occupational Workers	Adult	Inhalation	Quant Quant	Occupational workers may inhale air/dust particulates and vapors from surface soil while working at the site.
				Recreational Users	Child	Inhalation	Quant	Recreational users may inhale air/dust particulates and vapors from surface soil while at the site.
					Adult	Inhalation	Quant	Recreational users may inhale air/dust particulates and vapors from surface soil while at the site.
				Residents	Child	Inhalation	Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Inhalation	Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
	Groundwater	Vapor Intrusion	OU8	Occupational Workers	Adult	Inhalation	None	No COPCs were selected for vapor intrusion.
		Air	OU8	Residents	Child	Inhalation	None	No COPCs were selected for vapor intrusion.
					Adult	Inhalation	None	No COPCs were selected for vapor intrusion.

Notes:
COPC - Chemical of potential concern.
Quant - Quantitative.

RAGS Part D Table 2

Occurrence, Distribution and Selection Of Chemicals of Potential Concern

LIST OF TABLES
RAGS PART D TABLE 2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Table No.

2.1 Surface Soil - Direct Contact
2.2 Subsurface Soil - Direct Contact
2.3 Groundwater - Direct Contact
2.4 Groundwater - Vapor Intrusion

TABLE 2.1
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE SOIL
OU8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Site Data within Background[4]? (Yes/No)	USEPA RSL - Residential Soil[5]	Potential ARAR/TBC	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection[6]
OU8	**EPH MADEP**														
	--	**C11-C22 Aromatics**	10 J	1800	MG/KG	WTB-SS-19-0002	13/17	14 - 23	1800	NA	**750** [7]	NA	NA	**Yes**	ASL
	--	C19-C36 Aliphatics	12 J	140	MG/KG	WTB-SS-11-0002	11/17	14 - 31	140	--	10000 [7]	NA	NA	No	BSL
	METALS														
	7429-90-5	Aluminum	1730	18600	MG/KG	WTB-SS-20-0002	20/20	-	18600	Yes	**7700 N**	NA	NA	No	BKG
	7440-36-0	**Antimony**	0.1 J	3.2 J	MG/KG	WTB-SS02-0001-98	15/20	0.047 - 0.91	3.2	NA	**3.1 N**	NA	NA	**Yes**	ASL
	7440-38-2	Arsenic	1.64 J	18.6	MG/KG	WTB-SS-14-0002	20/20	-	18.6	Yes	**0.68 C**	NA	NA	No	BKG
	7440-39-3	Barium	8.02 J	276	MG/KG	WTB-SS-15-0002	20/20	-	276	--	1500 N	NA	NA	No	BSL
	7440-41-7	Beryllium	0.269 J	1.09 J	MG/KG	WTB-SS-20-0002	17/20	0.267 - 0.568	1.09	--	16 N	NA	NA	No	BSL
	7440-43-9	Cadmium	0.038 J	1.9 J	MG/KG	WTB-SS06-0001-98	16/20	0.371 - 0.805	1.9	--	7.1 N	NA	NA	No	BSL
	7440-70-2	Calcium	448	13200 J	MG/KG	WTB-SS-22-0002	20/20	-	13200	--	NA	NA	NA	No	NUT
	7440-47-3	Chromium	3.33 J	234	MG/KG	WTB-SS-11-0002	20/20	-	234	--	12000 N[8]	NA	NA	No	BSL
	7440-48-4	Cobalt	1.62	19.5	MG/KG	WTB-SS07-0001-98	20/20	-	19.5	Yes	**2.3 N**	NA	NA	No	BKG
	7440-50-8	**Copper**	4.68 J	769	MG/KG	WTB-SS-23-0002	20/20	-	769	No	**310 N**	NA	NA	**Yes**	ASL
	7439-89-6	**Iron**	5280	48500	MG/KG	WTB-SS-23-0002	20/20	-	48500	No	**5500 N**	NA	NA	**Yes**	ASL
	7439-92-1	Lead	7.86 J	858	MG/KG	WTB-SS-23-0002	20/20	-	858	Yes	**400**	NA	NA	No	BKG
	7439-95-4	Magnesium	587	12400	MG/KG	WTB-SS07-0001-98	20/20	-	12400	--	NA	NA	NA	No	NUT
	7439-96-5	**Manganese**	162 J-	672 J	MG/KG	WTB-SS-11-0002	20/20	-	672	No	**180 N**	NA	NA	**Yes**	ASL
	7439-97-6	Mercury	0.0082 J	1.45 J	MG/KG	WTB-SS-18-0002	18/20	0.014 - 0.018	1.45	--	2.3 N[9]	NA	NA	No	BSL
	7440-02-0	**Nickel**	3.18	260	MG/KG	WTB-SS-11-0002	20/20	-	260	No	**150 N**	NA	NA	**Yes**	ASL
	7440-09-7	Potassium	591 J	6040 J	MG/KG	WTB-SS-12-0002	20/20	-	6040	--	NA	NA	NA	No	NUT
	7782-49-2	Selenium	0.19 J	0.75 J	MG/KG	WTB-SS-18-0002	5/20	0.46 - 2.5	0.75	--	39 N	NA	NA	No	BSL
	7440-22-4	Silver	0.049 J	0.8 J	MG/KG	WTB-SS-15-0002	9/20	0.31 - 1.3	0.8	NA	39 N	NA	NA	No	BSL
	7440-23-5	Sodium	62.2 J	1470 J	MG/KG	WTB-SS-15-0002	18/20	116 - 266	1470	--	NA	NA	NA	No	NUT
	7440-28-0	**Thallium**	0.0759	0.32	MG/KG	WTB-SS-20-0002	15/20	0.072 - 1	0.32	NA	**0.078 N**	NA	NA	**Yes**	ASL
	7440-62-2	Vanadium	4.08	69.3	MG/KG	WTB-SS-12-0002	20/20	-	69.3	Yes	**39 N**	NA	NA	No	BKG
	7440-66-6	Zinc	22.7 J	900 J	MG/KG	WTB-SS06-0001-98	20/20	-	900	--	2300 N	NA	NA	No	BSL
	PETROLEUM HYDROCARBONS														
	--	Diesel Range Organics	160 J	170	MG/KG	WTB-SS06-0001-98	2/3	84 - 84	170	--	NA	NA	NA	No	NTX
	--	Gasoline Range Organics	3.1	3.1	MG/KG	WTB-SS02-0001-98	1/3	2.5 - 2.5	3.1	--	NA	NA	NA	No	NTX
	POLYCYCLIC AROMATIC HYDROCARBONS														
	83-32-9	Acenaphthene	5.1 J	1600 J	UG/KG	WTB-SS-16-0002	10/20	8.9 - 330	1600	--	360000 N	NA	NA	No	BSL
	208-96-8	Acenaphthylene	2.3 J	260	UG/KG	WTB-SS-12-0002	9/20	8.9 - 360	260	--	360000 N[10]	NA	NA	No	BSL
	120-12-7	Anthracene	3.9 J	3900	UG/KG	WTB-SS-16-0002	15/20	8.9 - 330	3900	--	1800000 N	NA	NA	No	BSL
	--	**BAP Equivalent-HalfND**	11	15000	UG/KG	WTB-SS-23-0002	19/20	9.9 - 9.9	15000	No	**16 C**	NA	NA	**Yes**	ASL
	--	**BAP Equivalent-Pos**	0.44	15000	UG/KG	WTB-SS-23-0002	19/20	9.9 - 9.9	15000	No	**16 C**	NA	NA	**Yes**	ASL
	56-55-3	**Benzo(a)anthracene**	4.7 J	13000	UG/KG	WTB-SS-16-0002	17/20	9.9 - 10	13000	No	**160 C**	NA	NA	**Yes**	ASL
	50-32-8	**Benzo(a)pyrene**	6.3 J	10000	UG/KG	WTB-SS-23-0002	17/20	9.9 - 10	10000	No	**16 C**	NA	NA	**Yes**	ASL
	205-99-2	**Benzo(b)fluoranthene**	4.4 J	15000	UG/KG	WTB-SS-23-0002	19/20	9.9 - 9.9	15000	No	**160 C**	NA	NA	**Yes**	ASL
	191-24-2	Benzo(g,h,i)perylene	5.4 J	6100	UG/KG	WTB-SS-23-0002	17/20	9.9 - 10	6100	--	180000 N[11]	NA	NA	No	BSL

TABLE 2.1
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE SOIL
OU8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Site Data within Background[4]? (Yes/No)	USEPA RSL - Residential Soil[5]	Potential ARAR/TBC	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection[6]
OU8	POLYCYCLIC AROMATIC HYDROCARBONS (CONTINUED)														
	207-08-9	Benzo(k)fluoranthene	3.6 J	4700	UG/KG	WTB-SS-23-0002	16/20	8.9 - 10	4700	No	1600 C	NA	NA	Yes	ASL
	218-01-9	Chrysene	11 J	12000 J	UG/KG	WTB-SS-16-0002, WTB-SS-23-0002	16/20	8.9 - 10	12000	--	16000 C	NA	NA	No	BSL
	53-70-3	Dibenzo(a,h)anthracene	12 J	1700	UG/KG	WTB-SS-23-0002	15/20	8.9 - 10	1700	NA	16 C	NA	NA	Yes	ASL
	206-44-0	Fluoranthene	8.5 J	24000	UG/KG	WTB-SS-16-0002	17/20	9.9 - 10	24000	--	240000 N	NA	NA	No	BSL
	86-73-7	Fluorene	4.5 J	1400 J	UG/KG	WTB-SS-16-0002	12/20	8.9 - 330	1400	--	240000 N	NA	NA	No	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	5.2 J	6700	UG/KG	WTB-SS-23-0002	17/20	9.9 - 10	6700	No	160 C	NA	NA	Yes	ASL
	91-20-3	Naphthalene	8.1 J	120	UG/KG	WTB-SS-15-0002	10/20	8.9 - 330	120	--	3800 C	NA	NA	No	BSL
	85-01-8	Phenanthrene	2.1 J	13000	UG/KG	WTB-SS-16-0002	19/20	9.9 - 9.9	13000	--	180000 N[11]	NA	NA	No	BSL
	129-00-0	Pyrene	9.2 J	27000 J	UG/KG	WTB-SS-23-0002	17/20	9.9 - 10	27000	--	180000 N	NA	NA	No	BSL
	SEMIVOLATILES														
	91-57-6	2-Methylnaphthalene	25 J	38 J	UG/KG	WTB-SS02-0001-98	2/3	330 - 330	38	--	24000 N	NA	NA	No	BSL
	85-68-7	Butyl Benzyl Phthalate	36 J	36 J	UG/KG	WTB-SS06-0001-98	1/3	330 - 330	36	--	290000 C	NA	NA	No	BSL
	86-74-8	Carbazole	28 J	76 J	UG/KG	WTB-SS02-0001-98	2/3	330 - 330	76	--	NA	NA	NA	No	NTX
	132-64-9	Dibenzofuran	28 J	28 J	UG/KG	WTB-SS06-0001-98	1/3	330 - 330	28	--	7300 N	NA	NA	No	BSL
	84-74-2	di-n-Butyl Phthalate	24 J	24 J	UG/KG	WTB-SS06-0001-98	1/3	330 - 330	24	--	630000 N	NA	NA	No	BSL
	VOLATILES														
	74-83-9	Bromomethane	1 J	1 J	UG/KG	WTB-SS06-0001-98	1/3	10 - 11	1	--	680 N	NA	NA	No	BSL

Footnotes:
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - To determine whether chemical concentrations were within background levels, a statistical analysis was conducted for chemicals above screening levels using the site and background datasets. The background analysis was not performed for chemicals with maximum concentrations less than screening levels.
5 - USEPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites, May 2016 (unless otherwise noted). The noncarcinogenic values (denoted with a "N" flag) correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of $1x10^{-6}$ (carcinogens denoted with a "C" flag).
6 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be greater than background.
7 - MEDEP Remedial Action Guidelines for Sites Contaminated with Hazardous Substances (MEDEP, May 2013).
8 - Value for trivalent chromium.
9 - Value for mercuric chloride.
10 - Value is for acenaphthene.
11 - Value is for pyrene.

Shaded criterion indicates that the maximum detected concentration exceeds one or more screening criteria. Shaded chemical name indicates that the chemical was retained as a COPC.

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available

Rationale Codes:
For selection as a COPC:
ASL = Above screening level and background
For elimination as a COPC:
BKG = Less than background concentration
BSL = Below COPC screening level
NUT = Essential nutrient
NTX = No toxicity criteria

TABLE 2.1
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE SOIL
OU8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Site Data within Background[4]? (Yes/No)	USEPA RSL - Residential Soil[5]	Potential ARAR/TBC	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection[6]

Associated Samples:

WTB-SS02-0001-98	WTB-SS-16-0002
WTB-SS06-0001-98	WTB-SS-17-0002
WTB-SS07-0001-98	WTB-SS-18-0002
WTB-SS-08-0002	WTB-SS-19-0002
WTB-SS-08-0002-D	WTB-SS-20-0002
WTB-SS-09-0002	WTB-SS-20-0002-D
WTB-SS-10-0002	WTB-SS-21-0002
WTB-SS-11-0002	WTB-SS-22-0002
WTB-SS-12-0002	WTB-SS-23-0002
WTB-SS-13-0002	WTB-SS-24-0002
WTB-SS-14-0002	
WTB-SS-15-0002	

TABLE 2.2
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SUBSURFACE SOIL
OU8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Site Data within Background[4]? (Yes/No)	USEPA RSL - Residential Soil[5]	Potential ARAR/TBC	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection[6]
OU8	EPH MADEP														
	--	C11-C22 Aromatics	12 J	2200	MG/KG	WTB-SB-17-0610	33/34	16 - 16	2200	NA	750 [7]	NA	NA	Yes	ASL
	--	C19-C36 Aliphatics	14 J	2500	MG/KG	WTB-SB-08-0206	28/34	15 - 28	2500	--	10000 [7]	NA	NA	No	BSL
	--	C9-C18 Aliphatics	11 J	170	MG/KG	WTB-SB-11-0206	15/34	15 - 120	170	--	2700 [7]	NA	NA	No	BSL
	METALS														
	7429-90-5	Aluminum	1910	18100	MG/KG	WTB-SB-16-0206	45/45	-	18100	Yes	7700 N	NA	NA	No	BKG
	7440-36-0	Antimony	0.11	1610 J	MG/KG	WTB-SB-09-0206	31/41	0.047 - 1.1	1610	NA	3.1 N	NA	NA	Yes	ASL
	7440-38-2	Arsenic	2.48	61.9	MG/KG	WTB-SB-08-0206	45/45	-	61.9	No	0.68 C	NA	NA	Yes	ASL
	7440-39-3	Barium	14.1 J	959 J	MG/KG	WTB-SB-21-0206	45/45	-	959	--	1500 N	NA	NA	No	BSL
	7440-41-7	Beryllium	0.262 J	1 J	MG/KG	WTB-SB-16-0206	35/45	0.18 - 4.94	1	--	16 N	NA	NA	No	BSL
	7440-43-9	Cadmium	0.053 J	7.64	MG/KG	WTB-SB-11-0206	29/45	0.153 - 5.22	7.64	No	7.1 N	NA	NA	Yes	ASL
	7440-70-2	Calcium	652 J	71900	MG/KG	WTB-SB-21-0206	45/45	-	71900	--	NA	NA	NA	No	NUT
	7440-47-3	Chromium	10.7 J	5780	MG/KG	WTB-SB-11-0610	43/45	6.7 - 7	5780	--	12000 N[8]	NA	NA	No	BSL
	7440-48-4	Cobalt	4	40.7	MG/KG	WTB-SB-11-0206	45/45	-	40.7	No	2.3 N	NA	NA	Yes	ASL
	7440-50-8	Copper	15.2	39600 J	MG/KG	WTB-SB-09-0610	45/45	-	39600	No	310 N	NA	NA	Yes	ASL
	7439-89-6	Iron	8300	269000	MG/KG	WTB-SB-11-0206	45/45	-	269000	No	5500 N	NA	NA	Yes	ASL
	7439-92-1	Lead	4.79	20100	MG/KG	WTB-SB-09-0206	43/45	21.9 - 36.9	20100	No	400	NA	NA	Yes	ASL
	7439-95-4	Magnesium	328	9960	MG/KG	WTB-SB03-0305-98	45/45	-	9960	--	NA	NA	NA	No	NUT
	7439-96-5	Manganese	33.3 J	12600 J	MG/KG	WTB-SB-11-0610	45/45	-	12600	No	180 N	NA	NA	Yes	ASL
	7439-97-6	Mercury	0.012 J	18.6 J	MG/KG	WTB-SB-11-0206	42/45	0.014 - 0.07	18.6	No	2.3 N[9]	NA	NA	Yes	ASL
	7440-02-0	Nickel	9.1 J	3260	MG/KG	WTB-SB-11-0610	43/45	8.7 - 10.3	3260	No	150 N	NA	NA	Yes	ASL
	7440-09-7	Potassium	634	4720 J	MG/KG	WTB-SB-21-0206	45/45	-	4720	--	NA	NA	NA	No	NUT
	7782-49-2	Selenium	0.22 J	1.6	MG/KG	WTB-SB-22-0206	14/45	0.52 - 19	1.6	--	39 N	NA	NA	No	BSL
	7440-22-4	Silver	0.063 J	6.86 J	MG/KG	WTB-SB-09-0206	22/45	0.26 - 9.23	6.86	--	39 N	NA	NA	No	BSL
	7440-23-5	Sodium	154 J	2300 J	MG/KG	WTB-SB-21-0206	36/45	155 - 761	2300	--	NA	NA	NA	No	NUT
	7440-28-0	Thallium	0.108	0.254	MG/KG	WTB-SB-10-0610	27/45	0.065 - 0.98	0.254	No	0.078 N	NA	NA	Yes	ASL
	7440-62-2	Vanadium	8.92	84.4 J	MG/KG	WTB-SB-17-0610	44/45	22.3 - 22.3	84.4	Yes	39 N	NA	NA	No	BKG
	7440-66-6	Zinc	30.6	7350	MG/KG	WTB-SB-09-0206	45/45	-	7350	No	2300 N	NA	NA	Yes	ASL
	MISCELLANEOUS PARAMETERS														
	57-12-5	Cyanide	34	34	MG/KG	WTB-SB02-0305-98	1/11	2 - 2	34	NA	2.3 N	NA	NA	Yes	ASL
	PESTICIDES/PCBS														
	309-00-2	Aldrin	1.9 J	5.3 J	UG/KG	WTB-SB07-0305-98	3/10	1.8 - 2.7	5.3	--	39 C	NA	NA	No	BSL
	33213-65-9	Endosulfan II	5 J	5 J	UG/KG	WTB-SB07-0709-98	1/11	3.6 - 5.3	5	--	47000 N	NA	NA	No	BSL
	PETROLEUM HYDROCARBONS														
	--	Diesel Range Organics	57	340 J	MG/KG	WTB-SB02-0305-98	4/11	28 - 330	340	--	NA	NA	NA	No	NTX
	--	Gasoline Range Organics	13	13	MG/KG	WTB-SB02-0305-98	1/11	2.5 - 4.8	13	--	NA	NA	NA	No	NTX
	POLYCYCLIC AROMATIC HYDROCARBONS														
	83-32-9	Acenaphthene	1.9 J	2200	UG/KG	WTB-SB-23-0206	30/45	9.1 - 530	2200	--	360000 N	NA	NA	No	BSL
	208-96-8	Acenaphthylene	2.3 J	290	UG/KG	WTB-SB-23-0206	20/45	9.1 - 530	290	--	360000 N[10]	NA	NA	No	BSL
	120-12-7	Anthracene	1.9 J	5100	UG/KG	WTB-SB-23-0206	41/45	9.1 - 530	5100	--	1800000 N	NA	NA	No	BSL

TABLE 2.2
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SUBSURFACE SOIL
OU8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Site Data within Background[4]? (Yes/No)	USEPA RSL - Residential Soil[5]	Potential ARAR/TBC	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection[6]
OU8	POLYCYCLIC AROMATIC HYDROCARBONS (CONTINUED)														
	--	BAP Equivalent-HalfND	12	17000	UG/KG	WTB-SB-23-0206	43/45	9.1 - 9.8	17000	No	16 C	NA	NA	Yes	ASL
	--	BAP Equivalent-Pos	6.1	17000	UG/KG	WTB-SB-23-0206	43/45	9.1 - 9.8	17000	No	16 C	NA	NA	Yes	ASL
	56-55-3	Benzo(a)anthracene	4.4 J	14000	UG/KG	WTB-SB-23-0206	43/45	9.1 - 9.8	14000	No	160 C	NA	NA	Yes	ASL
	50-32-8	Benzo(a)pyrene	4.8 J	12000	UG/KG	WTB-SB-23-0206	43/45	9.1 - 9.8	12000	No	16 C	NA	NA	Yes	ASL
	205-99-2	Benzo(b)fluoranthene	8.1 J	17000	UG/KG	WTB-SB-23-0206	43/45	9.1 - 9.8	17000	No	160 C	NA	NA	Yes	ASL
	191-24-2	Benzo(g,h,i)perylene	11 J	6100	UG/KG	WTB-SB-23-0206	40/45	9.1 - 400	6100	--	180000 N[11]	NA	NA	No	BSL
	207-08-9	Benzo(k)fluoranthene	11 J	6700	UG/KG	WTB-SB-23-0206	41/45	9.1 - 530	6700	No	1600 C	NA	NA	Yes	ASL
	218-01-9	Chrysene	60	13000	UG/KG	WTB-SB-23-0206	42/45	9.1 - 10	13000	--	16000 C	NA	NA	No	BSL
	53-70-3	Dibenzo(a,h)anthracene	11 J	1600	UG/KG	WTB-SB-23-0206, WTB-SB-23-0610	40/45	9.1 - 13	1600	NA	16 C	NA	NA	Yes	ASL
	206-44-0	Fluoranthene	7.9 J	33000	UG/KG	WTB-SB-23-0206	43/45	9.1 - 9.8	33000	--	240000 N	NA	NA	No	BSL
	86-73-7	Fluorene	3.9 J	2200	UG/KG	WTB-SB-23-0206	34/45	9.1 - 530	2200	--	240000 N	NA	NA	No	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	8.7 J	6500	UG/KG	WTB-SB-23-0206	43/45	9.1 - 10	6500	No	160 C	NA	NA	Yes	ASL
	91-20-3	Naphthalene	6.9 J	470	UG/KG	WTB-SB-23-0206	30/45	9.1 - 400	470	--	3800 C	NA	NA	No	BSL
	85-01-8	Phenanthrene	5.1 J	13000	UG/KG	WTB-SB-23-0206	44/45	9.1 - 9.1	13000	--	180000 N[11]	NA	NA	No	BSL
	129-00-0	Pyrene	8.9 J	25000	UG/KG	WTB-SB-23-0206	43/45	9.1 - 10	25000	--	180000 N	NA	NA	No	BSL
	SEMIVOLATILES														
	91-57-6	2-Methylnaphthalene	26 J	300 J	UG/KG	WTB-SB06-0507-98	8/11	360 - 400	300	--	24000 N	NA	NA	No	BSL
	117-81-7	Bis(2-ethylhexyl)phthalate	610	2000	UG/KG	WTB-SB03-0305-98	2/11	210 - 530	2000	--	39000 C	NA	NA	No	BSL
	85-68-7	Butyl Benzyl Phthalate	38 J	38 J	UG/KG	WTB-SB06-0305-98	1/11	360 - 530	38	--	290000 C	NA	NA	No	BSL
	86-74-8	Carbazole	24 J	380 J	UG/KG	WTB-SB06-0507-98	6/11	400 - 430	380	--	NA	NA	NA	No	NTX
	132-64-9	Dibenzofuran	23 J	320 J	UG/KG	WTB-SB06-0507-98	4/11	360 - 530	320	--	7300 N	NA	NA	No	BSL
	84-74-2	di-n-Butyl Phthalate	22 J	22 J	UG/KG	WTB-SB06-0305-98	1/11	360 - 530	22	--	630000 N	NA	NA	No	BSL
	VOLATILES														
	76-13-1	1,1,2-Trichlorotrifluoroethane	1 J	6 J	UG/KG	WTB-SB03-0305-98	3/11	11 - 16	6	--	4000000 N	NA	NA	No	BSL
	78-93-3	2-Butanone	8 J	8 J	UG/KG	WTB-SB02-0305-98	1/11	11 - 16	8	--	2700000 N	NA	NA	No	BSL
	67-64-1	Acetone	240	2500 J	UG/KG	WTB-SB06-0305-98	2/11	11 - 1900	2500	--	6100000 N	NA	NA	No	BSL
	71-43-2	Benzene	2 J	2 J	UG/KG	WTB-SB07-0709-98	1/10	11 - 16	2	--	1200 C	NA	NA	No	BSL
	75-15-0	Carbon Disulfide	4 J	4 J	UG/KG	WTB-SB04-0911-98	1/11	11 - 16	4	--	77000 N	NA	NA	No	BSL
	67-66-3	Chloroform	1 J	4 J	UG/KG	WTB-SB07-0709-98	3/11	11 - 16	4	--	320 C	NA	NA	No	BSL
	100-41-4	Ethylbenzene	2 J	2 J	UG/KG	WTB-SB07-0709-98	1/9	11 - 12	2	--	5800 C	NA	NA	No	BSL
	127-18-4	Tetrachloroethene	6 J	6 J	UG/KG	WTB-SB07-0709-98	1/9	11 - 12	6	--	8100 N	NA	NA	No	BSL
	108-88-3	Toluene	6 J	6 J	UG/KG	WTB-SB02-0709-98, WTB-SB07-0709-98	2/9	11 - 12	6	--	490000 N	NA	NA	No	BSL
	79-01-6	Trichloroethene	7 J	7 J	UG/KG	WTB-SB07-0709-98	1/10	3 - 12	7	--	410 N	NA	NA	No	BSL

TABLE 2.2
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SUBSURFACE SOIL
OU8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects(2)	Concentration Used for Screening(3)	Site Data within Background(4)? (Yes/No)	USEPA RSL - Residential Soil(5)	Potential ARAR/TBC	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection(6)

Footnotes:
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - To determine whether chemical concentrations were within background levels, a statistical analysis was conducted for chemicals above screening levels using the site and background datasets. The background analysis was not performed for chemicals with maximum concentrations less than screening levels.
5 - USEPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites, May 2016 (unless otherwise noted). The noncarcinogenic values (denoted with a "N" flag)correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of $1x10^{-6}$ (carcinogens denoted with a "C" flag).
6 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be greater than background.
7 - MEDEP Remedial Action Guidelines for Sites Contaminated with Hazardous Substances (MEDEP, May 2013).
8 - Value for trivalent chromium.
9 - Value for mercuric chloride.
10 - Value is for acenaphthene.
11 - Value is for pyrene.

Shaded criterion indicates that the maximum detected concentration exceeds one or more screening criteria. Shaded chemical name indicates that the chemical was retained as a COPC.

Associated Samples:

WTB-SB02-0305-98	WTB-SB-12-0206	WTB-SB-20-0610
WTB-SB02-0709-98	WTB-SB-12-0610	WTB-SB-21-0206
WTB-SB03-0305-98	WTB-SB-13-0206	WTB-SB-21-0610
WTB-SB03-0911-98	WTB-SB-13-0610	WTB-SB-22-0206
WTB-SB04-0305-98	WTB-SB-14-0206	WTB-SB-22-0610
WTB-SB04-0709-98	WTB-SB-14-0206-D	WTB-SB-22-0610-D
WTB-SB04-0911-98	WTB-SB-14-0607	WTB-SB-23-0206
WTB-SB06-0305-98	WTB-SB-15-0206	WTB-SB-23-0610
WTB-SB06-0507-98	WTB-SB-15-0206-D	WTB-SB-24-0206
WTB-SB07-0305-98	WTB-SB-15-0610	WTB-SB-24-069.7
WTB-SB07-0709-98	WTB-SB-16-0206	
WTB-SB-08-0206	WTB-SB-16-0610	
WTB-SB-08-0610	WTB-SB-17-0206	
WTB-SB-09-0206	WTB-SB-17-0610	
WTB-SB-09-0610	WTB-SB-18-0206	
WTB-SB-10-0206	WTB-SB-18-0610	
WTB-SB-10-0610	WTB-SB-19-0206	
WTB-SB-11-0206	WTB-SB-19-0610	
WTB-SB-11-0610	WTB-SB-20-0206	

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available

Rationale Codes:
For selection as a COPC:
ASL = Above screening level and background

For elimination as a COPC:
BKG = Less than background concentration
BSL = Below COPC screening level
NUT = Essential nutrient
NTX = No toxicity criteria

TABLE 2.3
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH GROUNDWATER
OU8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Range of Background Concentrations[4]	Construction Worker Screening Level[5]	Upgradient Concentration[6]	Potential ARAR/TBC	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
OU8	**POLYCYCLIC AROMATIC HYDROCARBONS**														
	83-32-9	Acenaphthene	0.26	0.39	UG/L	WTB-GW-MW06-0615	2/6	0.094 - 0.098	0.39	NA	3700 N	ND	NA	No	BSL
	120-12-7	Anthracene	0.13 J	0.13 J	UG/L	WTB-GW-MW05R-0615	1/6	0.094 - 0.098	0.13	NA	9980 N	ND	NA	No	BSL
	206-44-0	Fluoranthene	0.15 J	0.15 J	UG/L	WTB-GW-MW05R-0615	1/6	0.094 - 0.098	0.15	NA	195000 N	ND	NA	No	BSL
	86-73-7	Fluorene	0.14 J	0.18 J	UG/L	WTB-GW-MW05R-0615	2/6	0.094 - 0.098	0.18	NA	5560 N	ND	NA	No	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	0.13 J	0.14 J	UG/L	WTB-GW-MW03-0615	1/6	0.094 - 0.095	0.14	NA	1870 C	ND	NA	No	BSL
	91-20-3	Naphthalene	0.085 J	0.38	UG/L	WTB-GW-MW06-0615	6/6	-	0.38	NA	23200 N	0.11	NA	No	BSL
	85-01-8	Phenanthrene	0.12 J	0.69	UG/L	WTB-GW-MW05R-0615	2/6	0.094 - 0.098	0.69	NA	584000 N[8]	ND	NA	No	BSL
	129-00-0	Pyrene	0.12 J	0.12 J	UG/L	WTB-GW-MW05R-0615	1/6	0.094 - 0.098	0.12	NA	1820 N	ND	NA	No	BSL
	METALS														
	7440-38-2	Arsenic	3.6 J	20 J	UG/L	WTB-GW-MW05R-0615	6/6	-	20	NA	342 N	17	NA	No	BSL
	7440-39-3	Barium	44.3	1620	UG/L	WTB-GW-MW06-0615	6/6	-	1620	NA	35100 N	1100	NA	No	BSL
	7440-70-2	Calcium	61800	330000	UG/L	WTB-GW-MW05R-0615	6/6	-	330000	NA	NA	862000	NA	No	NUT
	7440-47-3	Chromium	1 J	2.9 J	UG/L	WTB-GW-MW06-0615	4/6	1.2 - 14	2.9	NA	26700 N[9]	ND	NA	No	BSL
	7440-48-4	Cobalt	3.96	3.96	UG/L	WTB-GW-MW07-0615	1/6	0.55 - 4.22	3.96	NA	4550 N	48.1	NA	No	BSL
	7440-50-8	Copper	12 J	12 J	UG/L	WTB-GW-MW02-0615	1/6	2.2 - 10.7	12	NA	45700 N	22	NA	No	BSL
	7439-89-6	Iron	5980	8050	UG/L	WTB-GW-MW07-0615	4/6	15 - 417	8050	NA	799000 N	12300	NA	No	BSL
	7439-92-1	Lead	1.5 J	23.9	UG/L	WTB-GW-MW02-0615	5/6	4 - 20	23.9	NA	1340	ND	NA	No	BSL
	7439-95-4	Magnesium	14100	820000	UG/L	WTB-GW-MW05R-0615	6/6	-	820000	NA	NA	54500	NA	No	NUT
	7439-96-5	**Manganese**	455	2630	UG/L	WTB-GW-MW05R-0615	5/6	4 - 4	2630	6.1 - 340; 3 - 3580	**2510 N**	22700	NA	**Yes**	ASL
	7439-97-6	Mercury	0.059 J	0.152 J	UG/L	WTB-GW-MW02-0615	2/6	0.1 - 0.1	0.152	NA	351 N[10]	ND	NA	No	BSL
	7440-02-0	Nickel	1.4 J	69.5	UG/L	WTB-GW-MW04-0615	5/6	5.64 - 8	69.5	NA	8600 N	421	NA	No	BSL
	7440-09-7	Potassium	8800	337000	UG/L	WTB-GW-MW05R-0615	6/6	-	337000	NA	NA	41200	NA	No	NUT
	7782-49-2	Selenium	1.2 J	2.77 J	UG/L	WTB-GW-MW07-0615	2/6	0.29 - 15	2.77	NA	5710 N	ND	NA	No	BSL
	7440-23-5	Sodium	210000	7270000	UG/L	WTB-GW-MW05R-0615	6/6	-	7270000	NA	NA	6450000	NA	No	NUT
	7440-62-2	Vanadium	0.53 J	0.53 J	UG/L	WTB-GW-MW06-0615	1/6	4 - 20	0.53	NA	692 N	ND	NA	No	BSL
	7440-66-6	Zinc	7.1 J	126	UG/L	WTB-GW-MW02-0615	6/6	-	126	NA	410000 N	514	NA	No	BSL

TABLE 2.3
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH GROUNDWATER
OU8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects(2)	Concentration Used for Screening(3)	Range of Background Concentrations(4)	Construction Worker Screening Level(5)	Upgradient Concentration(6)	Potential ARAR/TBC	COPC Flag	Rationale for Contaminant Deletion or Selection(7)

Footnotes:
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Source: Re-Evaluation of Facility Background Report (Tetra Tech, 2014). Detection ranges are for Saline/Brackish Groundwater Representative Concentrations (Table 5) and Freshwater Groundwater Representative Concentrations (Table 4), respectively. Groundwater at OU8 is saline/brackish; therefore, the saline/brackish groundwater values are applicable to the OU8 groundwater data. The freshwater background values are presented for informational purposes only. Background values are only provided for chemicals with maximum concentrations exceeding screening criteria.
5 - PNS-specific screening levels for construction worker exposure (ingestion and dermal contact) to groundwater calculated using the methodology provided in Appendix A.4 of the SAP (Tetra Tech, 2015). The values shown are based on a target hazard quotient of 0.1 for non-carcinogens (N) and an ILCR of $1x10^{-6}$ for carcinogens (C).
6 - Values are for WTB-MW01.
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is greater than background.
8 - Value is for pyrene.
9 - Value is for trivalent chromium.
10 - Value for mercuric chloride.

Shaded criterion indicates that the maximum detected concentration exceeds one or more screening criteria. Shaded chemical name indicates that the chemical was retained as a COPC.

Associated Samples:
WTB-GW-MW02-0615
WTB-GW-MW03-0615
WTB-GW-MW03-0615-D
WTB-GW-MW04-0615
WTB-GW-MW05R-0615
WTB-GW-MW06-0615
WTB-GW-MW07-0615

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available

Rationale Codes:
For selection as a COPC:
ASL = Above screening level and background

For elimination as a COPC:
BSL = Below COPC screening level
NUT = Essential nutrient

TABLE 2.4
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - VAPOR INTRUSION POTENTIAL FROM GROUNDWATER
OU8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Range of Background Concentrations[4]	Vapor Intrusion Screening Level[5]	Upgradient Concentration[6]	Potential ARAR/TBC	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
OU8	POLYCYCLIC AROMATIC HYDROCARBONS														
	83-32-9	Acenaphthene	0.26	0.39	UG/L	WTB-GW-MW06-0615	2/6	0.094 - 0.098	0.39	NA	NA	ND	NA	No	NTX
	120-12-7	Anthracene	0.13 J	0.13 J	UG/L	WTB-GW-MW05R-0615	1/6	0.094 - 0.098	0.13	NA	NA	ND	NA	No	NTX
	206-44-0	Fluoranthene	0.15 J	0.15 J	UG/L	WTB-GW-MW05R-0615	1/6	0.094 - 0.098	0.15	NA	NA	ND	NA	No	NTX
	86-73-7	Fluorene	0.14 J	0.18 J	UG/L	WTB-GW-MW05R-0615	2/6	0.094 - 0.098	0.18	NA	NA	ND	NA	No	NTX
	193-39-5	Indeno(1,2,3-cd)pyrene	0.13 J	0.14 J	UG/L	WTB-GW-MW03-0615	1/6	0.094 - 0.095	0.14	NA	NA	ND	NA	No	NTX
	91-20-3	Naphthalene	0.085 J	0.38	UG/L	WTB-GW-MW06-0615	6/6	-	0.38	NA	4.6 C	0.11	NA	No	BSL
	85-01-8	Phenanthrene	0.12 J	0.69	UG/L	WTB-GW-MW05R-0615	2/6	0.094 - 0.098	0.69	NA	NA	ND	NA	No	NTX
	129-00-0	Pyrene	0.12 J	0.12 J	UG/L	WTB-GW-MW05R-0615	1/6	0.094 - 0.098	0.12	NA	NA	ND	NA	No	NTX
	METALS														
	7440-38-2	Arsenic	3.6 J	20 J	UG/L	WTB-GW-MW05R-0615	6/6	-	20	NA	NA	17	NA	No	NTX
	7440-39-3	Barium	44.3	1620	UG/L	WTB-GW-MW06-0615	6/6	-	1620	NA	NA	1100	NA	No	NTX
	7440-70-2	Calcium	61800	330000	UG/L	WTB-GW-MW05R-0615	6/6	-	330000	NA	NA	862000	NA	No	NUT
	7440-47-3	Chromium	1 J	2.9 J	UG/L	WTB-GW-MW06-0615	4/6	1.2 - 14	2.9	NA	NA	ND	NA	No	NTX
	7440-48-4	Cobalt	3.96	3.96	UG/L	WTB-GW-MW07-0615	1/6	0.55 - 4.22	3.96	NA	NA	48.1	NA	No	NTX
	7440-50-8	Copper	12 J	12 J	UG/L	WTB-GW-MW02-0615	1/6	2.2 - 10.7	12	NA	NA	22	NA	No	NTX
	7439-89-6	Iron	5980	8050	UG/L	WTB-GW-MW07-0615	4/6	15 - 417	8050	NA	NA	12300	NA	No	NTX
	7439-92-1	Lead	1.5 J	23.9	UG/L	WTB-GW-MW02-0615	5/6	4 - 20	23.9	NA	NA	ND	NA	No	NTX
	7439-95-4	Magnesium	14100	820000	UG/L	WTB-GW-MW05R-0615	6/6	-	820000	NA	NA	54500	NA	No	NUT
	7439-96-5	Manganese	455	2630	UG/L	WTB-GW-MW05R-0615	5/6	4 - 4	2630	NA	NA	22700	NA	No	NTX
	7439-97-6	Mercury	0.059 J	0.152 J	UG/L	WTB-GW-MW02-0615	2/6	0.1 - 0.1	0.152	NA	NA	ND	NA	No	NTX
	7440-02-0	Nickel	1.4 J	69.5	UG/L	WTB-GW-MW04-0615	5/6	5.64 - 8	69.5	NA	NA	421	NA	No	NTX
	7440-09-7	Potassium	8800	337000	UG/L	WTB-GW-MW05R-0615	6/6	-	337000	NA	NA	41200	NA	No	NUT
	7782-49-2	Selenium	1.2 J	2.77 J	UG/L	WTB-GW-MW07-0615	2/6	0.29 - 15	2.77	NA	NA	ND	NA	No	NTX
	7440-23-5	Sodium	210000	7270000	UG/L	WTB-GW-MW05R-0615	6/6	-	7270000	NA	NA	6450000	NA	No	NUT
	7440-62-2	Vanadium	0.53 J	0.53 J	UG/L	WTB-GW-MW06-0615	1/6	4 - 20	0.53	NA	NA	ND	NA	No	NTX
	7440-66-6	Zinc	7.1 J	126	UG/L	WTB-GW-MW02-0615	6/6	-	126	NA	NA	514	NA	No	NTX

TABLE 2.4
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - VAPOR INTRUSION POTENTIAL FROM GROUNDWATER
OU8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects(2)	Concentration Used for Screening(3)	Range of Background Concentrations(4)	Vapor Intrusion Screening Level(5)	Upgradient Concentration(6)	Potential ARAR/TBC	COPC Flag	Rationale for Contaminant Deletion or Selection(7)

Footnotes:
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Background values are presented only for chemicals with maximum concentrations exceeding screening criteria.
5 - Calculated using USEPA's Vapor Intrusion Screening Level (VISL) calculator Version 3.4.6, January 2016. Values correspond to a target cancer risk level of 1E-06 or hazard quotient (HQ) of 0.1 and an attenuation factor of 0.001.
6 - Values are for WTB-MW01.
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level.

Shaded criterion indicates that the maximum detected concentration exceeds one or more screening criteria. Shaded chemical name indicates that the chemical was retained as a COPC.

Associated Samples:
WTB-GW-MW02-0615
WTB-GW-MW03-0615
WTB-GW-MW03-0615-D
WTB-GW-MW04-0615
WTB-GW-MW05R-0615
WTB-GW-MW06-0615
WTB-GW-MW07-0615

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available

Rationale Codes:
For selection as a COPC:
ASL = Above screening level

For elimination as a COPC:
BSL = Below COPC screening level
NUT = Essential nutrient

RAGS Part D Table 3

Medium-Specific Exposure Point Concentration Summary

LIST OF TABLES
RAGS PART D TABLE 3
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Table No.

Reasonable Maximum/Centtral Tendency Exposures

3.1 Surface Soil
3.2 Subsurface Soil
3.3 Groundwater

TABLE 3.1.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
OU8	Benzo(a)pyrene Equivalents	mg/kg	2.2	13 (L)	15	13	mg/kg	99% KM (Chebyshev) UCL	ProUCL 5.0.00
	Antimony	mg/kg	0.59	1.0 (G)	3.2 J	1.0	mg/kg	95% Adjusted Gamma KM-UCL	ProUCL 5.0.00
	Copper	mg/kg	189	312 (G)	769	312	mg/kg	95% Adjusted Gamma UCL	ProUCL 5.0.00
	Iron	mg/kg	25300	30100 (N)	48500	30100	mg/kg	95% Student's-t UCL	ProUCL 5.0.00
	Manganese	mg/kg	389	439 (N)	672 J	439	mg/kg	95% Student's-t UCL	ProUCL 5.0.00
	Nickel	mg/kg	57.1	83.7 (G)	260	83.7	mg/kg	95% Adjusted Gamma UCL	ProUCL 5.0.00
	Thallium	mg/kg	0.19	0.20 (N)	0.32	0.20	mg/kg	95% KM (t) UCL	ProUCL 5.0.00

G = Gamma
L = Lognormal
N = Normal

Exposure point concentrations for the RME scenarios are also the exposure point concentrations for the CTE scenarios.

TABLE 3.2.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
OU8	Benzo(a)pyrene Equivalents	mg/kg	1.3	3.4 (L)	17	3.4	mg/kg	95% KM (Chebyshev) UCL	ProUCL 5.0.00
	Antimony	mg/kg	90.7	610 (NP)	1610 J	610.0	mg/kg	99% KM (Chebyshev) UCL	ProUCL 5.0.00
	Arsenic	mg/kg	17.5	20.9 (L)	61.9	20.9	mg/kg	95% H-UCL	ProUCL 5.0.00
	Cadmium	mg/kg	1.55	3.66 (L)	7.64	3.66	mg/kg	97.5% KM (Chebyshev) UCL	ProUCL 5.0.00
	Cobalt	mg/kg	11.3	13.0 (L)	40.7	13.0	mg/kg	95% H-UCL	ProUCL 5.0.00
	Copper	mg/kg	3730	11700 (NP)	39600 J	11700	mg/kg	97.5% Chebyshev (Mean, Sd) UCL	ProUCL 5.0.00
	Iron	mg/kg	55900	102000 (NP)	269000	102000	mg/kg	95% Chebyshev (Mean, Sd) UCL	ProUCL 5.0.00
	Lead	mg/kg	2210	6620 (L)	20100	2210	mg/kg	Arithmetic Mean Concentration	(1)
	Manganese	mg/kg	698	1900 (NP)	12600 J	1900	mg/kg	95% Chebyshev (Mean, Sd) UCL	ProUCL 5.0.00
	Mercury	mg/kg	1.57	3.66 (L)	18.6 J	3.66	mg/kg	95% KM (Chebyshev) UCL	ProUCL 5.0.00
	Nickel	mg/kg	268	707 (NP)	3260	707	mg/kg	95% KM (Chebyshev) UCL	ProUCL 5.0.00
	Thallium	mg/kg	0.190	0.154 (G)	0.254	0.154	mg/kg	95% KM (t) UCL	ProUCL 5.0.00
	Zinc	mg/kg	1070	2200 (AL)	7350	2200	mg/kg	95% Chebyshev (Mean, Sd) UCL	ProUCL 5.0.00
	Cyanide	mg/kg	NA	NA	34	34	mg/kg	Maximum Detected Concentration	(2)

AL = Approximate Lognormal
G = Gamma
L = Lognormal
NP = Non-parametric

1 - The arithmetic mean concentration is used as the exposure point concentration for lead. USEPA, 1994: Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children.
2 - There are less than three detected concentrations. Reliable statistics cannot be computed. The maximum concentration was used as the exposure point concentration.

Exposure point concentrations for the RME scenarios are also the exposure point concentrations for the CTE scenarios.

TABLE 3.3.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
OU8	Manganese	ug/L	1090	2000 (N)	2630	2630	ug/L	Maximum Detected Concentration	(1)

N = Normal

1 - The maximum detected concentration is used as the exposure point concentration for groundwater.

RAGS Part D Table 4

Values Used For Daily Intake Calculations

LIST OF TABLES
RAGS PART D TABLE 4
VALUES USED FOR DAILY INTAKE CALCULATIONS

Table No.	
	Reasonable Maximum Exposures
4.1.RME	Construction Workers Exposed to Soil
4.2.RME	Construction Workers Soil to Air Exposure
4.3.RME	Construction Workers Exposed to Groundwater
4.4.RME	Occupational Workers Exposed to Soil
4.5.RME	Occupational Workers Soil to Air Exposure
4.6.RME	Child Recreational Users Exposed to Soil
4.7.RME	Child Recreational Users Soil to Air Exposure
4.8.RME	Adult Recreational Users Exposed to Soil
4.9.RME	Adult Recreational Users Soil to Air Exposure
4.10.RME	Child Residents Exposed to Soil
4.11.RME	Child Residents Soil to Air Exposure
4.12.RME	Adult Residents Exposed to Soil
4.13.RME	Adult Residents Soil to Air Exposure
	Central Tendency Exposures
4.1.CTE	Construction Workers Exposed to Soil
4.2.CTE	Construction Workers Soil to Air Exposure
4.3.CTE	Construction Workers Exposed to Groundwater
4.4.CTE	Occupational Workers Exposed to Soil
4.5.CTE	Occupational Workers Soil to Air Exposure
4.6.CTE	Child Recreational Users Exposed to Soil
4.7.CTE	Child Recreational Users Soil to Air Exposure
4.8.CTE	Adult Recreational Users Exposed to Soil
4.9.CTE	Adult Recreational Users Soil to Air Exposure
4.10.CTE	Child Residents Exposed to Soil
4.11.CTE	Child Residents Soil to Air Exposure
4.12.CTE	Adult Residents Exposed to Soil
4.13.CTE	Adult Residents Soil to Air Exposure

TABLE 4.1.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - CONSTRUCTION WORKERS- SOILS

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Construction Workers	Adult	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002a	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	330	mg/day	USEPA, 2002b	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	Cs x RBA x IRS x CF3 x FI x EF x ED
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	BW x AT
				FI	Fraction Ingested	1	unitless	USEPA, 2002b	
				EF	Exposure Frequency	150	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 2014	
Dermal	Construction Workers	Adult	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002a	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	3,527	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.3	mg/cm2/event	USEPA, 2002b	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	150	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 2014	

Notes:

1 - Professional judgment.

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

USEPA, 2002a: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 2.42E-08 Cancer Dermal Intake = 7.76E-08

Noncancer Ingestion Intake = 1.70E-06 Noncancer Dermal Intake = 5.44E-06

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.1.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - CONSTRUCTION WORKERS - SOILS

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Construction Workers	Adult	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002a	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	165	mg/day	(1)	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	Cs x RBA x IRS x CF3 x FI x EF x ED
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	BW x AT
				FI	Fraction Ingested	1	unitless	USEPA, 2002b	
				EF	Exposure Frequency	75	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 2014	
Dermal	Construction Workers	Adult	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002a	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	3,527	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.1	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	75	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 2014	

Notes:

1 - Professional judgment. For some factors, CTE is assumed to be 50 percent of RME.

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

USEPA, 2002a: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 6.05E-09 Cancer Dermal Intake = 1.29E-08

Noncancer Ingestion Intake = 4.24E-07 Noncancer Dermal Intake = 9.06E-07

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.2.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - CONSTRUCTION WORKERS - SOILS TO AIR

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Construction Workers	Adult	OU8	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	8	hours/day	(1)	CA x ET x EF x ED
				EF	Exposure Frequency	150	days/year	(1)	AT x 24 hours/day
				ED	Exposure Duration	1	years	(1)	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 2014	
				PEF	Particulate Emission Factor	1.36E+09	m3/kg	USEPA, 2015	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	14.31	g/m2-s per kg/m3	USEPA, 2002a	

Notes:

1 - Professional judgment.

Sources:

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

USEPA, 2015: USEPA Regional Screening Level Calculator at http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search. Site-specific values for Portland, ME.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Cancer Inhalation Intake = 1.96E-03 Noncancer Inhalation Intake = 1.37E-01

Cancer risk from inhalation = Air concentration x Cancer Inhalation Intake x Inhalation Unit Risk

Hazard Index from inhalation = Air concentration x Noncancer Inhalation Intake / Reference Concentration

TABLE 4.2.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - CONSTRUCTION WORKERS - SOILS TO AIR

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Construction Workers	Adult	OU8	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	8	hours/day	(1)	CA x ET x EF x ED
				EF	Exposure Frequency	75	days/year	(1)	AT x 24 hours/day
				ED	Exposure Duration	1	years	(1)	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 2014	
				PEF	Particulate Emission Factor	1.36E+09	m3/kg	USEPA, 2015	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	14.31	g/m2-s per kg/m3	USEPA, 2002a	

Notes:

1 - Professional judgment. For some factors, CTE is assumed to be 50 percent of RME.

Sources:

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

USEPA, 2015: USEPA Regional Screening Level Calculator at http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search. Site-specific values for Portland, ME.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Cancer Inhalation Intake = 9.78E-04 Noncancer Inhalation Intake = 6.85E-02

Cancer risk from inhalation = Air concentration x Cancer Inhalation Intake x Inhalation Unit Risk

Hazard Index from inhalation = Air concentration x Noncancer Inhalation Intake / Reference Concentration

TABLE 4.3.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - CONSTRUCTION WORKERS - GROUNDWATER

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Construction Workers	Adult	OU8	CGW	Chemical Concentration in Groundwater	Max or 95% UCL	ug/L	USEPA, 2014a	Chronic Daily Intake (CDI) (mg/kg/day) =
				CF	Conversion Factor	0.001	mg/ug	--	
				IR-GW	Ingestion Rate of Groundwater	0.01	L/day	(1)	CGW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	30	days/year	(1)	BW x AT
				ED	Exposure Duration	1	years	(1)	
				BW	Body Weight	80	kg	USEPA, 2014b	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014b	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 2014b	
Dermal	Construction Workers	Adult	OU8	Daevent	Dermally Absorbed Dose per Event	Calculated	mg/cm2-event	USEPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				Cw	Chemical Concentration in Groundwater	Max or 95% UCL	mg/kg	USEPA, 2014a	
				FA	Fraction Absorbed	Chemical Specific	unitless	USEPA, 2004	DAevent x EV x EF x ED x SA
				CF	Conversion factor	0.001	L/cm^3	- -	BW x AT
				Kp	Permeability coefficient	Chemical Specific	cm/hr	USEPA, 2004	
				τ	Lag time	Chemical Specific	hr/event	USEPA, 2004	For inorganics
				t*	Time it takes to reach steady state	Chemical Specific	hr/event	USEPA, 2004	DAevent = Kp x CW x CF x tevent
				tevent	Duration of event	4	hr/event	(1)	
				B	Bunge model constant	Chemical Specific	unitless	USEPA, 2004	For organics if tevent <= t*
				SA	Skin Surface Available for Contact	3,527	cm2	USEPA, 2014b	DAevent= 2 x FA x Kp x Cw x CF x sqrt[(6 x τ x tevent)/pi]
				EV	Event Frequency	1	events/day	(1)	
				EF	Exposure Frequency	30	days/year	(1)	For organics if tevent > t*
				ED	Exposure Duration	1	years	(1)	DAevent =FA x Kp x Cw x CF x [tevent/(1+B) +
				BW	Body Weight	80	kg	USEPA, 2014b	2 x τ +(1 + 3B + $3B^2$)/(1+B^2)
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014b	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 2014b	

Notes

1 - Professional judgment.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014a: Determining Groundwater Exposure Point Concentrations. OSWER 9283.1-42

USEPA, 2014b: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

Unit Intake Calculations

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Dermal Intake = 5.18E-02 Noncancer Dermal Intake = 3.62E+00

Cancer risk from dermal contact = Groundwater concentration x Cancer Dermal Intake x DAevent x Dermal Cancer Slope Factor

Hazard Index from dermal contact = Groundwater concentration x Noncancer Dermal Intake x DAevent / Dermal Reference Dose

TABLE 4.3.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - CONSTRUCTION WORKERS - GROUNDWATER

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Construction Workers	Adult	OU8	CGW	Chemical Concentration in Groundwater	Max or 95% UCL	ug/L	USEPA, 2014a	Chronic Daily Intake (CDI) (mg/kg/day) =
				CF	Conversion Factor	0.001	mg/ug	--	
				IR-GW	Ingestion Rate of Groundwater	0.01	L/day	(1)	CGW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	30	days/year	(1)	BW x AT
				ED	Exposure Duration	1	years	(1)	
				BW	Body Weight	80	kg	USEPA, 2014b	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014b	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 2014b	
Dermal	Construction Workers	Adult	OU8	Daevent	Dermally Absorbed Dose per Event	Calculated	mg/cm2-event	USEPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				Cw	Chemical Concentration in Groundwater	Max or 95% UCL	mg/kg	USEPA, 2002a	
				FA	Fraction Absorbed	Chemical Specific	unitless	USEPA, 2004	DAevent x EV x EF x ED x SA
				CF	Conversion factor	0.001	L/cm^3	- -	BW x AT
				Kp	Permeability coefficient	Chemical Specific	cm/hr	USEPA, 2004	
				τ	Lag time	Chemical Specific	hr/event	USEPA, 2004	For inorganics
				t*	Time it takes to reach steady state	Chemical Specific	hr/event	USEPA, 2004	DAevent = Kp x CW x CF x tevent
				tevent	Duration of event	2	hr/event	(1)	
				B	Bunge model constant	Chemical Specific	unitless	USEPA, 2004	For organics if tevent <= t*
				SA	Skin Surface Available for Contact	3,527	cm2	USEPA, 2014b	DAevent= 2 x FA x Kp x Cw x CF x sqrt[(6 x τ x tevent)/pi]
				EV	Event Frequency	1	events/day	(1)	
				EF	Exposure Frequency	30	days/year	(1)	For organics if tevent > t*
				ED	Exposure Duration	1	years	(1)	DAevent =FA x Kp x Cw x CF x [tevent/(1+B) +
				BW	Body Weight	80	kg	USEPA, 2014b	2 x τ +(1 + 3B + $3B^2$)/(1+B^2)
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014b	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 2014b	

Notes

1 - Professional judgment. For some factors, CTE is assumed to be 50 percent of RME.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014a: Determining Groundwater Exposure Point Concentrations. OSWER 9283.1-42

USEPA, 2014b: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

Unit Intake Calculations

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Dermal Intake = 5.18E-02 Noncancer Dermal Intake = 3.62E+00

Cancer risk from dermal contact = Groundwater concentration x Cancer Dermal Intake x DAevent x Dermal Cancer Slope Factor

Hazard Index from dermal contact = Groundwater concentration x Noncancer Dermal Intake x DAevent / Dermal Reference Dose

TABLE 4.4.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - OCCUPATIONAL WORKERS - SOIL

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Occupational Workers	Adult	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	USEPA, 2014	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	Cs x RBA x IRS x CF3 x FI x EF x ED
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	BW x AT
				FI	Fraction Ingested	1	unitless	USEPA, 2014	
				EF	Exposure Frequency	250	days/year	USEPA, 2014	
				ED	Exposure Duration	25	years	USEPA, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	USEPA, 2014	
Dermal	Occupational Workers	Adult	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	3,527	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.12	mg/cm2/event	USEPA, 2014	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	250	days/year	USEPA, 2014	
				ED	Exposure Duration	25	years	USEPA, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	USEPA, 2014	

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 3.06E-07 Cancer Dermal Intake = 1.29E-06

Noncancer Ingestion Intake = 8.56E-07 Noncancer Dermal Intake = 3.62E-06

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.4.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - OCCUPATIONAL WORKERS - SOIL

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Occupational Workers	Adult	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	50	mg/day	USEPA, 1993	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	Cs x RBA x IRS x CF3 x FI x EF x ED
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	BW x AT
				FI	Fraction Ingested	1	unitless	USEPA, 1993	
				EF	Exposure Frequency	219	days/year	USEPA, 1993	
				ED	Exposure Duration	9	years	USEPA, 1993	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	USEPA, 2014	
Dermal	Occupational Workers	Adult	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	3,527	cm2	USEPA, 2004	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.02	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	219	days/year	USEPA, 1993	
				ED	Exposure Duration	9	years	USEPA, 1993	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	USEPA, 2014	

Sources:

USEPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 4.82E-08 Cancer Dermal Intake = 6.80E-08

Noncancer Ingestion Intake = 3.75E-07 Noncancer Dermal Intake = 5.29E-07

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.5.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - OCCUPATIONAL WORKERS - SOIL TO AIR

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Occupational Workers	Adult	OU8	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	8	hours/day	USEPA, 2014	CA x ET x EF x ED
				EF	Exposure Frequency	250	days/year	USEPA, 2014	AT x 24 hours/day
				ED	Exposure Duration	25	years	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	9,125	days	USEPA, 2014	
				PEF	Particulate Emission Factor	1.36E+09	m3/kg	USEPA, 2015	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	93.77	g/m2-s per kg/m3	USEPA, 2015	

Sources:

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

USEPA, 2015: USEPA Regional Screening Level Calculator at http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search. Site-specific values for Portland, ME.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Cancer Inhalation Intake = 8.15E-02 Noncancer Inhalation Intake = 2.28E-01

Cancer risk from inhalation = Air concentration x Cancer Inhalation Intake x Inhalation Unit Risk

Hazard Index from inhalation = Air concentration x Noncancer Inhalation Intake / Reference Concentration

TABLE 4.5.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - OCCUPATIONAL WORKERS - SOIL TO AIR

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Occupational Workers	Adult	OU8	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	8	hours/day	USEPA, 2014	CA x ET x EF x ED / AT x 24 hours/day
				EF	Exposure Frequency	219	days/year	USEPA, 1993	
				ED	Exposure Duration	9	years	USEPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	3,285	days	USEPA, 2014	
				PEF	Particulate Emission Factor	1.36E+09	m3/kg	USEPA, 2015	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	93.77	g/m2-s per kg/m3	USEPA, 2015	

Sources:

USEPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

USEPA, 2015: USEPA Regional Screening Level Calculator at http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search. Site-specific values for Portland, ME.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Cancer Inhalation Intake = 2.57E-02 Noncancer Inhalation Intake = 2.00E-01

Cancer risk from inhalation = Air concentration x Cancer Inhalation Intake x Inhalation Unit Risk

Hazard Index from inhalation = Air concentration x Noncancer Inhalation Intake / Reference Concentration

TABLE 4.6.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - CHILD RECREATIONAL USERS - SOILS

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational User	Child	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	200	mg/day	USEPA, 2014	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	Cs x RBA x IRS x CF3 x FI x EF x ED
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	BW x AT
				FI	Fraction Ingested	0.5	unitless	(1)	
				EF	Exposure Frequency	100	days/year	(2)	
				ED1	Exposure Duration (Age 0 - 2)	2	years	(3), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	4	years	(3), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 2014	
Dermal	Recreational User	Child	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	2,373	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2/event	USEPA, 2014	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	100	days/year	(2)	
				ED1	Exposure Duration (Age 0 - 2)	2	years	(3), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	4	years	(3), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 2014	

Notes:

1 - The child recreational user is assumed to be at the site only a portion of the day.

2 - Assume four days a week in warm weather months for RME and two days a week for CTE.

3 - Children will be evaluated as one age group (0 - 6 years) for non-mutagenic chemicals. For chemicals that act via the mutagenic mode of action, children recreational users will be evaluated as two age groups, 0 - 2 years and 2 - 6 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Non-Mutagenic Chemicals

Cancer Ingestion Intake (Age 0 - 6) = 1.57E-07 Cancer Dermal Intake (Age 0 - 6) = 7.43E-07

Mutagenic Chemicals

Cancer Ingestion Intake (Age 0 - 2) = 5.22E-08 Cancer Dermal Intake (Age 0 - 2) = 2.48E-07

Cancer Ingestion Intake (Age 2 - 6) = 1.04E-07 Cancer Dermal Intake (Age 2 - 6) = 4.95E-07

Noncarcinogenic Chemicals

Noncancer Ingestion Intake = 1.83E-06 Noncancer Dermal Intake = 8.67E-06

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.6.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - CHILD RECREATIONAL USERS - SOILS

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational User	Child	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	USEPA, 1993	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	Cs x RBA x IRS x CF3 x FI x EF x ED
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	BW x AT
				FI	Fraction Ingested	0.5	unitless	(1)	
				EF	Exposure Frequency	50	days/year	(2)	
				ED1	Exposure Duration (Age 0 - 2)	1	years	(3), USEPA, 1989, 2005	
				ED2	Exposure Duration (Age 2 - 6)	1	years	(3), USEPA, 1989, 2005	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 2014	
Dermal	Recreational User	Child	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	2,373	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	50	days/year	(2)	
				ED1	Exposure Duration (Age 0 - 2)	1	years	(3), USEPA, 1989, 2005	
				ED2	Exposure Duration (Age 2 - 6)	1	years	(3), USEPA, 1989, 2005	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 2014	

Notes:

1 - The child recreational user is assumed to be at the site only a portion of the day.

2 - Assume four days a week in warm weather months for RME and two days a week for CTE.

3 - Children will be evaluated as one age group (0 - 6 years) for non-mutagenic chemicals. For chemicals that act via the mutagenic mode of action, children recreational users will be evaluated as two age groups, 0 - 2 years and 2 - 6 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Non-Mutagenic Chemicals

Cancer Ingestion Intake = 1.30E-08 Cancer Dermal Intake = 2.48E-08

Mutagenic Chemicals

Cancer Ingestion Intake (Age 0 - 2) = 6.52E-09 Cancer Dermal Intake (Age 0 - 2) = 1.24E-08

Cancer Ingestion Intake (Age 2 - 6) = 6.52E-09 Cancer Dermal Intake (Age 2 - 6) = 1.24E-08

Noncarcinogenic Chemicals

Noncancer Ingestion Intake = 4.57E-07 Noncancer Dermal Intake = 8.67E-07

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.7.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - CHILD RECREATIONAL USERS - SOILS TO AIR

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Recreational User	Child	OU8	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	4	hours/day	(1)	CA x ET x EF x ED
				EF	Exposure Frequency	100	days/year	(2)	AT x 24 hours/day
				ED1	Exposure Duration (Age 0 - 2)	2	years	(3), USEPA, 2005, 2014a	
				ED2	Exposure Duration (Age 2 - 6)	4	years	(3), USEPA, 2005, 2014a	CA = (1/PEF + 1/VF) x Cs
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014a	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 2014a	
				PEF	Particulate Emission Factor	1.36E+09	m3/kg	USEPA, 2015	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	93.77	g/m2-s per kg/m3	USEPA, 2015	

Notes:

1 - Professional judgment.

2 - Assume four days a week in warm weather months for RME and two days a week for CTE.

3 - Children will be evaluated as one age group (0 - 6 years) for non-mutagenic chemicals. For chemicals that act via the mutagenic mode of action, children recreational users will be evaluated as two age groups, 0 - 2 years and 2 - 6 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. USEPA/540/1-86/060.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2014a: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

USEPA, 2015: USEPA Regional Screening Level Calculator at http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search. Site-specific values for Portland, ME.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Non-Mutagenic Chemicals

Cancer Inhalation Intake (Age 0 - 6) = 3.91E-03 Noncancer Inhalation Intake = 4.57E-02

Mutagenic Chemicals

Cancer Inhalation Intake (Age 0 - 2) = 1.30E-03

Cancer Inhalation Intake (Age 2 - 6) = 2.61E-03

Cancer risk from inhalation = Air concentration x Cancer Inhalation Intake x Inhalation Unit Risk

Hazard Index from inhalation = Air concentration x Noncancer Inhalation Intake / Reference Concentration

TABLE 4.7.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - CHILD RECREATIONAL USERS - SOILS TO AIR

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Recreational User	Child	OU8	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	2	hours/day	(1)	CA x ET x EF x ED
				EF	Exposure Frequency	50	days/year	(2)	AT x 24 hours/day
				ED1	Exposure Duration (Age 0 - 2)	1	years	(3), USEPA, 1989, 2005	
				ED2	Exposure Duration (Age 2 - 6)	1	years	(3), USEPA, 1989, 2005	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 1989	
				PEF	Particulate Emission Factor	1.36E+09	m3/kg	USEPA, 2015	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	93.77	g/m2-s per kg/m3	USEPA, 2015	

Notes:

1 - Professional judgment.

2 - Assume four days a week in warm weather months for RME and two days a week for CTE.

3 - Children will be evaluated as one age group (0 - 6 years) for non-mutagenic chemicals. For chemicals that act via the mutagenic mode of action, children recreational users will be evaluated as two age groups, 0 - 2 years and 2 - 6 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. USEPA/540/1-86/060.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2015: USEPA Regional Screening Level Calculator at http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search. Site-specific values for Portland, ME.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Non-Mutagenic Chemicals

Cancer Inhalation Intake = 3.26E-04 Noncancer Inhalation Intake = 1.14E-02

Mutagenic Chemicals

Cancer Inhalation Intake (Age 0 - 2) = 1.63E-04

Cancer Inhalation Intake (Age 2 - 6) = 1.63E-04

Cancer risk from inhalation = Air concentration x Cancer Inhalation Intake x Inhalation Unit Risk

Hazard Index from inhalation = Air concentration x Noncancer Inhalation Intake / Reference Concentration

TABLE 4.8.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADULT RECREATIONAL USERS - SOILS

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational User	Adult	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	USEPA, 2014	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	Cs x RBA x IRS x CF3 x FI x EF x ED
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	BW x AT
				FI	Fraction Ingested	0.5	unitless	(1)	
				EF	Exposure Frequency	100	days/year	(2)	
				ED1	Exposure Duration (Age 6 - 16)	10	years	(3), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	10	years	(3), USEPA, 2005, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	USEPA, 2014	
Dermal	Recreational User	Adult	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	6,032	cm2	USEPA, 2004	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	100	days/year	(2)	
				ED1	Exposure Duration (Age 6 - 16)	10	years	(3), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	10	years	(3), USEPA, 2005, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	USEPA, 2014	

Notes:

1 - The adult recreational user is assumed to be at the site only a portion of the day.

2 - Assume four days a week in warm weather months for RME and two days a week for CTE.

3 - Adults will be evaluated as one age group (7 - 26 years) for non-mutagenic chemicals. For chemicals that act via the mutagenic mode of action, adult recreational users will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. USEPA/540/1-86/060.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Non-Mutagenic Chemicals

Cancer Ingestion Intake (Age 6 - 26) = 4.89E-08 Cancer Dermal Intake (Age 6 - 26) = 4.13E-07

Mutagenic Chemicals

Cancer Ingestion Intake (Age 6 - 16) = 2.45E-08 Cancer Dermal Intake (Age 6 - 16) = 2.07E-07

Cancer Ingestion Intake Age 16 - 26) = 2.45E-08 Cancer Dermal Intake (Age 16 - 26) = 2.07E-07

Noncarcinogenic Chemicals

Noncancer Ingestion Intake = 1.71E-07 Noncancer Dermal Intake = 1.45E-06

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.8.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - ADULT RECREATIONAL USERS - SOILS

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational User	Adult	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	50	mg/day	USEPA, 1993	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	Cs x RBA x IRS x CF3 x FI x EF x ED
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	BW x AT
				FI	Fraction Ingested	0.5	unitless	(1)	
				EF	Exposure Frequency	50	days/year	(2)	
				ED1	Exposure Duration (Age 6 - 16)	2	years	(3), USEPA, 1989, 2005	
				ED2	Exposure Duration (Age 16 - 26)	5	years	(3), USEPA, 1989, 2005	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 2014	
Dermal	Recreational User	Adult	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	6,032	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.01	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	50	days/year	(1)	
				ED1	Exposure Duration (Age 6 - 16)	2	years	(3), USEPA, 1989, 2005	
				ED2	Exposure Duration (Age 16 - 26)	5	years	(3), USEPA, 1989, 2005	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 2014	

Notes:

1 - The adult recreational user is assumed to be at the site only a portion of the day.

2 - Assume four days a week in warm weather months for RME and two days a week for CTE.

3 - Adults will be evaluated as one age group (7 - 26 years) for non-mutagenic chemicals. For chemicals that act via the mutagenic mode of action, adult recreational users will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Non-Mutagenic Chemicals

Cancer Ingestion Intake = 4.28E-09 Cancer Dermal Intake = 1.03E-08

Mutagenic Chemicals

Cancer Ingestion Intake (Age 6 - 16) = 1.22E-09 Cancer Dermal Intake (Age 6 - 16) = 2.95E-09

Cancer Ingestion Intake Age 16 - 26) = 3.06E-09 Cancer Dermal Intake (Age 16 - 26) = 7.38E-09

Noncarcinogenic Chemicals

Noncancer Ingestion Intake = 4.28E-08 Noncancer Dermal Intake = 1.03E-07

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.9.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADULT RECREATIONAL USERS - SOILS TO AIR

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Recreational User	Adult	OU8	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	4	hours/day	(1)	CA x ET x EF x ED
				EF	Exposure Frequency	100	days/year	(1)	AT x 24 hours/day
				ED1	Exposure Duration (Age 6 - 16)	10	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	10	years	(2), USEPA, 2005, 2014	CA = (1/PEF + 1/VF) x Cs
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	USEPA, 2014	
				PEF	Particulate Emission Factor	1.36E+09	m3/kg	USEPA, 2015	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	93.77	g/m2-s per kg/m3	USEPA, 2015	

Notes:

1 - Professional judgment. Assume four days a week in warm weather months for RME and two days a week for CTE.

2 - Adults will be evaluated as one age group (7 - 26 years) for non-mutagenic chemicals. For chemicals that act via the mutagenic mode of action, adult recreational users will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

USEPA, 2015: USEPA Regional Screening Level Calculator at http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search. Site-specific values for Portland, ME.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Non-Mutagenic Chemicals

Cancer Inhalation Intake (Age 6 - 26) = 1.30E-02

Noncarcinogenic Chemicals

Noncancer Inhalation Intake = 4.57E-02

Mutagenic Chemicals

Cancer Inhalation Intake (Age 6 - 16) = 6.52E-03

Cancer Inhalation Intake (Age 16 - 26) = 6.52E-03

Cancer risk from inhalation = Air concentration x Cancer Inhalation Intake x Inhalation Unit Risk

Hazard Index from inhalation = Air concentration x Noncancer Inhalation Intake / Reference Concentration

TABLE 4.9.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - ADULT RECREATIONAL USERS - SOILS TO AIR

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Recreational User	Adult	OU8	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	2	hours/day	(1)	CA x ET x EF x ED
				EF	Exposure Frequency	50	days/year	(1)	AT x 24 hours/day
				ED1	Exposure Duration (Age 6 - 16)	2	years	(2), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	5	years	(2), USEPA, 2005, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 2014	
				PEF	Particulate Emission Factor	1.36E+09	m3/kg	USEPA, 2015	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	93.77	g/m2-s per kg/m3	USEPA, 2015	

Notes:

1 - Professional judgment. Assume four days a week in warm weather months for RME and two days a week for CTE.

2 - Adults will be evaluated as one age group (7 - 26 years) for non-mutagenic chemicals. For chemicals that act via the mutagenic mode of action, adult recreational users will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

USEPA, 2015: USEPA Regional Screening Level Calculator at http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search. Site-specific values for Portland, ME.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Non-Mutagenic Chemicals

Cancer Inhalation Intake = 1.14E-03

Noncarcinogenic Chemicals

Noncancer Inhalation Intake = 1.14E-02

Mutagenic Chemicals

Cancer Inhalation Intake (Age 6 - 16) = 3.26E-04

Cancer Inhalation Intake (Age 16 - 26) = 8.15E-04

Cancer risk from inhalation = Air concentration x Cancer Inhalation Intake x Inhalation Unit Risk

Hazard Index from inhalation = Air concentration x Noncancer Inhalation Intake / Reference Concentration

TABLE 4.10.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - CHILD RESIDENTS - SOILS
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	200	mg/day	USEPA, 2014	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	Cs x RBA x IRS x CF3 x FI x EF x ED
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	BW x AT
				FI	Fraction Ingested	1	unitless	USEPA, 2014	
				EF	Exposure Frequency	350	days/year	USEPA, 2014	
				ED1	Exposure Duration (Age 0 - 2)	2	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	4	years	(1), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 2014	
Dermal	Resident	Child	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	2,373	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2/event	USEPA, 2014	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	350	days/year	USEPA, 2014	
				ED1	Exposure Duration (Age 0 - 2)	2	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	4	years	(1), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 2014	

Notes:

1 - Children will be evaluated as one age group (0 - 6 years) for non-mutagenic chemicals. For chemicals that act via the mutagenic mode of action, residential children will be evaluated as two age groups, 0 - 2 years and 2 - 6 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Non-Mutagenic Chemicals

Cancer Ingestion Intake (Age 0 - 6) = 1.10E-06 Cancer Dermal Intake (Age 0 - 6) = 2.60E-06

Mutagenic Chemicals

Cancer Ingestion Intake (Age 0 - 2) = 3.65E-07 Cancer Dermal Intake (Age 0 - 2) = 8.67E-07

Cancer Ingestion Intake (Age 2 - 6) = 7.31E-07 Cancer Dermal Intake (Age 2 - 6) = 1.73E-06

Noncarcinogenic Chemicals

Noncancer Ingestion Intake = 1.28E-05 Noncancer Dermal Intake = 3.03E-05

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.10.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURES - CHILD RESIDENTS - SOILS
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	USEPA, 1993	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	Cs x RBA x IRS x CF3 x FI x EF x ED
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	BW x AT
				FI	Fraction Ingested	1	unitless	USEPA, 1993	
				EF	Exposure Frequency	234	days/year	USEPA, 1993	
				ED1	Exposure Duration (Age 0 - 2)	1	years	(1), USEPA, 1993, 2005	
				ED2	Exposure Duration (Age 2 - 6)	1	years	(1), USEPA, 1993, 2005	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 2014	
Dermal	Resident	Child	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	2,373	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	234	days/year	USEPA, 1993	
				ED1	Exposure Duration (Age 0 - 2)	1	years	(1), USEPA, 1993, 2005	
				ED2	Exposure Duration (Age 2 - 6)	1	years	(1), USEPA, 1993, 2005	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 2014	

Notes:

1 - Children will be evaluated as one age group (0 - 6 years) for non-mutagenic chemicals. For chemicals that act via the mutagenic mode of action, residential children will be evaluated as two age groups, 0 - 2 years and 2 - 6 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Non-Mutagenic Chemicals

Cancer Ingestion Intake = 1.22E-07 Cancer Dermal Intake = 1.16E-07

Mutagenic Chemicals

Cancer Ingestion Intake (Age 0 - 2) = 6.11E-08 Cancer Dermal Intake (Age 0 - 2) = 5.80E-08

Cancer Ingestion Intake (Age 2 - 6) = 6.11E-08 Cancer Dermal Intake (Age 2 - 6) = 5.80E-08

Noncarcinogenic Chemicals

Noncancer Ingestion Intake = 4.27E-06 Noncancer Dermal Intake = 4.06E-06

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.11.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - CHILD RESIDENTS SOILS TO AIR

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Child	OU8	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	24	hours/day	USEPA, 2014	CA x ET x EF x ED
				EF	Exposure Frequency	350	days/year	USEPA, 2014	AT x 24 hours/day
				ED1	Exposure Duration (Age 0 - 2)	2	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	4	years	(1), USEPA, 2005, 2014	CA = (1/PEF + 1/VF) x Cs
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 2014	
				PEF	Particulate Emission Factor	1.36E+09	m3/kg	USEPA, 2015	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	93.77	g/m2-s per kg/m3	USEPA, 2015	

Notes:

1 - Children will be evaluated as one age group (0 - 6 years) for non-mutagenic chemicals. For chemicals that act via the mutagenic mode of action, residential children will be evaluated as two age groups, 0 - 2 years and 2 - 6 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

USEPA, 2015: USEPA Regional Screening Level Calculator at http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search. Site-specific values for Portland, ME.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Non-Mutagenic Chemicals

Cancer Inhalation Intake (Age 0 - 6) = 8.22E-02

Noncarcinogenic Chemicals

Noncancer Inhalation Intake = 9.59E-01

Mutagenic Chemicals

Cancer Inhalation Intake (Age 0 - 2) = 2.74E-02

Cancer Inhalation Intake (Age 2 - 6) = 5.48E-02

Cancer risk from inhalation = Air concentration x Cancer Inhalation Intake x Inhalation Unit Risk

Hazard Index from inhalation = Air concentration x Noncancer Inhalation Intake / Reference Concentration

TABLE 4.11.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - CHILD RESIDENTS - SOILS TO AIR

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Child	OU8	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	24	hours/day	USEPA, 2014	CA x ET x EF x ED
				EF	Exposure Frequency	234	days/year	USEPA, 1993	AT x 24 hours/day
				ED1	Exposure Duration (Age 0 - 2)	1	years	(1), USEPA, 1993, 2005	
				ED2	Exposure Duration (Age 2 - 6)	1	years	(1), USEPA, 1993, 2005	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 2014	
				PEF	Particulate Emission Factor	1.36E+09	m3/kg	USEPA, 2015	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	93.77	g/m2-s per kg/m3	USEPA, 2015	

Notes:

1 - Children will be evaluated as one age group (0 - 6 years) for non-mutagenic chemicals. For chemicals that act via the mutagenic mode of action, residential children will be evaluated as two age groups, 0 - 2 years and 2 - 6 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

USEPA, 2015: USEPA Regional Screening Level Calculator at http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search. Site-specific values for Portland, ME.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Non-Mutagenic Chemicals

Cancer Inhalation Intake = 1.83E-02

Noncarcinogenic Chemicals

Noncancer Inhalation Intake = 6.41E-01

Mutagenic Chemicals

Cancer Inhalation Intake (Age 0 - 2) = 9.16E-03

Cancer Inhalation Intake (Age 2 - 6) = 9.16E-03

Cancer risk from inhalation = Air concentration x Cancer Inhalation Intake x Inhalation Unit Risk

Hazard Index from inhalation = Air concentration x Noncancer Inhalation Intake / Reference Concentration

TABLE 4.12.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE - ADULT RESIDENTS - SOILS
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	USEPA, 2014	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	Cs x RBA x IRS x CF3 x FI x EF x ED
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	BW x AT
				FI	Fraction Ingested	1	unitless	USEPA, 1989	
				EF	Exposure Frequency	350	days/year	USEPA, 2014	
				ED1	Exposure Duration (Age 6 - 16)	10	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	10	years	(1), USEPA, 2005, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	USEPA, 2014	
Dermal	Resident	Adult	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	6,032	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm2/event	USEPA, 2014	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	350	days/year	USEPA, 2014	
				ED1	Exposure Duration (Age 6 - 16)	10	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	10	years	(1), USEPA, 2005, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	USEPA, 2014	

Notes:

1 - Adults will be evaluated as one age group (7 - 26 years) for non-mutagenic chemicals. For chemicals that act via the mutagenic mode of action, adults will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Non-Mutagenic Chemicals

Cancer Ingestion Intake (Age 6 - 26) = 3.42E-07 Cancer Dermal Intake (Age 6 - 26) = 1.45E-06

Mutagenic Chemicals

Cancer Ingestion Intake (Age 6 - 16) = 1.71E-07 Cancer Dermal Intake (Age 6 - 16) = 7.23E-07

Cancer Ingestion Intake (Age 16 - 26) = 1.71E-07 Cancer Dermal Intake (Age 16 - 26) = 7.23E-07

Noncarcinogenic Chemicals

Noncancer Ingestion Intake = 1.20E-06 Noncancer Dermal Intake = 5.06E-06

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.12.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURES - ADULT RESIDENTS - SOILS
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult	OIU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	50	mg/day	USEPA, 1993	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	Cs x RBA x IRS x CF3 x FI x EF x ED
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	BW x AT
				FI	Fraction Ingested	1	unitless	USEPA, 1993	
				EF	Exposure Frequency	234	days/year	USEPA, 1993	
				ED1	Exposure Duration (Age 6 - 16)	2	years	(1), USEPA, 1993, 2005	
				ED2	Exposure Duration (Age 16 - 26)	5	years	(1), USEPA, 1993, 2005	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 2014	
Dermal	Resident	Adult	OU8	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	6,032	cm2	USEPA, 2014	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.01	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	234	days/year	USEPA, 1993	
				ED1	Exposure Duration (Age 6 - 16)	2	years	(1), USEPA, 1993, 2005	
				ED2	Exposure Duration (Age 16 - 26)	5	years	(1), USEPA, 1993, 2005	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 2014	

Notes:

1 - Adults will be evaluated as one age group (7 - 26 years) for non-mutagenic chemicals. For chemicals that act via the mutagenic mode of action, adults will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

USEPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Non-Mutagenic Chemicals

Cancer Ingestion Intake = 4.01E-08 Cancer Dermal Intake = 4.83E-08

Mutagenic Chemicals

Cancer Ingestion Intake (Age 6 - 16) = 1.14E-08 Cancer Dermal Intake (Age 6 - 16) = 1.38E-08

Cancer Ingestion Intake (Age 16 - 26) = 2.86E-08 Cancer Dermal Intake (Age 16 - 26) = 3.45E-08

Noncarcinogenic Chemicals

Noncancer Ingestion Intake = 4.01E-07 Noncancer Dermal Intake = 4.83E-07

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.13.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADULT RESIDENTS - SOILS TO AIR

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Adult	OU8	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	24	hours/day	USEPA, 2014	CA x ET x EF x ED
				EF	Exposure Frequency	350	days/year	USEPA, 2014	AT x 24 hours/day
				ED1	Exposure Duration (Age 6 - 16)	10	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 26)	10	years	(1), USEPA, 2005, 2014	CA = (1/PEF + 1/VF) x Cs
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	USEPA, 2014	
				PEF	Particulate Emission Factor	1.36E+09	m3/kg	USEPA, 2015	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	93.77	g/m2-s per kg/m3	USEPA, 2015	

Notes:

1 - Adults will be evaluated as one age group (7 - 26 years) for non-mutagenic chemicals. For chemicals that act via the mutagenic mode of action, adults will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

USEPA, 2015: USEPA Regional Screening Level Calculator at http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search. Site-specific values for Portland, ME.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Non-Mutagenic Chemicals

Cancer Inhalation Intake (Age 6 - 26) = 2.74E-01

Noncarcinogenic Chemicals

Noncancer Inhalation Intake = 9.59E-01

Mutagenic Chemicals

Cancer Inhalation Intake (Age 6 - 16) = 1.37E-01

Cancer Inhalation Intake (Age 16 - 26) = 1.37E-01

Cancer risk from inhalation = Air concentration x Cancer Inhalation Intake x Inhalation Cancer Slope Factor

Hazard Index from inhalation = Air concentration x Noncancer Inhalation Intake / Inhalation Reference Dose

TABLE 4.13.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - ADULT RESIDENTS - SOILS TO AIR

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Adult	OU8	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	24	hours/day	USEPA, 2014a	CA x ET x EF x ED
				EF	Exposure Frequency	234	days/year	USEPA, 1993	AT x 24 hours/day
				ED1	Exposure Duration (Age 6 - 16)	2	years	(1), USEPA, 1993, 2005	
				ED2	Exposure Duration (Age 16 - 26)	5	years	(1), USEPA, 1993, 2005	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014a	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 2014a	
				PEF	Particulate Emission Factor	1.36E+09	m3/kg	USEPA, 2015	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	93.77	g/m2-s per kg/m3	USEPA, 2015	

Notes:

1 - Adults will be evaluated as one age group (7 - 26 years) for non-mutagenic chemicals. For chemicals that act via the mutagenic mode of action, adults will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. USEPA/540/1-86/060.

USEPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

USEPA, 2014a: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

USEPA, 2015: USEPA Regional Screening Level Calculator at http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search. Site-specific values for Portland, ME.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Non-Mutagenic Chemicals

Cancer Inhalation Intake = 6.41E-02

Noncarcinogenic Chemicals

Noncancer Inhalation Intake = 6.41E-01

Mutagenic Chemicals

Cancer Inhalation Intake (Age 6 - 16) = 1.83E-02

Cancer Inhalation Intake (Age 16 - 26) = 4.58E-02

Cancer risk from inhalation = Air concentration x Cancer Inhalation Intake x Inhalation Cancer Slope Factor

Hazard Index from inhalation = Air concentration x Noncancer Inhalation Intake / Inhalation Reference Dose

RAGS Part D Table 5

Non-Cancer Toxicity Data

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NON-CANCER TOXICITY DATA

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5.1 Non-Cancer Toxicity Data - Oral/Dermal
5.2 Non-Cancer Toxicity Data - Inhalation

TABLE 5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal[1]	Absorbed RfD for Dermal[2]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD: Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
PAHs										
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals										
Aluminum	Subchronic	1.0E+00	mg/kg/day	1	1.0E+00	mg/kg/day	Central Nervous System	30/1	ATSDR	9/2008
	Chronic	1.0E+00	mg/kg/day	1	1.0E+00	mg/kg/day	Central Nervous System	100	PPRTV	10/23/2006
Antimony	Subchronic	4.0E-04	mg/kg/day	0.15	6.0E-05	mg/kg/day	Blood	1000/1	PPRTV	7/29/2008
	Chronic	4.0E-04	mg/kg/day	0.15	6.0E-05	mg/kg/day	Blood	1000/1	IRIS	6/23/2016
Arsenic	Chronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	Skin, Cardiovascular System	3/1	IRIS	6/23/2016
Cadmium	Chronic	5.0E-04	mg/kg/day	0.05	2.5E-05	mg/kg/day	Kidney	10	IRIS	6/23/2016
Cobalt	Subchronic	3.0E-03	mg/kg/day	1	3.0E-03	mg/kg/day	Thyroid	300/1	PPRTV	8/25/2008
	Chronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	Thyroid	3000/1	PPRTV	8/25/2008
Copper	Chronic	4.0E-02	mg/kg/day	1	4.0E-02	mg/kg/day	Gastrointestinal System	NA	HEAST	6/23/2016
Iron	Subchronic	7.0E-01	mg/kg/day	1	7.0E-01	mg/kg/day	Gastrointestinal System	1.5	PPRTV	9/11/2006
	Chronic	7.0E-01	mg/kg/day	1	7.0E-01	mg/kg/day	Gastrointestinal System	1.5	PPRTV	9/11/2006
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese[3]	Chronic	2.4E-02	mg/kg/day	0.04	9.6E-04	mg/kg/day	Central Nervous System	1	IRIS	6/23/2016
Mercury[4]	Subchronic	2.0E-03	mg/kg/day	0.07	1.4E-04	mg/kg/day	Kidney	100/1	ATSDR	3/1999
	Chronic	3.0E-04	mg/kg/day	0.07	2.1E-05	mg/kg/day	Autoimmune	1000/1	IRIS	6/23/2016
Nickel	Subchronic	2.0E-02	mg/kg/day	0.04	8.0E-04	mg/kg/day	Body Weight	NA	HEAST	6/23/2016
	Chronic	2.0E-02	mg/kg/day	0.04	8.0E-04	mg/kg/day	Body Weight	300/1	IRIS	6/23/2016
Thallium[5]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	Subchronic	1.0E-02	mg/kg/day	0.026	2.6E-04	mg/kg/day	Kidney	10	ATSDR	9/2012
	Chronic	5.0E-03	mg/kg/day	0.026	1.3E-04	mg/kg/day	Kidney	300	RSL	6/2015
Zinc	Subchronic	3.0E-01	mg/kg/day	1	3.0E-01	mg/kg/day	Blood	3/1	ATSDR	9/2005
	Chronic	3.0E-01	mg/kg/day	1	3.0E-01	mg/kg/day	Blood	3/1	IRIS	6/23/2016
Cyanide	Subchronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	Thyroid, CNS, Body Weight	NA	HEAST	6/23/2016
	Chronic	6.0E-04	mg/kg/day	1	6.0E-04	mg/kg/day	Thyroid, CNS	3000	IRIS	6/23/2016

Notes:

1 - USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R/99/005.

2 - Adjusted dermal RfD = Oral RfD x Oral Absorption Efficiency for Dermal.

3 - Adjusted IRIS value in accordance with IRIS.

4 - Values are for mercuric chloride.

5 - Toxicity criterion used to derive the is only suitable for screening and is not to be used for quantifying risks.

Definitions:

ATSDR = Agency for Toxic Substances and Disease Registry.

HEAST = Health Effects Assessment Summary Tables

IRIS = Integrated Risk Information System

NA = Not Available.

PPRTV = Provisional Peer Reviewed Toxicity Value.

RSL = USEPA Regional Screening Levels for Chemical Contaminants at Superfund Sites, May 2016.

TABLE 5.2

NON-CANCER TOXICITY DATA -- INHALATION
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD[1]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC: Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
PAHs									
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals									
Aluminum	Chronic	5.0E-03	mg/m^3	1.4E-03	(mg/kg/day)	Central Nervous System	300/1	PPRTV	10/23/2006
Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	Chronic	1.5E-05	mg/m^3	4.3E-06	(mg/kg/day)	NA	NA	Cal EPA	9/2009
Cadmium	Chronic	1.0E-05	mg/m^3	2.9E-06	(mg/kg/day)	Kidney	9/1	ATSDR	9/2012
Cobalt	Subchronic	2.0E-05	mg/m^3	5.7E-06	(mg/kg/day)	Respiratory	100/1	PPRTV	8/25/2008
	Chronic	6.0E-06	mg/m^3	1.7E-06	(mg/kg/day)	Respiratory	300/1	PPRTV	8/25/2008
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	Chronic	5.0E-05	mg/m^3	1.4E-05	(mg/kg/day)	Central Nervous System	1000/1	IRIS	6/23/2016
Mercury[2]	Chronic	3.0E-04	mg/m^3	8.6E-05	(mg/kg/day)	Autoimmune	NA	Cal/EPA	9/2009
Nickel	Subchronic	2.0E-04	mg/m^3	5.7E-05	(mg/kg/day)	Respiratory	30/1	ATSDR	9/2005
	Chronic	9.0E-05	mg/m^3	2.6E-05	(mg/kg/day)	Respiratory	NA	ATSDR	9/2005
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	Chronic	1.0E-04	mg/m^3	2.9E-05	(mg/kg/day)	Respiratory	30	ATSDR	9/2012
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	Chronic	8.0E-04	mg/m^3	2.3E-04	(mg/kg/day)	Thyroid	3000	IRIS	6/23/2016

Notes:
1 - Extrapolated RfD = RfC *$20m^3$/day / 70 kg.
2 - Values are for mercuric chloride.

Definitions:
ATSDR = Agency for Toxic Substances and Disease Registry
Cal EPA = California Environmental Protection Agency, Technical Support Document for Describing Available Cancer Slope Factors, September 2009.
IRIS = Integrated Risk Information System.
NA = Not Applicable.
PPRTV = Provisional Peer Reviewed Toxicity Value.

RAGS Part D Table 6

Cancer Toxicity Data

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CANCER TOXICITY DATA

Table No.

6.1 Cancer Toxicity Data - Oral/Dermal
6.2 Cancer Toxicity Data - Inhalation

TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal[1]	Absorbed Cancer Slope Factor for Dermal[2]		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
PAHs								
Benzo(a)anthracene[3]	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	7/1993
Benzo(a)pyrene[3]	7.3E+00	$(mg/kg/day)^{-1}$	1	7.3E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	6/23/2016
Benzo(b)fluoranthene[3]	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	7/1993
Benzo(k)fluoranthene[3]	7.3E-02	$(mg/kg/day)^{-1}$	1	7.3E-02	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	7/1993
Dibenzo(a,h)anthracene[3]	7.3E+00	$(mg/kg/day)^{-1}$	1	7.3E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	7/1993
Indeno(1,2,3-cd)pyrene[3]	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	7/1993
Metals								
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	1.5E+00	$(mg/kg/day)^{-1}$	1	1.5E+00	$(mg/kg/day)^{-1}$	A / Known human carcinogen	IRIS	6/23/2016
Cadmium	NA	NA	NA	NA	NA	B1 / Probable human carcinogen	IRIS	6/23/2016
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	D (Not classifiable as to human carcinogenicity)	IRIS	6/23/2016
Iron	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	B2 / Probable human carcinogen	IRIS	6/23/2016
Manganese	NA	NA	NA	NA	NA	D (Not classifiable as to human carcinogenicity)	IRIS	6/23/2016
Mercury	NA	NA	NA	NA	NA	C / Possible human carcinogen	IRIS	6/23/2016
Nickel	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	6/23/2016
Cyanide	NA	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	6/23/2016

Notes:
1 - USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R/99/005.
2 - Adjusted cancer slope factor for dermal = Oral cancer slope factor / Oral absorption efficiency for dermal.
3 - Carcinogenic PAHs are considered to act via the mutagenic mode of action. These chemicals are evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

IRIS = Integrated Risk Information System.

NA = Not Available.

PPRTV = Provisional Peer Reviewed Toxicity Value.

USEPA(1) = USEPA Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons, July 1993, EPA/600/R-93/089.

TABLE 6.2

CANCER TOXICITY DATA -- INHALATION
OU8
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor[1]		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
PAHs							
Benzo(a)anthracene[2]	1.1E-04	$(ug/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	Cal EPA	9/2009
Benzo(a)pyrene[2]	1.1E-03	$(ug/m^3)^{-1}$	3.9E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	Cal EPA	9/2009
Benzo(b)fluoranthene[2]	1.1E-04	$(ug/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	Cal EPA	9/2009
Benzo(k)fluoranthene	1.1E-04	$(ug/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	Cal EPA	9/2009
Dibenzo(a,h)anthracene[2]	1.2E-03	$(ug/m^3)^{-1}$	4.2E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	Cal EPA	9/2009
Indeno(1,2,3-cd)pyrene[2]	1.1E-04	$(ug/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	Cal EPA	9/2009
Metals							
Aluminum	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA
Arsenic	4.3E-03	$(ug/m^3)^{-1}$	1.5E+01	$(mg/kg/day)^{-1}$	A / Known human carcinogen	IRIS	6/23/2016
Cadmium	1.8E-03	$(ug/m^3)^{-1}$	6.3E+00	$(mg/kg/day)^{-1}$	B1 / Probable human carcinogen	IRIS	6/23/2016
Cobalt	9.0E-03	$(ug/m^3)^{-1}$	3.2E+01	$(mg/kg/day)^{-1}$	NA	PPRTV	8/25/2008
Copper	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	6/23/2016
Iron	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	B2 / Probable human carcinogen	IRIS	6/23/2016
Manganese	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	6/23/2016
Mercury	NA	NA	NA	NA	C / Possible human carcinogen	IRIS	6/23/2016
Nickel	2.6E-04	$(ug/m^3)^{-1}$	9.1E-01	$(mg/kg/day)^{-1}$	NA	Cal/EPA	9/2009
Thallium	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	6/23/2016
Cyanide	NA	NA	NA	NA	D / Not classifiable as to human carcinogenicity	IRIS	6/23/2016

Notes:
1 - Inhalation CSF = Unit Risk * 70 kg / $20m^3$/day.
2 - Carcinogenic PAHs are considered to act via the mutagenic mode of action. These chemicals are evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Definitions:
Cal EPA = California Environmental Protection Agency, Technical Support Document for Describing Available Cancer Slope Factors, September 2009.
IRIS = Integrated Risk Information System.
NA = Not Available.
PPRTV = Provisional Peer Reviewed Toxicity Value.

RAGS Part D Table 7

Calculation of Cancer Risks and Non-Cancer Hazards

LIST OF TABLES
RAGS PART D TABLE 7
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Table No.	
	Reasonable Maximum Exposures
7.1.RME	Construction Workers
7.2.RME	Occupational Workers
7.3.RME	Child Recreational Users
7.4.RME	Adult Recreational Users
7.5.RME	Child Residents
7.6.RME	Adult Residents
	Central Tendency Exposures
7.1.CTE	Construction Workers
7.2.CTE	Occupational Workers
7.3.CTE	Child Recreational Users
7.4.CTE	Adult Recreational Users
7.5.CTE	Child Residents
7.6.CTE	Adult Residents

TABLE 7.1.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	3.1E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.3E-06	2.2E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	2.4E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.004
				Copper	312	mg/kg	7.6E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.3E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.01
				Iron	30100	mg/kg	7.3E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.1E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.07
				Manganese	439	mg/kg	1.1E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.4E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.03
				Nickel	83.7	mg/kg	2.0E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.007
				Thallium	0.2	mg/kg	4.8E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								2.3E-06					0.1
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	1.3E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9.6E-07	9.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								9.6E-07					--
		Exposure Point Total									3.3E-06					0.1
	Exposure Medium Total										3.3E-06					0.1
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	1.9E-11	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.1E-11	1.3E-09	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	7.4E-10	mg/m^3	1.4E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-10	(mg/m^3)	NA	(mg/m^3)	--
				Copper	2.3E-07	mg/m^3	4.5E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.1E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	4.3E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.0E-06	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	6.3E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.4E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.0009
				Nickel	6.2E-08	mg/m^3	1.2E-10	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	3.1E-11	8.4E-09	(mg/m^3)	2.0E-04	(mg/m^3)	0.00004
				Thallium	1.5E-10	mg/m^3	2.9E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.0E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								5.2E-11					0.0009
		Exposure Point Total									5.2E-11					0.0009
	Exposure Medium Total										5.2E-11					0.0009
Medium Total											3.3E-06					0.1
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	8.2E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	6.0E-07	5.8E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	1.5E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.0E-03	(mg/kg/day)	4.0E-04	(mg/kg/day)	2.6
				Arsenic	20.9	mg/kg	3.0E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	4.6E-07	2.1E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.07
				Cadmium	3.66	mg/kg	8.9E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.2E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.01
				Cobalt	13	mg/kg	3.1E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.2E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.007
				Copper	11700	mg/kg	2.8E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.0E-02	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.5
				Iron	102000	mg/kg	2.5E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-01	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.2
				Lead	2210	mg/kg	5.4E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.7E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	4.6E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.2E-03	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.1
				Mercury	3.66	mg/kg	8.9E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.2E-06	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.003
				Nickel	707	mg/kg	1.7E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-03	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.06
				Thallium	0.154	mg/kg	3.7E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	5.3E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.7E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.01
				Cyanide	34	mg/kg	8.2E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.8E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.003
			Exp. Route Total								1.1E-06					3.6
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	3.4E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.5E-07	2.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	4.9E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	7.3E-08	3.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Cadmium	3.66	mg/kg	2.8E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.0E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0008
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-03	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--

TABLE 7.1.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil (continued)	Subsurface Soil	OU8	Dermal	Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.4E-04	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.0E-02	(mg/kg/day)	--
			Exp. Route Total								3.2E-07					0.01
		Exposure Point Total									1.4E-06					3.6
	Exposure Medium Total										1.4E-06					3.6
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	4.9E-12	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	5.4E-12	3.4E-10	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	4.5E-07	mg/m^3	8.8E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.1E-08	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	3.0E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	1.3E-10	2.1E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0001
				Cadmium	2.7E-09	mg/m^3	5.3E-12	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	9.5E-12	3.7E-10	(mg/m^3)	1.0E-05	(mg/m^3)	0.00004
				Cobalt	9.6E-09	mg/m^3	1.9E-11	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	1.7E-10	1.3E-09	(mg/m^3)	2.0E-05	(mg/m^3)	0.00007
				Copper	8.6E-06	mg/m^3	1.7E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.2E-06	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	1.5E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-05	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	3.2E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.2E-07	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	2.7E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.9E-07	(mg/m^3)	5.0E-05	(mg/m^3)	0.004
				Mercury	2.7E-09	mg/m^3	5.3E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.7E-10	(mg/m^3)	3.0E-04	(mg/m^3)	0.000001
				Nickel	5.2E-07	mg/m^3	1.0E-09	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	2.6E-10	7.1E-08	(mg/m^3)	2.0E-04	(mg/m^3)	0.0004
				Thallium	1.1E-10	mg/m^3	2.2E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.6E-11	(mg/m^3)	NA	(mg/m^3)	--
				Zinc	1.6E-06	mg/m^3	3.2E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.2E-07	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	4.4E-02	mg/m^3	8.6E-05	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.0E-03	(mg/m^3)	8.0E-04	(mg/m^3)	7.5
			Exp. Route Total								5.8E-10					7.5
		Exposure Point Total									5.8E-10					7.5
	Exposure Medium Total										5.8E-10					7.5
Medium Total											1.4E-06					11
Groundwater	Groundwater	OU8	Ingestion	Manganese	2630	ug/L	3.9E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.7E-05	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.001
			Exp. Route Total								- -					0.001
			Dermal	Manganese	2630	ug/L	5.4E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.8E-05	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.04
			Exp. Route Total								- -					0.04
		Exposure Point Total									- -					0.04
	Exposure Medium Total										- -					0.04
Medium Total											- -					0.04
										Total of Receptor Risks Across All Media	4.6E-06				Total of Receptor Hazards Across All Media	11

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.2.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	4.0E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.9E-05	1.1E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	3.1E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.6E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.002
				Copper	312	mg/kg	9.5E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.7E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.007
				Iron	30100	mg/kg	9.2E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.04
				Manganese	439	mg/kg	1.3E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.8E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.02
				Nickel	83.7	mg/kg	2.6E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.2E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.004
				Thallium	0.2	mg/kg	6.1E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								2.9E-05					0.06
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	2.2E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.6E-05	6.1E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								1.6E-05					--
		Exposure Point Total									4.5E-05					0.06
	Exposure Medium Total										4.5E-05					0.06
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	7.8E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	8.6E-10	2.2E-09	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	7.4E-10	mg/m^3	6.0E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.7E-10	(mg/m^3)	NA	(mg/m^3)	--
				Copper	2.3E-07	mg/m^3	1.9E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.2E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	1.8E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.1E-06	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	2.6E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.4E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.001
				Nickel	6.2E-08	mg/m^3	5.0E-09	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.3E-09	1.4E-08	(mg/m^3)	9.0E-05	(mg/m^3)	0.0002
				Thallium	1.5E-10	mg/m^3	1.2E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.4E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								2.2E-09					0.002
		Exposure Point Total									2.2E-09					0.002
	Exposure Medium Total										2.2E-09					0.002
Medium Total											4.5E-05					0.07
										Total of Receptor Risks Across All Media	4.5E-05				Total of Receptor Hazards Across All Media	0.07

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.3.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	1.1E-05	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	7.9E-05	2.4E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	1.6E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.8E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.005
				Copper	312	mg/kg	4.9E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.7E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.01
				Iron	30100	mg/kg	4.7E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.5E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.08
				Manganese	439	mg/kg	6.9E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.0E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.03
				Nickel	83.7	mg/kg	1.3E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.008
				Thallium	0.2	mg/kg	3.1E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								7.9E-05					0.1
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	6.7E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4.9E-05	1.5E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								4.9E-05					--
		Exposure Point Total									1.3E-04					0.1
	Exposure Medium Total										1.3E-04					0.1
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	2.0E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.2E-10	4.4E-10	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	7.4E-10	mg/m^3	2.9E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.4E-11	(mg/m^3)	NA	(mg/m^3)	--
				Copper	2.3E-07	mg/m^3	9.0E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	8.7E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-06	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	1.3E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.5E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.0003
				Nickel	6.2E-08	mg/m^3	2.4E-10	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	6.3E-11	2.8E-09	(mg/m^3)	9.0E-05	(mg/m^3)	0.00003
				Thallium	1.5E-10	mg/m^3	5.8E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.7E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								2.8E-10					0.0003
		Exposure Point Total									2.8E-10					0.0003
	Exposure Medium Total										2.8E-10					0.0003
Medium Total											1.3E-04					0.1
										Total of Receptor Risks Across All Media	1.3E-04				Total of Receptor Hazards Across All Media	0.1

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.4.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	1.3E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9.3E-06	2.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	4.9E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.0004
				Copper	312	mg/kg	1.5E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.3E-05	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.001
				Iron	30100	mg/kg	1.5E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.2E-03	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.007
				Manganese	439	mg/kg	2.1E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.5E-05	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.003
				Nickel	83.7	mg/kg	4.1E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0007
				Thallium	0.2	mg/kg	9.8E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								9.3E-06					0.01
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	1.4E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.0E-05	2.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								1.0E-05					--
		Exposure Point Total									1.9E-05					0.01
	Exposure Medium Total										1.9E-05					0.01
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	2.5E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.7E-10	4.4E-10	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	7.4E-10	mg/m^3	9.6E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.4E-11	(mg/m^3)	NA	(mg/m^3)	--
				Copper	2.3E-07	mg/m^3	3.0E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	2.9E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-06	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	4.2E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.5E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.0003
				Nickel	6.2E-08	mg/m^3	8.0E-10	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	2.1E-10	2.8E-09	(mg/m^3)	9.0E-05	(mg/m^3)	0.00003
				Thallium	1.5E-10	mg/m^3	1.9E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.7E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								4.8E-10					0.0003
		Exposure Point Total									4.8E-10					0.0003
	Exposure Medium Total										4.8E-10					0.0003
Medium Total											1.9E-05					0.01
										Total of Receptor Risks Across All Media	1.9E-05				Total of Receptor Hazards Across All Media	0.01

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.5.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	7.6E-05	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	5.5E-04	1.7E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	1.1E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-05	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.03
				Copper	312	mg/kg	3.4E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.0E-03	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.10
				Iron	30100	mg/kg	3.3E-02	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.8E-01	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.5
				Manganese	439	mg/kg	4.8E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.6E-03	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.2
				Nickel	83.7	mg/kg	9.2E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.1E-03	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.05
				Thallium	0.2	mg/kg	2.2E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-06	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								5.5E-04					1.0
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	2.3E-05	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.7E-04	5.1E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								1.7E-04					--
		Exposure Point Total									7.3E-04					1.0
	Exposure Medium Total										7.3E-04					1.0
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	4.2E-09	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	4.6E-09	9.2E-09	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	7.4E-10	mg/m^3	6.0E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.1E-10	(mg/m^3)	NA	(mg/m^3)	--
				Copper	2.3E-07	mg/m^3	1.9E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.2E-07	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	1.8E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.1E-05	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	2.7E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.1E-07	(mg/m^3)	5.0E-05	(mg/m^3)	0.006
				Nickel	6.2E-08	mg/m^3	5.1E-09	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.3E-09	5.9E-08	(mg/m^3)	9.0E-05	(mg/m^3)	0.0007
				Thallium	1.5E-10	mg/m^3	1.2E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.4E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								5.9E-09					0.007
		Exposure Point Total									5.9E-09					0.007
	Exposure Medium Total										5.9E-09					0.007
Medium Total											7.3E-04					1.0
										Total of Receptor Risks Across All Media	7.3E-04				Total of Receptor Hazards Across All Media	1.0

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.6.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	8.9E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	6.5E-05	1.6E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	3.4E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.003
				Copper	312	mg/kg	1.1E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.7E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.009
				Iron	30100	mg/kg	1.0E-02	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.6E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.05
				Manganese	439	mg/kg	1.5E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.3E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.02
				Nickel	83.7	mg/kg	2.9E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.0E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.005
				Thallium	0.2	mg/kg	6.8E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								6.5E-05					0.09
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	4.9E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	3.6E-05	8.6E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								3.6E-05					--
		Exposure Point Total									1.0E-04					0.09
	Exposure Medium Total										1.0E-04					0.09
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	5.2E-09	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	5.8E-09	9.2E-09	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	7.4E-10	mg/m^3	2.0E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.1E-10	(mg/m^3)	NA	(mg/m^3)	--
				Copper	2.3E-07	mg/m^3	6.3E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.2E-07	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	6.1E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.1E-05	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	8.8E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.1E-07	(mg/m^3)	5.0E-05	(mg/m^3)	0.006
				Nickel	6.2E-08	mg/m^3	1.7E-08	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	4.4E-09	5.9E-08	(mg/m^3)	9.0E-05	(mg/m^3)	0.0007
				Thallium	1.5E-10	mg/m^3	4.0E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.4E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								1.0E-08					0.007
		Exposure Point Total									1.0E-08					0.007
	Exposure Medium Total										1.0E-08					0.007
Medium Total											1.0E-04					0.10
										Total of Receptor Risks Across All Media	1.0E-04				Total of Receptor Hazards Across All Media	0.10

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.1.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	7.9E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	5.7E-07	5.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	6.1E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.2E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.001
				Copper	312	mg/kg	1.9E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.003
				Iron	30100	mg/kg	1.8E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.02
				Manganese	439	mg/kg	2.7E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.008
				Nickel	83.7	mg/kg	5.1E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.5E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.002
				Thallium	0.2	mg/kg	1.2E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								5.7E-07					0.03
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	2.2E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.6E-07	1.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								1.6E-07					--
		Exposure Point Total									7.3E-07					0.03
	Exposure Medium Total										7.3E-07					0.03
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	9.4E-12	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	1.0E-11	6.5E-10	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	7.4E-10	mg/m^3	7.2E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.0E-11	(mg/m^3)	NA	(mg/m^3)	--
				Copper	2.3E-07	mg/m^3	2.2E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.6E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	2.2E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.5E-06	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	3.2E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.2E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.0004
				Nickel	6.2E-08	mg/m^3	6.0E-11	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.6E-11	4.2E-09	(mg/m^3)	2.0E-04	(mg/m^3)	0.00002
				Thallium	1.5E-10	mg/m^3	1.4E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								2.6E-11					0.0005
		Exposure Point Total									2.6E-11					0.0005
	Exposure Medium Total										2.6E-11					0.0005
Medium Total											7.3E-07					0.03
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	2.1E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.5E-07	1.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	3.7E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-04	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.6
				Arsenic	20.9	mg/kg	7.6E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.1E-07	5.3E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Cadmium	3.66	mg/kg	2.2E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.003
				Cobalt	13	mg/kg	7.9E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.5E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.002
				Copper	11700	mg/kg	7.1E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.0E-03	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.1
				Iron	102000	mg/kg	6.2E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.3E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.06
				Lead	2210	mg/kg	1.3E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.4E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	1.2E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.1E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.03
				Mercury	3.66	mg/kg	2.2E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-06	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.0008
				Nickel	707	mg/kg	4.3E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.0E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.01
				Thallium	0.154	mg/kg	9.3E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	1.3E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.3E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.003
				Cyanide	34	mg/kg	2.1E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0007
			Exp. Route Total								2.6E-07					0.9
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	5.7E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4.2E-08	4.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	8.1E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.2E-08	5.7E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Cadmium	3.66	mg/kg	4.7E-11	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.3E-09	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0001
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-03	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--

TABLE 7.1.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil (continued)	Subsurface Soil	OU8	Dermal	Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.4E-04	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.0E-02	(mg/kg/day)	--
			Exp. Route Total								5.4E-08					0.002
		Exposure Point Total									3.2E-07					0.9
	Exposure Medium Total										3.2E-07					0.9
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	2.4E-12	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.7E-12	1.7E-10	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	4.5E-07	mg/m^3	4.4E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.1E-08	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	1.5E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	6.5E-11	1.1E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.00007
				Cadmium	2.7E-09	mg/m^3	2.6E-12	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	4.7E-12	1.8E-10	(mg/m^3)	1.0E-05	(mg/m^3)	0.00002
				Cobalt	9.6E-09	mg/m^3	9.4E-12	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	8.4E-11	6.5E-10	(mg/m^3)	2.0E-05	(mg/m^3)	0.00003
				Copper	8.6E-06	mg/m^3	8.4E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.9E-07	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	7.3E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.1E-06	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	1.6E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.1E-07	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	1.4E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	9.6E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.002
				Mercury	2.7E-09	mg/m^3	2.6E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.8E-10	(mg/m^3)	3.0E-04	(mg/m^3)	6.1E-7
				Nickel	5.2E-07	mg/m^3	5.1E-10	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.3E-10	3.6E-08	(mg/m^3)	2.0E-04	(mg/m^3)	0.0002
				Thallium	1.1E-10	mg/m^3	1.1E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.8E-12	(mg/m^3)	NA	(mg/m^3)	--
				Zinc	1.6E-06	mg/m^3	1.6E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.1E-07	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	4.4E-02	mg/m^3	4.3E-05	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.0E-03	(mg/m^3)	8.0E-04	(mg/m^3)	3.7
			Exp. Route Total								2.9E-10					3.8
		Exposure Point Total									2.9E-10					3.8
	Exposure Medium Total										2.9E-10					3.8
Medium Total											3.2E-07					4.7
Groundwater	Groundwater	OU8	Ingestion	Manganese	2630	ug/L	3.9E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.7E-05	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.001
			Exp. Route Total								- -					0.001
			Dermal	Manganese	2630	ug/L	2.7E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-05	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.02
			Exp. Route Total								- -					0.02
		Exposure Point Total									- -					0.02
	Exposure Medium Total										- -					0.02
Medium Total											- -					0.02
										Total of Receptor Risks Across All Media	1.1E-06				Total of Receptor Hazards Across All Media	4.7

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.2.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	6.3E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4.6E-06	4.9E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	4.8E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.8E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.0009
				Copper	312	mg/kg	1.5E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.003
				Iron	30100	mg/kg	1.5E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.1E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.02
				Manganese	439	mg/kg	2.1E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.007
				Nickel	83.7	mg/kg	4.0E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.1E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.002
				Thallium	0.2	mg/kg	9.6E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								4.6E-06					0.03
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	1.1E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	8.4E-07	8.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								8.4E-07					--
		Exposure Point Total									5.4E-06					0.03
	Exposure Medium Total										5.4E-06					0.03
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	2.5E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.7E-10	1.9E-09	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	7.4E-10	mg/m^3	1.9E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.5E-10	(mg/m^3)	NA	(mg/m^3)	--
				Copper	2.3E-07	mg/m^3	5.9E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.6E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	5.7E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.4E-06	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	8.3E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.5E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.001
				Nickel	6.2E-08	mg/m^3	1.6E-09	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	4.1E-10	1.2E-08	(mg/m^3)	9.0E-05	(mg/m^3)	0.0001
				Thallium	1.5E-10	mg/m^3	3.8E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.9E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								6.8E-10					0.001
		Exposure Point Total									6.8E-10					0.001
	Exposure Medium Total										6.8E-10					0.001
Medium Total											5.4E-06					0.03
										Total of Receptor Risks Across All Media	5.4E-06				Total of Receptor Hazards Across All Media	0.03

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.3.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	1.1E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	8.0E-06	5.9E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	1.3E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.6E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.001
				Copper	312	mg/kg	4.1E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.004
				Iron	30100	mg/kg	3.9E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.02
				Manganese	439	mg/kg	5.7E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.0E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.008
				Nickel	83.7	mg/kg	1.1E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.8E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.002
				Thallium	0.2	mg/kg	2.6E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								8.0E-06					0.03
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	2.7E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.0E-06	1.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								2.0E-06					--
		Exposure Point Total									1.0E-05					0.03
	Exposure Medium Total										1.0E-05					0.03
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	2.0E-11	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.2E-11	1.1E-10	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	7.4E-10	mg/m^3	2.4E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	8.4E-12	(mg/m^3)	NA	(mg/m^3)	--
				Copper	2.3E-07	mg/m^3	7.5E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.6E-09	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	7.2E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.5E-07	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	1.1E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.7E-09	(mg/m^3)	5.0E-05	(mg/m^3)	0.00007
				Nickel	6.2E-08	mg/m^3	2.0E-11	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	5.2E-12	7.0E-10	(mg/m^3)	9.0E-05	(mg/m^3)	0.000008
				Thallium	1.5E-10	mg/m^3	4.8E-14	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.7E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								2.8E-11					0.00008
		Exposure Point Total									2.8E-11					0.00008
	Exposure Medium Total										2.8E-11					0.00008
Medium Total											1.0E-05					0.03
										Total of Receptor Risks Across All Media	1.0E-05				Total of Receptor Hazards Across All Media	0.03

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.4.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	8.7E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	6.4E-07	5.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	4.3E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.3E-08	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.0001
				Copper	312	mg/kg	1.3E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-05	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.0003
				Iron	30100	mg/kg	1.3E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-03	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.002
				Manganese	439	mg/kg	1.9E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-05	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.0008
				Nickel	83.7	mg/kg	3.6E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.6E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0002
				Thallium	0.2	mg/kg	8.6E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.6E-09	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								6.4E-07					0.003
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	2.7E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.0E-07	1.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								2.0E-07					--
		Exposure Point Total									8.4E-07					0.003
	Exposure Medium Total										8.4E-07					0.003
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	1.7E-11	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	1.9E-11	1.1E-10	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	7.4E-10	mg/m^3	8.4E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	8.4E-12	(mg/m^3)	NA	(mg/m^3)	--
				Copper	2.3E-07	mg/m^3	2.6E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.6E-09	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	2.5E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.5E-07	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	3.7E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.7E-09	(mg/m^3)	5.0E-05	(mg/m^3)	0.00007
				Nickel	6.2E-08	mg/m^3	7.0E-11	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.8E-11	7.0E-10	(mg/m^3)	9.0E-05	(mg/m^3)	0.000008
				Thallium	1.5E-10	mg/m^3	1.7E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.7E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								3.7E-11					0.00008
		Exposure Point Total									3.7E-11					0.00008
	Exposure Medium Total										3.7E-11					0.00008
Medium Total											8.4E-07					0.003
										Total of Receptor Risks Across All Media	8.4E-07				Total of Receptor Hazards Across All Media	0.003

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.5.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	1.0E-05	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	7.5E-05	5.6E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	1.2E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.3E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.01
				Copper	312	mg/kg	3.8E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-03	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.03
				Iron	30100	mg/kg	3.7E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-01	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.2
				Manganese	439	mg/kg	5.4E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-03	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.08
				Nickel	83.7	mg/kg	1.0E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.6E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.02
				Thallium	0.2	mg/kg	2.4E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								7.5E-05					0.3
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	1.3E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9.3E-06	6.9E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								9.3E-06					--
		Exposure Point Total									8.5E-05					0.3
	Exposure Medium Total										8.5E-05					0.3
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	1.1E-09	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	1.3E-09	6.1E-09	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	7.4E-10	mg/m^3	1.3E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.7E-10	(mg/m^3)	NA	(mg/m^3)	--
				Copper	2.3E-07	mg/m^3	4.2E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.5E-07	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	4.1E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.4E-05	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	5.9E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.1E-07	(mg/m^3)	5.0E-05	(mg/m^3)	0.004
				Nickel	6.2E-08	mg/m^3	1.1E-09	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	2.9E-10	3.9E-08	(mg/m^3)	9.0E-05	(mg/m^3)	0.0004
				Thallium	1.5E-10	mg/m^3	2.7E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	9.4E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								1.5E-09					0.005
		Exposure Point Total									1.5E-09					0.005
	Exposure Medium Total										1.5E-09					0.005
Medium Total											8.5E-05					0.3
										Total of Receptor Risks Across All Media	8.5E-05				Total of Receptor Hazards Across All Media	0.3

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.6.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	8.2E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	6.0E-06	5.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	4.0E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.0E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.001
				Copper	312	mg/kg	1.3E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.003
				Iron	30100	mg/kg	1.2E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.02
				Manganese	439	mg/kg	1.8E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.8E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.007
				Nickel	83.7	mg/kg	3.4E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.4E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.002
				Thallium	0.2	mg/kg	8.0E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								6.0E-06					0.03
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	1.3E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9.4E-07	8.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								9.4E-07					--
		Exposure Point Total									6.9E-06					0.03
	Exposure Medium Total										6.9E-06					0.03
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	9.6E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	1.1E-09	6.1E-09	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	7.4E-10	mg/m^3	4.7E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.7E-10	(mg/m^3)	NA	(mg/m^3)	--
				Copper	2.3E-07	mg/m^3	1.5E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.5E-07	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	1.4E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.4E-05	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	2.1E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.1E-07	(mg/m^3)	5.0E-05	(mg/m^3)	0.004
				Nickel	6.2E-08	mg/m^3	3.9E-09	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.0E-09	3.9E-08	(mg/m^3)	9.0E-05	(mg/m^3)	0.0004
				Thallium	1.5E-10	mg/m^3	9.4E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	9.4E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								2.1E-09					0.005
		Exposure Point Total									2.1E-09					0.005
	Exposure Medium Total										2.1E-09					0.005
Medium Total											6.9E-06					0.03
										Total of Receptor Risks Across All Media	6.9E-06				Total of Receptor Hazards Across All Media	0.03

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

RAGS Part D Table 9

Summary of Receptor Risks and Hazards for COPCs

LIST OF TABLES
RAGS PART D TABLE 9
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

Table No.	
	Reasonable Maximum Exposures
9.1.RME	Construction Workers
9.2.RME	Occupational Workers
9.3.RME	Child Recreational Users
9.4.RME	Adult Recreational Users
9.5.RME	Lifelong Recreational Users
9.6.RME	Child Residents
9.7.RME	Adult Residents
9.8.RME	Lifelong Residents
	Central Tendency Exposures
9.1.CTE	Construction Workers
9.2.CTE	Occupational Workers
9.3.CTE	Child Recreational Users
9.4.CTE	Adult Recreational Users
9.5.CTE	Lifelong Recreational Users
9.6.CTE	Child Residents
9.7.CTE	Adult Residents
9.8.CTE	Lifelong Residents

TABLE 9.1.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	2E-06	--	1E-06	--	3E-06	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.004	--	--	0.004
			Copper	- -	--	- -	--	- -	GS	0.01	--	--	0.01
			Iron	- -	--	- -	--	- -	GS	0.07	--	--	0.07
			Manganese	- -	--	- -	--	- -	CNS	0.03	--	--	0.03
			Nickel	- -	--	- -	--	- -	Body Weight	0.007	--	--	0.007
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Chemical Total	2E-06	--	1E-06	--	3E-06		0.1	--	--	0.1
		Exposure Point Total						3E-06					0.1
	Exposure Medium Total							3E-06					0.1
	Air	OU8	Benzo(a)pyrene Equivalents	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.0009	--	0.0009
			Nickel	--	3E-11	--	--	3E-11	Respiratory	--	0.00004	--	0.00004
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	5E-11	--	--	5E-11		- -	0.0009	- -	0.0009
		Exposure Point Total						5E-11					0.0009
	Exposure Medium Total							5E-11					0.0009
Medium Total								3E-06					0.1
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	6E-07	--	3E-07	--	9E-07	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	3	--	--	3
			Arsenic	5E-07	--	7E-08	--	5E-07	Skin, CVS	0.07	--	0.01	0.08
			Cadmium	- -	--	- -	--	- -	Kidney	0.01	--	0.0008	0.01
			Cobalt	- -	--	- -	--	- -	Thyroid	0.007	--	--	0.007
			Copper	- -	--	- -	--	- -	GS	0.5	--	--	0.5
			Iron	- -	--	- -	--	- -	GS	0.2	--	--	0.2
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.1	--	--	0.1
			Mercury	- -	--	- -	--	- -	CNS	0.003	--	--	0.003
			Nickel	- -	--	- -	--	- -	Body Weight	0.06	--	--	0.06
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Zinc	- -	--	- -	--	- -	Blood	0.01	--	--	0.01
			Cyanide	- -	--	- -	--	- -	yroid, CNS, Body Wei	0.003	--	--	0.003
			Chemical Total	1E-06	--	3E-07	--	1E-06		4	--	0.01	4
		Exposure Point Total						1E-06					4
	Exposure Medium Total							1E-06					4
	Air	OU8	Benzo(a)pyrene Equivalents	--	5E-12	--	--	5E-12	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	1E-10	--	--	1E-10	NA	--	0.0001	--	0.0001
			Cadmium	--	9E-12	--	--	9E-12	Kidney	--	0.00004	--	0.00004
			Cobalt	--	2E-10	--	--	2E-10	Respiratory	--	0.00007	--	0.00007
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.004	--	0.004
			Mercury	--	- -	--	--	- -	CNS	--	0.000001	--	0.000001
			Nickel	--	3E-10	--	--	3E-10	Respiratory	--	0.0004	--	0.0004
			Thallium	--	- -	--	--	- -	NA	--	--	--	--

TABLE 9.1.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil (continued)	Air	OU8	Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	7	--	7
			Chemical Total	--	6E-10	--	--	6E-10		- -	8	- -	8
		Exposure Point Total						6E-10					8
	Exposure Medium Total							6E-10					8
Medium Total								1E-06					11
Groundwater	Groundwater	OU8	Manganese	- -	--	- -	--	- -	CNS	0.001	--	0.04	0.04
			Chemical Total	- -	--	- -	--	- -		0.001	--	0.04	0.04
		Exposure Point Total						- -					0.04
	Exposure Medium Total							- -					0.04
Medium Total								- -					0.04
Receptor Total							Receptor Risk Total	5E-06				Receptor HI Total	11

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	3
Total Body Weight HI	0.07
Total CNS HI	0.2
Total CVS HI	0.08
Total GS HI	0.8
Total Kidney HI	0.01
Total Respiratory HI	0.0005
Total Skin HI	0.08
Total Thyroid HI	8

TABLE 9.2.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	3E-05	--	2E-05	--	4E-05	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.002	--	--	0.002
			Copper	- -	--	- -	--	- -	GS	0.007	--	--	0.007
			Iron	- -	--	- -	--	- -	GS	0.04	--	--	0.04
			Manganese	- -	--	- -	--	- -	CNS	0.02	--	--	0.02
			Nickel	- -	--	- -	--	- -	Body Weight	0.004	--	--	0.004
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Chemical Total	3E-05	--	2E-05	--	4E-05		0.06	--	--	0.06
		Exposure Point Total						4E-05					0.06
	Exposure Medium Total							4E-05					0.06
	Air	OU8	Benzo(a)pyrene Equivalents	--	9E-10	--	--	9E-10	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.001	--	0.001
			Nickel	--	1E-09	--	--	1E-09	Respiratory	--	0.0002	--	0.0002
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	2E-09	--	--	2E-09		- -	0.002	- -	0.002
		Exposure Point Total						2E-09					0.002
	Exposure Medium Total							2E-09					0.002
Medium Total								4E-05					0.07
Receptor Total							Receptor Risk Total	4E-05				Receptor HI Total	0.07

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	0.002
Total Body Weight HI	0.004
Total CNS HI	0.02
Total GS HI	0.04
Total Respiratory HI	0.0002
Total Skin HI	--

TABLE 9.3.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	8E-05	--	5E-05	--	1E-04	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.005	--	--	0.005
			Copper	- -	--	- -	--	- -	GS	0.01	--	--	0.01
			Iron	- -	--	- -	--	- -	GS	0.08	--	--	0.08
			Manganese	- -	--	- -	--	- -	CNS	0.03	--	--	0.03
			Nickel	- -	--	- -	--	- -	Body Weight	0.008	--	--	0.008
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Chemical Total	8E-05	--	5E-05	--	1E-04		0.1	--	--	0.1
		Exposure Point Total						1E-04					0.1
	Exposure Medium Total							1E-04					0.1
	Air	OU8	Benzo(a)pyrene Equivalents	--	2E-10	--	--	2E-10	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.0003	--	0.0003
			Nickel	--	6E-11	--	--	6E-11	Respiratory	--	0.00003	--	0.00003
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	3E-10	--	--	3E-10		- -	0.0003	- -	0.0003
		Exposure Point Total						3E-10					0.0003
	Exposure Medium Total							3E-10					0.0003
Medium Total								1E-04					0.1
Receptor Total							Receptor Risk Total	1E-04				Receptor HI Total	0.1

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	0.005
Total Body Weight HI	0.008
Total CNS HI	0.03
Total GS HI	0.09
Total Respiratory HI	0.00003
Total Skin HI	--

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	9E-06	--	1E-05	--	2E-05	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.0004	--	--	0.0004
			Copper	- -	--	- -	--	- -	GS	0.001	--	--	0.001
			Iron	- -	--	- -	--	- -	GS	0.007	--	--	0.007
			Manganese	- -	--	- -	--	- -	CNS	0.003	--	--	0.003
			Nickel	- -	--	- -	--	- -	Body Weight	0.0007	--	--	0.0007
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Chemical Total	9E-06	--	1E-05	--	2E-05		0.01	--	--	0.01
		Exposure Point Total						2E-05					0.01
	Exposure Medium Total							2E-05					0.01
	Air	OU8	Benzo(a)pyrene Equivalents	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.0003	--	0.0003
			Nickel	--	2E-10	--	--	2E-10	Respiratory	--	0.00003	--	0.00003
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	5E-10	--	--	5E-10		- -	0.0003	- -	0.0003
		Exposure Point Total						5E-10					0.0003
	Exposure Medium Total							5E-10					0.0003
Medium Total								2E-05					0.01
Receptor Total							Receptor Risk Total	2E-05				Receptor HI Total	0.01

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	0.0004
Total Body Weight HI	0.0007
Total CNS HI	0.003
Total GS HI	0.009
Total Respiratory HI	0.00003
Total Skin HI	--

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	9E-05	--	6E-05	--	1E-04					
			Antimony	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Manganese	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Thallium	- -	--	- -	--	- -					
			Chemical Total	9E-05	--	6E-05	--	1E-04					
		Exposure Point Total						1E-04					
	Exposure Medium Total							1E-04					
	Air	OU8	Benzo(a)pyrene Equivalents	--	5E-10	--	--	5E-10					
			Antimony	--	- -	--	--	- -					
			Copper	--	- -	--	--	- -					
			Iron	--	- -	--	--	- -					
			Manganese	--	- -	--	--	- -					
			Nickel	--	3E-10	--	--	3E-10					
			Thallium	--	- -	--	--	- -					
			Chemical Total	--	8E-10	--	--	8E-10					
		Exposure Point Total						8E-10					
	Exposure Medium Total							8E-10					
Medium Total								1E-04					
Receptor Total							Receptor Risk Total	1E-04					

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.6.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	6E-04	--	2E-04	--	7E-04	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.03	--	--	0.03
			Copper	- -	--	- -	--	- -	GS	0.10	--	--	0.10
			Iron	- -	--	- -	--	- -	GS	0.5	--	--	0.5
			Manganese	- -	--	- -	--	- -	CNS	0.2	--	--	0.2
			Nickel	- -	--	- -	--	- -	Body Weight	0.05	--	--	0.05
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Chemical Total	6E-04	--	2E-04	--	7E-04		1.0	--	--	1.0
		Exposure Point Total						7E-04					1.0
	Exposure Medium Total							7E-04					1.0
	Air	OU8	Benzo(a)pyrene Equivalents	--	5E-09	--	--	5E-09	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.006	--	0.006
			Nickel	--	1E-09	--	--	1E-09	Respiratory	--	0.0007	--	0.0007
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	6E-09	--	--	6E-09		- -	0.007	- -	0.007
		Exposure Point Total						6E-09					0.007
	Exposure Medium Total							6E-09					0.007
Medium Total								7E-04					1.0
Receptor Total							Receptor Risk Total	7E-04				Receptor HI Total	1.0

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	0.03
Total Body Weight HI	0.05
Total CNS HI	0.2
Total GS HI	0.6
Total Respiratory HI	0.0007
Total Skin HI	--

TABLE 9.7.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	7E-05	--	4E-05	--	1E-04	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.003	--	--	0.003
			Copper	- -	--	- -	--	- -	GS	0.009	--	--	0.009
			Iron	- -	--	- -	--	- -	GS	0.05	--	--	0.05
			Manganese	- -	--	- -	--	- -	CNS	0.02	--	--	0.02
			Nickel	- -	--	- -	--	- -	Body Weight	0.005	--	--	0.005
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Chemical Total	7E-05	--	4E-05	--	1E-04		0.09	--	--	0.09
		Exposure Point Total						1E-04					0.09
	Exposure Medium Total							1E-04					0.09
	Air	OU8	Benzo(a)pyrene Equivalents	--	6E-09	--	--	6E-09	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.006	--	0.006
			Nickel	--	4E-09	--	--	4E-09	Respiratory	--	0.0007	--	0.0007
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	1E-08	--	--	1E-08		- -	0.007	- -	0.007
		Exposure Point Total						1E-08					0.007
	Exposure Medium Total							1E-08					0.007
Medium Total								1E-04					0.10
Receptor Total							Receptor Risk Total	1E-04				Receptor HI Total	0.10

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	0.003
Total Body Weight HI	0.005
Total CNS HI	0.03
Total GS HI	0.06
Total Respiratory HI	0.0007
Total Skin HI	--

TABLE 9.8.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	6E-04	--	2E-04	--	8E-04					
			Antimony	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Manganese	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Thallium	- -	--	- -	--	- -					
			Chemical Total	6E-04	--	2E-04	--	8E-04					
		Exposure Point Total						8E-04					
	Exposure Medium Total							8E-04					
	Air	OU8	Benzo(a)pyrene Equivalents	--	1E-08	--	--	1E-08					
			Antimony	--	- -	--	--	- -					
			Copper	--	- -	--	--	- -					
			Iron	--	- -	--	--	- -					
			Manganese	--	- -	--	--	- -					
			Nickel	--	6E-09	--	--	6E-09					
			Thallium	--	- -	--	--	- -					
			Chemical Total	--	2E-08	--	--	2E-08					
		Exposure Point Total						2E-08					
	Exposure Medium Total							2E-08					
Medium Total								8E-04					
Receptor Total							Receptor Risk Total	8E-04					

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.1.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	6E-07	--	2E-07	--	7E-07	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.001	--	--	0.001
			Copper	- -	--	- -	--	- -	GS	0.003	--	--	0.003
			Iron	- -	--	- -	--	- -	GS	0.02	--	--	0.02
			Manganese	- -	--	- -	--	- -	CNS	0.008	--	--	0.008
			Nickel	- -	--	- -	--	- -	Body Weight	0.002	--	--	0.002
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Chemical Total	6E-07	--	2E-07	--	7E-07		0.03	--	--	0.03
		Exposure Point Total						7E-07					0.03
	Exposure Medium Total							7E-07					0.03
	Air	OU8	Benzo(a)pyrene Equivalents	--	1E-11	--	--	1E-11	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.0004	--	0.0004
			Nickel	--	2E-11	--	--	2E-11	Respiratory	--	0.00002	--	0.00002
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	3E-11	--	--	3E-11		- -	0.0005	- -	0.0005
		Exposure Point Total						3E-11					0.0005
	Exposure Medium Total							3E-11					0.0005
Medium Total								7E-07					0.03
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-07	--	4E-08	--	2E-07	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.6	--	--	0.6
			Arsenic	1E-07	--	1E-08	--	1E-07	Skin, CVS	0.02	--	0.002	0.02
			Cadmium	- -	--	- -	--	- -	Kidney	0.003	--	0.0001	0.003
			Cobalt	- -	--	- -	--	- -	Thyroid	0.002	--	--	0.002
			Copper	- -	--	- -	--	- -	GS	0.1	--	--	0.1
			Iron	- -	--	- -	--	- -	GS	0.06	--	--	0.06
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.03	--	--	0.03
			Mercury	- -	--	- -	--	- -	CNS	0.0008	--	--	0.0008
			Nickel	- -	--	- -	--	- -	Body Weight	0.01	--	--	0.01
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Zinc	- -	--	- -	--	- -	Blood	0.003	--	--	0.003
			Cyanide	- -	--	- -	--	- -	yroid, CNS, Body Wei	0.0007	--	--	0.0007
			Chemical Total	3E-07	--	5E-08	--	3E-07		0.9	--	0.002	0.9
		Exposure Point Total						3E-07					0.9
	Exposure Medium Total							3E-07					0.9
	Air	OU8	Benzo(a)pyrene Equivalents	--	3E-12	--	--	3E-12	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	6E-11	--	--	6E-11	NA	--	0.00007	--	0.00007
			Cadmium	--	5E-12	--	--	5E-12	Kidney	--	0.00002	--	0.00002
			Cobalt	--	8E-11	--	--	8E-11	Respiratory	--	0.00003	--	0.00003
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.002	--	0.002
			Mercury	--	- -	--	--	- -	CNS	--	0.0000006	--	0.0000006
			Nickel	--	1E-10	--	--	1E-10	Respiratory	--	0.0002	--	0.0002
			Thallium	--	- -	--	--	- -	NA	--	--	--	--

TABLE 9.1.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil (continued)	Air	OU8	Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	4	--	4
			Chemical Total	--	3E-10	--	--	3E-10		- -	4	- -	4
		Exposure Point Total						3E-10					4
	Exposure Medium Total							3E-10					4
Medium Total								3E-07					5
Groundwater	Groundwater	OU8	Manganese	- -	--	- -	--	- -	CNS	0.001	--	0.02	0.02
			Chemical Total	- -	--	- -	--	- -		0.001	--	0.02	0.02
		Exposure Point Total						- -					0.02
	Exposure Medium Total							- -					0.02
Medium Total								- -					0.02
Receptor Total							Receptor Risk Total	1E-06				Receptor HI Total	5

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	0.7
Total Body Weight HI	0.02
Total CNS HI	0.07
Total CVS HI	0.02
Total GS HI	0.2
Total Kidney HI	0.003
Total Respiratory HI	0.0002
Total Skin HI	0.02
Total Thyroid HI	4

TABLE 9.2.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	5E-06	--	8E-07	--	5E-06	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.0009	--	--	0.0009
			Copper	- -	--	- -	--	- -	GS	0.003	--	--	0.003
			Iron	- -	--	- -	--	- -	GS	0.02	--	--	0.02
			Manganese	- -	--	- -	--	- -	CNS	0.007	--	--	0.007
			Nickel	- -	--	- -	--	- -	Body Weight	0.002	--	--	0.002
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Chemical Total	5E-06	--	8E-07	--	5E-06		0.03	--	--	0.03
		Exposure Point Total						5E-06					0.03
	Exposure Medium Total							5E-06					0.03
	Air	OU8	Benzo(a)pyrene Equivalents	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.001	--	0.001
			Nickel	--	4E-10	--	--	4E-10	Respiratory	--	0.0001	--	0.0001
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	7E-10	--	--	7E-10		- -	0.001	- -	0.001
		Exposure Point Total						7E-10					0.001
	Exposure Medium Total							7E-10					0.001
Medium Total								5E-06					0.03
Receptor Total							Receptor Risk Total	5E-06				Receptor HI Total	0.03

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	0.0009
Total Body Weight HI	0.002
Total CNS HI	0.008
Total GS HI	0.02
Total Respiratory HI	0.0001
Total Skin HI	--

TABLE 9.3.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	8E-06	--	2E-06	--	1E-05	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.001	--	--	0.001
			Copper	- -	--	- -	--	- -	GS	0.004	--	--	0.004
			Iron	- -	--	- -	--	- -	GS	0.02	--	--	0.02
			Manganese	- -	--	- -	--	- -	CNS	0.008	--	--	0.008
			Nickel	- -	--	- -	--	- -	Body Weight	0.002	--	--	0.002
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Chemical Total	8E-06	--	2E-06	--	1E-05		0.03	--	--	0.03
		Exposure Point Total						1E-05					0.03
	Exposure Medium Total							1E-05					0.03
	Air	OU8	Benzo(a)pyrene Equivalents	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.00007	--	0.00007
			Nickel	--	5E-12	--	--	5E-12	Respiratory	--	0.000008	--	0.000008
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	3E-11	--	--	3E-11		- -	0.00008	- -	0.00008
		Exposure Point Total						3E-11					0.00008
	Exposure Medium Total							3E-11					0.00008
Medium Total								1E-05					0.03
Receptor Total							Receptor Risk Total	1E-05				Receptor HI Total	0.03

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	0.001
Total Body Weight HI	0.002
Total CNS HI	0.008
Total GS HI	0.02
Total Respiratory HI	0.000008
Total Skin HI	--

TABLE 9.4.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	6E-07	--	2E-07	--	8E-07	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.0001	--	--	0.0001
			Copper	- -	--	- -	--	- -	GS	0.0003	--	--	0.0003
			Iron	- -	--	- -	--	- -	GS	0.002	--	--	0.002
			Manganese	- -	--	- -	--	- -	CNS	0.0008	--	--	0.0008
			Nickel	- -	--	- -	--	- -	Body Weight	0.0002	--	--	0.0002
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Chemical Total	6E-07	--	2E-07	--	8E-07		0.003	--	--	0.003
		Exposure Point Total						8E-07					0.003
	Exposure Medium Total							8E-07					0.003
	Air	OU8	Benzo(a)pyrene Equivalents	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.00007	--	0.00007
			Nickel	--	2E-11	--	--	2E-11	Respiratory	--	0.000008	--	0.000008
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	4E-11	--	--	4E-11		- -	0.00008	- -	0.00008
		Exposure Point Total						4E-11					0.00008
	Exposure Medium Total							4E-11					0.00008
Medium Total								8E-07					0.003
Receptor Total							Receptor Risk Total	8E-07				Receptor HI Total	0.003

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	0.0001
Total Body Weight HI	0.0002
Total CNS HI	0.0009
Total GS HI	0.002
Total Respiratory HI	0.000008
Total Skin HI	--

TABLE 9.5.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	9E-06	--	2E-06	--	1E-05					
			Antimony	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Manganese	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Thallium	- -	--	- -	--	- -					
			Chemical Total	9E-06	--	2E-06	--	1E-05					
		Exposure Point Total						1E-05					
	Exposure Medium Total							1E-05					
	Air	OU8	Benzo(a)pyrene Equivalents	--	4E-11	--	--	4E-11					
			Antimony	--	- -	--	--	- -					
			Copper	--	- -	--	--	- -					
			Iron	--	- -	--	--	- -					
			Manganese	--	- -	--	--	- -					
			Nickel	--	2E-11	--	--	2E-11					
			Thallium	--	- -	--	--	- -					
			Chemical Total	--	6E-11	--	--	6E-11					
		Exposure Point Total						6E-11					
	Exposure Medium Total							6E-11					
Medium Total								1E-05					
Receptor Total							Receptor Risk Total	1E-05					

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.6.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	8E-05	--	9E-06	--	8E-05	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.01	--	--	0.01
			Copper	- -	--	- -	--	- -	GS	0.03	--	--	0.03
			Iron	- -	--	- -	--	- -	GS	0.2	--	--	0.2
			Manganese	- -	--	- -	--	- -	CNS	0.08	--	--	0.08
			Nickel	- -	--	- -	--	- -	Body Weight	0.02	--	--	0.02
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Chemical Total	8E-05	--	9E-06	--	8E-05		0.3	--	--	0.3
		Exposure Point Total						8E-05					0.3
	Exposure Medium Total							8E-05					0.3
	Air	OU8	Benzo(a)pyrene Equivalents	--	1E-09	--	--	1E-09	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.004	--	0.004
			Nickel	--	3E-10	--	--	3E-10	Respiratory	--	0.0004	--	0.0004
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	2E-09	--	--	2E-09		- -	0.005	- -	0.005
		Exposure Point Total						2E-09					0.005
	Exposure Medium Total							2E-09					0.005
Medium Total								8E-05					0.3
Receptor Total							Receptor Risk Total	8E-05				Receptor HI Total	0.3

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	0.01
Total Body Weight HI	0.02
Total CNS HI	0.08
Total GS HI	0.2
Total Respiratory HI	0.0004
Total Skin HI	--

TABLE 9.7.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	6E-06	--	9E-07	--	7E-06	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.001	--	--	0.001
			Copper	- -	--	- -	--	- -	GS	0.003	--	--	0.003
			Iron	- -	--	- -	--	- -	GS	0.02	--	--	0.02
			Manganese	- -	--	- -	--	- -	CNS	0.007	--	--	0.007
			Nickel	- -	--	- -	--	- -	Body Weight	0.002	--	--	0.002
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Chemical Total	6E-06	--	9E-07	--	7E-06		0.03	--	--	0.03
		Exposure Point Total						7E-06					0.03
	Exposure Medium Total							7E-06					0.03
	Air	OU8	Benzo(a)pyrene Equivalents	--	1E-09	--	--	1E-09	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.004	--	0.004
			Nickel	--	1E-09	--	--	1E-09	Respiratory	--	0.0004	--	0.0004
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	2E-09	--	--	2E-09		- -	0.005	- -	0.005
		Exposure Point Total						2E-09					0.005
	Exposure Medium Total							2E-09					0.005
Medium Total								7E-06					0.03
Receptor Total							Receptor Risk Total	7E-06				Receptor HI Total	0.03

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	0.001
Total Body Weight HI	0.002
Total CNS HI	0.01
Total GS HI	0.02
Total Respiratory HI	0.0004
Total Skin HI	--

TABLE 9.8.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	8E-05	--	1E-05	--	9E-05					
			Antimony	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Manganese	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Thallium	- -	--	- -	--	- -					
			Chemical Total	8E-05	--	1E-05	--	9E-05					
		Exposure Point Total						9E-05					
	Exposure Medium Total							9E-05					
	Air	OU8	Benzo(a)pyrene Equivalents	--	2E-09	--	--	2E-09					
			Antimony	--	- -	--	--	- -					
			Copper	--	- -	--	--	- -					
			Iron	--	- -	--	--	- -					
			Manganese	--	- -	--	--	- -					
			Nickel	--	1E-09	--	--	1E-09					
			Thallium	--	- -	--	--	- -					
			Chemical Total	--	4E-09	--	--	4E-09					
		Exposure Point Total						4E-09					
	Exposure Medium Total							4E-09					
Medium Total								9E-05					
Receptor Total							Receptor Risk Total	9E-05					

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

APPENDIX C.2

EXPOSURE ASSESSMENT AND EXAMPLE CALCULATIONS

Appendix C.2.1 - Chemical Intake Estimation

C.2 CHEMICAL INTAKE ESTIMATION

The methodologies and techniques used to estimate exposure intakes are presented in this Appendix. Intakes for the identified potential receptor groups were calculated using current USEPA risk assessment guidance (e.g., USEPA, 1991, 1997, 2004, 2009, and 2014) and presented in the risk assessment spreadsheets. All quantitative risk assessment results are presented in RAGS Part D format tables (Appendix C.1).

Noncarcinogenic intakes are estimated using the concept of an average annual exposure. Carcinogenic intakes are calculated as an incremental lifetime exposure, which assumes a life expectancy of 70 years. Equations used to calculate estimated intakes are provided below. Assumptions regarding exposure for all receptors and exposure pathways are presented in the RAGS Part D Table 4s, which are provided in Appendix C.1.

C.2.1 Incidental Ingestion of Soil

Direct physical contact with soil may result in the incidental ingestion of chemicals. Chemical intake for incidental ingestion of soil is estimated in the following manner (USEPA, 1989):

$$\text{Intake}_{si} = \frac{(C_{si})(RBA)(IR_s)(FI)(EF)(ED)(CF)}{(BW)(AT)}$$

where:

Intake_{si}	=	intake of contaminant "i" from soil (mg/kg/day)
C_{si}	=	concentration of contaminant "i" in soil (mg/kg)
IR_s	=	incidental ingestion rate of soil (mg/day)
RBA	=	relative bioavailability (unitless)
FI	=	fraction ingested from contaminated source (dimensionless)
EF	=	exposure frequency (days/yr)
ED	=	exposure duration (yr)
CF	=	conversion factor (1×10^{-6} kg/mg)
BW	=	body weight (kg)
AT	=	averaging time (days); for noncarcinogens, AT = ED x 365 days/yr; for carcinogens, AT = 70 yr x 365 days/yr

For soil exposures under the RME scenario, the incidental ingestion rate is set at 330 mg/day for construction workers (USEPA, 2002); 100 mg/day for occupational workers (USEPA, 2014), adult recreational users (assumed adult resident value), and adult residents (USEPA, 2014); and 200 mg/day for child recreational users (assumed child resident value) and child residents (USEPA, 2002). For the CTE scenario, the incidental ingestion rate is set at 165 mg/day for construction workers (professional judgment); 50 mg/day for occupational workers (USEPA, 1993), adult recreational users (assumed adult resident value), and adult residents (USEPA, 1993); and 100 mg/day for child recreational users (assumed child resident value) and child residents (USEPA, 1993). Exposure frequencies of 150 days/year for construction workers (professional judgment), 250 days/year for occupational workers (USEPA, 2014), 100 days/year for child and adult recreational users [assumes four days/week during warm weather months (e.g., April through September)], and 350 days/year for child and adult residents (USEPA, 2014) were used for the RME scenarios. Exposure frequencies of 75 days/year for construction workers (half of RME value), 219 days/year for occupational workers (USEPA, 1993), 50 days/year for child and adult recreational users [assumes two days/week during warm weather months (e.g., April through September)], and 234 days/year for child and adult residents (USEPA, 1993) are used for the CTE scenarios. Exposure durations of 1 year for the construction worker (professional judgment), 25 years for the occupational worker (USEPA, 2014), 6 years for child recreational users (assumed child resident value) and residents (USEPA, 2014), and 20 years for adult recreational users (assumed adult resident value) and residents (USEPA, 2014) were used under the RME scenario. For the CTE scenario, the exposure duration is set at 1 year for the construction worker (professional judgment); 9 years for the occupational worker (USEPA, 1993), 2 years for child recreational users (assumed child resident value) and residents (USEPA, 1993), and 7 years for adult recreational users (assumed adult resident value) and residents (USEPA, 1993).

Additionally, a fraction ingested (FI) factor of 0.5 applied to child and adult recreational users for both the RME and CTE scenarios, which assumes that these receptors only have contact with soil for part of the time spent onsite.

C.2.2 Dermal Contact with Soil

Direct physical contact with soil may result in the dermal absorption of chemicals. Exposure associated with dermal contact with soil is estimated in the following manner (USEPA, 1989):

$$\text{Intake}_{si} = \frac{(C_{si})(SA)(AF)(ABS)(CF)(EF)(ED)}{(BW)(AT)}$$

where: $Intake_{si}$ = amount of chemical "i" absorbed during contact with soil (mg/kg/day)

C_{si} = concentration of chemical "i" in soil (mg/kg)

SA = skin surface area available for contact (cm^2/day)

AF = skin adherence factor (mg/cm^2)

ABS = absorption factor (dimensionless)

CF = conversion factor ($1x10^{-6}$ kg/mg)

EF = exposure frequency (days/yr)

ED = exposure duration (yr)

BW = body weight (kg)

AT = averaging time (days);
for noncarcinogens, AT = ED x 365 days/yr;
for carcinogens, AT = 70 yr x 365 days/yr

The same exposure frequencies and durations used in the estimation of incidental ingestion intakes of soil are used to estimate exposure via dermal contact. Exposed surface areas of the body available for dermal contact are determined on a receptor-specific basis because they correspond with assumed human activities and clothing worn during exposure events. Current guidance (USEPA, 2014) was used to develop the following assumptions concerning the amount of skin surface area available for contact for a receptor:

- For construction workers and occupational workers, an area of 3,527 cm^2 was assumed available for dermal contact (USEPA, 2014). This assumes that the worker wears a short sleeved shirt, long pants, and shoes. Therefore, the exposed skin surface area is limited to the head, hands, and forearms.

- For adult recreational users and hypothetical adult residents, the head, hands, forearms, and lower legs (6,032 cm^2) are assumed to be available for soil contact (USEPA, 2014).

- For child recreational users and hypothetical child residents, the head, hands, forearms, lower legs, and feet (2,373 cm^2) are assumed to be available for soil contact (USEPA, 2014).

Current USEPA Guidance (USEPA, 2004, 2014) is used to determine soil adherence factors and chemical specific absorption factors. The following soil adherence factors were used for the RME and CTE exposure scenarios:

- Construction workers – 0.3 mg/cm^2 for the RME and 0.1 mg/cm^2 for the CTE (Exhibit 3.3, USEPA, 2004).

- Occupational workers – 0.12 mg/cm^2 for the RME (USEPA, 2014) and 0.02 mg/cm^2 for the CTE (Exhibit 3.3, USEPA, 2004).

- Child recreational users - 0.2 mg/cm2 for the RME and 0.04 mg/cm2 for the CTE (same as hypothetical child residents).

- Adult recreational users - 0.07 mg/cm^2 for the RME and 0.01 mg/cm^2 for the CTE (same as hypothetical adult residents).

- Hypothetical child residents – 0.2 mg/cm^2 for the RME (USEPA, 2014) and 0.04 mg/cm2 for the CTE (Exhibit 3.5, USEPA, 2004).

- Hypothetical adult residents – 0.07 mg/cm^2 for the RME and 0.01 mg/cm^2 for the CTE (Exhibit 3.5, USEPA, 2004).

For the chemicals in soil evaluated quantitatively, the following absorption factors were used (USEPA, 2004):

- Arsenic – 0.03
- Benzo(a)pyrene and other PAHs – 0.13
- Cadmium – 0.001

Additional metals were evaluated in the quantitative risk evaluation; however, no absorption factors are available for those metals in RAGS Part E (USEPA, 2004). Therefore, a value of zero was used as the absorption factor for metals lacking absorption factors in RAGS Part E.

C.2.3 Inhalation of Air and Fugitive Dust/Volatile Emissions from Soils

Intakes of both particulates and vapors/gases are calculated using the same equation, as follows (USEPA, 2009):

$$EC = \frac{(C_{air})(ET)(EF)(ED)}{AT}$$

where:

EC	=	exposure concentration (mg/m^3)
C_{air}	=	concentration of chemical in air (mg/m^3)
ET	=	exposure time (hours/day)
EF	=	exposure frequency (days/yr)
ED	=	exposure duration (yr)
AT	=	averaging time (hours)
	=	for noncarcinogens, AT = ED x 365 days/yr x 24 hours/day
	=	for carcinogens, AT = 70 yr x 365 days/yr x 24 hours/day

The same exposure frequencies and durations used to estimate incidental ingestion of soil intakes are used to estimate exposure via inhalation of fugitive dust/volatile emissions for surface and subsurface soils.

The concentrations of chemicals in air resulting from emissions from soil are developed following procedures presented in USEPA Soil Screening Guidance (USEPA, 2002). The chemical concentration in air is calculated from:

$$C_{air} = C_{soil} \times [(1/PEF) + (1/VF)]$$

where:

C_{air}	=	chemical concentration in air, mg/m^3
C_s	=	chemical concentration in soil, mg/kg
PEF	=	Particulate emission factor, m^3/kg
VF	=	volatilization factor, m^3/kg

The particulate emissions factor (PEF) relates the concentration of the chemical in soil with the concentration of dust particles in air. A PEF value of $1.36 \times 10^{+9}$ m3/kg was obtained from USEPA's RSL Calculator Internet site at http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search. This is the default value for Portland, Maine which is the closest city to PNS listed on the Internet site. Because air emissions resulting from fugitive dust emissions settings will be different than dust emissions generated during construction activities, a separate PEF was used for construction activities. The PEF for construction workers ($1.43 \times 10^{+6}$ m^3/kg) was calculated using the equations presented in the supplemental soil screening level guidance document (USEPA, 2002). Sample calculations showing how the PEFs were calculated are presented in Appendix C.2.

Ambient air concentrations resulting from the volatilization of COPC from soil are chemical dependent and were calculated using the following equation from USEPA's Soil Screening Guidance (USEPA, 2002):

$$VF = \frac{Q/C \times (3.14 \times D_a \times T)^{0.5} \times 10^{-4} \ (m^2 / cm^2)}{(2 \times \rho_b \times D_a)}$$

and

$$D_a = \frac{[(\theta_a^{10/3} \times D_i \times H' + \theta_w^{10/3} \times D_w)/n^2]}{\rho_b \times K_d + \theta_w + \theta_a \times H'}$$

where:

VF	=	volatilization factor (m^3-air/kg-soil)
Q/C	=	inverse of the mean concentration at the center of source (gm/m^2-sec per kg/m^3)
D_a	=	apparent diffusivity, chemical specific, (cm^2/sec)
T	=	exposure interval, exposure specific, (sec)
ρ_b	=	dry bulk soil particle density (g/cm^3)
θ_a	=	air-filled soil porosity (L_{air}/L_{soil})
D_i	=	diffusivity in air, chemical specific, (cm^2/sec)
n	=	total soil porosity (L_{pore}/L_{soil})
θ_w	=	water-filled soil porosity (L_{air}/L_{soil})
D_w	=	diffusivity in water, chemical specific, (cm^2/sec)
K_d	=	soil-water partition coefficient, chemical specific
H'	=	dimensionless Henry's law constant, chemical specific

A chemical is considered to be volatile if its vapor pressure is greater than 1 mm Hg or if its Henry's Law Constant is greater than $1x10^{-5}$ atm-m^3/mole (USEPA, 2016). Chemical properties were obtained from the current USEPA RSL table (USEPA, 2016) and are presented in Table C-2.2.

C.2.4 Incidental Ingestion of Groundwater

Direct ingestion of groundwater is expected to be limited to exposure that would occur under a future hypothetical residential scenario. Because the groundwater at OU8 is saline/brackish, it is not potable. Therefore, groundwater exposure under a residential scenario was not evaluated. Incidental ingestion of groundwater by construction workers could occur during excavation

activities. Intakes associated with ingestion of groundwater were evaluated using the following equation (USEPA, 1989):

$$\text{Intake} = \frac{(C_W)(CF)(IR_W)(EF)(ED)}{(BW)(AT)}$$

where:

Intake	=	Intake of chemical from groundwater (mg/kg/day)
C_w	=	concentration of chemical in groundwater (µg/L)
CF	=	conversion factor (0.001 mg/µg)
IR_w	=	ingestion rate for groundwater (L/day)
EF	=	exposure frequency (days/yr)
ED	=	exposure duration (yr)
BW	=	body weight (kg)
AT	=	averaging time (days)
	=	for noncarcinogens, AT = ED x 365 days/yr
	=	for carcinogens, AT = 70 yrs x 365 days/yr

Default exposure assumptions are not available for construction worker exposures to groundwater. Under the RME and CTE scenarios, the incidental ingestion rate was set at 0.01 L/day (based on professional judgment). Exposure frequencies of 30 days/year for the RME scenario and 15 days/year for the CTE scenario (both based on professional judgment) were used. A shorter exposure frequency is recommended for a construction worker exposed to groundwater than is recommended for exposure to soil because it is unlikely that a construction worker will have direct contact with groundwater on a daily basis during a construction project. The same exposure duration used for construction worker exposure to soil was used for exposure to groundwater.

C.2.5 Dermal Contact with Groundwater

Construction workers could contact groundwater while in an excavation trench. The following equation was used to assess exposures resulting from dermal contact with groundwater (USEPA, 2004):

$$DAD = \frac{(DA_{event})(EV)(ED)(EF)(SA)}{(BW)(AT)}$$

where:

DAD	=	dermally absorbed dose of chemical from water (mg/kg/day)
DA_{event}	=	dermally absorbed dose per event (mg/cm^2-event)
EV	=	event frequency (events/day)
ED	=	exposure duration (yr)
EF	=	exposure frequency (days/yr)
SA	=	skin surface area available for contact (cm^2)
BW	=	body weight (kg)
AT	=	averaging time (days)
	=	for noncarcinogens, AT = ED x 365 days/yr
	=	for carcinogens, AT = 70 yrs x 365 days/yr

There are no USEPA default exposure assumptions for exposures to groundwater by construction workers. Consequently, values were derived based on site-specific information and professional judgment. It was assumed that the construction worker will be exposed to groundwater 4 hours per day under the RME scenario and 2 hours per day under the CTE scenario.

For construction workers exposed to groundwater, the exposed surface area of the body available for contact was based on assumed activities and was the same as the surface area used in the calculation of dermal contact with soil (3,527 cm^2). Remaining exposure assumptions for construction workers (e.g., exposure duration, exposure frequency) for dermal exposure with groundwater were the same as those used for ingestion of groundwater.

The absorbed dose per event (DA_{event}) is estimated using a non-steady-state approach for organic compounds, and a traditional steady-state approach for inorganics. There were no organics selected as COPCs for groundwater. The following steady-state equation was used to estimate DA_{event} for inorganics:

$$DA_{event} = (K_p)(C_W)(t_{event})$$

The dermal permeability coefficient (K_p) values recommended in the USEPA dermal guidance (USEPA, 2004) were used to calculate DA_{event} for inorganic COPCs (Table C.2.1).

C.2.6 Inhalation of Volatiles in Groundwater

As mentioned previously, groundwater at OU8 is not suitable for use as a domestic water supply; therefore, only construction worker exposures were evaluated. Construction workers may contact shallow groundwater during excavation activities. Because one chemical (naphthalene) was detected in groundwater and is both volatile and toxic via inhalation, detected naphthalene concentrations were screened against calculated construction worker screening levels for inhalation (see Section 6.2.2.2). Naphthalene was not selected as a COPC for inhalation; therefore, the groundwater inhalation pathway was not quantitatively evaluated in this HHRA.

C.2.7 Assessing Cancer Risks from Early Life Exposures

USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005) recommends adjusting the toxicity of carcinogenic chemicals that act via the mutagenic mode of action when evaluating early-life exposures to contaminants. The guidance recommends using age-dependent adjustment factors (ADAFs) in concert with age-specific exposure estimates when assessing cancer risks. Absent chemical-specific data, the supplemental guidance recommends the following default adjustments, which reflect that cancer risks are generally higher from early-life exposures than from similar exposures later in life:

- For exposures before two years of age (i.e., spanning a two-year interval from the first day of birth until a child's second birthday), a 10-fold adjustment.

- For exposures between two and less than 16 years of age (i.e., spanning a 14-year time interval from a child's second birthday until a child's sixteenth birthday), a three-fold adjustment.

- For exposures after reaching 16 years of age, no adjustment.

These adjustments were applied using the same method as that used by USEPA to develop the RSLs. Children recreational users and residents were evaluated in two age groups, ages 0–2 and 2–6 years old. Adult recreational users and residents were evaluated as two age groups (6–16 and 16–26 years old). Using this approach, the intakes for child and adult recreational users and child and adult hypothetical residents were calculated as follows:

$$\text{Intake}_{\text{Child Recreational User/Resident}} = \text{Intake}_{(\text{ages 0 to 2 years})} \times 10 + \text{Intake}_{(\text{ages 2 to 6 years})} \times 3$$

$$\text{Intake}_{\text{Adult Recreational User/Resident}} = \text{Intake}_{(\text{age 6 to 16 years})} \times 3 + \text{Intake}_{(\text{ages 16 to 26 years})} \times 1$$

This approach was used only for chemicals identified as mutagenic in the USEPA RSL table (e.g., benzo(a)pyrene and related PAHs). Sample calculations showing how this approach was applied are included in Appendix C.2. In addition, risks to lifelong recreational users and lifelong resident receptors were evaluated. Risks to lifelong recreational users and residents are sums of the cancer risks calculated for individual children and adult recreational users and resident receptors, respectively. Therefore, lifelong cancer risks from chemicals that act via the mutagenic pathway are assessed through the lifelong scenarios. Cancer risks for mutagenic chemicals are presented in the RAGS Part D tables in Appendix C.1.

C.2.8 Vapor Intrusion into Buildings

Future occupational workers and hypothetical residents could be exposed to COPCs that have volatilized from groundwater and migrated into indoor air through future building foundations. However, no COPCs were selected for vapor intrusion for OU8. Therefore, vapor intrusion was not further evaluated in this HHRA.

C.2.9 Summary of Exposure Parameters

In general, standard default parameters (e.g., USEPA, 1989, 1991, 1997, 2004, and 2014), which combine mid-range and upper-end exposure factors, are used to assess RME. CTE is assessed primarily by the use of mid-range exposure factors presented in current risk assessment guidance (e.g., USEPA, 1989 and 1993). Age-adjusted factors are used to assess RME and CTE risks for recreational and residential receptors. Exposure input parameters for the identified potential receptor groups at OU8 are presented in the RAGS Part D Table 4s, which are provided in Appendix C.1.

REFERENCES

USEPA, 1989. Risk Assessment Guidance for Superfund: Volume I, Human Health Evaluation Manual (Part A). EPA 540/1-89/002. Office of Emergency and Remedial Response, Washington, D.C., December.

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. Directive 9285.6-03, Office of Solid Waste and Emergency Response, Washington, D.C., March.

USEPA, 1993. Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure. Office of Solid Waste and Emergency Response, Washington, D.C., May.

USEPA, 1997. Exposure Factors Handbook. EPA/600/P-95/002Ba, National Center for Environmental Assessment, Washington, D.C., August.

USEPA, 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. Office of Solid Waste and Emergency Response, Washington, D.C., December.

USEPA, 2004. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, (Part E, Supplemental Guidance for Dermal Risk Assessment), Final. EPA/540/R/99/005, Office of Emergency and Remedial Response, Washington, D.C., July.

USEPA, 2005. Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens. EPA/630/R-03/003F. Risk Assessment Forum, Washington, D.C. March.

USEPA, 2009. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment), Final. Office of Superfund Remediation and Technology Innovation, Washington, D.C. 20460 EPA-540-R-070-002, OSWER 9285.7-82. January.

USEPA, 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. Office of Solid Waste and Emergency Response, Washington, D.C. OSWER 9200.1-120. February 6.

USEPA, 2016. Regional Screening Levels for Chemical Contaminants at Superfund Sites. https://www.epa.gov/risk/regional-screening-levels-rsls. May.

TABLE C.2.1

INTERMEDIATE VARIABLES FOR CALCULATING DA(EVENT)
OU8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Chemical of Potential Concern	Medium	Dermal Absorption Fraction (Soil)	FA	Kp		T(event)		Tau		T*		B
			Value	Value	Units	Value	Units	Value	Units	Value	Units	Value
Metals												
Manganese	Soil, Groundwater	0	1	1.00E-03	cm/hr	(1)	hr	NA	NA	NA	NA	NA

Notes:
All values are from USEPA's Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final, July 2004.

1 - T(event) for the construction worker is 4 hours for RME and 2 hours for CTE.
FA = Fraction absorbed water
Kp = Dermal permeability coefficient of a compound in water
T(event) = Event duration
Tau = Lag time
T* = Time to reach steady-state
B = Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis
cm/hr = centimeters per hour
hr = hour
NA = Not applicable for this medium.

TABLE C-2.2

CHEMICAL PROPERTIES FOR VOLATILIZATION FROM SOIL AND GROUNDWATER TO OUTDOOR AIR MODELS
OU8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Chemical	Molecular Weight (g/mole)	Soil-Water Partition Coefficient (L/kg)	Air Diffusivity (cm^2/sec)	Water Diffusivity (cm^2/sec)	Solubility Limit (mg/L)	Henry's Law Constant	
						(Dimensionless)	(atm-m^3/mol)
Cyanide	2.60E+01	9.90E+00	2.11E-01	2.46E-05	9.54E+04	9.89E-01	2.42E-02

Source:
USEPA, 2016: USEPA Regional Screening Levels for Chemical Contaminants at Superfund Sites, May 2016.

Appendix C.2.2 - Example Calculations

Example Calculation - BAP Equivalent-HALFND
Units = ug/kg
Sample = WTB-SS-10-0002

Sample Results		
Chemical	**Concentration (with qualifier)**	
BENZO(A)ANTHRACENE	13	
BENZO(A)PYRENE	13	
BENZO(B)FLUORANTHENE	17	
BENZO(K)FLUORANTHENE	3.6	
CHRYSENE	11	
DIBENZO(A,H)ANTHRACENE	10	U
INDENO(1,2,3-CD)PYRENE	8.8	

Assumptions:
- Positive results accepted
- Non-detected results are assumed to be 1/2 quantitation limit
- Rejected results (R) are not used
- If all individual cPAHs are non-detected, BAP Equivalent = the quantitation limit for benzo(a)pyrene
- U = non-detect

Benzo(a)pyrene Equivalents = Σ(Sample Result$_{\text{chemical 1}}$ x TEF$_{\text{chemical 1}}$ + Sample Result$_{\text{chemical 2}}$ x TEF$_{\text{chemical 2}}$...)

Used in Calculation:

Carcinogenic PAH	TEF	Concentration
BENZO(A)ANTHRACENE	0.1	13
BENZO(A)PYRENE	1	13
BENZO(B)FLUORANTHENE	0.1	17
BENZO(K)FLUORANTHENE	0.01	3.6
CHRYSENE	0.001	11
DIBENZO(A,H)ANTHRACENE	1	5
INDENO(1,2,3-CD)PYRENE	0.1	8.8

TEF = Toxicity Equivalence Factor
TEF Source = USEPA, July 1993.

= 0.1 x 13 + 1 x 13 + 0.1 x 17 + 0.01 x 3.6 + 0.001 x 11 + 1 x 5 + 0.1 x 8.8

= 22 ug/kg

Example Calculation - BAP Equivalent-POS
Units = ug/kg
Sample = WTB-SS-10-0002

Sample Results		
Chemical	**Concentration (with qualifier)**	
BENZO(A)ANTHRACENE	13	
BENZO(A)PYRENE	13	
BENZO(B)FLUORANTHENE	17	
BENZO(K)FLUORANTHENE	3.6	
CHRYSENE	11	
DIBENZO(A,H)ANTHRACENE	10	U
INDENO(1,2,3-CD)PYRENE	8.8	

Assumptions:
- Positive results accepted
- Non-detected results are not included in the positive only calculation
- Rejected results (R) are not used
- If all individual cPAHs are non-detected, BAP Equivalent = the quantitation limit for benzo(a)pyrene
- U = non-detect

Benzo(a)pyrene Equivalents = Σ(Sample Result$_{\text{chemical 1}}$ x TEF$_{\text{chemical 1}}$ + Sample Result$_{\text{chemical 2}}$ x TEF$_{\text{chemical 2}}$...)

= 0.1 x 13 + 1 x 13 + 0.1 x 17 + 0.01 x 3.6 + 0.001 x 11 + 1 x NA + 0.1 x 8.8

= 17 ug/kg

Used in Calculation:

Carcinogenic PAH	TEF	Concentration
BENZO(A)ANTHRACENE	0.1	13
BENZO(A)PYRENE	1	13
BENZO(B)FLUORANTHENE	0.1	17
BENZO(K)FLUORANTHENE	0.01	3.6
CHRYSENE	0.001	11
DIBENZO(A,H)ANTHRACENE	1	NA
INDENO(1,2,3-CD)PYRENE	0.1	8.8

TEF = Toxicity Equivalence Factor
TEF Source = USEPA, July 1993.

CALCULATION WORKSHEET

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		**JOB NUMBER:** 112G03270
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SOIL INDUSTRIAL WORKERS		
BASED ON: USEPA, DECEMBER 1989		
BY: L. GANSER	**CHECKED BY:**	**DATE:** 9/28/2015

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from incidental ingestion of surface soil at OU8.

EQUATION:

$$IEX = \frac{CS \times RBA \times IR \times EF \times ED \times FI \times CF}{BW \times AT}$$

Where:

IEX	=	estimated exposure intake (mg/kg/day)
Cs	=	exposure point concentration in soil (mg/kg)
RBA	=	relative bioavailability (unitless)
IR	=	incidental ingestion rate (mg/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
FI	=	fraction ingested from contaminated source (unitless)
CF	=	conversion factor (1E-06 kg/mg)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor ($(mg/kg/day)^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg/day)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFo (mg/kg/day)-1
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDo (mg/kg/day)

ASSUMPTIONS:

Cs	=	13.7	mg/kg	Chemical: Arsenic
RBA	=	0.6		
IR	=	100	mg/day	
EF	=	250	days/year	
ED	=	25	years	
FI	=	1		
CF	=	1E-06	kg/mg	
BW	=	80	kg	
ATc	=	25,550	days	
ATnc	=	9125	days	
CSFo	=	1.5E+00	$(mg/kg/day)^{-1}$	
RfDo	=	3.0E-04	(mg/kg/day)	

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		**JOB NUMBER:** 112G03270
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SOIL INDUSTRIAL WORKERS		
BASED ON: USEPA, DECEMBER 1989		
BY: L. GANSER	**CHECKED BY:**	**DATE:** 9/28/2015

EXAMPLE CARCINOGENIC CALCULATION

$$IEXc = \frac{13.7 \text{ mg/kg} \times 0.6 \times 100 \text{ mg/day} \times 250 \text{ days/year} \times 25 \text{ years} \times 1 \times 1E\text{-}06 \text{ kg/mg}}{80 \text{ kg} \times 25550 \text{ days}}$$

IEXc = 2.51E-06 mg/kg/day

ILCR = 2.51E-06 mg/kg/day x 1.50E+00 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ILCR = 3.8E-06

EXAMPLE NONCARCINOGENIC CALCULATION

$$IEXnc = \frac{13.7 \text{ mg/kg} \times 0.6 \times 100 \text{ mg/day} \times 250 \text{ days/year} \times 25 \text{ years} \times 1 \times 1E\text{-}06 \text{ kg/mg}}{80 \text{ kg} \times 9125 \text{ days}}$$

IEXnc = 7.04E-06 mg/kg/day

HQ = 7.04E-06 mg/kg/day / 3.00E-04 (mg/kg/day) = Hazard Quotient

HQ = 2.3E-02

CALCULATION WORKSHEET

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		**JOB NUMBER:** 112G03270
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SOIL INDUSTRIAL WORKERS		
BASED ON: USEPA, JULY 2004		
BY: L. GANSER	**CHECKED BY:**	**DATE:** 9/28/2015

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from dermal contact with of surface soil at OU8.

EQUATION:

$$DEX = \frac{Cs \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

Where:

DEX	=	estimated exposure intake (mg/kg/day)
Cs	=	exposure point concentration in soil (mg/kg)
CF	=	conversion factor (1E-06 kg/mg)
SA	=	skin surface available for contact (cm2/day)
ABS	=	absorption factor (unitless)
AF	=	adherence factor (mg/cm2)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFd	=	dermal carcinogenic slope factor ($(mg/kg/day)^{-1}$)
RfDd	=	dermal noncarcinogenic reference dose (mg/kg/day)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFd (mg/kg/day)-1
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDd (mg/kg/day)

ASSUMPTIONS:

Cs	=	13.7	mg/kg	Chemical: Arsenic
CF	=	1E-06	kg/mg	
SA	=	3,527	cm^2/day	
AF	=	0.12	mg/cm^2	
ABS	=	0.03		
EF	=	250	days/year	
ED	=	25	years	
BW	=	80	kg	
ATc	=	25,550	days	
ATnc	=	9125	days	
CSFd	=	1.5E+00	$(mg/kg/day)^{-1}$	
RfDd	=	3.0E-04	(mg/kg/day)	

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		JOB NUMBER: 112G03270
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SOIL INDUSTRIAL WORKERS		
BASED ON: USEPA, JULY 2004		
BY: L. GANSER	CHECKED BY:	DATE: 9/28/2015

EXAMPLE CARCINOGENIC CALCULATION

$$DEXc = \frac{13.7 \text{ mg/kg} \times 1E\text{-}06 \text{ kg/mg} \times 3527 \text{ cm2/day} \times 0.12 \text{ mg/cm2} \times 0.03 \times 250 \text{ days/year} \times 25 \text{ years}}{80 \text{ kg} \times 25550 \text{ days}}$$

DEXc = 5.32E-07 mg/kg/day

ILCR = 5.32E-07 mg/kg/day x 1.50E+00 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ILCR = 8.0E-07

EXAMPLE NONCARCINOGENIC CALCULATION

$$DEXnc = \frac{13.7 \text{ mg/kg} \times 1E\text{-}06 \text{ kg/mg} \times 3527 \text{ cm2/day} \times 0.12 \text{ mg/cm2} \times 0.03 \times 250 \text{ days/year} \times 25 \text{ years}}{80 \text{ kg} \times 9125 \text{ days}}$$

DEXnc = 1.49E-06 mg/kg/day

HQ = 1.49E-06 mg/kg/day / 3.00E-04 (mg/kg/day) = Hazard Quotient

HQ = 5.0E-03

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		**JOB NUMBER:** 112G03270
SUBJECT: ESTIMATION OF AMBIENT AIR CONCENTRATIONS RESULTING FROM FUGITIVE DUST EMISSIONS AND VOLATILIZATION FROM SOIL FOR CONSTRUCTION WORKERS		
BASED ON: U.S. EPA 2002		
BY: L. GANSER	**CHECKED BY:**	**DATE:** 9/28/2015

PURPOSE: To calculate ambient air concentrations resulting from fugitive dust and volatilization from soil.

RELEVANT EQUATIONS:

$$Cair = Cs \times (1/PEF + 1/VF)$$

$$VF = \frac{Q/C \times (3.14 \times DA \times T)^{1/2} \times 10^{-4}\ m^2/cm^2}{2 \times pb \times DA} \times \frac{1}{F_D}$$

$$DA = \frac{(\theta a^{10/3} \times Di \times H + \theta w^{10/3} \times Dw)/\theta_T^{\ 2}}{pb \times Kd + \theta w + \theta a \times H}$$

$$Csat = S/pb \times (Kd \times pb + \theta w + H \times \theta a)$$

Where:

Cair	=	Chemical concentration in air (mg/m^3)
Cs	=	Chemical concentration in soil (mg/kg)
PEF	=	Particulate emission factor (m^3/kg)
VF_{sc}	=	Subchronic volatilization factor (m^3/kg)
Q/C_{sa}	=	Inverse of mean conc. at center of source (g/m^2-s per kg/m^3).
F_D	=	Dispersion correction factor (unitless)
T	=	Total time over which construction occurs (seconds).
pb	=	Dry soil bulk density (g/cm^3).
ps	=	soil particle density (g/cm^3).
n	=	Total soil porosity (Lpore/Lsoil).
θw	=	Water-filled soil porosity (Lpore/Lsoil).
θa	=	Air-filled soil porosity (Lair/Lsoil).
Di	=	Diffusivity in air (cm^2/sec).
H	=	Dimensionless Henry's Law Constant.
S	=	Solubility limit (mg/L)
Dw	=	Diffusivity in water (cm^2/sec).
DA	=	Apparent diffusivity (cm^2/sec).
Kd	=	Soil-water partition coefficient (cm^3/g).
Koc	=	Soil organic carbon partition coefficient (cm^3/g).
foc	=	Fraction organic carbon in soil (g/g).

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		JOB NUMBER: 112G03270
SUBJECT: ESTIMATION OF AMBIENT AIR CONCENTRATIONS RESULTING FROM FUGITIVE DUST EMISSIONS AND VOLATILIZATION FROM SOIL FOR CONSTRUCTION WORKERS		
BASED ON: U.S. EPA 2002		
BY: L. GANSER	CHECKED BY:	DATE: 9/28/2015

ASSUMPTIONS:

Cs	=	34	mg/kg	Chemical: Cyanide
PEF	=	1.36E+09	m3/kg	
Q/C	=	14.31	g/m2-s per kg/m3	
F_D	=	0.185		
T	=	3.15E+07	sec	
pb	=	1.5	g/cm3	
ps	=	2.65	g/cm3	
θ_T	=	0.434	Lpore/Lsoil	
θw	=	0.15	Lpore/Lsoil	
θa	=	0.284	Lair/Lsoil	
Di	=	2.11E-01	cm2/sec	
H	=	9.89E-01	Uniltess	
S	=	9.54E+04	mg/L	
Dw	=	2.46E-05	cm2/sec	
Koc	=	1.65E+03	cm3/g	
foc	=	0.006	g/g	
Kd	=	9.9	cm3/g	

EXAMPLE CALCULATIONS

$$DA = \frac{[(0.284^{10/3}) \times (0.211\ cm2/sec) \times (9.89E\text{-}01) + (0.15^{10/3}) \times (2.46E\text{-}05\ cm2/sec)]/(0.434^2)}{(1.5\ g/cm3 \times 9.9\ cm3/g) + (0.15 + 0.284 \times 0.989)}$$

DA = 1.09E-03 cm^2/sec

$$VF = \frac{(14.31\ g/m2\text{-}s\ per\ kg/m3) \times [(3.14) \times (1.09E\text{-}03\ cm2/sec) \times (3.15E+07\ sec)]^{1/2} \times (1E\text{-}4\ m2/cm2)}{2 \times 1.5 g/cm3 \times 1.09E\text{-}03\ cm2/sec} \times \frac{1}{0.185}$$

VF = 7.77E+02 m^3/kg

Csat = (9.54E+04 mg/L)/(1.5 g/cm3) x [(9.9 cm3/g) x (1.5 g/cm3) + (0.15 + 9.89E-01 x 0.284)]

Csat = 9.72E+05 mg/kg

Csat is greater than Cs, therfore use Cs in calculation of air concentration.

Cair = 34 mg/kg x [(1/1.36E+09 m3/kg) + (1/7.77E+02 m3/kg)]

Cair = 4.38E-02 mg/m^3

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		**JOB NUMBER:** 112G03270
SUBJECT: ESTIMATION OF AMBIENT AIR CONCENTRATIONS RESULTING FROM FUGITIVE DUST EMISSIONS AND VOLATILIZATION FROM SOIL FOR CONSTRUCTION WORKERS		
BASED ON: U.S. EPA 2002		
BY: L. GANSER	**CHECKED BY:**	**DATE:** 9/28/2015

PURPOSE: To calculate ambient air concentrations resulting from fugitive dust and volatilization from soil.

RELEVANT EQUATIONS:

$$Cair = Cs \times (1/PEF + 1/VF)$$

$$VF = \frac{Q/C \times (3.14 \times DA \times T)^{1/2} \times 10^{-4}\ m^2/cm^2}{2 \times pb \times DA} \times \frac{1}{F_D}$$

$$DA = \frac{(\theta a^{10/3} \times Di \times H + \theta w^{10/3} \times Dw)/\theta_T^{\,2}}{pb \times Kd + \theta w + \theta a \times H}$$

$$Csat = S/pb \times (Kd \times pb + \theta w + H \times \theta a)$$

Where:

Cair	=	Chemical concentration in air (mg/m^3)
Cs	=	Chemical concentration in soil (mg/kg)
PEF	=	Particulate emission factor (m^3/kg)
VF_{sc}	=	Subchronic volatilization factor (m^3/kg)
Q/C_{sa}	=	Inverse of mean conc. at center of source (g/m^2-s per kg/m^3).
F_D	=	Dispersion correction factor (unitless)
T	=	Total time over which construction occurs (seconds).
pb	=	Dry soil bulk density (g/cm^3).
ps	=	soil particle density (g/cm^3).
n	=	Total soil porosity (Lpore/Lsoil).
θw	=	Water-filled soil porosity (Lpore/Lsoil).
θa	=	Air-filled soil porosity (Lair/Lsoil).
Di	=	Diffusivity in air (cm^2/sec).
H	=	Dimensionless Henry's Law Constant.
S	=	Solubility limit (mg/L)
Dw	=	Diffusivity in water (cm^2/sec).
DA	=	Apparent diffusivity (cm^2/sec).
Kd	=	Soil-water partition coefficient (cm^3/g).
Koc	=	Soil organic carbon partition coefficient (cm^3/g).
foc	=	Fraction organic carbon in soil (g/g).

CLIENT:		JOB NUMBER:
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		112G03270
SUBJECT: ESTIMATION OF AMBIENT AIR CONCENTRATIONS RESULTING FROM FUGITIVE DUST EMISSIONS AND VOLATILIZATION FROM SOIL FOR CONSTRUCTION WORKERS		
BASED ON: U.S. EPA 2002		
BY: L. GANSER	CHECKED BY:	DATE: 9/28/2015

ASSUMPTIONS:

Cs	=	34	mg/kg	Chemical: Cyanide
PEF	=	1.43E+06	m3/kg	
Q/C	=	14.31	g/m2-s per kg/m3	
F_D	=	0.185		
T	=	3.15E+07	sec	
pb	=	1.5	g/cm3	
ps	=	2.65	g/cm3	
θ_T	=	0.434	Lpore/Lsoil	
θw	=	0.15	Lpore/Lsoil	
θa	=	0.284	Lair/Lsoil	
Di	=	2.11E-01	cm2/sec	
H	=	9.89E-01	Uniltess	
S	=	9.54E+04	mg/L	
Dw	=	2.46E-05	cm2/sec	
Koc	=	1.65E+03	cm3/g	
foc	=	0.006	g/g	
Kd	=	9.9	cm3/g	

EXAMPLE CALCULATIONS

$$DA = \frac{[(0.284^{10/3}) \times (0.211\ cm2/sec) \times (9.89E\text{-}01) + (0.15^{10/3}) \times (2.46E\text{-}05\ cm2/sec)]/(0.434^2)}{(1.5\ g/cm3 \times 9.9\ cm3/g) + (0.15 + 0.284 \times 0.989)}$$

DA = 1.09E-03 cm^2/sec ✓

$$VF = \frac{(14.31\ g/m2\text{-}s\ per\ kg/m3) \times [(3.14) \times (1.09E\text{-}03\ cm2/sec) \times (3.15E+07\ sec)]^{1/2} \times (1E\text{-}4\ m2/cm2)}{2 \times 1.5g/cm3 \times 1.09E\text{-}03\ cm2/sec} \times \frac{1}{0.185}$$

VF = 7.77E+02 m^3/kg ✓

Csat = (9.54E+04 mg/L)/(1.5 g/cm3) x [(9.9 cm3/g) x (1.5 g/cm3) + (0.15 + 9.89E-01 x 0.284)]

Csat = 9.72E+05 mg/kg ✓

Csat is greater than Cs, therfore use Cs in calculation of air concentration.

Cair = 34 mg/kg x [(1/1.43E+06 m3/kg) + (1/7.77E+02 m3/kg)]

Cair = 4.38E-02 mg/m^3 ✓

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		**JOB NUMBER:** 112G03270
SUBJECT: CALCULATION OF INTAKE/RISK FROM INGESTION OF GROUNDWATER CONSTRUCTION WORKERS		
BASED ON: USEPA, DECEMBER 1989		
BY: L. GANSER	**CHECKED BY:**	**DATE:** 9/28/2015

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from ingestion of groundwater at OU8.

EQUATION:

$$IEX = \frac{Cgw \times CF \times IR \times EF \times ED}{BW \times AT}$$

Where:

IEX	=	estimated exposure intake (mg/kg/day)
Cgw	=	exposure point concentration in groundwater (ug/L)
CF	=	conversion factor (1.0E-3 mg/ug)
IR	=	ingestion rate (L/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor ($(mg/kg/day)^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg/day)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFo (mg/kg/day)-1
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDo (mg/kg/day)

ASSUMPTIONS:

Cgw	=	2630	ug/L	Chemical: Manganese
IR	=	0.01	L/day	
CF	=	1.0E-03	mg/ug	
EF	=	30	days/year	
ED	=	1	years	
BW	=	80	kg	
ATc	=	25,550	days	
ATnc	=	365	days	
CSFo	=	NA	$(mg/kg/day)^{-1}$	
RfDo	=	2.4E-02	(mg/kg/day)	

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		**JOB NUMBER:** 112G03270
SUBJECT: CALCULATION OF INTAKE/RISK FROM INGESTION OF GROUNDWATER CONSTRUCTION WORKERS		
BASED ON: USEPA, DECEMBER 1989		
BY: L. GANSER	**CHECKED BY:**	**DATE:** 9/28/2015

EXAMPLE NONCARCINOGENIC CALCULATION

$$IEXnc = \frac{2630 \text{ ug/L} \times 0.001 \text{ mg/ug} \times 0.01 \text{ L/day} \times 30 \text{ days/year} \times 1 \text{ years}}{80 \text{ kg} \times 365 \text{ days}}$$

IEXnc = 2.70E-05 mg/kg/day

$$HQ = \frac{2.70E\text{-}05 \text{ mg/kg/day}}{2.40E\text{-}02 \text{ (mg/kg/day)}} = \text{Hazard Quotient}$$

HQ = 1.1E-03 ✓

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		**JOB NUMBER:** 112G03270
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH GROUNDWATER CONSTRUCTION WORKERS		
BASED ON: USEPA, DECEMBER 1989, JULY 2004		
BY: L. GANSER	**CHECKED BY:**	**DATE:** 9/28/2015

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from dermal contact with groundwater at OU8.

EQUATION:

$$DAD = \frac{DAevent \times EV \times ED \times EF \times A}{BW \times AT}$$

Where:

DAD	=	dermally absorbed dose (mg/kg/day)
DAevent	=	absorbed dose per event (mg/cm^2/event)
EV	=	event frequency (events/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
A	=	skin surface available for contact (cm^2)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFd	=	dermal carcinogenic slope factor ((mg/kg/day)$^{-1}$)
RfDd	=	dermal noncarcinogenic reference dose (mg/kg/day)

RISKS:

ILCR (Carcinogens) = DAD (mg/kg/day) x CSFd (mg/kg/day)-1
HQ (Noncarcinogens) = DAD (mg/kg/day) / RFDd (mg/kg/day)

EQUATIONS for DAevent:

For Inorganics:

DAevent = Kp x Cw x CF x tevent

For Organics:

$$\text{If } tevent \le t^{*}, \text{ then: } DAevent = 2 \times FA \times Kp \times Cw \times CF \times \sqrt{\frac{6 \times tau \times tevent}{\pi}}$$

$$\text{If } tevent > t^{*}, \text{ then: } DAevent = FA \times Kp \times Cw \times CF \times \left[\frac{tevent}{1+B} + 2 \times tau \times \left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$$

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		JOB NUMBER: 112G03270
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH GROUNDWATER CONSTRUCTION WORKERS		
BASED ON: USEPA, DECEMBER 1989, JULY 2004		
BY: L. GANSER	CHECKED BY:	DATE: 9/28/2015

Where:

Kp	=	permeability coefficient from water (cm/hr)
Cgw	=	concentration of chemical in groundwater (mg/L)
tevent	=	duration of event (hr/event)
CF	=	conversion factor (0.001 L/cm^3)
t*	=	time it takes to reach steady-state (hr/event)
τ	=	lag time (hr/event)
B	=	Bunge Model Constant (dimensionless)

EXAMPLE CALCULATION OF DAevent

ASSUMPTIONS:

Cgw	=	2.63	mg/L	Chemical: Manganese
Kp	=	1.00E-03	cm/hr	
FA	=	1	unitless	
tevent	=	4	hr/event	
CF	=	0.001	L/cm^3	

DA_{event} = 0.001 cm/hr x 2.63 mg/L x 0.001 L/cm3 x 4 hr/event

DA_{event} 1.05E-05 mg/cm2-event

RISK CALCULATIONS

ASSUMPTIONS:

A	=	3,527	cm^2
EV	=	1	event/day
ED	=	1	years
EF	=	30	days/year
BW	=	80	kg
ATc	=	25,550	days
ATnc	=	365	days
CSFd	=	NA	(mg/kg/day)$^{-1}$
RfDd	=	9.6E-04	(mg/kg/day)

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		**JOB NUMBER:** 112G03270
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH GROUNDWATER CONSTRUCTION WORKERS		
BASED ON: USEPA, DECEMBER 1989, JULY 2004		
BY: L. GANSER	**CHECKED BY:**	**DATE:** 9/28/2015

EXAMPLE NONCARCINOGENIC CALCULATION

$$\text{DADnc} = \frac{\text{1.05E-05 mg/cm2-event x 1 event/day x 1 years x 30 days/year x 3527 cm2}}{\text{80 kg x 365 days}}$$

DADnc = 3.81E-05 mg/kg/day

HQ = 3.81E-05 mg/kg/day / 9.60E-04 (mg/kg/day) = Hazard Quotient

HQ = 4.0E-02

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		**JOB NUMBER:** 112G03270
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SOIL FOR MUTAGENIC CHEMICALS - HYPOTHETICAL CHILD RESIDENTS		
BASED ON: USEPA, DECEMBER 1989, MARCH 2005		
BY: L. GANSER	**CHECKED BY:**	**DATE:** 9/28/2015

PURPOSE: To estimate intake and cancer risks for mutagenic chemicals from incidental ingestion of surface soil.

EQUATION:

$$IEX = \frac{CS \times IR \times EF \times ED \times FI \times CF}{BW \times AT} \times ADAF$$

Where:

IEX	=	estimated exposure intake (mg/kg/day)
Cs	=	exposure point concentration in soil (mg/kg)
IR	=	incidental ingestion rate (mg/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
FI	=	fraction ingested from contaminated source (unitless)
CF	=	conversion factor (1.0E-6 kg/mg)
BW	=	body weight (kg)
AT	=	averaging time (days)
ADAF	=	age-dependent adjustment factor
CSFo	=	oral carcinogenic slope factor ($(mg/kg/day)^{-1}$)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFo (mg/kg/day)-1

ASSUMPTIONS:

Cs	=	13	mg/kg	Chemical: Benzo(a)pyrene Equivalents
IR	=	200	mg/day	
EF	=	350	days/year	
ED_1	=	2	years	
ED_2	=	4	years	
FI	=	1		
CF	=	1.0E-06	kg/mg	
BW	=	15	kg	
AT	=	25,550	days	
CSFo	=	7.3E+00	$(mg/kg/day)^{-1}$	
$ADAF_1$	=	10		
$ADAF_2$	=	3		

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		**JOB NUMBER:** 112G03270
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SOIL FOR MUTAGENIC CHEMICALS - HYPOTHETICAL CHILD RESIDENTS		
BASED ON: USEPA, DECEMBER 1989, MARCH 2005		
BY: L. GANSER	**CHECKED BY:**	**DATE:** 9/28/2015

EXAMPLE CARCINOGENIC CALCULATION

$$IEX_1 = \frac{13 \text{ mg/kg} \times 200 \text{ mg/day} \times 350 \text{ days/year} \times 2 \text{ years} \times 1 \times 1.0\text{E-06 kg/mg}}{15 \text{ kg} \times 25550 \text{ days}} \times 10$$

IEX_1 = 4.75E-05 mg/kg/day

$$IEX_2 = \frac{13 \text{ mg/kg} \times 200 \text{ mg/day} \times 350 \text{ days/year} \times 4 \text{ years} \times 1 \times 1.0\text{E-06 kg/mg}}{15 \text{ kg} \times 25550 \text{ days}} \times 3$$

IEX_2 = 2.85E-05 mg/kg/day

ILCR = (4.75E-05 mg/kg/day + 2.85E-05 mg/kg/day) x 7.30E+00 (mg/kg/day)-1

ILCR = 5.5E-04

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		**JOB NUMBER:** 112G03270
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SOIL FOR MUTAGENIC CHEMICALS HYPOTHETICAL CHILD RESIDENTS		
BASED ON: USEPA, JULY 2004, MARCH 2005		
BY: L. GANSER	**CHECKED BY:**	**DATE:** 9/28/2015

PURPOSE: To estimate intake and cancer risks for mutagenic chemicals from dermal contact with surface soil.

EQUATION:

$$DEX = \frac{Cs \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT} \times ADAF$$

Where:

DEX	=	estimated exposure intake (mg/kg/day)
Cs	=	exposure point concentration in soil (mg/kg)
CF	=	conversion factor (1.0E-6 kg/mg)
SA	=	skin surface available for contact (cm^2/day)
ABS	=	absorption factor (unitless)
AF	=	adherence factor (mg/cm^2)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days)
ADAF	=	age-dependent adjustment factor
CSFd	=	dermal carcinogenic slope factor ($(mg/kg/day)^{-1}$)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFd (mg/kg/day)-1

ASSUMPTIONS:

Cs	=	13	mg/kg	Chemical: Benzo(a)pyrene Equivalents
CF	=	1.0E-06	kg/mg	
SA	=	2,373	cm^2/day	
AF	=	0.2	mg/cm^2	
ABS	=	0.13		
EF	=	350	days/year	
ED_1	=	2	years	
ED_2	=	4	years	
BW	=	15	kg	
AT	=	25,550	days	
CSFd	=	7.3E+00	$(mg/kg/day)^{-1}$	
$ADAF_1$	=	10		
$ADAF_2$	=	3		

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		**JOB NUMBER:** 112G03270
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SOIL FOR MUTAGENIC CHEMICALS HYPOTHETICAL CHILD RESIDENTS		
BASED ON: USEPA, JULY 2004, MARCH 2005		
BY: L. GANSER	**CHECKED BY:**	**DATE:** 9/28/2015

EXAMPLE CARCINOGENIC CALCULATION

$$DEXc = \frac{13\ mg/kg \times 1.0E\text{-}06\ kg/mg \times 2373\ cm2/day \times 0.2\ mg/cm2 \times 0.13 \times 350\ days/year \times 2\ years}{15\ kg \times 25550\ days} \times 10$$

DEXc = 1.46E-05 mg/kg/day

$$DEXc = \frac{13\ mg/kg \times 1.0E\text{-}06\ kg/mg \times 2373\ cm2/day \times 0.2\ mg/cm2 \times 0.13 \times 350\ days/year \times 4\ years}{15\ kg \times 25550\ days} \times 3$$

DEXc = 8.79E-06 mg/kg/day

ILCR = (1.46E-05 mg/kg/day + 8.79E-06 mg/kg/day) x 7.30E+00 (mg/kg/day)-1

ILCR = 1.7E-04 ✓

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		**JOB NUMBER:** 112G03270
SUBJECT: CALCULATION OF INTAKE/RISK FROM INHALATION OF FUGATIVE DUST EMISSIONS FOR MUTAGENIC CHEMICALS - HYPOTHETICAL CHILD RESIDENTS		
BASED ON: USEPA, DECEMBER 1989, MARCH 2005, JANUARY 2009		
BY: L. GANSER	**CHECKED BY:**	**DATE:** 9/28/2015

PURPOSE: To estimate intake, carcinogenic risks for mutagenic chemicals from inhalation of surface soil.

EQUATION:

$$EC = \frac{Ca \times ET \times EF \times ED}{AT \times 24\ hours/day} \times ADAF$$

Where:

EC	=	estimated exposure concentration (mg/m3)
Ca	=	exposure point concentration in air (mg/m3)
	=	Cs x 1/PEF
Cs	=	exposure point concentration in soil (mg/kg)
PEF	=	particulate emission factor (m3/kg)
ET	=	exposure time (hrs/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
AT	=	averaging time (hours)
ADAF	=	age-dependent adjustment factor
IUR	=	inhalation unit risk($(ug/mg)^{-1}$)

RISKS:

ILCR = Exposure concentration (mg/m3) x IURi (ug/m3)-1 x 1000 ug/mg

ASSUMPTIONS:

Cs	=	13	mg/kg	Chemical: Benzo(a)pyrene Equivalents
PEF	=	1.36E+09	m3/kg	
Ca	=	9.56E-09	mg/m3	
ET	=	24	hr/day	
EF	=	350	days/year	
ED_1	=	2	years	
ED_2	=	4	years	
ATc	=	25,550	days	
IUR	=	1.1E-03	$(ug/m3)^{-1}$	
$ADAF_1$	=	10		
$ADAF_2$	=	3		

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		**JOB NUMBER:** 112G03270
SUBJECT: CALCULATION OF INTAKE/RISK FROM INHALATION OF FUGATIVE DUST EMISSIONS FOR MUTAGENIC CHEMICALS - HYPOTHETICAL CHILD RESIDENTS		
BASED ON: USEPA, DECEMBER 1989, MARCH 2005, JANUARY 2009		
BY: L. GANSER	**CHECKED BY:**	**DATE:** 9/28/2015

EXAMPLE CARCINOGENIC CALCULATION

$$EC = \frac{9.56E\text{-}09\ mg/m3 \times 24\ hr/day \times 350\ days/year \times 2\ years}{25550\ days \times 24\ hours/day} \times 10$$

EC = 2.62E-09 mg/m3

$$EC = \frac{9.56E\text{-}09\ mg/m3 \times 24\ hr/day \times 350\ days/year \times 4\ years}{25550\ days \times 24\ hours/day} \times 3$$

EC = 1.57E-09 mg/m3

ILCR = (2.62E-09 mg/m3 + 1.57E-09 mg/m3) x 1.10E-03 (ug/m3)-1 x 1000 ug/mg

ILCR = 4.6E-09

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		**JOB NUMBER:** 112G03270
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SOIL FOR MUTAGENIC CHEMICALS - HYPOTHETICAL ADULT RESIDENTS		
BASED ON: USEPA, DECEMBER 1989, MARCH 2005		
BY: L. GANSER	**CHECKED BY:**	**DATE:** 9/28/2015

PURPOSE: To estimate intake and cancer risks for mutagenic chemicals from incidental ingestion of surface soil.

EQUATION:

$$IEX = \frac{CS \times IR \times EF \times ED \times FI \times CF}{BW \times AT} \times ADAF$$

Where:

IEX	=	estimated exposure intake (mg/kg/day)
Cs	=	exposure point concentration in soil (mg/kg)
IR	=	incidental ingestion rate (mg/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
FI	=	fraction ingested from contaminated source (unitless)
CF	=	conversion factor (1.0E-6 kg/mg)
BW	=	body weight (kg)
AT	=	averaging time (days)
ADAF	=	age-dependent adjustment factor
CSFo	=	oral carcinogenic slope factor ($(mg/kg/day)^{-1}$)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFo (mg/kg/day)-1

ASSUMPTIONS:

Cs	=	13	mg/kg	Chemical: Benzo(a)pyrene Equivalents
IR	=	100	mg/day	
EF	=	350	days/year	
ED_1	=	10	years	
ED_2	=	10	years	
FI	=	1		
CF	=	1.0E-06	kg/mg	
BW	=	80	kg	
AT	=	25,550	days	
CSFo	=	7.3E+00	$(mg/kg/day)^{-1}$	
$ADAF_1$	=	3		
$ADAF_2$	=	1		

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		**JOB NUMBER:** 112G03270
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SOIL FOR MUTAGENIC CHEMICALS - HYPOTHETICAL ADULT RESIDENTS		
BASED ON: USEPA, DECEMBER 1989, MARCH 2005		
BY: L. GANSER	**CHECKED BY:**	**DATE:** 9/28/2015

EXAMPLE CARCINOGENIC CALCULATION

$$IEX_1 = \frac{13 \text{ mg/kg} \times 100 \text{ mg/day} \times 350 \text{ days/year} \times 10 \text{ years} \times 1 \times 1.0\text{E-06 kg/mg}}{80 \text{ kg} \times 25550 \text{ days}} \times 3$$

IEX_1 = 6.68E-06 mg/kg/day

$$IEX_2 = \frac{13 \text{ mg/kg} \times 100 \text{ mg/day} \times 350 \text{ days/year} \times 10 \text{ years} \times 1 \times 1.0\text{E-06 kg/mg}}{80 \text{ kg} \times 25550 \text{ days}} \times 1$$

IEX_2 = 2.23E-06 mg/kg/day

ILCR = (6.68E-06 mg/kg/day + 2.23E-06 mg/kg/day) x 7.30E+00 (mg/kg/day)-1

ILCR = 6.5E-05 ✓

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		JOB NUMBER: 112G03270
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SOIL FOR MUTAGENIC CHEMICALS HYPOTHETICAL ADULT RESIDENTS		
BASED ON: USEPA, JULY 2004, MARCH 2005		
BY: L. GANSER	CHECKED BY:	DATE: 9/28/2015

PURPOSE: To estimate intake and cancer risks for mutagenic chemicals from dermal contact with surface soil.

EQUATION:

$$DEX = \frac{Cs \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT} \times ADAF$$

Where:

DEX	=	estimated exposure intake (mg/kg/day)
Cs	=	exposure point concentration in soil (mg/kg)
CF	=	conversion factor (1.0E-6 kg/mg)
SA	=	skin surface available for contact (cm^2/day)
ABS	=	absorption factor (unitless)
AF	=	adherence factor (mg/cm^2)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days)
ADAF	=	age-dependent adjustment factor
CSFd	=	dermal carcinogenic slope factor ($(mg/kg/day)^{-1}$)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFd (mg/kg/day)-1

ASSUMPTIONS:

Cs	=	13	mg/kg	Chemical: Benzo(a)pyrene Equivalents
CF	=	1.0E-06	kg/mg	
SA	=	6,032	cm^2/day	
AF	=	0.07	mg/cm^2	
ABS	=	0.13		
EF	=	350	days/year	
ED_1	=	10	years	
ED_2	=	10	years	
BW	=	80	kg	
AT	=	25,550	days	
CSFd	=	7.3E+00	$(mg/kg/day)^{-1}$	
$ADAF_1$	=	3		
$ADAF_2$	=	1		

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		**JOB NUMBER:** 112G03270
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SOIL FOR MUTAGENIC CHEMICALS HYPOTHETICAL ADULT RESIDENTS		
BASED ON: USEPA, JULY 2004, MARCH 2005		
BY: L. GANSER	**CHECKED BY:**	**DATE:** 9/28/2015

EXAMPLE CARCINOGENIC CALCULATION

$$DEXc = \frac{13\ mg/kg \times 1.0E\text{-}06\ kg/mg \times 6032\ cm2/day \times 0.07\ mg/cm2 \times 0.13 \times 350\ days/year \times 10\ years}{80\ kg \times 25550\ days} \times 3$$

DEXc = 3.67E-06 mg/kg/day

$$DEXc = \frac{13\ mg/kg \times 1.0E\text{-}06\ kg/mg \times 6032\ cm2/day \times 0.07\ mg/cm2 \times 0.13 \times 350\ days/year \times 10\ years}{80\ kg \times 25550\ days} \times 1$$

DEXc = 1.22E-06 mg/kg/day

ILCR = (3.67E-06 mg/kg/day + 1.22E-06 mg/kg/day) x 7.30E+00 (mg/kg/day)-1

ILCR = 3.6E-05 ✓

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		**JOB NUMBER:** 112G03270
SUBJECT: CALCULATION OF INTAKE/RISK FROM INHALATION OF FUGATIVE DUST EMISSIONS FOR MUTAGENIC CHEMICALS - HYPOTHETICAL ADULT RESIDENTS		
BASED ON: USEPA, DECEMBER 1989, MARCH 2005, JANUARY 2009		
BY: L. GANSER	**CHECKED BY:**	**DATE:** 9/28/2015

PURPOSE: To estimate intake, carcinogenic risks for mutagenic chemicals from inhalation of surface soil.

EQUATION:

$$EC = \frac{Ca \times ET \times EF \times ED}{AT \times 24\ hours/day} \times ADAF$$

Where:

EC	=	estimated exposure intake (mg/kg/day)
Ca	=	exposure point concentration in air (mg/m3)
	=	Cs x 1/PEF
Cs	=	exposure point concentration in soil (mg/kg)
PEF	=	particulate emission factor (m3/kg)
ET	=	exposure time (hrs/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (hours)
ADAF	=	age-dependent adjustment factor
IURi	=	inhalation unit risk($(ug/mg)^{-1}$)

RISKS:

ILCR = Exposure concentration (mg/m3) x IUR (ug/m3)-1 x 1000 ug/mg

ASSUMPTIONS:

Cs	=	13	mg/kg	Chemical: Benzo(a)pyrene Equivalents
PEF	=	1.36E+09	m3/kg	
Ca	=	9.56E-09	mg/m3	
ET	=	24	hr/day	
EF	=	350	days/year	
ED_1	=	10	years	
ED_2	=	10	years	
ATc	=	25,550	days	
IUR	=	1.1E-03	$(ug/m3)^{-1}$	
$ADAF_1$	=	3		
$ADAF_2$	=	1		

CLIENT: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE		**JOB NUMBER:** 112G03270
SUBJECT: CALCULATION OF INTAKE/RISK FROM INHALATION OF FUGATIVE DUST EMISSIONS FOR MUTAGENIC CHEMICALS - HYPOTHETICAL ADULT RESIDENTS		
BASED ON: USEPA, DECEMBER 1989, MARCH 2005, JANUARY 2009		
BY: L. GANSER	**CHECKED BY:**	**DATE:** 9/28/2015

EXAMPLE CARCINOGENIC CALCULATION

$$EC = \frac{9.56E\text{-}09\ mg/m3 \times 24\ hr/day \times 350\ days/year \times 10\ years}{25550\ days \times 24\ hours/day} \times 3$$

EC = 3.93E-09 mg/m3

$$EC = \frac{9.56E\text{-}09\ mg/m3 \times 24\ hr/day \times 350\ days/year \times 10\ years}{25550\ days \times 24\ hours/day} \times 1$$

EC = 1.31E-09 mg/m3

ILCR = (3.93E-09 mg/m3 + 1.31E-09 mg/m3) x 1.10E-03 (ug/m3)-1 x 1000 ug/mg

ILCR = 5.8E-09 ✓

APPENDIX C.3

INHALATION SCREENING LEVELS – CONSTRUCTION WORKERS EXPOSED TO GROUNDWATER

For Mass-Transfer Coefficients:			For Emission Flux and Concentration in Trench:			Trench dimensions:		
Kg,H2O	0.833	cm/s	CF1	1.00E-03	L/cm3	Length	8	ft
MWH2O	18		CF2	1.00E+04	cm2/m2		2.44	m
Kg,O2	0.002	cm/s	CF3	3600	s/hr	Width	3	ft
MWO2	32		F	1			0.91	m
T	77	F	ACH	2	hr-1	Depth	8	ft
T	298	K					2.44	m
R	8.20E-05	atm-m3/mol-K				Width/Depth	0.38	

Inhalation Exposure Factors:			Oral Exposure Factors:			Dermal Exposure Factors:		
ET	0.17	4hrs/24hrs	IR-W		L/day	EV		events/day
EF	30	days/year	CF		ug/mg	EF		days/years
ED	1	year	EF		days/year	ET		hours/day
BW	80	kg	ED		years	ED		years
AT-C	25550	days/year	BW		kg	SA		cm2
AT-N	365	days/year	AT-C		days	CF1		cm3/L
			AT-N		days	CF2		mg/ug
						BWa		kg
						AT-C		days
						AT-N		days

Target Risk and Hazard Quotient:		
TR	1.00E-06	
THQ	0.1	

Revised 8/5/14 Groundwater Screening Levels (inhalation) for construction/utility workers in a trench: Groundwater less than 15 feet deep	CAS No.	Molecular Weight MWi g/mol	Henry's Law Constant Hi atm-m3/mol	Gas-Phase Mass Transfer Coefficient KiG cm/s	Liquid-Phase Mass Transfer Coefficient KiL cm/s	Overall Mass Transfer Coefficient Ki cm/s	Inhalation Unit Risk Factor URF 1/(mg/m3)
Naphthalene	91-20-3	128.18	4.40E-03	4.32E-01	9.99E-04	9.87E-04	3.40E-02

Revised 8/5/14 Table 6.4 Groundwater Screening Levels for construction/utility workers in a trench: Groundwater less than 15 feet deep	Screening Level Oral Cancer SLo-c ug/L	1/SLo-c L/ug	Screening Level Oral (RLo) Noncancer SLo-nc ug/L	1/SLo-nc L/ug	Screening Level Dermal Cancer SLd-c ug/L	1/SLd-c L/ug	Screening Level Dermal (RLd) Noncancer SLd-nc ug/L	1/SLd-nc L/ug	Screening Level Inhalation Cancer SLi-c ug/L	1/SLi-c L/ug	Screening Level Inhalation Noncancer SLi-nc ug/L	1/SLi-nc L/ug	Screening Level Groundwater Inhalation SLi ug/L
Naphthalene			#DIV/0!	#DIV/0!			#DIV/0!	#DIV/0!	2.06E+01	4.85E-02	3.01E+00	3.33E-01	3.01E+00

APPENDIX C.4

PROUCL PRINTOUTS

Surface Soil

PROUCL OUTPUT - SURFACE SOIL

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	10/6/2015 5:36:05 PM
From File	ProUCL Input_SS.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

BENZO(A)PYRENE EQUIVALENTS-POS

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	20
Number of Detects	19	Number of Non-Detects	1
Number of Distinct Detects	19	Number of Distinct Non-Detects	1
Minimum Detect	0.44	Minimum Non-Detect	9.9
Maximum Detect	15129	Maximum Non-Detect	9.9
Variance Detects	22377250	Percent Non-Detects	5%
Mean Detects	2351	SD Detects	4730
Median Detects	170.4	CV Detects	2.012
Skewness Detects	2.132	Kurtosis Detects	3.356
Mean of Logged Detects	5.25	SD of Logged Detects	2.933

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.554	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.901	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.407	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.203	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	2234	Standard Error of Mean	1038
SD	4517	95% KM (BCA) UCL	3967
95% KM (t) UCL	4028	95% KM (Percentile Bootstrap) UCL	3977
95% KM (z) UCL	3941	95% KM Bootstrap t UCL	5930
90% KM Chebyshev UCL	5347	95% KM Chebyshev UCL	6757
97.5% KM Chebyshev UCL	8714	99% KM Chebyshev UCL	12559

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.927	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.853	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.245	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.216	Detected Data Not Gamma Distributed at 5% Significance Level
Detected Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.278	k star (bias corrected MLE)	0.269
Theta hat (MLE)	8463	Theta star (bias corrected MLE)	8739
nu hat (MLE)	10.56	nu star (bias corrected)	10.22
MLE Mean (bias corrected)	2351	MLE Sd (bias corrected)	4533

PROUCL OUTPUT - SURFACE SOIL

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.245	nu hat (KM)	9.784
Approximate Chi Square Value (9.78, α)	3.807	Adjusted Chi Square Value (9.78, β)	3.517
95% Gamma Approximate KM-UCL (use when n>=50)	5741	95% Gamma Adjusted KM-UCL (use when n<50)	6215

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	2234
Maximum	15129	Median	163.8
SD	4634	CV	2.075
k hat (MLE)	0.242	k star (bias corrected MLE)	0.239
Theta hat (MLE)	9242	Theta star (bias corrected MLE)	9355
nu hat (MLE)	9.668	nu star (bias corrected)	9.551
MLE Mean (bias corrected)	2234	MLE Sd (bias corrected)	4571
		Adjusted Level of Significance (β)	0.038
Approximate Chi Square Value (9.55, α)	3.663	Adjusted Chi Square Value (9.55, β)	3.38
95% Gamma Approximate UCL (use when n>=50)	5824	95% Gamma Adjusted UCL (use when n<50)	6313

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.928	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.901	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.199	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.203	Detected Data appear Lognormal at 5% Significance Level
Detected Data appear Lognormal at 5% Significance Level		

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	2234	Mean in Log Scale	5.033
SD in Original Scale	4634	SD in Log Scale	3.015
95% t UCL (assumes normality of ROS data)	4026	95% Percentile Bootstrap UCL	4067
95% BCA Bootstrap UCL	4637	95% Bootstrap t UCL	5656
95% H-UCL (Log ROS)	1044155		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	4.997	95% H-UCL (KM -Log)	965325
KM SD (logged)	3.007	95% Critical H Value (KM-Log)	6.177
KM Standard Error of Mean (logged)	0.696		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	2234	Mean in Log Scale	5.067
SD in Original Scale	4634	SD in Log Scale	2.969
95% t UCL (Assumes normality)	4026	95% H-Stat UCL	831799
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics
Detected Data appear Lognormal Distributed at 5% Significance Level

PROUCL OUTPUT - SURFACE SOIL

Suggested UCL to Use			
99% KM (Chebyshev) UCL	12559		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ANTIMONY

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	20
Number of Detects	15	Number of Non-Detects	5
Number of Distinct Detects	15	Number of Distinct Non-Detects	5
Minimum Detect	0.1	Minimum Non-Detect	0.047
Maximum Detect	3.2	Maximum Non-Detect	0.91
Variance Detects	0.69	Percent Non-Detects	25%
Mean Detects	0.726	SD Detects	0.831
Median Detects	0.461	CV Detects	1.144
Skewness Detects	2.285	Kurtosis Detects	5.502
Mean of Logged Detects	-0.789	SD of Logged Detects	0.986

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.715	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.881	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.266	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.229	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.577	Standard Error of Mean	0.173
SD	0.746	95% KM (BCA) UCL	0.853
95% KM (t) UCL	0.877	95% KM (Percentile Bootstrap) UCL	0.857
95% KM (z) UCL	0.862	95% KM Bootstrap t UCL	1.182
90% KM Chebyshev UCL	1.097	95% KM Chebyshev UCL	1.333
97.5% KM Chebyshev UCL	1.659	99% KM Chebyshev UCL	2.301

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.399	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.759	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.143	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.227	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	1.205	k star (bias corrected MLE)	1.008
Theta hat (MLE)	0.603	Theta star (bias corrected MLE)	0.72
nu hat (MLE)	36.14	nu star (bias corrected)	30.25
MLE Mean (bias corrected)	0.726	MLE Sd (bias corrected)	0.723

PROUCL OUTPUT - SURFACE SOIL

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.599	nu hat (KM)	23.95
Approximate Chi Square Value (23.95, α)	13.81	Adjusted Chi Square Value (23.95, β)	13.21
95% Gamma Approximate KM-UCL (use when n>=50)	1.001	95% Gamma Adjusted KM-UCL (use when n<50)	1.047

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.555
Maximum	3.2	Median	0.272
SD	0.776	CV	1.397
k hat (MLE)	0.646	k star (bias corrected MLE)	0.582
Theta hat (MLE)	0.86	Theta star (bias corrected MLE)	0.953
nu hat (MLE)	25.84	nu star (bias corrected)	23.29
MLE Mean (bias corrected)	0.555	MLE Sd (bias corrected)	0.728
		Adjusted Level of Significance (β)	0.038
Approximate Chi Square Value (23.29, α)	13.31	Adjusted Chi Square Value (23.29, β)	12.72
95% Gamma Approximate UCL (use when n>=50)	0.972	95% Gamma Adjusted UCL (use when n<50)	1.017

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.881	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0978	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.229	Detected Data appear Lognormal at 5% Significance Level
Detected Data appear Lognormal at 5% Significance Level		

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.572	Mean in Log Scale	-1.202
SD in Original Scale	0.765	SD in Log Scale	1.17
95% t UCL (assumes normality of ROS data)	0.868	95% Percentile Bootstrap UCL	0.862
95% BCA Bootstrap UCL	0.998	95% Bootstrap t UCL	1.23
95% H-UCL (Log ROS)	1.295		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-1.223	95% H-UCL (KM -Log)	1.349
KM SD (logged)	1.198	95% Critical H Value (KM-Log)	2.932
KM Standard Error of Mean (logged)	0.286		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.587	Mean in Log Scale	-1.231
SD in Original Scale	0.76	SD in Log Scale	1.335
95% t UCL (Assumes normality)	0.881	95% H-Stat UCL	1.866
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics
Detected Data appear Gamma Distributed at 5% Significance Level

PROUCL OUTPUT - SURFACE SOIL

Suggested UCL to Use			
95% KM (Percentile Bootstrap) UCL	0.857	95% GROS Adjusted Gamma UCL	1.017
95% Adjusted Gamma KM-UCL	1.047		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

THALLIUM

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	20
Number of Detects	15	Number of Non-Detects	5
Number of Distinct Detects	15	Number of Distinct Non-Detects	5
Minimum Detect	0.0759	Minimum Non-Detect	0.072
Maximum Detect	0.301	Maximum Non-Detect	1
Variance Detects	0.005	Percent Non-Detects	25%
Mean Detects	0.182	SD Detects	0.0707
Median Detects	0.183	CV Detects	0.388
Skewness Detects	0.138	Kurtosis Detects	-1.145
Mean of Logged Detects	-1.78	SD of Logged Detects	0.423

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.952	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.881	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.137	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.229	Detected Data appear Normal at 5% Significance Level
Detected Data appear Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.169	Standard Error of Mean	0.0184
SD	0.0732	95% KM (BCA) UCL	0.198
95% KM (t) UCL	0.201	95% KM (Percentile Bootstrap) UCL	0.2
95% KM (z) UCL	0.2	95% KM Bootstrap t UCL	0.202
90% KM Chebyshev UCL	0.225	95% KM Chebyshev UCL	0.25
97.5% KM Chebyshev UCL	0.284	99% KM Chebyshev UCL	0.352

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.329	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.738	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.144	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.222	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	6.557	k star (bias corrected MLE)	5.29
Theta hat (MLE)	0.0278	Theta star (bias corrected MLE)	0.0345
nu hat (MLE)	196.7	nu star (bias corrected)	158.7
MLE Mean (bias corrected)	0.182	MLE Sd (bias corrected)	0.0793

PROUCL OUTPUT - SURFACE SOIL

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	5.357	nu hat (KM)	214.3
Approximate Chi Square Value (214.30, α)	181.4	Adjusted Chi Square Value (214.30, β)	179
95% Gamma Approximate KM-UCL (use when n>=50)	0.2	95% Gamma Adjusted KM-UCL (use when n<50)	0.203

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0457	Mean	0.166
Maximum	0.301	Median	0.159
SD	0.0722	CV	0.434
k hat (MLE)	4.827	k star (bias corrected MLE)	4.136
Theta hat (MLE)	0.0344	Theta star (bias corrected MLE)	0.0402
nu hat (MLE)	193.1	nu star (bias corrected)	165.4
MLE Mean (bias corrected)	0.166	MLE Sd (bias corrected)	0.0817
		Adjusted Level of Significance (β)	0.038
Approximate Chi Square Value (165.44, α)	136.7	Adjusted Chi Square Value (165.44, β)	134.6
95% Gamma Approximate UCL (use when n>=50)	0.201	95% Gamma Adjusted UCL (use when n<50)	0.204

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.945	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.881	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.167	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.229	Detected Data appear Lognormal at 5% Significance Level
Detected Data appear Lognormal at 5% Significance Level		

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.166	Mean in Log Scale	-1.889
SD in Original Scale	0.0705	SD in Log Scale	0.462
95% t UCL (assumes normality of ROS data)	0.193	95% Percentile Bootstrap UCL	0.191
95% BCA Bootstrap UCL	0.19	95% Bootstrap t UCL	0.194
95% H-UCL (Log ROS)	0.208		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-1.879	95% H-UCL (KM -Log)	0.211
KM SD (logged)	0.469	95% Critical H Value (KM-Log)	1.99
KM Standard Error of Mean (logged)	0.118		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.191	Mean in Log Scale	-1.833
SD in Original Scale	0.108	SD in Log Scale	0.668
95% t UCL (Assumes normality)	0.233	95% H-Stat UCL	0.28
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics
Detected Data appear Normal Distributed at 5% Significance Level

PROUCL OUTPUT - SURFACE SOIL

Suggested UCL to Use							
95% KM (t) UCL	0.201	95% KM (Percentile Bootstrap) UCL					0.2
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
Recommendations are based upon data size, data distribution, and skewness.							
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							

PROUCL OUTPUT - SURFACE SOIL

UCL Statistics for Uncensored Full Data Sets	
User Selected Options	
Date/Time of Computation	9/25/2015 2:59:00 PM
From File	ProUCL Input_SS.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

COPPER

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	20
		Number of Missing Observations	0
Minimum	4.68	Mean	189.1
Maximum	769	Median	150.5
SD	198	Std. Error of Mean	44.27
Coefficient of Variation	1.047	Skewness	1.909

Normal GOF Test		
Shapiro Wilk Test Statistic	0.782	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.905	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.214	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.198	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	265.7	95% Adjusted-CLT UCL (Chen-1995)	282.1
		95% Modified-t UCL (Johnson-1978)	268.8

Gamma GOF Test		
A-D Test Statistic	0.407	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.772	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.141	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.2	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	0.918	k star (bias corrected MLE)	0.813
Theta hat (MLE)	206.1	Theta star (bias corrected MLE)	232.5
nu hat (MLE)	36.71	nu star (bias corrected)	32.54
MLE Mean (bias corrected)	189.1	MLE Sd (bias corrected)	209.7
		Approximate Chi Square Value (0.05)	20.5
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	19.74

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	300.2	95% Adjusted Gamma UCL (use when n<50)	311.7

PROUCL OUTPUT - SURFACE SOIL

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.917	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.214	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.198	Data Not Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.543	Mean of logged Data	4.607
Maximum of Logged Data	6.645	SD of logged Data	1.372
Assuming Lognormal Distribution			
95% H-UCL	705.6	90% Chebyshev (MVUE) UCL	493.4
95% Chebyshev (MVUE) UCL	609.6	97.5% Chebyshev (MVUE) UCL	771
99% Chebyshev (MVUE) UCL	1088		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	262	95% Jackknife UCL	265.7
95% Standard Bootstrap UCL	260.2	95% Bootstrap-t UCL	318.1
95% Hall's Bootstrap UCL	699.4	95% Percentile Bootstrap UCL	261.2
95% BCA Bootstrap UCL	277.4		
90% Chebyshev(Mean, Sd) UCL	321.9	95% Chebyshev(Mean, Sd) UCL	382.1
97.5% Chebyshev(Mean, Sd) UCL	465.6	99% Chebyshev(Mean, Sd) UCL	629.6
Suggested UCL to Use			
95% Adjusted Gamma UCL	311.7		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			
IRON			
General Statistics			
Total Number of Observations	20	Number of Distinct Observations	20
		Number of Missing Observations	0
Minimum	5280	Mean	25269
Maximum	48500	Median	24600
SD	12650	Std. Error of Mean	2829
Coefficient of Variation	0.501	Skewness	0.366
Normal GOF Test			
Shapiro Wilk Test Statistic	0.959	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.13	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.198	Data appear Normal at 5% Significance Level	

PROUCL OUTPUT - SURFACE SOIL

Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	30160	95% Adjusted-CLT UCL (Chen-1995)	30169
		95% Modified-t UCL (Johnson-1978)	30199
Gamma GOF Test			
A-D Test Statistic	0.228	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.746	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0931	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.195	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	3.608	k star (bias corrected MLE)	3.1
Theta hat (MLE)	7003	Theta star (bias corrected MLE)	8150
nu hat (MLE)	144.3	nu star (bias corrected)	124
MLE Mean (bias corrected)	25269	MLE Sd (bias corrected)	14351
		Approximate Chi Square Value (0.05)	99.3
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	97.55
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	31559	95% Adjusted Gamma UCL (use when n<50)	32125
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.942	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.123	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.198	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	8.572	Mean of logged Data	9.992
Maximum of Logged Data	10.79	SD of logged Data	0.594
Assuming Lognormal Distribution			
95% H-UCL	34811	90% Chebyshev (MVUE) UCL	36634
95% Chebyshev (MVUE) UCL	41532	97.5% Chebyshev (MVUE) UCL	48331
99% Chebyshev (MVUE) UCL	61685		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	29922	95% Jackknife UCL	30160
95% Standard Bootstrap UCL	29844	95% Bootstrap-t UCL	30524
95% Hall's Bootstrap UCL	30158	95% Percentile Bootstrap UCL	30004
95% BCA Bootstrap UCL	29959		
90% Chebyshev(Mean, Sd) UCL	33755	95% Chebyshev(Mean, Sd) UCL	37599
97.5% Chebyshev(Mean, Sd) UCL	42934	99% Chebyshev(Mean, Sd) UCL	53414

Suggested UCL to Use			
95% Student's-t UCL	30160		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

MANGANESE

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	162	Mean	388.7
Maximum	672	Median	376
SD	128.8	Std. Error of Mean	28.79
Coefficient of Variation	0.331	Skewness	0.37

Normal GOF Test		
Shapiro Wilk Test Statistic	0.985	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.905	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.107	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.198	Data appear Normal at 5% Significance Level
Data appear Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	438.5	95% Adjusted-CLT UCL (Chen-1995)	438.6
		95% Modified-t UCL (Johnson-1978)	438.9

Gamma GOF Test		
A-D Test Statistic	0.133	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0889	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.194	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	9.069	k star (bias corrected MLE)	7.742
Theta hat (MLE)	42.86	Theta star (bias corrected MLE)	50.21
nu hat (MLE)	362.8	nu star (bias corrected)	309.7
MLE Mean (bias corrected)	388.7	MLE Sd (bias corrected)	139.7
		Approximate Chi Square Value (0.05)	269.9
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	267

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	446	95% Adjusted Gamma UCL (use when n<50)	450.9

PROUCL OUTPUT - SURFACE SOIL

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.974	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.113	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.198	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	5.088	Mean of logged Data	5.907
Maximum of Logged Data	6.51	SD of logged Data	0.355
Assuming Lognormal Distribution			
95% H-UCL	456.4	90% Chebyshev (MVUE) UCL	484.6
95% Chebyshev (MVUE) UCL	527.4	97.5% Chebyshev (MVUE) UCL	586.8
99% Chebyshev (MVUE) UCL	703.5		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	436.1	95% Jackknife UCL	438.5
95% Standard Bootstrap UCL	434.2	95% Bootstrap-t UCL	442.2
95% Hall's Bootstrap UCL	445.4	95% Percentile Bootstrap UCL	436.3
95% BCA Bootstrap UCL	435.8		
90% Chebyshev(Mean, Sd) UCL	475.1	95% Chebyshev(Mean, Sd) UCL	514.2
97.5% Chebyshev(Mean, Sd) UCL	568.5	99% Chebyshev(Mean, Sd) UCL	675.2
Suggested UCL to Use			
95% Student's-t UCL	438.5		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

NICKEL

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	20
		Number of Missing Observations	0
Minimum	3.18	Mean	57.08
Maximum	260	Median	49.25
SD	54.24	Std. Error of Mean	12.13
Coefficient of Variation	0.95	Skewness	2.903
Normal GOF Test			
Shapiro Wilk Test Statistic	0.696	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.226	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.198	Data Not Normal at 5% Significance Level	

PROUCL OUTPUT - SURFACE SOIL

Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	78.05	95% Adjusted-CLT UCL (Chen-1995)	85.44
		95% Modified-t UCL (Johnson-1978)	79.36
Gamma GOF Test			
A-D Test Statistic	0.461	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.758	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.145	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.197	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.506	k star (bias corrected MLE)	1.313
Theta hat (MLE)	37.91	Theta star (bias corrected MLE)	43.47
nu hat (MLE)	60.22	nu star (bias corrected)	52.52
MLE Mean (bias corrected)	57.08	MLE Sd (bias corrected)	49.81
		Approximate Chi Square Value (0.05)	36.87
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	35.84
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	81.3	95% Adjusted Gamma UCL (use when n<50)	83.65
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.926	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.168	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.198	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.157	Mean of logged Data	3.677
Maximum of Logged Data	5.561	SD of logged Data	0.968
Assuming Lognormal Distribution			
95% H-UCL	112.2	90% Chebyshev (MVUE) UCL	105.4
95% Chebyshev (MVUE) UCL	125.4	97.5% Chebyshev (MVUE) UCL	153.2
99% Chebyshev (MVUE) UCL	207.8		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	77.03	95% Jackknife UCL	78.05
95% Standard Bootstrap UCL	76.68	95% Bootstrap-t UCL	92.87
95% Hall's Bootstrap UCL	167.9	95% Percentile Bootstrap UCL	78.75
95% BCA Bootstrap UCL	91.83		
90% Chebyshev(Mean, Sd) UCL	93.46	95% Chebyshev(Mean, Sd) UCL	109.9
97.5% Chebyshev(Mean, Sd) UCL	132.8	99% Chebyshev(Mean, Sd) UCL	177.8

PROUCL OUTPUT - SURFACE SOIL

Suggested UCL to Use							
95% Adjusted Gamma UCL	83.65						
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
For additional insight the user may want to consult a statistician.							

Subsurface Soil

PROUCL OUTPUT - SUBSURFACE SOIL

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	9/25/2015 2:19:35 PM
From File	ProUCL Input_SB.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

BENZO(A)PYRENE EQUIVALENTS-HALFND

General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
Number of Detects	43	Number of Non-Detects	2
Number of Distinct Detects	43	Number of Distinct Non-Detects	2
Minimum Detect	14.66	Minimum Non-Detect	9.1
Maximum Detect	17430	Maximum Non-Detect	9.8
Variance Detects	9943029	Percent Non-Detects	4.444%
Mean Detects	1411	SD Detects	3153
Median Detects	365.7	CV Detects	2.234
Skewness Detects	3.927	Kurtosis Detects	16.95
Mean of Logged Detects	6.079	SD of Logged Detects	1.456

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.461	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.943	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.333	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.135	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	1349	Standard Error of Mean	461.6
SD	3060	95% KM (BCA) UCL	2223
95% KM (t) UCL	2124	95% KM (Percentile Bootstrap) UCL	2191
95% KM (z) UCL	2108	95% KM Bootstrap t UCL	3191
90% KM Chebyshev UCL	2734	95% KM Chebyshev UCL	3361
97.5% KM Chebyshev UCL	4231	99% KM Chebyshev UCL	5941

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	2.738	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.81	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.204	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.142	Detected Data Not Gamma Distributed at 5% Significance Level
Detected Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.536	k star (bias corrected MLE)	0.514
Theta hat (MLE)	2635	Theta star (bias corrected MLE)	2747
nu hat (MLE)	46.06	nu star (bias corrected)	44.18
MLE Mean (bias corrected)	1411	MLE Sd (bias corrected)	1969

PROUCL OUTPUT - SUBSURFACE SOIL

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.194	nu hat (KM)	17.49
Approximate Chi Square Value (17.49, α)	9.022	Adjusted Chi Square Value (17.49, β)	8.82
95% Gamma Approximate KM-UCL (use when n>=50)	2615	95% Gamma Adjusted KM-UCL (use when n<50)	2675

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	1348
Maximum	17430	Median	354
SD	3095	CV	2.295
k hat (MLE)	0.409	k star (bias corrected MLE)	0.397
Theta hat (MLE)	3296	Theta star (bias corrected MLE)	3400
nu hat (MLE)	36.82	nu star (bias corrected)	35.7
MLE Mean (bias corrected)	1348	MLE Sd (bias corrected)	2141
		Adjusted Level of Significance (β)	0.0447
Approximate Chi Square Value (35.70, α)	23.02	Adjusted Chi Square Value (35.70, β)	22.69
95% Gamma Approximate UCL (use when n>=50)	2091	95% Gamma Adjusted UCL (use when n<50)	2122

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.975	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.943	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0928	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.135	Detected Data appear Lognormal at 5% Significance Level
Detected Data appear Lognormal at 5% Significance Level		

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	1349	Mean in Log Scale	5.924
SD in Original Scale	3094	SD in Log Scale	1.596
95% t UCL (assumes normality of ROS data)	2124	95% Percentile Bootstrap UCL	2163
95% BCA Bootstrap UCL	2465	95% Bootstrap t UCL	3141
95% H-UCL (Log ROS)	2833		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	5.907	95% H-UCL (KM -Log)	2927
KM SD (logged)	1.617	95% Critical H Value (KM-Log)	3.147
KM Standard Error of Mean (logged)	0.244		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1349	Mean in Log Scale	5.878
SD in Original Scale	3095	SD in Log Scale	1.707
95% t UCL (Assumes normality)	2124	95% H-Stat UCL	3557
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics
Detected Data appear Lognormal Distributed at 5% Significance Level

PROUCL OUTPUT - SUBSURFACE SOIL

Suggested UCL to Use			
95% KM (Chebyshev) UCL	3361		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ANTIMONY

General Statistics			
Total Number of Observations	41	Number of Distinct Observations	41
		Number of Missing Observations	4
Number of Detects	31	Number of Non-Detects	10
Number of Distinct Detects	31	Number of Distinct Non-Detects	10
Minimum Detect	0.115	Minimum Non-Detect	0.047
Maximum Detect	1610	Maximum Non-Detect	1.1
Variance Detects	144202	Percent Non-Detects	24.39%
Mean Detects	119.9	SD Detects	379.7
Median Detects	1.13	CV Detects	3.166
Skewness Detects	3.386	Kurtosis Detects	10.8
Mean of Logged Detects	0.919	SD of Logged Detects	2.552

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.36	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.929	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.474	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.159	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	90.72	Standard Error of Mean	52.21
SD	328.9	95% KM (BCA) UCL	188
95% KM (t) UCL	178.6	95% KM (Percentile Bootstrap) UCL	183.2
95% KM (z) UCL	176.6	95% KM Bootstrap t UCL	348.3
90% KM Chebyshev UCL	247.4	95% KM Chebyshev UCL	318.3
97.5% KM Chebyshev UCL	416.8	99% KM Chebyshev UCL	610.2

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	4.858	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.913	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.336	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.176	Detected Data Not Gamma Distributed at 5% Significance Level
Detected Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.192	k star (bias corrected MLE)	0.195
Theta hat (MLE)	626.1	Theta star (bias corrected MLE)	616.6
nu hat (MLE)	11.88	nu star (bias corrected)	12.06
MLE Mean (bias corrected)	119.9	MLE Sd (bias corrected)	271.9

PROUCL OUTPUT - SUBSURFACE SOIL

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.0761	nu hat (KM)	6.24
Approximate Chi Square Value (6.24, α)	1.764	Adjusted Chi Square Value (6.24, β)	1.679
95% Gamma Approximate KM-UCL (use when n>=50)	321	95% Gamma Adjusted KM-UCL (use when n<50)	337.2
Gamma (KM) may not be used when k hat (KM) is < 0.1			
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	90.68
Maximum	1610	Median	0.591
SD	333	CV	3.672
k hat (MLE)	0.155	k star (bias corrected MLE)	0.16
Theta hat (MLE)	585.1	Theta star (bias corrected MLE)	567.1
nu hat (MLE)	12.71	nu star (bias corrected)	13.11
MLE Mean (bias corrected)	90.68	MLE Sd (bias corrected)	226.8
		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (13.11, α)	5.968	Adjusted Chi Square Value (13.11, β)	5.792
95% Gamma Approximate UCL (use when n>=50)	199.2	95% Gamma Adjusted UCL (use when n<50)	205.3
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.865	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.929	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.171	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.159	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	90.7	Mean in Log Scale	-0.0779
SD in Original Scale	333	SD in Log Scale	2.903
95% t UCL (assumes normality of ROS data)	178.3	95% Percentile Bootstrap UCL	177.2
95% BCA Bootstrap UCL	234.3	95% Bootstrap t UCL	343.3
95% H-UCL (Log ROS)	613.1		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	90.73	Mean in Log Scale	0.215
SD in Original Scale	333	SD in Log Scale	2.602
95% t UCL (Assumes normality)	178.3	95% H-Stat UCL	234.6
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
99% KM (Chebyshev) UCL	610.2		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			

PROUCL OUTPUT - SUBSURFACE SOIL

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

CADMIUM

General Statistics			
Total Number of Observations	45	Number of Distinct Observations	43
Number of Detects	29	Number of Non-Detects	16
Number of Distinct Detects	29	Number of Distinct Non-Detects	14
Minimum Detect	0.053	Minimum Non-Detect	0.208
Maximum Detect	7.64	Maximum Non-Detect	5.22
Variance Detects	7.328	Percent Non-Detects	35.56%
Mean Detects	2.112	SD Detects	2.707
Median Detects	0.697	CV Detects	1.282
Skewness Detects	1.179	Kurtosis Detects	-0.326
Mean of Logged Detects	-0.209	SD of Logged Detects	1.504

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.708	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.926	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.312	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.165	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	1.459	Standard Error of Mean	0.353
SD	2.318	95% KM (BCA) UCL	2.065
95% KM (t) UCL	2.052	95% KM (Percentile Bootstrap) UCL	2.055
95% KM (z) UCL	2.04	95% KM Bootstrap t UCL	2.172
90% KM Chebyshev UCL	2.518	95% KM Chebyshev UCL	2.998
97.5% KM Chebyshev UCL	3.663	99% KM Chebyshev UCL	4.971

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	1.454	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.796	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.195	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.17	Detected Data Not Gamma Distributed at 5% Significance Level
Detected Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.64	k star (bias corrected MLE)	0.596
Theta hat (MLE)	3.302	Theta star (bias corrected MLE)	3.541
nu hat (MLE)	37.1	nu star (bias corrected)	34.59
MLE Mean (bias corrected)	2.112	MLE Sd (bias corrected)	2.735

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.396	nu hat (KM)	35.67
Approximate Chi Square Value (35.67, α)	23	Adjusted Chi Square Value (35.67, β)	22.66
95% Gamma Approximate KM-UCL (use when n>=50)	2.263	95% Gamma Adjusted KM-UCL (use when n<50)	2.296

PROUCL OUTPUT - SUBSURFACE SOIL

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	1.382
Maximum	7.64	Median	0.284
SD	2.378	CV	1.721
k hat (MLE)	0.367	k star (bias corrected MLE)	0.358
Theta hat (MLE)	3.76	Theta star (bias corrected MLE)	3.862
nu hat (MLE)	33.07	nu star (bias corrected)	32.2
MLE Mean (bias corrected)	1.382	MLE Sd (bias corrected)	2.31
		Adjusted Level of Significance (β)	0.0447
Approximate Chi Square Value (32.20, α)	20.23	Adjusted Chi Square Value (32.20, β)	19.92
95% Gamma Approximate UCL (use when n>=50)	2.199	95% Gamma Adjusted UCL (use when n<50)	2.234

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.928	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.926	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.146	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.165	Detected Data appear Lognormal at 5% Significance Level
Detected Data appear Lognormal at 5% Significance Level		

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	1.443	Mean in Log Scale	-0.682
SD in Original Scale	2.344	SD in Log Scale	1.383
95% t UCL (assumes normality of ROS data)	2.031	95% Percentile Bootstrap UCL	2.041
95% BCA Bootstrap UCL	2.146	95% Bootstrap t UCL	2.222
95% H-UCL (Log ROS)	2.376		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-0.714	95% H-UCL (KM -Log)	2.663
KM SD (logged)	1.451	95% Critical H Value (KM-Log)	2.925
KM Standard Error of Mean (logged)	0.241		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.551	Mean in Log Scale	-0.515
SD in Original Scale	2.326	SD in Log Scale	1.363
95% t UCL (Assumes normality)	2.134	95% H-Stat UCL	2.695
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics
Detected Data appear Lognormal Distributed at 5% Significance Level

Suggested UCL to Use	
97.5% KM (Chebyshev) UCL	3.663

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

LEAD

General Statistics

Total Number of Observations	45	Number of Distinct Observations	45
Number of Detects	43	Number of Non-Detects	2
Number of Distinct Detects	43	Number of Distinct Non-Detects	2
Minimum Detect	4.79	Minimum Non-Detect	21.9
Maximum Detect	20100	Maximum Non-Detect	36.9
Variance Detects	23305774	Percent Non-Detects	4.444%
Mean Detects	2309	SD Detects	4828
Median Detects	422	CV Detects	2.09
Skewness Detects	2.941	Kurtosis Detects	7.92
Mean of Logged Detects	6.219	SD of Logged Detects	1.866

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.505	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.943	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.319	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.135	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	2207	Standard Error of Mean	707.1
SD	4688	95% KM (BCA) UCL	3366
95% KM (t) UCL	3396	95% KM (Percentile Bootstrap) UCL	3437
95% KM (z) UCL	3371	95% KM Bootstrap t UCL	4071
90% KM Chebyshev UCL	4329	95% KM Chebyshev UCL	5290
97.5% KM Chebyshev UCL	6623	99% KM Chebyshev UCL	9243

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.852	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.83	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.178	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.144	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.427	k star (bias corrected MLE)	0.413
Theta hat (MLE)	5409	Theta star (bias corrected MLE)	5597
nu hat (MLE)	36.72	nu star (bias corrected)	35.49
MLE Mean (bias corrected)	2309	MLE Sd (bias corrected)	3595

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.222	nu hat (KM)	19.96
Approximate Chi Square Value (19.96, α)	10.82	Adjusted Chi Square Value (19.96, β)	10.6
95% Gamma Approximate KM-UCL (use when n>=50)	4072	95% Gamma Adjusted KM-UCL (use when n<50)	4158

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

PROUCL OUTPUT - SUBSURFACE SOIL

GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	2207
Maximum	20100	Median	401
SD	4741	CV	2.148
k hat (MLE)	0.344	k star (bias corrected MLE)	0.336
Theta hat (MLE)	6417	Theta star (bias corrected MLE)	6572
nu hat (MLE)	30.95	nu star (bias corrected)	30.22
MLE Mean (bias corrected)	2207	MLE Sd (bias corrected)	3808
		Adjusted Level of Significance (β)	0.0447
Approximate Chi Square Value (30.22, α)	18.67	Adjusted Chi Square Value (30.22, β)	18.36
95% Gamma Approximate UCL (use when n>=50)	3573	95% Gamma Adjusted UCL (use when n<50)	3631
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.984	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.943	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0741	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.135	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	2208	Mean in Log Scale	6.067
SD in Original Scale	4741	SD in Log Scale	1.959
95% t UCL (assumes normality of ROS data)	3395	95% Percentile Bootstrap UCL	3486
95% BCA Bootstrap UCL	3787	95% Bootstrap t UCL	4333
95% H-UCL (Log ROS)	8584		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	6.054	95% H-UCL (KM -Log)	8591
KM SD (logged)	1.964	95% Critical H Value (KM-Log)	3.634
KM Standard Error of Mean (logged)	0.297		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	2207	Mean in Log Scale	6.061
SD in Original Scale	4741	SD in Log Scale	1.97
95% t UCL (Assumes normality)	3395	95% H-Stat UCL	8804
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
97.5% KM (Chebyshev) UCL	6623		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

PROUCL OUTPUT - SUBSURFACE SOIL

MERCURY

General Statistics			
Total Number of Observations	45	Number of Distinct Observations	42
Number of Detects	42	Number of Non-Detects	3
Number of Distinct Detects	40	Number of Distinct Non-Detects	2
Minimum Detect	0.013	Minimum Non-Detect	0.014
Maximum Detect	18.6	Maximum Non-Detect	0.07
Variance Detects	10.92	Percent Non-Detects	6.667%
Mean Detects	1.681	SD Detects	3.305
Median Detects	0.616	CV Detects	1.966
Skewness Detects	3.934	Kurtosis Detects	17.5
Mean of Logged Detects	-0.453	SD of Logged Detects	1.383

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.491	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.942	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.307	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.137	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	1.569	Standard Error of Mean	0.48
SD	3.182	95% KM (BCA) UCL	2.463
95% KM (t) UCL	2.376	95% KM (Percentile Bootstrap) UCL	2.432
95% KM (z) UCL	2.359	95% KM Bootstrap t UCL	3.351
90% KM Chebyshev UCL	3.009	95% KM Chebyshev UCL	3.662
97.5% KM Chebyshev UCL	4.567	99% KM Chebyshev UCL	6.346

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	1.83	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.801	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.192	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.143	Detected Data Not Gamma Distributed at 5% Significance Level
Detected Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.631	k star (bias corrected MLE)	0.602
Theta hat (MLE)	2.663	Theta star (bias corrected MLE)	2.792
nu hat (MLE)	53.01	nu star (bias corrected)	50.55
MLE Mean (bias corrected)	1.681	MLE Sd (bias corrected)	2.166

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.243	nu hat (KM)	21.9
Approximate Chi Square Value (21.90, α)	12.26	Adjusted Chi Square Value (21.90, β)	12.02
95% Gamma Approximate KM-UCL (use when n>=50)	2.803	95% Gamma Adjusted KM-UCL (use when n<50)	2.859

Gamma ROS Statistics using Imputed Non-Detects
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs

PROUCL OUTPUT - SUBSURFACE SOIL

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	1.569
Maximum	18.6	Median	0.548
SD	3.218	CV	2.05
k hat (MLE)	0.533	k star (bias corrected MLE)	0.512
Theta hat (MLE)	2.944	Theta star (bias corrected MLE)	3.064
nu hat (MLE)	47.96	nu star (bias corrected)	46.1
MLE Mean (bias corrected)	1.569	MLE Sd (bias corrected)	2.193
		Adjusted Level of Significance (β)	0.0447
Approximate Chi Square Value (46.10, α)	31.52	Adjusted Chi Square Value (46.10, β)	31.12
95% Gamma Approximate UCL (use when n>=50)	2.295	95% Gamma Adjusted UCL (use when n<50)	2.324
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.942	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0949	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.137	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	1.571	Mean in Log Scale	-0.649
SD in Original Scale	3.217	SD in Log Scale	1.528
95% t UCL (assumes normality of ROS data)	2.377	95% Percentile Bootstrap UCL	2.423
95% BCA Bootstrap UCL	2.759	95% Bootstrap t UCL	3.2
95% H-UCL (Log ROS)	3.371		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-0.712	95% H-UCL (KM -Log)	4.111
KM SD (logged)	1.638	95% Critical H Value (KM-Log)	3.176
KM Standard Error of Mean (logged)	0.247		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.57	Mean in Log Scale	-0.718
SD in Original Scale	3.217	SD in Log Scale	1.681
95% t UCL (Assumes normality)	2.375	95% H-Stat UCL	4.547
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	3.662		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

PROUCL OUTPUT - SUBSURFACE SOIL

NICKEL

General Statistics			
Total Number of Observations	45	Number of Distinct Observations	44
Number of Detects	43	Number of Non-Detects	2
Number of Distinct Detects	42	Number of Distinct Non-Detects	2
Minimum Detect	9.1	Minimum Non-Detect	8.7
Maximum Detect	3260	Maximum Non-Detect	10.3
Variance Detects	473416	Percent Non-Detects	4.444%
Mean Detects	280.3	SD Detects	688.1
Median Detects	32.8	CV Detects	2.455
Skewness Detects	3.401	Kurtosis Detects	11.73
Mean of Logged Detects	4.101	SD of Logged Detects	1.467

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.441	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.943	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.402	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.135	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	268.3	Standard Error of Mean	100.6
SD	667.1	95% KM (BCA) UCL	449.8
95% KM (t) UCL	437.3	95% KM (Percentile Bootstrap) UCL	446.2
95% KM (z) UCL	433.8	95% KM Bootstrap t UCL	637.2
90% KM Chebyshev UCL	570.1	95% KM Chebyshev UCL	706.8
97.5% KM Chebyshev UCL	896.6	99% KM Chebyshev UCL	1269

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	6.763	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.831	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.368	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.144	Detected Data Not Gamma Distributed at 5% Significance Level
Detected Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.425	k star (bias corrected MLE)	0.41
Theta hat (MLE)	660.3	Theta star (bias corrected MLE)	683
nu hat (MLE)	36.51	nu star (bias corrected)	35.3
MLE Mean (bias corrected)	280.3	MLE Sd (bias corrected)	437.6

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.162	nu hat (KM)	14.55
Approximate Chi Square Value (14.55, α)	6.952	Adjusted Chi Square Value (14.55, β)	6.778
95% Gamma Approximate KM-UCL (use when n>=50)	561.6	95% Gamma Adjusted KM-UCL (use when n<50)	576

Gamma ROS Statistics using Imputed Non-Detects
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs

PROUCL OUTPUT - SUBSURFACE SOIL

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	267.9
Maximum	3260	Median	32.6
SD	674.8	CV	2.519
k hat (MLE)	0.357	k star (bias corrected MLE)	0.348
Theta hat (MLE)	750	Theta star (bias corrected MLE)	769.4
nu hat (MLE)	32.14	nu star (bias corrected)	31.33
MLE Mean (bias corrected)	267.9	MLE Sd (bias corrected)	454
		Adjusted Level of Significance (β)	0.0447
Approximate Chi Square Value (31.33, α)	19.54	Adjusted Chi Square Value (31.33, β)	19.23
95% Gamma Approximate UCL (use when n>=50)	429.4	95% Gamma Adjusted UCL (use when n<50)	436.4
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.787	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.943	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.283	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.135	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	268	Mean in Log Scale	3.961
SD in Original Scale	674.7	SD in Log Scale	1.577
95% t UCL (assumes normality of ROS data)	437	95% Percentile Bootstrap UCL	450.9
95% BCA Bootstrap UCL	500	95% Bootstrap t UCL	634.3
95% H-UCL (Log ROS)	379.9		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	268.1	Mean in Log Scale	3.987
SD in Original Scale	674.7	SD in Log Scale	1.529
95% t UCL (Assumes normality)	437.1	95% H-Stat UCL	348.6
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	706.8		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
THALLIUM			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	40
Number of Detects	27	Number of Non-Detects	18
Number of Distinct Detects	24	Number of Distinct Non-Detects	16
Minimum Detect	0.105	Minimum Non-Detect	0.065

PROUCL OUTPUT - SUBSURFACE SOIL

Maximum Detect	0.254	Maximum Non-Detect	0.98
Variance Detects	0.00162	Percent Non-Detects	40%
Mean Detects	0.157	SD Detects	0.0403
Median Detects	0.149	CV Detects	0.256
Skewness Detects	0.864	Kurtosis Detects	0.0475
Mean of Logged Detects	-1.881	SD of Logged Detects	0.245
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.917	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.179	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.171	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.139	Standard Error of Mean	0.00889
SD	0.0507	95% KM (BCA) UCL	0.156
95% KM (t) UCL	0.154	95% KM (Percentile Bootstrap) UCL	0.154
95% KM (z) UCL	0.153	95% KM Bootstrap t UCL	0.152
90% KM Chebyshev UCL	0.165	95% KM Chebyshev UCL	0.177
97.5% KM Chebyshev UCL	0.194	99% KM Chebyshev UCL	0.227
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.506	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.151	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.168	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	17.05	k star (bias corrected MLE)	15.18
Theta hat (MLE)	0.00921	Theta star (bias corrected MLE)	0.0103
nu hat (MLE)	920.9	nu star (bias corrected)	819.9
MLE Mean (bias corrected)	0.157	MLE Sd (bias corrected)	0.0403
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	7.466	nu hat (KM)	671.9
Approximate Chi Square Value (671.91, α)	612.8	Adjusted Chi Square Value (671.91, β)	610.9
95% Gamma Approximate KM-UCL (use when n>=50)	0.152	95% Gamma Adjusted KM-UCL (use when n<50)	0.152
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0772	Mean	0.14
Maximum	0.254	Median	0.137
SD	0.0421	CV	0.301
k hat (MLE)	11.41	k star (bias corrected MLE)	10.66
Theta hat (MLE)	0.0123	Theta star (bias corrected MLE)	0.0131
nu hat (MLE)	1027	nu star (bias corrected)	959.7

PROUCL OUTPUT - SUBSURFACE SOIL

MLE Mean (bias corrected)	0.14	MLE Sd (bias corrected)	0.0429
		Adjusted Level of Significance (β)	0.0447
Approximate Chi Square Value (959.71, α)	888.8	Adjusted Chi Square Value (959.71, β)	886.6
95% Gamma Approximate UCL (use when n>=50)	0.151	95% Gamma Adjusted UCL (use when n<50)	0.152
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.955	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.134	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.171	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.141	Mean in Log Scale	-1.993
SD in Original Scale	0.0399	SD in Log Scale	0.272
95% t UCL (assumes normality of ROS data)	0.151	95% Percentile Bootstrap UCL	0.152
95% BCA Bootstrap UCL	0.152	95% Bootstrap t UCL	0.152
95% H-UCL (Log ROS)	0.152		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-2.051	95% H-UCL (KM -Log)	0.156
KM SD (logged)	0.399	95% Critical H Value (KM-Log)	1.837
KM Standard Error of Mean (logged)	0.0702		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.19	Mean in Log Scale	-1.863
SD in Original Scale	0.116	SD in Log Scale	0.68
95% t UCL (Assumes normality)	0.219	95% H-Stat UCL	0.241
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.154	95% GROS Adjusted Gamma UCL	0.152
95% Adjusted Gamma KM-UCL	0.152		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

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UCL Statistics for Uncensored Full Data Sets	
User Selected Options	
Date/Time of Computation	9/25/2015 1:41:25 PM
From File	ProUCL Input_SB.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

ARSENIC

General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	2.48	Mean	17.46
Maximum	61.9	Median	12.8
SD	11.91	Std. Error of Mean	1.776
Coefficient of Variation	0.683	Skewness	1.908

Normal GOF Test		
Shapiro Wilk Test Statistic	0.805	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.213	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.132	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	20.44	95% Adjusted-CLT UCL (Chen-1995)	20.92
		95% Modified-t UCL (Johnson-1978)	20.52

Gamma GOF Test		
A-D Test Statistic	1.199	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.756	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.148	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.133	Data Not Gamma Distributed at 5% Significance Level
Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	2.89	k star (bias corrected MLE)	2.712
Theta hat (MLE)	6.04	Theta star (bias corrected MLE)	6.437
nu hat (MLE)	260.1	nu star (bias corrected)	244.1
MLE Mean (bias corrected)	17.46	MLE Sd (bias corrected)	10.6
		Approximate Chi Square Value (0.05)	208.9
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	207.8

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	20.39	95% Adjusted Gamma UCL (use when n<50)	20.5

PROUCL OUTPUT - SUBSURFACE SOIL

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.969	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.107	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.132	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.908	Mean of logged Data	2.677
Maximum of Logged Data	4.126	SD of logged Data	0.605
Assuming Lognormal Distribution			
95% H-UCL	20.92	90% Chebyshev (MVUE) UCL	22.4
95% Chebyshev (MVUE) UCL	24.68	97.5% Chebyshev (MVUE) UCL	27.84
99% Chebyshev (MVUE) UCL	34.05		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	20.38	95% Jackknife UCL	20.44
95% Standard Bootstrap UCL	20.36	95% Bootstrap-t UCL	21.63
95% Hall's Bootstrap UCL	21.1	95% Percentile Bootstrap UCL	20.34
95% BCA Bootstrap UCL	20.94		
90% Chebyshev(Mean, Sd) UCL	22.78	95% Chebyshev(Mean, Sd) UCL	25.2
97.5% Chebyshev(Mean, Sd) UCL	28.55	99% Chebyshev(Mean, Sd) UCL	35.13
Suggested UCL to Use			
95% H-UCL	20.92		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			
COBALT			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	41
		Number of Missing Observations	0
Minimum	4	Mean	11.3
Maximum	40.7	Median	8.8
SD	7.762	Std. Error of Mean	1.157
Coefficient of Variation	0.687	Skewness	2.487

PROUCL OUTPUT - SUBSURFACE SOIL

Normal GOF Test			
Shapiro Wilk Test Statistic	0.725	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.22	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.132	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	13.24	95% Adjusted-CLT UCL (Chen-1995)	13.66
		95% Modified-t UCL (Johnson-1978)	13.31
Gamma GOF Test			
A-D Test Statistic	1.294	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.755	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.155	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.133	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	3.362	k star (bias corrected MLE)	3.153
Theta hat (MLE)	3.36	Theta star (bias corrected MLE)	3.583
nu hat (MLE)	302.6	nu star (bias corrected)	283.8
MLE Mean (bias corrected)	11.3	MLE Sd (bias corrected)	6.363
		Approximate Chi Square Value (0.05)	245.7
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	244.6
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	13.05	95% Adjusted Gamma UCL (use when n<50)	13.11
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.948	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.113	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.132	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.386	Mean of logged Data	2.269
Maximum of Logged Data	3.706	SD of logged Data	0.528
Assuming Lognormal Distribution			
95% H-UCL	12.96	90% Chebyshev (MVUE) UCL	13.83
95% Chebyshev (MVUE) UCL	15.09	97.5% Chebyshev (MVUE) UCL	16.82
99% Chebyshev (MVUE) UCL	20.23		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	13.2	95% Jackknife UCL	13.24

95% Standard Bootstrap UCL	13.17	95% Bootstrap-t UCL	14.08
95% Hall's Bootstrap UCL	14.49	95% Percentile Bootstrap UCL	13.34
95% BCA Bootstrap UCL	13.68		
90% Chebyshev(Mean, Sd) UCL	14.77	95% Chebyshev(Mean, Sd) UCL	16.34
97.5% Chebyshev(Mean, Sd) UCL	18.52	99% Chebyshev(Mean, Sd) UCL	22.81

Suggested UCL to Use

95% H-UCL	12.96

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

COPPER

General Statistics

Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	15.2	Mean	3734
Maximum	39600	Median	224
SD	8563	Std. Error of Mean	1276
Coefficient of Variation	2.293	Skewness	2.761

Normal GOF Test

Shapiro Wilk Test Statistic	0.502	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.369	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.132	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	5878	95% Adjusted-CLT UCL (Chen-1995)	6395
		95% Modified-t UCL (Johnson-1978)	5966

Gamma GOF Test

A-D Test Statistic	4.026	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.864	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.277	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.143	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.296	k star (bias corrected MLE)	0.291

PROUCL OUTPUT - SUBSURFACE SOIL

Theta hat (MLE)	12603	Theta star (bias corrected MLE)	12816
nu hat (MLE)	26.66	nu star (bias corrected)	26.22
MLE Mean (bias corrected)	3734	MLE Sd (bias corrected)	6917
		Approximate Chi Square Value (0.05)	15.55
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	15.28
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	6296	95% Adjusted Gamma UCL (use when n<50)	6409
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.913	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.161	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.132	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.721	Mean of logged Data	5.893
Maximum of Logged Data	10.59	SD of logged Data	2.18
Assuming Lognormal Distribution			
95% H-UCL	14288	90% Chebyshev (MVUE) UCL	8122
95% Chebyshev (MVUE) UCL	10290	97.5% Chebyshev (MVUE) UCL	13300
99% Chebyshev (MVUE) UCL	19212		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	5833	95% Jackknife UCL	5878
95% Standard Bootstrap UCL	5843	95% Bootstrap-t UCL	6884
95% Hall's Bootstrap UCL	6145	95% Percentile Bootstrap UCL	6041
95% BCA Bootstrap UCL	6271		
90% Chebyshev(Mean, Sd) UCL	7563	95% Chebyshev(Mean, Sd) UCL	9298
97.5% Chebyshev(Mean, Sd) UCL	11705	99% Chebyshev(Mean, Sd) UCL	16434
Suggested UCL to Use			
97.5% Chebyshev (Mean, Sd) UCL	11705		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

IRON

General Statistics			
Total Number of Observations	45	Number of Distinct Observations	42
		Number of Missing Observations	0
Minimum	8300	Mean	55902

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Maximum	269000	Median	23700
SD	71089	Std. Error of Mean	10597
Coefficient of Variation	1.272	Skewness	1.805
Normal GOF Test			
Shapiro Wilk Test Statistic	0.624	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.396	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.132	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	73708	95% Adjusted-CLT UCL (Chen-1995)	76381
		95% Modified-t UCL (Johnson-1978)	74184
Gamma GOF Test			
A-D Test Statistic	5.515	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.776	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.346	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.136	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.039	k star (bias corrected MLE)	0.984
Theta hat (MLE)	53827	Theta star (bias corrected MLE)	56804
nu hat (MLE)	93.47	nu star (bias corrected)	88.57
MLE Mean (bias corrected)	55902	MLE Sd (bias corrected)	56351
		Approximate Chi Square Value (0.05)	67.87
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	67.27
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	72950	95% Adjusted Gamma UCL (use when n<50)	73600
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.804	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.291	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.132	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	9.024	Mean of logged Data	10.38
Maximum of Logged Data	12.5	SD of logged Data	0.956
Assuming Lognormal Distribution			
95% H-UCL	70955	90% Chebyshev (MVUE) UCL	74834
95% Chebyshev (MVUE) UCL	86065	97.5% Chebyshev (MVUE) UCL	101654
99% Chebyshev (MVUE) UCL	132275		

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Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	73333	95% Jackknife UCL	73708
95% Standard Bootstrap UCL	73290	95% Bootstrap-t UCL	79462
95% Hall's Bootstrap UCL	75443	95% Percentile Bootstrap UCL	73792
95% BCA Bootstrap UCL	77847		
90% Chebyshev(Mean, Sd) UCL	87694	95% Chebyshev(Mean, Sd) UCL	102095
97.5% Chebyshev(Mean, Sd) UCL	122082	99% Chebyshev(Mean, Sd) UCL	161344
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	102095		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

MANGANESE

General Statistics			
Total Number of Observations	45	Number of Distinct Observations	44
		Number of Missing Observations	0
Minimum	33.3	Mean	698.2
Maximum	12600	Median	313
SD	1847	Std. Error of Mean	275.3
Coefficient of Variation	2.645	Skewness	6.356
Normal GOF Test			
Shapiro Wilk Test Statistic	0.282	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.359	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.132	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1161	95% Adjusted-CLT UCL (Chen-1995)	1430
		95% Modified-t UCL (Johnson-1978)	1204
Gamma GOF Test			
A-D Test Statistic	3.816	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.785	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.215	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.137	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.844	k star (bias corrected MLE)	0.802

PROUCL OUTPUT - SUBSURFACE SOIL

Theta hat (MLE)	827.4	Theta star (bias corrected MLE)	870.1
nu hat (MLE)	75.95	nu star (bias corrected)	72.22
MLE Mean (bias corrected)	698.2	MLE Sd (bias corrected)	779.5
		Approximate Chi Square Value (0.05)	53.65
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	53.12
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	939.9	95% Adjusted Gamma UCL (use when n<50)	949.2
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.928	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.134	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.132	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.506	Mean of logged Data	5.85
Maximum of Logged Data	9.441	SD of logged Data	0.965
Assuming Lognormal Distribution			
95% H-UCL	777.2	90% Chebyshev (MVUE) UCL	818.7
95% Chebyshev (MVUE) UCL	942.6	97.5% Chebyshev (MVUE) UCL	1115
99% Chebyshev (MVUE) UCL	1452		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1151	95% Jackknife UCL	1161
95% Standard Bootstrap UCL	1154	95% Bootstrap-t UCL	2821
95% Hall's Bootstrap UCL	2754	95% Percentile Bootstrap UCL	1226
95% BCA Bootstrap UCL	1542		
90% Chebyshev(Mean, Sd) UCL	1524	95% Chebyshev(Mean, Sd) UCL	1898
97.5% Chebyshev(Mean, Sd) UCL	2418	99% Chebyshev(Mean, Sd) UCL	3438
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	1898		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			
ZINC			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	30.6	Mean	1066

PROUCL OUTPUT - SUBSURFACE SOIL

Maximum	7350	Median	233
SD	1752	Std. Error of Mean	261.1
Coefficient of Variation	1.643	Skewness	2.328
Normal GOF Test			
Shapiro Wilk Test Statistic	0.629	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.301	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.132	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1505	95% Adjusted-CLT UCL (Chen-1995)	1593
		95% Modified-t UCL (Johnson-1978)	1520
Gamma GOF Test			
A-D Test Statistic	2.139	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.809	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.2	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.139	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.548	k star (bias corrected MLE)	0.526
Theta hat (MLE)	1946	Theta star (bias corrected MLE)	2026
nu hat (MLE)	49.32	nu star (bias corrected)	47.37
MLE Mean (bias corrected)	1066	MLE Sd (bias corrected)	1470
		Approximate Chi Square Value (0.05)	32.57
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	32.16
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1551	95% Adjusted Gamma UCL (use when n<50)	1570
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.941	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.108	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.132	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.421	Mean of logged Data	5.829
Maximum of Logged Data	8.902	SD of logged Data	1.542
Assuming Lognormal Distribution			
95% H-UCL	2265	90% Chebyshev (MVUE) UCL	2025
95% Chebyshev (MVUE) UCL	2463	97.5% Chebyshev (MVUE) UCL	3072
99% Chebyshev (MVUE) UCL	4266		

PROUCL OUTPUT - SUBSURFACE SOIL

Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1496	95% Jackknife UCL	1505
95% Standard Bootstrap UCL	1491	95% Bootstrap-t UCL	1688
95% Hall's Bootstrap UCL	1568	95% Percentile Bootstrap UCL	1519
95% BCA Bootstrap UCL	1640		
90% Chebyshev(Mean, Sd) UCL	1850	95% Chebyshev(Mean, Sd) UCL	2205
97.5% Chebyshev(Mean, Sd) UCL	2697	99% Chebyshev(Mean, Sd) UCL	3665
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	2205		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

Groundwater

PROUCL OUTPUT - GROUNDWATER

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	9/25/2015 3:39:16 PM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Manganese

General Statistics

Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	1
Number of Detects	5	Number of Non-Detects	1
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect	455	Minimum Non-Detect	4
Maximum Detect	2630	Maximum Non-Detect	4
Variance Detects	1094338	Percent Non-Detects	16.67%
Mean Detects	1312	SD Detects	1046
Median Detects	697	CV Detects	0.797
Skewness Detects	0.647	Kurtosis Detects	-2.884
Mean of Logged Detects	6.903	SD of Logged Detects	0.834

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.795	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.322	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	1094	Standard Error of Mean	448.9
SD	983.5	95% KM (BCA) UCL	1801
95% KM (t) UCL	1999	95% KM (Percentile Bootstrap) UCL	1801
95% KM (z) UCL	1833	95% KM Bootstrap t UCL	3613
90% KM Chebyshev UCL	2441	95% KM Chebyshev UCL	3051
97.5% KM Chebyshev UCL	3898	99% KM Chebyshev UCL	5561

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.579	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.685	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.309	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.361	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

PROUCL OUTPUT - GROUNDWATER

Gamma Statistics on Detected Data Only			
k hat (MLE)	1.961	k star (bias corrected MLE)	0.918
Theta hat (MLE)	669	Theta star (bias corrected MLE)	1430
nu hat (MLE)	19.61	nu star (bias corrected)	9.178
MLE Mean (bias corrected)	1312	MLE Sd (bias corrected)	1370
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	1.238	nu hat (KM)	14.85
Approximate Chi Square Value (14.85, α)	7.159	Adjusted Chi Square Value (14.85, β)	5.348
95% Gamma Approximate KM-UCL (use when n>=50)	2270	95% Gamma Adjusted KM-UCL (use when n<50)	3039
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	1094
Maximum	2630	Median	608
SD	1078	CV	0.986
k hat (MLE)	0.336	k star (bias corrected MLE)	0.279
Theta hat (MLE)	3251	Theta star (bias corrected MLE)	3915
nu hat (MLE)	4.037	nu star (bias corrected)	3.352
MLE Mean (bias corrected)	1094	MLE Sd (bias corrected)	2069
		Adjusted Level of Significance (β)	0.0122
Approximate Chi Square Value (3.35, α)	0.484	Adjusted Chi Square Value (3.35, β)	0.221
95% Gamma Approximate UCL (use when n>=50)	7575	95% Gamma Adjusted UCL (use when n<50)	16558
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.832	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.266	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.396	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	1115	Mean in Log Scale	6.559
SD in Original Scale	1053	SD in Log Scale	1.125
95% t UCL (assumes normality of ROS data)	1981	95% Percentile Bootstrap UCL	1822
95% BCA Bootstrap UCL	1862	95% Bootstrap t UCL	4540
95% H-UCL (Log ROS)	13218		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	5.984	95% H-UCL (KM -Log)	12982205
KM SD (logged)	2.166	95% Critical H Value (KM-Log)	8.311
KM Standard Error of Mean (logged)	0.989		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1094	Mean in Log Scale	5.868
SD in Original Scale	1078	SD in Log Scale	2.643
95% t UCL (Assumes normality)	1980	95% H-Stat UCL	1.722E+9

PROUCL OUTPUT - GROUNDWATER

DL/2 is not a recommended method, provided for comparisons and historical reasons							
Nonparametric Distribution Free UCL Statistics							
Detected Data appear Normal Distributed at 5% Significance Level							
Suggested UCL to Use							
95% KM (t) UCL	1999	95% KM (Percentile Bootstrap) UCL					1801
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
Recommendations are based upon data size, data distribution, and skewness.							
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							

APPENDIX C.5

LEAD MODELING RESULTS

Adult Lead Model Results

SITE NAME: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
LOCATION: OU8
RECEPTOR: CONSTRUCTION WORKERS
MEDIA: SUBSURFACE SOIL
DATE: SEPTEMBER 29, 2015

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee
Version date 6/21/09

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004
PbS	Soil lead concentration	ug/g or ppm	2210
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4
GSD_i	Geometric standard deviation PbB	--	1.8
PbB_0	Baseline PbB	ug/dL	1.0
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.165
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--
K_{SD}	Mass fraction of soil in dust	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	75
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**4.6**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	10.9
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**6.7%**

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

APPENDIX C.6

1998 GROUNDWATER ANALYTICAL RESULTS AND SUMMARY STATISTICS

TABLE C.6.1
1998 GROUNDWATER RESULTS
OU8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	**WTB-MW02**	**WTB-MW03**	**WTB-MW04**	**WTB-MW05**
SAMPLE ID	**WTB-MW-02-11**	**WTB-MW-03-11**	**WTB-MW-04-11**	**WTB-MW-05-11**
SAMPLE DATE	**19980802**	**19980803**	**19980803**	**19980802**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
MATRIX	**GW**	**GW**	**GW**	**GW**
DISSOLVED METALS (UG/L)				
ALUMINUM	--	--	47 U	--
ANTIMONY	--	--	2.1 U	--
ARSENIC	--	--	4.5 U	--
BARIUM	--	--	109 J	--
BERYLLIUM	--	--	0.17 UJ	--
CADMIUM	--	--	2.3 U	--
CALCIUM	--	--	44000 U	--
CHROMIUM	--	--	3.4 U	--
COBALT	--	--	2.7 U	--
COPPER	--	--	2.2 U	--
IRON	--	--	82.7 U	--
LEAD	--	--	1.4 J	--
MAGNESIUM	--	--	7290 U	--
MANGANESE	--	--	664 J	--
MERCURY	--	--	0.01 UJ	--
NICKEL	--	--	5.8 U	--
POTASSIUM	--	--	6440	--
SELENIUM	--	--	3.2 U	--
SILVER	--	--	2.7 U	--
SODIUM	--	--	110000	--
THALLIUM	--	--	3.2 UJ	--
VANADIUM	--	--	3.2 U	--
ZINC	--	--	4.2 U	--
METALS (UG/L)				
ALUMINUM	65.9 U	202 U	1300 U	72.6 U
ANTIMONY	19.8 U	2.6 U	2 U	19.8 U
ARSENIC	42.5 J	5.6 U	6.7 U	48.6 J
BARIUM	90.8 J	25.3 U	120 J	279 J
BERYLLIUM	0.69 U	0.25 U	0.24 U	0.85 U
CADMIUM	2.3 U	2.3 U	2.3 U	2.5 U
CALCIUM	195000	28800	40400	291000 U
CHROMIUM	3.4 U	12.5 U	11.9 U	4.1 U
COBALT	2.7 U	2.7 U	3.1 U	2.7 U
COPPER	51.1 U	2.6 U	38.2 U	1.8 U
IRON	266 U	589 U	4600 J	5000 J
LEAD	64.7 U	7.6 U	35.7 J	13.1 UJ
MAGNESIUM	495000	7970	7460 U	971000
MANGANESE	0.59 UJ	459 J	600 J	1190 J
MERCURY	0.12 J	0.01 UJ	0.45 J	0.01 UJ
NICKEL	18.4 U	17.4 U	19.2 U	37.1 U
POTASSIUM	158000	6200	6340	334000
SELENIUM	31.9 U	3.2 U	3.2 U	31.9 U
SILVER	2.7 U	2.7 U	2.7 U	2.7 U
SODIUM	3780000	98800	104000	7470000
THALLIUM	48.4 J	3.2 UJ	3.2 U	32.2 UJ
VANADIUM	3.2 U	3.2 U	3.7 U	3.2 U
ZINC	178 U	14.1 U	49.6 U	2.9 UJ
MISCELLANEOUS PARAMETERS (MG/L)				
BROMIDE	23	2 U	2 U	46
CARBONATE ALKALINITY	140	110	140	350
CHLORIDE	--	85 J	110 J	--
HEXAVALENT CHROMIUM	0.01 U	0.01 UJ	0.012	0.01 U
NITRATE	0.12	0.05 U	0.05 UJ	0.05 UJ
SULFATE	1000	10	2.1	1800
TOTAL ORGANIC CARBON	2.4	2.2	4.1	5.1
MISCELLANEOUS PARAMETERS (PPT)				
SALINITY	11	0.23	0.33	26
MISCELLANEOUS PARAMETERS (S.U.)				
PH	7	7.5	7.4	7.5
MISCELLANEOUS PARAMETERS (UG/L)				
CYANIDE	20 U	20 U	20 U	20 U

TABLE C.6.1
1998 GROUNDWATER RESULTS
OU8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-MW02	WTB-MW03	WTB-MW04	WTB-MW05
SAMPLE ID	WTB-MW-02-11	WTB-MW-03-11	WTB-MW-04-11	WTB-MW-05-11
SAMPLE DATE	19980802	19980803	19980803	19980802
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	GW	GW	GW	GW
PESTICIDES/PCBS (UG/L)				
4,4'-DDD	0.1 U	0.23 U	0.11 U	0.12 U
4,4'-DDE	0.1 U	0.23 U	0.11 U	0.12 U
4,4'-DDT	0.1 U	0.23 U	0.11 U	0.12 U
ALDRIN	0.052 U	0.12 U	0.054 U	0.058 U
ALPHA-BHC	0.052 U	0.12 U	0.054 U	0.058 U
ALPHA-CHLORDANE	0.052 U	0.12 U	0.054 U	0.058 U
AROCLOR-1016	1 U	2.3 U	1.1 U	1.2 U
AROCLOR-1221	2.1 U	4.7 U	2.2 U	2.3 U
AROCLOR-1232	1 U	2.3 U	1.1 U	1.2 U
AROCLOR-1242	1 U	2.3 U	1.1 U	1.2 U
AROCLOR-1248	1 U	2.3 U	1.1 U	1.2 U
AROCLOR-1254	1 U	2.3 U	1.1 U	1.2 U
AROCLOR-1260	1 U	2.3 U	1.1 U	1.2 U
BETA-BHC	0.052 U	0.12 U	0.054 U	0.058 U
DELTA-BHC	0.052 U	0.12 U	0.054 U	0.058 U
DIELDRIN	0.1 U	0.23 U	0.11 U	0.12 U
ENDOSULFAN I	0.052 U	0.12 U	0.054 U	0.058 U
ENDOSULFAN II	0.1 U	0.23 U	0.11 U	0.12 U
ENDOSULFAN SULFATE	0.1 U	0.23 U	0.11 U	0.12 U
ENDRIN	0.1 U	0.23 U	0.11 U	0.12 U
ENDRIN ALDEHYDE	0.1 U	0.23 U	0.11 U	0.12 U
ENDRIN KETONE	0.1 U	0.23 U	0.11 U	0.12 U
GAMMA-BHC (LINDANE)	0.052 U	0.12 U	0.054 U	0.058 U
GAMMA-CHLORDANE	0.052 U	0.12 U	0.054 U	0.058 U
HEPTACHLOR	0.052 U	0.12 U	0.054 U	0.058 U
HEPTACHLOR EPOXIDE	0.052 U	0.12 U	0.054 U	0.058 U
METHOXYCHLOR	0.52 U	1.2 U	0.54 U	0.58 U
TOXAPHENE	5.2 U	12 U	5.4 U	5.8 U
PETROLEUM HYDROCARBONS (UG/L)				
DIESEL RANGE ORGANICS	62	210	190	170
GASOLINE RANGE ORGANICS	10 U	10 U	10 U	10 U
POLYCYCLIC AROMATIC HYDROCARBONS (UG/L)				
ACENAPHTHENE	11 U	11 U	11 U	11 U
ACENAPHTHYLENE	11 U	11 U	11 U	11 U
ANTHRACENE	11 U	11 U	11 U	11 U
BENZO(A)ANTHRACENE	11 U	11 U	11 U	11 U
BENZO(A)PYRENE	11 U	11 U	11 U	11 U
BENZO(B)FLUORANTHENE	11 U	11 U	11 U	11 U
BENZO(G,H,I)PERYLENE	11 U	11 U	11 U	11 U
BENZO(K)FLUORANTHENE	11 U	11 U	11 U	11 U
CHRYSENE	--	--	--	--
DIBENZO(A,H)ANTHRACENE	11 U	11 U	11 U	11 U
DIBENZOFURAN	11 U	11 U	11 U	11 U
FLUORANTHENE	11 U	11 U	11 U	11 U
FLUORENE	11 U	11 U	11 U	11 U
INDENO(1,2,3-CD)PYRENE	11 U	11 U	11 U	11 U
NAPHTHALENE	11 U	11 U	11 U	11 U
PHENANTHRENE	11 U	11 U	11 U	11 U
PYRENE	11 UJ	11 UJ	11 UJ	11 UJ
SEMIVOLATILES (UG/L)				
1,2,4-TRICHLOROBENZENE	11 UJ	11 UJ	11 UJ	11 UJ
1,2-DICHLOROBENZENE	11 U	11 U	11 U	11 U
1,3-DICHLOROBENZENE	11 U	11 U	11 U	11 U
1,4-DICHLOROBENZENE	11 U	11 U	11 U	11 U
2,2'-OXYBIS(1-CHLOROPROPANE)	11 U	11 U	11 U	11 U
2,4,5-TRICHLOROPHENOL	28 U	28 U	28 U	28 U
2,4,6-TRICHLOROPHENOL	11 U	11 U	11 U	11 U
2,4-DICHLOROPHENOL	11 U	11 U	11 U	11 U
2,4-DIMETHYLPHENOL	11 U	11 U	11 U	11 U
2,4-DINITROPHENOL	28 UJ	28 UJ	28 UJ	28 UJ
2,4-DINITROTOLUENE	11 U	11 U	11 U	11 U
2,6-DINITROTOLUENE	11 U	11 U	11 U	11 U
2-CHLORONAPHTHALENE	11 U	11 U	11 U	11 U
2-CHLOROPHENOL	11 U	11 U	11 U	11 U

TABLE C.6.1
1998 GROUNDWATER RESULTS
OU8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	WTB-MW02	WTB-MW03	WTB-MW04	WTB-MW05
SAMPLE ID	WTB-MW-02-11	WTB-MW-03-11	WTB-MW-04-11	WTB-MW-05-11
SAMPLE DATE	19980802	19980803	19980803	19980802
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	GW	GW	GW	GW
SEMIVOLATILES (UG/L) (CONTINUED)				
2-METHYLNAPHTHALENE	11 U	11 U	11 U	11 U
2-METHYLPHENOL	11 U	11 U	11 U	11 U
2-NITROANILINE	28 U	28 U	28 U	28 U
2-NITROPHENOL	11 U	11 U	11 U	11 U
3,3'-DICHLOROBENZIDINE	11 U	11 U	11 U	11 U
3-NITROANILINE	28 U	28 U	28 U	28 U
4,6-DINITRO-2-METHYLPHENOL	28 U	28 U	28 U	28 U
4-BROMOPHENYL PHENYL ETHER	11 U	11 U	11 U	11 U
4-CHLORO-3-METHYLPHENOL	11 U	11 U	11 U	11 U
4-CHLOROANILINE	11 U	11 U	11 U	11 U
4-CHLOROPHENYL PHENYL ETHER	11 U	11 U	11 U	11 U
4-METHYLPHENOL	11 U	11 U	11 U	11 U
4-NITROANILINE	28 U	28 U	28 U	28 U
4-NITROPHENOL	28 U	28 U	28 U	28 U
BIS(2-CHLOROETHOXY)METHANE	11 U	11 U	11 U	11 U
BIS(2-CHLOROETHYL)ETHER	11 U	11 U	11 U	11 U
BIS(2-ETHYLHEXYL)PHTHALATE	11 U	11 U	11 U	11 U
BUTYL BENZYL PHTHALATE	11 U	11 U	1 J	11 U
CARBAZOLE	11 U	11 U	11 U	11 U
CHRYSENE	11 U	11 U	11 U	11 U
DIETHYL PHTHALATE	11 U	11 U	11 U	11 U
DIMETHYL PHTHALATE	11 U	11 U	11 U	11 U
DI-N-BUTYL PHTHALATE	11 U	11 U	11 U	11 U
DI-N-OCTYL PHTHALATE	11 U	11 U	11 U	11 U
HEXACHLOROBENZENE	11 U	11 U	11 U	11 U
HEXACHLOROBUTADIENE	11 U	11 U	11 U	11 U
HEXACHLOROCYCLOPENTADIENE	11 UJ	11 UJ	11 UJ	11 UJ
HEXACHLOROETHANE	11 U	11 U	11 U	11 U
ISOPHORONE	11 U	11 U	11 U	11 U
NITROBENZENE	11 U	11 U	11 U	11 U
N-NITROSO-DI-N-PROPYLAMINE	11 U	11 U	11 U	11 U
N-NITROSODIPHENYLAMINE	11 U	11 U	11 U	11 U
PENTACHLOROPHENOL	28 UJ	28 UJ	28 UJ	28 UJ
PHENOL	11 U	11 U	11 U	11 U
VOLATILES (UG/L)				
1,1,1-TRICHLOROETHANE	10 U	10 U	10 U	10 U
1,1,2,2-TETRACHLOROETHANE	10 U	10 U	10 U	10 U
1,1,2-TRICHLOROETHANE	10 U	10 U	10 U	10 U
1,1,2-TRICHLOROTRIFLUOROETHANE	10 U	10 U	10 U	10 U
1,1-DICHLOROETHANE	10 U	10 U	10 U	10 U
1,1-DICHLOROETHENE	10 U	10 U	10 U	10 U
1,2-DICHLOROETHANE	10 U	10 U	10 U	10 U
1,2-DICHLOROPROPANE	10 U	10 U	10 U	10 U
2-BUTANONE	10 U	10 U	10 U	10 U
2-HEXANONE	10 U	10 U	2 J	10 U
4-METHYL-2-PENTANONE	10 U	10 U	10 U	10 U
ACETONE	18 U	10 U	10 U	10 U
BENZENE	10 U	10 U	10 U	10 U
BROMODICHLOROMETHANE	10 U	10 U	10 U	10 U
BROMOFORM	10 U	10 U	10 U	10 U
BROMOMETHANE	10 U	10 U	10 U	10 U
CARBON DISULFIDE	10 U	10 U	10 U	10 U
CARBON TETRACHLORIDE	10 U	10 U	10 U	10 U
CHLOROBENZENE	10 U	10 U	10 U	10 U
CHLORODIBROMOMETHANE	10 U	10 U	10 U	10 U
CHLOROETHANE	10 U	10 U	10 U	10 U
CHLOROFORM	10 U	10 U	10 U	10 U
CHLOROMETHANE	10 U	10 U	10 UJ	10 U
CIS-1,3-DICHLOROPROPENE	10 U	10 U	10 U	10 U
ETHYLBENZENE	10 U	10 U	10 U	10 U
METHYLENE CHLORIDE	10 U	10 U	10 U	10 U
STYRENE	10 U	10 U	10 U	10 U
TETRACHLOROETHENE	10 U	10 U	10 U	10 U
TOLUENE	10 U	10 U	10 U	10 U

TABLE C.6.1
1998 GROUNDWATER RESULTS
OU8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	**WTB-MW02**	**WTB-MW03**	**WTB-MW04**	**WTB-MW05**
SAMPLE ID	**WTB-MW-02-11**	**WTB-MW-03-11**	**WTB-MW-04-11**	**WTB-MW-05-11**
SAMPLE DATE	**19980802**	**19980803**	**19980803**	**19980802**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
MATRIX	**GW**	**GW**	**GW**	**GW**
VOLATILES (UG/L) (CONTINUED)				
TOTAL 1,2-DICHLOROETHENE	10 U	10 U	10 U	10 U
TOTAL XYLENES	10 U	10 U	10 U	10 U
TRANS-1,3-DICHLOROPROPENE	10 U	10 U	10 U	10 U
TRICHLOROETHENE	10 U	10 U	10 U	10 U
VINYL CHLORIDE	10 U	10 U	10 UJ	10 U

J = Estimated
U = Non-detect
UJ = Non-detected value is estimated

TABLE C.6.2
SUMMARY STATISTICS FOR CHEMICALS DETECTED IN 1998 GROUNDWATER
OU8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Chemical	PNS-specific Screening Level for Construction Workers[1]	Summary Statistics						
		Frequency of Detection		Minimum Non Detected	Maximum Non Detected	Minimum Detected	Maximum Detected	Sample of Maximum Detected
		Number	Percent					
DISSOLVED METALS (UG/L)								
BARIUM	35700 N	1/1	100%	-	-	109 J	109 J	WTB-MW-04-11
LEAD	1340	1/1	100%	-	-	1.4 J	1.4 J	WTB-MW-04-11
MANGANESE	2550 N	1/1	100%	-	-	664 J	664 J	WTB-MW-04-11
POTASSIUM	NA	1/1	100%	-	-	6440	6440	WTB-MW-04-11
SODIUM	NA	1/1	100%	-	-	110000	110000	WTB-MW-04-11
METALS (UG/L)								
ARSENIC	345 N	2/4	50%	5.6	6.7	42.5 J	48.6 J	WTB-MW-05-11
BARIUM	35700 N	3/4	75%	25.3	25.3	90.8 J	279 J	WTB-MW-05-11
CALCIUM	NA	3/4	75%	291000	291000	28800	195000	WTB-MW-02-11
IRON	804000 N	2/4	50%	266	589	4600 J	5000 J	WTB-MW-05-11
LEAD	1340	1/4	25%	7.6	64.7	35.7 J	35.7 J	WTB-MW-04-11
MAGNESIUM	NA	3/4	75%	7460	7460	7970	971000	WTB-MW-05-11
MANGANESE	2550 N	3/4	75%	0.59	0.59	459 J	1190 J	WTB-MW-05-11
MERCURY	357 N[2]	2/4	50%	0.01	0.01	0.12 J	0.45 J	WTB-MW-04-11
POTASSIUM	NA	4/4	100%	-	-	6200	334000	WTB-MW-05-11
SODIUM	NA	4/4	100%	-	-	98800	7470000	WTB-MW-05-11
THALLIUM	**46 N**	1/4	25%	3.2	32.2	48.4 J	48.4 J	WTB-MW-02-11
MISCELLANEOUS PARAMETERS (MG/L)								
BROMIDE	NA	2/4	50%	2	2	23	46	WTB-MW-05-11
CARBONATE ALKALINITY	NA	4/4	100%	-	-	110	350	WTB-MW-05-11
CHLORIDE	NA	2/2	100%	-	-	85 J	110 J	WTB-MW-04-11
HEXAVALENT CHROMIUM	1.14 C	1/4	25%	0.01	0.01	0.012	0.012	WTB-MW-04-11
NITRATE	3110 N	1/4	25%	0.05	0.05	0.12	0.12	WTB-MW-02-11
SULFATE	NA	4/4	100%	-	-	2.1	1800	WTB-MW-05-11
TOTAL ORGANIC CARBON	NA	4/4	100%	-	-	2.2	5.1	WTB-MW-05-11
MISCELLANEOUS PARAMETERS (PPT)								
SALINITY	NA	4/4	100%	-	-	0.23	26	WTB-MW-05-11
MISCELLANEOUS PARAMETERS (S.U.)								
PH	NA	4/4	100%	-	-	7	7.5	WTB-MW-03-11, WTB-MW-05-11
PETROLEUM HYDROCARBONS (UG/L)								
DIESEL RANGE ORGANICS	NA	4/4	100%	-	-	62	210	WTB-MW-03-11
SEMIVOLATILES (UG/L)								
BUTYL BENZYL PHTHALATE	5780 C	1/4	25%	11	11	1 J	1 J	WTB-MW-04-11
VOLATILES (UG/L)								
2-HEXANONE	2220 N	1/4	25%	10	10	2 J	2 J	WTB-MW-04-11

Footnotes:
1 - PNS-specific screening levels for construction worker exposure (ingestion and dermal contact) to groundwater that were calculated using the methodology provided in Appendix A.4 of the SAP (Tetra Tech, 2015). The values shown are based on a target hazard quotient of 0.1 for non-carcinogens (N) and an ILCR of $1x10^{-6}$ for carcinogens (C).
2 - Criteria are for mercuric chloride.
Shaded criterion and chemical name indicates that the maximum detected concentration exceeds the screening criterion.
J = Estimated

Associated Samples:
WTB-MW-02-11
WTB-MW-03-11
WTB-MW-04-11
WTB-MW-05-11

APPENDIX C.7

DEEP SUBSURFACE SOIL ANALYTICAL RESULTS AND SUMMARY STATISTICS

TABLE C.7.1
SUBSURFACE SOIL RESULTS GREATER THAN 10 FEET BGS
OU8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	**WTB-MW02**	**WTB-MW03**	**WTB-MW05**	**WTB-SB06**	**WTB-SB06**	**WTB-SB06**	**WTB-SB07**
SAMPLE ID	**WTB-SB02-1517-98**	**WTB-SB03-1820-98**	**WTB-SB05-1315-98**	**WTB-SB06-1820-98**	**WTB-SB06-1820-98-AVG**	**WTB-SB06-1820-98-D**	**WTB-SB07-1315-98**
SAMPLE DATE	**19980708**	**19980711**	**19980707**	**19980715**	**19980715**	**19980715**	**19980711**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**AVG**	**DUP**	**NORMAL**
TOP DEPTH	**15**	**18**	**13**	**18**	**18**	**18**	**13**
BOTTOM DEPTH	**17**	**20**	**15**	**20**	**20**	**20**	**15**
METALS (MG/KG)							
ALUMINUM	13500	22100	15400	19400	18900	18400	14700
ANTIMONY	0.52 UR	0.41 UR	0.53 UR	0.44 UJ	0.4 U	0.36 UJ	0.83 U
ARSENIC	9.7 J	8 J	30.9 J	8.2	8.35	8.5	8.3 J
BARIUM	81 J	78.1	148 J	74.6	72.85	71.1	55.9
BERYLLIUM	0.76	1.6	0.87 J	1.4	1.35	1.3	0.98
CADMIUM	0.61 U	0.53 U	0.61 U	0.9 J	0.845	0.79 J	1.1 U
CALCIUM	2670 J	2490 J	8790 J	1790	1785	1780	4900 J
CHROMIUM	36.5 J	40.3 J	52.8 J	40.5	39.65	38.8	66.6 J
COBALT	5.6	14	7.1	11.4	11.55	11.7	9.4
COPPER	127 J	29.4 J	4090 J	39.5 J	33.75	28 J	91.8 J
IRON	26200	34000	31400	34900	33900	32900	28900
LEAD	413	17.9 U	1020	33.2 J	27.2	21.2 J	278 J
MAGNESIUM	6210	8510	8820	8190	8145	8100	6940
MANGANESE	193	325 J	362	366	359	352	224 J
MERCURY	0.39 J	0.01 U	2.4 J	0.02 U	0.04 U	0.06 U	4.6 J
NICKEL	19.1 J	28.4 J	24.8 J	27.8	27.85	27.9	22.7 U
POTASSIUM	3710	8350	4610	7390	7295	7200	4300
SELENIUM	1.1 U	0.65 UJ	0.86 UJ	0.71 U	0.645 U	0.58 U	1.2 UJ
SILVER	0.71 U	0.54 U	1.2 J	0.17 U	0.155 U	0.14 U	0.96 U
SODIUM	3690	1360	6750	2140	2115	2090	5720
THALLIUM	0.86 U	0.66 U	0.86 U	0.72 UJ	0.825 U	0.93 U	1.2 U
VANADIUM	37.8	55.6	46.4	50.3 J	49.95	49.6 J	43.9
ZINC	261 J	91.7 J	317 J	117 J	104.35	91.7 J	155 J
MISCELLANEOUS PARAMETERS (MG/KG)							
CYANIDE	2 U	2 UJ	2 U	2 U	2 U	2 U	2 UJ
HEXAVALENT CHROMIUM	2 UJ	0.64 UJ	1 UJ	0.55 UJ	0.56 U	0.57 UJ	1.9 UJ
TOTAL ORGANIC CARBON	--	7900	33000	4600	3900	3200	51000
MISCELLANEOUS PARAMETERS (S.U.)							
PH	8.2	8.7	8.8	8.4	8.35	8.3	8.2
PESTICIDES/PCBS (UG/KG)							
4,4'-DDD	4.9 U	4.9 U	5 U	4.1 U	4.1 U	4.1 U	6.1 U
4,4'-DDE	4.9 U	4.9 U	5 U	4.1 U	4.1 U	4.1 U	6.1 U
4,4'-DDT	4.9 U	4.9 U	5 U	4.1 U	4.1 U	4.1 U	6.1 U
ALDRIN	2.5 U	2.5 U	2.6 U	2.1 U	2.1 U	2.1 U	3.1 U
ALPHA-BHC	2.5 U	2.5 U	2.6 U	2.1 U	2.1 U	2.1 U	3.1 U
ALPHA-CHLORDANE	2.5 U	2.5 U	2.6 U	2.1 U	2.1 U	2.1 U	3.1 U
AROCLOR-1016	49 U	49 U	50 U	41 U	41 U	41 U	61 U
AROCLOR-1221	100 U	100 U	100 U	82 U	83 U	84 U	120 U
AROCLOR-1232	49 U	49 U	50 U	41 U	41 U	41 U	61 U
AROCLOR-1242	49 U	49 U	50 U	41 U	41 U	41 U	61 U
AROCLOR-1248	49 U	49 U	50 U	41 U	41 U	41 U	61 U
AROCLOR-1254	49 U	49 U	50 U	41 U	41 U	41 U	61 U
AROCLOR-1260	49 U	49 U	50 U	41 U	41 U	41 U	61 U
BETA-BHC	2.5 U	2.5 U	2.6 U	2.1 U	2.1 U	2.1 U	3.1 U

TABLE C.7.1
SUBSURFACE SOIL RESULTS GREATER THAN 10 FEET BGS
OU8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	**WTB-MW02**	**WTB-MW03**	**WTB-MW05**	**WTB-SB06**	**WTB-SB06**	**WTB-SB06**	**WTB-SB07**
SAMPLE ID	**WTB-SB02-1517-98**	**WTB-SB03-1820-98**	**WTB-SB05-1315-98**	**WTB-SB06-1820-98**	**WTB-SB06-1820-98-AVG**	**WTB-SB06-1820-98-D**	**WTB-SB07-1315-98**
SAMPLE DATE	**19980708**	**19980711**	**19980707**	**19980715**	**19980715**	**19980715**	**19980711**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**AVG**	**DUP**	**NORMAL**
TOP DEPTH	**15**	**18**	**13**	**18**	**18**	**18**	**13**
BOTTOM DEPTH	**17**	**20**	**15**	**20**	**20**	**20**	**15**
PESTICIDES/PCBS (UG/KG) (CONTINUED)							
DELTA-BHC	2.5 U	2.5 U	2.6 U	2.1 U	2.1 U	2.1 U	3.1 U
DIELDRIN	4.9 U	4.9 U	5 U	4.1 U	4.1 U	4.1 U	6.1 U
ENDOSULFAN I	2.5 U	2.5 U	2.6 U	2.1 U	2.1 U	2.1 U	3.1 U
ENDOSULFAN II	4.9 U	4.9 U	5 U	4.1 U	4.1 U	4.1 U	6.1 U
ENDOSULFAN SULFATE	4.9 U	4.9 U	5 U	4.1 U	4.1 U	4.1 U	6.1 U
ENDRIN	4.9 U	4.9 U	5 U	4.1 U	4.1 U	4.1 U	6.1 U
ENDRIN ALDEHYDE	4.9 U	4.9 U	5 U	4.1 U	4.1 U	4.1 U	6.1 U
ENDRIN KETONE	54	4.9 U	5 U	4.1 U	4.1 U	4.1 U	6.1 U
GAMMA-BHC (LINDANE)	2.5 UJ	2.5 U	2.6 UJ	2.1 U	2.1 U	2.1 U	3.1 U
GAMMA-CHLORDANE	2.5 U	2.5 U	2.6 U	2.1 U	2.1 U	2.1 U	3.1 U
HEPTACHLOR	2.5 U	2.5 U	2.6 U	2.1 U	2.1 U	2.1 U	3.1 U
HEPTACHLOR EPOXIDE	2.5 U	2.5 U	2.6 U	2.1 U	2.1 U	2.1 U	3.1 U
METHOXYCHLOR	25 U	25 U	26 U	21 U	21 U	21 U	31 U
TOXAPHENE	250 U	250 U	260 U	210 U	210 U	210 U	310 U
PETROLEUM HYDROCARBONS (MG/KG)							
DIESEL RANGE ORGANICS	1000 J	9.9 U	740 J	11	9.3	7.6	100 U
GASOLINE RANGE ORGANICS	4.3	3 U	4.2	3 U	3 U	3 U	5.3 U
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)							
ACENAPHTHENE	3800	430 U	500 U	430 U	430 U	430 U	52 J
ACENAPHTHYLENE	2500 U	430 U	500 U	430 U	430 U	430 U	34 J
ANTHRACENE	8900	41 J	500 U	430 U	430 U	430 U	88 J
BENZO(A)ANTHRACENE	10000	180 J	66 J	430 U	430 U	430 U	390 J
BENZO(A)PYRENE	8600	180 J	65 J	430 U	430 U	430 U	290 J
BENZO(B)FLUORANTHENE	9800	180 J	65 J	430 U	430 U	430 U	390 J
BENZO(G,H,I)PERYLENE	2500 UJ	120 J	34 J	430 U	430 U	430 U	200 J
BENZO(K)FLUORANTHENE	5300	150 J	54 J	430 U	430 U	430 U	220 J
CHRYSENE	11000	200 J	59 J	430 U	430 U	430 U	390 J
DIBENZO(A,H)ANTHRACENE	1600 J	44 J	26 J	430 U	430 U	430 U	89 J
DIBENZOFURAN	3200	430 U	500 U	430 U	430 U	430 U	48 J
FLUORANTHENE	30000	270 J	120 J	23 J	23 J	430 U	650
FLUORENE	4100	30 J	500 U	430 U	430 U	430 U	75 J
INDENO(1,2,3-CD)PYRENE	4200 J	100 J	41 J	21 J	21 J	430 U	170 J
NAPHTHALENE	1600 J	23 J	500 U	430 U	430 U	430 U	96 J
PHENANTHRENE	26000	150 J	66 J	430 U	430 U	430 U	330 J
PYRENE	18000	320 J	130 J	24 J	24 J	430 U	610 J
BAP EQUIVALENT-HALFND	12664	271.7	108.799	477.465	346.2325	430 U	476.59
BAP EQUIVALENT-POS	12664	271.7	108.799	2.1	2.1	430 U	476.59
SEMIVOLATILES (UG/KG)							
1,2,4-TRICHLOROBENZENE	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
1,2-DICHLOROBENZENE	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
1,3-DICHLOROBENZENE	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
1,4-DICHLOROBENZENE	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
2,2'-OXYBIS(1-CHLOROPROPANE)	2500 U	430 UJ	500 U	430 U	430 U	430 U	590 U
2,4,5-TRICHLOROPHENOL	6300 U	1100 U	1200 U	1100 U	1100 U	1100 U	1500 U
2,4,6-TRICHLOROPHENOL	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
2,4-DICHLOROPHENOL	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
2,4-DIMETHYLPHENOL	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
2,4-DINITROPHENOL	6300 UJ	1100 UJ	1200 UJ	1100 UJ	1100 U	1100 UJ	1500 U
2,4-DINITROTOLUENE	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
2,6-DINITROTOLUENE	2500 U	430 U	500 U	430 U	430 U	430 U	590 U

TABLE C.7.1
SUBSURFACE SOIL RESULTS GREATER THAN 10 FEET BGS
OU8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	**WTB-MW02**	**WTB-MW03**	**WTB-MW05**	**WTB-SB06**	**WTB-SB06**	**WTB-SB06**	**WTB-SB07**
SAMPLE ID	**WTB-SB02-1517-98**	**WTB-SB03-1820-98**	**WTB-SB05-1315-98**	**WTB-SB06-1820-98**	**WTB-SB06-1820-98-AVG**	**WTB-SB06-1820-98-D**	**WTB-SB07-1315-98**
SAMPLE DATE	**19980708**	**19980711**	**19980707**	**19980715**	**19980715**	**19980715**	**19980711**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**AVG**	**DUP**	**NORMAL**
TOP DEPTH	**15**	**18**	**13**	**18**	**18**	**18**	**13**
BOTTOM DEPTH	**17**	**20**	**15**	**20**	**20**	**20**	**15**
SEMIVOLATILES (UG/KG) (CONTINUED)							
2-CHLORONAPHTHALENE	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
2-CHLOROPHENOL	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
2-METHYLNAPHTHALENE	890 J	430 U	500 U	430 U	430 U	430 U	58 J
2-METHYLPHENOL	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
2-NITROANILINE	6300 U	1100 UJ	1200 U	1100 U	1100 U	1100 U	1500 U
2-NITROPHENOL	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
3,3'-DICHLOROBENZIDINE	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
3-NITROANILINE	6300 U	1100 U	1200 U	1100 U	1100 U	1100 U	1500 U
4,6-DINITRO-2-METHYLPHENOL	6300 U	1100 U	1200 U	1100 U	1100 U	1100 U	1500 U
4-BROMOPHENYL PHENYL ETHER	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
4-CHLORO-3-METHYLPHENOL	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
4-CHLOROANILINE	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
4-CHLOROPHENYL PHENYL ETHER	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
4-METHYLPHENOL	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
4-NITROANILINE	6300 U	1100 UJ	1200 U	1100 U	1100 U	1100 U	1500 U
4-NITROPHENOL	6300 UJ	1100 UJ	1200 UJ	1100 U	1100 U	1100 U	1500 U
BIS(2-CHLOROETHOXY)METHANE	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
BIS(2-CHLOROETHYL)ETHER	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
BIS(2-ETHYLHEXYL)PHTHALATE	2500 U	430 U	550	150 U	150 U	150 U	590 U
BUTYL BENZYL PHTHALATE	2500 U	430 UJ	27 J	26 J	28	30 J	590 U
CARBAZOLE	4000	430 U	500 U	430 U	430 U	430 U	71 J
DIETHYL PHTHALATE	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
DIMETHYL PHTHALATE	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
DI-N-BUTYL PHTHALATE	2500 U	430 U	500 U	430 U	26 J	26 J	590 U
DI-N-OCTYL PHTHALATE	2500 UJ	430 UJ	500 UJ	430 U	430 U	430 U	590 U
HEXACHLOROBENZENE	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
HEXACHLOROBUTADIENE	2500 UJ	430 U	500 UJ	430 U	430 U	430 U	590 U
HEXACHLOROCYCLOPENTADIENE	2500 U	430 U	500 U	430 UJ	430 U	430 UJ	590 U
HEXACHLOROETHANE	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
ISOPHORONE	2500 U	430 UJ	500 U	430 U	430 U	430 U	590 U
NITROBENZENE	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
N-NITROSO-DI-N-PROPYLAMINE	2500 U	430 UJ	500 U	430 U	430 U	430 U	590 U
N-NITROSODIPHENYLAMINE	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
PENTACHLOROPHENOL	6300 U	1100 UJ	1200 U	1100 UJ	1100 U	1100 UJ	1500 UJ
PHENOL	2500 U	430 U	500 U	430 U	430 U	430 U	590 U
VOLATILES (UG/KG)							
1,1,1-TRICHLOROETHANE	15 U	13 UJ	15 U	13 U	13 U	13 U	92 U
1,1,2,2-TETRACHLOROETHANE	15 U	13 UJ	15 UJ	13 U	13 U	13 U	92 U
1,1,2-TRICHLOROETHANE	15 U	13 UJ	15 U	13 U	13 U	13 U	92 U
1,1,2-TRICHLOROTRIFLUOROETHANE	15 U	13 UJ	15 U	13 U	13 U	13 U	92 U
1,1-DICHLOROETHANE	15 U	13 U	15 U	13 U	13 U	13 U	92 U
1,1-DICHLOROETHENE	15 U	13 U	15 U	13 U	13 U	13 U	92 U
1,2-DICHLOROETHANE	15 U	13 U	15 U	13 U	13 U	13 U	92 U
1,2-DICHLOROPROPANE	15 U	13 U	15 U	13 U	13 U	13 U	92 U
2-BUTANONE	16 U	13 U	13	13 U	13 U	13 U	92 U
2-HEXANONE	15 U	13 UJ	15 UJ	13 U	13 U	13 U	92 U
4-METHYL-2-PENTANONE	15 U	13 UJ	15 UJ	13 U	13 U	13 U	92 U
ACETONE	290	600 U	230	120	150	180	5600 U
BENZENE	15 U	13 UJ	15 U	13 U	13 U	13 U	92 U
BROMODICHLOROMETHANE	15 U	13 UJ	15 U	13 U	13 U	13 U	92 U

TABLE C.7.1
SUBSURFACE SOIL RESULTS GREATER THAN 10 FEET BGS
OU8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

LOCATION	**WTB-MW02**	**WTB-MW03**	**WTB-MW05**	**WTB-SB06**	**WTB-SB06**	**WTB-SB06**	**WTB-SB07**
SAMPLE ID	**WTB-SB02-1517-98**	**WTB-SB03-1820-98**	**WTB-SB05-1315-98**	**WTB-SB06-1820-98**	**WTB-SB06-1820-98-AVG**	**WTB-SB06-1820-98-D**	**WTB-SB07-1315-98**
SAMPLE DATE	**19980708**	**19980711**	**19980707**	**19980715**	**19980715**	**19980715**	**19980711**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**AVG**	**DUP**	**NORMAL**
TOP DEPTH	**15**	**18**	**13**	**18**	**18**	**18**	**13**
BOTTOM DEPTH	**17**	**20**	**15**	**20**	**20**	**20**	**15**
VOLATILES (UG/KG) (CONTINUED)							
BROMOFORM	15 U	13 UJ	15 U	13 U	13 U	13 U	92 U
BROMOMETHANE	15 U	13 U	15 U	13 U	13 U	13 U	92 U
CARBON DISULFIDE	35 U	4 J	4 J	11 J	8.5	6 J	20 J
CARBON TETRACHLORIDE	15 U	13 UJ	15 U	13 U	13 U	13 U	92 U
CHLOROBENZENE	15 U	13 UJ	15 UJ	13 U	13 U	13 U	92 U
CHLORODIBROMOMETHANE	15 U	13 UJ	15 U	13 U	13 U	13 U	92 U
CHLOROETHANE	15 U	13 U	15 U	13 U	13 U	13 U	92 U
CHLOROFORM	15 U	2 J	15 U	13 U	13 U	13 U	92 U
CHLOROMETHANE	15 U	13 U	15 U	13 U	13 U	13 U	92 U
CIS-1,3-DICHLOROPROPENE	15 U	13 UJ	15 U	13 U	13 U	13 U	92 U
ETHYLBENZENE	15 U	13 UJ	15 UJ	13 U	13 U	13 U	92 U
METHYLENE CHLORIDE	46 U	13 U	15 U	25 U	22 U	19 U	920 J
STYRENE	15 U	13 UJ	15 UJ	13 U	13 U	13 U	92 U
TETRACHLOROETHENE	15 U	13 UJ	15 UJ	13 U	13 U	13 U	92 U
TOLUENE	15 J	13 UJ	15 UJ	13 U	13 U	13 U	92 U
TOTAL 1,2-DICHLOROETHENE	15 U	13 U	15 U	13 U	13 U	13 U	92 U
TOTAL XYLENES	2 U	13 UJ	15 UJ	13 U	13 U	13 U	92 U
TRANS-1,3-DICHLOROPROPENE	15 U	13 UJ	15 U	13 U	13 U	13 U	92 U
TRICHLOROETHENE	15 U	13 UJ	25	13 U	13 U	13 U	92 U
VINYL CHLORIDE	15 U	13 U	15 U	13 U	13 U	13 U	92 U

J = Estimated
U = Non-detect
UJ = Non-detected value is estimated
UR = Non-detected value is rejected

TABLE C.7.2
SUMMARY STATISTICS FOR CHEMICALS DETECTED IN SUBSURFACE SOIL GREATER THAN 10 FEET BGS
OU8
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Chemical	USEPA RSL - Residential Soil[1]	Summary Statistics						
		Frequency of Detection		Minimum Non Detected	Maximum Non Detected	Minimum Detected	Maximum Detected	Sample of Maximum Detected
		Number	Percent					
METALS (MG/KG)								
ALUMINUM	**7700 N**	5/5	100%	-	-	13500	22100	WTB-SB03-1820-98
ARSENIC	**0.68 C**	5/5	100%	-	-	8 J	30.9 J	WTB-SB05-1315-98
BARIUM	1500 N	5/5	100%	-	-	55.9	148 J	WTB-SB05-1315-98
BERYLLIUM	16 N	5/5	100%	-	-	0.76	1.6	WTB-SB03-1820-98
CADMIUM	7.1 N	1/5	20%	0.53	1.1	0.79 J	0.9 J	WTB-SB06-1820-98
CALCIUM	NA	5/5	100%	-	-	1780	8790 J	WTB-SB05-1315-98
CHROMIUM	12000 N[2]	5/5	100%	-	-	36.5 J	66.6 J	WTB-SB07-1315-98
COBALT	**2.3 N**	5/5	100%	-	-	5.6	14	WTB-SB03-1820-98
COPPER	**310 N**	5/5	100%	-	-	28 J	4090 J	WTB-SB05-1315-98
IRON	**5500 N**	5/5	100%	-	-	26200	34900	WTB-SB06-1820-98
LEAD	**400**	4/5	80%	17.9	17.9	21.2 J	1020	WTB-SB05-1315-98
MAGNESIUM	NA	5/5	100%	-	-	6210	8820	WTB-SB05-1315-98
MANGANESE	**180 N**	5/5	100%	-	-	193	366	WTB-SB06-1820-98
MERCURY	**2.3 N[3]**	3/5	60%	0.01	0.06	0.39 J	4.6 J	WTB-SB07-1315-98
NICKEL	150 N	4/5	80%	22.7	22.7	19.1 J	28.4 J	WTB-SB03-1820-98
POTASSIUM	NA	5/5	100%	-	-	3710	8350	WTB-SB03-1820-98
SILVER	39 N	1/5	20%	0.14	0.96	1.2 J	1.2 J	WTB-SB05-1315-98
SODIUM	NA	5/5	100%	-	-	1360	6750	WTB-SB05-1315-98
VANADIUM	**39 N**	5/5	100%	-	-	37.8	55.6	WTB-SB03-1820-98
ZINC	2300 N	5/5	100%	-	-	91.7 J	317 J	WTB-SB05-1315-98
MISCELLANEOUS PARAMETERS (MG/KG)								
TOTAL ORGANIC CARBON	NA	4/4	100%	-	-	3200	51000	WTB-SB07-1315-98
MISCELLANEOUS PARAMETERS (S.U.)								
PH	NA	5/5	100%	-	-	8.2	8.8	WTB-SB05-1315-98
PESTICIDES/PCBS (UG/KG)								
ENDRIN KETONE	1900 N[4]	1/5	20%	4.1	6.1	54	54	WTB-SB02-1517-98
PETROLEUM HYDROCARBONS (MG/KG)								
DIESEL RANGE ORGANICS	NA	3/5	60%	9.9	100	7.6	1000 J	WTB-SB02-1517-98
GASOLINE RANGE ORGANICS	NA	2/5	40%	3	5.3	4.2	4.3	WTB-SB02-1517-98
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)								
ACENAPHTHENE	360000 N	2/5	40%	430	500	52 J	3800	WTB-SB02-1517-98
ACENAPHTHYLENE	360000 N[5]	1/5	20%	430	2500	34 J	34 J	WTB-SB07-1315-98
ANTHRACENE	1800000 N	3/5	60%	430	500	41 J	8900	WTB-SB02-1517-98
BENZO(A)ANTHRACENE	**160 C**	4/5	80%	430	430	66 J	10000	WTB-SB02-1517-98
BENZO(A)PYRENE	**16 C**	4/5	80%	430	430	65 J	8600	WTB-SB02-1517-98
BENZO(B)FLUORANTHENE	**160 C**	4/5	80%	430	430	65 J	9800	WTB-SB02-1517-98
BENZO(G,H,I)PERYLENE	180000 N[6]	3/5	60%	430	2500	34 J	200 J	WTB-SB07-1315-98
BENZO(K)FLUORANTHENE	**1600 C**	4/5	80%	430	430	54 J	5300	WTB-SB02-1517-98
CHRYSENE	16000 C	4/5	80%	430	430	59 J	11000	WTB-SB02-1517-98
DIBENZO(A,H)ANTHRACENE	**16 C**	4/5	80%	430	430	26 J	1600 J	WTB-SB02-1517-98
DIBENZOFURAN	7300 N	2/5	40%	430	500	48 J	3200	WTB-SB02-1517-98
FLUORANTHENE	240000 N	5/5	100%	430	430	23 J	30000	WTB-SB02-1517-98
FLUORENE	240000 N	3/5	60%	430	500	30 J	4100	WTB-SB02-1517-98
INDENO(1,2,3-CD)PYRENE	**160 C**	5/5	100%	430	430	21 J	4200 J	WTB-SB02-1517-98
NAPHTHALENE	3800 C	3/5	60%	430	500	23 J	1600 J	WTB-SB02-1517-98
PHENANTHRENE	180000 N[6]	4/5	80%	430	430	66 J	26000	WTB-SB02-1517-98
PYRENE	180000 N	5/5	100%	430	430	24 J	18000	WTB-SB02-1517-98
BAP EQUIVALENT-HALFND	**16 C**	5/5	100%	430	430	108.799	12664	WTB-SB02-1517-98
BAP EQUIVALENT-POS	**16 C**	5/5	100%	430	430	2.1	12664	WTB-SB02-1517-98
SEMIVOLATILES (UG/KG)								
2-METHYLNAPHTHALENE	24000 N	2/5	40%	430	500	58 J	890 J	WTB-SB02-1517-98
BIS(2-ETHYLHEXYL)PHTHALATE	39000 C	1/5	20%	150	2500	550	550	WTB-SB05-1315-98
BUTYL BENZYL PHTHALATE	290000 C	2/5	40%	430	2500	26 J	30 J	WTB-SB06-1820-98-D
CARBAZOLE	NA	2/5	40%	430	500	71 J	4000	WTB-SB02-1517-98
DI-N-BUTYL PHTHALATE	630000 N	1/5	20%	430	2500	26 J	26 J	WTB-SB06-1820-98-D
VOLATILES (UG/KG)								
2-BUTANONE	2700000 N	1/5	20%	13	92	13	13	WTB-SB05-1315-98
ACETONE	6100000 N	3/5	60%	600	5600	120	290	WTB-SB02-1517-98
CARBON DISULFIDE	77000 N	4/5	80%	35	35	4 J	20 J	WTB-SB07-1315-98
CHLOROFORM	320 C	1/5	20%	13	92	2 J	2 J	WTB-SB03-1820-98
METHYLENE CHLORIDE	35000 N	1/5	20%	13	46	920 J	920 J	WTB-SB07-1315-98
TOLUENE	490000 N	1/5	20%	13	92	15 J	15 J	WTB-SB02-1517-98
TRICHLOROETHENE	410 N	1/5	20%	13	92	25	25	WTB-SB05-1315-98

Footnotes:
1 - USEPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites, May 2016. The noncarcinogenic values (denoted with a "N" flag) correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag).
2 - Value for trivalent chromium.
3 - Value for mercuric chloride.
4 - Value for endrin.
5 - Value is for acenaphthene.
6 - Value is for pyrene.
Shaded criterion and chemical name indicates that the maximum detected concentration exceeds the screening criterion.
J = Estimated

Associated Samples:
WTB-SB02-1517-98
WTB-SB03-1820-98
WTB-SB05-1315-98
WTB-SB06-1820-98
WTB-SB06-1820-98-D
WTB-SB07-1315-98

APPENDIX C.8

ADDITIONAL RISK ESTIMATES

Appendix C.8.1

Cumulative Human Health Risks

RAGS Part D Table 3

Medium-Specific Exposure Point Concentration Summary

LIST OF TABLES
RAGS PART D TABLE 3
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Table No.

Reasonable Maximum/Centtral Tendency Exposures

3.1 Surface Soil
3.2 Subsurface Soil
3.3 Groundwater

TABLE 3.1.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
OU8	Benzo(a)pyrene Equivalents	mg/kg	2.2	13 (L)	15	13	mg/kg	99% KM (Chebyshev) UCL	ProUCL 5.0.00
	Aluminum	mg/kg	10100	12000 (N)	18600	12000	mg/kg	95% Student's-t UCL	ProUCL 5.0.00
	Antimony	mg/kg	0.59	1.0 (G)	3.2 J	1.0	mg/kg	95% Adjusted Gamma KM-UCL	ProUCL 5.0.00
	Arsenic	mg/kg	11.9	13.7 (N)	18.6	13.7	mg/kg	95% Student's-t UCL	ProUCL 5.0.00
	Cobalt	mg/kg	9.92	11.7 (N)	19.5	11.7	mg/kg	95% Student's-t UCL	ProUCL 5.0.00
	Copper	mg/kg	189	312 (G)	769	312	mg/kg	95% Adjusted Gamma UCL	ProUCL 5.0.00
	Iron	mg/kg	25300	30100 (N)	48500	30100	mg/kg	95% Student's-t UCL	ProUCL 5.0.00
	Lead	mg/kg	213	346 (G)	858	213	mg/kg	Arithmetic Mean Concentration	(1)
	Manganese	mg/kg	389	439 (N)	672 J	439	mg/kg	95% Student's-t UCL	ProUCL 5.0.00
	Nickel	mg/kg	57.1	83.7 (G)	260	83.7	mg/kg	95% Adjusted Gamma UCL	ProUCL 5.0.00
	Thallium	mg/kg	0.19	0.20 (N)	0.32	0.20	mg/kg	95% KM (t) UCL	ProUCL 5.0.00
	Vanadium	mg/kg	30.2	37 (N)	69.3	37	mg/kg	95% Student's-t UCL	ProUCL 5.0.00

G = Gamma
L = Lognormal
N = Normal
NP = Non-parametric

1 - The arithmetic mean concentration is used as the exposure point concentration for lead. USEPA, 1994: Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children.

Exposure point concentrations for the RME scenarios are also the exposure point concentrations for the CTE scenarios.

TABLE 3.2.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
OU8	Benzo(a)pyrene Equivalents	mg/kg	1.3	3.4 (L)	17	3.4	mg/kg	95% KM (Chebyshev) UCL	ProUCL 5.0.00
	Aluminum	mg/kg	8590	9590 (N)	18100	9590	mg/kg	95% Student's-t UCL	ProUCL 5.0.00
	Antimony	mg/kg	90.7	610 (NP)	1610 J	610.0	mg/kg	99% KM (Chebyshev) UCL	ProUCL 5.0.00
	Arsenic	mg/kg	17.5	20.9 (L)	61.9	20.9	mg/kg	95% H-UCL	ProUCL 5.0.00
	Cadmium	mg/kg	1.55	3.66 (L)	7.64	3.66	mg/kg	97.5% KM (Chebyshev) UCL	ProUCL 5.0.00
	Cobalt	mg/kg	11.3	13.0 (L)	40.7	13.0	mg/kg	95% H-UCL	ProUCL 5.0.00
	Copper	mg/kg	3730	11700 (NP)	39600 J	11700	mg/kg	97.5% Chebyshev (Mean, Sd) UCL	ProUCL 5.0.00
	Iron	mg/kg	55900	102000 (NP)	269000	102000	mg/kg	95% Chebyshev (Mean, Sd) UCL	ProUCL 5.0.00
	Lead	mg/kg	2210	6620 (L)	20100	2210	mg/kg	Arithmetic Mean Concentration	(1)
	Manganese	mg/kg	698	1900 (NP)	12600 J	1900	mg/kg	95% Chebyshev (Mean, Sd) UCL	ProUCL 5.0.00
	Mercury	mg/kg	1.57	3.66 (L)	18.6 J	3.66	mg/kg	95% KM (Chebyshev) UCL	ProUCL 5.0.00
	Nickel	mg/kg	268	707 (NP)	3260	707	mg/kg	95% KM (Chebyshev) UCL	ProUCL 5.0.00
	Thallium	mg/kg	0.190	0.154 (G)	0.254	0.154	mg/kg	95% KM (t) UCL	ProUCL 5.0.00
	Vanadium	mg/kg	29.0	33.3 (G)	84.4 J	33.3	mg/kg	95% Adjusted Gamma KM-UCL	ProUCL 5.0.00
	Zinc	mg/kg	1070	2200 (AL)	7350	2200	mg/kg	95% Chebyshev (Mean, Sd) UCL	ProUCL 5.0.00
	Cyanide	mg/kg	NA	NA	34	34	mg/kg	Maximum Detected Concentration	(2)

AL = Approximate Lognormal
G = Gamma
L = Lognormal
N = Normal
NP = Non-parametric

1 - The arithmetic mean concentration is used as the exposure point concentration for lead. USEPA, 1994: Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children.
2 - There are less than three detected concentrations. Reliable statistics cannot be computed. The maximum concentration was used as the exposure point concentration.

Exposure point concentrations for the RME scenarios are also the exposure point concentrations for the CTE scenarios.

TABLE 3.3.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
OU8	Manganese	ug/L	1090	2000 (N)	2630	2630	ug/L	Maximum Detected Concentration	(1)

G = Gamma

1 - The maximum detected concentration is used as the exposure point concentration for groundwater.

RAGS Part D Table 7

Calculation of Cancer Risks and Non-Cancer Hazards

LIST OF TABLES
RAGS PART D TABLE 7
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Table No.	
	Reasonable Maximum Exposures
7.1.RME	Construction Workers
7.2.RME	Occupational Workers
7.3.RME	Child Recreational Users
7.4.RME	Adult Recreational Users
7.5.RME	Child Residents
7.6.RME	Adult Residents
	Central Tendency Exposures
7.1.CTE	Construction Workers
7.2.CTE	Occupational Workers
7.3.CTE	Child Recreational Users
7.4.CTE	Adult Recreational Users
7.5.CTE	Child Residents
7.6.CTE	Adult Residents

TABLE 7.1.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	3.1E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.3E-06	2.2E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	2.9E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.0E-02	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.02
				Antimony	1	mg/kg	2.4E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.004
				Arsenic	13.7	mg/kg	2.0E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	3.0E-07	1.4E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.05
				Cobalt	11.7	mg/kg	2.8E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.0E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.007
				Copper	312	mg/kg	7.6E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.3E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.01
				Iron	30100	mg/kg	7.3E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.1E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.07
				Lead	213	mg/kg	5.2E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.6E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	1.1E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.4E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.03
				Nickel	83.7	mg/kg	2.0E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.007
				Thallium	0.2	mg/kg	4.8E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	9.0E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.3E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.006
			Exp. Route Total								2.6E-06					0.2
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	1.3E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9.6E-07	9.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.7	mg/kg	3.2E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	4.8E-08	2.2E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.007
				Cobalt	11.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-03	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	213	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.6E-04	(mg/kg/day)	--
			Exp. Route Total								1.0E-06					0.007
		Exposure Point Total									3.6E-06					0.2
	Exposure Medium Total										3.6E-06					0.2
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	1.9E-11	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.1E-11	1.3E-09	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	8.8E-06	mg/m^3	1.7E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.2E-06	(mg/m^3)	5.0E-03	(mg/m^3)	0.0002
				Antimony	7.4E-10	mg/m^3	1.4E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-10	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.0E-08	mg/m^3	2.0E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	8.5E-11	1.4E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.00009
				Cobalt	8.6E-09	mg/m^3	1.7E-11	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	1.5E-10	1.2E-09	(mg/m^3)	2.0E-05	(mg/m^3)	0.00006
				Copper	2.3E-07	mg/m^3	4.5E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.1E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	4.3E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.0E-06	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-07	mg/m^3	3.1E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.1E-08	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	6.3E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.4E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.0009
				Nickel	6.2E-08	mg/m^3	1.2E-10	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	3.1E-11	8.4E-09	(mg/m^3)	2.0E-04	(mg/m^3)	0.00004
				Thallium	1.5E-10	mg/m^3	2.9E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.0E-11	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.7E-08	mg/m^3	5.3E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.7E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00004
			Exp. Route Total								2.9E-10					0.001
		Exposure Point Total									2.9E-10					0.001
	Exposure Medium Total										2.9E-10					0.001
Medium Total											3.6E-06					0.2
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	8.2E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	6.0E-07	5.8E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	2.3E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-02	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.02
				Antimony	610	mg/kg	1.5E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.0E-03	(mg/kg/day)	4.0E-04	(mg/kg/day)	2.6
				Arsenic	20.9	mg/kg	3.0E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	4.6E-07	2.1E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.07
				Cadmium	3.66	mg/kg	8.9E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.2E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.01
				Cobalt	13	mg/kg	3.1E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.2E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.007
				Copper	11700	mg/kg	2.8E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.0E-02	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.5
				Iron	102000	mg/kg	2.5E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-01	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.2
				Lead	2210	mg/kg	5.4E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.7E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	4.6E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.2E-03	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.1
				Mercury	3.66	mg/kg	8.9E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.2E-06	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.003
				Nickel	707	mg/kg	1.7E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-03	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.06

TABLE 7.1.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil (continued)	Subsurface Soil	OU8	Ingestion	Thallium	0.154	mg/kg	3.7E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	8.1E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.6E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.006
				Zinc	2200	mg/kg	5.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.7E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.01
				Cyanide	34	mg/kg	8.2E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.8E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.003
			Exp. Route Total								1.1E-06					3.7
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	3.4E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2.5E-07	2.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	4.9E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	7.3E-08	3.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Cadmium	3.66	mg/kg	2.8E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.0E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0008
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-03	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1.4E-04	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.6E-04	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.0E-02	(mg/kg/day)	--
			Exp. Route Total								3.2E-07					0.01
		Exposure Point Total									1.4E-06					3.7
	Exposure Medium Total										1.4E-06					3.7
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	4.9E-12	(mg/m^3)	1.1E-03	(ug/m^3)$^{-1}$	5.4E-12	3.4E-10	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	7.1E-06	mg/m^3	1.4E-08	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	9.7E-07	(mg/m^3)	5.0E-03	(mg/m^3)	0.0002
				Antimony	4.5E-07	mg/m^3	8.8E-10	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	6.1E-08	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	3.0E-11	(mg/m^3)	4.3E-03	(ug/m^3)$^{-1}$	1.3E-10	2.1E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0001
				Cadmium	2.7E-09	mg/m^3	5.3E-12	(mg/m^3)	1.8E-03	(ug/m^3)$^{-1}$	9.5E-12	3.7E-10	(mg/m^3)	1.0E-05	(mg/m^3)	0.00004
				Cobalt	9.6E-09	mg/m^3	1.9E-11	(mg/m^3)	9.0E-03	(ug/m^3)$^{-1}$	1.7E-10	1.3E-09	(mg/m^3)	2.0E-05	(mg/m^3)	0.00007
				Copper	8.6E-06	mg/m^3	1.7E-08	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	1.2E-06	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	1.5E-07	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	1.0E-05	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	3.2E-09	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	2.2E-07	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	2.7E-09	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	1.9E-07	(mg/m^3)	5.0E-05	(mg/m^3)	0.004
				Mercury	2.7E-09	mg/m^3	5.3E-12	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	3.7E-10	(mg/m^3)	3.0E-04	(mg/m^3)	0.000001
				Nickel	5.2E-07	mg/m^3	1.0E-09	(mg/m^3)	2.6E-04	(ug/m^3)$^{-1}$	2.6E-10	7.1E-08	(mg/m^3)	2.0E-04	(mg/m^3)	0.0004
				Thallium	1.1E-10	mg/m^3	2.2E-13	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	1.6E-11	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.4E-08	mg/m^3	4.8E-11	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	3.4E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00003
				Zinc	1.6E-06	mg/m^3	3.2E-09	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	2.2E-07	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	4.4E-02	mg/m^3	8.6E-05	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	6.0E-03	(mg/m^3)	8.0E-04	(mg/m^3)	7.5
			Exp. Route Total								5.8E-10					7.5
		Exposure Point Total									5.8E-10					7.5
	Exposure Medium Total										5.8E-10					7.5
Medium Total											1.4E-06					11
Groundwater	Groundwater	OU8	Ingestion	Manganese	2630	ug/L	3.9E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.7E-05	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.001
			Exp. Route Total								- -					0.001
			Dermal	Manganese	2630	ug/L	5.4E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.8E-05	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.04
			Exp. Route Total								- -					0.04
		Exposure Point Total									- -					0.04
	Exposure Medium Total										- -					0.04
Medium Total											- -					0.04
										Total of Receptor Risks Across All Media	5.0E-06				Total of Receptor Hazards Across All Media	11

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.2.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	4.0E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.9E-05	1.1E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	3.7E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.0E-02	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.01
				Antimony	1	mg/kg	3.1E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.6E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.002
				Arsenic	13.7	mg/kg	2.5E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	3.8E-06	7.0E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Cobalt	11.7	mg/kg	3.6E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.0E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.03
				Copper	312	mg/kg	9.5E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.7E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.007
				Iron	30100	mg/kg	9.2E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.04
				Lead	213	mg/kg	6.5E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.8E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	1.3E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.8E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.02
				Nickel	83.7	mg/kg	2.6E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.2E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.004
				Silver	0	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-03	(mg/kg/day)	--
				Thallium	0.2	mg/kg	6.1E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	1.1E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.2E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.006
			Exp. Route Total								3.3E-05					0.1
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	2.2E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.6E-05	6.1E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.7	mg/kg	5.3E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	8.0E-07	1.5E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.005
				Cobalt	11.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	213	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Silver	0	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								1.7E-05					0.005
		Exposure Point Total									5.0E-05					0.1
	Exposure Medium Total										5.0E-05					0.1
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	7.8E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	8.6E-10	2.2E-09	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	8.8E-06	mg/m^3	7.2E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.0E-06	(mg/m^3)	5.0E-03	(mg/m^3)	0.0004
				Antimony	7.4E-10	mg/m^3	6.0E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.7E-10	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.0E-08	mg/m^3	8.2E-10	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	3.5E-09	2.3E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0002
				Cobalt	8.6E-09	mg/m^3	7.0E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	6.3E-09	2.0E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.0003
				Copper	2.3E-07	mg/m^3	1.9E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.2E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	1.8E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.1E-06	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-07	mg/m^3	1.3E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.6E-08	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	2.6E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.4E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.001
				Nickel	6.2E-08	mg/m^3	5.0E-09	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.3E-09	1.4E-08	(mg/m^3)	9.0E-05	(mg/m^3)	0.0002
				Silver	0.0E+00	mg/m^3	0.0E+00	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				Thallium	1.5E-10	mg/m^3	1.2E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.4E-11	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.7E-08	mg/m^3	2.2E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.2E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00006
			Exp. Route Total								1.2E-08					0.003
		Exposure Point Total									1.2E-08					0.003
	Exposure Medium Total										1.2E-08					0.003
Medium Total											5.0E-05					0.1
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	1.0E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	7.6E-06	2.9E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	2.9E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.2E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.008
				Antimony	610	mg/kg	1.9E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.2E-04	(mg/kg/day)	4.0E-04	(mg/kg/day)	1.3
				Arsenic	20.9	mg/kg	3.8E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	5.8E-06	1.1E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.04
				Cadmium	3.66	mg/kg	1.1E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.1E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.006
				Cobalt	13	mg/kg	4.0E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.1E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.04
				Copper	11700	mg/kg	3.6E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.0E-02	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.3

TABLE 7.2.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Iron	102000	mg/kg	3.1E-02	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.7E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.1
				Lead	2210	mg/kg	6.8E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	5.8E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-03	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.07
				Mercury	3.66	mg/kg	1.1E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Nickel	707	mg/kg	2.2E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.1E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.03
				Thallium	0.154	mg/kg	4.7E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	1.0E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.9E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.006
				Zinc	2200	mg/kg	6.7E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.006
				Cyanide	34	mg/kg	1.0E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.9E-05	(mg/kg/day)	6.0E-04	(mg/kg/day)	0.05
			Exp. Route Total								1.3E-05					1.9
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	5.7E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4.2E-06	1.6E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	8.1E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.2E-06	2.3E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.008
				Cadmium	3.66	mg/kg	4.7E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0005
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-04	(mg/kg/day)	--
			Exp. Route Total								5.4E-06					0.008
		Exposure Point Total									1.9E-05					1.9
	Exposure Medium Total										1.9E-05					1.9
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	2.0E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.2E-10	5.7E-10	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	7.1E-06	mg/m^3	5.7E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.6E-06	(mg/m^3)	5.0E-03	(mg/m^3)	0.0003
				Antimony	4.5E-07	mg/m^3	3.7E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-07	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	1.3E-09	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	5.4E-09	3.5E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0002
				Cadmium	2.7E-09	mg/m^3	2.2E-10	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	3.9E-10	6.1E-10	(mg/m^3)	1.0E-05	(mg/m^3)	0.00006
				Cobalt	9.6E-09	mg/m^3	7.8E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	7.0E-09	2.2E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.0004
				Copper	8.6E-06	mg/m^3	7.0E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.0E-06	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	6.1E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.7E-05	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	1.3E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.7E-07	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	1.1E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.2E-07	(mg/m^3)	5.0E-05	(mg/m^3)	0.006
				Mercury	2.7E-09	mg/m^3	2.2E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.1E-10	(mg/m^3)	3.0E-04	(mg/m^3)	0.000002
				Nickel	5.2E-07	mg/m^3	4.2E-08	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.1E-08	1.2E-07	(mg/m^3)	9.0E-05	(mg/m^3)	0.001
				Thallium	1.1E-10	mg/m^3	9.2E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.6E-11	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.4E-08	mg/m^3	2.0E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.6E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00006
				Zinc	1.6E-06	mg/m^3	1.3E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.7E-07	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	7.1E-03	mg/m^3	5.8E-04	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.6E-03	(mg/m^3)	8.0E-04	(mg/m^3)	2.0
			Exp. Route Total								2.4E-08					2.0
		Exposure Point Total									2.4E-08					2.0
	Exposure Medium Total										2.4E-08					2.0
Medium Total											1.9E-05					4.0
										Total of Receptor Risks Across All Media	6.8E-05				Total of Receptor Hazards Across All Media	4.1

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.3.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	1.1E-05	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	7.9E-05	2.4E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	1.9E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.2E-02	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.02
				Antimony	1	mg/kg	1.6E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.8E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.005
				Arsenic	13.7	mg/kg	1.3E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.9E-06	1.5E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.05
				Cobalt	11.7	mg/kg	1.8E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.1E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.07
				Copper	312	mg/kg	4.9E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.7E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.01
				Iron	30100	mg/kg	4.7E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.5E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.08
				Lead	213	mg/kg	3.3E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.9E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	6.9E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.0E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.03
				Nickel	83.7	mg/kg	1.3E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.008
				Silver	0	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-03	(mg/kg/day)	--
				Thallium	0.2	mg/kg	3.1E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	5.8E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.8E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.01
			Exp. Route Total								8.1E-05					0.3
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	6.7E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4.9E-05	1.5E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.7	mg/kg	3.1E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	4.6E-07	3.6E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Cobalt	11.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	213	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Silver	0	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								4.9E-05					0.01
		Exposure Point Total									1.3E-04					0.3
	Exposure Medium Total										1.3E-04					0.3
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	2.0E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.2E-10	4.4E-10	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	8.8E-06	mg/m^3	3.5E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.0E-07	(mg/m^3)	5.0E-03	(mg/m^3)	0.00008
				Antimony	7.4E-10	mg/m^3	2.9E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.4E-11	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.0E-08	mg/m^3	3.9E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	1.7E-10	4.6E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00003
				Cobalt	8.6E-09	mg/m^3	3.4E-11	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	3.0E-10	3.9E-10	(mg/m^3)	6.0E-06	(mg/m^3)	0.00007
				Copper	2.3E-07	mg/m^3	9.0E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	8.7E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-06	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-07	mg/m^3	6.1E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.2E-09	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	1.3E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.5E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.0003
				Nickel	6.2E-08	mg/m^3	2.4E-10	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	6.3E-11	2.8E-09	(mg/m^3)	9.0E-05	(mg/m^3)	0.00003
				Silver	0.0E+00	mg/m^3	0.0E+00	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				Thallium	1.5E-10	mg/m^3	5.8E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.7E-12	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.7E-08	mg/m^3	1.1E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.2E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00001
			Exp. Route Total								7.5E-10					0.0005
		Exposure Point Total									7.5E-10					0.0005
	Exposure Medium Total										7.5E-10					0.0005
Medium Total											1.3E-04					0.3
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	2.8E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.1E-05	6.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	1.5E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.8E-02	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.02
				Antimony	610	mg/kg	9.5E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.1E-03	(mg/kg/day)	4.0E-04	(mg/kg/day)	2.8
				Arsenic	20.9	mg/kg	2.0E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.9E-06	2.3E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.08
				Cadmium	3.66	mg/kg	5.7E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.7E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.01
				Cobalt	13	mg/kg	2.0E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.4E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.08
				Copper	11700	mg/kg	1.8E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.1E-02	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.5

TABLE 7.3.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Iron	102000	mg/kg	1.6E-02	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.9E-01	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.3
				Lead	2210	mg/kg	3.5E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.0E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	3.0E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.5E-03	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.1
				Mercury	3.66	mg/kg	5.7E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.7E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Nickel	707	mg/kg	1.1E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-03	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.06
				Thallium	0.154	mg/kg	2.4E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	5.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.1E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.01
				Zinc	2200	mg/kg	3.4E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.0E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.01
				Cyanide	34	mg/kg	5.3E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.2E-05	(mg/kg/day)	6.0E-04	(mg/kg/day)	0.1
			Exp. Route Total								2.4E-05					4.1
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	1.8E-06	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	1.3E-05	3.8E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	4.7E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	7.0E-07	5.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Cadmium	3.66	mg/kg	2.7E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.2E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.001
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-04	(mg/kg/day)	--
			Exp. Route Total								1.3E-05					0.02
		Exposure Point Total									3.7E-05					4.2
	Exposure Medium Total										3.7E-05					4.2
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	5.2E-11	(mg/m^3)	1.1E-03	(ug/m^3)$^{-1}$	5.7E-11	1.1E-10	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	7.1E-06	mg/m^3	2.8E-08	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	3.2E-07	(mg/m^3)	5.0E-03	(mg/m^3)	0.00006
				Antimony	4.5E-07	mg/m^3	1.8E-09	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	2.0E-08	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	6.0E-11	(mg/m^3)	4.3E-03	(ug/m^3)$^{-1}$	2.6E-10	7.0E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00005
				Cadmium	2.7E-09	mg/m^3	1.1E-11	(mg/m^3)	1.8E-03	(ug/m^3)$^{-1}$	1.9E-11	1.2E-10	(mg/m^3)	1.0E-05	(mg/m^3)	0.00001
				Cobalt	9.6E-09	mg/m^3	3.7E-11	(mg/m^3)	9.0E-03	(ug/m^3)$^{-1}$	3.4E-10	4.4E-10	(mg/m^3)	6.0E-06	(mg/m^3)	0.00007
				Copper	8.6E-06	mg/m^3	3.4E-08	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	3.9E-07	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	2.9E-07	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	3.4E-06	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	6.4E-09	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	7.4E-08	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	5.5E-09	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	6.4E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.001
				Mercury	2.7E-09	mg/m^3	1.1E-11	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	1.2E-10	(mg/m^3)	3.0E-04	(mg/m^3)	4.1E-7
				Nickel	5.2E-07	mg/m^3	2.0E-09	(mg/m^3)	2.6E-04	(ug/m^3)$^{-1}$	5.3E-10	2.4E-08	(mg/m^3)	9.0E-05	(mg/m^3)	0.0003
				Thallium	1.1E-10	mg/m^3	4.4E-13	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	5.2E-12	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.4E-08	mg/m^3	9.6E-11	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	1.1E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00001
				Zinc	1.6E-06	mg/m^3	6.3E-09	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	7.4E-08	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	7.1E-03	mg/m^3	2.8E-05	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	3.2E-04	(mg/m^3)	8.0E-04	(mg/m^3)	0.4
			Exp. Route Total								1.2E-09					0.4
		Exposure Point Total									1.2E-09					0.4
	Exposure Medium Total										1.2E-09					0.4
Medium Total											3.7E-05					4.6
										Total of Receptor Risks Across All Media	1.7E-04				Total of Receptor Hazards Across All Media	4.9

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.4.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	1.3E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9.3E-06	2.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	5.9E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.1E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.002
				Antimony	1	mg/kg	4.9E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.0004
				Arsenic	13.7	mg/kg	4.0E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	6.0E-07	1.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.005
				Cobalt	11.7	mg/kg	5.7E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.0E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.007
				Copper	312	mg/kg	1.5E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.3E-05	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.001
				Iron	30100	mg/kg	1.5E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.2E-03	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.007
				Lead	213	mg/kg	1.0E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.6E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	2.1E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.5E-05	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.003
				Nickel	83.7	mg/kg	4.1E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0007
				Silver	0	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-03	(mg/kg/day)	--
				Thallium	0.2	mg/kg	9.8E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	1.8E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.3E-06	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.001
			Exp. Route Total								9.9E-06					0.03
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	1.4E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.0E-05	2.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.7	mg/kg	1.7E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.5E-07	5.9E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Cobalt	11.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	213	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Silver	0	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								1.0E-05					0.002
		Exposure Point Total									2.0E-05					0.03
	Exposure Medium Total										2.0E-05					0.03
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	2.5E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.7E-10	4.4E-10	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	8.8E-06	mg/m^3	1.2E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.0E-07	(mg/m^3)	5.0E-03	(mg/m^3)	0.00008
				Antimony	7.4E-10	mg/m^3	9.6E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.4E-11	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.0E-08	mg/m^3	1.3E-10	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	5.7E-10	4.6E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00003
				Cobalt	8.6E-09	mg/m^3	1.1E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	1.0E-09	3.9E-10	(mg/m^3)	6.0E-06	(mg/m^3)	0.00007
				Copper	2.3E-07	mg/m^3	3.0E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	2.9E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-06	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-07	mg/m^3	2.0E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.2E-09	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	4.2E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.5E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.0003
				Nickel	6.2E-08	mg/m^3	8.0E-10	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	2.1E-10	2.8E-09	(mg/m^3)	9.0E-05	(mg/m^3)	0.00003
				Silver	0.0E+00	mg/m^3	0.0E+00	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				Thallium	1.5E-10	mg/m^3	1.9E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.7E-12	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.7E-08	mg/m^3	3.5E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.2E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00001
			Exp. Route Total								2.1E-09					0.0005
		Exposure Point Total									2.1E-09					0.0005
	Exposure Medium Total										2.1E-09					0.0005
Medium Total											2.0E-05					0.03
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	3.3E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.4E-06	5.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	4.7E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.002
				Antimony	610	mg/kg	3.0E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.0E-04	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.3
				Arsenic	20.9	mg/kg	6.1E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	9.2E-07	2.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.007
				Cadmium	3.66	mg/kg	1.8E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.3E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.001
				Cobalt	13	mg/kg	6.4E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.2E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.007
				Copper	11700	mg/kg	5.7E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.0E-03	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.05

TABLE 7.4.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Iron	102000	mg/kg	5.0E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.7E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.02
				Lead	2210	mg/kg	1.1E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.8E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	9.3E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.3E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.01
				Mercury	3.66	mg/kg	1.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.3E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Nickel	707	mg/kg	3.5E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.006
				Thallium	0.154	mg/kg	7.5E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	1.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.7E-06	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.001
				Zinc	2200	mg/kg	1.1E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.8E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.001
				Cyanide	34	mg/kg	1.7E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.8E-06	(mg/kg/day)	6.0E-04	(mg/kg/day)	0.010
			Exp. Route Total								3.3E-06					0.4
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	3.7E-07	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2.7E-06	6.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	2.6E-07	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	3.9E-07	9.1E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
				Cadmium	3.66	mg/kg	1.5E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.3E-09	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0002
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-04	(mg/kg/day)	--
			Exp. Route Total								3.1E-06					0.003
		Exposure Point Total									6.4E-06					0.4
	Exposure Medium Total										6.4E-06					0.4
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	6.5E-11	(mg/m^3)	1.1E-03	(ug/m^3)$^{-1}$	7.2E-11	1.1E-10	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	7.1E-06	mg/m^3	9.2E-08	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	3.2E-07	(mg/m^3)	5.0E-03	(mg/m^3)	0.00006
				Antimony	4.5E-07	mg/m^3	5.9E-09	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	2.0E-08	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	2.0E-10	(mg/m^3)	4.3E-03	(ug/m^3)$^{-1}$	8.6E-10	7.0E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00005
				Cadmium	2.7E-09	mg/m^3	3.5E-11	(mg/m^3)	1.8E-03	(ug/m^3)$^{-1}$	6.3E-11	1.2E-10	(mg/m^3)	1.0E-05	(mg/m^3)	0.00001
				Cobalt	9.6E-09	mg/m^3	1.2E-10	(mg/m^3)	9.0E-03	(ug/m^3)$^{-1}$	1.1E-09	4.4E-10	(mg/m^3)	6.0E-06	(mg/m^3)	0.00007
				Copper	8.6E-06	mg/m^3	1.1E-07	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	3.9E-07	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	9.8E-07	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	3.4E-06	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	2.1E-08	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	7.4E-08	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	1.8E-08	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	6.4E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.001
				Mercury	2.7E-09	mg/m^3	3.5E-11	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	1.2E-10	(mg/m^3)	3.0E-04	(mg/m^3)	4.1E-7
				Nickel	5.2E-07	mg/m^3	6.8E-09	(mg/m^3)	2.6E-04	(ug/m^3)$^{-1}$	1.8E-09	2.4E-08	(mg/m^3)	9.0E-05	(mg/m^3)	0.0003
				Thallium	1.1E-10	mg/m^3	1.5E-12	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	5.2E-12	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.4E-08	mg/m^3	3.2E-10	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	1.1E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00001
				Zinc	1.6E-06	mg/m^3	2.1E-08	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	7.4E-08	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	7.1E-03	mg/m^3	9.2E-05	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	3.2E-04	(mg/m^3)	8.0E-04	(mg/m^3)	0.4
			Exp. Route Total								3.9E-09					0.4
		Exposure Point Total									3.9E-09					0.4
	Exposure Medium Total										3.9E-09					0.4
Medium Total											6.4E-06					0.8
										Total of Receptor Risks Across All Media	2.7E-05				Total of Receptor Hazards Across All Media	0.8

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.5.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	7.6E-05	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	5.5E-04	1.7E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	1.3E-02	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-01	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.2
				Antimony	1	mg/kg	1.1E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-05	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.03
				Arsenic	13.7	mg/kg	9.0E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.4E-05	1.1E-04	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.4
				Cobalt	11.7	mg/kg	1.3E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-04	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.5
				Copper	312	mg/kg	3.4E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.0E-03	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.10
				Iron	30100	mg/kg	3.3E-02	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.8E-01	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.5
				Lead	213	mg/kg	2.3E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.7E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	4.8E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.6E-03	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.2
				Nickel	83.7	mg/kg	9.2E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.1E-03	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.05
				Silver	0	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-03	(mg/kg/day)	--
				Thallium	0.2	mg/kg	2.2E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	4.1E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.7E-04	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.09
			Exp. Route Total								5.7E-04					2.1
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	2.3E-05	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.7E-04	5.1E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.7	mg/kg	1.1E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.6E-06	1.2E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.04
				Cobalt	11.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	213	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Silver	0	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								1.7E-04					0.04
		Exposure Point Total									7.4E-04					2.1
	Exposure Medium Total										7.4E-04					2.1
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	4.2E-09	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	4.6E-09	9.2E-09	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	8.8E-06	mg/m^3	7.3E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	8.5E-06	(mg/m^3)	5.0E-03	(mg/m^3)	0.002
				Antimony	7.4E-10	mg/m^3	6.0E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.1E-10	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.0E-08	mg/m^3	8.3E-10	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	3.6E-09	9.7E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0006
				Cobalt	8.6E-09	mg/m^3	7.1E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	6.4E-09	8.2E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.001
				Copper	2.3E-07	mg/m^3	1.9E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.2E-07	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	1.8E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.1E-05	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-07	mg/m^3	1.3E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.5E-07	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	2.7E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.1E-07	(mg/m^3)	5.0E-05	(mg/m^3)	0.006
				Nickel	6.2E-08	mg/m^3	5.1E-09	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.3E-09	5.9E-08	(mg/m^3)	9.0E-05	(mg/m^3)	0.0007
				Silver	0.0E+00	mg/m^3	0.0E+00	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				Thallium	1.5E-10	mg/m^3	1.2E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.4E-10	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.7E-08	mg/m^3	2.2E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.6E-08	(mg/m^3)	1.0E-04	(mg/m^3)	0.0003
			Exp. Route Total								1.6E-08					0.01
		Exposure Point Total									1.6E-08					0.01
	Exposure Medium Total										1.6E-08					0.01
Medium Total											7.4E-04					2.1
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	2.0E-05	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.5E-04	4.3E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	1.1E-02	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-01	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.1
				Antimony	610	mg/kg	6.7E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.8E-03	(mg/kg/day)	4.0E-04	(mg/kg/day)	19
				Arsenic	20.9	mg/kg	1.4E-05	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.1E-05	1.6E-04	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.5
				Cadmium	3.66	mg/kg	4.0E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.7E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.09
				Cobalt	13	mg/kg	1.4E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-04	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.6
				Copper	11700	mg/kg	1.3E-02	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-01	(mg/kg/day)	4.0E-02	(mg/kg/day)	3.7

TABLE 7.5.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Iron	102000	mg/kg	1.1E-01	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	1.9
				Lead	2210	mg/kg	2.4E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.8E-02	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	2.1E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.4E-02	(mg/kg/day)	2.4E-02	(mg/kg/day)	1.0
				Mercury	3.66	mg/kg	4.0E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.7E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.2
				Nickel	707	mg/kg	7.7E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.0E-03	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.5
				Thallium	0.154	mg/kg	1.7E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	3.6E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.3E-04	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.09
				Zinc	2200	mg/kg	2.4E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.8E-02	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.09
				Cyanide	34	mg/kg	3.7E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.3E-04	(mg/kg/day)	6.0E-04	(mg/kg/day)	0.7
			Exp. Route Total								1.7E-04					29
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	6.1E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4.5E-05	1.3E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	1.6E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.4E-06	1.9E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.06
				Cadmium	3.66	mg/kg	9.5E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.1E-07	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.004
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-04	(mg/kg/day)	--
			Exp. Route Total								4.7E-05					0.07
		Exposure Point Total									2.1E-04					29
	Exposure Medium Total										2.1E-04					29
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	1.1E-09	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	1.2E-09	2.4E-09	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	7.1E-06	mg/m^3	5.8E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.8E-06	(mg/m^3)	5.0E-03	(mg/m^3)	0.001
				Antimony	4.5E-07	mg/m^3	3.7E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.3E-07	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	1.3E-09	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	5.4E-09	1.5E-08	(mg/m^3)	1.5E-05	(mg/m^3)	0.0010
				Cadmium	2.7E-09	mg/m^3	2.2E-10	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	4.0E-10	2.6E-09	(mg/m^3)	1.0E-05	(mg/m^3)	0.0003
				Cobalt	9.6E-09	mg/m^3	7.9E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	7.1E-09	9.2E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.002
				Copper	8.6E-06	mg/m^3	7.1E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	8.2E-06	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	6.2E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.2E-05	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	1.3E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.6E-06	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	1.1E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.3E-06	(mg/m^3)	5.0E-05	(mg/m^3)	0.03
				Mercury	2.7E-09	mg/m^3	2.2E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.6E-09	(mg/m^3)	3.0E-04	(mg/m^3)	0.000009
				Nickel	5.2E-07	mg/m^3	4.3E-08	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.1E-08	5.0E-07	(mg/m^3)	9.0E-05	(mg/m^3)	0.006
				Thallium	1.1E-10	mg/m^3	9.3E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.1E-10	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.4E-08	mg/m^3	2.0E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.3E-08	(mg/m^3)	1.0E-04	(mg/m^3)	0.0002
				Zinc	1.6E-06	mg/m^3	1.3E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.6E-06	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	7.1E-03	mg/m^3	5.8E-04	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.8E-03	(mg/m^3)	8.0E-04	(mg/m^3)	8.5
			Exp. Route Total								2.5E-08					8.5
		Exposure Point Total									2.5E-08					8.5
	Exposure Medium Total										2.5E-08					8.5
Medium Total											2.1E-04					38
										Total of Receptor Risks Across All Media	9.5E-04				Total of Receptor Hazards Across All Media	40

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.6.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	8.9E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	6.5E-05	1.6E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	4.1E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-02	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.01
				Antimony	1	mg/kg	3.4E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.003
				Arsenic	13.7	mg/kg	2.8E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	4.2E-06	9.9E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.03
				Cobalt	11.7	mg/kg	4.0E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.05
				Copper	312	mg/kg	1.1E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.7E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.009
				Iron	30100	mg/kg	1.0E-02	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.6E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.05
				Lead	213	mg/kg	7.3E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	1.5E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.3E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.02
				Nickel	83.7	mg/kg	2.9E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.0E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.005
				Silver	0	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-03	(mg/kg/day)	--
				Thallium	0.2	mg/kg	6.8E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	1.3E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.4E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.009
			Exp. Route Total								6.9E-05					0.2
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	4.9E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	3.6E-05	8.6E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.7	mg/kg	5.9E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	8.9E-07	2.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.007
				Cobalt	11.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	213	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Silver	0	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								3.7E-05					0.007
		Exposure Point Total									1.1E-04					0.2
	Exposure Medium Total										1.1E-04					0.2
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	5.2E-09	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	5.8E-09	9.2E-09	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	8.8E-06	mg/m^3	2.4E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	8.5E-06	(mg/m^3)	5.0E-03	(mg/m^3)	0.002
				Antimony	7.4E-10	mg/m^3	2.0E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.1E-10	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.0E-08	mg/m^3	2.8E-09	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	1.2E-08	9.7E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0006
				Cobalt	8.6E-09	mg/m^3	2.4E-09	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	2.1E-08	8.2E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.001
				Copper	2.3E-07	mg/m^3	6.3E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.2E-07	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	6.1E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.1E-05	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-07	mg/m^3	4.3E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.5E-07	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	8.8E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.1E-07	(mg/m^3)	5.0E-05	(mg/m^3)	0.006
				Nickel	6.2E-08	mg/m^3	1.7E-08	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	4.4E-09	5.9E-08	(mg/m^3)	9.0E-05	(mg/m^3)	0.0007
				Silver	0.0E+00	mg/m^3	0.0E+00	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				Thallium	1.5E-10	mg/m^3	4.0E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.4E-10	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.7E-08	mg/m^3	7.5E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.6E-08	(mg/m^3)	1.0E-04	(mg/m^3)	0.0003
			Exp. Route Total								4.3E-08					0.01
		Exposure Point Total									4.3E-08					0.01
	Exposure Medium Total										4.3E-08					0.01
Medium Total											1.1E-04					0.2
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	2.3E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.7E-05	4.1E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	3.3E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.1E-02	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.01
				Antimony	610	mg/kg	2.1E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.3E-04	(mg/kg/day)	4.0E-04	(mg/kg/day)	1.8
				Arsenic	20.9	mg/kg	4.3E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	6.4E-06	1.5E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.05
				Cadmium	3.66	mg/kg	1.3E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.4E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.009
				Cobalt	13	mg/kg	4.5E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.05
				Copper	11700	mg/kg	4.0E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-02	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.4

TABLE 7.6.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Iron	102000	mg/kg	3.5E-02	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-01	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.2
				Lead	2210	mg/kg	7.6E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	6.5E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.3E-03	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.09
				Mercury	3.66	mg/kg	1.3E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Nickel	707	mg/kg	2.4E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.5E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.04
				Thallium	0.154	mg/kg	5.3E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	1.1E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.0E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.008
				Zinc	2200	mg/kg	7.5E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.009
				Cyanide	34	mg/kg	1.2E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.1E-05	(mg/kg/day)	6.0E-04	(mg/kg/day)	0.07
			Exp. Route Total								2.3E-05					2.7
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	1.3E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9.3E-06	2.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	9.1E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.4E-06	3.2E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Cadmium	3.66	mg/kg	5.3E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0007
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-04	(mg/kg/day)	--
			Exp. Route Total								1.1E-05					0.01
		Exposure Point Total									3.4E-05					2.7
	Exposure Medium Total										3.4E-05					2.7
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	1.4E-09	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	1.5E-09	2.4E-09	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	7.1E-06	mg/m^3	1.9E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.8E-06	(mg/m^3)	5.0E-03	(mg/m^3)	0.001
				Antimony	4.5E-07	mg/m^3	1.2E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.3E-07	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	4.2E-09	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	1.8E-08	1.5E-08	(mg/m^3)	1.5E-05	(mg/m^3)	0.0010
				Cadmium	2.7E-09	mg/m^3	7.4E-10	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	1.3E-09	2.6E-09	(mg/m^3)	1.0E-05	(mg/m^3)	0.0003
				Cobalt	9.6E-09	mg/m^3	2.6E-09	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	2.4E-08	9.2E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.002
				Copper	8.6E-06	mg/m^3	2.4E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	8.2E-06	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	2.1E-05	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.2E-05	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	4.5E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.6E-06	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	3.8E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.3E-06	(mg/m^3)	5.0E-05	(mg/m^3)	0.03
				Mercury	2.7E-09	mg/m^3	7.4E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.6E-09	(mg/m^3)	3.0E-04	(mg/m^3)	0.000009
				Nickel	5.2E-07	mg/m^3	1.4E-07	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	3.7E-08	5.0E-07	(mg/m^3)	9.0E-05	(mg/m^3)	0.006
				Thallium	1.1E-10	mg/m^3	3.1E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.1E-10	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.4E-08	mg/m^3	6.7E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.3E-08	(mg/m^3)	1.0E-04	(mg/m^3)	0.0002
				Zinc	1.6E-06	mg/m^3	4.4E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.6E-06	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	7.1E-03	mg/m^3	1.9E-03	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.8E-03	(mg/m^3)	8.0E-04	(mg/m^3)	8.5
			Exp. Route Total								8.2E-08					8.5
		Exposure Point Total									8.2E-08					8.5
	Exposure Medium Total										8.2E-08					8.5
Medium Total											3.4E-05					11
										Total of Receptor Risks Across All Media	1.4E-04				Total of Receptor Hazards Across All Media	11

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.1.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	7.9E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	5.7E-07	5.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	7.3E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.1E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.005
				Antimony	1	mg/kg	6.1E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.2E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.001
				Arsenic	13.7	mg/kg	5.0E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	7.5E-08	3.5E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Cobalt	11.7	mg/kg	7.1E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.0E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.002
				Copper	312	mg/kg	1.9E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.003
				Iron	30100	mg/kg	1.8E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.02
				Lead	213	mg/kg	1.3E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.0E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	2.7E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.008
				Nickel	83.7	mg/kg	5.1E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.5E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.002
				Thallium	0.2	mg/kg	1.2E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	2.2E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.002
			Exp. Route Total								6.5E-07					0.05
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	2.2E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.6E-07	1.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.7	mg/kg	5.3E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	8.0E-09	3.7E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Cobalt	11.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-03	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	213	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.6E-04	(mg/kg/day)	--
			Exp. Route Total								1.7E-07					0.001
		Exposure Point Total									8.2E-07					0.05
	Exposure Medium Total										8.2E-07					0.05
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	9.4E-12	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	1.0E-11	6.5E-10	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	8.8E-06	mg/m^3	8.6E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.0E-07	(mg/m^3)	5.0E-03	(mg/m^3)	0.0001
				Antimony	7.4E-10	mg/m^3	7.2E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.0E-11	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.0E-08	mg/m^3	9.9E-12	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	4.2E-11	6.9E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00005
				Cobalt	8.6E-09	mg/m^3	8.4E-12	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	7.6E-11	5.9E-10	(mg/m^3)	2.0E-05	(mg/m^3)	0.00003
				Copper	2.3E-07	mg/m^3	2.2E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.6E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	2.2E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.5E-06	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-07	mg/m^3	1.5E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.1E-08	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	3.2E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.2E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.0004
				Nickel	6.2E-08	mg/m^3	6.0E-11	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.6E-11	4.2E-09	(mg/m^3)	2.0E-04	(mg/m^3)	0.00002
				Thallium	1.5E-10	mg/m^3	1.4E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-11	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.7E-08	mg/m^3	2.7E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.9E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00002
			Exp. Route Total								1.4E-10					0.0007
		Exposure Point Total									1.4E-10					0.0007
	Exposure Medium Total										1.4E-10					0.0007
Medium Total											8.2E-07					0.05
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	2.1E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.5E-07	1.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	5.8E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.1E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.004
				Antimony	610	mg/kg	3.7E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-04	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.6
				Arsenic	20.9	mg/kg	7.6E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.1E-07	5.3E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Cadmium	3.66	mg/kg	2.2E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.003
				Cobalt	13	mg/kg	7.9E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.5E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.002
				Copper	11700	mg/kg	7.1E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.0E-03	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.1
				Iron	102000	mg/kg	6.2E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.3E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.06
				Lead	2210	mg/kg	1.3E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.4E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	1.2E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.1E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.03
				Mercury	3.66	mg/kg	2.2E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-06	(mg/kg/day)	2.0E-03	(mg/kg/day)	0.0008
				Nickel	707	mg/kg	4.3E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.0E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.01

TABLE 7.1.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Thallium	0.154	mg/kg	9.3E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	2.0E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-05	(mg/kg/day)	1.0E-02	(mg/kg/day)	0.001
				Zinc	2200	mg/kg	1.3E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.3E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.003
				Cyanide	34	mg/kg	2.1E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0007
			Exp. Route Total								2.6E-07					0.9
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	5.7E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4.2E-08	4.0E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	8.1E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.2E-08	5.7E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Cadmium	3.66	mg/kg	4.7E-11	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.3E-09	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0001
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-03	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.4E-04	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.6E-04	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.0E-02	(mg/kg/day)	--
			Exp. Route Total								5.4E-08					0.002
		Exposure Point Total									3.2E-07					0.9
	Exposure Medium Total										3.2E-07					0.9
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	2.4E-12	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.7E-12	1.7E-10	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	7.1E-06	mg/m^3	6.9E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.8E-07	(mg/m^3)	5.0E-03	(mg/m^3)	0.00010
				Antimony	4.5E-07	mg/m^3	4.4E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.1E-08	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	1.5E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	6.5E-11	1.1E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.00007
				Cadmium	2.7E-09	mg/m^3	2.6E-12	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	4.7E-12	1.8E-10	(mg/m^3)	1.0E-05	(mg/m^3)	0.00002
				Cobalt	9.6E-09	mg/m^3	9.4E-12	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	8.4E-11	6.5E-10	(mg/m^3)	2.0E-05	(mg/m^3)	0.00003
				Copper	8.6E-06	mg/m^3	8.4E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.9E-07	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	7.3E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.1E-06	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	1.6E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.1E-07	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	1.4E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	9.6E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.002
				Mercury	2.7E-09	mg/m^3	2.6E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.8E-10	(mg/m^3)	3.0E-04	(mg/m^3)	6.1E-7
				Nickel	5.2E-07	mg/m^3	5.1E-10	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.3E-10	3.6E-08	(mg/m^3)	2.0E-04	(mg/m^3)	0.0002
				Thallium	1.1E-10	mg/m^3	1.1E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.8E-12	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.4E-08	mg/m^3	2.4E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.7E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00002
				Zinc	1.6E-06	mg/m^3	1.6E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.1E-07	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	4.4E-02	mg/m^3	4.3E-05	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.0E-03	(mg/m^3)	8.0E-04	(mg/m^3)	3.7
			Exp. Route Total								2.9E-10					3.8
		Exposure Point Total									2.9E-10					3.8
	Exposure Medium Total										2.9E-10					3.8
Medium Total											3.2E-07					4.7
Groundwater	Groundwater	OU8	Ingestion	Manganese	2630	ug/L	3.9E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.7E-05	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.001
			Exp. Route Total								- -					0.001
			Dermal	Manganese	2630	ug/L	2.7E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-05	(mg/kg/day)	9.6E-04	(mg/kg/day)	0.02
			Exp. Route Total								- -					0.02
		Exposure Point Total									- -					0.02
	Exposure Medium Total										- -					0.02
Medium Total											- -					0.02
										Total of Receptor Risks Across All Media	1.1E-06				Total of Receptor Hazards Across All Media	4.7

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.2.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	6.3E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4.6E-06	4.9E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	5.8E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.5E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.005
				Antimony	1	mg/kg	4.8E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.8E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.0009
				Arsenic	13.7	mg/kg	4.0E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	5.9E-07	3.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Cobalt	11.7	mg/kg	5.6E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Copper	312	mg/kg	1.5E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.003
				Iron	30100	mg/kg	1.5E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.1E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.02
				Lead	213	mg/kg	1.0E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.0E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	2.1E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.007
				Nickel	83.7	mg/kg	4.0E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.1E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.002
				Silver	0	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-03	(mg/kg/day)	--
				Thallium	0.2	mg/kg	9.6E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	1.8E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.003
			Exp. Route Total								5.2E-06					0.06
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	1.1E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	8.4E-07	8.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.7	mg/kg	2.8E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	4.2E-08	2.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0007
				Cobalt	11.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	213	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Silver	0	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								8.8E-07					0.0007
		Exposure Point Total									6.1E-06					0.06
	Exposure Medium Total										6.1E-06					0.06
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	2.5E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.7E-10	1.9E-09	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	8.8E-06	mg/m^3	2.3E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.8E-06	(mg/m^3)	5.0E-03	(mg/m^3)	0.0004
				Antimony	7.4E-10	mg/m^3	1.9E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.5E-10	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.0E-08	mg/m^3	2.6E-10	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	1.1E-09	2.0E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0001
				Cobalt	8.6E-09	mg/m^3	2.2E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	2.0E-09	1.7E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.0003
				Copper	2.3E-07	mg/m^3	5.9E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.6E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	5.7E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.4E-06	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-07	mg/m^3	4.0E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.1E-08	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	8.3E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.5E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.001
				Nickel	6.2E-08	mg/m^3	1.6E-09	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	4.1E-10	1.2E-08	(mg/m^3)	9.0E-05	(mg/m^3)	0.0001
				Silver	0.0E+00	mg/m^3	0.0E+00	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				Thallium	1.5E-10	mg/m^3	3.8E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.9E-11	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.7E-08	mg/m^3	7.0E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.4E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00005
			Exp. Route Total								3.8E-09					0.002
		Exposure Point Total									3.8E-09					0.002
	Exposure Medium Total										3.8E-09					0.002
Medium Total											6.1E-06					0.06
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	1.6E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.2E-06	1.3E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	4.6E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.6E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.004
				Antimony	610	mg/kg	2.9E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.3E-04	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.6
				Arsenic	20.9	mg/kg	6.0E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	9.1E-07	4.7E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Cadmium	3.66	mg/kg	1.8E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.003
				Cobalt	13	mg/kg	6.3E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.9E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Copper	11700	mg/kg	5.6E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.4E-03	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.1

TABLE 7.2.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Iron	102000	mg/kg	4.9E-03	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.8E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.05
				Lead	2210	mg/kg	1.1E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.3E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	9.2E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	7.1E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.03
				Mercury	3.66	mg/kg	1.8E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.005
				Nickel	707	mg/kg	3.4E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	2.7E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.01
				Thallium	0.154	mg/kg	7.4E-09	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	5.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	1.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.2E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.002
				Zinc	2200	mg/kg	1.1E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.3E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.003
				Cyanide	34	mg/kg	1.6E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.3E-05	(mg/kg/day)	6.0E-04	(mg/kg/day)	0.02
			Exp. Route Total								2.1E-06					0.8
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	3.0E-08	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2.2E-07	2.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	4.3E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	6.4E-08	3.3E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Cadmium	3.66	mg/kg	2.5E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.9E-09	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.00008
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-04	(mg/kg/day)	--
			Exp. Route Total								2.8E-07					0.001
		Exposure Point Total									2.4E-06					0.8
	Exposure Medium Total										2.4E-06					0.8
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	6.4E-11	(mg/m^3)	1.1E-03	(ug/m^3)$^{-1}$	7.1E-11	5.0E-10	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	7.1E-06	mg/m^3	1.8E-07	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	1.4E-06	(mg/m^3)	5.0E-03	(mg/m^3)	0.0003
				Antimony	4.5E-07	mg/m^3	1.2E-08	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	9.0E-08	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	4.0E-10	(mg/m^3)	4.3E-03	(ug/m^3)$^{-1}$	1.7E-09	3.1E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0002
				Cadmium	2.7E-09	mg/m^3	6.9E-11	(mg/m^3)	1.8E-03	(ug/m^3)$^{-1}$	1.2E-10	5.4E-10	(mg/m^3)	1.0E-05	(mg/m^3)	0.00005
				Cobalt	9.6E-09	mg/m^3	2.5E-10	(mg/m^3)	9.0E-03	(ug/m^3)$^{-1}$	2.2E-09	1.9E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.0003
				Copper	8.6E-06	mg/m^3	2.2E-07	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	1.7E-06	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	1.9E-06	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	1.5E-05	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	4.2E-08	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	3.3E-07	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	3.6E-08	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	2.8E-07	(mg/m^3)	5.0E-05	(mg/m^3)	0.006
				Mercury	2.7E-09	mg/m^3	6.9E-11	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	5.4E-10	(mg/m^3)	3.0E-04	(mg/m^3)	0.000002
				Nickel	5.2E-07	mg/m^3	1.3E-08	(mg/m^3)	2.6E-04	(ug/m^3)$^{-1}$	3.5E-09	1.0E-07	(mg/m^3)	9.0E-05	(mg/m^3)	0.001
				Thallium	1.1E-10	mg/m^3	2.9E-12	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	2.3E-11	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.4E-08	mg/m^3	6.3E-10	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	4.9E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00005
				Zinc	1.6E-06	mg/m^3	4.2E-08	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	3.2E-07	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	7.1E-03	mg/m^3	1.8E-04	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	1.4E-03	(mg/m^3)	8.0E-04	(mg/m^3)	1.8
			Exp. Route Total								7.6E-09					1.8
		Exposure Point Total									7.6E-09					1.8
	Exposure Medium Total										7.6E-09					1.8
Medium Total											2.4E-06					2.6
										Total of Receptor Risks Across All Media	8.4E-06				Total of Receptor Hazards Across All Media	2.7

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.3.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	1.1E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	8.0E-06	5.9E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	1.6E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.5E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.005
				Antimony	1	mg/kg	1.3E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.6E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.001
				Arsenic	13.7	mg/kg	1.1E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.6E-07	3.8E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Cobalt	11.7	mg/kg	1.5E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.3E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Copper	312	mg/kg	4.1E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.004
				Iron	30100	mg/kg	3.9E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.02
				Lead	213	mg/kg	2.8E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.7E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	5.7E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.0E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.008
				Nickel	83.7	mg/kg	1.1E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.8E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.002
				Silver	0	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-03	(mg/kg/day)	--
				Thallium	0.2	mg/kg	2.6E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	4.8E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.003
			Exp. Route Total								8.2E-06					0.07
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	2.7E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.0E-06	1.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.7	mg/kg	1.0E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.5E-08	3.6E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Cobalt	11.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	213	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Silver	0	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								2.0E-06					0.001
		Exposure Point Total									1.0E-05					0.07
	Exposure Medium Total										1.0E-05					0.07
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	2.0E-11	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.2E-11	1.1E-10	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	8.8E-06	mg/m^3	2.9E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-07	(mg/m^3)	5.0E-03	(mg/m^3)	0.00002
				Antimony	7.4E-10	mg/m^3	2.4E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	8.4E-12	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.0E-08	mg/m^3	3.3E-12	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	1.4E-11	1.1E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.000008
				Cobalt	8.6E-09	mg/m^3	2.8E-12	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	2.5E-11	9.8E-11	(mg/m^3)	6.0E-06	(mg/m^3)	0.00002
				Copper	2.3E-07	mg/m^3	7.5E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.6E-09	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	7.2E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.5E-07	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-07	mg/m^3	5.1E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.8E-09	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	1.1E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.7E-09	(mg/m^3)	5.0E-05	(mg/m^3)	0.00007
				Nickel	6.2E-08	mg/m^3	2.0E-11	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	5.2E-12	7.0E-10	(mg/m^3)	9.0E-05	(mg/m^3)	0.000008
				Silver	0.0E+00	mg/m^3	0.0E+00	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				Thallium	1.5E-10	mg/m^3	4.8E-14	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.7E-12	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.7E-08	mg/m^3	8.9E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.1E-10	(mg/m^3)	1.0E-04	(mg/m^3)	0.000003
			Exp. Route Total								6.7E-11					0.0001
		Exposure Point Total									6.7E-11					0.0001
	Exposure Medium Total										6.7E-11					0.0001
Medium Total											1.0E-05					0.08
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	2.9E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.1E-06	1.6E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	1.3E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.4E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.004
				Antimony	610	mg/kg	8.0E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.8E-04	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.7
				Arsenic	20.9	mg/kg	1.6E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.5E-07	5.7E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Cadmium	3.66	mg/kg	4.8E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.003
				Cobalt	13	mg/kg	1.7E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.9E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Copper	11700	mg/kg	1.5E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.3E-03	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.1

TABLE 7.3.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Iron	102000	mg/kg	1.3E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.7E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.07
				Lead	2210	mg/kg	2.9E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.0E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	2.5E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.7E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.04
				Mercury	3.66	mg/kg	4.8E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.006
				Nickel	707	mg/kg	9.2E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.2E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.02
				Thallium	0.154	mg/kg	2.0E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	4.3E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.003
				Zinc	2200	mg/kg	2.9E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.0E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.003
				Cyanide	34	mg/kg	4.4E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-05	(mg/kg/day)	6.0E-04	(mg/kg/day)	0.03
			Exp. Route Total								2.4E-06					1.0
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	7.1E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	5.2E-07	3.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	1.6E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.3E-08	5.4E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Cadmium	3.66	mg/kg	9.1E-11	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.2E-09	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0001
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-04	(mg/kg/day)	--
			Exp. Route Total								5.4E-07					0.002
		Exposure Point Total									2.9E-06					1.0
	Exposure Medium Total										2.9E-06					1.0
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	5.3E-12	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	5.8E-12	2.9E-11	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	7.1E-06	mg/m^3	2.3E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	8.0E-08	(mg/m^3)	5.0E-03	(mg/m^3)	0.00002
				Antimony	4.5E-07	mg/m^3	1.5E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.1E-09	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	5.0E-12	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	2.2E-11	1.8E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00001
				Cadmium	2.7E-09	mg/m^3	8.8E-13	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	1.6E-12	3.1E-11	(mg/m^3)	1.0E-05	(mg/m^3)	0.000003
				Cobalt	9.6E-09	mg/m^3	3.1E-12	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	2.8E-11	1.1E-10	(mg/m^3)	6.0E-06	(mg/m^3)	0.00002
				Copper	8.6E-06	mg/m^3	2.8E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	9.8E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	2.4E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	8.6E-07	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	5.3E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.9E-08	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	4.6E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.6E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.0003
				Mercury	2.7E-09	mg/m^3	8.8E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.1E-11	(mg/m^3)	3.0E-04	(mg/m^3)	1.0E-7
				Nickel	5.2E-07	mg/m^3	1.7E-10	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	4.4E-11	5.9E-09	(mg/m^3)	9.0E-05	(mg/m^3)	0.00007
				Thallium	1.1E-10	mg/m^3	3.7E-14	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.3E-12	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.4E-08	mg/m^3	8.0E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.8E-10	(mg/m^3)	1.0E-04	(mg/m^3)	0.000003
				Zinc	1.6E-06	mg/m^3	5.3E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.8E-08	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	7.1E-03	mg/m^3	2.3E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	8.1E-05	(mg/m^3)	8.0E-04	(mg/m^3)	0.1
			Exp. Route Total								1.0E-10					0.1
		Exposure Point Total									1.0E-10					0.1
	Exposure Medium Total										1.0E-10					0.1
Medium Total											2.9E-06					1.1
										Total of Receptor Risks Across All Media	1.3E-05				Total of Receptor Hazards Across All Media	1.2

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.4.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	8.7E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	6.4E-07	5.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	5.1E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.1E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0005
				Antimony	1	mg/kg	4.3E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.3E-08	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.0001
				Arsenic	13.7	mg/kg	3.5E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	5.3E-08	3.5E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Cobalt	11.7	mg/kg	5.0E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.0E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Copper	312	mg/kg	1.3E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-05	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.0003
				Iron	30100	mg/kg	1.3E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-03	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.002
				Lead	213	mg/kg	9.1E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.1E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	1.9E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-05	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.0008
				Nickel	83.7	mg/kg	3.6E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.6E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0002
				Silver	0	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-03	(mg/kg/day)	--
				Thallium	0.2	mg/kg	8.6E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.6E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	1.6E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-06	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.0003
			Exp. Route Total								6.9E-07					0.007
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	2.7E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.0E-07	1.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.7	mg/kg	4.2E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	6.4E-09	4.2E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0001
				Cobalt	11.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	213	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Silver	0	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								2.1E-07					0.0001
		Exposure Point Total									9.0E-07					0.007
	Exposure Medium Total										9.0E-07					0.007
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	1.7E-11	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	1.9E-11	1.1E-10	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	8.8E-06	mg/m^3	1.0E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-07	(mg/m^3)	5.0E-03	(mg/m^3)	0.00002
				Antimony	7.4E-10	mg/m^3	8.4E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	8.4E-12	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.0E-08	mg/m^3	1.1E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	4.9E-11	1.1E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.000008
				Cobalt	8.6E-09	mg/m^3	9.8E-12	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	8.8E-11	9.8E-11	(mg/m^3)	6.0E-06	(mg/m^3)	0.00002
				Copper	2.3E-07	mg/m^3	2.6E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.6E-09	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	2.5E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.5E-07	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-07	mg/m^3	1.8E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.8E-09	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	3.7E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.7E-09	(mg/m^3)	5.0E-05	(mg/m^3)	0.00007
				Nickel	6.2E-08	mg/m^3	7.0E-11	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.8E-11	7.0E-10	(mg/m^3)	9.0E-05	(mg/m^3)	0.000008
				Silver	0.0E+00	mg/m^3	0.0E+00	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				Thallium	1.5E-10	mg/m^3	1.7E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.7E-12	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.7E-08	mg/m^3	3.1E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.1E-10	(mg/m^3)	1.0E-04	(mg/m^3)	0.000003
			Exp. Route Total								1.7E-10					0.0001
		Exposure Point Total									1.7E-10					0.0001
	Exposure Medium Total										1.7E-10					0.0001
Medium Total											9.0E-07					0.007
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	2.3E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.7E-07	1.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	4.1E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.1E-04	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.0004
				Antimony	610	mg/kg	2.6E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-05	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.07
				Arsenic	20.9	mg/kg	5.4E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	8.1E-08	5.4E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Cadmium	3.66	mg/kg	1.6E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0003
				Cobalt	13	mg/kg	5.6E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.6E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Copper	11700	mg/kg	5.0E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.0E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.01

TABLE 7.4.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Iron	102000	mg/kg	4.4E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.4E-03	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.006
				Lead	2210	mg/kg	9.5E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.5E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	8.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.1E-05	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.003
				Mercury	3.66	mg/kg	1.6E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.6E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0005
				Nickel	707	mg/kg	3.0E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.0E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.002
				Thallium	0.154	mg/kg	6.6E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.6E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	1.4E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-06	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.0003
				Zinc	2200	mg/kg	9.4E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.4E-05	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0003
				Cyanide	34	mg/kg	1.5E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-06	(mg/kg/day)	6.0E-04	(mg/kg/day)	0.002
			Exp. Route Total								2.5E-07					0.10
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	7.2E-09	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	5.2E-08	4.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	6.5E-09	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	9.7E-09	6.5E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0002
				Cadmium	3.66	mg/kg	3.8E-11	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.8E-10	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.00002
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-04	(mg/kg/day)	--
			Exp. Route Total								6.2E-08					0.0002
		Exposure Point Total									3.1E-07					0.10
	Exposure Medium Total										3.1E-07					0.10
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	4.5E-12	(mg/m^3)	1.1E-03	(ug/m^3)$^{-1}$	4.9E-12	2.9E-11	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	7.1E-06	mg/m^3	8.0E-09	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	8.0E-08	(mg/m^3)	5.0E-03	(mg/m^3)	0.00002
				Antimony	4.5E-07	mg/m^3	5.1E-10	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	5.1E-09	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	1.8E-11	(mg/m^3)	4.3E-03	(ug/m^3)$^{-1}$	7.5E-11	1.8E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00001
				Cadmium	2.7E-09	mg/m^3	3.1E-12	(mg/m^3)	1.8E-03	(ug/m^3)$^{-1}$	5.5E-12	3.1E-11	(mg/m^3)	1.0E-05	(mg/m^3)	0.000003
				Cobalt	9.6E-09	mg/m^3	1.1E-11	(mg/m^3)	9.0E-03	(ug/m^3)$^{-1}$	9.8E-11	1.1E-10	(mg/m^3)	6.0E-06	(mg/m^3)	0.00002
				Copper	8.6E-06	mg/m^3	9.8E-09	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	9.8E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	8.6E-08	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	8.6E-07	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	1.9E-09	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	1.9E-08	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	1.6E-09	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	1.6E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.0003
				Mercury	2.7E-09	mg/m^3	3.1E-12	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	3.1E-11	(mg/m^3)	3.0E-04	(mg/m^3)	1.0E-7
				Nickel	5.2E-07	mg/m^3	5.9E-10	(mg/m^3)	2.6E-04	(ug/m^3)$^{-1}$	1.5E-10	5.9E-09	(mg/m^3)	9.0E-05	(mg/m^3)	0.00007
				Thallium	1.1E-10	mg/m^3	1.3E-13	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	1.3E-12	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.4E-08	mg/m^3	2.8E-11	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	2.8E-10	(mg/m^3)	1.0E-04	(mg/m^3)	0.000003
				Zinc	1.6E-06	mg/m^3	1.8E-09	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	1.8E-08	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	7.1E-03	mg/m^3	8.1E-06	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	8.1E-05	(mg/m^3)	8.0E-04	(mg/m^3)	0.1
			Exp. Route Total								3.4E-10					0.1
		Exposure Point Total									3.4E-10					0.1
	Exposure Medium Total										3.4E-10					0.1
Medium Total											3.1E-07					0.2
										Total of Receptor Risks Across All Media	1.2E-06				Total of Receptor Hazards Across All Media	0.2

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.5.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	1.0E-05	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	7.5E-05	5.6E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	1.5E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.1E-02	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.05
				Antimony	1	mg/kg	1.2E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.3E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.01
				Arsenic	13.7	mg/kg	1.0E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.5E-06	3.5E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.1
				Cobalt	11.7	mg/kg	1.4E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.0E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.2
				Copper	312	mg/kg	3.8E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-03	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.03
				Iron	30100	mg/kg	3.7E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-01	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.2
				Lead	213	mg/kg	2.6E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.1E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	5.4E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-03	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.08
				Nickel	83.7	mg/kg	1.0E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.6E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.02
				Silver	0	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-03	(mg/kg/day)	--
				Thallium	0.2	mg/kg	2.4E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	4.5E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-04	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.03
			Exp. Route Total								7.7E-05					0.7
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	1.3E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9.3E-06	6.9E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.7	mg/kg	4.8E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	7.1E-08	1.7E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.006
				Cobalt	11.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	213	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Silver	0	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								9.4E-06					0.006
		Exposure Point Total									8.6E-05					0.7
	Exposure Medium Total										8.6E-05					0.7
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	1.1E-09	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	1.3E-09	6.1E-09	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	8.8E-06	mg/m^3	1.6E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.7E-06	(mg/m^3)	5.0E-03	(mg/m^3)	0.001
				Antimony	7.4E-10	mg/m^3	1.3E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.7E-10	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.0E-08	mg/m^3	1.8E-10	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	7.9E-10	6.5E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0004
				Cobalt	8.6E-09	mg/m^3	1.6E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	1.4E-09	5.5E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.0009
				Copper	2.3E-07	mg/m^3	4.2E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.5E-07	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	4.1E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.4E-05	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-07	mg/m^3	2.9E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-07	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	5.9E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.1E-07	(mg/m^3)	5.0E-05	(mg/m^3)	0.004
				Nickel	6.2E-08	mg/m^3	1.1E-09	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	2.9E-10	3.9E-08	(mg/m^3)	9.0E-05	(mg/m^3)	0.0004
				Silver	0.0E+00	mg/m^3	0.0E+00	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				Thallium	1.5E-10	mg/m^3	2.7E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	9.4E-11	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.7E-08	mg/m^3	5.0E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.7E-08	(mg/m^3)	1.0E-04	(mg/m^3)	0.0002
			Exp. Route Total								3.8E-09					0.007
		Exposure Point Total									3.8E-09					0.007
	Exposure Medium Total										3.8E-09					0.007
Medium Total											8.6E-05					0.7
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	2.7E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.0E-05	1.5E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	1.2E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.1E-02	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.04
				Antimony	610	mg/kg	7.4E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-03	(mg/kg/day)	4.0E-04	(mg/kg/day)	6.5
				Arsenic	20.9	mg/kg	1.5E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.3E-06	5.4E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.2
				Cadmium	3.66	mg/kg	4.5E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.03
				Cobalt	13	mg/kg	1.6E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.6E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.2
				Copper	11700	mg/kg	1.4E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.0E-02	(mg/kg/day)	4.0E-02	(mg/kg/day)	1.3

TABLE 7.5.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Iron	102000	mg/kg	1.2E-02	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	4.4E-01	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.6
				Lead	2210	mg/kg	2.7E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.4E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	2.3E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	8.1E-03	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.3
				Mercury	3.66	mg/kg	4.5E-07	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.6E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.05
				Nickel	707	mg/kg	8.6E-05	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	3.0E-03	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.2
				Thallium	0.154	mg/kg	1.9E-08	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	6.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	4.1E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.4E-04	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.03
				Zinc	2200	mg/kg	2.7E-04	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	9.4E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.03
				Cyanide	34	mg/kg	4.2E-06	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-04	(mg/kg/day)	6.0E-04	(mg/kg/day)	0.2
			Exp. Route Total								2.2E-05					9.7
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	3.3E-07	(mg/kg/day)	7.3E+00	(mg/kg/day)$^{-1}$	2.4E-06	1.8E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	7.3E-08	(mg/kg/day)	1.5E+00	(mg/kg/day)$^{-1}$	1.1E-07	2.5E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.008
				Cadmium	3.66	mg/kg	4.2E-10	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	1.5E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0006
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)$^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-04	(mg/kg/day)	--
			Exp. Route Total								2.5E-06					0.009
		Exposure Point Total									2.5E-05					9.7
	Exposure Medium Total										2.5E-05					9.7
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	3.0E-10	(mg/m^3)	1.1E-03	(ug/m^3)$^{-1}$	3.3E-10	1.6E-09	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	7.1E-06	mg/m^3	1.3E-07	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	4.5E-06	(mg/m^3)	5.0E-03	(mg/m^3)	0.0009
				Antimony	4.5E-07	mg/m^3	8.2E-09	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	2.9E-07	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	2.8E-10	(mg/m^3)	4.3E-03	(ug/m^3)$^{-1}$	1.2E-09	9.9E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0007
				Cadmium	2.7E-09	mg/m^3	4.9E-11	(mg/m^3)	1.8E-03	(ug/m^3)$^{-1}$	8.9E-11	1.7E-09	(mg/m^3)	1.0E-05	(mg/m^3)	0.0002
				Cobalt	9.6E-09	mg/m^3	1.8E-10	(mg/m^3)	9.0E-03	(ug/m^3)$^{-1}$	1.6E-09	6.1E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.001
				Copper	8.6E-06	mg/m^3	1.6E-07	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	5.5E-06	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	1.4E-06	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	4.8E-05	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	3.0E-08	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	1.0E-06	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	2.6E-08	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	9.0E-07	(mg/m^3)	5.0E-05	(mg/m^3)	0.02
				Mercury	2.7E-09	mg/m^3	4.9E-11	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	1.7E-09	(mg/m^3)	3.0E-04	(mg/m^3)	0.000006
				Nickel	5.2E-07	mg/m^3	9.5E-09	(mg/m^3)	2.6E-04	(ug/m^3)$^{-1}$	2.5E-09	3.3E-07	(mg/m^3)	9.0E-05	(mg/m^3)	0.004
				Thallium	1.1E-10	mg/m^3	2.1E-12	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	7.3E-11	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.4E-08	mg/m^3	4.5E-10	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	1.6E-08	(mg/m^3)	1.0E-04	(mg/m^3)	0.0002
				Zinc	1.6E-06	mg/m^3	3.0E-08	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	1.0E-06	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	7.1E-03	mg/m^3	1.3E-04	(mg/m^3)	NA	(ug/m^3)$^{-1}$	- -	4.5E-03	(mg/m^3)	8.0E-04	(mg/m^3)	5.7
			Exp. Route Total								5.7E-09					5.7
		Exposure Point Total									5.7E-09					5.7
	Exposure Medium Total										5.7E-09					5.7
Medium Total											2.5E-05					15
										Total of Receptor Risks Across All Media	1.1E-04				Total of Receptor Hazards Across All Media	16

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.6.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	8.2E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	6.0E-06	5.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	4.8E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.8E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.005
				Antimony	1	mg/kg	4.0E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.0E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.001
				Arsenic	13.7	mg/kg	3.3E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	4.9E-07	3.3E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Cobalt	11.7	mg/kg	4.7E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.7E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Copper	312	mg/kg	1.3E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.003
				Iron	30100	mg/kg	1.2E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.02
				Lead	213	mg/kg	8.5E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.5E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	1.8E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.8E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.007
				Nickel	83.7	mg/kg	3.4E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.4E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.002
				Silver	0	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-03	(mg/kg/day)	--
				Thallium	0.2	mg/kg	8.0E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	1.5E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.003
			Exp. Route Total								6.5E-06					0.06
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	1.3E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9.4E-07	8.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	12000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	13.7	mg/kg	2.0E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	3.0E-08	2.0E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0007
				Cobalt	11.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	213	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Silver	0	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	37	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
			Exp. Route Total								9.7E-07					0.0007
		Exposure Point Total									7.4E-06					0.07
	Exposure Medium Total										7.4E-06					0.07
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	9.6E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	1.1E-09	6.1E-09	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	8.8E-06	mg/m^3	5.7E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.7E-06	(mg/m^3)	5.0E-03	(mg/m^3)	0.001
				Antimony	7.4E-10	mg/m^3	4.7E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.7E-10	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.0E-08	mg/m^3	6.5E-10	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	2.8E-09	6.5E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0004
				Cobalt	8.6E-09	mg/m^3	5.5E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	5.0E-09	5.5E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.0009
				Copper	2.3E-07	mg/m^3	1.5E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.5E-07	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	1.4E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.4E-05	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-07	mg/m^3	1.0E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-07	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	2.1E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.1E-07	(mg/m^3)	5.0E-05	(mg/m^3)	0.004
				Nickel	6.2E-08	mg/m^3	3.9E-09	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.0E-09	3.9E-08	(mg/m^3)	9.0E-05	(mg/m^3)	0.0004
				Silver	0.0E+00	mg/m^3	0.0E+00	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				Thallium	1.5E-10	mg/m^3	9.4E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	9.4E-11	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.7E-08	mg/m^3	1.7E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.7E-08	(mg/m^3)	1.0E-04	(mg/m^3)	0.0002
			Exp. Route Total								9.8E-09					0.007
		Exposure Point Total									9.8E-09					0.007
	Exposure Medium Total										9.8E-09					0.007
Medium Total											7.4E-06					0.07
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	2.1E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.6E-06	1.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	3.8E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.8E-03	(mg/kg/day)	1.0E+00	(mg/kg/day)	0.004
				Antimony	610	mg/kg	2.4E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.4E-04	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.6
				Arsenic	20.9	mg/kg	5.0E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	7.5E-07	5.0E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Cadmium	3.66	mg/kg	1.5E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.003
				Cobalt	13	mg/kg	5.2E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.2E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Copper	11700	mg/kg	4.7E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.7E-03	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.1

TABLE 7.6.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Iron	102000	mg/kg	4.1E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.1E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.06
				Lead	2210	mg/kg	8.9E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.9E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	7.6E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.6E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.03
				Mercury	3.66	mg/kg	1.5E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.005
				Nickel	707	mg/kg	2.8E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.8E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.01
				Thallium	0.154	mg/kg	6.2E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	1.3E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.003
				Zinc	2200	mg/kg	8.8E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.8E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.003
				Cyanide	34	mg/kg	1.4E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-05	(mg/kg/day)	6.0E-04	(mg/kg/day)	0.02
			Exp. Route Total								2.3E-06					0.9
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	3.4E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.5E-07	2.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aluminum	9590	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E+00	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	3.0E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	4.5E-08	3.0E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Cadmium	3.66	mg/kg	1.8E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.8E-09	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.00007
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Vanadium	33.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.3E-04	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-04	(mg/kg/day)	--
			Exp. Route Total								2.9E-07					0.001
		Exposure Point Total									2.6E-06					0.9
	Exposure Medium Total										2.6E-06					0.9
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	2.5E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.8E-10	1.6E-09	(mg/m^3)	NA	(mg/m^3)	--
				Aluminum	7.1E-06	mg/m^3	4.5E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.5E-06	(mg/m^3)	5.0E-03	(mg/m^3)	0.0009
				Antimony	4.5E-07	mg/m^3	2.9E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.9E-07	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	9.9E-10	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	4.2E-09	9.9E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0007
				Cadmium	2.7E-09	mg/m^3	1.7E-10	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	3.1E-10	1.7E-09	(mg/m^3)	1.0E-05	(mg/m^3)	0.0002
				Cobalt	9.6E-09	mg/m^3	6.1E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	5.5E-09	6.1E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.001
				Copper	8.6E-06	mg/m^3	5.5E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.5E-06	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	4.8E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.8E-05	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	1.0E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-06	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	9.0E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	9.0E-07	(mg/m^3)	5.0E-05	(mg/m^3)	0.02
				Mercury	2.7E-09	mg/m^3	1.7E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.7E-09	(mg/m^3)	3.0E-04	(mg/m^3)	0.000006
				Nickel	5.2E-07	mg/m^3	3.3E-08	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	8.7E-09	3.3E-07	(mg/m^3)	9.0E-05	(mg/m^3)	0.004
				Thallium	1.1E-10	mg/m^3	7.3E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.3E-11	(mg/m^3)	NA	(mg/m^3)	--
				Vanadium	2.4E-08	mg/m^3	1.6E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.6E-08	(mg/m^3)	1.0E-04	(mg/m^3)	0.0002
				Zinc	1.6E-06	mg/m^3	1.0E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-06	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	7.1E-03	mg/m^3	4.5E-04	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.5E-03	(mg/m^3)	8.0E-04	(mg/m^3)	5.7
			Exp. Route Total								1.9E-08					5.7
		Exposure Point Total									1.9E-08					5.7
	Exposure Medium Total										1.9E-08					5.7
Medium Total											2.6E-06					6.6
										Total of Receptor Risks Across All Media	1.0E-05				Total of Receptor Hazards Across All Media	6.7

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

RAGS Part D Table 9

Summary of Receptor Risks and Hazards for COPCs

LIST OF TABLES
RAGS PART D TABLE 9
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

Table No.	
	Reasonable Maximum Exposures
9.1.RME	Construction Workers
9.2.RME	Occupational Workers
9.3.RME	Child Recreational Users
9.4.RME	Adult Recreational Users
9.5.RME	Lifelong Recreational Users
9.6.RME	Child Residents
9.7.RME	Adult Residents
9.8.RME	Lifelong Residents
	Central Tendency Exposures
9.1.CTE	Construction Workers
9.2.CTE	Occupational Workers
9.3.CTE	Child Recreational Users
9.4.CTE	Adult Recreational Users
9.5.CTE	Lifelong Recreational Users
9.6.CTE	Child Residents
9.7.CTE	Adult Residents
9.8.CTE	Lifelong Residents

TABLE 9.1.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	2E-06	--	1E-06	--	3E-06	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.02	--	--	0.02
			Antimony	- -	--	- -	--	- -	Blood	0.004	--	--	0.004
			Arsenic	3E-07	--	5E-08	--	3E-07	Skin, CVS	0.05	--	0.007	0.05
			Cobalt	- -	--	- -	--	- -	Thyroid	0.007	--	--	0.007
			Copper	- -	--	- -	--	- -	GS	0.01	--	--	0.01
			Iron	- -	--	- -	--	- -	GS	0.07	--	--	0.07
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.03	--	--	0.03
			Nickel	- -	--	- -	--	- -	Body Weight	0.007	--	--	0.007
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.006	--	--	0.006
			Chemical Total	3E-06	--	1E-06	--	4E-06		0.2	--	0.007	0.2
		Exposure Point Total						4E-06					0.2
	Exposure Medium Total							4E-06					0.2
	Air	OU8	Benzo(a)pyrene Equivalents	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.0002	--	0.0002
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	8E-11	--	--	8E-11	NA	--	0.00009	--	0.00009
			Cobalt	--	2E-10	--	--	2E-10	Respiratory	--	0.00006	--	0.00006
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.0009	--	0.0009
			Nickel	--	3E-11	--	--	3E-11	Respiratory	--	0.00004	--	0.00004
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.00004	--	0.00004
			Chemical Total	--	3E-10	--	--	3E-10		- -	0.001	- -	0.001
		Exposure Point Total						3E-10					0.001
	Exposure Medium Total							3E-10					0.001
Medium Total								4E-06					0.2
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	6E-07	--	3E-07	--	9E-07	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.02	--	--	0.02
			Antimony	- -	--	- -	--	- -	Blood	3	--	--	3
			Arsenic	5E-07	--	7E-08	--	5E-07	Skin, CVS	0.07	--	0.01	0.08
			Cadmium	- -	--	- -	--	- -	Kidney	0.01	--	0.0008	0.01
			Cobalt	- -	--	- -	--	- -	Thyroid	0.007	--	--	0.007
			Copper	- -	--	- -	--	- -	GS	0.5	--	--	0.5
			Iron	- -	--	- -	--	- -	GS	0.2	--	--	0.2
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.1	--	--	0.1
			Mercury	- -	--	- -	--	- -	CNS	0.003	--	--	0.003
			Nickel	- -	--	- -	--	- -	Body Weight	0.06	--	--	0.06
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.006	--	--	0.006
			Zinc	- -	--	- -	--	- -	Blood	0.01	--	--	0.01
			Cyanide	- -	--	- -	--	- -	yroid, CNS, Body Wei	0.003	--	--	0.003
			Chemical Total	1E-06	--	3E-07	--	1E-06		4	--	0.01	4
		Exposure Point Total						1E-06					4
	Exposure Medium Total							1E-06					4

TABLE 9.1.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Air	OU8	Benzo(a)pyrene Equivalents	--	5E-12	--	--	5E-12	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.0002	--	0.0002
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	1E-10	--	--	1E-10	NA	--	0.0001	--	0.0001
			Cadmium	--	9E-12	--	--	9E-12	Kidney	--	0.00004	--	0.00004
			Cobalt	--	2E-10	--	--	2E-10	Respiratory	--	0.00007	--	0.00007
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.004	--	0.004
			Mercury	--	- -	--	--	- -	CNS	--	0.000001	--	0.000001
			Nickel	--	3E-10	--	--	3E-10	Respiratory	--	0.0004	--	0.0004
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.00003	--	0.00003
			Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	7	--	7
			Chemical Total	--	6E-10	--	--	6E-10		- -	8	- -	8
		Exposure Point Total						6E-10					8
	Exposure Medium Total							6E-10					8
Medium Total								1E-06					11
Groundwater	Groundwater	OU8	Manganese	- -	--	- -	--	- -	CNS	0.001	--	0.04	0.04
			Chemical Total	- -	--	- -	--	- -		0.001	--	0.04	0.04
		Exposure Point Total						- -					0.04
	Exposure Medium Total							- -					0.04
Medium Total								- -					0.04
Receptor Total							Receptor Risk Total	5E-06				Receptor HI Total	11

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	3
Total Body Weight HI	0.07
Total CNS HI	0.3
Total CVS HI	0.1
Total GS HI	0.8
Total Kidney HI	0.03
Total Respiratory HI	0.0006
Total Skin HI	0.1
Total Thyroid HI	8

TABLE 9.2.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	3E-05	--	2E-05	--	4E-05	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.01	--	--	0.01
			Antimony	- -	--	- -	--	- -	Blood	0.002	--	--	0.002
			Arsenic	4E-06	--	8E-07	--	5E-06	Skin, CVS	0.02	--	0.005	0.03
			Cobalt	- -	--	- -	--	- -	Thyroid	0.03	--	--	0.03
			Copper	- -	--	- -	--	- -	GS	0.007	--	--	0.007
			Iron	- -	--	- -	--	- -	GS	0.04	--	--	0.04
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.02	--	--	0.02
			Nickel	- -	--	- -	--	- -	Body Weight	0.004	--	--	0.004
			Silver	- -	--	- -	--	- -	Skin	--	--	--	--
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.006	--	--	0.006
			Chemical Total	3E-05	--	2E-05	--	5E-05		0.1	--	0.005	0.1
		Exposure Point Total						5E-05					0.1
	Exposure Medium Total							5E-05					0.1
	Air	OU8	Benzo(a)pyrene Equivalents	--	9E-10	--	--	9E-10	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.0004	--	0.0004
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	4E-09	--	--	4E-09	NA	--	0.0002	--	0.0002
			Cobalt	--	6E-09	--	--	6E-09	Respiratory	--	0.0003	--	0.0003
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.001	--	0.001
			Nickel	--	1E-09	--	--	1E-09	Respiratory	--	0.0002	--	0.0002
			Silver	--	- -	--	--	- -	NA	--	--	--	--
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.00006	--	0.00006
			Chemical Total	--	1E-08	--	--	1E-08		- -	0.003	- -	0.003
		Exposure Point Total						1E-08					0.003
	Exposure Medium Total							1E-08					0.003
Medium Total								5E-05					0.1
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	8E-06	--	4E-06	--	1E-05	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.008	--	--	0.008
			Antimony	- -	--	- -	--	- -	Blood	1	--	--	1
			Arsenic	6E-06	--	1E-06	--	7E-06	Skin, CVS	0.04	--	0.008	0.04
			Cadmium	- -	--	- -	--	- -	Kidney	0.006	--	0.0005	0.007
			Cobalt	- -	--	- -	--	- -	Thyroid	0.04	--	--	0.04
			Copper	- -	--	- -	--	- -	GS	0.3	--	--	0.3
			Iron	- -	--	- -	--	- -	GS	0.1	--	--	0.1
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.07	--	--	0.07
			Mercury	- -	--	- -	--	- -	CNS	0.01	--	--	0.01
			Nickel	- -	--	- -	--	- -	Body Weight	0.03	--	--	0.03
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.006	--	--	0.006
			Zinc	- -	--	- -	--	- -	Blood	0.006	--	--	0.006
			Cyanide	- -	--	- -	--	- -	Thyroid, CNS	0.05	--	--	0.05
			Chemical Total	1E-05	--	5E-06	--	2E-05		2	--	0.008	2
		Exposure Point Total						2E-05					2
	Exposure Medium Total							2E-05					2

TABLE 9.2.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Air	OU8	Benzo(a)pyrene Equivalents	--	2E-10	--	--	2E-10	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.0003	--	0.0003
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	5E-09	--	--	5E-09	NA	--	0.0002	--	0.0002
			Cadmium	--	4E-10	--	--	4E-10	Kidney	--	0.00006	--	0.00006
			Cobalt	--	7E-09	--	--	7E-09	Respiratory	--	0.0004	--	0.0004
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.006	--	0.006
			Mercury	--	- -	--	--	- -	CNS	--	0.000002	--	0.000002
			Nickel	--	1E-08	--	--	1E-08	Respiratory	--	0.001	--	0.001
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.00006	--	0.00006
			Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	2	--	2
			Chemical Total	--	2E-08	--	--	2E-08		- -	2	- -	2
		Exposure Point Total						2E-08					2
	Exposure Medium Total							2E-08					2
Medium Total								2E-05					4
Receptor Total							Receptor Risk Total	7E-05				Receptor HI Total	4

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	1
Total Body Weight HI	0.03
Total CNS HI	0.2
Total CVS HI	0.07
Total GS HI	0.4
Total Kidney HI	0.02
Total Respiratory HI	0.002
Total Skin HI	0.07
Total Thyroid HI	2

TABLE 9.3.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	8E-05	--	5E-05	--	1E-04	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.02	--	--	0.02
			Antimony	- -	--	- -	--	- -	Blood	0.005	--	--	0.005
			Arsenic	2E-06	--	5E-07	--	2E-06	Skin, CVS	0.05	--	0.01	0.06
			Cobalt	- -	--	- -	--	- -	Thyroid	0.07	--	--	0.07
			Copper	- -	--	- -	--	- -	GS	0.01	--	--	0.01
			Iron	- -	--	- -	--	- -	GS	0.08	--	--	0.08
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.03	--	--	0.03
			Nickel	- -	--	- -	--	- -	Body Weight	0.008	--	--	0.008
			Silver	- -	--	- -	--	- -	Skin	--	--	--	--
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.01	--	--	0.01
			Chemical Total	8E-05	--	5E-05	--	1E-04		0.3	--	0.01	0.3
		Exposure Point Total						1E-04					0.3
	Exposure Medium Total							1E-04					0.3
	Air	OU8	Benzo(a)pyrene Equivalents	--	2E-10	--	--	2E-10	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.00008	--	0.00008
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	2E-10	--	--	2E-10	NA	--	0.00003	--	0.00003
			Cobalt	--	3E-10	--	--	3E-10	Respiratory	--	0.00007	--	0.00007
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.0003	--	0.0003
			Nickel	--	6E-11	--	--	6E-11	Respiratory	--	0.00003	--	0.00003
			Silver	--	- -	--	--	- -	NA	--	--	--	--
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.00001	--	0.00001
			Chemical Total	--	8E-10	--	--	8E-10		- -	0.0005	- -	0.0005
		Exposure Point Total						8E-10					0.0005
	Exposure Medium Total							8E-10					0.0005
Medium Total								1E-04					0.3
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-05	--	1E-05	--	3E-05	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.02	--	--	0.02
			Antimony	- -	--	- -	--	- -	Blood	3	--	--	3
			Arsenic	3E-06	--	7E-07	--	4E-06	Skin, CVS	0.08	--	0.02	0.09
			Cadmium	- -	--	- -	--	- -	Kidney	0.01	--	0.001	0.01
			Cobalt	- -	--	- -	--	- -	Thyroid	0.08	--	--	0.08
			Copper	- -	--	- -	--	- -	GS	0.5	--	--	0.5
			Iron	- -	--	- -	--	- -	GS	0.3	--	--	0.3
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.1	--	--	0.1
			Mercury	- -	--	- -	--	- -	CNS	0.02	--	--	0.02
			Nickel	- -	--	- -	--	- -	Body Weight	0.06	--	--	0.06
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.01	--	--	0.01
			Zinc	- -	--	- -	--	- -	Blood	0.01	--	--	0.01
			Cyanide	- -	--	- -	--	- -	Thyroid, CNS	0.1	--	--	0.1
			Chemical Total	2E-05	--	1E-05	--	4E-05		4	--	0.02	4

TABLE 9.3.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Subsurface Soil	Exposure Point Total						4E-05					4
	Exposure Medium Total							4E-05					4
	Air	OU8	Benzo(a)pyrene Equivalents	--	6E-11	--	--	6E-11	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.00006	--	0.00006
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	3E-10	--	--	3E-10	NA	--	0.00005	--	0.00005
			Cadmium	--	2E-11	--	--	2E-11	Kidney	--	0.00001	--	0.00001
			Cobalt	--	3E-10	--	--	3E-10	Respiratory	--	0.00007	--	0.00007
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.001	--	0.001
			Mercury	--	- -	--	--	- -	CNS	--	0.0000004	--	0.0000004
			Nickel	--	5E-10	--	--	5E-10	Respiratory	--	0.0003	--	0.0003
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.00001	--	0.00001
			Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	0.4	--	0.4
			Chemical Total	--	1E-09	--	--	1E-09		- -	0.4	- -	0.4
		Exposure Point Total						1E-09					0.4
	Exposure Medium Total							1E-09					0.4
Medium Total								4E-05					5
Receptor Total							Receptor Risk Total	2E-04				Receptor HI Total	5

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	3
Total Body Weight HI	0.07
Total CNS HI	0.3
Total CVS HI	0.2
Total GS HI	0.9
Total Kidney HI	0.04
Total Respiratory HI	0.0005
Total Skin HI	0.2
Total Thyroid HI	0.7

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	9E-06	--	1E-05	--	2E-05	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.002	--	--	0.002
			Antimony	- -	--	- -	--	- -	Blood	0.0004	--	--	0.0004
			Arsenic	6E-07	--	3E-07	--	9E-07	Skin, CVS	0.005	--	0.002	0.007
			Cobalt	- -	--	- -	--	- -	Thyroid	0.007	--	--	0.007
			Copper	- -	--	- -	--	- -	GS	0.001	--	--	0.001
			Iron	- -	--	- -	--	- -	GS	0.007	--	--	0.007
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.003	--	--	0.003
			Nickel	- -	--	- -	--	- -	Body Weight	0.0007	--	--	0.0007
			Silver	- -	--	- -	--	- -	Skin	--	--	--	--
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.001	--	--	0.001
			Chemical Total	1E-05	--	1E-05	--	2E-05		0.03	--	0.002	0.03
		Exposure Point Total						2E-05					0.03
	Exposure Medium Total							2E-05					0.03
	Air	OU8	Benzo(a)pyrene Equivalents	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.00008	--	0.00008
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	6E-10	--	--	6E-10	NA	--	0.00003	--	0.00003
			Cobalt	--	1E-09	--	--	1E-09	Respiratory	--	0.00007	--	0.00007
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.0003	--	0.0003
			Nickel	--	2E-10	--	--	2E-10	Respiratory	--	0.00003	--	0.00003
			Silver	--	- -	--	--	- -	NA	--	--	--	--
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.00001	--	0.00001
			Chemical Total	--	2E-09	--	--	2E-09		- -	0.0005	- -	0.0005
		Exposure Point Total						2E-09					0.0005
	Exposure Medium Total							2E-09					0.0005
Medium Total								2E-05					0.03
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-06	--	3E-06	--	5E-06	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.002	--	--	0.002
			Antimony	- -	--	- -	--	- -	Blood	0.3	--	--	0.3
			Arsenic	9E-07	--	4E-07	--	1E-06	Skin, CVS	0.007	--	0.003	0.01
			Cadmium	- -	--	- -	--	- -	Kidney	0.001	--	0.0002	0.001
			Cobalt	- -	--	- -	--	- -	Thyroid	0.007	--	--	0.007
			Copper	- -	--	- -	--	- -	GS	0.05	--	--	0.05
			Iron	- -	--	- -	--	- -	GS	0.02	--	--	0.02
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.01	--	--	0.01
			Mercury	- -	--	- -	--	- -	CNS	0.002	--	--	0.002
			Nickel	- -	--	- -	--	- -	Body Weight	0.006	--	--	0.006
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.001	--	--	0.001
			Zinc	- -	--	- -	--	- -	Blood	0.001	--	--	0.001
			Cyanide	- -	--	- -	--	- -	Thyroid, CNS	0.010	--	--	0.010
			Chemical Total	3E-06	--	3E-06	--	6E-06		0.4	--	0.003	0.4

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Subsurface Soil	Exposure Point Total						6E-06					0.4
	Exposure Medium Total							6E-06					0.4
	Air	OU8	Benzo(a)pyrene Equivalents	--	7E-11	--	--	7E-11	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.00006	--	0.00006
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	9E-10	--	--	9E-10	NA	--	0.00005	--	0.00005
			Cadmium	--	6E-11	--	--	6E-11	Kidney	--	0.00001	--	0.00001
			Cobalt	--	1E-09	--	--	1E-09	Respiratory	--	0.00007	--	0.00007
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.001	--	0.001
			Mercury	--	- -	--	--	- -	CNS	--	0.0000004	--	0.0000004
			Nickel	--	2E-09	--	--	2E-09	Respiratory	--	0.0003	--	0.0003
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.00001	--	0.00001
			Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	0.4	--	0.4
			Chemical Total	--	4E-09	--	--	4E-09		- -	0.4	- -	0.4
		Exposure Point Total						4E-09					0.4
	Exposure Medium Total							4E-09					0.4
Medium Total								6E-06					0.8
Receptor Total							Receptor Risk Total	3E-05				Receptor HI Total	0.8

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	0.3
Total Body Weight HI	0.007
Total CNS HI	0.03
Total CVS HI	0.02
Total GS HI	0.08
Total Kidney HI	0.004
Total Respiratory HI	0.0005
Total Skin HI	0.02
Total Thyroid HI	0.4

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	9E-05	--	6E-05	--	1E-04					
			Aluminum	- -	--	- -	--	- -					
			Antimony	- -	--	- -	--	- -					
			Arsenic	3E-06	--	7E-07	--	3E-06					
			Cobalt	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Manganese	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Silver	- -	--	- -	--	- -					
			Thallium	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Chemical Total	9E-05	--	6E-05	--	2E-04					
		Exposure Point Total						2E-04					
	Exposure Medium Total							2E-04					
	Air	OU8	Benzo(a)pyrene Equivalents	--	5E-10	--	--	5E-10					
			Aluminum	--	- -	--	--	- -					
			Antimony	--	- -	--	--	- -					
			Arsenic	--	7E-10	--	--	7E-10					
			Cobalt	--	1E-09	--	--	1E-09					
			Copper	--	- -	--	--	- -					
			Iron	--	- -	--	--	- -					
			Lead	--	- -	--	--	- -					
			Manganese	--	- -	--	--	- -					
			Nickel	--	3E-10	--	--	3E-10					
			Silver	--	- -	--	--	- -					
			Thallium	--	- -	--	--	- -					
			Vanadium	--	- -	--	--	- -					
			Chemical Total	--	3E-09	--	--	3E-09					
		Exposure Point Total						3E-09					
	Exposure Medium Total							3E-09					
Medium Total								2E-04					
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-05	--	2E-05	--	4E-05					
			Aluminum	- -	--	- -	--	- -					
			Antimony	- -	--	- -	--	- -					
			Arsenic	4E-06	--	1E-06	--	5E-06					
			Cadmium	- -	--	- -	--	- -					
			Cobalt	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Manganese	- -	--	- -	--	- -					
			Mercury	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Thallium	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Zinc	- -	--	- -	--	- -					
			Cyanide	- -	--	- -	--	- -					
			Chemical Total	3E-05	--	2E-05	--	4E-05					

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Subsurface Soil	Exposure Point Total						4E-05					
	Exposure Medium Total							4E-05					
	Air	OU8	Benzo(a)pyrene Equivalents	--	1E-10	--	--	1E-10					
			Aluminum	--	- -	--	--	- -					
			Antimony	--	- -	--	--	- -					
			Arsenic	--	1E-09	--	--	1E-09					
			Cadmium	--	8E-11	--	--	8E-11					
			Cobalt	--	1E-09	--	--	1E-09					
			Copper	--	- -	--	--	- -					
			Iron	--	- -	--	--	- -					
			Lead	--	- -	--	--	- -					
			Manganese	--	- -	--	--	- -					
			Mercury	--	- -	--	--	- -					
			Nickel	--	2E-09	--	--	2E-09					
			Thallium	--	- -	--	--	- -					
			Vanadium	--	- -	--	--	- -					
			Zinc	--	- -	--	--	- -					
			Cyanide	--	- -	--	--	- -					
			Chemical Total	--	5E-09	--	--	5E-09					
		Exposure Point Total						5E-09					
	Exposure Medium Total							5E-09					
Medium Total								4E-05					
Receptor Total							Receptor Risk Total	2E-04					

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.6.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	6E-04	--	2E-04	--	7E-04	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.2	--	--	0.2
			Antimony	- -	--	- -	--	- -	Blood	0.03	--	--	0.03
			Arsenic	1E-05	--	2E-06	--	2E-05	Skin, CVS	0.4	--	0.04	0.4
			Cobalt	- -	--	- -	--	- -	Thyroid	0.5	--	--	0.5
			Copper	- -	--	- -	--	- -	GS	0.10	--	--	0.10
			Iron	- -	--	- -	--	- -	GS	0.5	--	--	0.5
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.2	--	--	0.2
			Nickel	- -	--	- -	--	- -	Body Weight	0.05	--	--	0.05
			Silver	- -	--	- -	--	- -	Skin	--	--	--	--
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.09	--	--	0.09
			Chemical Total	6E-04	--	2E-04	--	7E-04		2	--	0.04	2
		Exposure Point Total						7E-04					2
	Exposure Medium Total							7E-04					2
	Air	OU8	Benzo(a)pyrene Equivalents	--	5E-09	--	--	5E-09	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.002	--	0.002
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	4E-09	--	--	4E-09	NA	--	0.0006	--	0.0006
			Cobalt	--	6E-09	--	--	6E-09	Respiratory	--	0.001	--	0.001
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.006	--	0.006
			Nickel	--	1E-09	--	--	1E-09	Respiratory	--	0.0007	--	0.0007
			Silver	--	- -	--	--	- -	NA	--	--	--	--
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.0003	--	0.0003
			Chemical Total	--	2E-08	--	--	2E-08		- -	0.01	- -	0.01
		Exposure Point Total						2E-08					0.01
	Exposure Medium Total							2E-08					0.01
Medium Total								7E-04					2
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	1E-04	--	4E-05	--	2E-04	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.1	--	--	0.1
			Antimony	- -	--	- -	--	- -	Blood	19	--	--	19
			Arsenic	2E-05	--	2E-06	--	2E-05	Skin, CVS	0.5	--	0.06	0.6
			Cadmium	- -	--	- -	--	- -	Kidney	0.09	--	0.004	0.10
			Cobalt	- -	--	- -	--	- -	Thyroid	0.6	--	--	0.6
			Copper	- -	--	- -	--	- -	GS	4	--	--	4
			Iron	- -	--	- -	--	- -	GS	2	--	--	2
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	1	--	--	1
			Mercury	- -	--	- -	--	- -	CNS	0.2	--	--	0.2
			Nickel	- -	--	- -	--	- -	Body Weight	0.5	--	--	0.5
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.09	--	--	0.09
			Zinc	- -	--	- -	--	- -	Blood	0.09	--	--	0.09
			Cyanide	- -	--	- -	--	- -	Thyroid, CNS	0.7	--	--	0.7
			Chemical Total	2E-04	--	5E-05	--	2E-04		29	--	0.07	29

TABLE 9.6.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Subsurface Soil	Exposure Point Total						2E-04					29
	Exposure Medium Total							2E-04					29
	Air	OU8	Benzo(a)pyrene Equivalents	--	1E-09	--	--	1E-09	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.001	--	0.001
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	5E-09	--	--	5E-09	NA	--	0.0010	--	0.0010
			Cadmium	--	4E-10	--	--	4E-10	Kidney	--	0.0003	--	0.0003
			Cobalt	--	7E-09	--	--	7E-09	Respiratory	--	0.002	--	0.002
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.03	--	0.03
			Mercury	--	- -	--	--	- -	CNS	--	0.000009	--	0.000009
			Nickel	--	1E-08	--	--	1E-08	Respiratory	--	0.006	--	0.006
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.0002	--	0.0002
			Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	8	--	8
			Chemical Total	--	3E-08	--	--	3E-08		- -	9	- -	9
		Exposure Point Total						3E-08					9
	Exposure Medium Total							3E-08					9
Medium Total								2E-04					38
Receptor Total							Receptor Risk Total	1E-03				Receptor HI Total	40

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	20
Total Body Weight HI	0.5
Total CNS HI	2
Total CVS HI	1.0
Total GS HI	6
Total Kidney HI	0.3
Total Respiratory HI	0.010
Total Skin HI	1.0
Total Thyroid HI	10

TABLE 9.7.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	7E-05	--	4E-05	--	1E-04	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.01	--	--	0.01
			Antimony	- -	--	- -	--	- -	Blood	0.003	--	--	0.003
			Arsenic	4E-06	--	9E-07	--	5E-06	Skin, CVS	0.03	--	0.007	0.04
			Cobalt	- -	--	- -	--	- -	Thyroid	0.05	--	--	0.05
			Copper	- -	--	- -	--	- -	GS	0.009	--	--	0.009
			Iron	- -	--	- -	--	- -	GS	0.05	--	--	0.05
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.02	--	--	0.02
			Nickel	- -	--	- -	--	- -	Body Weight	0.005	--	--	0.005
			Silver	- -	--	- -	--	- -	Skin	--	--	--	--
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.009	--	--	0.009
			Chemical Total	7E-05	--	4E-05	--	1E-04		0.2	--	0.007	0.2
		Exposure Point Total						1E-04					0.2
	Exposure Medium Total							1E-04					0.2
	Air	OU8	Benzo(a)pyrene Equivalents	--	6E-09	--	--	6E-09	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.002	--	0.002
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	1E-08	--	--	1E-08	NA	--	0.0006	--	0.0006
			Cobalt	--	2E-08	--	--	2E-08	Respiratory	--	0.001	--	0.001
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.006	--	0.006
			Nickel	--	4E-09	--	--	4E-09	Respiratory	--	0.0007	--	0.0007
			Silver	--	- -	--	--	- -	NA	--	--	--	--
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.0003	--	0.0003
			Chemical Total	--	4E-08	--	--	4E-08		- -	0.01	- -	0.01
		Exposure Point Total						4E-08					0.01
	Exposure Medium Total							4E-08					0.01
Medium Total								1E-04					0.2
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-05	--	9E-06	--	3E-05	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.01	--	--	0.01
			Antimony	- -	--	- -	--	- -	Blood	2	--	--	2
			Arsenic	6E-06	--	1E-06	--	8E-06	Skin, CVS	0.05	--	0.01	0.06
			Cadmium	- -	--	- -	--	- -	Kidney	0.009	--	0.0007	0.010
			Cobalt	- -	--	- -	--	- -	Thyroid	0.05	--	--	0.05
			Copper	- -	--	- -	--	- -	GS	0.4	--	--	0.4
			Iron	- -	--	- -	--	- -	GS	0.2	--	--	0.2
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.09	--	--	0.09
			Mercury	- -	--	- -	--	- -	CNS	0.01	--	--	0.01
			Nickel	- -	--	- -	--	- -	Body Weight	0.04	--	--	0.04
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.008	--	--	0.008
			Zinc	- -	--	- -	--	- -	Blood	0.009	--	--	0.009
			Cyanide	- -	--	- -	--	- -	Thyroid, CNS	0.07	--	--	0.07
			Chemical Total	2E-05	--	1E-05	--	3E-05		3	--	0.01	3

TABLE 9.7.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Subsurface Soil	Exposure Point Total						3E-05					3
	Exposure Medium Total							3E-05					3
	Air	OU8	Benzo(a)pyrene Equivalents	--	2E-09	--	--	2E-09	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.001	--	0.001
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	2E-08	--	--	2E-08	NA	--	0.0010	--	0.0010
			Cadmium	--	1E-09	--	--	1E-09	Kidney	--	0.0003	--	0.0003
			Cobalt	--	2E-08	--	--	2E-08	Respiratory	--	0.002	--	0.002
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.03	--	0.03
			Mercury	--	- -	--	--	- -	CNS	--	0.000009	--	0.000009
			Nickel	--	4E-08	--	--	4E-08	Respiratory	--	0.006	--	0.006
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.0002	--	0.0002
			Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	8	--	8
			Chemical Total	--	8E-08	--	--	8E-08		- -	9	- -	9
		Exposure Point Total						8E-08					9
	Exposure Medium Total							8E-08					9
Medium Total								3E-05					11
Receptor Total							Receptor Risk Total	1E-04				Receptor HI Total	11

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	2
Total Body Weight HI	0.05
Total CNS HI	0.3
Total CVS HI	0.1
Total GS HI	0.6
Total Kidney HI	0.03
Total Respiratory HI	0.010
Total Skin HI	0.1
Total Thyroid HI	9

TABLE 9.8.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	6E-04	--	2E-04	--	8E-04					
			Aluminum	- -	--	- -	--	- -					
			Antimony	- -	--	- -	--	- -					
			Arsenic	2E-05	--	2E-06	--	2E-05					
			Cobalt	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Manganese	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Silver	- -	--	- -	--	- -					
			Thallium	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Chemical Total	6E-04	--	2E-04	--	8E-04					
		Exposure Point Total						8E-04					
	Exposure Medium Total							8E-04					
	Air	OU8	Benzo(a)pyrene Equivalents	--	1E-08	--	--	1E-08					
			Aluminum	--	- -	--	--	- -					
			Antimony	--	- -	--	--	- -					
			Arsenic	--	2E-08	--	--	2E-08					
			Cobalt	--	3E-08	--	--	3E-08					
			Copper	--	- -	--	--	- -					
			Iron	--	- -	--	--	- -					
			Lead	--	- -	--	--	- -					
			Manganese	--	- -	--	--	- -					
			Nickel	--	6E-09	--	--	6E-09					
			Silver	--	- -	--	--	- -					
			Thallium	--	- -	--	--	- -					
			Vanadium	--	- -	--	--	- -					
			Chemical Total	--	6E-08	--	--	6E-08					
		Exposure Point Total						6E-08					
	Exposure Medium Total							6E-08					
Medium Total								8E-04					
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-04	--	5E-05	--	2E-04					
			Aluminum	- -	--	- -	--	- -					
			Antimony	- -	--	- -	--	- -					
			Arsenic	3E-05	--	4E-06	--	3E-05					
			Cadmium	- -	--	- -	--	- -					
			Cobalt	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Manganese	- -	--	- -	--	- -					
			Mercury	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Thallium	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Zinc	- -	--	- -	--	- -					
			Cyanide	- -	--	- -	--	- -					
			Chemical Total	2E-04	--	6E-05	--	2E-04					

TABLE 9.8.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Subsurface Soil	Exposure Point Total						2E-04					
	Exposure Medium Total							2E-04					
	Air	OU8	Benzo(a)pyrene Equivalents	--	3E-09	--	--	3E-09					
			Aluminum	--	- -	--	--	- -					
			Antimony	--	- -	--	--	- -					
			Arsenic	--	2E-08	--	--	2E-08					
			Cadmium	--	2E-09	--	--	2E-09					
			Cobalt	--	3E-08	--	--	3E-08					
			Copper	--	- -	--	--	- -					
			Iron	--	- -	--	--	- -					
			Lead	--	- -	--	--	- -					
			Manganese	--	- -	--	--	- -					
			Mercury	--	- -	--	--	- -					
			Nickel	--	5E-08	--	--	5E-08					
			Thallium	--	- -	--	--	- -					
			Vanadium	--	- -	--	--	- -					
			Zinc	--	- -	--	--	- -					
			Cyanide	--	- -	--	--	- -					
			Chemical Total	--	1E-07	--	--	1E-07					
		Exposure Point Total						1E-07					
	Exposure Medium Total							1E-07					
Medium Total								2E-04					
Receptor Total							Receptor Risk Total	1E-03					

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.1.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	6E-07	--	2E-07	--	7E-07	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.005	--	--	0.005
			Antimony	- -	--	- -	--	- -	Blood	0.001	--	--	0.001
			Arsenic	7E-08	--	8E-09	--	8E-08	Skin, CVS	0.01	--	0.001	0.01
			Cobalt	- -	--	- -	--	- -	Thyroid	0.002	--	--	0.002
			Copper	- -	--	- -	--	- -	GS	0.003	--	--	0.003
			Iron	- -	--	- -	--	- -	GS	0.02	--	--	0.02
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.008	--	--	0.008
			Nickel	- -	--	- -	--	- -	Body Weight	0.002	--	--	0.002
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.002	--	--	0.002
			Chemical Total	6E-07	--	2E-07	--	8E-07		0.05	--	0.001	0.05
		Exposure Point Total						8E-07					0.05
	Exposure Medium Total							8E-07					0.05
	Air	OU8	Benzo(a)pyrene Equivalents	--	1E-11	--	--	1E-11	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.0001	--	0.0001
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	4E-11	--	--	4E-11	NA	--	0.00005	--	0.00005
			Cobalt	--	8E-11	--	--	8E-11	Respiratory	--	0.00003	--	0.00003
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.0004	--	0.0004
			Nickel	--	2E-11	--	--	2E-11	Respiratory	--	0.00002	--	0.00002
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.00002	--	0.00002
			Chemical Total	--	1E-10	--	--	1E-10		- -	0.0007	- -	0.0007
		Exposure Point Total						1E-10					0.0007
	Exposure Medium Total							1E-10					0.0007
Medium Total								8E-07					0.05
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-07	--	4E-08	--	2E-07	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.004	--	--	0.004
			Antimony	- -	--	- -	--	- -	Blood	0.6	--	--	0.6
			Arsenic	1E-07	--	1E-08	--	1E-07	Skin, CVS	0.02	--	0.002	0.02
			Cadmium	- -	--	- -	--	- -	Kidney	0.003	--	0.0001	0.003
			Cobalt	- -	--	- -	--	- -	Thyroid	0.002	--	--	0.002
			Copper	- -	--	- -	--	- -	GS	0.1	--	--	0.1
			Iron	- -	--	- -	--	- -	GS	0.06	--	--	0.06
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.03	--	--	0.03
			Mercury	- -	--	- -	--	- -	CNS	0.0008	--	--	0.0008
			Nickel	- -	--	- -	--	- -	Body Weight	0.01	--	--	0.01
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.001	--	--	0.001
			Zinc	- -	--	- -	--	- -	Blood	0.003	--	--	0.003
			Cyanide	- -	--	- -	--	- -	yroid, CNS, Body Wei	0.0007	--	--	0.0007
			Chemical Total	3E-07	--	5E-08	--	3E-07		0.9	--	0.002	0.9
		Exposure Point Total						3E-07					0.9
	Exposure Medium Total							3E-07					0.9

TABLE 9.1.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Air	OU8	Benzo(a)pyrene Equivalents	--	3E-12	--	--	3E-12	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.00010	--	0.00010
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	6E-11	--	--	6E-11	NA	--	0.00007	--	0.00007
			Cadmium	--	5E-12	--	--	5E-12	Kidney	--	0.00002	--	0.00002
			Cobalt	--	8E-11	--	--	8E-11	Respiratory	--	0.00003	--	0.00003
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.002	--	0.002
			Mercury	--	- -	--	--	- -	CNS	--	0.0000006	--	0.0000006
			Nickel	--	1E-10	--	--	1E-10	Respiratory	--	0.0002	--	0.0002
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.00002	--	0.00002
			Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	4	--	4
			Chemical Total	--	3E-10	--	--	3E-10		- -	4	- -	4
		Exposure Point Total						3E-10					4
	Exposure Medium Total							3E-10					4
Medium Total								3E-07					5
Groundwater	Groundwater	OU8	Manganese	- -	--	- -	--	- -	CNS	0.001	--	0.02	0.02
			Chemical Total	- -	--	- -	--	- -		0.001	--	0.02	0.02
		Exposure Point Total						- -					0.02
	Exposure Medium Total							- -					0.02
Medium Total								- -					0.02
Receptor Total							Receptor Risk Total	1E-06				Receptor HI Total	5

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	0.7
Total Body Weight HI	0.02
Total CNS HI	0.08
Total CVS HI	0.03
Total GS HI	0.2
Total Kidney HI	0.006
Total Respiratory HI	0.0003
Total Skin HI	0.03
Total Thyroid HI	4

TABLE 9.2.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	5E-06	--	8E-07	--	5E-06	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.005	--	--	0.005
			Antimony	- -	--	- -	--	- -	Blood	0.0009	--	--	0.0009
			Arsenic	6E-07	--	4E-08	--	6E-07	Skin, CVS	0.01	--	0.0007	0.01
			Cobalt	- -	--	- -	--	- -	Thyroid	0.01	--	--	0.01
			Copper	- -	--	- -	--	- -	GS	0.003	--	--	0.003
			Iron	- -	--	- -	--	- -	GS	0.02	--	--	0.02
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.007	--	--	0.007
			Nickel	- -	--	- -	--	- -	Body Weight	0.002	--	--	0.002
			Silver	- -	--	- -	--	- -	Skin	--	--	--	--
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.003	--	--	0.003
			Chemical Total	5E-06	--	9E-07	--	6E-06		0.06	--	0.0007	0.06
		Exposure Point Total						6E-06					0.06
	Exposure Medium Total							6E-06					0.06
	Air	OU8	Benzo(a)pyrene Equivalents	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.0004	--	0.0004
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	1E-09	--	--	1E-09	NA	--	0.0001	--	0.0001
			Cobalt	--	2E-09	--	--	2E-09	Respiratory	--	0.0003	--	0.0003
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.001	--	0.001
			Nickel	--	4E-10	--	--	4E-10	Respiratory	--	0.0001	--	0.0001
			Silver	--	- -	--	--	- -	NA	--	--	--	--
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.00005	--	0.00005
			Chemical Total	--	4E-09	--	--	4E-09		- -	0.002	- -	0.002
		Exposure Point Total						4E-09					0.002
	Exposure Medium Total							4E-09					0.002
Medium Total								6E-06					0.06
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	1E-06	--	2E-07	--	1E-06	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.004	--	--	0.004
			Antimony	- -	--	- -	--	- -	Blood	0.6	--	--	0.6
			Arsenic	9E-07	--	6E-08	--	1E-06	Skin, CVS	0.02	--	0.001	0.02
			Cadmium	- -	--	- -	--	- -	Kidney	0.003	--	0.00008	0.003
			Cobalt	- -	--	- -	--	- -	Thyroid	0.02	--	--	0.02
			Copper	- -	--	- -	--	- -	GS	0.1	--	--	0.1
			Iron	- -	--	- -	--	- -	GS	0.05	--	--	0.05
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.03	--	--	0.03
			Mercury	- -	--	- -	--	- -	CNS	0.005	--	--	0.005
			Nickel	- -	--	- -	--	- -	Body Weight	0.01	--	--	0.01
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.002	--	--	0.002
			Zinc	- -	--	- -	--	- -	Blood	0.003	--	--	0.003
			Cyanide	- -	--	- -	--	- -	Thyroid, CNS	0.02	--	--	0.02
			Chemical Total	2E-06	--	3E-07	--	2E-06		0.8	--	0.001	0.8
		Exposure Point Total						2E-06					0.8
	Exposure Medium Total							2E-06					0.8

TABLE 9.2.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Air	OU8	Benzo(a)pyrene Equivalents	--	7E-11	--	--	7E-11	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.0003	--	0.0003
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	2E-09	--	--	2E-09	NA	--	0.0002	--	0.0002
			Cadmium	--	1E-10	--	--	1E-10	Kidney	--	0.00005	--	0.00005
			Cobalt	--	2E-09	--	--	2E-09	Respiratory	--	0.0003	--	0.0003
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.006	--	0.006
			Mercury	--	- -	--	--	- -	CNS	--	0.000002	--	0.000002
			Nickel	--	3E-09	--	--	3E-09	Respiratory	--	0.001	--	0.001
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.00005	--	0.00005
			Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	2	--	2
			Chemical Total	--	8E-09	--	--	8E-09		- -	2	- -	2
		Exposure Point Total						8E-09					2
	Exposure Medium Total							8E-09					2
Medium Total								2E-06					3
Receptor Total							Receptor Risk Total	8E-06				Receptor HI Total	3

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	0.6
Total Body Weight HI	0.01
Total CNS HI	0.08
Total CVS HI	0.03
Total GS HI	0.2
Total Kidney HI	0.008
Total Respiratory HI	0.002
Total Skin HI	0.03
Total Thyroid HI	2

TABLE 9.3.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	8E-06	--	2E-06	--	1E-05	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.005	--	--	0.005
			Antimony	- -	--	- -	--	- -	Blood	0.001	--	--	0.001
			Arsenic	2E-07	--	2E-08	--	2E-07	Skin, CVS	0.01	--	0.001	0.01
			Cobalt	- -	--	- -	--	- -	Thyroid	0.02	--	--	0.02
			Copper	- -	--	- -	--	- -	GS	0.004	--	--	0.004
			Iron	- -	--	- -	--	- -	GS	0.02	--	--	0.02
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.008	--	--	0.008
			Nickel	- -	--	- -	--	- -	Body Weight	0.002	--	--	0.002
			Silver	- -	--	- -	--	- -	Skin	--	--	--	--
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.003	--	--	0.003
			Chemical Total	8E-06	--	2E-06	--	1E-05		0.07	--	0.001	0.07
		Exposure Point Total						1E-05					0.07
	Exposure Medium Total							1E-05					0.07
	Air	OU8	Benzo(a)pyrene Equivalents	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.00002	--	0.00002
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	1E-11	--	--	1E-11	NA	--	0.000008	--	0.000008
			Cobalt	--	3E-11	--	--	3E-11	Respiratory	--	0.00002	--	0.00002
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.00007	--	0.00007
			Nickel	--	5E-12	--	--	5E-12	Respiratory	--	0.000008	--	0.000008
			Silver	--	- -	--	--	- -	NA	--	--	--	--
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.000003	--	0.000003
			Chemical Total	--	7E-11	--	--	7E-11		- -	0.0001	- -	0.0001
		Exposure Point Total						7E-11					0.0001
	Exposure Medium Total							7E-11					0.0001
Medium Total								1E-05					0.08
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-06	--	5E-07	--	3E-06	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.004	--	--	0.004
			Antimony	- -	--	- -	--	- -	Blood	0.7	--	--	0.7
			Arsenic	2E-07	--	2E-08	--	3E-07	Skin, CVS	0.02	--	0.002	0.02
			Cadmium	- -	--	- -	--	- -	Kidney	0.003	--	0.0001	0.003
			Cobalt	- -	--	- -	--	- -	Thyroid	0.02	--	--	0.02
			Copper	- -	--	- -	--	- -	GS	0.1	--	--	0.1
			Iron	- -	--	- -	--	- -	GS	0.07	--	--	0.07
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.04	--	--	0.04
			Mercury	- -	--	- -	--	- -	CNS	0.006	--	--	0.006
			Nickel	- -	--	- -	--	- -	Body Weight	0.02	--	--	0.02
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.003	--	--	0.003
			Zinc	- -	--	- -	--	- -	Blood	0.003	--	--	0.003
			Cyanide	- -	--	- -	--	- -	Thyroid, CNS	0.03	--	--	0.03
			Chemical Total	2E-06	--	5E-07	--	3E-06		1	--	0.002	1

TABLE 9.3.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Subsurface Soil	Exposure Point Total						3E-06					1
	Exposure Medium Total							3E-06					1
	Air	OU8	Benzo(a)pyrene Equivalents	--	6E-12	--	--	6E-12	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.00002	--	0.00002
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	2E-11	--	--	2E-11	NA	--	0.00001	--	0.00001
			Cadmium	--	2E-12	--	--	2E-12	Kidney	--	0.000003	--	0.000003
			Cobalt	--	3E-11	--	--	3E-11	Respiratory	--	0.00002	--	0.00002
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.0003	--	0.0003
			Mercury	--	- -	--	--	- -	CNS	--	0.0000001	--	0.0000001
			Nickel	--	4E-11	--	--	4E-11	Respiratory	--	0.00007	--	0.00007
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.000003	--	0.000003
			Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	0.1	--	0.1
			Chemical Total	--	1E-10	--	--	1E-10		- -	0.1	- -	0.1
		Exposure Point Total						1E-10					0.1
	Exposure Medium Total							1E-10					0.1
Medium Total								3E-06					1
Receptor Total							Receptor Risk Total	1E-05				Receptor HI Total	1

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	0.7
Total Body Weight HI	0.02
Total CNS HI	0.09
Total CVS HI	0.03
Total GS HI	0.2
Total Kidney HI	0.010
Total Respiratory HI	0.0001
Total Skin HI	0.03
Total Thyroid HI	0.2

TABLE 9.4.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	6E-07	--	2E-07	--	8E-07	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.0005	--	--	0.0005
			Antimony	- -	--	- -	--	- -	Blood	0.0001	--	--	0.0001
			Arsenic	5E-08	--	6E-09	--	6E-08	Skin, CVS	0.001	--	0.0001	0.001
			Cobalt	- -	--	- -	--	- -	Thyroid	0.002	--	--	0.002
			Copper	- -	--	- -	--	- -	GS	0.0003	--	--	0.0003
			Iron	- -	--	- -	--	- -	GS	0.002	--	--	0.002
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.0008	--	--	0.0008
			Nickel	- -	--	- -	--	- -	Body Weight	0.0002	--	--	0.0002
			Silver	- -	--	- -	--	- -	Skin	--	--	--	--
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.0003	--	--	0.0003
			Chemical Total	7E-07	--	2E-07	--	9E-07		0.007	--	0.0001	0.007
		Exposure Point Total						9E-07					0.007
	Exposure Medium Total							9E-07					0.007
	Air	OU8	Benzo(a)pyrene Equivalents	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.00002	--	0.00002
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	5E-11	--	--	5E-11	NA	--	0.000008	--	0.000008
			Cobalt	--	9E-11	--	--	9E-11	Respiratory	--	0.00002	--	0.00002
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.00007	--	0.00007
			Nickel	--	2E-11	--	--	2E-11	Respiratory	--	0.000008	--	0.000008
			Silver	--	- -	--	--	- -	NA	--	--	--	--
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.000003	--	0.000003
			Chemical Total	--	2E-10	--	--	2E-10		- -	0.0001	- -	0.0001
		Exposure Point Total						2E-10					0.0001
	Exposure Medium Total							2E-10					0.0001
Medium Total								9E-07					0.007
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-07	--	5E-08	--	2E-07	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.0004	--	--	0.0004
			Antimony	- -	--	- -	--	- -	Blood	0.07	--	--	0.07
			Arsenic	8E-08	--	1E-08	--	9E-08	Skin, CVS	0.002	--	0.0002	0.002
			Cadmium	- -	--	- -	--	- -	Kidney	0.0003	--	0.00002	0.0003
			Cobalt	- -	--	- -	--	- -	Thyroid	0.002	--	--	0.002
			Copper	- -	--	- -	--	- -	GS	0.01	--	--	0.01
			Iron	- -	--	- -	--	- -	GS	0.006	--	--	0.006
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.003	--	--	0.003
			Mercury	- -	--	- -	--	- -	CNS	0.0005	--	--	0.0005
			Nickel	- -	--	- -	--	- -	Body Weight	0.002	--	--	0.002
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.0003	--	--	0.0003
			Zinc	- -	--	- -	--	- -	Blood	0.0003	--	--	0.0003
			Cyanide	- -	--	- -	--	- -	Thyroid, CNS	0.002	--	--	0.002
			Chemical Total	2E-07	--	6E-08	--	3E-07		0.10	--	0.0002	0.10

TABLE 9.4.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Subsurface Soil	Exposure Point Total						3E-07					0.10
	Exposure Medium Total							3E-07					0.10
	Air	OU8	Benzo(a)pyrene Equivalents	--	5E-12	--	--	5E-12	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.00002	--	0.00002
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	8E-11	--	--	8E-11	NA	--	0.00001	--	0.00001
			Cadmium	--	6E-12	--	--	6E-12	Kidney	--	0.000003	--	0.000003
			Cobalt	--	1E-10	--	--	1E-10	Respiratory	--	0.00002	--	0.00002
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.0003	--	0.0003
			Mercury	--	- -	--	--	- -	CNS	--	0.0000001	--	0.0000001
			Nickel	--	2E-10	--	--	2E-10	Respiratory	--	0.00007	--	0.00007
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.000003	--	0.000003
			Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	0.1	--	0.1
			Chemical Total	--	3E-10	--	--	3E-10		- -	0.1	- -	0.1
		Exposure Point Total						3E-10					0.1
	Exposure Medium Total							3E-10					0.1
Medium Total								3E-07					0.2
Receptor Total							Receptor Risk Total	1E-06				Receptor HI Total	0.2

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	0.07
Total Body Weight HI	0.002
Total CNS HI	0.008
Total CVS HI	0.003
Total GS HI	0.02
Total Kidney HI	0.0009
Total Respiratory HI	0.0001
Total Skin HI	0.003
Total Thyroid HI	0.1

TABLE 9.5.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	9E-06	--	2E-06	--	1E-05					
			Aluminum	- -	--	- -	--	- -					
			Antimony	- -	--	- -	--	- -					
			Arsenic	2E-07	--	2E-08	--	2E-07					
			Cobalt	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Manganese	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Silver	- -	--	- -	--	- -					
			Thallium	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Chemical Total	9E-06	--	2E-06	--	1E-05					
		Exposure Point Total						1E-05					
	Exposure Medium Total							1E-05					
	Air	OU8	Benzo(a)pyrene Equivalents	--	4E-11	--	--	4E-11					
			Aluminum	--	- -	--	--	- -					
			Antimony	--	- -	--	--	- -					
			Arsenic	--	6E-11	--	--	6E-11					
			Cobalt	--	1E-10	--	--	1E-10					
			Copper	--	- -	--	--	- -					
			Iron	--	- -	--	--	- -					
			Lead	--	- -	--	--	- -					
			Manganese	--	- -	--	--	- -					
			Nickel	--	2E-11	--	--	2E-11					
			Silver	--	- -	--	--	- -					
			Thallium	--	- -	--	--	- -					
			Vanadium	--	- -	--	--	- -					
			Chemical Total	--	2E-10	--	--	2E-10					
		Exposure Point Total						2E-10					
	Exposure Medium Total							2E-10					
Medium Total								1E-05					
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-06	--	6E-07	--	3E-06					
			Aluminum	- -	--	- -	--	- -					
			Antimony	- -	--	- -	--	- -					
			Arsenic	3E-07	--	3E-08	--	4E-07					
			Cadmium	- -	--	- -	--	- -					
			Cobalt	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Manganese	- -	--	- -	--	- -					
			Mercury	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Thallium	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Zinc	- -	--	- -	--	- -					
			Cyanide	- -	--	- -	--	- -					
			Chemical Total	3E-06	--	6E-07	--	3E-06					

TABLE 9.5.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Subsurface Soil	Exposure Point Total						3E-06					
	Exposure Medium Total							3E-06					
	Air	OU8	Benzo(a)pyrene Equivalents	--	1E-11	--	--	1E-11					
			Aluminum	--	- -	--	--	- -					
			Antimony	--	- -	--	--	- -					
			Arsenic	--	1E-10	--	--	1E-10					
			Cadmium	--	7E-12	--	--	7E-12					
			Cobalt	--	1E-10	--	--	1E-10					
			Copper	--	- -	--	--	- -					
			Iron	--	- -	--	--	- -					
			Lead	--	- -	--	--	- -					
			Manganese	--	- -	--	--	- -					
			Mercury	--	- -	--	--	- -					
			Nickel	--	2E-10	--	--	2E-10					
			Thallium	--	- -	--	--	- -					
			Vanadium	--	- -	--	--	- -					
			Zinc	--	- -	--	--	- -					
			Cyanide	--	- -	--	--	- -					
			Chemical Total	--	4E-10	--	--	4E-10					
		Exposure Point Total						4E-10					
	Exposure Medium Total							4E-10					
Medium Total								3E-06					
Receptor Total							Receptor Risk Total	1E-05					

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.6.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	8E-05	--	9E-06	--	8E-05	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.05	--	--	0.05
			Antimony	- -	--	- -	--	- -	Blood	0.01	--	--	0.01
			Arsenic	2E-06	--	7E-08	--	2E-06	Skin, CVS	0.1	--	0.006	0.1
			Cobalt	- -	--	- -	--	- -	Thyroid	0.2	--	--	0.2
			Copper	- -	--	- -	--	- -	GS	0.03	--	--	0.03
			Iron	- -	--	- -	--	- -	GS	0.2	--	--	0.2
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.08	--	--	0.08
			Nickel	- -	--	- -	--	- -	Body Weight	0.02	--	--	0.02
			Silver	- -	--	- -	--	- -	Skin	--	--	--	--
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.03	--	--	0.03
			Chemical Total	8E-05	--	9E-06	--	9E-05		0.7	--	0.006	0.7
		Exposure Point Total						9E-05					0.7
	Exposure Medium Total							9E-05					0.7
	Air	OU8	Benzo(a)pyrene Equivalents	--	1E-09	--	--	1E-09	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.001	--	0.001
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	8E-10	--	--	8E-10	NA	--	0.0004	--	0.0004
			Cobalt	--	1E-09	--	--	1E-09	Respiratory	--	0.0009	--	0.0009
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.004	--	0.004
			Nickel	--	3E-10	--	--	3E-10	Respiratory	--	0.0004	--	0.0004
			Silver	--	- -	--	--	- -	NA	--	--	--	--
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.0002	--	0.0002
			Chemical Total	--	4E-09	--	--	4E-09		- -	0.007	- -	0.007
		Exposure Point Total						4E-09					0.007
	Exposure Medium Total							4E-09					0.007
Medium Total								9E-05					0.7
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-05	--	2E-06	--	2E-05	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.04	--	--	0.04
			Antimony	- -	--	- -	--	- -	Blood	7	--	--	7
			Arsenic	2E-06	--	1E-07	--	2E-06	Skin, CVS	0.2	--	0.008	0.2
			Cadmium	- -	--	- -	--	- -	Kidney	0.03	--	0.0006	0.03
			Cobalt	- -	--	- -	--	- -	Thyroid	0.2	--	--	0.2
			Copper	- -	--	- -	--	- -	GS	1	--	--	1
			Iron	- -	--	- -	--	- -	GS	0.6	--	--	0.6
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.3	--	--	0.3
			Mercury	- -	--	- -	--	- -	CNS	0.05	--	--	0.05
			Nickel	- -	--	- -	--	- -	Body Weight	0.2	--	--	0.2
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.03	--	--	0.03
			Zinc	- -	--	- -	--	- -	Blood	0.03	--	--	0.03
			Cyanide	- -	--	- -	--	- -	Thyroid, CNS	0.2	--	--	0.2
			Chemical Total	2E-05	--	3E-06	--	2E-05		10	--	0.009	10

TABLE 9.6.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Subsurface Soil	Exposure Point Total						2E-05					10
	Exposure Medium Total							2E-05					10
	Air	OU8	Benzo(a)pyrene Equivalents	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.0009	--	0.0009
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	1E-09	--	--	1E-09	NA	--	0.0007	--	0.0007
			Cadmium	--	9E-11	--	--	9E-11	Kidney	--	0.0002	--	0.0002
			Cobalt	--	2E-09	--	--	2E-09	Respiratory	--	0.001	--	0.001
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.02	--	0.02
			Mercury	--	- -	--	--	- -	CNS	--	0.000006	--	0.000006
			Nickel	--	2E-09	--	--	2E-09	Respiratory	--	0.004	--	0.004
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.0002	--	0.0002
			Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	6	--	6
			Chemical Total	--	6E-09	--	--	6E-09		- -	6	- -	6
		Exposure Point Total						6E-09					6
	Exposure Medium Total							6E-09					6
Medium Total								2E-05					15
Receptor Total							Receptor Risk Total	1E-04				Receptor HI Total	16

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	7
Total Body Weight HI	0.2
Total CNS HI	0.8
Total CVS HI	0.3
Total GS HI	2
Total Kidney HI	0.09
Total Respiratory HI	0.006
Total Skin HI	0.3
Total Thyroid HI	6

TABLE 9.7.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	6E-06	--	9E-07	--	7E-06	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.005	--	--	0.005
			Antimony	- -	--	- -	--	- -	Blood	0.001	--	--	0.001
			Arsenic	5E-07	--	3E-08	--	5E-07	Skin, CVS	0.01	--	0.0007	0.01
			Cobalt	- -	--	- -	--	- -	Thyroid	0.02	--	--	0.02
			Copper	- -	--	- -	--	- -	GS	0.003	--	--	0.003
			Iron	- -	--	- -	--	- -	GS	0.02	--	--	0.02
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.007	--	--	0.007
			Nickel	- -	--	- -	--	- -	Body Weight	0.002	--	--	0.002
			Silver	- -	--	- -	--	- -	Skin	--	--	--	--
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.003	--	--	0.003
			Chemical Total	6E-06	--	1E-06	--	7E-06		0.06	--	0.0007	0.07
		Exposure Point Total						7E-06					0.07
	Exposure Medium Total							7E-06					0.07
	Air	OU8	Benzo(a)pyrene Equivalents	--	1E-09	--	--	1E-09	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.001	--	0.001
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	3E-09	--	--	3E-09	NA	--	0.0004	--	0.0004
			Cobalt	--	5E-09	--	--	5E-09	Respiratory	--	0.0009	--	0.0009
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.004	--	0.004
			Nickel	--	1E-09	--	--	1E-09	Respiratory	--	0.0004	--	0.0004
			Silver	--	- -	--	--	- -	NA	--	--	--	--
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.0002	--	0.0002
			Chemical Total	--	1E-08	--	--	1E-08		- -	0.007	- -	0.007
		Exposure Point Total						1E-08					0.007
	Exposure Medium Total							1E-08					0.007
Medium Total								7E-06					0.07
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-06	--	2E-07	--	2E-06	NA	--	--	--	--
			Aluminum	- -	--	- -	--	- -	CNS	0.004	--	--	0.004
			Antimony	- -	--	- -	--	- -	Blood	0.6	--	--	0.6
			Arsenic	8E-07	--	5E-08	--	8E-07	Skin, CVS	0.02	--	0.001	0.02
			Cadmium	- -	--	- -	--	- -	Kidney	0.003	--	0.00007	0.003
			Cobalt	- -	--	- -	--	- -	Thyroid	0.02	--	--	0.02
			Copper	- -	--	- -	--	- -	GS	0.1	--	--	0.1
			Iron	- -	--	- -	--	- -	GS	0.06	--	--	0.06
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.03	--	--	0.03
			Mercury	- -	--	- -	--	- -	CNS	0.005	--	--	0.005
			Nickel	- -	--	- -	--	- -	Body Weight	0.01	--	--	0.01
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Vanadium	- -	--	- -	--	- -	Kidney	0.003	--	--	0.003
			Zinc	- -	--	- -	--	- -	Blood	0.003	--	--	0.003
			Cyanide	- -	--	- -	--	- -	Thyroid, CNS	0.02	--	--	0.02
			Chemical Total	2E-06	--	3E-07	--	3E-06		0.9	--	0.001	0.9

TABLE 9.7.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Subsurface Soil	Exposure Point Total						3E-06					0.9
	Exposure Medium Total							3E-06					0.9
	Air	OU8	Benzo(a)pyrene Equivalents	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Aluminum	--	- -	--	--	- -	CNS	--	0.0009	--	0.0009
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	4E-09	--	--	4E-09	NA	--	0.0007	--	0.0007
			Cadmium	--	3E-10	--	--	3E-10	Kidney	--	0.0002	--	0.0002
			Cobalt	--	6E-09	--	--	6E-09	Respiratory	--	0.001	--	0.001
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.02	--	0.02
			Mercury	--	- -	--	--	- -	CNS	--	0.000006	--	0.000006
			Nickel	--	9E-09	--	--	9E-09	Respiratory	--	0.004	--	0.004
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.0002	--	0.0002
			Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	6	--	6
			Chemical Total	--	2E-08	--	--	2E-08		- -	6	- -	6
		Exposure Point Total						2E-08					6
	Exposure Medium Total							2E-08					6
Medium Total								3E-06					7
Receptor Total							Receptor Risk Total	1E-05				Receptor HI Total	7

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	0.6
Total Body Weight HI	0.02
Total CNS HI	0.10
Total CVS HI	0.03
Total GS HI	0.2
Total Kidney HI	0.009
Total Respiratory HI	0.006
Total Skin HI	0.03
Total Thyroid HI	6

TABLE 9.8.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	8E-05	--	1E-05	--	9E-05					
			Aluminum	- -	--	- -	--	- -					
			Antimony	- -	--	- -	--	- -					
			Arsenic	2E-06	--	1E-07	--	2E-06					
			Cobalt	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Manganese	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Silver	- -	--	- -	--	- -					
			Thallium	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Chemical Total	8E-05	--	1E-05	--	9E-05					
		Exposure Point Total						9E-05					
	Exposure Medium Total							9E-05					
	Air	OU8	Benzo(a)pyrene Equivalents	--	2E-09	--	--	2E-09					
			Aluminum	--	- -	--	--	- -					
			Antimony	--	- -	--	--	- -					
			Arsenic	--	4E-09	--	--	4E-09					
			Cobalt	--	6E-09	--	--	6E-09					
			Copper	--	- -	--	--	- -					
			Iron	--	- -	--	--	- -					
			Lead	--	- -	--	--	- -					
			Manganese	--	- -	--	--	- -					
			Nickel	--	1E-09	--	--	1E-09					
			Silver	--	- -	--	--	- -					
			Thallium	--	- -	--	--	- -					
			Vanadium	--	- -	--	--	- -					
			Chemical Total	--	1E-08	--	--	1E-08					
		Exposure Point Total						1E-08					
	Exposure Medium Total							1E-08					
Medium Total								9E-05					
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-05	--	3E-06	--	2E-05					
			Aluminum	- -	--	- -	--	- -					
			Antimony	- -	--	- -	--	- -					
			Arsenic	3E-06	--	2E-07	--	3E-06					
			Cadmium	- -	--	- -	--	- -					
			Cobalt	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Manganese	- -	--	- -	--	- -					
			Mercury	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Thallium	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Zinc	- -	--	- -	--	- -					
			Cyanide	- -	--	- -	--	- -					
			Chemical Total	2E-05	--	3E-06	--	3E-05					

TABLE 9.8.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Subsurface Soil	Exposure Point Total						3E-05					
	Exposure Medium Total							3E-05					
	Air	OU8	Benzo(a)pyrene Equivalents	--	6E-10	--	--	6E-10					
			Aluminum	--	- -	--	--	- -					
			Antimony	--	- -	--	--	- -					
			Arsenic	--	5E-09	--	--	5E-09					
			Cadmium	--	4E-10	--	--	4E-10					
			Cobalt	--	7E-09	--	--	7E-09					
			Copper	--	- -	--	--	- -					
			Iron	--	- -	--	--	- -					
			Lead	--	- -	--	--	- -					
			Manganese	--	- -	--	--	- -					
			Mercury	--	- -	--	--	- -					
			Nickel	--	1E-08	--	--	1E-08					
			Thallium	--	- -	--	--	- -					
			Vanadium	--	- -	--	--	- -					
			Zinc	--	- -	--	--	- -					
			Cyanide	--	- -	--	--	- -					
			Chemical Total	--	2E-08	--	--	2E-08					
		Exposure Point Total						2E-08					
	Exposure Medium Total							2E-08					
Medium Total								3E-05					
Receptor Total							Receptor Risk Total	1E-04					

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

ProUCL Output Files for Cumulative Risk Evaluation

Surface Soil

PROUCL OUTPUT - SURFACE SOIL

UCL Statistics for Uncensored Full Data Sets	
User Selected Options	
Date/Time of Computation	9/25/2015 3:18:59 PM
From File	ProUCL Input_SS.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

ALUMINUM

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	20
		Number of Missing Observations	0
Minimum	1730	Mean	10066
Maximum	18000	Median	9180
SD	5064	Std. Error of Mean	1132
Coefficient of Variation	0.503	Skewness	-0.0453

Normal GOF Test		
Shapiro Wilk Test Statistic	0.938	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.905	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.17	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.198	Data appear Normal at 5% Significance Level
Data appear Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	12023	95% Adjusted-CLT UCL (Chen-1995)	11916
		95% Modified-t UCL (Johnson-1978)	12021

Gamma GOF Test		
A-D Test Statistic	0.527	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.747	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.166	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.195	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	3.165	k star (bias corrected MLE)	2.723
Theta hat (MLE)	3181	Theta star (bias corrected MLE)	3696
nu hat (MLE)	126.6	nu star (bias corrected)	108.9
MLE Mean (bias corrected)	10066	MLE Sd (bias corrected)	6099
		Approximate Chi Square Value (0.05)	85.84
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	84.22

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	12773	95% Adjusted Gamma UCL (use when n<50)	13018

PROUCL OUTPUT - SURFACE SOIL

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.898	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.147	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.198	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	7.456	Mean of logged Data	9.051
Maximum of Logged Data	9.798	SD of logged Data	0.655
Assuming Lognormal Distribution			
95% H-UCL	14664	90% Chebyshev (MVUE) UCL	15285
95% Chebyshev (MVUE) UCL	17485	97.5% Chebyshev (MVUE) UCL	20538
99% Chebyshev (MVUE) UCL	26534		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	11928	95% Jackknife UCL	12023
95% Standard Bootstrap UCL	11831	95% Bootstrap-t UCL	11958
95% Hall's Bootstrap UCL	11846	95% Percentile Bootstrap UCL	11936
95% BCA Bootstrap UCL	11930		
90% Chebyshev(Mean, Sd) UCL	13462	95% Chebyshev(Mean, Sd) UCL	15001
97.5% Chebyshev(Mean, Sd) UCL	17136	99% Chebyshev(Mean, Sd) UCL	21331
Suggested UCL to Use			
95% Student's-t UCL	12023		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			
Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be			
reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.			
ARSENIC			
General Statistics			
Total Number of Observations	20	Number of Distinct Observations	18
		Number of Missing Observations	0
Minimum	1.64	Mean	11.86
Maximum	18.6	Median	12.15
SD	4.649	Std. Error of Mean	1.04
Coefficient of Variation	0.392	Skewness	-0.5
Normal GOF Test			
Shapiro Wilk Test Statistic	0.953	**Shapiro Wilk GOF Test**	

PROUCL OUTPUT - SURFACE SOIL

5% Shapiro Wilk Critical Value	0.905	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.128	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.198	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	13.66	95% Adjusted-CLT UCL (Chen-1995)	13.44
		95% Modified-t UCL (Johnson-1978)	13.64
Gamma GOF Test			
A-D Test Statistic	0.886	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.745	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.195	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.195	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	4.395	k star (bias corrected MLE)	3.769
Theta hat (MLE)	2.698	Theta star (bias corrected MLE)	3.146
nu hat (MLE)	175.8	nu star (bias corrected)	150.8
MLE Mean (bias corrected)	11.86	MLE Sd (bias corrected)	6.108
		Approximate Chi Square Value (0.05)	123.4
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	121.4
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	14.49	95% Adjusted Gamma UCL (use when n<50)	14.72
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.795	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.215	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.198	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.495	Mean of logged Data	2.355
Maximum of Logged Data	2.923	SD of logged Data	0.583
Assuming Lognormal Distribution			
95% H-UCL	16.56	90% Chebyshev (MVUE) UCL	17.45
95% Chebyshev (MVUE) UCL	19.75	97.5% Chebyshev (MVUE) UCL	22.94
99% Chebyshev (MVUE) UCL	29.21		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	13.57	95% Jackknife UCL	13.66
95% Standard Bootstrap UCL	13.51	95% Bootstrap-t UCL	13.52
95% Hall's Bootstrap UCL	13.53	95% Percentile Bootstrap UCL	13.42

95% BCA Bootstrap UCL	13.35		
90% Chebyshev(Mean, Sd) UCL	14.98	95% Chebyshev(Mean, Sd) UCL	16.39
97.5% Chebyshev(Mean, Sd) UCL	18.35	99% Chebyshev(Mean, Sd) UCL	22.2

Suggested UCL to Use

95% Student's-t UCL	13.66		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

COBALT

General Statistics

Total Number of Observations	20	Number of Distinct Observations	20
		Number of Missing Observations	0
Minimum	1.62	Mean	9.921
Maximum	19.5	Median	10.75
SD	4.607	Std. Error of Mean	1.03
Coefficient of Variation	0.464	Skewness	-0.0666

Normal GOF Test

Shapiro Wilk Test Statistic	0.975	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.905	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.117	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.198	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	11.7	95% Adjusted-CLT UCL (Chen-1995)	11.6
		95% Modified-t UCL (Johnson-1978)	11.7

Gamma GOF Test

A-D Test Statistic	0.677	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.746	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.178	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.195	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.519	k star (bias corrected MLE)	3.025
Theta hat (MLE)	2.819	Theta star (bias corrected MLE)	3.28
nu hat (MLE)	140.8	nu star (bias corrected)	121
MLE Mean (bias corrected)	9.921	MLE Sd (bias corrected)	5.705
		Approximate Chi Square Value (0.05)	96.59

PROUCL OUTPUT - SURFACE SOIL

Adjusted Level of Significance	0.038	Adjusted Chi Square Value	94.86
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	12.43	95% Adjusted Gamma UCL (use when n<50)	12.65
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.877	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.211	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.198	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.482	Mean of logged Data	2.146
Maximum of Logged Data	2.97	SD of logged Data	0.631
Assuming Lognormal Distribution			
95% H-UCL	14.26	90% Chebyshev (MVUE) UCL	14.93
95% Chebyshev (MVUE) UCL	17.02	97.5% Chebyshev (MVUE) UCL	19.92
99% Chebyshev (MVUE) UCL	25.61		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	11.62	95% Jackknife UCL	11.7
95% Standard Bootstrap UCL	11.58	95% Bootstrap-t UCL	11.75
95% Hall's Bootstrap UCL	11.66	95% Percentile Bootstrap UCL	11.55
95% BCA Bootstrap UCL	11.56		
90% Chebyshev(Mean, Sd) UCL	13.01	95% Chebyshev(Mean, Sd) UCL	14.41
97.5% Chebyshev(Mean, Sd) UCL	16.35	99% Chebyshev(Mean, Sd) UCL	20.17
Suggested UCL to Use			
95% Student's-t UCL	11.7		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

LEAD

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	20
		Number of Missing Observations	0
Minimum	7.86	Mean	213.2
Maximum	858	Median	175.5

PROUCL OUTPUT - SURFACE SOIL

SD	219.2	Std. Error of Mean	49.02
Coefficient of Variation	1.028	Skewness	1.804
Normal GOF Test			
Shapiro Wilk Test Statistic	0.785	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.295	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.198	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	298	95% Adjusted-CLT UCL (Chen-1995)	315
		95% Modified-t UCL (Johnson-1978)	301.3
Gamma GOF Test			
A-D Test Statistic	0.529	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.769	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.161	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.2	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.972	k star (bias corrected MLE)	0.86
Theta hat (MLE)	219.2	Theta star (bias corrected MLE)	247.9
nu hat (MLE)	38.9	nu star (bias corrected)	34.4
MLE Mean (bias corrected)	213.2	MLE Sd (bias corrected)	229.9
		Approximate Chi Square Value (0.05)	21.98
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	21.2
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	333.6	95% Adjusted Gamma UCL (use when n<50)	346
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.907	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.218	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.198	Data Not Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.062	Mean of logged Data	4.767
Maximum of Logged Data	6.755	SD of logged Data	1.309
Assuming Lognormal Distribution			
95% H-UCL	703.6	90% Chebyshev (MVUE) UCL	522.1
95% Chebyshev (MVUE) UCL	641.9	97.5% Chebyshev (MVUE) UCL	808.1
99% Chebyshev (MVUE) UCL	1135		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			

Nonparametric Distribution Free UCLs			
95% CLT UCL	293.8	95% Jackknife UCL	298
95% Standard Bootstrap UCL	291.4	95% Bootstrap-t UCL	349.8
95% Hall's Bootstrap UCL	357.4	95% Percentile Bootstrap UCL	296.2
95% BCA Bootstrap UCL	323.5		
90% Chebyshev(Mean, Sd) UCL	360.3	95% Chebyshev(Mean, Sd) UCL	426.9
97.5% Chebyshev(Mean, Sd) UCL	519.3	99% Chebyshev(Mean, Sd) UCL	700.9
Suggested UCL to Use			
95% Adjusted Gamma UCL	346		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

VANADIUM

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	20
		Number of Missing Observations	0
Minimum	4.08	Mean	30.24
Maximum	69.3	Median	31.95
SD	17.49	Std. Error of Mean	3.91
Coefficient of Variation	0.578	Skewness	0.385
Normal GOF Test			
Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.113	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.198	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	37	95% Adjusted-CLT UCL (Chen-1995)	37.03
		95% Modified-t UCL (Johnson-1978)	37.05
Gamma GOF Test			
A-D Test Statistic	0.462	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.75	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.164	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.196	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.464	k star (bias corrected MLE)	2.127
Theta hat (MLE)	12.27	Theta star (bias corrected MLE)	14.21
nu hat (MLE)	98.55	nu star (bias corrected)	85.1

PROUCL OUTPUT - SURFACE SOIL

MLE Mean (bias corrected)	30.24	MLE Sd (bias corrected)	20.73
		Approximate Chi Square Value (0.05)	64.84
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	63.44
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	39.68	95% Adjusted Gamma UCL (use when n<50)	40.56
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.919	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.186	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.198	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.406	Mean of logged Data	3.193
Maximum of Logged Data	4.238	SD of logged Data	0.752
Assuming Lognormal Distribution			
95% H-UCL	48.04	90% Chebyshev (MVUE) UCL	48.98
95% Chebyshev (MVUE) UCL	56.79	97.5% Chebyshev (MVUE) UCL	67.62
99% Chebyshev (MVUE) UCL	88.91		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	36.67	95% Jackknife UCL	37
95% Standard Bootstrap UCL	36.52	95% Bootstrap-t UCL	37.39
95% Hall's Bootstrap UCL	37.31	95% Percentile Bootstrap UCL	36.7
95% BCA Bootstrap UCL	36.53		
90% Chebyshev(Mean, Sd) UCL	41.97	95% Chebyshev(Mean, Sd) UCL	47.28
97.5% Chebyshev(Mean, Sd) UCL	54.66	99% Chebyshev(Mean, Sd) UCL	69.14
Suggested UCL to Use			
95% Student's-t UCL	37		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.

For additional insight the user may want to consult a statistician.

Subsurface Soil

PROUCL OUTPUT - SUBSURFACE SOIL

UCL Statistics for Uncensored Full Data Sets	
User Selected Options	
Date/Time of Computation	9/25/2015 1:41:25 PM
From File	ProUCL Input_SB.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

ALUMINUM

General Statistics			
Total Number of Observations	45	Number of Distinct Observations	43
		Number of Missing Observations	0
Minimum	1910	Mean	8588
Maximum	18100	Median	7695
SD	4000	Std. Error of Mean	596.2
Coefficient of Variation	0.466	Skewness	0.442

Normal GOF Test		
Shapiro Wilk Test Statistic	0.961	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.945	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.105	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.132	Data appear Normal at 5% Significance Level
Data appear Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	9590	95% Adjusted-CLT UCL (Chen-1995)	9610
		95% Modified-t UCL (Johnson-1978)	9596

Gamma GOF Test		
A-D Test Statistic	0.24	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.753	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0852	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.132	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	4.225	k star (bias corrected MLE)	3.958
Theta hat (MLE)	2033	Theta star (bias corrected MLE)	2170
nu hat (MLE)	380.2	nu star (bias corrected)	356.2
MLE Mean (bias corrected)	8588	MLE Sd (bias corrected)	4317
		Approximate Chi Square Value (0.05)	313.5
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	312.2

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	9759	95% Adjusted Gamma UCL (use when n<50)	9800

PROUCL OUTPUT - SUBSURFACE SOIL

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0939	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.132	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	7.555	Mean of logged Data	8.935
Maximum of Logged Data	9.804	SD of logged Data	0.534
Assuming Lognormal Distribution			
95% H-UCL	10226	90% Chebyshev (MVUE) UCL	10922
95% Chebyshev (MVUE) UCL	11917	97.5% Chebyshev (MVUE) UCL	13299
99% Chebyshev (MVUE) UCL	16012		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	9568	95% Jackknife UCL	9590
95% Standard Bootstrap UCL	9544	95% Bootstrap-t UCL	9635
95% Hall's Bootstrap UCL	9588	95% Percentile Bootstrap UCL	9512
95% BCA Bootstrap UCL	9553		
90% Chebyshev(Mean, Sd) UCL	10376	95% Chebyshev(Mean, Sd) UCL	11187
97.5% Chebyshev(Mean, Sd) UCL	12311	99% Chebyshev(Mean, Sd) UCL	14520
Suggested UCL to Use			
95% Student's-t UCL	9590		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

PROUCL OUTPUT - SUBSURFACE SOIL

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	9/25/2015 2:39:06 PM
From File	ProUCL Input_SB.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

VANADIUM

General Statistics			
Total Number of Observations	45	Number of Distinct Observations	44
Number of Detects	44	Number of Non-Detects	1
Number of Distinct Detects	43	Number of Distinct Non-Detects	1
Minimum Detect	8.92	Minimum Non-Detect	22.3
Maximum Detect	84.4	Maximum Non-Detect	22.3
Variance Detects	228.9	Percent Non-Detects	2.222%
Mean Detects	29.37	SD Detects	15.13
Median Detects	26.3	CV Detects	0.515
Skewness Detects	1.936	Kurtosis Detects	5.291
Mean of Logged Detects	3.27	SD of Logged Detects	0.473

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.833	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.944	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.16	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.134	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	29.06	Standard Error of Mean	2.255
SD	14.94	95% KM (BCA) UCL	33.22
95% KM (t) UCL	32.85	95% KM (Percentile Bootstrap) UCL	32.72
95% KM (z) UCL	32.77	95% KM Bootstrap t UCL	33.68
90% KM Chebyshev UCL	35.83	95% KM Chebyshev UCL	38.9
97.5% KM Chebyshev UCL	43.15	99% KM Chebyshev UCL	51.5

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.616	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.753	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0957	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.134	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	4.705	k star (bias corrected MLE)	4.399
Theta hat (MLE)	6.243	Theta star (bias corrected MLE)	6.677
nu hat (MLE)	414	nu star (bias corrected)	387.1
MLE Mean (bias corrected)	29.37	MLE Sd (bias corrected)	14

PROUCL OUTPUT - SUBSURFACE SOIL

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	3.784	nu hat (KM)	340.5
Approximate Chi Square Value (340.54, α)	298.8	Adjusted Chi Square Value (340.54, β)	297.5
95% Gamma Approximate KM-UCL (use when n>=50)	33.13	95% Gamma Adjusted KM-UCL (use when n<50)	33.27

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	8.92	Mean	29.03
Maximum	84.4	Median	26.2
SD	15.13	CV	0.521
k hat (MLE)	4.608	k star (bias corrected MLE)	4.315
Theta hat (MLE)	6.3	Theta star (bias corrected MLE)	6.726
nu hat (MLE)	414.7	nu star (bias corrected)	388.4
MLE Mean (bias corrected)	29.03	MLE Sd (bias corrected)	13.97
		Adjusted Level of Significance (β)	0.0447
Approximate Chi Square Value (388.39, α)	343.7	Adjusted Chi Square Value (388.39, β)	342.3
95% Gamma Approximate UCL (use when n>=50)	32.8	95% Gamma Adjusted UCL (use when n<50)	32.93

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.966	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.944	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0959	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.134	Detected Data appear Lognormal at 5% Significance Level
Detected Data appear Lognormal at 5% Significance Level		

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	29.06	Mean in Log Scale	3.258
SD in Original Scale	15.1	SD in Log Scale	0.474
95% t UCL (assumes normality of ROS data)	32.84	95% Percentile Bootstrap UCL	32.88
95% BCA Bootstrap UCL	33.37	95% Bootstrap t UCL	33.86
95% H-UCL (Log ROS)	33.3		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	3.257	95% H-UCL (KM -Log)	33.21
KM SD (logged)	0.472	95% Critical H Value (KM-Log)	1.885
KM Standard Error of Mean (logged)	0.0715		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	28.97	Mean in Log Scale	3.251
SD in Original Scale	15.2	SD in Log Scale	0.485
95% t UCL (Assumes normality)	32.77	95% H-Stat UCL	33.35
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics
Detected Data appear Gamma Distributed at 5% Significance Level

PROUCL OUTPUT - SUBSURFACE SOIL

Suggested UCL to Use							
95% KM (BCA) UCL	33.22	95% GROS Adjusted Gamma UCL					32.93
95% Adjusted Gamma KM-UCL	33.27						
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
Recommendations are based upon data size, data distribution, and skewness.							
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							

Appendix C.8.2

Additional Receptors Exposed to Subsurface Soil

RAGS Part D Table 7

Calculation of Cancer Risks and Non-Cancer Hazards

LIST OF TABLES
RAGS PART D TABLE 7
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Table No.	
	Reasonable Maximum Exposures
7.1.RME	Occupational Workers
7.2.RME	Child Recreational Users
7.3.RME	Adult Recreational Users
7.4.RME	Child Residents
7.5.RME	Adult Residents
	Central Tendency Exposures
7.1.CTE	Occupational Workers
7.2.CTE	Child Recreational Users
7.3.CTE	Adult Recreational Users
7.4.CTE	Child Residents
7.5.CTE	Adult Residents

TABLE 7.1.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	4.0E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.9E-05	1.1E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	3.1E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.6E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.002
				Copper	312	mg/kg	9.5E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.7E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.007
				Iron	30100	mg/kg	9.2E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.04
				Manganese	439	mg/kg	1.3E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.8E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.02
				Nickel	83.7	mg/kg	2.6E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.2E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.004
				Thallium	0.2	mg/kg	6.1E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								2.9E-05					0.06
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	2.2E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.6E-05	6.1E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								1.6E-05					--
		Exposure Point Total									4.5E-05					0.06
	Exposure Medium Total										4.5E-05					0.06
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	7.8E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	8.6E-10	2.2E-09	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	7.4E-10	mg/m^3	6.0E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.7E-10	(mg/m^3)	NA	(mg/m^3)	--
				Copper	2.3E-07	mg/m^3	1.9E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.2E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	1.8E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.1E-06	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	2.6E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.4E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.001
				Nickel	6.2E-08	mg/m^3	5.0E-09	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.3E-09	1.4E-08	(mg/m^3)	9.0E-05	(mg/m^3)	0.0002
				Thallium	1.5E-10	mg/m^3	1.2E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.4E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								2.2E-09					0.002
		Exposure Point Total									2.2E-09					0.002
	Exposure Medium Total										2.2E-09					0.002
Medium Total											4.5E-05					0.07
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	1.0E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	7.6E-06	2.9E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	1.9E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.2E-04	(mg/kg/day)	4.0E-04	(mg/kg/day)	1.3
				Arsenic	20.9	mg/kg	3.8E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	5.8E-06	1.1E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.04
				Cadmium	3.66	mg/kg	1.1E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.1E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.006
				Cobalt	13	mg/kg	4.0E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.1E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.04
				Copper	11700	mg/kg	3.6E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.0E-02	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.3
				Iron	102000	mg/kg	3.1E-02	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.7E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.1
				Lead	2210	mg/kg	6.8E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	5.8E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-03	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.07
				Mercury	3.66	mg/kg	1.1E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Nickel	707	mg/kg	2.2E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.1E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.03
				Thallium	0.154	mg/kg	4.7E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	6.7E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.006
				Cyanide	34	mg/kg	1.0E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.9E-05	(mg/kg/day)	6.0E-04	(mg/kg/day)	0.05
			Exp. Route Total								1.3E-05					1.9
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	5.7E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4.2E-06	1.6E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	8.1E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.2E-06	2.3E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.008
				Cadmium	3.66	mg/kg	4.7E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0005
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--

TABLE 7.1.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	OU8	Dermal	Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-04	(mg/kg/day)	--
			Exp. Route Total								5.4E-06					0.008
		Exposure Point Total									1.9E-05					1.9
	Exposure Medium Total										1.9E-05					1.9
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	2.0E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.2E-10	5.7E-10	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	4.5E-07	mg/m^3	3.7E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-07	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	1.3E-09	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	5.4E-09	3.5E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0002
				Cadmium	2.7E-09	mg/m^3	2.2E-10	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	3.9E-10	6.1E-10	(mg/m^3)	1.0E-05	(mg/m^3)	0.00006
				Cobalt	9.6E-09	mg/m^3	7.8E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	7.0E-09	2.2E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.0004
				Copper	8.6E-06	mg/m^3	7.0E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.0E-06	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	6.1E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.7E-05	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	1.3E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.7E-07	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	1.1E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.2E-07	(mg/m^3)	5.0E-05	(mg/m^3)	0.006
				Mercury	2.7E-09	mg/m^3	2.2E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.1E-10	(mg/m^3)	3.0E-04	(mg/m^3)	0.000002
				Nickel	5.2E-07	mg/m^3	4.2E-08	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.1E-08	1.2E-07	(mg/m^3)	9.0E-05	(mg/m^3)	0.001
				Thallium	1.1E-10	mg/m^3	9.2E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.6E-11	(mg/m^3)	NA	(mg/m^3)	--
				Zinc	1.6E-06	mg/m^3	1.3E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.7E-07	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	7.1E-03	mg/m^3	5.8E-04	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.6E-03	(mg/m^3)	8.0E-04	(mg/m^3)	2.0
			Exp. Route Total								2.4E-08					2.0
		Exposure Point Total									2.4E-08					2.0
	Exposure Medium Total										2.4E-08					2.0
Medium Total											1.9E-05					4.0
										Total of Receptor Risks Across All Media	6.4E-05				Total of Receptor Hazards Across All Media	4.0

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.2.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	1.1E-05	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	7.9E-05	2.4E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	1.6E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.8E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.005
				Copper	312	mg/kg	4.9E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.7E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.01
				Iron	30100	mg/kg	4.7E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.5E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.08
				Manganese	439	mg/kg	6.9E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.0E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.03
				Nickel	83.7	mg/kg	1.3E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.008
				Thallium	0.2	mg/kg	3.1E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								7.9E-05					0.1
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	6.7E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4.9E-05	1.5E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								4.9E-05					--
		Exposure Point Total									1.3E-04					0.1
	Exposure Medium Total										1.3E-04					0.1
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	2.0E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.2E-10	4.4E-10	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	7.4E-10	mg/m^3	2.9E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.4E-11	(mg/m^3)	NA	(mg/m^3)	--
				Copper	2.3E-07	mg/m^3	9.0E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	8.7E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-06	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	1.3E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.5E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.0003
				Nickel	6.2E-08	mg/m^3	2.4E-10	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	6.3E-11	2.8E-09	(mg/m^3)	9.0E-05	(mg/m^3)	0.00003
				Thallium	1.5E-10	mg/m^3	5.8E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.7E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								2.8E-10					0.0003
		Exposure Point Total									2.8E-10					0.0003
	Exposure Medium Total										2.8E-10					0.0003
Medium Total											1.3E-04					0.1
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	2.8E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.1E-05	6.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	9.5E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.1E-03	(mg/kg/day)	4.0E-04	(mg/kg/day)	2.8
				Arsenic	20.9	mg/kg	2.0E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.9E-06	2.3E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.08
				Cadmium	3.66	mg/kg	5.7E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.7E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.01
				Cobalt	13	mg/kg	2.0E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.4E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.08
				Copper	11700	mg/kg	1.8E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.1E-02	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.5
				Iron	102000	mg/kg	1.6E-02	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-01	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.3
				Lead	2210	mg/kg	3.5E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.0E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	3.0E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.5E-03	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.1
				Mercury	3.66	mg/kg	5.7E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.7E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Nickel	707	mg/kg	1.1E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-03	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.06
				Thallium	0.154	mg/kg	2.4E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	3.4E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.0E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.01
				Cyanide	34	mg/kg	5.3E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.2E-05	(mg/kg/day)	6.0E-04	(mg/kg/day)	0.1
			Exp. Route Total								2.4E-05					4.1
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	1.8E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.3E-05	3.8E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	4.7E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	7.0E-07	5.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Cadmium	3.66	mg/kg	2.7E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.2E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.001
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--

TABLE 7.2.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	OU8	Dermal	Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-04	(mg/kg/day)	--
			Exp. Route Total								1.3E-05					0.02
		Exposure Point Total									3.7E-05					4.1
	Exposure Medium Total										3.7E-05					4.1
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	5.2E-11	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	5.7E-11	1.1E-10	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	4.5E-07	mg/m^3	1.8E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.0E-08	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	6.0E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	2.6E-10	7.0E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00005
				Cadmium	2.7E-09	mg/m^3	1.1E-11	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	1.9E-11	1.2E-10	(mg/m^3)	1.0E-05	(mg/m^3)	0.00001
				Cobalt	9.6E-09	mg/m^3	3.7E-11	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	3.4E-10	4.4E-10	(mg/m^3)	6.0E-06	(mg/m^3)	0.00007
				Copper	8.6E-06	mg/m^3	3.4E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.9E-07	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	2.9E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.4E-06	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	6.4E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.4E-08	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	5.5E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.4E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.001
				Mercury	2.7E-09	mg/m^3	1.1E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.2E-10	(mg/m^3)	3.0E-04	(mg/m^3)	--
				Nickel	5.2E-07	mg/m^3	2.0E-09	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	5.3E-10	2.4E-08	(mg/m^3)	9.0E-05	(mg/m^3)	0.0003
				Thallium	1.1E-10	mg/m^3	4.4E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.2E-12	(mg/m^3)	NA	(mg/m^3)	--
				Zinc	1.6E-06	mg/m^3	6.3E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.4E-08	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	7.1E-03	mg/m^3	2.8E-05	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.2E-04	(mg/m^3)	8.0E-04	(mg/m^3)	--
			Exp. Route Total								1.2E-09					0.406
		Exposure Point Total									1.2E-09					0.406
	Exposure Medium Total										1.2E-09					0.406
Medium Total											3.7E-05					4.5
										Total of Receptor Risks Across All Media	1.7E-04				Total of Receptor Hazards Across All Media	5

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.3.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	1.3E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9.3E-06	2.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	4.9E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.0004
				Copper	312	mg/kg	1.5E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.3E-05	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.001
				Iron	30100	mg/kg	1.5E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.2E-03	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.007
				Manganese	439	mg/kg	2.1E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.5E-05	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.003
				Nickel	83.7	mg/kg	4.1E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0007
				Thallium	0.2	mg/kg	9.8E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								9.3E-06					0.01
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	1.4E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.0E-05	2.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								1.0E-05					--
		Exposure Point Total									1.9E-05					0.01
	Exposure Medium Total										1.9E-05					0.01
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	2.5E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.7E-10	4.4E-10	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	7.4E-10	mg/m^3	9.6E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.4E-11	(mg/m^3)	NA	(mg/m^3)	--
				Copper	2.3E-07	mg/m^3	3.0E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	2.9E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-06	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	4.2E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.5E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.0003
				Nickel	6.2E-08	mg/m^3	8.0E-10	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	2.1E-10	2.8E-09	(mg/m^3)	9.0E-05	(mg/m^3)	0.00003
				Thallium	1.5E-10	mg/m^3	1.9E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.7E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								4.8E-10					0.0003
		Exposure Point Total									4.8E-10					0.0003
	Exposure Medium Total										4.8E-10					0.0003
Medium Total											1.9E-05					0.01
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	3.3E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.4E-06	5.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	3.0E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.0E-04	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.3
				Arsenic	20.9	mg/kg	6.1E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	9.2E-07	2.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.007
				Cadmium	3.66	mg/kg	1.8E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.3E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.001
				Cobalt	13	mg/kg	6.4E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.2E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.007
				Copper	11700	mg/kg	5.7E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.0E-03	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.05
				Iron	102000	mg/kg	5.0E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.02
				Lead	2210	mg/kg	1.1E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.8E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	9.3E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.3E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.01
				Mercury	3.66	mg/kg	1.8E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.3E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Nickel	707	mg/kg	3.5E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.006
				Thallium	0.154	mg/kg	7.5E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	1.1E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.8E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.001
				Cyanide	34	mg/kg	1.7E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.8E-06	(mg/kg/day)	6.0E-04	(mg/kg/day)	0.010
			Exp. Route Total								3.3E-06					0.4
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	3.7E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.7E-06	6.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	2.6E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	3.9E-07	9.1E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
				Cadmium	3.66	mg/kg	1.5E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.3E-09	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0002
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--

TABLE 7.3.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	OU8	Dermal	Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-04	(mg/kg/day)	--
			Exp. Route Total								3.1E-06					0.003
		Exposure Point Total									6.4E-06					0.4
	Exposure Medium Total										6.4E-06					0.4
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	6.5E-11	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	7.2E-11	1.1E-10	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	4.5E-07	mg/m^3	5.9E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.0E-08	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	2.0E-10	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	8.6E-10	7.0E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00005
				Cadmium	2.7E-09	mg/m^3	3.5E-11	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	6.3E-11	1.2E-10	(mg/m^3)	1.0E-05	(mg/m^3)	0.00001
				Cobalt	9.6E-09	mg/m^3	1.2E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	1.1E-09	4.4E-10	(mg/m^3)	6.0E-06	(mg/m^3)	0.00007
				Copper	8.6E-06	mg/m^3	1.1E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.9E-07	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	9.8E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.4E-06	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	2.1E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.4E-08	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	1.8E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.4E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.001
				Mercury	2.7E-09	mg/m^3	3.5E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.2E-10	(mg/m^3)	3.0E-04	(mg/m^3)	4.1E-7
				Nickel	5.2E-07	mg/m^3	6.8E-09	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.8E-09	2.4E-08	(mg/m^3)	9.0E-05	(mg/m^3)	0.0003
				Thallium	1.1E-10	mg/m^3	1.5E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.2E-12	(mg/m^3)	NA	(mg/m^3)	--
				Zinc	1.6E-06	mg/m^3	2.1E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.4E-08	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	7.1E-03	mg/m^3	9.2E-05	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.2E-04	(mg/m^3)	8.0E-04	(mg/m^3)	0.4
			Exp. Route Total								3.9E-09					0.4
		Exposure Point Total									3.9E-09					0.4
	Exposure Medium Total										3.9E-09					0.4
Medium Total											6.4E-06					0.8
										Total of Receptor Risks Across All Media	2.6E-05				Total of Receptor Hazards Across All Media	0.8

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.4.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	7.6E-05	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	5.5E-04	1.7E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	1.1E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-05	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.03
				Copper	312	mg/kg	3.4E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.0E-03	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.10
				Iron	30100	mg/kg	3.3E-02	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.8E-01	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.5
				Manganese	439	mg/kg	4.8E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.6E-03	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.2
				Nickel	83.7	mg/kg	9.2E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.1E-03	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.05
				Thallium	0.2	mg/kg	2.2E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-06	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								5.5E-04					1.0
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	2.3E-05	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.7E-04	5.1E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								1.7E-04					--
		Exposure Point Total									7.3E-04					1.0
	Exposure Medium Total										7.3E-04					1.0
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	4.2E-09	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	4.6E-09	9.2E-09	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	7.4E-10	mg/m^3	6.0E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.1E-10	(mg/m^3)	NA	(mg/m^3)	--
				Copper	2.3E-07	mg/m^3	1.9E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.2E-07	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	1.8E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.1E-05	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	2.7E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.1E-07	(mg/m^3)	5.0E-05	(mg/m^3)	0.006
				Nickel	6.2E-08	mg/m^3	5.1E-09	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.3E-09	5.9E-08	(mg/m^3)	9.0E-05	(mg/m^3)	0.0007
				Thallium	1.5E-10	mg/m^3	1.2E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.4E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								5.9E-09					0.007
		Exposure Point Total									5.9E-09					0.007
	Exposure Medium Total										5.9E-09					0.007
Medium Total											7.3E-04					1.0
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	2.0E-05	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.5E-04	4.3E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	6.7E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.8E-03	(mg/kg/day)	4.0E-04	(mg/kg/day)	19
				Arsenic	20.9	mg/kg	1.4E-05	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.1E-05	1.6E-04	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.5
				Cadmium	3.66	mg/kg	4.0E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.7E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.09
				Cobalt	13	mg/kg	1.4E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-04	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.6
				Copper	11700	mg/kg	1.3E-02	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-01	(mg/kg/day)	4.0E-02	(mg/kg/day)	3.7
				Iron	102000	mg/kg	1.1E-01	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	1.9
				Lead	2210	mg/kg	2.4E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.8E-02	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	2.1E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.4E-02	(mg/kg/day)	2.4E-02	(mg/kg/day)	1.0
				Mercury	3.66	mg/kg	4.0E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.7E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.2
				Nickel	707	mg/kg	7.7E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.0E-03	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.5
				Thallium	0.154	mg/kg	1.7E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	2.4E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.8E-02	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.09
				Cyanide	34	mg/kg	3.7E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.3E-04	(mg/kg/day)	6.0E-04	(mg/kg/day)	0.7
			Exp. Route Total								1.7E-04					29
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	6.1E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4.5E-05	1.3E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	1.6E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.4E-06	1.9E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.06
				Cadmium	3.66	mg/kg	9.5E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.1E-07	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.004
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--

TABLE 7.4.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	OU8	Dermal	Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-04	(mg/kg/day)	--
			Exp. Route Total								4.7E-05					0.07
		Exposure Point Total									2.1E-04					29
	Exposure Medium Total										2.1E-04					29
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	1.1E-09	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	1.2E-09	2.4E-09	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	4.5E-07	mg/m^3	3.7E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.3E-07	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	1.3E-09	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	5.4E-09	1.5E-08	(mg/m^3)	1.5E-05	(mg/m^3)	0.0010
				Cadmium	2.7E-09	mg/m^3	2.2E-10	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	4.0E-10	2.6E-09	(mg/m^3)	1.0E-05	(mg/m^3)	0.0003
				Cobalt	9.6E-09	mg/m^3	7.9E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	7.1E-09	9.2E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.002
				Copper	8.6E-06	mg/m^3	7.1E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	8.2E-06	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	6.2E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.2E-05	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	1.3E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.6E-06	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	1.1E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.3E-06	(mg/m^3)	5.0E-05	(mg/m^3)	0.03
				Mercury	2.7E-09	mg/m^3	2.2E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.6E-09	(mg/m^3)	3.0E-04	(mg/m^3)	0.000009
				Nickel	5.2E-07	mg/m^3	4.3E-08	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.1E-08	5.0E-07	(mg/m^3)	9.0E-05	(mg/m^3)	0.006
				Thallium	1.1E-10	mg/m^3	9.3E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.1E-10	(mg/m^3)	NA	(mg/m^3)	--
				Zinc	1.6E-06	mg/m^3	1.3E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.6E-06	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	7.1E-03	mg/m^3	5.8E-04	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.8E-03	(mg/m^3)	8.0E-04	(mg/m^3)	8.5
			Exp. Route Total								2.5E-08					8.5
		Exposure Point Total									2.5E-08					8.5
	Exposure Medium Total										2.5E-08					8.5
Medium Total											2.1E-04					37
										Total of Receptor Risks Across All Media	9.4E-04				Total of Receptor Hazards Across All Media	38

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.5.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	8.9E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	6.5E-05	1.6E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	3.4E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.003
				Copper	312	mg/kg	1.1E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.7E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.009
				Iron	30100	mg/kg	1.0E-02	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.6E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.05
				Manganese	439	mg/kg	1.5E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.3E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.02
				Nickel	83.7	mg/kg	2.9E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.0E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.005
				Thallium	0.2	mg/kg	6.8E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								6.5E-05					0.09
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	4.9E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	3.6E-05	8.6E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								3.6E-05					--
		Exposure Point Total									1.0E-04					0.09
	Exposure Medium Total										1.0E-04					0.09
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	5.2E-09	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	5.8E-09	9.2E-09	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	7.4E-10	mg/m^3	2.0E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.1E-10	(mg/m^3)	NA	(mg/m^3)	--
				Copper	2.3E-07	mg/m^3	6.3E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.2E-07	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	6.1E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.1E-05	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	8.8E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.1E-07	(mg/m^3)	5.0E-05	(mg/m^3)	0.006
				Nickel	6.2E-08	mg/m^3	1.7E-08	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	4.4E-09	5.9E-08	(mg/m^3)	9.0E-05	(mg/m^3)	0.0007
				Thallium	1.5E-10	mg/m^3	4.0E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.4E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								1.0E-08					0.007
		Exposure Point Total									1.0E-08					0.007
	Exposure Medium Total										1.0E-08					0.007
Medium Total											1.0E-04					0.10
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	2.3E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.7E-05	4.1E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	2.1E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.3E-04	(mg/kg/day)	4.0E-04	(mg/kg/day)	1.8
				Arsenic	20.9	mg/kg	4.3E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	6.4E-06	1.5E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.05
				Cadmium	3.66	mg/kg	1.3E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.4E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.009
				Cobalt	13	mg/kg	4.5E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.05
				Copper	11700	mg/kg	4.0E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-02	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.4
				Iron	102000	mg/kg	3.5E-02	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-01	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.2
				Lead	2210	mg/kg	7.6E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	6.5E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.3E-03	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.09
				Mercury	3.66	mg/kg	1.3E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Nickel	707	mg/kg	2.4E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.5E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.04
				Thallium	0.154	mg/kg	5.3E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	7.5E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.009
				Cyanide	34	mg/kg	1.2E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.1E-05	(mg/kg/day)	6.0E-04	(mg/kg/day)	0.07
			Exp. Route Total								2.3E-05					2.7
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	1.3E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9.3E-06	2.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	9.1E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.4E-06	3.2E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Cadmium	3.66	mg/kg	5.3E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0007
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--

TABLE 7.5.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	OU8	Dermal	Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-04	(mg/kg/day)	--
			Exp. Route Total								1.1E-05					0.01
		Exposure Point Total									3.4E-05					2.7
	Exposure Medium Total										3.4E-05					2.7
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	1.4E-09	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	1.5E-09	2.4E-09	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	4.5E-07	mg/m^3	1.2E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.3E-07	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	4.2E-09	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	1.8E-08	1.5E-08	(mg/m^3)	1.5E-05	(mg/m^3)	0.0010
				Cadmium	2.7E-09	mg/m^3	7.4E-10	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	1.3E-09	2.6E-09	(mg/m^3)	1.0E-05	(mg/m^3)	0.0003
				Cobalt	9.6E-09	mg/m^3	2.6E-09	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	2.4E-08	9.2E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.002
				Copper	8.6E-06	mg/m^3	2.4E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	8.2E-06	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	2.1E-05	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.2E-05	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	4.5E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.6E-06	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	3.8E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.3E-06	(mg/m^3)	5.0E-05	(mg/m^3)	0.03
				Mercury	2.7E-09	mg/m^3	7.4E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.6E-09	(mg/m^3)	3.0E-04	(mg/m^3)	0.000009
				Nickel	5.2E-07	mg/m^3	1.4E-07	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	3.7E-08	5.0E-07	(mg/m^3)	9.0E-05	(mg/m^3)	0.006
				Thallium	1.1E-10	mg/m^3	3.1E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.1E-10	(mg/m^3)	NA	(mg/m^3)	--
				Zinc	1.6E-06	mg/m^3	4.4E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.6E-06	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	7.1E-03	mg/m^3	1.9E-03	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.8E-03	(mg/m^3)	8.0E-04	(mg/m^3)	8.5
			Exp. Route Total								8.2E-08					8.5
		Exposure Point Total									8.2E-08					8.5
	Exposure Medium Total										8.2E-08					8.5
Medium Total											3.4E-05					11
										Total of Receptor Risks Across All Media	1.3E-04				Total of Receptor Hazards Across All Media	11

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.1.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	6.3E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4.6E-06	4.9E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	4.8E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.8E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.0009
				Copper	312	mg/kg	1.5E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.003
				Iron	30100	mg/kg	1.5E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.1E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.02
				Manganese	439	mg/kg	2.1E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.007
				Nickel	83.7	mg/kg	4.0E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.1E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.002
				Thallium	0.2	mg/kg	9.6E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								4.6E-06					0.03
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	1.1E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	8.4E-07	8.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								8.4E-07					--
		Exposure Point Total									5.4E-06					0.03
	Exposure Medium Total										5.4E-06					0.03
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	2.5E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.7E-10	1.9E-09	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	7.4E-10	mg/m^3	1.9E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.5E-10	(mg/m^3)	NA	(mg/m^3)	--
				Copper	2.3E-07	mg/m^3	5.9E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.6E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	5.7E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.4E-06	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	8.3E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.5E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.001
				Nickel	6.2E-08	mg/m^3	1.6E-09	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	4.1E-10	1.2E-08	(mg/m^3)	9.0E-05	(mg/m^3)	0.0001
				Thallium	1.5E-10	mg/m^3	3.8E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.9E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								6.8E-10					0.001
		Exposure Point Total									6.8E-10					0.001
	Exposure Medium Total										6.8E-10					0.001
Medium Total											5.4E-06					0.03
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	1.6E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.2E-06	1.3E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	2.9E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.3E-04	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.6
				Arsenic	20.9	mg/kg	6.0E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	9.1E-07	4.7E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Cadmium	3.66	mg/kg	1.8E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.003
				Cobalt	13	mg/kg	6.3E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.9E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Copper	11700	mg/kg	5.6E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.4E-03	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.1
				Iron	102000	mg/kg	4.9E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.8E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.05
				Lead	2210	mg/kg	1.1E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.3E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	9.2E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.1E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.03
				Mercury	3.66	mg/kg	1.8E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.005
				Nickel	707	mg/kg	3.4E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.7E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.01
				Thallium	0.154	mg/kg	7.4E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	1.1E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.3E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.003
				Cyanide	34	mg/kg	1.6E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-05	(mg/kg/day)	6.0E-04	(mg/kg/day)	0.02
			Exp. Route Total								2.1E-06					0.8
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	3.0E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.2E-07	2.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	4.3E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	6.4E-08	3.3E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Cadmium	3.66	mg/kg	2.5E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-09	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.00008
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--

TABLE 7.1.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	OU8	Dermal	Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-04	(mg/kg/day)	--
			Exp. Route Total								2.8E-07					0.001
		Exposure Point Total									2.4E-06					0.8
	Exposure Medium Total										2.4E-06					0.8
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	6.4E-11	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	7.1E-11	5.0E-10	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	4.5E-07	mg/m^3	1.2E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	9.0E-08	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	4.0E-10	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	1.7E-09	3.1E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0002
				Cadmium	2.7E-09	mg/m^3	6.9E-11	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	1.2E-10	5.4E-10	(mg/m^3)	1.0E-05	(mg/m^3)	0.00005
				Cobalt	9.6E-09	mg/m^3	2.5E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	2.2E-09	1.9E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.0003
				Copper	8.6E-06	mg/m^3	2.2E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.7E-06	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	1.9E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.5E-05	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	4.2E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.3E-07	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	3.6E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.8E-07	(mg/m^3)	5.0E-05	(mg/m^3)	0.006
				Mercury	2.7E-09	mg/m^3	6.9E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.4E-10	(mg/m^3)	3.0E-04	(mg/m^3)	0.000002
				Nickel	5.2E-07	mg/m^3	1.3E-08	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	3.5E-09	1.0E-07	(mg/m^3)	9.0E-05	(mg/m^3)	0.001
				Thallium	1.1E-10	mg/m^3	2.9E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.3E-11	(mg/m^3)	NA	(mg/m^3)	--
				Zinc	1.6E-06	mg/m^3	4.2E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.2E-07	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	7.1E-03	mg/m^3	1.8E-04	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.4E-03	(mg/m^3)	8.0E-04	(mg/m^3)	1.8
			Exp. Route Total								7.6E-09					1.8
		Exposure Point Total									7.6E-09					1.8
	Exposure Medium Total										7.6E-09					1.8
Medium Total											2.4E-06					2.6
										Total of Receptor Risks Across All Media	7.8E-06				Total of Receptor Hazards Across All Media	2.7

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.2.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	1.1E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	8.0E-06	5.9E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	1.3E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.6E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.001
				Copper	312	mg/kg	4.1E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.004
				Iron	30100	mg/kg	3.9E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.02
				Manganese	439	mg/kg	5.7E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.0E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.008
				Nickel	83.7	mg/kg	1.1E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.8E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.002
				Thallium	0.2	mg/kg	2.6E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								8.0E-06					0.0
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	2.7E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.0E-06	1.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								2.0E-06					--
		Exposure Point Total									1.0E-05					0.0
	Exposure Medium Total										1.0E-05					0.0
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	2.0E-11	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.2E-11	1.1E-10	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	7.4E-10	mg/m^3	2.4E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	8.4E-12	(mg/m^3)	NA	(mg/m^3)	--
				Copper	2.3E-07	mg/m^3	7.5E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.6E-09	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	7.2E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.5E-07	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	1.1E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.7E-09	(mg/m^3)	5.0E-05	(mg/m^3)	0.00007
				Nickel	6.2E-08	mg/m^3	2.0E-11	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	5.2E-12	7.0E-10	(mg/m^3)	9.0E-05	(mg/m^3)	0.000008
				Thallium	1.5E-10	mg/m^3	4.8E-14	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.7E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								2.8E-11					0.00008
		Exposure Point Total									2.8E-11					0.00008
	Exposure Medium Total										2.8E-11					0.00008
Medium Total											1.0E-05					0.0
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	2.9E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.1E-06	1.6E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	8.0E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.8E-04	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.7
				Arsenic	20.9	mg/kg	1.6E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.5E-07	5.7E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Cadmium	3.66	mg/kg	4.8E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.003
				Cobalt	13	mg/kg	1.7E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.9E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Copper	11700	mg/kg	1.5E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.3E-03	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.1
				Iron	102000	mg/kg	1.3E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.7E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.07
				Lead	2210	mg/kg	2.9E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.0E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	2.5E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.7E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.04
				Mercury	3.66	mg/kg	4.8E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Nickel	707	mg/kg	9.2E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.2E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.02
				Thallium	0.154	mg/kg	2.0E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	2.9E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.0E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.003
				Cyanide	34	mg/kg	4.4E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-05	(mg/kg/day)	6.0E-04	(mg/kg/day)	0.03
			Exp. Route Total								2.4E-06					1.0
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	7.1E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	5.2E-07	3.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	1.6E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.3E-08	5.4E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Cadmium	3.66	mg/kg	9.1E-11	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.2E-09	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0001
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--

TABLE 7.2.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	OU8	Dermal	Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-04	(mg/kg/day)	--
			Exp. Route Total								5.4E-07					0.002
		Exposure Point Total									2.9E-06					1.0
	Exposure Medium Total										2.9E-06					1.0
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	5.3E-12	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	5.8E-12	2.9E-11	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	4.5E-07	mg/m^3	1.5E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.1E-09	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	5.0E-12	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	2.2E-11	1.8E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00001
				Cadmium	2.7E-09	mg/m^3	8.8E-13	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	1.6E-12	3.1E-11	(mg/m^3)	1.0E-05	(mg/m^3)	0.000003
				Cobalt	9.6E-09	mg/m^3	3.1E-12	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	2.8E-11	1.1E-10	(mg/m^3)	6.0E-06	(mg/m^3)	0.00002
				Copper	8.6E-06	mg/m^3	2.8E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	9.8E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	2.4E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	8.6E-07	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	5.3E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.9E-08	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	4.6E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.6E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.0003
				Mercury	2.7E-09	mg/m^3	8.8E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.1E-11	(mg/m^3)	3.0E-04	(mg/m^3)	--
				Nickel	5.2E-07	mg/m^3	1.7E-10	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	4.4E-11	5.9E-09	(mg/m^3)	9.0E-05	(mg/m^3)	0.00007
				Thallium	1.1E-10	mg/m^3	3.7E-14	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.3E-12	(mg/m^3)	NA	(mg/m^3)	--
				Zinc	1.6E-06	mg/m^3	5.3E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.8E-08	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	7.1E-03	mg/m^3	2.3E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	8.1E-05	(mg/m^3)	8.0E-04	(mg/m^3)	--
			Exp. Route Total								1.0E-10					0.1015
		Exposure Point Total									1.0E-10					0.1015
	Exposure Medium Total										1.0E-10					0.1015
Medium Total											2.9E-06					1.1
										Total of Receptor Risks Across All Media	1.3E-05				Total of Receptor Hazards Across All Media	1.2

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.3.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	8.7E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	6.4E-07	5.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	4.3E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.3E-08	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.0001
				Copper	312	mg/kg	1.3E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-05	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.0003
				Iron	30100	mg/kg	1.3E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-03	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.002
				Manganese	439	mg/kg	1.9E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-05	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.0008
				Nickel	83.7	mg/kg	3.6E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.6E-06	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0002
				Thallium	0.2	mg/kg	8.6E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.6E-09	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								6.4E-07					0.003
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	2.7E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.0E-07	1.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								2.0E-07					--
		Exposure Point Total									8.4E-07					0.003
	Exposure Medium Total										8.4E-07					0.003
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	1.7E-11	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	1.9E-11	1.1E-10	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	7.4E-10	mg/m^3	8.4E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	8.4E-12	(mg/m^3)	NA	(mg/m^3)	--
				Copper	2.3E-07	mg/m^3	2.6E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.6E-09	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	2.5E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.5E-07	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	3.7E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.7E-09	(mg/m^3)	5.0E-05	(mg/m^3)	0.00007
				Nickel	6.2E-08	mg/m^3	7.0E-11	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.8E-11	7.0E-10	(mg/m^3)	9.0E-05	(mg/m^3)	0.000008
				Thallium	1.5E-10	mg/m^3	1.7E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.7E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								3.7E-11					0.00008
		Exposure Point Total									3.7E-11					0.00008
	Exposure Medium Total										3.7E-11					0.00008
Medium Total											8.4E-07					0.003
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	2.3E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.7E-07	1.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	2.6E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-05	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.07
				Arsenic	20.9	mg/kg	5.4E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	8.1E-08	5.4E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Cadmium	3.66	mg/kg	1.6E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0003
				Cobalt	13	mg/kg	5.6E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.6E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Copper	11700	mg/kg	5.0E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.0E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.01
				Iron	102000	mg/kg	4.4E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.4E-03	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.006
				Lead	2210	mg/kg	9.5E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.5E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	8.1E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.1E-05	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.003
				Mercury	3.66	mg/kg	1.6E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0005
				Nickel	707	mg/kg	3.0E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.0E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.002
				Thallium	0.154	mg/kg	6.6E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.6E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	9.4E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.4E-05	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.0003
				Cyanide	34	mg/kg	1.5E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-06	(mg/kg/day)	6.0E-04	(mg/kg/day)	0.002
			Exp. Route Total								2.5E-07					0.10
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	7.2E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	5.2E-08	4.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	6.5E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	9.7E-09	6.5E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0002
				Cadmium	3.66	mg/kg	3.8E-11	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.8E-10	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.00002
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--

TABLE 7.3.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	OU8	Dermal	Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-04	(mg/kg/day)	--
			Exp. Route Total								6.2E-08					0.0002
		Exposure Point Total									3.1E-07					0.10
	Exposure Medium Total										3.1E-07					0.10
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	4.5E-12	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	4.9E-12	2.9E-11	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	4.5E-07	mg/m^3	5.1E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.1E-09	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	1.8E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	7.5E-11	1.8E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00001
				Cadmium	2.7E-09	mg/m^3	3.1E-12	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	5.5E-12	3.1E-11	(mg/m^3)	1.0E-05	(mg/m^3)	0.000003
				Cobalt	9.6E-09	mg/m^3	1.1E-11	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	9.8E-11	1.1E-10	(mg/m^3)	6.0E-06	(mg/m^3)	0.00002
				Copper	8.6E-06	mg/m^3	9.8E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	9.8E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	8.6E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	8.6E-07	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	1.9E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.9E-08	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	1.6E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.6E-08	(mg/m^3)	5.0E-05	(mg/m^3)	0.0003
				Mercury	2.7E-09	mg/m^3	3.1E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.1E-11	(mg/m^3)	3.0E-04	(mg/m^3)	1.0E-7
				Nickel	5.2E-07	mg/m^3	5.9E-10	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.5E-10	5.9E-09	(mg/m^3)	9.0E-05	(mg/m^3)	0.00007
				Thallium	1.1E-10	mg/m^3	1.3E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.3E-12	(mg/m^3)	NA	(mg/m^3)	--
				Zinc	1.6E-06	mg/m^3	1.8E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.8E-08	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	7.1E-03	mg/m^3	8.1E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	8.1E-05	(mg/m^3)	8.0E-04	(mg/m^3)	0.1
			Exp. Route Total								3.4E-10					0.1
		Exposure Point Total									3.4E-10					0.1
	Exposure Medium Total										3.4E-10					0.1
Medium Total											3.1E-07					0.2
										Total of Receptor Risks Across All Media	1.1E-06				Total of Receptor Hazards Across All Media	0.2

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.4.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	1.0E-05	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	7.5E-05	5.6E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	1.2E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.3E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.01
				Copper	312	mg/kg	3.8E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-03	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.03
				Iron	30100	mg/kg	3.7E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-01	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.2
				Manganese	439	mg/kg	5.4E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-03	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.08
				Nickel	83.7	mg/kg	1.0E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.6E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.02
				Thallium	0.2	mg/kg	2.4E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								7.5E-05					0.3
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	1.3E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9.3E-06	6.9E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								9.3E-06					--
		Exposure Point Total									8.5E-05					0.3
	Exposure Medium Total										8.5E-05					0.3
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	1.1E-09	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	1.3E-09	6.1E-09	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	7.4E-10	mg/m^3	1.3E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.7E-10	(mg/m^3)	NA	(mg/m^3)	--
				Copper	2.3E-07	mg/m^3	4.2E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.5E-07	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	4.1E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.4E-05	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	5.9E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.1E-07	(mg/m^3)	5.0E-05	(mg/m^3)	0.004
				Nickel	6.2E-08	mg/m^3	1.1E-09	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	2.9E-10	3.9E-08	(mg/m^3)	9.0E-05	(mg/m^3)	0.0004
				Thallium	1.5E-10	mg/m^3	2.7E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	9.4E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								1.5E-09					0.005
		Exposure Point Total									1.5E-09					0.005
	Exposure Medium Total										1.5E-09					0.005
Medium Total											8.5E-05					0.3
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	2.7E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.0E-05	1.5E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	7.4E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-03	(mg/kg/day)	4.0E-04	(mg/kg/day)	6.5
				Arsenic	20.9	mg/kg	1.5E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.3E-06	5.4E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.2
				Cadmium	3.66	mg/kg	4.5E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.03
				Cobalt	13	mg/kg	1.6E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.6E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.2
				Copper	11700	mg/kg	1.4E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.0E-02	(mg/kg/day)	4.0E-02	(mg/kg/day)	1.3
				Iron	102000	mg/kg	1.2E-02	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.4E-01	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.6
				Lead	2210	mg/kg	2.7E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.4E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	2.3E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.1E-03	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.3
				Mercury	3.66	mg/kg	4.5E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.05
				Nickel	707	mg/kg	8.6E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.0E-03	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.2
				Thallium	0.154	mg/kg	1.9E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	2.7E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.4E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.03
				Cyanide	34	mg/kg	4.2E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-04	(mg/kg/day)	6.0E-04	(mg/kg/day)	0.2
			Exp. Route Total								2.2E-05					9.6
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	3.3E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.4E-06	1.8E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	7.3E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.1E-07	2.5E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.008
				Cadmium	3.66	mg/kg	4.2E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0006
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--

TABLE 7.4.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	OU8	Dermal	Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-04	(mg/kg/day)	--
			Exp. Route Total								2.5E-06					0.009
		Exposure Point Total									2.5E-05					9.6
	Exposure Medium Total										2.5E-05					9.6
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	3.0E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	3.3E-10	1.6E-09	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	4.5E-07	mg/m^3	8.2E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.9E-07	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	2.8E-10	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	1.2E-09	9.9E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0007
				Cadmium	2.7E-09	mg/m^3	4.9E-11	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	8.9E-11	1.7E-09	(mg/m^3)	1.0E-05	(mg/m^3)	0.0002
				Cobalt	9.6E-09	mg/m^3	1.8E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	1.6E-09	6.1E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.001
				Copper	8.6E-06	mg/m^3	1.6E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.5E-06	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	1.4E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.8E-05	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	3.0E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-06	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	2.6E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	9.0E-07	(mg/m^3)	5.0E-05	(mg/m^3)	0.02
				Mercury	2.7E-09	mg/m^3	4.9E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.7E-09	(mg/m^3)	3.0E-04	(mg/m^3)	0.000006
				Nickel	5.2E-07	mg/m^3	9.5E-09	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	2.5E-09	3.3E-07	(mg/m^3)	9.0E-05	(mg/m^3)	0.004
				Thallium	1.1E-10	mg/m^3	2.1E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.3E-11	(mg/m^3)	NA	(mg/m^3)	--
				Zinc	1.6E-06	mg/m^3	3.0E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-06	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	7.1E-03	mg/m^3	1.3E-04	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.5E-03	(mg/m^3)	8.0E-04	(mg/m^3)	5.7
			Exp. Route Total								5.7E-09					5.7
		Exposure Point Total									5.7E-09					5.7
	Exposure Medium Total										5.7E-09					5.7
Medium Total											2.5E-05					15
										Total of Receptor Risks Across All Media	1.1E-04				Total of Receptor Hazards Across All Media	16

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.5.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	13	mg/kg	8.2E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	6.0E-06	5.2E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	4.0E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.0E-07	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.001
				Copper	312	mg/kg	1.3E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.003
				Iron	30100	mg/kg	1.2E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.02
				Manganese	439	mg/kg	1.8E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.8E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.007
				Nickel	83.7	mg/kg	3.4E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.4E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.002
				Thallium	0.2	mg/kg	8.0E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.0E-08	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								6.0E-06					0.03
			Dermal	Benzo(a)pyrene Equivalents	13	mg/kg	1.3E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9.4E-07	8.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Copper	312	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	30100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Manganese	439	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--
				Nickel	83.7	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
			Exp. Route Total								9.4E-07					--
		Exposure Point Total									6.9E-06					0.03
	Exposure Medium Total										6.9E-06					0.03
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	9.6E-09	mg/m^3	9.6E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	1.1E-09	6.1E-09	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	7.4E-10	mg/m^3	4.7E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.7E-10	(mg/m^3)	NA	(mg/m^3)	--
				Copper	2.3E-07	mg/m^3	1.5E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.5E-07	(mg/m^3)	NA	(mg/m^3)	--
				Iron	2.2E-05	mg/m^3	1.4E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.4E-05	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	3.2E-07	mg/m^3	2.1E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.1E-07	(mg/m^3)	5.0E-05	(mg/m^3)	0.004
				Nickel	6.2E-08	mg/m^3	3.9E-09	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.0E-09	3.9E-08	(mg/m^3)	9.0E-05	(mg/m^3)	0.0004
				Thallium	1.5E-10	mg/m^3	9.4E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	9.4E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								2.1E-09					0.005
		Exposure Point Total									2.1E-09					0.005
	Exposure Medium Total										2.1E-09					0.005
Medium Total											6.9E-06					0.03
Subsurface Soil	Subsurface Soil	OU8	Ingestion	Benzo(a)pyrene Equivalents	3.4	mg/kg	2.1E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.6E-06	1.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	2.4E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.4E-04	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.6
				Arsenic	20.9	mg/kg	5.0E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	7.5E-07	5.0E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Cadmium	3.66	mg/kg	1.5E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.003
				Cobalt	13	mg/kg	5.2E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.2E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Copper	11700	mg/kg	4.7E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.7E-03	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.1
				Iron	102000	mg/kg	4.1E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.1E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.06
				Lead	2210	mg/kg	8.9E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.9E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	7.6E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.6E-04	(mg/kg/day)	2.4E-02	(mg/kg/day)	0.03
				Mercury	3.66	mg/kg	1.5E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.005
				Nickel	707	mg/kg	2.8E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.8E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.01
				Thallium	0.154	mg/kg	6.2E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	8.8E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.8E-04	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.003
				Cyanide	34	mg/kg	1.4E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-05	(mg/kg/day)	6.0E-04	(mg/kg/day)	0.02
			Exp. Route Total								2.3E-06					0.9
			Dermal	Benzo(a)pyrene Equivalents	3.4	mg/kg	3.4E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.5E-07	2.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	610	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Arsenic	20.9	mg/kg	3.0E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	4.5E-08	3.0E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Cadmium	3.66	mg/kg	1.8E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.8E-09	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.00007
				Cobalt	13	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	11700	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	102000	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	2210	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	1900	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	9.6E-04	(mg/kg/day)	--

TABLE 7.5.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	OU8	Dermal	Mercury	3.66	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	707	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.154	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Zinc	2200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
				Cyanide	34	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-04	(mg/kg/day)	--
			Exp. Route Total								2.9E-07					0.001
		Exposure Point Total									2.6E-06					0.9
	Exposure Medium Total										2.6E-06					0.9
	Air	OU8	Inhalation	Benzo(a)pyrene Equivalents	2.5E-09	mg/m^3	2.5E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.8E-10	1.6E-09	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	4.5E-07	mg/m^3	2.9E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.9E-07	(mg/m^3)	NA	(mg/m^3)	--
				Arsenic	1.5E-08	mg/m^3	9.9E-10	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	4.2E-09	9.9E-09	(mg/m^3)	1.5E-05	(mg/m^3)	0.0007
				Cadmium	2.7E-09	mg/m^3	1.7E-10	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	3.1E-10	1.7E-09	(mg/m^3)	1.0E-05	(mg/m^3)	0.0002
				Cobalt	9.6E-09	mg/m^3	6.1E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	5.5E-09	6.1E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.001
				Copper	8.6E-06	mg/m^3	5.5E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.5E-06	(mg/m^3)	NA	(mg/m^3)	--
				Iron	7.5E-05	mg/m^3	4.8E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.8E-05	(mg/m^3)	NA	(mg/m^3)	--
				Lead	1.6E-06	mg/m^3	1.0E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-06	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	1.4E-06	mg/m^3	9.0E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	9.0E-07	(mg/m^3)	5.0E-05	(mg/m^3)	0.02
				Mercury	2.7E-09	mg/m^3	1.7E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.7E-09	(mg/m^3)	3.0E-04	(mg/m^3)	0.000006
				Nickel	5.2E-07	mg/m^3	3.3E-08	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	8.7E-09	3.3E-07	(mg/m^3)	9.0E-05	(mg/m^3)	0.004
				Thallium	1.1E-10	mg/m^3	7.3E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.3E-11	(mg/m^3)	NA	(mg/m^3)	--
				Zinc	1.6E-06	mg/m^3	1.0E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.0E-06	(mg/m^3)	NA	(mg/m^3)	--
				Cyanide	7.1E-03	mg/m^3	4.5E-04	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.5E-03	(mg/m^3)	8.0E-04	(mg/m^3)	5.7
			Exp. Route Total								1.9E-08					5.7
		Exposure Point Total									1.9E-08					5.7
	Exposure Medium Total										1.9E-08					5.7
Medium Total											2.6E-06					6.6
										Total of Receptor Risks Across All Media	9.5E-06				Total of Receptor Hazards Across All Media	6.6

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

RAGS Part D Table 9

Summary of Receptor Risks and Hazards for COPCs

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RAGS PART D TABLE 9
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

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9.5.RME	Child Residents
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	Central Tendency Exposures
9.1.CTE	Occupational Workers
9.2.CTE	Child Recreational Users
9.3.CTE	Adult Recreational Users
9.4.CTE	Lifelong Recreational Users
9.5.CTE	Child Residents
9.6.CTE	Adult Residents
9.7.CTE	Lifelong Residents

TABLE 9.1.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	3E-05	--	2E-05	--	4E-05	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.002	--	--	0.002
			Copper	- -	--	- -	--	- -	GS	0.007	--	--	0.007
			Iron	- -	--	- -	--	- -	GS	0.04	--	--	0.04
			Manganese	- -	--	- -	--	- -	CNS	0.02	--	--	0.02
			Nickel	- -	--	- -	--	- -	Body Weight	0.004	--	--	0.004
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Chemical Total	3E-05	--	2E-05	--	4E-05		0.06	--	--	0.06
		Exposure Point Total						4E-05					0.06
	Exposure Medium Total							4E-05					0.06
	Air	OU8	Benzo(a)pyrene Equivalents	--	9E-10	--	--	9E-10	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.001	--	0.001
			Nickel	--	1E-09	--	--	1E-09	Respiratory	--	0.0002	--	0.0002
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	2E-09	--	--	2E-09		- -	0.002	- -	0.002
		Exposure Point Total						2E-09					0.002
	Exposure Medium Total							2E-09					0.002
Medium Total								4E-05					0.07
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	8E-06	--	4E-06	--	1E-05	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	1	--	--	1
			Arsenic	6E-06	--	1E-06	--	7E-06	Skin, CVS	0.04	--	0.008	0.04
			Cadmium	- -	--	- -	--	- -	Kidney	0.006	--	0.0005	0.007
			Cobalt	- -	--	- -	--	- -	Thyroid	0.04	--	--	0.04
			Copper	- -	--	- -	--	- -	GS	0.3	--	--	0.3
			Iron	- -	--	- -	--	- -	GS	0.1	--	--	0.1
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.07	--	--	0.07
			Mercury	- -	--	- -	--	- -	CNS	0.01	--	--	0.01
			Nickel	- -	--	- -	--	- -	Body Weight	0.03	--	--	0.03
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Zinc	- -	--	- -	--	- -	Blood	0.006	--	--	0.006
			Cyanide	- -	--	- -	--	- -	Thyroid, CNS	0.05	--	--	0.05
			Chemical Total	1E-05	--	5E-06	--	2E-05		2	--	0.008	2
		Exposure Point Total						2E-05					2
	Exposure Medium Total							2E-05					2
	Air	OU8	Benzo(a)pyrene Equivalents	--	2E-10	--	--	2E-10	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	5E-09	--	--	5E-09	NA	--	0.0002	--	0.0002
			Cadmium	--	4E-10	--	--	4E-10	Kidney	--	0.00006	--	0.00006
			Cobalt	--	7E-09	--	--	7E-09	Respiratory	--	0.0004	--	0.0004
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.006	--	0.006
			Mercury	--	- -	--	--	- -	CNS	--	0.000002	--	0.000002
			Nickel	--	1E-08	--	--	1E-08	Respiratory	--	0.001	--	0.001
			Thallium	--	- -	--	--	- -	NA	--	--	--	--

TABLE 9.1.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Air	OU8	Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	2	--	2
			Chemical Total	--	2E-08	--	--	2E-08		- -	2	- -	2
		Exposure Point Total						2E-08					2
	Exposure Medium Total							2E-08					2
Medium Total								2E-05					4
Receptor Total							Receptor Risk Total	6E-05				Receptor HI Total	4

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	1
Total Body Weight HI	0.03
Total CNS HI	0.2
Total CVS HI	0.04
Total GS HI	0.4
Total Kidney HI	0.007
Total Respiratory HI	0.002
Total Skin HI	0.04
Total Thyroid HI	2

TABLE 9.2.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	8E-05	--	5E-05	--	1E-04	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.005	--	--	0.005
			Copper	- -	--	- -	--	- -	GS	0.01	--	--	0.01
			Iron	- -	--	- -	--	- -	GS	0.08	--	--	0.08
			Manganese	- -	--	- -	--	- -	CNS	0.03	--	--	0.03
			Nickel	- -	--	- -	--	- -	Body Weight	0.008	--	--	0.008
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Chemical Total	8E-05	--	5E-05	--	1E-04		0	--	--	0
		Exposure Point Total						1E-04					0
	Exposure Medium Total							1E-04					0
	Air	OU8	Benzo(a)pyrene Equivalents	--	2E-10	--	--	2E-10	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.0003	--	0.0003
			Nickel	--	6E-11	--	--	6E-11	Respiratory	--	0.00003	--	0.00003
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	3E-10	--	--	3E-10		- -	0.0003	- -	0.0003
		Exposure Point Total						3E-10					0.0003
	Exposure Medium Total							3E-10					0.0003
Medium Total								1E-04					0
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-05	--	1E-05	--	3E-05	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	3	--	--	3
			Arsenic	3E-06	--	7E-07	--	4E-06	Skin, CVS	0.08	--	0.02	0.09
			Cadmium	- -	--	- -	--	- -	Kidney	0.01	--	0.001	0.01
			Cobalt	- -	--	- -	--	- -	Thyroid	0.08	--	--	0.08
			Copper	- -	--	- -	--	- -	GS	0.5	--	--	0.5
			Iron	- -	--	- -	--	- -	GS	0.3	--	--	0.3
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.1	--	--	0.1
			Mercury	- -	--	- -	--	- -	CNS	--	--	--	--
			Nickel	- -	--	- -	--	- -	Body Weight	0.06	--	--	0.06
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Zinc	- -	--	- -	--	- -	Blood	0.01	--	--	0.01
			Cyanide	- -	--	- -	--	- -	Thyroid, CNS	0.1	--	--	0.1
			Chemical Total	2E-05	--	1E-05	--	4E-05		4	--	0.02	4
		Exposure Point Total						4E-05					4
	Exposure Medium Total							4E-05					4
	Air	OU8	Benzo(a)pyrene Equivalents	--	6E-11	--	--	6E-11	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	3E-10	--	--	3E-10	NA	--	0.00005	--	0.00005
			Cadmium	--	2E-11	--	--	2E-11	Kidney	--	0.00001	--	0.00001
			Cobalt	--	3E-10	--	--	3E-10	Respiratory	--	0.00007	--	0.00007
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.001	--	0.001
			Mercury	--	- -	--	--	- -	CNS	--	--	--	--
			Nickel	--	5E-10	--	--	5E-10	Respiratory	--	0.0003	--	0.0003
			Thallium	--	- -	--	--	- -	NA	--	--	--	--

TABLE 9.2.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Air	OU8	Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	--	--	--
			Chemical Total	--	1E-09	--	--	1E-09		- -	0.406	- -	0.406
		Exposure Point Total						1E-09					0.406
	Exposure Medium Total							1E-09					0.406
Medium Total								4E-05					5
Receptor Total							Receptor Risk Total	2E-04				Receptor HI Total	5

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	3
Total Body Weight HI	0.07
Total CNS HI	0.3
Total CVS HI	0.09
Total GS HI	0.9
Total Kidney HI	0.01
Total Respiratory HI	0.0004
Total Skin HI	0
Total Thyroid HI	0.6

TABLE 9.3.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	9E-06	--	1E-05	--	2E-05	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.0004	--	--	0.0004
			Copper	- -	--	- -	--	- -	GS	0.001	--	--	0.001
			Iron	- -	--	- -	--	- -	GS	0.007	--	--	0.007
			Manganese	- -	--	- -	--	- -	CNS	0.003	--	--	0.003
			Nickel	- -	--	- -	--	- -	Body Weight	0.0007	--	--	0.0007
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Chemical Total	9E-06	--	1E-05	--	2E-05		0.01	--	--	0.01
		Exposure Point Total						2E-05					0.01
	Exposure Medium Total							2E-05					0.01
	Air	OU8	Benzo(a)pyrene Equivalents	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.0003	--	0.0003
			Nickel	--	2E-10	--	--	2E-10	Respiratory	--	0.00003	--	0.00003
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	5E-10	--	--	5E-10		- -	0.0003	- -	0.0003
		Exposure Point Total						5E-10					0.0003
	Exposure Medium Total							5E-10					0.0003
Medium Total								2E-05					0.01
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-06	--	3E-06	--	5E-06	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.3	--	--	0.3
			Arsenic	9E-07	--	4E-07	--	1E-06	Skin, CVS	0.007	--	0.003	0.01
			Cadmium	- -	--	- -	--	- -	Kidney	0.001	--	0.0002	0.001
			Cobalt	- -	--	- -	--	- -	Thyroid	0.007	--	--	0.007
			Copper	- -	--	- -	--	- -	GS	0.05	--	--	0.05
			Iron	- -	--	- -	--	- -	GS	0.02	--	--	0.02
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.01	--	--	0.01
			Mercury	- -	--	- -	--	- -	CNS	0.002	--	--	0.002
			Nickel	- -	--	- -	--	- -	Body Weight	0.006	--	--	0.006
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Zinc	- -	--	- -	--	- -	Blood	0.001	--	--	0.001
			Cyanide	- -	--	- -	--	- -	Thyroid, CNS	0.010	--	--	0.010
			Chemical Total	3E-06	--	3E-06	--	6E-06		0.4	--	0.003	0.4
		Exposure Point Total						6E-06					0.4
	Exposure Medium Total							6E-06					0.4
	Air	OU8	Benzo(a)pyrene Equivalents	--	7E-11	--	--	7E-11	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	9E-10	--	--	9E-10	NA	--	0.00005	--	0.00005
			Cadmium	--	6E-11	--	--	6E-11	Kidney	--	0.00001	--	0.00001
			Cobalt	--	1E-09	--	--	1E-09	Respiratory	--	0.00007	--	0.00007
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.001	--	0.001
			Mercury	--	- -	--	--	- -	CNS	--	0.0000004	--	0.0000004
			Nickel	--	2E-09	--	--	2E-09	Respiratory	--	0.0003	--	0.0003
			Thallium	--	- -	--	--	- -	NA	--	--	--	--

TABLE 9.3.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Air	OU8	Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	0.4	--	0.4
			Chemical Total	--	4E-09	--	--	4E-09		- -	0.4	- -	0.4
		Exposure Point Total						4E-09					0.4
	Exposure Medium Total							4E-09					0.4
Medium Total								6E-06					0.8
Receptor Total							Receptor Risk Total	3E-05				Receptor HI Total	0.8

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	0.3
Total Body Weight HI	0.007
Total CNS HI	0.03
Total CVS HI	0.01
Total GS HI	0.08
Total Kidney HI	0.001
Total Respiratory HI	0.0004
Total Skin HI	0.01
Total Thyroid HI	0.4

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	9E-05	--	6E-05	--	1E-04					
			Antimony	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Manganese	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Thallium	- -	--	- -	--	- -					
			Chemical Total	9E-05	--	6E-05	--	1E-04					
		Exposure Point Total						1E-04					
	Exposure Medium Total							1E-04					
	Air	OU8	Benzo(a)pyrene Equivalents	--	5E-10	--	--	5E-10					
			Antimony	--	- -	--	--	- -					
			Copper	--	- -	--	--	- -					
			Iron	--	- -	--	--	- -					
			Manganese	--	- -	--	--	- -					
			Nickel	--	3E-10	--	--	3E-10					
			Thallium	--	- -	--	--	- -					
			Chemical Total	--	8E-10	--	--	8E-10					
		Exposure Point Total						8E-10					
	Exposure Medium Total							8E-10					
Medium Total								1E-04					
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-05	--	2E-05	--	4E-05					
			Antimony	- -	--	- -	--	- -					
			Arsenic	4E-06	--	1E-06	--	5E-06					
			Cadmium	- -	--	- -	--	- -					
			Cobalt	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Manganese	- -	--	- -	--	- -					
			Mercury	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Thallium	- -	--	- -	--	- -					
			Zinc	- -	--	- -	--	- -					
			Cyanide	- -	--	- -	--	- -					
			Chemical Total	3E-05	--	2E-05	--	4E-05					
		Exposure Point Total						4E-05					
	Exposure Medium Total							4E-05					
	Air	OU8	Benzo(a)pyrene Equivalents	--	1E-10	--	--	1E-10					
			Antimony	--	- -	--	--	- -					
			Arsenic	--	1E-09	--	--	1E-09					
			Cadmium	--	8E-11	--	--	8E-11					
			Cobalt	--	1E-09	--	--	1E-09					
			Copper	--	- -	--	--	- -					
			Iron	--	- -	--	--	- -					
			Lead	--	- -	--	--	- -					
			Manganese	--	- -	--	--	- -					
			Mercury	--	- -	--	--	- -					
			Nickel	--	2E-09	--	--	2E-09					
			Thallium	--	- -	--	--	- -					

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Air	OU8	Zinc	--	- -	--	--	- -					
			Cyanide	--	- -	--	--	- -					
			Chemical Total	--	5E-09	--	--	5E-09					
		Exposure Point Total						5E-09					
	Exposure Medium Total							5E-09					
Medium Total								4E-05					
Receptor Total							Receptor Risk Total	2E-04					

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	6E-04	--	2E-04	--	7E-04	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.03	--	--	0.03
			Copper	- -	--	- -	--	- -	GS	0.10	--	--	0.10
			Iron	- -	--	- -	--	- -	GS	0.5	--	--	0.5
			Manganese	- -	--	- -	--	- -	CNS	0.2	--	--	0.2
			Nickel	- -	--	- -	--	- -	Body Weight	0.05	--	--	0.05
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Chemical Total	6E-04	--	2E-04	--	7E-04		1.0	--	--	1.0
		Exposure Point Total						7E-04					1.0
	Exposure Medium Total							7E-04					1.0
	Air	OU8	Benzo(a)pyrene Equivalents	--	5E-09	--	--	5E-09	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.006	--	0.006
			Nickel	--	1E-09	--	--	1E-09	Respiratory	--	0.0007	--	0.0007
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	6E-09	--	--	6E-09		- -	0.007	- -	0.007
		Exposure Point Total						6E-09					0.007
	Exposure Medium Total							6E-09					0.007
Medium Total								7E-04					1.0
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	1E-04	--	4E-05	--	2E-04	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	19	--	--	19
			Arsenic	2E-05	--	2E-06	--	2E-05	Skin, CVS	0.5	--	0.06	0.6
			Cadmium	- -	--	- -	--	- -	Kidney	0.09	--	0.004	0.10
			Cobalt	- -	--	- -	--	- -	Thyroid	0.6	--	--	0.6
			Copper	- -	--	- -	--	- -	GS	4	--	--	4
			Iron	- -	--	- -	--	- -	GS	2	--	--	2
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	1	--	--	1
			Mercury	- -	--	- -	--	- -	CNS	0.2	--	--	0.2
			Nickel	- -	--	- -	--	- -	Body Weight	0.5	--	--	0.5
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Zinc	- -	--	- -	--	- -	Blood	0.09	--	--	0.09
			Cyanide	- -	--	- -	--	- -	Thyroid, CNS	0.7	--	--	0.7
			Chemical Total	2E-04	--	5E-05	--	2E-04		29	--	0.07	29
		Exposure Point Total						2E-04					29
	Exposure Medium Total							2E-04					29
	Air	OU8	Benzo(a)pyrene Equivalents	--	1E-09	--	--	1E-09	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	5E-09	--	--	5E-09	NA	--	0.0010	--	0.0010
			Cadmium	--	4E-10	--	--	4E-10	Kidney	--	0.0003	--	0.0003
			Cobalt	--	7E-09	--	--	7E-09	Respiratory	--	0.002	--	0.002
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.03	--	0.03
			Mercury	--	- -	--	--	- -	CNS	--	0.000009	--	0.000009
			Nickel	--	1E-08	--	--	1E-08	Respiratory	--	0.006	--	0.006
			Thallium	--	- -	--	--	- -	NA	--	--	--	--

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Air	OU8	Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	8	--	8
			Chemical Total	--	3E-08	--	--	3E-08		- -	9	- -	9
		Exposure Point Total						3E-08					9
	Exposure Medium Total							3E-08					9
Medium Total								2E-04					37
Receptor Total							Receptor Risk Total	9E-04				Receptor HI Total	38

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	20
Total Body Weight HI	0.5
Total CNS HI	2
Total CVS HI	0.6
Total GS HI	6
Total Kidney HI	0.10
Total Respiratory HI	0.008
Total Skin HI	0.6
Total Thyroid HI	10

TABLE 9.6.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	7E-05	--	4E-05	--	1E-04	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.003	--	--	0.003
			Copper	- -	--	- -	--	- -	GS	0.009	--	--	0.009
			Iron	- -	--	- -	--	- -	GS	0.05	--	--	0.05
			Manganese	- -	--	- -	--	- -	CNS	0.02	--	--	0.02
			Nickel	- -	--	- -	--	- -	Body Weight	0.005	--	--	0.005
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Chemical Total	7E-05	--	4E-05	--	1E-04		0.09	--	--	0.09
		Exposure Point Total						1E-04					0.09
	Exposure Medium Total							1E-04					0.09
	Air	OU8	Benzo(a)pyrene Equivalents	--	6E-09	--	--	6E-09	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.006	--	0.006
			Nickel	--	4E-09	--	--	4E-09	Respiratory	--	0.0007	--	0.0007
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	1E-08	--	--	1E-08		- -	0.007	- -	0.007
		Exposure Point Total						1E-08					0.007
	Exposure Medium Total							1E-08					0.007
Medium Total								1E-04					0.10
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-05	--	9E-06	--	3E-05	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	2	--	--	2
			Arsenic	6E-06	--	1E-06	--	8E-06	Skin, CVS	0.05	--	0.01	0.06
			Cadmium	- -	--	- -	--	- -	Kidney	0.009	--	0.0007	0.010
			Cobalt	- -	--	- -	--	- -	Thyroid	0.05	--	--	0.05
			Copper	- -	--	- -	--	- -	GS	0.4	--	--	0.4
			Iron	- -	--	- -	--	- -	GS	0.2	--	--	0.2
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.09	--	--	0.09
			Mercury	- -	--	- -	--	- -	CNS	0.01	--	--	0.01
			Nickel	- -	--	- -	--	- -	Body Weight	0.04	--	--	0.04
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Zinc	- -	--	- -	--	- -	Blood	0.009	--	--	0.009
			Cyanide	- -	--	- -	--	- -	Thyroid, CNS	0.07	--	--	0.07
			Chemical Total	2E-05	--	1E-05	--	3E-05		3	--	0.01	3
		Exposure Point Total						3E-05					3
	Exposure Medium Total							3E-05					3
	Air	OU8	Benzo(a)pyrene Equivalents	--	2E-09	--	--	2E-09	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	2E-08	--	--	2E-08	NA	--	0.0010	--	0.0010
			Cadmium	--	1E-09	--	--	1E-09	Kidney	--	0.0003	--	0.0003
			Cobalt	--	2E-08	--	--	2E-08	Respiratory	--	0.002	--	0.002
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.03	--	0.03
			Mercury	--	- -	--	--	- -	CNS	--	0.000009	--	0.000009
			Nickel	--	4E-08	--	--	4E-08	Respiratory	--	0.006	--	0.006
			Thallium	--	- -	--	--	- -	NA	--	--	--	--

TABLE 9.6.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Air	OU8	Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	8	--	8
			Chemical Total	--	8E-08	--	--	8E-08		- -	9	- -	9
		Exposure Point Total						8E-08					9
	Exposure Medium Total							8E-08					9
Medium Total								3E-05					11
Receptor Total							Receptor Risk Total	1E-04				Receptor HI Total	11

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	2
Total Body Weight HI	0.05
Total CNS HI	0.2
Total CVS HI	0.06
Total GS HI	0.6
Total Kidney HI	0.010
Total Respiratory HI	0.008
Total Skin HI	0.06
Total Thyroid HI	9

TABLE 9.7.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	6E-04	--	2E-04	--	8E-04					
			Antimony	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Manganese	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Thallium	- -	--	- -	--	- -					
			Chemical Total	6E-04	--	2E-04	--	8E-04					
		Exposure Point Total						8E-04					
	Exposure Medium Total							8E-04					
	Air	OU8	Benzo(a)pyrene Equivalents	--	1E-08	--	--	1E-08					
			Antimony	--	- -	--	--	- -					
			Copper	--	- -	--	--	- -					
			Iron	--	- -	--	--	- -					
			Manganese	--	- -	--	--	- -					
			Nickel	--	6E-09	--	--	6E-09					
			Thallium	--	- -	--	--	- -					
			Chemical Total	--	2E-08	--	--	2E-08					
		Exposure Point Total						2E-08					
	Exposure Medium Total							2E-08					
Medium Total								8E-04					
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-04	--	5E-05	--	2E-04					
			Antimony	- -	--	- -	--	- -					
			Arsenic	3E-05	--	4E-06	--	3E-05					
			Cadmium	- -	--	- -	--	- -					
			Cobalt	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Manganese	- -	--	- -	--	- -					
			Mercury	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Thallium	- -	--	- -	--	- -					
			Zinc	- -	--	- -	--	- -					
			Cyanide	- -	--	- -	--	- -					
			Chemical Total	2E-04	--	6E-05	--	2E-04					
		Exposure Point Total						2E-04					
	Exposure Medium Total							2E-04					
	Air	OU8	Benzo(a)pyrene Equivalents	--	3E-09	--	--	3E-09					
			Antimony	--	- -	--	--	- -					
			Arsenic	--	2E-08	--	--	2E-08					
			Cadmium	--	2E-09	--	--	2E-09					
			Cobalt	--	3E-08	--	--	3E-08					
			Copper	--	- -	--	--	- -					
			Iron	--	- -	--	--	- -					
			Lead	--	- -	--	--	- -					
			Manganese	--	- -	--	--	- -					
			Mercury	--	- -	--	--	- -					
			Nickel	--	5E-08	--	--	5E-08					
			Thallium	--	- -	--	--	- -					

TABLE 9.7.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Air	OU8	Zinc	--	- -	--	--	- -					
			Cyanide	--	- -	--	--	- -					
			Chemical Total	--	1E-07	--	--	1E-07					
		Exposure Point Total						1E-07					
	Exposure Medium Total							1E-07					
Medium Total								2E-04					
Receptor Total							Receptor Risk Total	1E-03					

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.1.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	5E-06	--	8E-07	--	5E-06	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.0009	--	--	0.0009
			Copper	- -	--	- -	--	- -	GS	0.003	--	--	0.003
			Iron	- -	--	- -	--	- -	GS	0.02	--	--	0.02
			Manganese	- -	--	- -	--	- -	CNS	0.007	--	--	0.007
			Nickel	- -	--	- -	--	- -	Body Weight	0.002	--	--	0.002
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Chemical Total	5E-06	--	8E-07	--	5E-06		0.03	--	--	0.03
		Exposure Point Total						5E-06					0.03
	Exposure Medium Total							5E-06					0.03
	Air	OU8	Benzo(a)pyrene Equivalents	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.001	--	0.001
			Nickel	--	4E-10	--	--	4E-10	Respiratory	--	0.0001	--	0.0001
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	7E-10	--	--	7E-10		- -	0.001	- -	0.001
		Exposure Point Total						7E-10					0.001
	Exposure Medium Total							7E-10					0.001
Medium Total								5E-06					0.03
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	1E-06	--	2E-07	--	1E-06	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.6	--	--	0.6
			Arsenic	9E-07	--	6E-08	--	1E-06	Skin, CVS	0.02	--	0.001	0.02
			Cadmium	- -	--	- -	--	- -	Kidney	0.003	--	0.00008	0.003
			Cobalt	- -	--	- -	--	- -	Thyroid	0.02	--	--	0.02
			Copper	- -	--	- -	--	- -	GS	0.1	--	--	0.1
			Iron	- -	--	- -	--	- -	GS	0.05	--	--	0.05
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.03	--	--	0.03
			Mercury	- -	--	- -	--	- -	CNS	0.005	--	--	0.005
			Nickel	- -	--	- -	--	- -	Body Weight	0.01	--	--	0.01
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Zinc	- -	--	- -	--	- -	Blood	0.003	--	--	0.003
			Cyanide	- -	--	- -	--	- -	Thyroid, CNS	0.02	--	--	0.02
			Chemical Total	2E-06	--	3E-07	--	2E-06		0.8	--	0.001	0.8
		Exposure Point Total						2E-06					0.8
	Exposure Medium Total							2E-06					0.8
	Air	OU8	Benzo(a)pyrene Equivalents	--	7E-11	--	--	7E-11	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	2E-09	--	--	2E-09	NA	--	0.0002	--	0.0002
			Cadmium	--	1E-10	--	--	1E-10	Kidney	--	0.00005	--	0.00005
			Cobalt	--	2E-09	--	--	2E-09	Respiratory	--	0.0003	--	0.0003
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.006	--	0.006
			Mercury	--	- -	--	--	- -	CNS	--	0.000002	--	0.000002
			Nickel	--	3E-09	--	--	3E-09	Respiratory	--	0.001	--	0.001
			Thallium	--	- -	--	--	- -	NA	--	--	--	--

TABLE 9.1.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Air	OU8	Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	2	--	2
			Chemical Total	--	8E-09	--	--	8E-09		- -	2	- -	2
		Exposure Point Total						8E-09					2
	Exposure Medium Total							8E-09					2
Medium Total								2E-06					3
Receptor Total							Receptor Risk Total	8E-06				Receptor HI Total	3

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	0.6
Total Body Weight HI	0.01
Total CNS HI	0.07
Total CVS HI	0.02
Total GS HI	0.2
Total Kidney HI	0.003
Total Respiratory HI	0.002
Total Skin HI	0.02
Total Thyroid HI	2

TABLE 9.2.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	8E-06	--	2E-06	--	1E-05	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.001	--	--	0.001
			Copper	- -	--	- -	--	- -	GS	0.004	--	--	0.004
			Iron	- -	--	- -	--	- -	GS	0.02	--	--	0.02
			Manganese	- -	--	- -	--	- -	CNS	0.008	--	--	0.008
			Nickel	- -	--	- -	--	- -	Body Weight	0.002	--	--	0.002
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Chemical Total	8E-06	--	2E-06	--	1E-05		0	--	--	0
		Exposure Point Total						1E-05					0
	Exposure Medium Total							1E-05					0
	Air	OU8	Benzo(a)pyrene Equivalents	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.00007	--	0.00007
			Nickel	--	5E-12	--	--	5E-12	Respiratory	--	0.000008	--	0.000008
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	3E-11	--	--	3E-11		- -	0.00008	- -	0.00008
		Exposure Point Total						3E-11					0.00008
	Exposure Medium Total							3E-11					0.00008
Medium Total								1E-05					0
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-06	--	5E-07	--	3E-06	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.7	--	--	0.7
			Arsenic	2E-07	--	2E-08	--	3E-07	Skin, CVS	0.02	--	0.002	0.02
			Cadmium	- -	--	- -	--	- -	Kidney	0.003	--	0.0001	0.003
			Cobalt	- -	--	- -	--	- -	Thyroid	0.02	--	--	0.02
			Copper	- -	--	- -	--	- -	GS	0.1	--	--	0.1
			Iron	- -	--	- -	--	- -	GS	0.07	--	--	0.07
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.04	--	--	0.04
			Mercury	- -	--	- -	--	- -	CNS	--	--	--	--
			Nickel	- -	--	- -	--	- -	Body Weight	0.02	--	--	0.02
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Zinc	- -	--	- -	--	- -	Blood	0.003	--	--	0.003
			Cyanide	- -	--	- -	--	- -	Thyroid, CNS	0.03	--	--	0.03
			Chemical Total	2E-06	--	5E-07	--	3E-06		1	--	0.002	1
		Exposure Point Total						3E-06					1
	Exposure Medium Total							3E-06					1
	Air	OU8	Benzo(a)pyrene Equivalents	--	6E-12	--	--	6E-12	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	2E-11	--	--	2E-11	NA	--	0.00001	--	0.00001
			Cadmium	--	2E-12	--	--	2E-12	Kidney	--	0.000003	--	0.000003
			Cobalt	--	3E-11	--	--	3E-11	Respiratory	--	0.00002	--	0.00002
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.0003	--	0.0003
			Mercury	--	- -	--	--	- -	CNS	--	--	--	--
			Nickel	--	4E-11	--	--	4E-11	Respiratory	--	0.00007	--	0.00007
			Thallium	--	- -	--	--	- -	NA	--	--	--	--

TABLE 9.2.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Air	OU8	Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	--	--	--
			Chemical Total	--	1E-10	--	--	1E-10		- -	0.1015	- -	0.1015
		Exposure Point Total						1E-10					0.1015
	Exposure Medium Total							1E-10					0.1015
Medium Total								3E-06					1
Receptor Total							Receptor Risk Total	1E-05				Receptor HI Total	1

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	0.7
Total Body Weight HI	0.02
Total CNS HI	0.08
Total CVS HI	0.02
Total GS HI	0.2
Total Kidney HI	0.003
Total Respiratory HI	0.00009
Total Skin HI	0
Total Thyroid HI	0.15

TABLE 9.3.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	6E-07	--	2E-07	--	8E-07	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.0001	--	--	0.0001
			Copper	- -	--	- -	--	- -	GS	0.0003	--	--	0.0003
			Iron	- -	--	- -	--	- -	GS	0.002	--	--	0.002
			Manganese	- -	--	- -	--	- -	CNS	0.0008	--	--	0.0008
			Nickel	- -	--	- -	--	- -	Body Weight	0.0002	--	--	0.0002
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Chemical Total	6E-07	--	2E-07	--	8E-07		0.003	--	--	0.003
		Exposure Point Total						8E-07					0.003
	Exposure Medium Total							8E-07					0.003
	Air	OU8	Benzo(a)pyrene Equivalents	--	2E-11	--	--	2E-11	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.00007	--	0.00007
			Nickel	--	2E-11	--	--	2E-11	Respiratory	--	0.000008	--	0.000008
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	4E-11	--	--	4E-11		- -	0.00008	- -	0.00008
		Exposure Point Total						4E-11					0.00008
	Exposure Medium Total							4E-11					0.00008
Medium Total								8E-07					0.003
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-07	--	5E-08	--	2E-07	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.07	--	--	0.07
			Arsenic	8E-08	--	1E-08	--	9E-08	Skin, CVS	0.002	--	0.0002	0.002
			Cadmium	- -	--	- -	--	- -	Kidney	0.0003	--	0.00002	0.0003
			Cobalt	- -	--	- -	--	- -	Thyroid	0.002	--	--	0.002
			Copper	- -	--	- -	--	- -	GS	0.01	--	--	0.01
			Iron	- -	--	- -	--	- -	GS	0.006	--	--	0.006
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.003	--	--	0.003
			Mercury	- -	--	- -	--	- -	CNS	0.0005	--	--	0.0005
			Nickel	- -	--	- -	--	- -	Body Weight	0.002	--	--	0.002
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Zinc	- -	--	- -	--	- -	Blood	0.0003	--	--	0.0003
			Cyanide	- -	--	- -	--	- -	Thyroid, CNS	0.002	--	--	0.002
			Chemical Total	2E-07	--	6E-08	--	3E-07		0.10	--	0.0002	0.10
		Exposure Point Total						3E-07					0.10
	Exposure Medium Total							3E-07					0.10
	Air	OU8	Benzo(a)pyrene Equivalents	--	5E-12	--	--	5E-12	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	8E-11	--	--	8E-11	NA	--	0.00001	--	0.00001
			Cadmium	--	6E-12	--	--	6E-12	Kidney	--	0.000003	--	0.000003
			Cobalt	--	1E-10	--	--	1E-10	Respiratory	--	0.00002	--	0.00002
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.0003	--	0.0003
			Mercury	--	- -	--	--	- -	CNS	--	0.0000001	--	0.0000001
			Nickel	--	2E-10	--	--	2E-10	Respiratory	--	0.00007	--	0.00007
			Thallium	--	- -	--	--	- -	NA	--	--	--	--

TABLE 9.3.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Air	OU8	Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	0.1	--	0.1
			Chemical Total	--	3E-10	--	--	3E-10		- -	0.1	- -	0.1
		Exposure Point Total						3E-10					0.1
	Exposure Medium Total							3E-10					0.1
Medium Total								3E-07					0.2
Receptor Total							Receptor Risk Total	1E-06				Receptor HI Total	0.2

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	0.07
Total Body Weight HI	0.002
Total CNS HI	0.008
Total CVS HI	0.002
Total GS HI	0.02
Total Kidney HI	0.0003
Total Respiratory HI	0.00009
Total Skin HI	0.002
Total Thyroid HI	0.1

TABLE 9.4.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	9E-06	--	2E-06	--	1E-05					
			Antimony	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Manganese	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Thallium	- -	--	- -	--	- -					
			Chemical Total	9E-06	--	2E-06	--	1E-05					
		Exposure Point Total						1E-05					
	Exposure Medium Total							1E-05					
	Air	OU8	Benzo(a)pyrene Equivalents	--	4E-11	--	--	4E-11					
			Antimony	--	- -	--	--	- -					
			Copper	--	- -	--	--	- -					
			Iron	--	- -	--	--	- -					
			Manganese	--	- -	--	--	- -					
			Nickel	--	2E-11	--	--	2E-11					
			Thallium	--	- -	--	--	- -					
			Chemical Total	--	6E-11	--	--	6E-11					
		Exposure Point Total						6E-11					
	Exposure Medium Total							6E-11					
Medium Total								1E-05					
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-06	--	6E-07	--	3E-06					
			Antimony	- -	--	- -	--	- -					
			Arsenic	3E-07	--	3E-08	--	4E-07					
			Cadmium	- -	--	- -	--	- -					
			Cobalt	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Manganese	- -	--	- -	--	- -					
			Mercury	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Thallium	- -	--	- -	--	- -					
			Zinc	- -	--	- -	--	- -					
			Cyanide	- -	--	- -	--	- -					
			Chemical Total	3E-06	--	6E-07	--	3E-06					
		Exposure Point Total						3E-06					
	Exposure Medium Total							3E-06					
	Air	OU8	Benzo(a)pyrene Equivalents	--	1E-11	--	--	1E-11					
			Antimony	--	- -	--	--	- -					
			Arsenic	--	1E-10	--	--	1E-10					
			Cadmium	--	7E-12	--	--	7E-12					
			Cobalt	--	1E-10	--	--	1E-10					
			Copper	--	- -	--	--	- -					
			Iron	--	- -	--	--	- -					
			Lead	--	- -	--	--	- -					
			Manganese	--	- -	--	--	- -					
			Mercury	--	- -	--	--	- -					
			Nickel	--	2E-10	--	--	2E-10					
			Thallium	--	- -	--	--	- -					

TABLE 9.4.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Air	OU8	Zinc	--	- -	--	--	- -					
			Cyanide	--	- -	--	--	- -					
			Chemical Total	--	4E-10	--	--	4E-10					
		Exposure Point Total						4E-10					
	Exposure Medium Total							4E-10					
Medium Total								3E-06					
Receptor Total							Receptor Risk Total	1E-05					

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.5.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	8E-05	--	9E-06	--	8E-05	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.01	--	--	0.01
			Copper	- -	--	- -	--	- -	GS	0.03	--	--	0.03
			Iron	- -	--	- -	--	- -	GS	0.2	--	--	0.2
			Manganese	- -	--	- -	--	- -	CNS	0.08	--	--	0.08
			Nickel	- -	--	- -	--	- -	Body Weight	0.02	--	--	0.02
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Chemical Total	8E-05	--	9E-06	--	8E-05		0.3	--	--	0.3
		Exposure Point Total						8E-05					0.3
	Exposure Medium Total							8E-05					0.3
	Air	OU8	Benzo(a)pyrene Equivalents	--	1E-09	--	--	1E-09	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.004	--	0.004
			Nickel	--	3E-10	--	--	3E-10	Respiratory	--	0.0004	--	0.0004
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	2E-09	--	--	2E-09		- -	0.005	- -	0.005
		Exposure Point Total						2E-09					0.005
	Exposure Medium Total							2E-09					0.005
Medium Total								8E-05					0.3
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-05	--	2E-06	--	2E-05	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	7	--	--	7
			Arsenic	2E-06	--	1E-07	--	2E-06	Skin, CVS	0.2	--	0.008	0.2
			Cadmium	- -	--	- -	--	- -	Kidney	0.03	--	0.0006	0.03
			Cobalt	- -	--	- -	--	- -	Thyroid	0.2	--	--	0.2
			Copper	- -	--	- -	--	- -	GS	1	--	--	1
			Iron	- -	--	- -	--	- -	GS	0.6	--	--	0.6
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.3	--	--	0.3
			Mercury	- -	--	- -	--	- -	CNS	0.05	--	--	0.05
			Nickel	- -	--	- -	--	- -	Body Weight	0.2	--	--	0.2
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Zinc	- -	--	- -	--	- -	Blood	0.03	--	--	0.03
			Cyanide	- -	--	- -	--	- -	Thyroid, CNS	0.2	--	--	0.2
			Chemical Total	2E-05	--	3E-06	--	2E-05		10	--	0.009	10
		Exposure Point Total						2E-05					10
	Exposure Medium Total							2E-05					10
	Air	OU8	Benzo(a)pyrene Equivalents	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	1E-09	--	--	1E-09	NA	--	0.0007	--	0.0007
			Cadmium	--	9E-11	--	--	9E-11	Kidney	--	0.0002	--	0.0002
			Cobalt	--	2E-09	--	--	2E-09	Respiratory	--	0.001	--	0.001
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.02	--	0.02
			Mercury	--	- -	--	--	- -	CNS	--	0.000006	--	0.000006
			Nickel	--	2E-09	--	--	2E-09	Respiratory	--	0.004	--	0.004
			Thallium	--	- -	--	--	- -	NA	--	--	--	--

TABLE 9.5.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Air	OU8	Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	6	--	6
			Chemical Total	--	6E-09	--	--	6E-09		- -	6	- -	6
		Exposure Point Total						6E-09					6
	Exposure Medium Total							6E-09					6
Medium Total								2E-05					15
Receptor Total							Receptor Risk Total	1E-04				Receptor HI Total	16

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	7
Total Body Weight HI	0.2
Total CNS HI	0.7
Total CVS HI	0.2
Total GS HI	2
Total Kidney HI	0.03
Total Respiratory HI	0.005
Total Skin HI	0.2
Total Thyroid HI	6

TABLE 9.6.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	6E-06	--	9E-07	--	7E-06	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.001	--	--	0.001
			Copper	- -	--	- -	--	- -	GS	0.003	--	--	0.003
			Iron	- -	--	- -	--	- -	GS	0.02	--	--	0.02
			Manganese	- -	--	- -	--	- -	CNS	0.007	--	--	0.007
			Nickel	- -	--	- -	--	- -	Body Weight	0.002	--	--	0.002
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Chemical Total	6E-06	--	9E-07	--	7E-06		0.03	--	--	0.03
		Exposure Point Total						7E-06					0.03
	Exposure Medium Total							7E-06					0.03
	Air	OU8	Benzo(a)pyrene Equivalents	--	1E-09	--	--	1E-09	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.004	--	0.004
			Nickel	--	1E-09	--	--	1E-09	Respiratory	--	0.0004	--	0.0004
			Thallium	--	- -	--	--	- -	NA	--	--	--	--
			Chemical Total	--	2E-09	--	--	2E-09		- -	0.005	- -	0.005
		Exposure Point Total						2E-09					0.005
	Exposure Medium Total							2E-09					0.005
Medium Total								7E-06					0.03
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-06	--	2E-07	--	2E-06	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.6	--	--	0.6
			Arsenic	8E-07	--	5E-08	--	8E-07	Skin, CVS	0.02	--	0.001	0.02
			Cadmium	- -	--	- -	--	- -	Kidney	0.003	--	0.00007	0.003
			Cobalt	- -	--	- -	--	- -	Thyroid	0.02	--	--	0.02
			Copper	- -	--	- -	--	- -	GS	0.1	--	--	0.1
			Iron	- -	--	- -	--	- -	GS	0.06	--	--	0.06
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Manganese	- -	--	- -	--	- -	CNS	0.03	--	--	0.03
			Mercury	- -	--	- -	--	- -	CNS	0.005	--	--	0.005
			Nickel	- -	--	- -	--	- -	Body Weight	0.01	--	--	0.01
			Thallium	- -	--	- -	--	- -	Skin	--	--	--	--
			Zinc	- -	--	- -	--	- -	Blood	0.003	--	--	0.003
			Cyanide	- -	--	- -	--	- -	Thyroid, CNS	0.02	--	--	0.02
			Chemical Total	2E-06	--	3E-07	--	3E-06		0.9	--	0.001	0.9
		Exposure Point Total						3E-06					0.9
	Exposure Medium Total							3E-06					0.9
	Air	OU8	Benzo(a)pyrene Equivalents	--	3E-10	--	--	3E-10	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Arsenic	--	4E-09	--	--	4E-09	NA	--	0.0007	--	0.0007
			Cadmium	--	3E-10	--	--	3E-10	Kidney	--	0.0002	--	0.0002
			Cobalt	--	6E-09	--	--	6E-09	Respiratory	--	0.001	--	0.001
			Copper	--	- -	--	--	- -	NA	--	--	--	--
			Iron	--	- -	--	--	- -	NA	--	--	--	--
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Manganese	--	- -	--	--	- -	CNS	--	0.02	--	0.02
			Mercury	--	- -	--	--	- -	CNS	--	0.000006	--	0.000006
			Nickel	--	9E-09	--	--	9E-09	Respiratory	--	0.004	--	0.004
			Thallium	--	- -	--	--	- -	NA	--	--	--	--

TABLE 9.6.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Air	OU8	Zinc	--	- -	--	--	- -	NA	--	--	--	--
			Cyanide	--	- -	--	--	- -	Thyroid	--	6	--	6
			Chemical Total	--	2E-08	--	--	2E-08		- -	6	- -	6
		Exposure Point Total						2E-08					6
	Exposure Medium Total							2E-08					6
Medium Total								3E-06					7
Receptor Total							Receptor Risk Total	1E-05				Receptor HI Total	7

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Blood HI	0.6
Total Body Weight HI	0.02
Total CNS HI	0.09
Total CVS HI	0.02
Total GS HI	0.2
Total Kidney HI	0.003
Total Respiratory HI	0.005
Total Skin HI	0.02
Total Thyroid HI	6

TABLE 9.7.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	OU8	Benzo(a)pyrene Equivalents	8E-05	--	1E-05	--	9E-05					
			Antimony	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Manganese	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Thallium	- -	--	- -	--	- -					
			Chemical Total	8E-05	--	1E-05	--	9E-05					
		Exposure Point Total						9E-05					
	Exposure Medium Total							9E-05					
	Air	OU8	Benzo(a)pyrene Equivalents	--	2E-09	--	--	2E-09					
			Antimony	--	- -	--	--	- -					
			Copper	--	- -	--	--	- -					
			Iron	--	- -	--	--	- -					
			Manganese	--	- -	--	--	- -					
			Nickel	--	1E-09	--	--	1E-09					
			Thallium	--	- -	--	--	- -					
			Chemical Total	--	4E-09	--	--	4E-09					
		Exposure Point Total						4E-09					
	Exposure Medium Total							4E-09					
Medium Total								9E-05					
Subsurface Soil	Subsurface Soil	OU8	Benzo(a)pyrene Equivalents	2E-05	--	3E-06	--	2E-05					
			Antimony	- -	--	- -	--	- -					
			Arsenic	3E-06	--	2E-07	--	3E-06					
			Cadmium	- -	--	- -	--	- -					
			Cobalt	- -	--	- -	--	- -					
			Copper	- -	--	- -	--	- -					
			Iron	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Manganese	- -	--	- -	--	- -					
			Mercury	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Thallium	- -	--	- -	--	- -					
			Zinc	- -	--	- -	--	- -					
			Cyanide	- -	--	- -	--	- -					
			Chemical Total	2E-05	--	3E-06	--	3E-05					
		Exposure Point Total						3E-05					
	Exposure Medium Total							3E-05					
	Air	OU8	Benzo(a)pyrene Equivalents	--	6E-10	--	--	6E-10					
			Antimony	--	- -	--	--	- -					
			Arsenic	--	5E-09	--	--	5E-09					
			Cadmium	--	4E-10	--	--	4E-10					
			Cobalt	--	7E-09	--	--	7E-09					
			Copper	--	- -	--	--	- -					
			Iron	--	- -	--	--	- -					
			Lead	--	- -	--	--	- -					
			Manganese	--	- -	--	--	- -					
			Mercury	--	- -	--	--	- -					
			Nickel	--	1E-08	--	--	1E-08					
			Thallium	--	- -	--	--	- -					

TABLE 9.7.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Hypothetical
Receptor Population: Residents
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Air	OU8	Zinc	--	- -	--	--	- -					
			Cyanide	--	- -	--	--	- -					
			Chemical Total	--	2E-08	--	--	2E-08					
		Exposure Point Total						2E-08					
	Exposure Medium Total							2E-08					
Medium Total								3E-05					
Receptor Total							Receptor Risk Total	1E-04					

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Adult Lead Model Results

SITE NAME: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
LOCATION: OU8
RECEPTOR: OCCUPATIONAL WORKERS
MEDIA: SUBSURFACE SOIL
DATE: SEPTEMBER 29, 2015

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee
Version date 6/21/09

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004
PbS	Soil lead concentration	ug/g or ppm	2210
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4
GSD_i	Geometric standard deviation PbB	--	1.8
PbB_0	Baseline PbB	ug/dL	1.0
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--
K_{SD}	Mass fraction of soil in dust	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	219
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**4.2**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	9.9
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**4.8%**

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

SITE NAME: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
LOCATION: OU8
RECEPTOR: RECREATIONAL USERS
MEDIA: SUBSURFACE SOIL
DATE: JUNE 23, 2016

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee
Version date 6/21/09

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004
PbS	Soil lead concentration	ug/g or ppm	2210
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4
GSD_i	Geometric standard deviation PbB	--	1.8
PbB_0	Baseline PbB	ug/dL	1.0
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--
K_{SD}	Mass fraction of soil in dust	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	50
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	180
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**2.5**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	5.9
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.53%**

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

IEUBK Modeling Results

LEAD MODEL FOR WINDOWS Version 1.1

==========
Model Version: 1.1 Build11
User Name: Tt
Date: 10/19/2015
Site Name: Portsmouth Naval Shipyard, Kittery, Maine
Operable Unit: OU8
Run Mode: Site Risk Assessment

Soil/Dust Data
Mean concentration of lead in subsurface soil = 2,210 mg/kg.
==========

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(µg/day)
.5-1	2.260
1-2	1.960
2-3	2.130
3-4	2.040
4-5	1.950
5-6	2.050
6-7	2.220

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.000 µg Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 1557.000 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (µg Pb/g)	House Dust (µg Pb/g)
.5-1	2210.000	1557.000
1-2	2210.000	1557.000
2-3	2210.000	1557.000
3-4	2210.000	1557.000
4-5	2210.000	1557.000
5-6	2210.000	1557.000
6-7	2210.000	1557.000

****** Alternate Intake ******

Age	Alternate (µg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

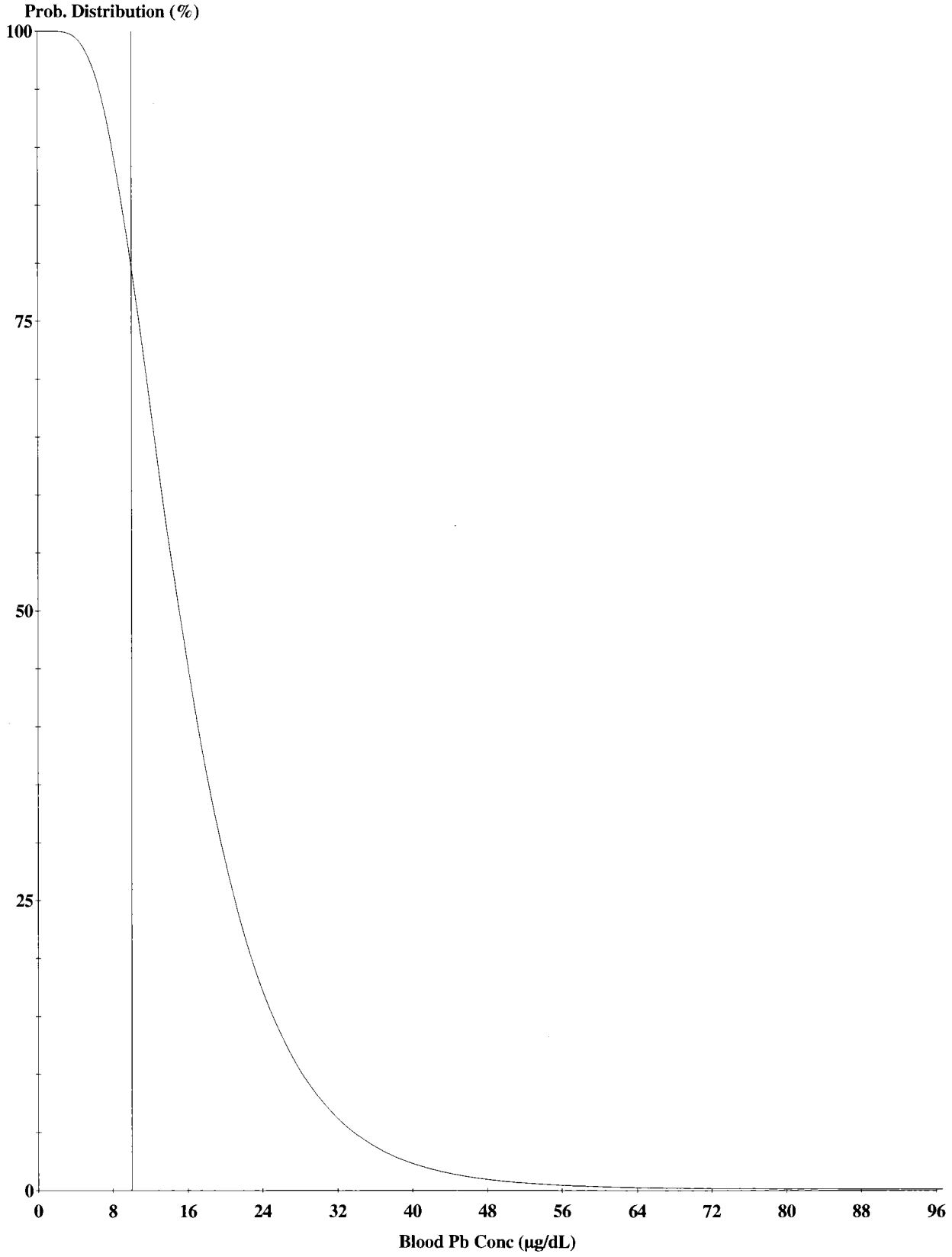
****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 1.000 µg Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
.5-1	0.021	0.764	0.000	0.270
1-2	0.034	0.625	0.000	0.637
2-3	0.062	0.712	0.000	0.696
3-4	0.067	0.713	0.000	0.741
4-5	0.067	0.756	0.000	0.853
5-6	0.093	0.829	0.000	0.939
6-7	0.093	0.920	0.000	0.978

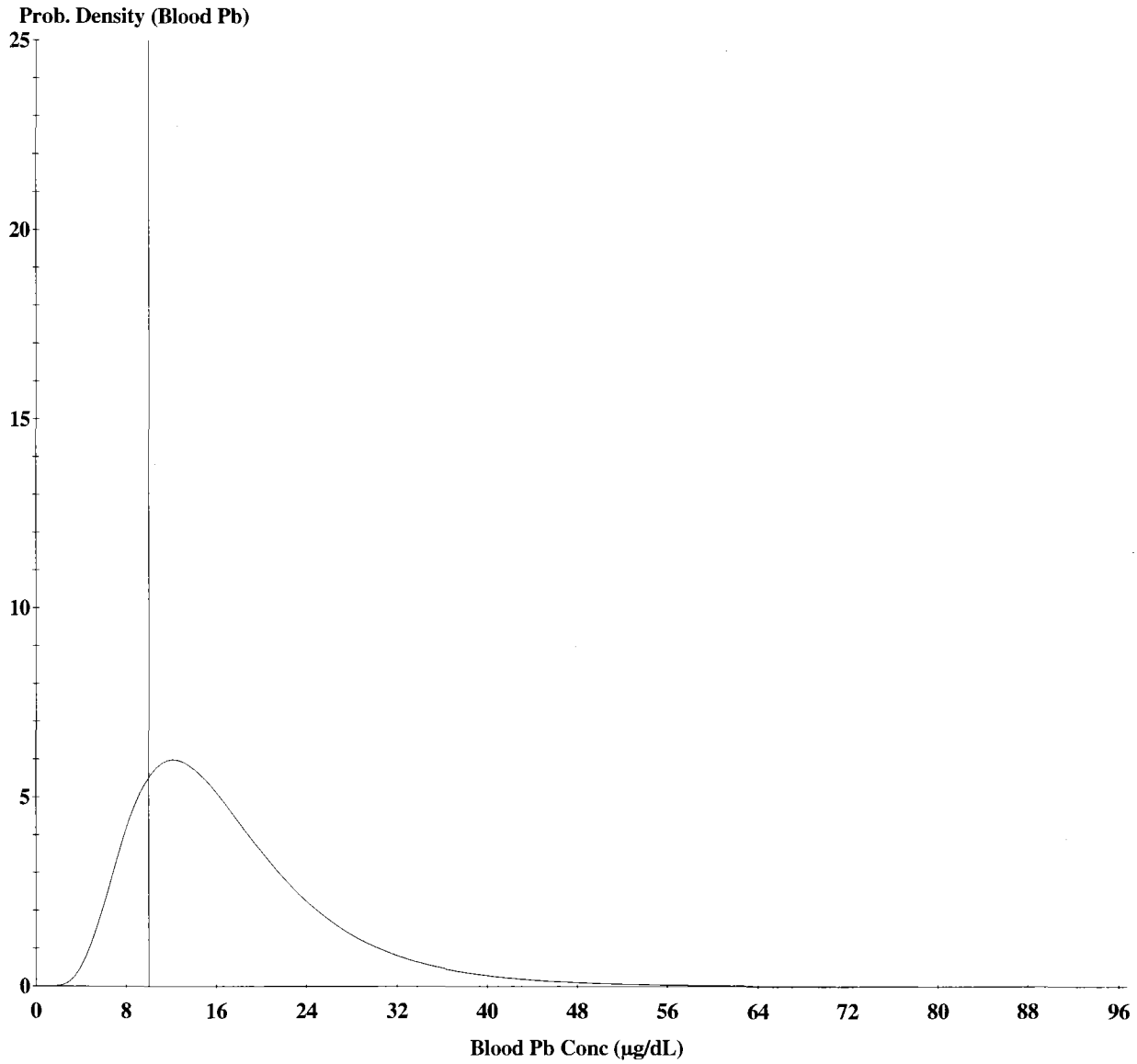
Year	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
.5-1	31.900	32.955	16.8
1-2	47.771	49.067	19.5
2-3	50.130	51.600	18.5
3-4	52.384	53.904	18.1
4-5	43.064	44.740	15.4
5-6	40.433	42.294	13.2
6-7	39.102	41.092	11.7



Cutoff = 10.000 µg/dl
Geo Mean = 15.815
GSD = 1.600
% Above = 83.527

Age Range = 0 to 84 months

Run Mode = Site Risk Assessment
Comment = Avg. Pb in SB = 2,210 mg/kg



Cutoff = 10.000 µg/dl
Geo Mean = 15.815
GSD = 1.600
% Above = 83.527
% Below = 16.473

Age Range = 0 to 84 months

Run Mode = Site Risk Assessment
Comment = Avg. Pb in SB = 2,210 mg/kg

APPENDIX D

DEVELOPMENT OF PRELIMINARY REMEDIATION GOALS

APPENDIX D

DEVELOPMENT OF PRELIMINARY REMEDIATION GOALS

The methodology used to develop preliminary remediation goals (PRGs) for chemicals of concern (COCs) for Operable Unit 8 (OU8) is described herein. Risk-based PRGs were calculated for carcinogenic polycyclic aromatic hydrocarbons (cPAHs) [expressed as the benzo(a)pyrene (BAP) toxicity equivalency quotient (TEQ)], antimony, arsenic, cobalt, copper, iron, manganese, and mercury in soil. Example calculations for BAP TEQ are included in Appendix C.2. For lead, a guidance value was used for residents, while a site-specific value was used for construction workers, as discussed herein. The following table provides a summary of the COCs that are contributing to potentially unacceptable risks for receptors exposed to soil (see Tables 3.1 and 3.2 in Appendix C.1 for COC exposure point concentrations).

Receptor	Media	Chemical of Concern
Industrial Worker (Construction and Occupational Workers)	Subsurface Soil	Antimony
		Lead
Hypothetical Future Recreational User(1)	Subsurface Soil	Antimony
		Lead
Hypothetical Future Resident(1)	Surface Soil	Carcinogenic PAHs(2)
	Subsurface Soil	Carcinogenic PAHs(2)
		Antimony
		Arsenic
		Cobalt
		Copper
		Iron
		Lead
		Manganese
		Mercury

(1) Exposure to subsurface soil is not a current exposure scenario for the recreational user or resident because the site is covered with pavement. Additionally, the site is not currently used for recreational or residential purposes.

(2) Carcinogenic PAHs are evaluated based on BAP TEQs.

DEVELOPMENT OF PRELIMINARY REMEDIATION GOALS FOR DIRECT CONTACT WITH SOIL

The assumption was made that exposure to chemicals in soil occurred through incidental ingestion, dermal contact, and inhalation of fugitive dust and volatiles. The incremental lifetime cancer risk (ILCR) is calculated from:

$$\text{ILCR} = C_S\left[(\text{Intake}_{ing})(\text{CSF}_{oral}) + (\text{Intake}_{derm})(\text{CSF}_{derm}) + (\text{Intake}_{inh})(\text{CSF}_{inh})\right]$$

and the hazard index (HI) is calculated from:

$$HI = C_S\left[\frac{Intake_{ing}}{RfD_{oral}} + \frac{Intake_{derm}}{RfD_{derm}} + \frac{Intake_{inh}}{RfD_{inh}}\right]$$

where:	C_S	=	chemical concentration in soil (mg/kg)
	$Intake_{ing}$	=	intake through incidental ingestion (kg/kg/day)
	$Intake_{derm}$	=	dermally absorbed dose (kg/kg/day)
	$Intake_{inh}$	=	intake through inhalation (kg/kg/day)
	CSF_{oral}	=	oral cancer slope factor $(mg/kg/day)^{-1}$
	RfD_{oral}	=	oral reference dose (mg/kg/day)
	CSF_{derm}	=	dermal cancer slope factor $(mg/kg/day)^{-1}$
	RfD_{derm}	=	dermal reference dose (mg/kg/day)
	CSF_{inh}	=	inhalation cancer slope factor $(mg/kg/day)^{-1}$
	RfD_{inh}	=	inhalation reference dose (mg/kg/day)

A soil concentration (PRG_{Soil}) corresponding to a target cancer risk (TCR) or target hazard index (THI) can be calculated by rearranging the above equations and solving for the soil concentration. The PRG_{Soil} for carcinogens is calculated from:

$$PRG_{Soil} = \frac{TCR}{\left[(Intake_{Ing})(CSF_{oral}) + (Intake_{derm})(CSF_{derm}) + (Intake_{inh})(CSF_{inh})\right]}$$

and for noncarcinogens:

$$PRG_{Soil} = \frac{THI}{\left[\frac{Intake_{ing}}{RfD_{oral}}\right] + \left[\frac{Intake_{derm}}{RfD_{derm}}\right] + \left[\frac{Intake_{inh}}{RfD_{inh}}\right]}$$

The intake through incidental ingestion of soil is calculated from:

$$Intake_{ing} = \frac{(IR_S)(RBA)(FI)(EF)(ED)(CF)}{(BW)(AT)}$$

where:	$Intake_{ing}$	=	intake of contaminant from soil via ingestion (kg/kg/day)
	IR_s	=	ingestion rate of soil (mg/day)
	RBA	=	relative bioavailability (unitless)
	FI	=	fraction ingested from contaminated source (dimensionless)
	EF	=	exposure frequency (days/yr)
	ED	=	exposure duration (yr)

CF	=	conversion factor ($1x10^{-6}$ kg/mg)
BW	=	body weight (kg)
AT	=	averaging time (days);
		for non-carcinogens, AT = ED x 365 days/yr;
		for carcinogens, AT = 70 yr x 365 days/yr

Exposure assumptions used to calculate the intake through incidental ingestion of soil are presented in the PRG calculations spreadsheets and in Appendix D.

The intake from dermal contact with soil is calculated from:

$$\text{Intake}_{\text{derm}} = \frac{(SA)(AF)(ABS)(CF)(EF)(ED)}{(BW)(AT)}$$

where:	$\text{Intake}_{\text{derm}}$	=	amount of chemical absorbed during contact with soil (kg/kg/day)
	SA	=	skin surface area available for contact (cm^2/day)
	AF	=	skin adherence factor (mg/cm^2)
	ABS	=	absorption factor (dimensionless)
	CF	=	conversion factor ($1x10^{-6}$ kg/mg)
	EF	=	exposure frequency (days/yr)
	ED	=	exposure duration (yr)
	BW	=	body weight (kg)
	AT	=	averaging time (days);
			for non-carcinogens, AT = ED x 365 days/yr;
			for carcinogens, AT = 70 yr x 365 days/yr

Exposure assumptions used to calculate the intake through dermal contact of soil are presented in the PRG calculations spreadsheets and in Appendix D.

The intake through inhalation of chemicals that have volatilized from soil is calculated from:

$$\text{Intake}_{\text{inh}} = \frac{(ET)(EF)(ED)[1/VF + 1/PEF]}{(AT)(24\ \text{hours/day})}$$

where:	$\text{Intake}_{\text{inh}}$	=	intake of chemical from air via inhalation (kg/kg/day)
	ET	=	exposure time (hours/day)
	EF	=	exposure frequency (days/yr)
	ED	=	exposure duration (yr)
	VF	=	volatilization factor (m^3/kg)

PEF	=	particulate emission factor (m^3/kg)
AT	=	averaging time (days);
		for non-carcinogens, AT = ED x 365 days/yr;
		for carcinogens, AT = 70 yr x 365 days/yr

The particulate emissions factor (PEF) relates the concentration of the chemical in soil with the concentration of dust particles in air. A PEF value of $1.36 \times 10^{+9}$ m^3/kg was obtained from United States Environmental Protection Agency's (USEPA's) Regional Screening Level (RSL) Calculator Internet site located at http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search. This is the default value for Portland, Maine, which is the closest city to Portsmouth listed on the internet site. For construction workers, a separate PEF is often used because air emissions resulting from fugitive dust emissions settings are different than dust emissions generated during construction activities. However, for OU8, the entire site is paved, and it is unlikely that a future construction project would result in dust emissions different than those assumed for the other receptors evaluated. Therefore, the same PEF value ($1.36 \times 10^{+9}$) was used for construction workers, as discussed in Section 6 of the main report. The volatilization factor (VF) is chemical specific and was calculated using the methodology presented in the USEPA's soil screening guidance (USEPA, December 2002). Exposure assumptions used to calculate the intake through inhalation of fugitive dust and volatiles are presented in the PRG calculations spreadsheets and in Appendix C.

PRGs for residential exposure to subsurface soil were developed based on a cumulative target ILCR level of 1×10^{-4}. The carcinogenic PAHs are the only COCs for residential exposure to surface soil; therefore, development of the residential PRG for carcinogenic COCs in surface soil was based on a target ILCR of 1.0×10^{-4}, which would result in a cumulative target ILCR of 1×10^{-4} or less. There are two carcinogenic COCs (carcinogenic PAHs, and arsenic) for residential exposure to subsurface soil; therefore, development of residential PRGs for carcinogenic COCs was based on a target ILCR of 5.0×10^{-5} for each COC so that the cumulative target ILCR would be 1×10^{-4} or less. The target ILCR was set at the least conservative end (1×10^{-4}) of USEPA's acceptable ILCR range (1×10^{-6} to 1×10^{-4}) for residential exposure to surface and subsurface soil because current and foreseeable future site use is industrial and residential exposures to surface and subsurface soil based on the exposure parameters used in the human health risk assessment (i.e., 350 day per year) are improbable. No carcinogenic toxicity criteria are available for the COCs for construction workers and recreational users. PRGs based on noncarcinogenic toxicity criteria were developed so that cumulative target HIs for a given target organ or system are equal to one. For example, two of the subsurface soil COCs for the hypothetical future resident, copper and iron, adversely affect the gastrointestinal system; therefore, the target hazard index was set as 0.5 when developing a PRG for each of those COCs so that the cumulative HI affecting the gastrointestinal system would not exceed 1.

The PRGs are presented in Section 7.4 of the main report. The methodology for calculating carcinogenic PRGs was performed in accordance with USEPA risk assessment guidance (USEPA, March 2005a and March 2005b).

DEVELOPMENT OF PRELIMINARY REMEDIATION GOAL FOR LEAD

The Office of Solid Waste and Emergency Response (OSWER) soil screening level of 400 mg/kg for residential land use (USEPA, July 1994) was used as the PRG for residents. The USEPA RSL table (USEPA, June 2015) lists 400 mg/kg as the RSL for lead in soil assuming a residential land use scenario. A PRG for lead for construction workers was calculated using the Adult Lead Model (ALM) (USEPA, January 2003, 2009) and central tendency exposure (CTE) assumptions as recommended by the ALM guidance (see Appendix C.5).

PRELIMINARY REMEDIATION GOALS SELECTED FOR OU8

The surface soil PRGs selected for OU8 are summarized in the table below.

COC	Industrial Worker	Recreational User	Resident	Basis
Carcinogenic PAHs(2)	NA	NA	1.6	Site-specific risked-based; based on ILCR of 1.0×10^{-4}

NA – Not applicable: PRG is not required because potential risks are acceptable for this receptor for this COC.

(1) PRGs are goals for representative exposure concentrations for an exposure unit and are not intended as pick-up levels. It is possible for a COC to remain on site at concentrations greater than the corresponding EPCs while still being protective of human health and the environment, provided the EPC for that COC is less than the listed PRG.
(2) Carcinogenic PAHs are evaluated based on BAP TEQs.

The subsurface soil PRGs selected for OU8 are summarized in the table below.

COC	Industrial Worker	Recreational User	Resident	Basis
Carcinogenic PAHs(2)	NA	NA	0.79	Site-specific risked-based; based on ILCR of 5.0×10^{-5}
Antimony	240	220	31	Site-specific risk-based; based on HI = 1 for all receptors (Target organ/system = blood)
Arsenic	NA	NA	34	Site-specific risked-based; based on ILCR of 5.0×10^{-5}

COC	Industrial Worker	Recreational User	Resident	Basis
Cobalt	NA	NA	23	Site-specific risk-based; based on HI = 1 (Target organ/system = thyroid, respiratory)
Copper	NA	NA	1,600	Site-specific risk-based; based on HI = 0.5 (Target organ/system = GS)
Iron	NA	NA	27,000	Site-specific risk-based; based on HI = 0.5 (Target organ/system = GS)
Lead	2,000	4,600	400	OSWER Directive 9355.4-12 for residents; site-specific risk-based based on ALM (USEPA, January 2003) calculation for construction workers
Manganese	NA	NA	900	Site-specific risk-based; based on HI = 0.5 (Target organ/system = CNS)
Mercury	NA	NA	12	Site-specific risk-based; based on HI = 0.5 (Target organ/system = CNS)

NA – Not applicable: PRG is not required because potential risks are acceptable for this receptor for this COC.

(1) PRGs are goals for representative exposure concentrations for an exposure unit and are not intended as pick-up levels. It is possible for a COC to remain on site at concentrations greater than the corresponding EPCs while still being protective of human health and the environment, provided the EPC for that COC is less than the listed PRG.
(2) Carcinogenic PAHs are evaluated based on BAP TEQs.

CNS = central nervous system
GS = gastrointestinal system

REFERENCES

USEPA, July 1994. Revised Interim Soil-Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. Office of Solid Waste and Emergency Response, Washington, D.C. Directive 9355.4-12.

USEPA, December 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, Office of Solid Waste and Emergency Response Washington, D.C.

USEPA, January 2003. Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. December 1996 finalized January.

USEPA, March 2005a. Guidelines for Carcinogen Risk Assessment. EPA/630/P-03/001B. Risk Assessment Forum, Washington, D.C.

USEPA, March 2005b. Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens. EPA/630/R-03/003F. Risk Assessment Forum, Washington, D.C.

USEPA, June 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites. http://epa-prgs.USEPA.gov/chemicals/index.shtml. .

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL (PAGE ONE OF THREE)

SITE NAME: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
EXPOSURE POINT: OU8
EXPOSURE SCENARIO: CONSTRUCTION WORKERS
MEDIA: SUBSURFACE SOIL
DATE: 11/19/2015

THIS SPREADSHEET CALCULATES RISK-BASED CLEANUP GOALS FOR EXPOSURES TO SOIL
THE INCIDENTAL INGESTION, DERMAL CONTACT, AND INHALATION ROUTES OF EXPOSURE ARE CONSIDERED.

RELEVANT EQUATION:

Carcinogens

$$PRG_{soil} = \frac{TCR}{Intake_{oral} \times CSF_{oral} + Intake_{derm} \times CSF_{derm} + EC_{air} \times IUR}$$

NonCarcinogens

$$PRG_{soil} = \frac{THI}{\left(\frac{Intake_{oral}}{RfD_{oral}}\right) + \left(\frac{Intake_{derm}}{RfD_{derm}}\right) + \left(\frac{EC_{air}}{RfC}\right)}$$

$$Intake_{oral} = \frac{IR \times RBA \times EF \times ED \times FI \times CF}{BW \times AT}$$

$$Intake_{derm} = \frac{SA \times AF \times ABS \times EF \times ED \times CF}{BW \times AT}$$

$$Intake_{inh} = \frac{EF \times ED \times ET \times (1/VF + 1/PEF)}{AT \times 24\ Hours/day}$$

WHERE:

PRG = :		Concentration in soil (mg/kg)
TCR = :	1.0E-06	Target Cancer Risk
THI = :	1	Target Hazard Index
IR = :	330	Soil Ingestion Rate (mg/day)
RBA = :	Chemical Specific	Relative Bioavailibity (unitless)
CF = :	1.0E-06	Conversion Factor (kg/mg)
FI = :	1	Fraction from contaminated source (unitless)
SA = :	3527	Skin surface available for contact (cm^2/day)
AF = :	0.3	Soil to skin adherence factor (mg/cm^2)
ABS = :	Chemical Specific	Absorption factor (unitless)
ET = :	8	Exposure time (hr/day)
EF = :	150	Exposure Frequency (days/year)
ED = :	1	Exposure Duration (years)
BW = :	80	Body Weight (kg)
ATc = :	25,550	Averaging time for carcinogenic exposures (days)
ATn = :	365	Averaging time for noncarcinogenic exposures (days)
PEF = :	1.36E+09	Particulate emission factor (m^3/kg)
VF = :	Chemical Specific	Volatilization Factor (m^3/kg)

CHEMICAL	ABS	RBA	Cancer Slope Factor			Reference Dose		
			Oral (mg/kg/day)$^{-1}$	Dermal (mg/kg/day)$^{-1}$	Inhalation (ug/m^3)$^{-1}$	Oral (mg/kg/day)	Dermal (mg/kg/day)	Inhalation (mg/m^3)
Antimony		1	NA	NA	NA	4.0E-04	6.0E-05	NA

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL (PAGE TWO OF THREE)

SITE NAME: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
EXPOSURE POINT: OU8
EXPOSURE SCENARIO: CONSTRUCTION WORKERS
MEDIA: SUBSURFACE SOIL
DATE: 11/19/2015

CHEMICAL	Carcinogenic Intake Factors			Noncarcinogenic Intakes Factors		
	Oral (kg/kg/day)	Dermal (kg/kg/day)	Inhalation (kg/m^3)	Oral (kg/kg/day)	Dermal (kg/kg/day)	Inhalation (kg/m^3)
Antimony	2.42E-08	0.00E+00	1.44E-12	1.70E-06	0.00E+00	1.01E-10

CHEMICAL	Soil Concentration		Target Organ(s)
	Carcinogenic (mg/kg)	Noncarcinogenic (mg/kg)	
Antimony	NA	236	Blood

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL (PAGE THREE OF THREE)

CALCULATION OF AMBIENT AIR CONCENTRATION
SOURCE: U.S. EPA SOIL SCREENING GUIDANCE

Purpose: To calculate ambient air concentrations resulting from fugitive dust and volatilization from soil.

Relevant Equations:

$$Cair = Cs \times (1/PEF + 1/VF)$$

$$VF = \frac{Q/C \times (3.14 \times DA \times T)^{1/2} \times 10^{-4}\ m^2/cm^2}{2 \times pb \times DA} \qquad PEF = \frac{3600}{0.036 \times (1-V) \times (U_m/U_t)^3 \times F(x)}$$

$$DA = \frac{[(\theta a^{10/3} \times Di \times H + \theta w^{10/3} \times Dw)/n^2)]}{pb \times Kd + \theta w + \theta a \times H}$$

$$Csat = S/pb \times (Kd \times pb + \theta w + H \times \theta a)$$

INPUT PARAMTERS		
Parameter	**Value**	**Definition**
Q/C = :	14.31	Inverse of mean conc. at center of source (g/m^2-s per kg/m^3).
T = :	3.2E+07	Exposure interval (seconds).
pb = :	1.5	Dry soil bulk density (g/cm^3).
ps = :	2.65	soil particle density (g/cm^3).
n = :	0.434	Total soil porosity (L_{pore}/L_{soil}).
θw = :	0.15	Water-filled soil porosity (L_{pore}/L_{soil}).
θa = :	0.284	Air-filled soil porosity (L_{air}/L_{soil}).
Di = :	Chemical specific	Diffusivity in air (cm^2/sec).
H' = :	Chemical specific	Dimensionless Henry's Law Constant.
Dw = :	Chemical specific	Diffusivity in water (cm^2/sec).
DA = :	Chemical specific	Apparent diffusivity (cm^2/sec).
Kd = :	Chemical specific	Soil-water partition coefficient (cm^3/g).
Koc = :	Chemical specific	Soil organic carbon partition coefficient (cm^3/g).
foc = :	0.006	Fraction organic carbon in soil (g/g).
F_D = :	0.185	dispersion correction factor

Chemical	Volatile	Chemical Properties					Intermediate Calculations			
		Koc (cm^3/g)	Di (cm^2/sec)	Dw (cm^2/sec)	S (mg/L)	H'	Kd (cm^3/g)	Da (cm^2/sec)	VF (m^3/kg)	Csat (mg/kg)
Surface Soil										
Antimony	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA

Calculations of Preliminary Remediation Goals (PRGs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 6/21/09 **EDIT RED CELLS**

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004
$PbB_{fetal,\ 0.95}$	95th percentile PbB in fetus	ug/dL	10
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4
GSD_i	Geometric standard deviation PbB	--	1.8
PbB_0	Baseline PbB	ug/dL	1.0
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.165
$AF_{S,\ D}$	Absorption fraction (same for soil and dust)	--	0.12
$EF_{S,\ D}$	Exposure frequency (same for soil and dust)	days/yr	75
$AT_{S,\ D}$	Averaging time (same for soil and dust)	days/yr	365
PRG		**ppm**	**1,982**

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL (PAGE ONE OF TWO)

SITE NAME: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
EXPOSURE POINT: OU8
EXPOSURE SCENARIO: CHILD RECREATIONAL USERS
MEDIA: SUBSURFACE SOIL
DATE: 11/19/2015

THIS SPREADSHEET CALCULATES SCREENING LEVELS FOR EXPOSURES TO SOIL
VIA INCIDENTAL INGESTION, DERMAL CONTACT, AND INHALATION

RELEVANT EQUATIONS:

Carcinogens

$$PRG_{soil} = \frac{TCR}{Intake_{oral} \times CSF_{oral} + Intake_{derm} \times CSF_{derm} + EC_{air} \times IUR}$$

Mutagenic

$$PRG_{soil} = \frac{TCR}{Intake_{ages\ 6\text{-}16} \times ADAF_{ages\ 6\text{-}16} + Intake_{ages\ >\ 16} \times ADAF_{ages\ >\ 16}}$$

Noncarcinogens

$$RBC_{soil} = \frac{THI}{\left(\frac{Intake_{oral}}{RfD_{oral}}\right) + \left(\frac{Intake_{derm}}{RfD_{derm}}\right) + \left(\frac{EC_{air}}{RfC}\right)}$$

$$Intake_{oral} = \frac{IR \times EF \times ED \times FI \times CF}{BW \times AT} \times ADAF$$

$$Intake_{derm} = \frac{SA \times AF \times ABS \times EF \times ED \times CF}{BW \times AT} \times ADAF$$

$$EC_{air} = \frac{ET \times EF \times ED \times [1/PEF + 1/VF]}{AT \times 24\ hours/day} \times ADAF$$

INPUT ASSUMPTIONS:				
	Parameter	**Child Ages 0 - 2**	**Child Ages 2 - 6**	**Definition**
General	TCR = :	1E-06		Target Cancer Risk
	THI = :	1		Target Hazard Index
	EF = :	100	100	Exposure Frequency (days/year)
	ED =:	2	4	Exposure Duration (years)
	BW = :	15	15	Body Weight (kg)
	ATc = :	25,550		Averaging time for carcinogenic exposures (days)
	ATn = :	730	1,460	Averaging time for noncarcinogenic exposures (days)
	CF = :	1.0E-06		Conversion Factor (kg/mg)
	ADAF = :	Chemical Specific		Age Dependent Adjustment Factor
Incidental Ingestion	IR = :	200	200	Soil Ingestion Rate (mg/day)
	RBA = :	Chemical Specific		Relative Bioavailibility (unitless)
	FI = :	0.5	0.5	Fraction from contaminated source (unitless)
Dermal Contact	SA = :	2,373	2,373	Skin surface available for contact (cm^2/day)
	AFc = :	0.2	0.2	Soil to skin adherence factor (mg/cm^2)
	ABS = :	Chemical Specific		Absorption factor (unitless)
Inhalation	ETc = :	24	24	Exposure time (hours/day)
	PEF = :	1.36E+09		Particulate emission factor (m^3/kg)
	VF = :	Chemical Specific		Volatilization factor (m^3/kg)

CHEMICAL	ABS	Cancer Slope Factor			Reference Dose			ADAF	
		Oral $(mg/kg/day)^{-1}$	Dermal $(mg/kg/day)^{-1}$	Inhalation $(ug/m^3)^{-1}$	Oral (mg/kg/day)	Dermal (mg/kg/day)	Inhalation (mg/m^3)	Ages 0 - 2	Ages 2 - 6
Antimony	0	NA	NA	NA	4.0E-04	6.0E-05	NA	1	1

CHEMICAL	RBA	Carcinogenic Intake Factors			Noncarcinogenic Intake Factors		
		Oral (kg/kg/day)	Dermal (kg/kg/day)	Inhalation (kg/m^3)	Oral (kg/kg/day)	Dermal (kg/kg/day)	Inhalation (kg/m^3)
Antimony	1	1.57E-07	0.00E+00	1.73E-11	1.83E-06	0.00E+00	2.01E-10

CHEMICAL	Soil Concentration		Target Organ(s)
	Carcinogenic (mg/kg)	Noncarcinogenic (mg/kg)	
Antimony	NA	219	Blood

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL (PAGE TWO OF TWO)

CALCULATION OF AMBIENT AIR CONCENTRATION
SOURCE: U.S. EPA SOIL SCREENING GUIDANCE

Purpose: To calculate ambient air concentrations resulting from fugitive dust and volatilization from soil.

Relevant Equations:

$$Cair = Cs \times (1/PEF + 1/VF)$$

$$VF = \frac{Q/C \times (3.14 \times DA \times T)^{1/2} \times 10^{-4}\ m^2/cm^2}{2 \times pb \times DA} \qquad PEF = \frac{3600}{0.036 \times (1-V) \times (U_m/U_t)^3 \times F(x)}$$

$$DA = \frac{[(\theta a^{10/3} \times Di \times H + \theta w^{10/3} \times Dw)/n^2)]}{pb \times Kd + \theta w + \theta a \times H}$$

$$Csat = S/pb \times (Kd \times pb + \theta w + H \times \theta a)$$

INPUT PARAMTERS		
Parameter	**Value**	**Definition**
Q/C = :	93.77	Inverse of mean conc. at center of source (g/m^2-s per kg/m^3).
T = :	8.2E+08	Exposure interval (seconds).
pb = :	1.5	Dry soil bulk density (g/cm^3).
ps = :	2.65	soil particle density (g/cm^3).
n = :	0.434	Total soil porosity (L_{pore}/L_{soil}).
θw = :	0.15	Water-filled soil porosity (L_{pore}/L_{soil}).
θa = :	0.284	Air-filled soil porosity (L_{air}/L_{soil}).
Di = :	Chemical specific	Diffusivity in air (cm^2/sec).
H' = :	Chemical specific	Dimensionless Henry's Law Constant.
Dw = :	Chemical specific	Diffusivity in water (cm^2/sec).
DA = :	Chemical specific	Apparent diffusivity (cm^2/sec).
Kd = :	Chemical specific	Soil-water partition coefficient (cm^3/g).
Koc = :	Chemical specific	Soil organic carbon partition coefficient (cm^3/g).
foc = :	0.006	Fraction organic carbon in soil (g/g).

Chemical	**Volatile**	**Chemical Properties**					**Intermediate Calculations**			
		Koc (cm^3/g)	**Di (cm^2/sec)**	**Dw (cm^2/sec)**	**S (mg/L)**	**H'**	**Kd (cm^3/g)**	**Da (cm^2/sec)**	**VF (m^3/kg)**	**Csat (mg/kg)**
Surface Soil										
Antimony	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL (PAGE ONE OF TWO)

SITE NAME: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
EXPOSURE POINT: OU8
EXPOSURE SCENARIO: CHILD RESIDENTS
MEDIA: SURFACE SOIL
DATE: 11/19/2015

THIS SPREADSHEET CALCULATES SCREENING LEVELS FOR EXPOSURES TO SOIL
VIA INCIDENTAL INGESTION, DERMAL CONTACT, AND INHALATION

RELEVANT EQUATIONS:

Carcinogens

$$PRG_{soil} = \frac{TCR}{Intake_{oral} \times CSF_{oral} + Intake_{derm} \times CSF_{derm} + EC_{air} \times IUR}$$

Mutagenic

$$PRG_{soil} = \frac{TCR}{Intake_{ages\ 6\text{-}16} \times ADAF_{ages\ 6\text{-}16} + Intake_{ages\ >\ 16} \times ADAF_{ages\ >\ 16}}$$

Noncarcinogens

$$RBC_{soil} = \frac{THI}{\left(\frac{Intake_{oral}}{RfD_{oral}}\right) + \left(\frac{Intake_{derm}}{RfD_{derm}}\right) + \left(\frac{EC_{air}}{RfC}\right)}$$

$$Intake_{oral} = \frac{IR \times EF \times ED \times FI \times CF}{BW \times AT} \times ADAF$$

$$Intake_{derm} = \frac{SA \times AF \times ABS \times EF \times ED \times CF}{BW \times AT} \times ADAF$$

$$EC_{air} = \frac{ET \times EF \times ED \times [1/PEF + 1/VF]}{AT \times 24\ hours/day} \times ADAF$$

INPUT ASSUMPTIONS:				
	Parameter	**Child Ages 0 - 2**	**Child Ages 2 - 6**	**Definition**
General	TCR = :	1.0E-04		Target Cancer Risk
	THI = :	1		Target Hazard Index
	EF = :	350	350	Exposure Frequency (days/year)
	ED =:	2	4	Exposure Duration (years)
	BW = :	15	15	Body Weight (kg)
	ATc = :	25,550		Averaging time for carcinogenic exposures (days)
	ATn = :	730	1,460	Averaging time for noncarcinogenic exposures (days)
	CF = :	1.0E-06		Conversion Factor (kg/mg)
	ADAF = :	Chemical Specific		Age Dependent Adjustment Factor
Incidental Ingestion	IR = :	200	200	Soil Ingestion Rate (mg/day)
	RBA = :	Chemical Specific		Relative Bioavailibility (unitless)
	FI = :	1	1	Fraction from contaminated source (unitless)
Dermal Contact	SA = :	2,373	2,373	Skin surface available for contact (cm^2/day)
	AFc = :	0.2	0.2	Soil to skin adherence factor (mg/cm^2)
	ABS = :	Chemical Specific		Absorption factor (unitless)
Inhalation	ETc = :	24	24	Exposure time (hours/day)
	PEF = :	1.36E+09		Particulate emission factor (m^3/kg)
	VF = :	Chemical Specific		Volatilization factor (m^3/kg)

CHEMICAL	ABS	Cancer Slope Factor			Reference Dose			ADAF	
		Oral $(mg/kg/day)^{-1}$	Dermal $(mg/kg/day)^{-1}$	Inhalation $(ug/m^3)^{-1}$	Oral (mg/kg/day)	Dermal (mg/kg/day)	Inhalation (mg/m^3)	Ages 0 - 2	Ages 2 - 6
Benzo(a)pyrene Equivalents	0.13	7.3E+00	7.3E+00	1.1E-03	NA	NA	NA	10	3

CHEMICAL	RBA	Carcinogenic Intake Factors			Noncarcinogenic Intake Factors		
		Oral (kg/kg/day)	Dermal (kg/kg/day)	Inhalation (kg/m^3)	Oral (kg/kg/day)	Dermal (kg/kg/day)	Inhalation (kg/m^3)
Benzo(a)pyrene Equivalents	1	5.84E-06	1.80E-06	3.22E-10	1.28E-05	3.94E-06	7.05E-10

CHEMICAL	Soil Concentration		Target Organ(s)
	Carcinogenic (mg/kg)	Noncarcinogenic (mg/kg)	
Benzo(a)pyrene Equivalents	1.79	NA	NA

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL (PAGE TWO OF TWO)

CALCULATION OF AMBIENT AIR CONCENTRATION
SOURCE: U.S. EPA SOIL SCREENING GUIDANCE

Purpose: To calculate ambient air concentrations resulting from fugitive dust and volatilization from soil.

Relevant Equations:

$$Cair = Cs \times (1/PEF + 1/VF)$$

$$VF = \frac{Q/C \times (3.14 \times DA \times T)^{1/2} \times 10^{-4}\ m^2/cm^2}{2 \times pb \times DA} \qquad PEF = \frac{3600}{0.036 \times (1-V) \times (U_m/U_t)^3 \times F(x)}$$

$$DA = \frac{[(\theta a^{10/3} \times Di \times H + \theta w^{10/3} \times Dw)/n^2)]}{pb \times Kd + \theta w + \theta a \times H}$$

$$Csat = S/pb \times (Kd \times pb + \theta w + H \times \theta a)$$

INPUT PARAMTERS		
Parameter	**Value**	**Definition**
Q/C = :	93.77	Inverse of mean conc. at center of source (g/m^2-s per kg/m^3).
T = :	8.2E+08	Exposure interval (seconds).
pb = :	1.5	Dry soil bulk density (g/cm^3).
ps = :	2.65	soil particle density (g/cm^3).
n = :	0.434	Total soil porosity (L_{pore}/L_{soil}).
θw = :	0.15	Water-filled soil porosity (L_{pore}/L_{soil}).
θa = :	0.284	Air-filled soil porosity (L_{air}/L_{soil}).
Di = :	Chemical specific	Diffusivity in air (cm^2/sec).
H' = :	Chemical specific	Dimensionless Henry's Law Constant.
Dw = :	Chemical specific	Diffusivity in water (cm^2/sec).
DA = :	Chemical specific	Apparent diffusivity (cm^2/sec).
Kd = :	Chemical specific	Soil-water partition coefficient (cm^3/g).
Koc = :	Chemical specific	Soil organic carbon partition coefficient (cm^3/g).
foc = :	0.006	Fraction organic carbon in soil (g/g).

Chemical	**Volatile**	**Chemical Properties**					**Intermediate Calculations**			
		Koc (cm^3/g)	**Di (cm^2/sec)**	**Dw (cm^2/sec)**	**S (mg/L)**	**H'**	**Kd (cm^3/g)**	**Da (cm^2/sec)**	**VF (m^3/kg)**	**Csat (mg/kg)**
Surface Soil										
Benzo(a)pyrene Equivalents	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL (PAGE ONE OF TWO)

SITE NAME: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
EXPOSURE POINT: OU8
EXPOSURE SCENARIO: CHILD RESIDENTS
MEDIA: SUBSURFACE SOIL
DATE: 11/19/2015

THIS SPREADSHEET CALCULATES SCREENING LEVELS FOR EXPOSURES TO SOIL
VIA INCIDENTAL INGESTION, DERMAL CONTACT, AND INHALATION

RELEVANT EQUATIONS:

Carcinogens

$$PRG_{soil} = \frac{TCR}{Intake_{oral} \times CSF_{oral} + Intake_{derm} \times CSF_{derm} + EC_{air} \times IUR}$$

Mutagenic

$$PRG_{soil} = \frac{TCR}{Intake_{ages\ 6\text{-}16} \times ADAF_{ages\ 6\text{-}16} + Intake_{ages\ >\ 16} \times ADAF_{ages\ >\ 16}}$$

Noncarcinogens

$$RBC_{soil} = \frac{THI}{\left(\frac{Intake_{oral}}{RfD_{oral}}\right) + \left(\frac{Intake_{derm}}{RfD_{derm}}\right) + \left(\frac{EC_{air}}{RfC}\right)}$$

$$Intake_{oral} = \frac{IR \times EF \times ED \times FI \times CF}{BW \times AT} \times ADAF$$

$$Intake_{derm} = \frac{SA \times AF \times ABS \times EF \times ED \times CF}{BW \times AT} \times ADAF$$

$$EC_{air} = \frac{ET \times EF \times ED \times [1/PEF + 1/VF]}{AT \times 24\ hours/day} \times ADAF$$

INPUT ASSUMPTIONS:				
	Parameter	**Child Ages 0 - 2**	**Child Ages 2 - 6**	**Definition**
General	TCR = :	5.0E-05		Target Cancer Risk
	THI = :	1		Target Hazard Index
	EF = :	350	350	Exposure Frequency (days/year)
	ED =:	2	4	Exposure Duration (years)
	BW = :	15	15	Body Weight (kg)
	ATc = :	25,550		Averaging time for carcinogenic exposures (days)
	ATn = :	730	1,460	Averaging time for noncarcinogenic exposures (days)
	CF = :	1.0E-06		Conversion Factor (kg/mg)
	ADAF = :	Chemical Specific		Age Dependent Adjustment Factor
Incidental Ingestion	IR = :	200	200	Soil Ingestion Rate (mg/day)
	RBA = :	Chemical Specific		Relative Bioavailibility (unitless)
	FI = :	1	1	Fraction from contaminated source (unitless)
Dermal Contact	SA = :	2,373	2,373	Skin surface available for contact (cm^2/day)
	AFc = :	0.2	0.2	Soil to skin adherence factor (mg/cm^2)
	ABS = :	Chemical Specific		Absorption factor (unitless)
Inhalation	ETc = :	24	24	Exposure time (hours/day)
	PEF = :	1.36E+09		Particulate emission factor (m^3/kg)
	VF = :	Chemical Specific		Volatilization factor (m^3/kg)

CHEMICAL	ABS	Cancer Slope Factor			Reference Dose			ADAF	
		Oral (mg/kg/day)$^{-1}$	Dermal (mg/kg/day)$^{-1}$	Inhalation (ug/m^3)$^{-1}$	Oral (mg/kg/day)	Dermal (mg/kg/day)	Inhalation (mg/m^3)	Ages 0 - 2	Ages 2 - 6
Benzo(a)pyrene Equivalents	0.13	7.3E+00	7.3E+00	1.1E-03	NA	NA	NA	10	3
Antimony	0	NA	NA	NA	4.0E-04	6.0E-05	NA	1	1
Arsenic	0.03	1.5E+00	1.5E+00	4.3E-03	3.0E-04	3.0E-04	1.5E-05	1	1
Cobalt	0	NA	NA	9.0E-03	3.0E-04	3.0E-04	6.0E-06	1	1
Copper	0	NA	NA	NA	4.0E-02	4.0E-02	NA	1	1
Iron	0	NA	NA	NA	7.0E-01	7.0E-01	NA	1	1
Manganese	0	NA	NA	NA	2.4E-02	9.6E-04	5.0E-05	1	1
Mercury	0	NA	NA	NA	3.0E-04	2.1E-05	3.0E-04	1	1

CHEMICAL	RBA	Carcinogenic Intake Factors			Noncarcinogenic Intake Factors		
		Oral (kg/kg/day)	Dermal (kg/kg/day)	Inhalation (kg/m^3)	Oral (kg/kg/day)	Dermal (kg/kg/day)	Inhalation (kg/m^3)
Benzo(a)pyrene Equivalents	1	5.84E-06	1.80E-06	3.22E-10	1.28E-05	3.94E-06	7.05E-10
Antimony	1	1.10E-06	0.00E+00	6.04E-11	1.28E-05	0.00E+00	7.05E-10
Arsenic	0.6	9.50E-07	7.80E-08	6.04E-11	7.67E-06	9.10E-07	7.05E-10
Cobalt	1	1.10E-06	0.00E+00	6.04E-11	1.28E-05	0.00E+00	7.05E-10
Copper	1	1.10E-06	0.00E+00	6.04E-11	1.28E-05	0.00E+00	7.05E-10
Iron	1	1.10E-06	0.00E+00	6.04E-11	1.28E-05	0.00E+00	7.05E-10
Manganese	1	1.10E-06	0.00E+00	6.04E-11	1.28E-05	0.00E+00	7.05E-10
Mercury	1	1.10E-06	0.00E+00	6.04E-11	1.28E-05	0.00E+00	7.05E-10

CHEMICAL	Soil Concentration		Target Organ(s)
	Carcinogenic (mg/kg)	Noncarcinogenic (mg/kg)	
Benzo(a)pyrene Equivalents	0.90	NA	NA
Antimony	NA	31	Blood
Arsenic	32	35	Skin, CVS
Cobalt	91926	23	Thyroid, Respiratory
Copper	NA	3129	GS
Iron	NA	54750	GS
Manganese	NA	1829	CNS
Mercury	NA	23	CNS

CNS = central nervous system
CVS = cardiovascular system
GS = gastrointestinal system

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL (PAGE TWO OF TWO)

CALCULATION OF AMBIENT AIR CONCENTRATION
SOURCE: U.S. EPA SOIL SCREENING GUIDANCE

Purpose: To calculate ambient air concentrations resulting from fugitive dust and volatilization from soil.

Relevant Equations:

$$Cair = Cs \times (1/PEF + 1/VF)$$

$$VF = \frac{Q/C \times (3.14 \times DA \times T)^{1/2} \times 10^{-4}\ m^2/cm^2}{2 \times pb \times DA} \qquad PEF = \frac{3600}{0.036 \times (1-V) \times (U_m/U_t)^3 \times F(x)}$$

$$DA = \frac{[(\theta a^{10/3} \times Di \times H + \theta w^{10/3} \times Dw)/n^2)]}{pb \times Kd + \theta w + \theta a \times H}$$

$$Csat = S/pb \times (Kd \times pb + \theta w + H \times \theta a)$$

INPUT PARAMTERS		
Parameter	**Value**	**Definition**
Q/C = :	93.77	Inverse of mean conc. at center of source (g/m^2-s per kg/m^3).
T = :	8.2E+08	Exposure interval (seconds).
pb = :	1.5	Dry soil bulk density (g/cm^3).
ps = :	2.65	soil particle density (g/cm^3).
n = :	0.434	Total soil porosity (L_{pore}/L_{soil}).
θw = :	0.15	Water-filled soil porosity (L_{pore}/L_{soil}).
θa = :	0.284	Air-filled soil porosity (L_{air}/L_{soil}).
Di = :	Chemical specific	Diffusivity in air (cm^2/sec).
H' = :	Chemical specific	Dimensionless Henry's Law Constant.
Dw = :	Chemical specific	Diffusivity in water (cm^2/sec).
DA = :	Chemical specific	Apparent diffusivity (cm^2/sec).
Kd = :	Chemical specific	Soil-water partition coefficient (cm^3/g).
Koc = :	Chemical specific	Soil organic carbon partition coefficient (cm^3/g).
foc = :	0.006	Fraction organic carbon in soil (g/g).

Chemical	Volatile	Chemical Properties					Intermediate Calculations			
		Koc (cm^3/g)	Di (cm^2/sec)	Dw (cm^2/sec)	S (mg/L)	H'	Kd (cm^3/g)	Da (cm^2/sec)	VF (m^3/kg)	Csat (mg/kg)
Surface Soil										
Benzo(a)pyrene Equivalents	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA
Antimony	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA
Arsenic	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA
Cobalt	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA
Copper	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA
Iron	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA
Manganese	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA
Mercury	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL (PAGE ONE OF TWO)

SITE NAME: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
EXPOSURE POINT: OU8
EXPOSURE SCENARIO: ADULT RESIDENTS
MEDIA: SURFACE SOIL
DATE: 11/19/2015

THIS SPREADSHEET CALCULATES SCREENING LEVELS FOR EXPOSURES TO SOIL
VIA INCIDENTAL INGESTION, DERMAL CONTACT, AND INHALATION

RELEVANT EQUATIONS:

Carcinogens

$$PRG_{soil} = \frac{TCR}{Intake_{oral} \times CSF_{oral} + Intake_{derm} \times CSF_{derm} + EC_{air} \times IUR}$$

Mutagenic

$$PRG_{soil} = \frac{TCR}{Intake_{ages\ 6\text{-}16} \times ADAF_{ages\ 6\text{-}16} + Intake_{ages\ >\ 16} \times ADAF_{ages\ >\ 16}}$$

Noncarcinogens

$$RBC_{soil} = \frac{THI}{\left(\frac{Intake_{oral}}{RfD_{oral}}\right) + \left(\frac{Intake_{derm}}{RfD_{derm}}\right) + \left(\frac{EC_{air}}{RfC}\right)}$$

$$Intake_{oral} = \frac{IR \times EF \times ED \times FI \times CF}{BW \times AT} \times ADAF$$

$$Intake_{derm} = \frac{SA \times AF \times ABS \times EF \times ED \times CF}{BW \times AT} \times ADAF$$

$$EC_{air} = \frac{ET \times EF \times ED \times [1/PEF + 1/VF]}{AT \times 24\ hours/day} \times ADAF$$

INPUT ASSUMPTIONS:				
	Parameter	**Adult Ages 6 - 16**	**Adult Ages > 16**	**Definition**
General	TCR = :	1.0E-04		Target Cancer Risk
	THI = :	1		Target Hazard Index
	EF = :	350	350	Exposure Frequency (days/year)
	ED =:	10	10	Exposure Duration (years)
	BW = :	80	80	Body Weight (kg)
	ATc = :	25,550		Averaging time for carcinogenic exposures (days)
	ATn = :	3,650	3,650	Averaging time for noncarcinogenic exposures (days)
	CF = :	1.0E-06		Conversion Factor (kg/mg)
	ADAF = :	Chemical Specific		Age Dependent Adjustment Factor
Incidental Ingestion	IR = :	100	100	Soil Ingestion Rate (mg/day)
	RBA = :	Chemical Specific		Relative Bioavailibility (unitless)
	FI = :	1	1	Fraction from contaminated source (unitless)
Dermal Contact	SA = :	6,032	6,032	Skin surface available for contact (cm^2/day)
	AFc = :	0.07	0.07	Soil to skin adherence factor (mg/cm^2)
	ABS = :	Chemical Specific		Absorption factor (unitless)
Inhalation	ETc = :	24	24	Exposure time (hours/day)
	PEF = :	1.36E+09		Particulate emission factor (m^3/kg)
	VF = :	Chemical Specific		Volatilization factor (m^3/kg)

CHEMICAL	ABS	Cancer Slope Factor			Reference Dose			ADAF	
		Oral $(mg/kg/day)^{-1}$	Dermal $(mg/kg/day)^{-1}$	Inhalation $(ug/m^3)^{-1}$	Oral (mg/kg/day)	Dermal (mg/kg/day)	Inhalation (mg/m^3)	Ages 6 - 16	Ages >16
Benzo(a)pyrene Equivalents	0.13	7.3E+00	7.3E+00	1.1E-03	NA	NA	NA	3	1

CHEMICAL	RBA	Carcinogenic Intake Factors			Noncarcinogenic Intake Factors		
		Oral (kg/kg/day)	Dermal (kg/kg/day)	Inhalation (kg/m^3)	Oral (kg/kg/day)	Dermal (kg/kg/day)	Inhalation (kg/m^3)
Benzo(a)pyrene Equivalents	1	6.85E-07	3.76E-07	4.03E-10	1.20E-06	6.58E-07	7.05E-10

CHEMICAL	Soil Concentration		Target Organ(s)
	Carcinogenic (mg/kg)	Noncarcinogenic (mg/kg)	
Benzo(a)pyrene Equivalents	12.9	NA	NA

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL (PAGE TWO OF TWO)

CALCULATION OF AMBIENT AIR CONCENTRATION
SOURCE: U.S. EPA SOIL SCREENING GUIDANCE

Purpose: To calculate ambient air concentrations resulting from fugitive dust and volatilization from soil.

Relevant Equations:

$$Cair = Cs \times (1/PEF + 1/VF)$$

$$VF = \frac{Q/C \times (3.14 \times DA \times T)^{1/2} \times 10^{-4}\ m^2/cm^2}{2 \times pb \times DA} \qquad PEF = \frac{3600}{0.036 \times (1-V) \times (U_m/U_t)^3 \times F(x)}$$

$$DA = \frac{[(\theta a^{10/3} \times Di \times H + \theta w^{10/3} \times Dw)/n^2)]}{pb \times Kd + \theta w + \theta a \times H}$$

$$Csat = S/pb \times (Kd \times pb + \theta w + H \times \theta a)$$

INPUT PARAMTERS		
Parameter	**Value**	**Definition**
Q/C = :	93.77	Inverse of mean conc. at center of source (g/m^2-s per kg/m^3).
T = :	8.2E+08	Exposure interval (seconds).
pb = :	1.5	Dry soil bulk density (g/cm^3).
ps = :	2.65	soil particle density (g/cm^3).
n = :	0.434	Total soil porosity (L_{pore}/L_{soil}).
θw = :	0.15	Water-filled soil porosity (L_{pore}/L_{soil}).
θa = :	0.284	Air-filled soil porosity (L_{air}/L_{soil}).
Di = :	Chemical specific	Diffusivity in air (cm^2/sec).
H' = :	Chemical specific	Dimensionless Henry's Law Constant.
Dw = :	Chemical specific	Diffusivity in water (cm^2/sec).
DA = :	Chemical specific	Apparent diffusivity (cm^2/sec).
Kd = :	Chemical specific	Soil-water partition coefficient (cm^3/g).
Koc = :	Chemical specific	Soil organic carbon partition coefficient (cm^3/g).
foc = :	0.006	Fraction organic carbon in soil (g/g).

Chemical	**Volatile**	**Chemical Properties**					**Intermediate Calculations**			
		Koc (cm^3/g)	**Di (cm^2/sec)**	**Dw (cm^2/sec)**	**S (mg/L)**	**H'**	**Kd (cm^3/g)**	**Da (cm^2/sec)**	**VF (m^3/kg)**	**Csat (mg/kg)**
Surface Soil										
Benzo(a)pyrene Equivalents	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL (PAGE ONE OF TWO)

SITE NAME: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
EXPOSURE POINT: OU8
EXPOSURE SCENARIO: ADULT RESIDENTS
MEDIA: SUBSURFACE SOIL
DATE: 11/19/2015

THIS SPREADSHEET CALCULATES SCREENING LEVELS FOR EXPOSURES TO SOIL
VIA INCIDENTAL INGESTION, DERMAL CONTACT, AND INHALATION

RELEVANT EQUATIONS:

Carcinogens

$$PRG_{soil} = \frac{TCR}{Intake_{oral} \times CSF_{oral} + Intake_{derm} \times CSF_{derm} + EC_{air} \times IUR}$$

Mutagenic

$$PRG_{soil} = \frac{TCR}{Intake_{ages\ 6\text{-}16} \times ADAF_{ages\ 6\text{-}16} + Intake_{ages\ >\ 16} \times ADAF_{ages\ >\ 16}}$$

Noncarcinogens

$$RBC_{soil} = \frac{THI}{\left(\frac{Intake_{oral}}{RfD_{oral}}\right) + \left(\frac{Intake_{derm}}{RfD_{derm}}\right) + \left(\frac{EC_{air}}{RfC}\right)}$$

$$Intake_{oral} = \frac{IR \times EF \times ED \times FI \times CF}{BW \times AT} \times ADAF$$

$$Intake_{derm} = \frac{SA \times AF \times ABS \times EF \times ED \times CF}{BW \times AT} \times ADAF$$

$$EC_{air} = \frac{ET \times EF \times ED \times [1/PEF + 1/VF]}{AT \times 24\ hours/day} \times ADAF$$

INPUT ASSUMPTIONS:				
	Parameter	**Adult Ages 6 - 16**	**Adult Ages > 16**	**Definition**
General	TCR = :	5.0E-05		Target Cancer Risk
	THI = :	1		Target Hazard Index
	EF = :	350	350	Exposure Frequency (days/year)
	ED =:	10	10	Exposure Duration (years)
	BW = :	80	80	Body Weight (kg)
	ATc = :	25,550		Averaging time for carcinogenic exposures (days)
	ATn = :	3,650	3,650	Averaging time for noncarcinogenic exposures (days)
	CF = :	1.0E-06		Conversion Factor (kg/mg)
	ADAF = :	Chemical Specific		Age Dependent Adjustment Factor
Incidental Ingestion	IR = :	100	100	Soil Ingestion Rate (mg/day)
	RBA = :	Chemical Specific		Relative Bioavailibility (unitless)
	FI = :	1	1	Fraction from contaminated source (unitless)
Dermal Contact	SA = :	6,032	6,032	Skin surface available for contact (cm^2/day)
	AFc = :	0.07	0.07	Soil to skin adherence factor (mg/cm^2)
	ABS = :	Chemical Specific		Absorption factor (unitless)
Inhalation	ETc = :	24	24	Exposure time (hours/day)
	PEF = :	1.36E+09		Particulate emission factor (m^3/kg)
	VF = :	Chemical Specific		Volatilization factor (m^3/kg)

CHEMICAL	ABS	Cancer Slope Factor			Reference Dose			ADAF	
		Oral (mg/kg/day)$^{-1}$	Dermal (mg/kg/day)$^{-1}$	Inhalation (ug/m^3)$^{-1}$	Oral (mg/kg/day)	Dermal (mg/kg/day)	Inhalation (mg/m^3)	Ages 6 - 16	Ages >16
Benzo(a)pyrene Equivalents	0.13	7.3E+00	7.3E+00	1.1E-03	NA	NA	NA	3	1
Antimony	0	NA	NA	NA	4.0E-04	6.0E-05	NA	1	1
Arsenic	0.03	1.5E+00	1.5E+00	4.3E-03	3.0E-04	3.0E-04	1.5E-05	1	1
Cobalt	0	NA	NA	9.0E-03	3.0E-04	3.0E-04	6.0E-06	1	1
Copper	0	NA	NA	NA	4.0E-02	4.0E-02	NA	1	1
Iron	0	NA	NA	NA	7.0E-01	7.0E-01	NA	1	1
Manganese	0	NA	NA	NA	2.4E-02	9.6E-04	5.0E-05	1	1
Mercury	0	NA	NA	NA	3.0E-04	2.1E-05	3.0E-04	1	1

CHEMICAL	RBA	Carcinogenic Intake Factors			Noncarcinogenic Intake Factors		
		Oral (kg/kg/day)	Dermal (kg/kg/day)	Inhalation (kg/m^3)	Oral (kg/kg/day)	Dermal (kg/kg/day)	Inhalation (kg/m^3)
Benzo(a)pyrene Equivalents	1	6.85E-07	3.76E-07	4.03E-10	1.20E-06	6.58E-07	7.05E-10
Antimony	1	3.42E-07	0.00E+00	2.01E-10	1.20E-06	0.00E+00	7.05E-10
Arsenic	0.6	2.74E-07	4.34E-08	2.01E-10	7.19E-07	1.52E-07	7.05E-10
Cobalt	1	3.42E-07	0.00E+00	2.01E-10	1.20E-06	0.00E+00	7.05E-10
Copper	1	3.42E-07	0.00E+00	2.01E-10	1.20E-06	0.00E+00	7.05E-10
Iron	1	3.42E-07	0.00E+00	2.01E-10	1.20E-06	0.00E+00	7.05E-10
Manganese	1	3.42E-07	0.00E+00	2.01E-10	1.20E-06	0.00E+00	7.05E-10
Mercury	1	3.42E-07	0.00E+00	2.01E-10	1.20E-06	0.00E+00	7.05E-10

CHEMICAL	Soil Concentration		Target Organ(s)
	Carcinogenic (mg/kg)	Noncarcinogenic (mg/kg)	
Benzo(a)pyrene Equivalents	6.5	NA	NA
Antimony	NA	334	Blood
Arsenic	105	339	Skin, CVS
Cobalt	27578	243	Thyroid, Respiratory
Copper	NA	33371	GS
Iron	NA	584000	GS
Manganese	NA	15614	CNS
Mercury	NA	250	CNS

CNS = central nervous system
CVS = cardiovascular system
GS = gastrointestinal system

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL (PAGE TWO OF TWO)

CALCULATION OF AMBIENT AIR CONCENTRATION
SOURCE: U.S. EPA SOIL SCREENING GUIDANCE

Purpose: To calculate ambient air concentrations resulting from fugitive dust and volatilization from soil.

Relevant Equations:

$$Cair = Cs \times (1/PEF + 1/VF)$$

$$VF = \frac{Q/C \times (3.14 \times DA \times T)^{1/2} \times 10^{-4}\ m^2/cm^2}{2 \times pb \times DA} \qquad PEF = \frac{3600}{0.036 \times (1-V) \times (U_m/U_t)^3 \times F(x)}$$

$$DA = \frac{[(\theta a^{10/3} \times Di \times H + \theta w^{10/3} \times Dw)/n^2)]}{pb \times Kd + \theta w + \theta a \times H}$$

$$Csat = S/pb \times (Kd \times pb + \theta w + H \times \theta a)$$

INPUT PARAMTERS		
Parameter	**Value**	**Definition**
Q/C = :	93.77	Inverse of mean conc. at center of source (g/m^2-s per kg/m^3).
T = :	8.2E+08	Exposure interval (seconds).
pb = :	1.5	Dry soil bulk density (g/cm^3).
ps = :	2.65	soil particle density (g/cm^3).
n = :	0.434	Total soil porosity (L_{pore}/L_{soil}).
θw = :	0.15	Water-filled soil porosity (L_{pore}/L_{soil}).
θa = :	0.284	Air-filled soil porosity (L_{air}/L_{soil}).
Di = :	Chemical specific	Diffusivity in air (cm^2/sec).
H' = :	Chemical specific	Dimensionless Henry's Law Constant.
Dw = :	Chemical specific	Diffusivity in water (cm^2/sec).
DA = :	Chemical specific	Apparent diffusivity (cm^2/sec).
Kd = :	Chemical specific	Soil-water partition coefficient (cm^3/g).
Koc = :	Chemical specific	Soil organic carbon partition coefficient (cm^3/g).
foc = :	0.006	Fraction organic carbon in soil (g/g).

Chemical	Volatile	Chemical Properties					Intermediate Calculations			
		Koc (cm^3/g)	Di (cm^2/sec)	Dw (cm^2/sec)	S (mg/L)	H'	Kd (cm^3/g)	Da (cm^2/sec)	VF (m^3/kg)	Csat (mg/kg)
Surface Soil										
Benzo(a)pyrene Equivalents	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA
Antimony	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA
Arsenic	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA
Cobalt	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA
Copper	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA
Iron	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA
Manganese	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA
Mercury	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL (PAGE ONE OF THREE)

SITE NAME: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
EXPOSURE POINT: OU8
EXPOSURE SCENARIO: LIFELONG RESIDENTS
MEDIA: SURFACE SOIL
DATE: 11/19/2015

THIS SPREADSHEET CALCULATES SCREENING LEVELS FOR EXPOSURES TO SOIL
VIA INCIDENTAL INGESTION, DERMAL CONTACT, AND INHALATION

RELEVANT EQUATIONS:

Carcinogens

$$PRG_{soil} = \frac{TCR}{Intake_{oral} \times CSF_{oral} + Intake_{derm} \times CSF_{derm} + EC_{air} \times IUR}$$

Mutagenic

$$PRG_{soil} = \frac{TCR}{Intake_{ages\ 0\text{-}2} \times ADAF_{ages\ 0\text{-}2} + Intake_{ages\ 2\text{-}6} \times ADAF_{ages\ 2\text{-}6} + Intake_{ages\ 6\text{-}16} \times ADAF_{ages\ 6\text{-}16} + Intake_{ages\ >16} \times ADAF_{ages\ >16}}$$

Noncarcinogens

$$PRG_{soil} = \frac{THI}{\left(\frac{Intake_{oral}}{RfD_{oral}}\right) + \left(\frac{Intake_{derm}}{RfD_{derm}}\right) + \left(\frac{EC_{air}}{RfC}\right)}$$

$$Intake_{oral} = \frac{IR \times RBA \times EF \times ED \times FI \times CF}{BW \times AT}$$

$$Intake_{derm} = \frac{SA \times AF \times ABS \times EF \times ED \times CF}{BW \times AT}$$

$$EC_{air} = \frac{ET \times EF \times ED \times [1/PEF + 1/VF]}{AT \times 24\ hours/day}$$

INPUT ASSUMPTIONS:

	Parameter	Child Ages 0 - 2	Child Ages 2 - 6	Adult Ages 6 - 16	Adult Ages > 16	Definition
General	TCR = :	1.0E-04				Target Cancer Risk
	THI = :	1				Target Hazard Index
	EF = :	350	350	350	350	Exposure Frequency (days/year)
	ED =:	2	4	10	10	Exposure Duration (years)
	BW = :	15	15	80	80	Body Weight (kg)
	ATc = :	25,550				Averaging time for carcinogenic exposures (days)
	ATn = :	730	1,460	3,650	3,650	Averaging time for noncarcinogenic exposures (days)
	CF = :	1.0E-06				Conversion Factor (kg/mg)
	ADAF = :	Chemical Specific				Age Dependent Adjustment Factor
Incidental Ingestion	IR = :	200	200	100	100	Soil Ingestion Rate (mg/day)
	RBA = :	Chemical Specific				Relative Bioavailibility
	FI = :	1	1	1	1	Fraction from contaminated source (unitless)
Dermal Contact	SA = :	2,373	2,373	6,032	6,032	Skin surface available for contact (cm^2/day)
	AFc = :	0.2	0.2	0.07	0.07	Soil to skin adherence factor (mg/cm^2)
	ABS = :	Chemical Specific				Absorption factor (unitless)
Inhalation	ETc = :	24	24	24	24	Exposure time (hours/day)
	PEF = :	1.36E+09				Particulate emission factor (m^3/kg)
	VF = :	Chemical Specific				Volatilization factor (m^3/kg)

CHEMICAL	ABS	RBA	Cancer Slope Factor			Reference Dose		
			Oral $(mg/kg/day)^{-1}$	Dermal $(mg/kg/day)^{-1}$	Inhalation $(ug/m^3)^{-1}$	Oral (mg/kg/day)	Dermal (mg/kg/day)	Inhalation (mg/m^3)
Benzo(a)pyrene Equivalents	0.13	1	7.3E+00	7.3E+00	1.1E-03	NA	NA	NA

CHEMICAL	Age Dependent Adjustment Factor			
	Ages 0 - 2	Ages 2 - 6	Ages 6 - 16	Ages >16
Benzo(a)pyrene Equivalents	10	3	3	1

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL (PAGE TWO OF THREE)

SITE NAME: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
EXPOSURE POINT: OU8
EXPOSURE SCENARIO: LIFELONG RESIDENTS
MEDIA: SURFACE SOIL
DATE: 11/19/2015

CHEMICAL	Carcinogenic Intake Factors			Noncarcinogenic Intake Factors		
	Oral (kg/kg/day)	Dermal (kg/kg/day)	Inhalation (kg/m^3)	Oral (kg/kg/day)	Dermal (kg/kg/day)	Inhalation (kg/m^3)
Benzo(a)pyrene Equivalents	6.53E-06	2.18E-06	7.25E-10	1.28E-05	3.94E-06	7.05E-10

CHEMICAL	Soil Concentration		Target Organ(s)
	Carcinogenic (mg/kg)	Noncarcinogenic (mg/kg)[1]	
Benzo(a)pyrene Equivalents	1.6	NA	NA

1 - Noncarcinogenic concentration is based on the child resident.

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL (PAGE THREE OF THREE)

CALCULATION OF AMBIENT AIR CONCENTRATION
SOURCE: U.S. EPA SOIL SCREENING GUIDANCE

Purpose: To calculate ambient air concentrations resulting from fugitive dust and volatilization from soil.

Relevant Equations:

$$Cair = Cs \times (1/PEF + 1/VF)$$

$$VF = \frac{Q/C \times (3.14 \times DA \times T)^{1/2} \times 10^{-4}\ m^2/cm^2}{2 \times pb \times DA} \qquad PEF = \frac{3600}{0.036 \times (1-V) \times (U_m/U_t)^3 \times F(x)}$$

$$DA = \frac{[(\theta a^{10/3} \times Di \times H + \theta w^{10/3} \times Dw)/n^2)]}{pb \times Kd + \theta w + \theta a \times H}$$

$$Csat = S/pb \times (Kd \times pb + \theta w + H \times \theta a)$$

INPUT PARAMTERS		
Parameter	**Value**	**Definition**
Q/C = :	93.77	Inverse of mean conc. at center of source (g/m^2-s per kg/m^3).
T = :	8.2E+08	Exposure interval (seconds).
pb = :	1.5	Dry soil bulk density (g/cm^3).
ps = :	2.65	soil particle density (g/cm^3).
n = :	0.434	Total soil porosity (L_{pore}/L_{soil}).
θw = :	0.15	Water-filled soil porosity (L_{pore}/L_{soil}).
θa = :	0.284	Air-filled soil porosity (L_{air}/L_{soil}).
Di = :	Chemical specific	Diffusivity in air (cm^2/sec).
H' = :	Chemical specific	Dimensionless Henry's Law Constant.
Dw = :	Chemical specific	Diffusivity in water (cm^2/sec).
DA = :	Chemical specific	Apparent diffusivity (cm^2/sec).
Kd = :	Chemical specific	Soil-water partition coefficient (cm^3/g).
Koc = :	Chemical specific	Soil organic carbon partition coefficient (cm^3/g).
foc = :	0.006	Fraction organic carbon in soil (g/g).

Chemical	Volatile	Chemical Properties					Intermediate Calculations			
		Koc (cm^3/g)	Di (cm^2/sec)	Dw (cm^2/sec)	S (mg/L)	H'	Kd (cm^3/g)	Da (cm^2/sec)	VF (m^3/kg)	Csat (mg/kg)
Surface Soil										
Benzo(a)pyrene Equivalents	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL (PAGE ONE OF THREE)

SITE NAME: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
EXPOSURE POINT: OU8
EXPOSURE SCENARIO: LIFELONG RESIDENTS
MEDIA: SUBSURFACE SOIL
DATE: 11/19/2015

THIS SPREADSHEET CALCULATES SCREENING LEVELS FOR EXPOSURES TO SOIL
VIA INCIDENTAL INGESTION, DERMAL CONTACT, AND INHALATION

RELEVANT EQUATIONS:

Carcinogens

$$PRG_{soil} = \frac{TCR}{Intake_{oral} \times CSF_{oral} + Intake_{derm} \times CSF_{derm} + EC_{air} \times IUR}$$

Mutagenic

$$PRG_{soil} = \frac{TCR}{Intake_{ages\ 0\text{-}2} \times ADAF_{ages\ 0\text{-}2} + Intake_{ages\ 2\text{-}6} \times ADAF_{ages\ 2\text{-}6} + Intake_{ages\ 6\text{-}16} \times ADAF_{ages\ 6\text{-}16} + Intake_{ages\ >16} \times ADAF_{ages\ >16}}$$

Noncarcinogens

$$PRG_{soil} = \frac{THI}{\left(\frac{Intake_{oral}}{RfD_{oral}}\right) + \left(\frac{Intake_{derm}}{RfD_{derm}}\right) + \left(\frac{EC_{air}}{RfC}\right)}$$

$$Intake_{oral} = \frac{IR \times RBA \times EF \times ED \times FI \times CF}{BW \times AT}$$

$$Intake_{derm} = \frac{SA \times AF \times ABS \times EF \times ED \times CF}{BW \times AT}$$

$$EC_{air} = \frac{ET \times EF \times ED \times [1/PEF + 1/VF]}{AT \times 24\ hours/day}$$

INPUT ASSUMPTIONS:

	Parameter	Child Ages 0 - 2	Child Ages 2 - 6	Adult Ages 6 - 16	Adult Ages > 16	Definition
General	TCR = :	5.0E-05				Target Cancer Risk
	THI = :	1				Target Hazard Index
	EF = :	350	350	350	350	Exposure Frequency (days/year)
	ED =:	2	4	10	10	Exposure Duration (years)
	BW = :	15	15	80	80	Body Weight (kg)
	ATc = :	25,550				Averaging time for carcinogenic exposures (days)
	ATn = :	730	1,460	3,650	3,650	Averaging time for noncarcinogenic exposures (days)
	CF = :	1.0E-06				Conversion Factor (kg/mg)
	ADAF = :	Chemical Specific				Age Dependent Adjustment Factor
Incidental Ingestion	IR = :	200	200	100	100	Soil Ingestion Rate (mg/day)
	RBA = :	Chemical Specific				Relative Bioavailibility
	FI = :	1	1	1	1	Fraction from contaminated source (unitless)
Dermal Contact	SA = :	2,373	2,373	6,032	6,032	Skin surface available for contact (cm^2/day)
	AFc = :	0.2	0.2	0.07	0.07	Soil to skin adherence factor (mg/cm^2)
	ABS = :	Chemical Specific				Absorption factor (unitless)
Inhalation	ETc = :	24	24	24	24	Exposure time (hours/day)
	PEF = :	1.36E+09				Particulate emission factor (m^3/kg)
	VF = :	Chemical Specific				Volatilization factor (m^3/kg)

CHEMICAL	ABS	RBA	Cancer Slope Factor			Reference Dose		
			Oral $(mg/kg/day)^{-1}$	Dermal $(mg/kg/day)^{-1}$	Inhalation $(ug/m^3)^{-1}$	Oral (mg/kg/day)	Dermal (mg/kg/day)	Inhalation (mg/m^3)
Benzo(a)pyrene Equivalents	0.13	1	7.3E+00	7.3E+00	1.1E-03	NA	NA	NA
Antimony	0	1	NA	NA	NA	4.0E-04	6.0E-05	NA
Arsenic	0.03	0.6	1.5E+00	1.5E+00	4.3E-03	3.0E-04	3.0E-04	1.5E-05
Cobalt	0	1	NA	NA	9.0E-03	3.0E-04	3.0E-04	6.0E-06
Copper	0	1	NA	NA	NA	4.0E-02	4.0E-02	NA
Iron	0	1	NA	NA	NA	7.0E-01	7.0E-01	NA
Manganese	0	1	NA	NA	NA	2.4E-02	9.6E-04	5.0E-05
Mercury	0	1	NA	NA	NA	3.0E-04	2.1E-05	3.0E-04

CHEMICAL	Age Dependent Adjustment Factor			
	Ages 0 - 2	Ages 2 - 6	Ages 6 - 16	Ages >16
Benzo(a)pyrene Equivalents	10	3	3	1
Antimony	1	1	1	1
Arsenic	1	1	1	1
Cobalt	1	1	1	1
Copper	1	1	1	1
Iron	1	1	1	1
Manganese	1	1	1	1
Mercury	1	1	1	1

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL (PAGE TWO OF THREE)

SITE NAME: PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE
EXPOSURE POINT: OU8
EXPOSURE SCENARIO: LIFELONG RESIDENTS
MEDIA: SUBSURFACE SOIL
DATE: 11/19/2015

CHEMICAL	Carcinogenic Intake Factors			Noncarcinogenic Intake Factors		
	Oral (kg/kg/day)	Dermal (kg/kg/day)	Inhalation (kg/m^3)	Oral (kg/kg/day)	Dermal (kg/kg/day)	Inhalation (kg/m^3)
Benzo(a)pyrene Equivalents	6.53E-06	2.18E-06	7.25E-10	1.28E-05	3.94E-06	7.05E-10
Antimony	1.44E-06	0.00E+00	2.62E-10	1.28E-05	0.00E+00	7.05E-10
Arsenic	8.63E-07	1.21E-07	2.62E-10	7.67E-06	9.10E-07	7.05E-10
Cobalt	1.44E-06	0.00E+00	2.62E-10	1.28E-05	0.00E+00	7.05E-10
Copper	1.44E-06	0.00E+00	2.62E-10	1.28E-05	0.00E+00	7.05E-10
Iron	1.44E-06	0.00E+00	2.62E-10	1.28E-05	0.00E+00	7.05E-10
Manganese	1.44E-06	0.00E+00	2.62E-10	1.28E-05	0.00E+00	7.05E-10
Mercury	1.44E-06	0.00E+00	2.62E-10	1.28E-05	0.00E+00	7.05E-10

CHEMICAL	Soil Concentration		Target Organ(s)
	Carcinogenic (mg/kg)	Noncarcinogenic (mg/kg)[1]	
Benzo(a)pyrene Equivalents	0.79	NA	NA
Antimony	NA	31	Blood
Arsenic	34	35	Skin, CVS
Cobalt	7660	23	Thyroid, Respiratory
Copper	NA	3129	GS
Iron	NA	54750	GS
Manganese	NA	1829	CNS
Mercury	NA	23.5	CNS

1 - Noncarcinogenic concentration is based on the child resident.

CNS = central nervous system
CVS = cardiovascular system
GS = gastrointestinal system

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL (PAGE THREE OF THREE)

CALCULATION OF AMBIENT AIR CONCENTRATION
SOURCE: U.S. EPA SOIL SCREENING GUIDANCE

Purpose: To calculate ambient air concentrations resulting from fugitive dust and volatilization from soil.

Relevant Equations:

$$Cair = Cs \times (1/PEF + 1/VF)$$

$$VF = \frac{Q/C \times (3.14 \times DA \times T)^{1/2} \times 10^{-4}\ m^2/cm^2}{2 \times pb \times DA} \qquad PEF = \frac{3600}{0.036 \times (1-V) \times (U_m/U_t)^3 \times F(x)}$$

$$DA = \frac{[(\theta a^{10/3} \times Di \times H + \theta w^{10/3} \times Dw)/n^2)]}{pb \times Kd + \theta w + \theta a \times H}$$

$$Csat = S/pb \times (Kd \times pb + \theta w + H \times \theta a)$$

INPUT PARAMTERS		
Parameter	**Value**	**Definition**
Q/C = :	93.77	Inverse of mean conc. at center of source (g/m^2-s per kg/m^3).
T = :	8.2E+08	Exposure interval (seconds).
pb = :	1.5	Dry soil bulk density (g/cm^3).
ps = :	2.65	soil particle density (g/cm^3).
n = :	0.434	Total soil porosity (L_{pore}/L_{soil}).
θw = :	0.15	Water-filled soil porosity (L_{pore}/L_{soil}).
θa = :	0.284	Air-filled soil porosity (L_{air}/L_{soil}).
Di = :	Chemical specific	Diffusivity in air (cm^2/sec).
H' = :	Chemical specific	Dimensionless Henry's Law Constant.
Dw = :	Chemical specific	Diffusivity in water (cm^2/sec).
DA = :	Chemical specific	Apparent diffusivity (cm^2/sec).
Kd = :	Chemical specific	Soil-water partition coefficient (cm^3/g).
Koc = :	Chemical specific	Soil organic carbon partition coefficient (cm^3/g).
foc = :	0.006	Fraction organic carbon in soil (g/g).

Chemical	Volatile	Chemical Properties					Intermediate Calculations			
		Koc (cm^3/g)	Di (cm^2/sec)	Dw (cm^2/sec)	S (mg/L)	H'	Kd (cm^3/g)	Da (cm^2/sec)	VF (m^3/kg)	Csat (mg/kg)
Surface Soil										
Benzo(a)pyrene Equivalents	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA
Antimony	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA
Arsenic	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA
Cobalt	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA
Copper	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA
Iron	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA
Manganese	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA
Mercury	N	NA	NA	NA	NA	NA	NA	NA	1E+99	NA

APPENDIX E

ALTERNATIVE-SPECIFIC ARARs

TABLE E-1

ALTERNATIVE 1: NO ACTION
CHEMICAL, LOCATION AND ACTION-SPECIFIC ARARs
OPERABLE UNIT 8 – RI/FS REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL CHEMICAL-SPECIFIC ARARs and TBCs				
Soil/Risk Assessment	Office of Solid Waste and Emergency Response (OSWER) Directive 9355.4-12	To be considered (TBC)	United States Environmental Protection Agency (USEPA) has provided recommended methodology for assessing risk caused by exposure to lead in surface soil under residential scenarios.	Guidelines were used to develop risk-based cleanup goals for lead in soil.
	USEPA Risk Reference Doses (RfDs) from Integrated Risk Information System (IRIS)	TBC	RfDs are estimates of daily exposure for human populations (including sensitive subpopulations) considered unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure over a lifetime.	RfDs were used to develop risk-based soil cleanup goals for non-carcinogenic contaminants of concern (COCs), including antimony, copper, cobalt, iron, manganese, and mercury.
	USEPA Human Health Assessment Group Cancer Slope Factors (CSFs) from IRIS	TBC	CSFs present the most up-to-date information on cancer risk potency for known and suspected carcinogens.	CSFs were used to develop risk-based soil cleanup goals for carcinogenic COCs, including polycyclic aromatic hydrocarbons (PAHs) and arsenic.
	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005a)	TBC	These guidelines are used to perform Human Health Risk Assessment (HHRA). They provide a framework for assessing possible cancer risks from exposures to pollutants or other agents in the environment.	These guidelines were used to develop risk-based soil cleanup goals for carcinogenic COCs, including PAHs and arsenic.
	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005b)	TBC	These guidelines are used to perform HHRA and address a number of issues pertaining to cancer risks associated with early-life exposures in general and provide specific guidance on potency adjustment for carcinogens acting through a mutagenic mode of action.	This guidance was used to develop risk-based soil cleanup goals for carcinogenic COCs, including PAHs and arsenic.

TABLE E-1

ALTERNATIVE 1: NO ACTION
CHEMICAL, LOCATION AND ACTION-SPECIFIC ARARs
OPERABLE UNIT 8 – RI/FS REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
STATE CHEMICAL-SPECIFIC ARARs and TBCs : No ARARs or TBCs				
FEDERAL LOCATION-SPECIFIC ARARs and TBCs : No ARARs or TBCs				
STATE LOCATION-SPECIFIC ARARs and TBCs: No ARARs or TBCs				
FEDERAL ACTION-SPECIFIC ARARs and TBCs: No ARARs or TBCs				
STATE ACTION-SPECIFIC ARARs and TBCs: No ARARs or TBCs				

TABLE E-2

ALTERNATIVE 2: LAND USE CONTROLS
CHEMICAL, LOCATION AND ACTION-SPECIFIC ARARs
OPERABLE UNIT 8 – RI/FS REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL CHEMICAL-SPECIFIC ARARs and TBCs				
Soil/Risk Assessment	Office of Solid Waste and Emergency Response (OSWER) Directive 9355.4-12	To be considered (TBC)	USEPA has provided recommended methodology for assessing risk caused by exposure to lead in surface soil under residential scenarios.	Guidelines were used to develop risk-based cleanup goals for lead in soil.
	USEPA Risk Reference Doses (RfDs) from Integrated Risk Information System (IRIS)	TBC	RfDs are estimates of daily exposure for human populations (including sensitive subpopulations) considered unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure over a lifetime.	RfDs were used to develop risk-based soil cleanup goals for non-carcinogenic chemicals of concern (COCs), including antimony, copper, cobalt, iron, manganese, and mercury.
	USEPA Human Health Assessment Group Cancer Slope Factors (CSFs) from IRIS	TBC	CSFs present the most up-to-date information on cancer risk potency for known and suspected carcinogens.	CSFs were used to develop risk-based soil cleanup goals for carcinogenic COCs, including polycyclic aromatic hydrocarbons (PAHs) and arsenic.
	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005a)	TBC	These guidelines are used to perform Human Health Risk Assessment (HHRA). They provide a framework for assessing possible cancer risks from exposures to pollutants or other agents in the environment.	These guidelines were used to develop risk-based soil cleanup goals for carcinogenic COCs, including PAHs and arsenic.
	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005b)	TBC	These guidelines are used to perform HHRA and address a number of issues pertaining to cancer risks associated with early-life exposures in general and provide specific guidance on potency adjustment for carcinogens acting through a mutagenic mode of action.	This guidance was used to develop risk-based soil cleanup goals for carcinogenic COCs, including PAHs and arsenic.
STATE CHEMICAL-SPECIFIC ARARs and TBCs: No ARARs or TBCs				
FEDERAL LOCATION-SPECIFIC ARARs and TBCs: No ARARs or TBCs				

TABLE E-2

ALTERNATIVE 2: LAND USE CONTROLS
CHEMICAL, LOCATION AND ACTION-SPECIFIC ARARs
OPERABLE UNIT 8 – RI/FS REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
STATE LOCATION-SPECIFIC ARARs and TBCs: No ARARs or TBCs				
FEDERAL ACTION-SPECIFIC ARARs and TBCs: NO ARARS OR TBCS				
STATE ACTION-SPECIFIC ARARs and TBCs: NO ARARS OR TBCS				

TABLE E-3

ALTERNATIVE 3: LIMITED EXCAVATION AND LAND USE CONTROLS
CHEMICAL, LOCATION AND ACTION-SPECIFIC ARARs
OPERABLE UNIT 8 – RI/FS REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL CHEMICAL-SPECIFIC ARARs and TBCs				
Soil/Risk Assessment	United States Environmental Protection Agency (USEPA) Office of Solid Waste and Emergency Response (OSWER) Directive 9355.4-12	To be considered (TBC)	USEPA has provided recommended methodology for assessing risk caused by exposure to lead in surface soil under residential scenarios.	Guidelines were used to develop risk-based cleanup goals for lead in soil.
	USEPA Risk Reference Doses (RfDs) from Integrated Risk Information System (IRIS)	TBC	RfDs are estimates of daily exposure for human populations (including sensitive subpopulations) considered unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure over a lifetime.	RfDs were used to develop risk-based soil cleanup goals for non-carcinogenic chemicals of concern (COCs), including antimony, copper, cobalt, iron, manganese, and mercury.
	USEPA Human Health Assessment Group Cancer Slope Factors (CSFs) from IRIS	TBC	CSFs present the most up-to-date information on cancer risk potency for known and suspected carcinogens.	CSFs were used to develop risk-based soil cleanup goals for carcinogenic COCs, including polycyclic aromatic hydrocarbons (PAHs) and arsenic.
	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005a)	TBC	These guidelines are used to perform Human Health Risk Assessment (HHRA). They provide a framework for assessing possible cancer risks from exposures to pollutants or other agents in the environment.	These guidelines were used to develop risk-based soil cleanup goals for carcinogenic COCs, including PAHs and arsenic.
	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005b)	TBC	These guidelines are used to perform HHRA and address a number of issues pertaining to cancer risks associated with early-life exposures in general and provide specific guidance on potency adjustment for carcinogens acting through a mutagenic mode of action.	This guidance was used to develop risk-based soil cleanup goals for carcinogenic COCs, including PAHs and arsenic.

TABLE E-3

ALTERNATIVE 3: LIMITED EXCAVATION AND LAND USE CONTROLS
CHEMICAL, LOCATION AND ACTION-SPECIFIC ARARs
OPERABLE UNIT 8 – RI/FS REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
STATE CHEMICAL-SPECIFIC ARARs and TBCs: NO ARARS OR TBCS				
FEDERAL LOCATION-SPECIFIC ARARs and TBCs				
Coastal Zone Management	Coastal Zone Management Act [16 United States Code (USC) 1451 *et seq*]	Applicable	This act provides for the preservation and protection of coastal zone areas. Federal activities that are in or directly affecting the coastal zone must be consistent, to the maximum extent practicable, with a federally approved state management program.	Remedial activities related to excavation that take place in the coastal zone would be controlled according to the requirements of the MEDEP program. MEDEP would review the remedial action document and work plans to ensure that they meet the substantive requirements of this act.
Wetlands and US Waters	Clean Water Act (CWA) Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material [40 Code of Federal Regulations (CFR) 230; 33 CFR 320, 322, and 323]	Applicable	These regulations outline the requirements for the discharge of dredged or fill material into US waters, including wetlands. No activity that adversely affects a US waters is permitted if a practicable alternative that has less effect is available. If there is no other practicable alternative, impacts must be mitigated.	Remedial activities related to excavation near the shoreline would be performed so as to not impact the offshore area.
Other Natural Resources	The Endangered Species Act of 1973 (16 USC 1531 *et seq*.; 50 CFR Parts 17 and 402)	Applicable	Provides for consideration of the impacts on endangered and threatened species and their critical habitats. Requires federal agencies to ensure that any action carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or adversely affect its critical habitat. The entire state of Maine is considered a habitat of the federally-listed endangered short-nosed sturgeon. The Gulf of Maine population of Atlantic sturgeon is listed as a threatened species.	There are no known endangered, threatened, or protected species or critical habitats within the boundaries of PNS. However short-nosed and Atlantic sturgeon are present in the Piscataqua River. Remedial activities would be conducted so as to avoid any adverse effect under the act to these sturgeon.

TABLE E-3

ALTERNATIVE 3: LIMITED EXCAVATION AND LAND USE CONTROLS
CHEMICAL, LOCATION AND ACTION-SPECIFIC ARARs
OPERABLE UNIT 8 – RI/FS REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
	Fish and Wildlife Coordination Act (16 USC 661 *et seq.*)	Applicable	This act requires any federal agency proposing to modify a body of water to coordinate with the United States Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS) and appropriate state agencies if alteration of a body of water, including discharge of pollutants into a wetland or construction in a wetland, will occur as a result of offsite remedial activities.	For remedial activities related to excavation that may impact the coastal floodplain and river, the Navy would coordinate with USFWS in the event that the remedy disturbs these areas.
Floodplain Management and Protection of Wetlands	44 CFR 9	Relevant and Appropriate	FEMA regulations that set forth the policy, procedure, and responsibilities to implement and enforce Executive Order 11988, Floodplain Management, and Executive Order 11990, Protection of Wetlands.	Remedial activities conducted within the 100-year floodplain of the Piscataqua River or federal jurisdictional wetlands would be implemented in compliance with these standards.
National Historic Preservation Act (NHPA, 1966)	Public Law 89-665; 16 USC § 470 *et. seq.;* 36 CFR Part 800	Applicable	Provides requirements relating to potential loss or destruction of significant scientific, historical, or archaeological data due to remedial actions at a site.	Prehistoric and historical archeological resource sensitivity for OU8 is low; however, the boundary of the PNS Historic District includes the majority of the Controlled Industrial Area (CIA), and the quay walls forming the boundary of the site are historic elements. Remedial design and work plans would address measures to preserve the integrity of these structures during remedial actions. Excavation activities will be coordinated with the Advisory Council on Historic Preservation to prevent disturbance of the historic quay walls.

TABLE E-3

ALTERNATIVE 3: LIMITED EXCAVATION AND LAND USE CONTROLS
CHEMICAL, LOCATION AND ACTION-SPECIFIC ARARs
OPERABLE UNIT 8 – RI/FS REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
STATE LOCATION-SPECIFIC ARARs and TBCs				
Other Natural Resources	Maine Natural Resources Protection Act Permit by Rule Standards [38 Maine Revised Statutes Annotated (MRSA) 480 *et seq.*; 06-096 Code of Maine Rules (CMR) Part 305, 1, 2, and 8]	Applicable	This act regulates activity conducted in, on, or over any protected natural resource or any activity conducted adjacent to and operated in such a way that material or soil may be washed into any freshwater or coastal wetland, great pond, river, stream or brook.	Remedial activities related to excavation would be conducted so as to avoid washing any soil into the nearby Piscataqua River or adjacent wetlands. Stormwater management and erosion control practices would be used to prevent sediment from entering the river or adjacent wetlands during remedial activities.
Wetlands	Maine Wetland Protection Rules(06-096 CMR Part 310)	Applicable	Standards are provided for protection of wetlands, as defined in MEDEP Ch. 1000 Guidelines for Municipal Shoreline Zoning Ordinances. Jurisdiction under the Rules includes the area adjacent to the wetlands, which is the area within 75 feet of the normal high water line. Activities that have an unreasonable impact on wetlands are prohibited.	Remedial activities related to excavation would be conducted to avoid impacts to wetlands and coastal wetlands, which include tidal and subtidal lands.
Coastal Zone	Maine Coastal Management Policies (38 MRSA 1801 *et seq*.) (06-096 CMR chapter 1000)	Applicable	Regulates activities near great ponds, rivers and larger streams, coastal areas, and wetlands. Regulates shoreland activities and development, including (but not limited to) water pollution prevention and control, wildlife habitat protection, and freshwater and coastal wetlands protection. The law is administered at the local government level. Shoreland areas include areas within 250 feet of the normal high-water line of any river or saltwater body and areas within 75 feet of the high-water line of a stream.	Remedial activities related to excavation that may affect storm water runoff, erosion and sedimentation, and surface water quality would be controlled according to these regulations.

TABLE E-3

ALTERNATIVE 3: LIMITED EXCAVATION AND LAND USE CONTROLS
CHEMICAL, LOCATION AND ACTION-SPECIFIC ARARs
OPERABLE UNIT 8 – RI/FS REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL ACTION-SPECIFIC ARARs and TBCs				
Surface Water	CWA [33 USC § 1251 *et seq.*]; National Recommended Water Quality Criteria (NRWQC) (40 CFR Part 122.44)	Relevant and Appropriate	These criteria are used to establish water quality standards for the protection of aquatic life.	Remedial activities would be conducted to reduce adverse impacts to the Piscataqua River. Stormwater management and erosion control practices would be used to prevent soil and contamination from entering the river during maintenance of shoreline controls.
Water Management	CWA Section 402 National Pollutant Discharge Elimination System (NPDES) (40 CFR 122.26)	Applicable	CWA Section 402 requires NPDES permits for stormwater discharges to navigable waters.	Stormwater management would be implemented to minimize discharges of contaminants to the Piscataqua River and meet the substantive requirements of this act.
STATE ACTION-SPECIFIC ARARs and TBCs				
Hazardous Waste	Identification of Hazardous Wastes 06-096 Part 850	Applicable	These standards establish requirements for determining whether wastes are hazardous based on either characteristic or listing. Wastes with PCB concentrations greater than or equal to 50 ppm are hazardous wastes in Maine.	Wastes generated during remedial activities would be analyzed to determine whether they are RCRA characteristic hazardous wastes. If determined to be hazardous, then the waste would be managed in accordance with regulatory requirements.
	Standards for Generators of Hazardous Waste (38 MRSA 1301 *et seq.*, 06-096 Part 851)	Applicable	These regulations contain requirements for the generators of hazardous waste.	Wastes generated during remedial activities that are determined to be hazardous waste would be managed in accordance with regulatory requirements.

TABLE E-3

ALTERNATIVE 3: LIMITED EXCAVATION AND LAND USE CONTROLS
CHEMICAL, LOCATION AND ACTION-SPECIFIC ARARs
OPERABLE UNIT 8 – RI/FS REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Water Management	Maine Discharge Licenses (38 MRSA 413 *et seq*.) and Waste Discharge Permitting Program (06-096 CMR 520-529)	Applicable	These standards regulate the discharge of pollutants from point sources.	These regulations are applicable to water management during soil excavation and discharges of treated water to a surface water body, if required. The substantive requirements would be met if any discharges of treated water to surface water bodies are required during the remedial action.
Erosion	Erosion and Sedimentation Control (38 MRSA Part 420-C)	Applicable	Erosion control measures must be in place before activities such as filling, displacing, or exposing soil or other earthen materials occur. Prior MEDEP approval is required if the disturbed area is in the direct watershed of a body of water most at risk for erosion or sedimentation.	These controls would be applicable to remedial activities that need to address erosion and sedimentation. Applicable plans would be coordinated with MEDEP before implementation.
Storm Water Management	Storm Water Management (38 MRSA Part 420-D; 06-096 CMR Part 500)	Applicable	Storm water management measures must be in place before activities such as filling, displacing, or exposing soil or other earthen material occur on land greater than or equal to 1 acre.	These regulations apply to earth disturbance activities equal to or greater than 1 acre and would be applicable to runoff resulting from earth disturbance activities. Applicable plans would be coordinated with MEDEP before implementation.
Waste Management	Additional Standards Applicable to Waste Facilities Located in a Flood Plain (06-096 CMR 854.16)	Relevant and Appropriate	Any facility located or to be located within 300 feet of a 100 year flood zone must be constructed, operated, and maintained to prevent wash-out of any hazardous waste by a 100 year flood or have procedures in place which will cause the waste to be removed to a location where the waste will not be vulnerable to flood waters and to a location which is authorized to manage hazardous waste safely before flood water can reach the facility.	Any remedial activities conducted within 300 feet of the 100-year flood zone would be conducted in compliance with these standards.

TABLE E-3

ALTERNATIVE 3: LIMITED EXCAVATION AND LAND USE CONTROLS
CHEMICAL, LOCATION AND ACTION-SPECIFIC ARARs
OPERABLE UNIT 8 – RI/FS REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Air Emissions	Visible Emissions Regulation (38 MRSA Part 584; 06-096 CMR Part 101)	TBC	These regulations establish opacity limits for emissions from several categories of air contaminant sources, including general fugitive emissions.	These regulations would be considered for excavation and backfilling activities. These standards would be met if any of the activities result in emission of particulate matter and fugitive matter to the atmosphere (e.g., dust generation).

APPENDIX F

AREA AND QUANTITY CALCULATIONS AND COST ESTIMATES

APPENDIX F.1

AREA AND QUANTITY CALCULATIONS

CLIENT: PORTSMOUTH NAVAL SHIPYARD		JOB NUMBER: 112G03270 - FS.PD	
SUBJECT: OU8 FS - QUANTITY CALCULATIONS			
BASED ON:		DRAWING NUMBER:	
BY: BES Date: 11/20/15	CHECKED BY MBV Date: 12/15/15	APPROVED BY: MBV	DATE: 3/30/16

PURPOSE:

The purpose of this calculation is to determine the volumes, areas, and quantities of materials associated with the remedial action alternatives presented in the OU8 RI/FS. These material and volume quantities are presented within the RI/FS text and are used to support the cost estimates provided in Appendix F.2.

DISCUSSION:

The volume, area, and quantity calculations presented below are based on the descriptions of the alternatives presented in Section 9 of the text and Figures 9-1 and 9-2.

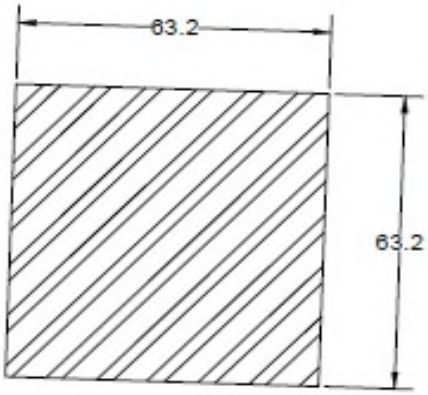
CALCULATIONS:

Alternative 3 - Limited Excavation and Offsite Disposal and LUCs

Alternative 3 includes excavation of lead contaminated soil, LUCs, and long term management. All excavated soil will be characterized and disposed of off site. The excavation areas will be backfilled to existing grade and surface conditions will be returned. The following presents the volumes quantities of materials involved in the excavation, disposal, and restoration of the excavation areas.

Excavation Areas

Area 1
Assume a approximately 63ft x 63ft areal extent at WTB-SB02/MW02 with Lead Contamination to 9 feet.

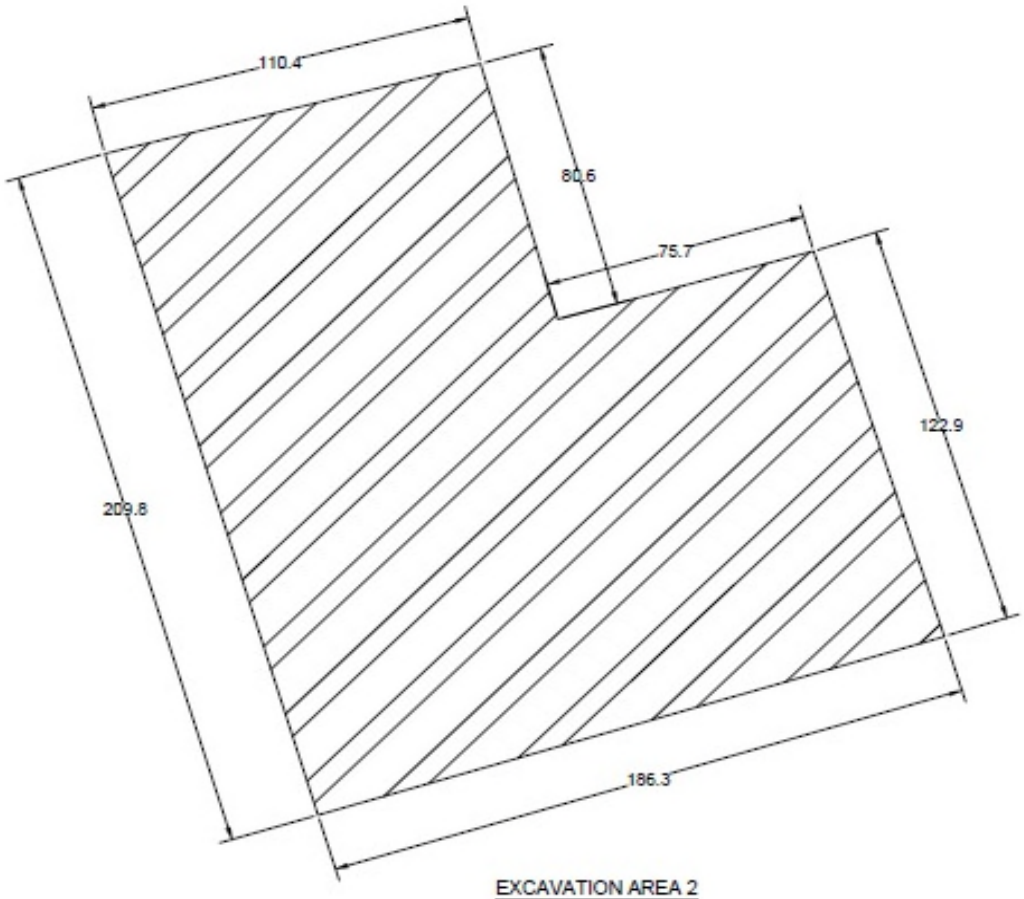


EXCAVATION AREA 1
AREA = 3998 SF
PERIMETER = 253 LF

CLIENT: PORTSMOUTH NAVAL SHIPYARD		JOB NUMBER: 112G03270 - FS.PD	
SUBJECT: OU8 FS - QUANTITY CALCULATIONS			
BASED ON:		DRAWING NUMBER:	
BY: BES Date: 11/20/15	CHECKED BY MBV Date: 12/15/15	APPROVED BY: MBV	DATE: 3/30/16

Area =	3998	sf
Depth =	10	ft
(Assume shoring is required)		
Volume =	39980	cf
=	1481	cy
Assume 9 inches of asphalt and base cover removed for recycling=	133	cy
Volume of soil for offsite disposal=	1347	cy

Area 2
Assume an areal extent as shown below at WTB-SB08, WTB-SB09, and WTB-SB11 (lead contamination to 10 feet).



EXCAVATION AREA 2
AREA = 32,091 SF
PERIMETER = 786 LF

CLIENT:	PORTSMOUTH NAVAL SHIPYARD	JOB NUMBER:	112G03270 - FS.PD
SUBJECT:	OU8 FS - QUANTITY CALCULATIONS		
BASED ON:		DRAWING NUMBER:	
BY: BES Date: 11/20/15	CHECKED BY MBV Date: 12/15/15	APPROVED BY: MBV	DATE: 3/30/16

Area =	32091	sf
Depth =	10	ft
(Assume shoring is required)		
Volume =	320910	cf
=	11886	cy
Assume 9 inches of asphalt and base cover removed for recycling=	1070	cy
Volume of soil for offsite disposal=	10816	cy
Total Volume of Soil to be Excavated and Disposed Off site =	12163	cy

Assume conversion factor of 1.5 tons per cy of soil for off site disposal:

Total Weight of Soil Excavated and Disposed Off site =	18245	tons
Total Volume of asphalt & base course be removed and recycled=	1203	cy

Assume conversion factor of 1.7 tons per cy of asphalt for off site recycling:

Total Weight of Asphalt and base course for Off site recycling =	2045	tons

Confirmation samples will be collected from the floor and sidewalls of each excavation area every 25 feet.

Excavation Area 1 - Number of Confirmation Samples =	16	samples
Excavation Area 2 - Number of Confirmation Samples =	69	samples
Assume 10% QA samples =	9	samples
Total confirmation samples =	94	samples

Characterization sampling for off site disposal will be collected at a rate of 1 sample for every 500 cy of material going off site for disposal

Number of Characterization Samples =	27	samples

Assume the excavated material will be disposed as hazardous waste based on the 10 times rule (concentrations between 197 mg/kg and 20,100 mg/kg).

Following excavation and off-site disposal, excavated areas will need to be backfilled and restored to site condition. The following calculations present the volume of material needed to backfill the excavation areas and the volume of material needed to construct the asphalt cover.

CLIENT: PORTSMOUTH NAVAL SHIPYARD		JOB NUMBER: 112G03270 - FS.PD	
SUBJECT: OU8 FS - QUANTITY CALCULATIONS			
BASED ON:		DRAWING NUMBER:	
BY: BES Date: 11/20/15	CHECKED BY MBV Date: 12/15/15	APPROVED BY: MBV	DATE: 3/30/16

Volume of Backfill Material for Area 1 =	1,481	cy
Area of pavement (from excavation only)=	3,998	sf
Assume the area of pavement needs replacement (+10%) =	4,398	sf
(to account for damage by excavation equipment)		
Top 9-inches asphalt pavement =	122	cy
Volume of Backfill Soil for Area 1 =	1,370	cy
Volume of Backfill Material for Area 2 =	11,886	cy
Area of pavement (from excavation only)=	32,091	sf
Assume the area of pavement needs replacement (+10%) =	35,300	sf
(to account for damage by excavation equipment)		
Top 9-inches asphalt pavement =	981	cy
Volume of Backfill Soil for Area 2 =	10,994	cy
Total Volume of Backfill Soil (assume 1.2 fluff factor) =	14,837	cy
Total Area of Pavement to restore for Excavation Areas =	39,698	sf (9-inch thick section)

Excavation Area 1

1) Temporary Fence - 400 lf
2) Decommission monitoring well WTB-MW02
3) Remove asphalt pavement - 444 sy - 1 day
4) Transport & dispose of removed asphalt - 122 cy or 216 tons
5) Sheet pile installation, extraction, and salvage - 400 lf - 15 lf sheetpiles (6000 SF) - 11 days
6) Excavate & haul soil to stockpile area (1,370 cy) - 7 days
7) Backfill and compact excavation - 7 days
8) Pave area - 4,398 sf - 2 days
9) Time to complete - 28 days

Excavation Area 2

1) Temporary Fence - 1000 lf
2) Decommission monitoring wells WTB-MW04 and WTB-MW06
3) Remove asphalt pavement - 3566 sy - 7 days
4) Transport & dispose of removed asphalt - 981 cy or 1736 tons
5) Sheet pile installation, extraction, and salvage - 1000 lf - 15 lf sheetpiles (15,000 SF) - 28 days
6) Excavate & haul soil to stockpile area (10,994 cy) - 55 days
7) Backfill and compact excavation - 30 days
8) Pave area - 35,300 sf - 14 days
9) Time to complete - 134 days

Appendix F.1

Effects of Limited Removal of Subsurface Soil at OU8 on Average Lead Concentration

Unacceptable risks were identified to the construction worker from concentrations of antimony and lead in the subsurface soil at OU8. Elevated lead and antimony levels were found in samples from WTB-SB08, -SB09, and -SB11 (which were located adjacent to each other in the southwestern portion of the site, and elevated lead levels were found in a sample collected from WTB-MW02 (which was located in the northwestern portion of the site). To determine the effects of removing these samples on the overall average lead concentrations, the following was conducted:

1. Average lead concentrations were recalculated by removing the 2 to 6 and 6 to 10 foot samples from WTB-SB08, -SB09, and -SB11 and replacing the values with 400 mg/kg.
2. Average lead concentrations were recalculated by removing also removing the 3 to 5 and 7 to 9 foot samples from WTB-MW02 and replacing the values with 400 mg/kg.

Table 1 presents the results of these calculations (the standard deviation and 95% UCLs are presented for information purposes). The mean lead concentrations decreases from 2,200 mg/kg to 826 mg/kg with the removal of the samples from WTB-SB08, -SB09, and -SB11, and then decreases further to 625 mg/kg with the removal of the samples from WTB-MW02. All of the antimony detections that were greater than the industrial RSL of 47 mg/kg were in samples from WTB-SB09 and -SB11. Therefore, by removing these samples, risks to the construction worker would be acceptable.

Table 1 – Recalculated lead concentrations after removing select samples

Lead SB	Max	Mean	Std. Dev.	95% UCL
Includes all subsurface soil samples	20100	2207	4741	6623
Includes all subsurface soil samples except 2 to 6 and 6 to 10 foot samples from WTB-SB08, -SB09, and -SB11	9080	826	1513	1810
Includes all subsurface soil samples except 2 to 6 and 6 to 10 foot samples from WTB-MW02, SB08, -SB09, and -SB11	3610	625	842	1172

APPENDIX F.2

COST ESTIMATE FOR ALTERNATIVES 2 AND 3

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU8 RI/FS
Alternative 2 - Land Use Controls
Capital Cost

	Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1	**PROJECT PLANNING & DOCUMENTS**											
1.1	Prepare LUC Documents	200	hr			$39.00		$0	$0	$7,800	$0	$7,800
	Subtotal							$0	$0	$7,800	$0	$7,800
	Overhead on Labor Cost @ 30%									$2,340		$2,340
	G & A on Labor, Material, Equipment, & Subs Cost @ 10%							$0	$0	$780	$0	$780
	Tax on Materials and Equipment Cost @ 6%								$0		$0	$0
	Total Direct Cost							$0	$0	$10,920	$0	$10,920
	Indirects on Total Direct Cost @ 0%											$0
	Profit on Total Direct Cost @ 10%											$1,092
	Subtotal											$12,012
	Health & Safety Monitoring @ 0%											$0
	Total Field Cost											$12,012
	Contingency on Total Field Costs @ 25%											$3,003
	Engineering on Total Field Cost @ 0%											$0
	TOTAL CAPITAL COST											**$15,015**

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU8 RI/FS
Alternative 2 - Land Use Controls
Annual Cost

Item	Item Cost years 1 - 30	Item Cost every 5 years	Notes
Annual Site Inspection & Report	$2,950		Labor and supplies once a year to inspect Land Use Controls with Report.
Five Year Site Review		$23,000	Labor and supplies to evaluate site every five years for 5-year review
SUBTOTAL	$2,950	$23,000	
Contingency @ 10%	$295	$2,300	
TOTAL	**$3,245**	**$25,300**	

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU8 RI/FS
Alternative 2 - Land Use Controls
Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate 2.0%	Present Worth
0	$15,015		$15,015	1.000	$15,015
1		$3,245	$3,245	0.980	$3,181
2		$3,245	$3,245	0.961	$3,119
3		$3,245	$3,245	0.942	$3,058
4		$3,245	$3,245	0.924	$2,998
5		$28,545	$28,545	0.906	$25,854
6		$3,245	$3,245	0.888	$2,881
7		$3,245	$3,245	0.871	$2,825
8		$3,245	$3,245	0.853	$2,770
9		$3,245	$3,245	0.837	$2,715
10		$28,545	$28,545	0.820	$23,417
11		$3,245	$3,245	0.804	$2,610
12		$3,245	$3,245	0.788	$2,559
13		$3,245	$3,245	0.773	$2,508
14		$3,245	$3,245	0.758	$2,459
15		$28,545	$28,545	0.743	$21,209
16		$3,245	$3,245	0.728	$2,364
17		$3,245	$3,245	0.714	$2,317
18		$3,245	$3,245	0.700	$2,272
19		$3,245	$3,245	0.686	$2,227
20		$28,545	$28,545	0.673	$19,210
21		$3,245	$3,245	0.660	$2,141
22		$3,245	$3,245	0.647	$2,099
23		$3,245	$3,245	0.634	$2,058
24		$3,245	$3,245	0.622	$2,017
25		$28,545	$28,545	0.610	$17,399
26		$3,245	$3,245	0.598	$1,939
27		$3,245	$3,245	0.586	$1,901
28		$3,245	$3,245	0.574	$1,864
29		$3,245	$3,245	0.563	$1,827
30		$28,545	$28,545	0.552	$15,759
				TOTAL PRESENT WORTH	**$196,574**

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU8 FS
Alternative 3 - Limited Excavation and Land Use Controls
Capital Cost

				Unit Cost			Extended Cost				
Item	Quantity	Unit	Subcontract	Material	Labor	Equipment	Subcontract	Material	Labor	Equipment	Subtotal
1 PROJECT PLANNING & DOCUMENTS											
1.1 Prepare LUC Documents	200	hr			$40.00		$0	$0	$8,000	$0	$8,000
1.2 Prepare Documents & Plans including Permits	300	hr			$40.00		$0	$0	$12,000	$0	$12,000
2 MOBILIZATION AND DEMOBILIZATION											
2.1 Site Support Facilities (trailers, phone, electric, etc.)	1	ls		$1,200.00		$3,750.00	$0	$1,200	$0	$3,750	$4,950
2.2 Equipment Mobilization/Demobilization	6	ea			$730.00	$750.00	$0	$0	$4,380	$4,500	$8,880
3 FIELD SUPPORT AND SITE ACCESS											
3.1 Office Trailer	10	mo				$410.00	$0	$0	$0	$4,100	$4,100
3.2 Field Office Equipment, Utilities, & Support	10	mo		$525.00			$0	$5,250	$0	$0	$5,250
3.3 Storage Trailer	10	mo				$101.00	$0	$0	$0	$1,010	$1,010
3.4 Utility Connection/Disconnection (Phone/electric)	1	ls	$1,500.00				$1,500	$0	$0		
3.5 Survey Support	4	day	$1,200.00				$4,800	$0	$0	$0	$4,800
3.6 Site Superintendent	200	day		$153.00	$420.00		$0	$30,600	$84,000	$0	$114,600
3.7 Site Health & Safety and QA/QC	200	day		$153.00	$370.00		$0	$30,600	$74,000	$0	$104,600
3.8 Field Officer Labor	200	day			$230.77		$0	$0	$46,154	$0	$46,154
3.9 Underground Utility Clearance	1	ls	$10,000.00				$10,000	$0	$0	$0	$10,000
4 DECONTAMINATION											
4.1 Decontamination Services	10	mo		$1,220.00	$2,345.00	$1,550.00	$0	$12,200	$23,450	$15,500	$51,150
4.2 Equipment Decon Pad	1	ls		$7,000.00	$6,500.00	$1,200.00	$0	$7,000	$6,500	$1,200	$14,700
4.3 Decon Water	4,000	gal		$0.20			$0	$800	$0	$0	$800
4.4 Decon Water Storage Tank, 6,000 gallon	10	mo				$813.00	$0	$0	$0	$8,130	$8,130
4.5 Clean Water Storage Tank, 4,000 gallon	10	mo				$731.00	$0	$0	$0	$7,310	$7,310
4.6 Disposal of Decon Waste (liquid & solid)	10	mo	$995.00				$9,950	$0	$0	$0	$9,950
5 SITE PREPARATION											
5.1 Stockpile pad, barrier containment system - Jersey barriers	180	ea		$550.00			$0	$99,000	$0	$0	$99,000
5.2 Stockpile pad lining - LLDPE	50,000	sf		$0.45			$0	$22,500	$0	$0	$22,500
5.3 Stockpile pad lining - geotextile	50,000	sf		$0.25			$0	$12,500	$0	$0	$12,500
5.4 Stockpile pad cushion layer	2,000	ton		$25.00			$0	$50,000	$0	$0	$50,000
5.5 Temporary stockpile covers	1	ls	$10,000.00				$10,000	$0	$0	$0	$10,000
5.6 Monitoring wells abandonment	3	ea	$925.00				$2,775	$0	$0	$0	$2,775
6 AREAS 1 and 2 EXCAVATION AND DISPOSAL											
6.1 Temporary Fence	1,400	lf	$8.75				$12,250	$0	$0	$0	$12,250
6.2 Excavator, 2 cy	100	day			$382.40	$1,253.00	$0	$0	$38,240	$125,300	$163,540
6.3 Compactor Attachment	40	day				$280.00	$0	$0	$0	$11,200	$11,200
6.4 Pavement Saw, 18 hp	8	day				$66.00	$0	$0	$0	$528	$528
6.5 Sheetpile	21,000	sf	$44.00				$924,000	$0	$0	$0	$924,000
6.6 Sheetpile Equipment (mob/demob)	2	ea	$25,000.00				$50,000	$0	$0	$0	$50,000
6.7 Dewatering Pump & Filter	160	day				$151.50	$0	$0	$0	$24,240	$24,240
6.8 Site Labor, (3 laborers)	480	day			$280.80		$0	$0	$134,784	$0	$134,784
6.9 Confirmation Sampling, lead	94	ea	$50.00	$30.00	$50.00	$30.00	$4,700	$2,820	$4,700	$2,820	$15,040
6.10 T & D of Excavated Soil, hazardous	18,245	ton	$245.00				$4,470,025	$0	$0	$0	$4,470,025

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU8 FS
Alternative 3 - Limited Excavation and Land Use Controls
Capital Cost

				Unit Cost			Extended Cost				
Item	Quantity	Unit	Subcontract	Material	Labor	Equipment	Subcontract	Material	Labor	Equipment	Subtotal
6.11 T & D of asphalt pavement	2,045	ton	$55.00				$112,475	$0	$0	$0	$112,475
6.12 T & D of water from excavation dewatering	200,000	gal	$0.39				$78,000	$0	$0	$0	$78,000
6.13 Waste Disposal Characterization / Analytical	27	ea	$850.00	$30.00	$50.00	$30.00	$22,950	$810	$1,350	$810	$25,920
6.14 Backfill, common fill	14,837	cy		$18.33			$0	$271,962	$0	$0	$271,962
6.15 Utility Removal, Bypass, Replacement	1	ls	$50,000.00				$50,000	$0	$0	$0	$50,000
6.16 Pavement Repair (6" base, 2" binder, 1" top)	2,500	sf	$2.46				$6,150	$0	$0	$0	$6,150
7 POST CONSTRUCTION COST											
7.1 Contractor Completion Report	150	hr			$40.00		$0	$0	$6,000	$0	$6,000
7.2 Remedial Action Closeout Report	150	hr			$40.00		$0	$0	$6,000	$0	$6,000
Subtotal							$5,769,575	$547,242	$449,558	$210,398	$6,976,773

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU8 FS
Alternative 3 - Limited Excavation and Land Use Controls
Capital Cost

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
Overhead on Labor Cost @	30%								$134,867		$134,867
G & A on Labor, Material, Equipment, & Subs Cost @	10%						$576,958	$54,724	$44,956	$21,040	$697,677
Tax on Materials and Equipment Cost @	6%							$32,835		$12,624	$45,458
Total Direct Cost							$6,346,533	$634,801	$629,381	$244,062	$7,854,776
Indirects on Total Direct Cost @	30%	(excluding transportation and disposal cost)									$955,298
Profit on Total Direct Cost @	10%										$785,478
Subtotal											$9,595,552
Health & Safety Monitoring @	2%										$191,911
Total Field Cost											$9,787,463
Contingency on Total Field Costs @	20%										$1,957,493
Engineering on Total Field Cost @	20%										$1,957,493
TOTAL CAPITAL COST											**$13,702,448**

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU8 FS

Alternative 3 - Limited Excavation and Land Use Controls
Annual Cost

Item	Item Cost years 1 - 30	Item Cost every 5 years	Notes
Annual Site Inspection & Report	$2,950		Labor and supplies once a year to inspect Land Use Controls with Report.
Five Year Site Review		$23,000	Labor and supplies to evaluate site every five years for 5-year review
SUBTOTAL	$2,950	$23,000	
Contingency @ 10%	$295	$2,300	
TOTAL	**$3,245**	**$25,300**	

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU8 FS

Alternative 3 - Limited Excavation and Land Use Controls
Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate 2.0%	Present Worth
0	$13,702,448		$13,702,448	1.000	$13,702,448
1		$3,245	$3,245	0.980	$3,181
2		$3,245	$3,245	0.961	$3,119
3		$3,245	$3,245	0.942	$3,058
4		$3,245	$3,245	0.924	$2,998
5		$28,545	$28,545	0.906	$25,854
6		$3,245	$3,245	0.888	$2,881
7		$3,245	$3,245	0.871	$2,825
8		$3,245	$3,245	0.853	$2,770
9		$3,245	$3,245	0.837	$2,715
10		$28,545	$28,545	0.820	$23,417
11		$3,245	$3,245	0.804	$2,610
12		$3,245	$3,245	0.788	$2,559
13		$3,245	$3,245	0.773	$2,508
14		$3,245	$3,245	0.758	$2,459
15		$28,545	$28,545	0.743	$21,209
16		$3,245	$3,245	0.728	$2,364
17		$3,245	$3,245	0.714	$2,317
18		$3,245	$3,245	0.700	$2,272
19		$3,245	$3,245	0.686	$2,227
20		$28,545	$28,545	0.673	$19,210
21		$3,245	$3,245	0.660	$2,141
22		$3,245	$3,245	0.647	$2,099
23		$3,245	$3,245	0.634	$2,058
24		$3,245	$3,245	0.622	$2,017
25		$28,545	$28,545	0.610	$17,399
26		$3,245	$3,245	0.598	$1,939
27		$3,245	$3,245	0.586	$1,901
28		$3,245	$3,245	0.574	$1,864
29		$3,245	$3,245	0.563	$1,827
30		$28,545	$28,545	0.552	$15,759
				TOTAL PRESENT WORTH	**$13,884,007**

APPENDIX F.3

EXCAVATION TECHNOLOGY ELIMINATED DUE TO COSTS

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU8 RI/FS
10 Feet Below Ground Surface - Excavation
Capital Cost

			Unit Cost				Extended Cost				
Item	Quantity	Unit	Subcontract	Material	Labor	Equipment	Subcontract	Material	Labor	Equipment	Subtotal
COMPLETE EXCAVATION AND DISPOSAL											
Site Support Facilities (trailers, phone, electric, etc.)	1	ls		$1,200.00		$3,750.00	$0	$1,200	$0	$3,750	$4,950
Equipment Mobilization/Demobilization	6	ea			$730.00	$750.00	$0	$0	$4,380	$4,500	$8,880
Temporary Fence	2,400	lf	$8.65				$20,760	$0	$0	$0	$20,760
Excavator, 2.5 cy (2 each)	200	day			$362.80	$1,613.00	$0	$0	$72,560	$322,600	$395,160
Pavement Saw, 18 hp	190	day				$63.20	$0	$0	$0	$12,008	$12,008
Sliding Rail Shoring (50' by 10' by 9' deep) 10 days	1	ls	$43,650.00				$43,650	$0	$0	$0	$43,650
Sheetpile	21,000	sf	$44.00				$924,000	$0	$0	$0	$924,000
Dewatering Pump & Filter	190	day				$151.50	$0	$0	$0	$28,785	$28,785
Site Labor, (3 laborers)	570	day			$274.80		$0	$0	$156,636	$0	$156,636
Confirmation Sampling, lead	120	ea	$50.00	$30.00	$50.00	$30.00	$6,000	$3,600	$6,000	$3,600	$19,200
Confirmation Sampling,PAHs	120	ea	$160.00	$30.00	$50.00	$30.00	$19,200	$3,600	$6,000	$3,600	$32,400
T & D of Excavated Soil, hazardous	18,000	ton	$245.00				$4,410,000	$0	$0	$0	$4,410,000
T & D of Excavated Soil, non-hazardous	57,231	ton	$80.00				$4,578,480	$0	$0	$0	$4,578,480
T & D of Demo Materials	6,000	ton	$55.00				$330,000	$0	$0	$0	$330,000
Waste Disposal Characterization / Analytical	10	ea	$850.00	$30.00	$50.00	$30.00	$8,500	$300	$500	$300	$9,600
Backfill, common fill	67,400	cy		$18.33			$0	$1,235,442	$0	$0	$1,235,442
Utility Removal, Bypass, Replacement	1	ls	$50,000.00				$50,000	$0	$0	$0	$50,000
Pavement Repair (6" base, 2" binder, 1" top)	157,000	sf	$2.46				$386,220	$0	$0	$0	$386,220
											$12,646,171

* Only excavation and disposal costs are shown to demonstrate the high costs for this screened out alternative. Actual costs for this alternative would be higher than shown.

APPENDIX G

ENVIRONMENTAL FOOTPRINT EVALUTION

APPENDIX G

Environmental Footprint Evaluation
Operable Unit 8
Portsmouth Naval Shipyard, Kittery, Maine
December 2015

OBJECTIVE

This Environmental Footprint Evaluation of remedial alternatives is provided as Appendix G to the Remedial Investigation (RI)/Feasibility Study (FS) Report for Operable Unit (OU) 8, Site 31 located at Portsmouth Naval Shipyard (PNS) in Kittery, Maine. The purpose of the footprint evaluation is to assess the environmental impacts of two remedial alternatives (in addition to the no action alternative) using the metrics of greenhouse gas (GHG) and criteria pollutant emissions, energy use, water consumption, and worker safety. The results of this footprint evaluation are intended to provide additional information for consideration during remedy selection, design, and to enhance the understanding of the environmental impacts throughout the remedy life-cycle for each of the proposed alternatives.

POLICY BACKGROUND

Department of Defense (DoD) and Navy policies require continual optimization of remedies in every phase from remedy selection through site closeout (Navy, 2010a).

In January 2007, Executive Order 13423 set targets for sustainable practices for (i) energy efficiency, greenhouse gas emissions avoidance or reduction, and petroleum products use reduction, (ii) renewable energy, including bioenergy, (iii) water conservation, (iv) acquisition, (v) pollution and waste prevention and recycling, etc. In October 2009, Executive Order 13514 was issued, which reinforced these sustainability requirements and established specific goals for federal agencies to meet by 2020.

In August 2009, DoD issued a policy for “Consideration of Green and Sustainable Remediation Practices in the Defense Environmental Restoration Program.” The DoD policy and related Navy guidance state that opportunities to increase sustainability should be considered throughout all phases of remediation (i.e., site investigation, remedy selection, remedy design and construction, operation, monitoring, and site closeout). In response to this policy, the Department of the Navy (DON) issued an updated Navy Guidance for “Optimizing Remedy Evaluation, Selection, and Design” (NAVFAC, 2010), which includes environmental footprint evaluations as part of the traditional DON optimization review process for remedy selection, design, and remedial action operation. In August 2010, the Naval Facilities Engineering Command (NAVFAC) issued policy requiring use of the SiteWise™ tool to perform environmental impact reviews as part of all Feasibility Studies and Remedial Action Plans. As such, this environmental footprint evaluation

of remedial alternatives is being performed to estimate the environmental footprint associated with each alternative in the interest of reducing the environmental impact of remedial action at the site.

Applying the DON optimization concepts with an environmental footprint evaluation within the remedy selection and design phases allows for the following benefits:

- Determining factors in each remedial alternative with the greatest environmental impacts and gathering insight into how to reduce these impacts;
- Evaluating remedial alternatives with optimized or reduced environmental footprints in conjunction with other selection criteria;
- Designing and implementing a more robust remedy while balancing the impact to the environment; and
- Ensuring efficient, cost-effective and sustainable site closeout.

EVALUATION TOOLS

This evaluation was performed using a hybrid model of the Navy's SiteWise™ tool supplemented with a Tetra Tech developed model as appropriate for some site-specific items.

SiteWise™ is a life-cycle footprint assessment tool developed jointly by the Navy, U.S. Army Corps of Engineers (USACE), and Battelle. SiteWise™ assesses the environmental footprint of a remedial alternative/technology using a consistent set of metrics. The assessment is conducted using a building block approach, where each remedial alternative is first broken down into modules that follow the phases for most remedial actions, including remedial investigation (RI), remedial action construction (RA-C), remedial action operation (RA-O), and long-term monitoring (LTM). Once broken down by remedial phase, the footprint of each phase is calculated. The phase-specific footprints are then combined to estimate the overall footprint of the remedial alternative. This building block approach reduces redundancy in the footprint assessment and facilitates the identification of specific impact drivers that contribute to the environmental footprint. The inputs that need to be considered include (1) production of material required by the activity; (2) transportation of the required materials to the site, transportation of personnel; (3) all site activities to be performed; and (4) management of the waste produced by the activity.

GSRx builds off of SiteWise™ and allows for a flexible, detailed analysis, particularly for materials and equipment use. GSRx was used to account for materials and activities not readily input into SiteWise™ and where equipment usage assumptions built into SiteWise™ were not consistent with site-specific requirements.

ENVIRONMENTAL FOOTPRINT EVALUATION FRAMEWORK AND LIMITATIONS

The environmental footprint evaluation performed for the OU8 RI/FS Report considered life-cycle quantitative metrics for global warming potential (through greenhouse gas emissions), criteria air pollutant emissions (through NO_X, SO_X and PM_{10} emissions), energy consumption, water usage, and worker safety.

Life cycle impacts were calculated for energy consumption, emissions of GHG (carbon dioxide [CO_2], methane [CH_4], and nitrous oxide [N_2O]) and criteria pollutants (nitrogen oxides [NO_x], sulfur oxides [SO_x] and particulate matter [PM_{10}]), water usage, and energy consumption, and worker safety.

Life cycle inventory inputs in SiteWise™ were divided into four categories – 1) materials production; 2) transportation of personnel, materials and equipment; 3) equipment use and miscellaneous; and 4) residual handling and disposal. Cost estimates from the FS and design calculations were used as a basis for inventory quantities and related assumptions. Emission factors, energy consumption, and water usage data were correlated to material quantities, equipment, transportation distances, and installation time frames in order to calculate life-cycle emissions, energy consumption, water usage, and worker safety. Default SiteWise™ emission, energy usage, water consumption, and worker fatality and accident risk factors were utilized.

Although GSRx was used to minimize limitations resulting within SiteWise™, elimination of all limitations was not possible while using a hybrid model of SiteWise™ and GSRx. For example, several materials and construction equipment inventoried were input into GSRx and these impacts were incorporated into SiteWise™ within the “Equipment Use and Miscellaneous” sector. This sector in SiteWise™ does not differentiate into the specific equipment usage or material consumption items that are input in GSRx, but rather are considered miscellaneous items. However, impact drivers for items input in GSRx can be identified and evaluated directly within the respective GSRx evaluation and output summary sheets. In addition, worker safety results in general do not include worker safety related to equipment usage that was input within GSRx because GSRx was not developed to evaluate worker safety.

EVALUATION RESULTS

The following are the remedial action phases that were analyzed with SiteWise™ and GSRx for the OU8 RI/FS located at PNS:

- Alternative 2: LUCs
- Alternative 3: Limited Excavation and Offsite Disposal, and LUCs

The following sections summarize the relative environmental impacts and primary impact drivers for the 2 alternatives and their respective metrics. In addition, the attachment includes the inventory and output

sheets that were used for the SiteWise™/GSRx hybrid model. An evaluation of SiteWise™ and GSRx output summary sheets and related figures included in the footprint evaluation attachments (Appendix G-2 and G-3), provides detailed information on the contribution to each metric from each phase of the remedial process (RI, RAC, RAO, and LTM) and for each respective input category (materials production, transportation, equipment usage, etc). Further inspection of related inventory sheets provide information on the specific contribution to a metric from each item of material, transportation, equipment, etc. This level of detail also helps clarify results that could be misinterpreted based on SiteWise™ data entry limitations mentioned previously. The environmental impacts of the alternatives analyzed are summarized quantitatively in Table G1.

Greenhouse Gas Emissions

Emissions of CO_2, CH_4, and N_2O were normalized to CO_2 equivalents (CO_2e), which is a cumulative method of weighing GHG emissions relative to global warming potential. Figure G1 shows the overall GHG emissions of each of the phases analyzed; the x-axis represents the alternatives evaluated and the y-axis represents the GHG emissions in metric ton of CO_2e. Figure G2 shows the breakdown of the percent that each of the main activities of each alternative (x-axis) contributes to the GHG emissions (y-axis).

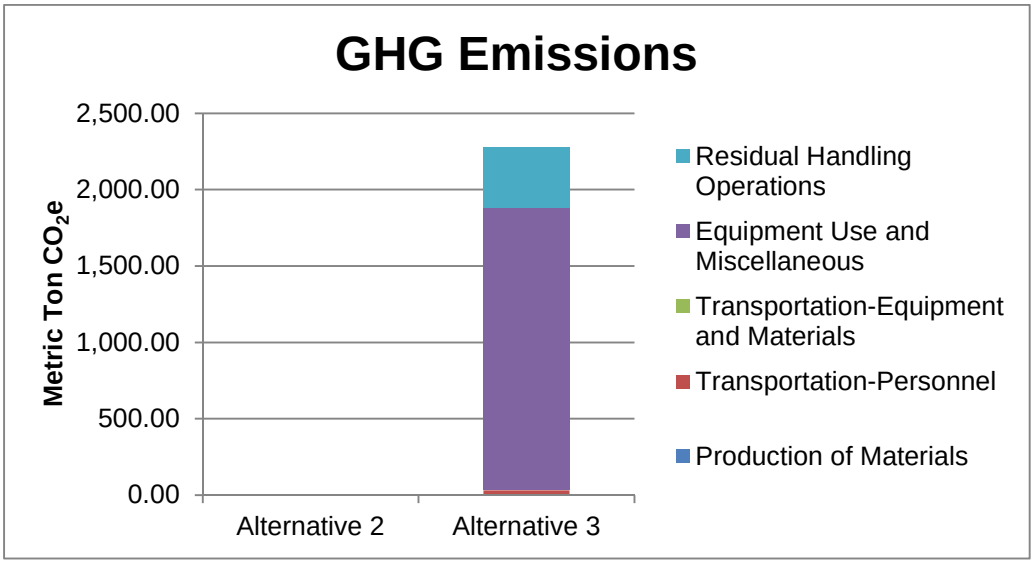


Figure G1: GHG Emissions for Alternatives 2 and 3 at PNS OU8

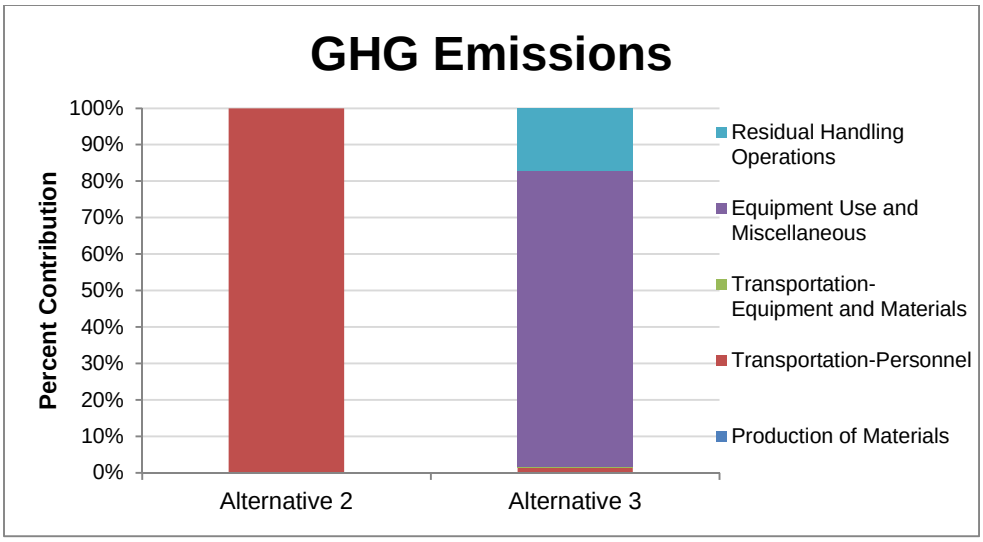


Figure G2: GHG Emissions percentage breakdown for Alternatives 2 and 3 at PNS OU8

The total amount of GHG emissions from Alternative 2 is 0.69 metric ton of CO_2e. The only contributor for the GHG emissions is the transportation of personnel.

The total amount of GHG emissions from Alternative 3 is 2,279 metric ton of CO_2e. The main contributor for the GHG emissions is the use of equipment and production of materials and the amount of emissions resulting from these activities is 1,849 metric ton of CO_2e, corresponding to 81.1 percent of the total GHG emissions. The greatest contributor to this total comes from the production of steel for the shoring that would be used to ensure safe excavation (1,242 metric ton of CO_2e and 67.1 percent of the total), with the second greatest contributor being the production and handling of clean backfill (464.3 metric ton of CO_2e and 25.1 percent of the total). The handling of residuals to and from the site is the activity with the third highest contribution to GHG emissions with 392.86 metric ton of CO_2e released, corresponding to approximately 172 percent of the total GHG emissions. Use of the excavator is the activity with the fourth highest contribution to the CO_2e emissions, with 62.03 metric ton being released corresponding to 2.7 percent of the total GHG emissions.

Criteria Pollutant Emissions

NO_X

Figure G3 shows the overall NO_X emissions of each of the alternatives analyzed; the x-axis represents the alternatives evaluated and the y-axis represents the NO_X emissions in metric ton of NO_X. Figure G4 shows the breakdown of the percent that each of main activities of each alternative (x-axis) contributes to the NO_X emissions (y-axis).

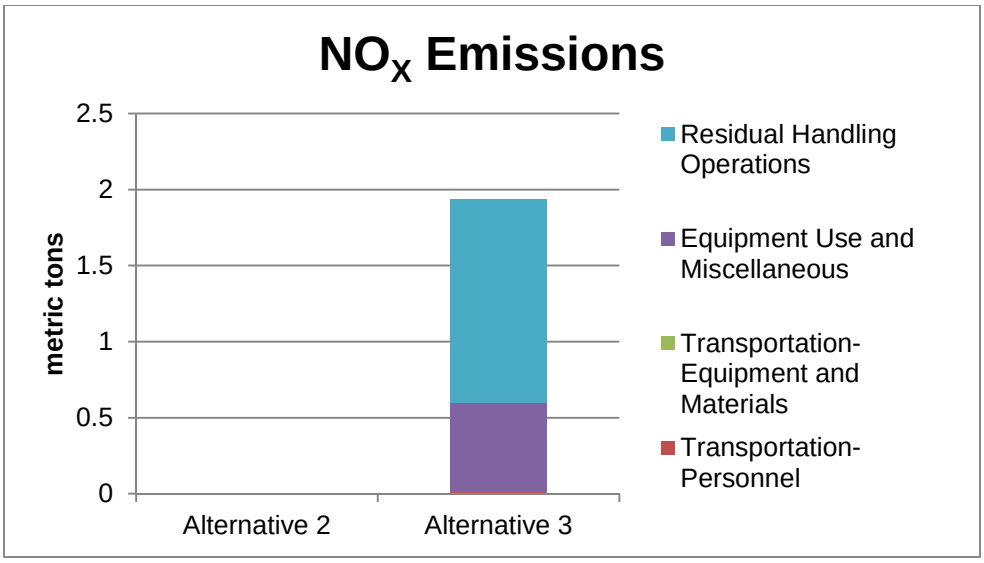


Figure G3 NO_X Emissions for Alternatives 2 and 3 at PNS OU8

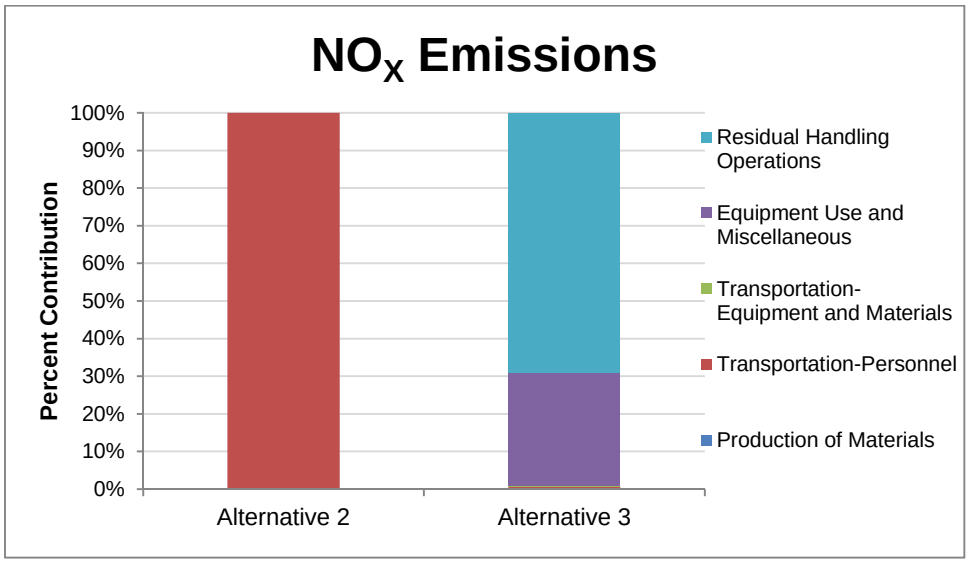


Figure G4: NO_X Emissions percentage breakdown for Alternatives 2 and 3 at PNS OU8

The total amount of NO_X emissions from Alternative 2 is 0.00025 metric ton. The only contributor to NO_X emissions is transportation of personnel.

The total amount of NO_X emissions from Alternative 3 is 1.94 metric ton. The activity with the highest contribution to NO_X emissions is the handling of residuals, emitting 1.34 metric ton of NO_X, corresponding to approximately 69.1 percent of the total NO_X emissions. The activity with the second highest contribution to NO_X emissions is equipment use, emitting a total of 0.59 metric ton of NO_X, corresponding to

approximately 30.2 percent of the total NO_X emissions. Use of the excavator contributes 0.39 metric tons of NO_X of the 0.59 metric tons, or 20.1 percent of the total.

SO_X

Figure G5 shows the overall SO_X emissions of each of the alternatives analyzed; the x-axis represents the alternatives evaluated and the y-axis represents the SO_X emissions in metric ton of SO_X. Figure G6 shows the breakdown of the percent that each of main activities of each alternative (x-axis) contributes to the SO_X emissions (y-axis).

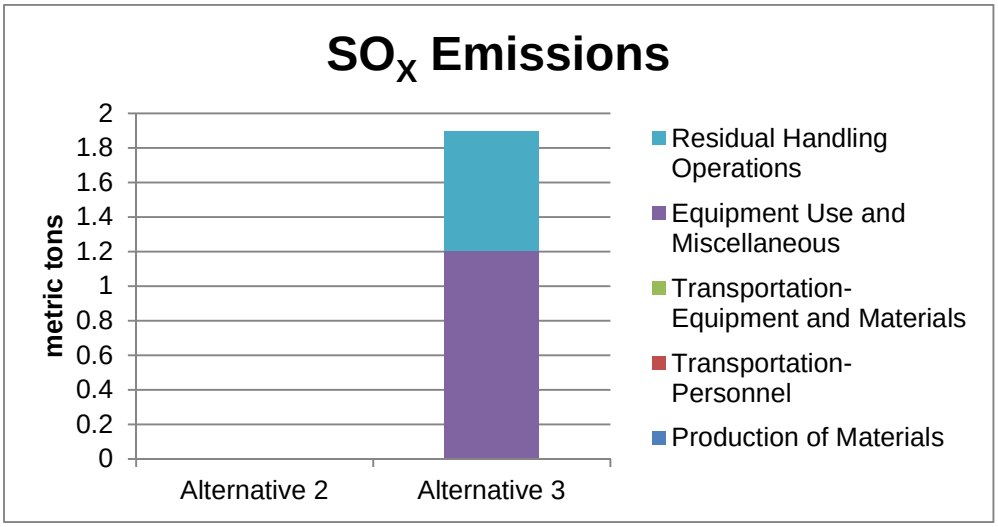


Figure G5: SO_X Emissions for Alternatives 2 and 3 at PNS OU8

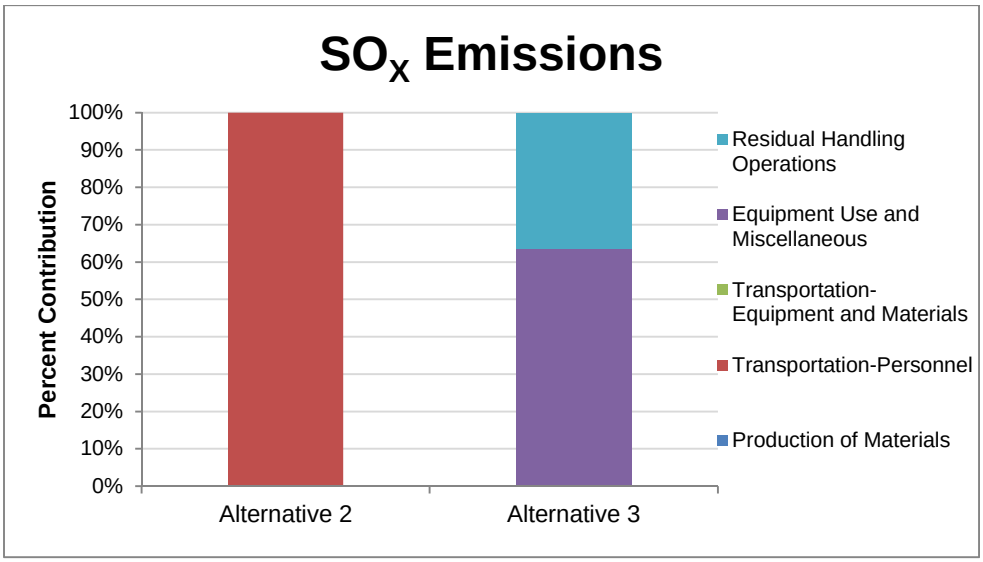


Figure G6: SO_X Emissions percentage breakdown for Alternatives 2 and 3 PNS OU8

The total amount of SO_X emissions from Alternative 2 is 8.94 x10^{-6} metric ton. The only activity contributing to SO_X emissions is transportation of personnel.

The total amount of SO_X emissions from Alternative 3 is 1.90 metric ton. The activity with the highest contribution to SO_X emissions is the production and handling of steel, emitting 1.02 metric ton of SO_X, corresponding to 53.7 percent of the total SO_X emissions. The handling of residuals is the activity with the second highest contribution and emits 0.69 metric ton of SO_X, corresponding to approximately 36.5 percent of the total emissions.

PM_{10}

Figure G7 shows the overall PM_{10} emissions of each alternative analyzed; the x-axis represents the alternatives evaluated and the y-axis represents the PM_{10} emissions in metric ton of PM_{10}. Figure G8 shows the breakdown of the percent that each of main activities of each alternative (x-axis) contributes to the PM_{10} emissions (y-axis).

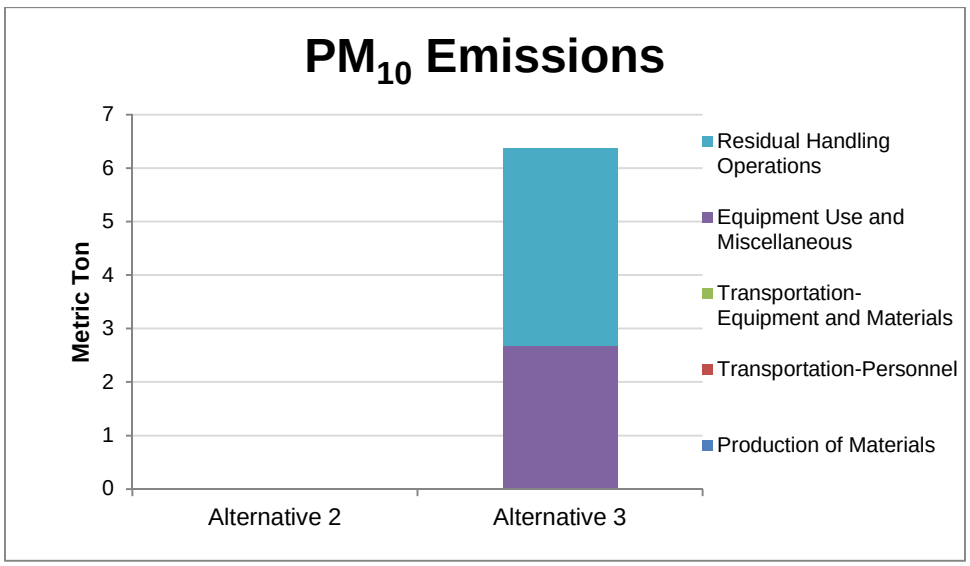


Figure G7: PM_{10} Emissions for Alternatives 2 and 3 at PNS OU8

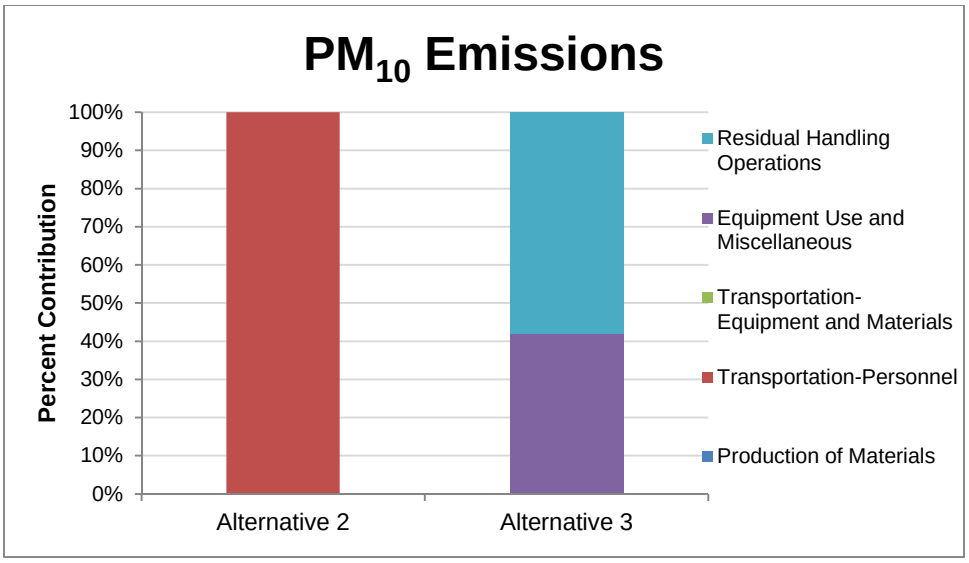


Figure G8: PM_{10} Emissions percentage breakdown for Alternatives 2 and 3 at PNS OU8

The total PM_{10} emissions resulting from Alternative 2 is 5.15×10^{-5} metric ton. The only activity contributing to these emissions is transportation of personnel.

The total PM_{10} emissions resulting from Alternative 3 is 6.36 metric ton. The activity with the highest contribution to these emissions is residuals handling, emitting 3.69 metric ton of PM_{10}, approximately 57.9 percent of the total PM_{10} emissions. Production and handling of asphalt for re-paving after excavation is complete is the activity with the second highest contribution and emits 2.63 metric ton of PM_{10}, corresponding to approximately 41.6 percent of the total emissions.

Energy Consumption

Figure G9 shows the energy consumption of each of the alternatives; the x-axis represents the alternatives evaluated and the y-axis represents the amount of energy consumed in units of million British Thermal Units (MMBTU). Figure G10 shows the percentage breakdown contribution of energy consumption from the different activity groups for each alternative.

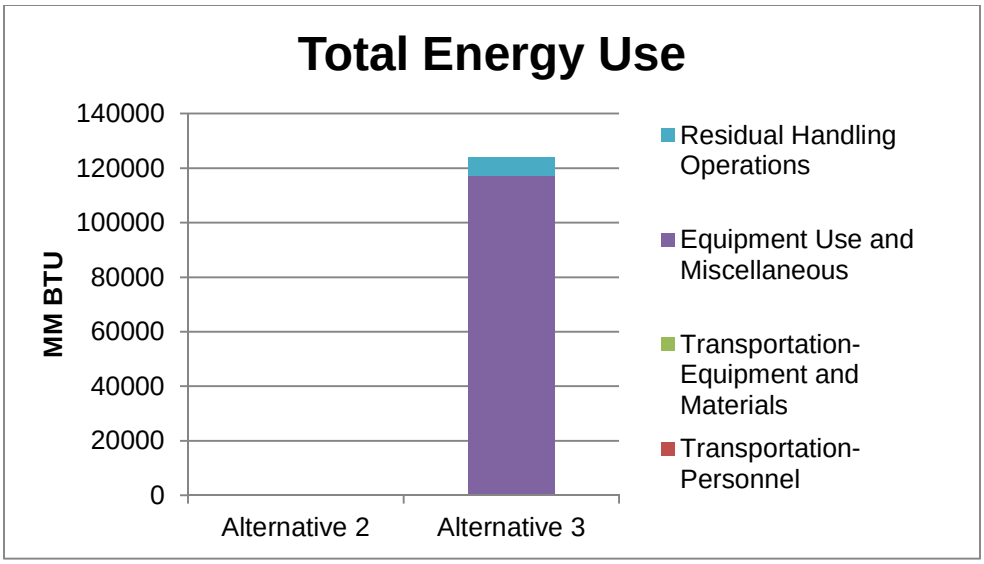


Figure G9: Energy Consumption for Alternatives 2 and 3 at PNS OU8

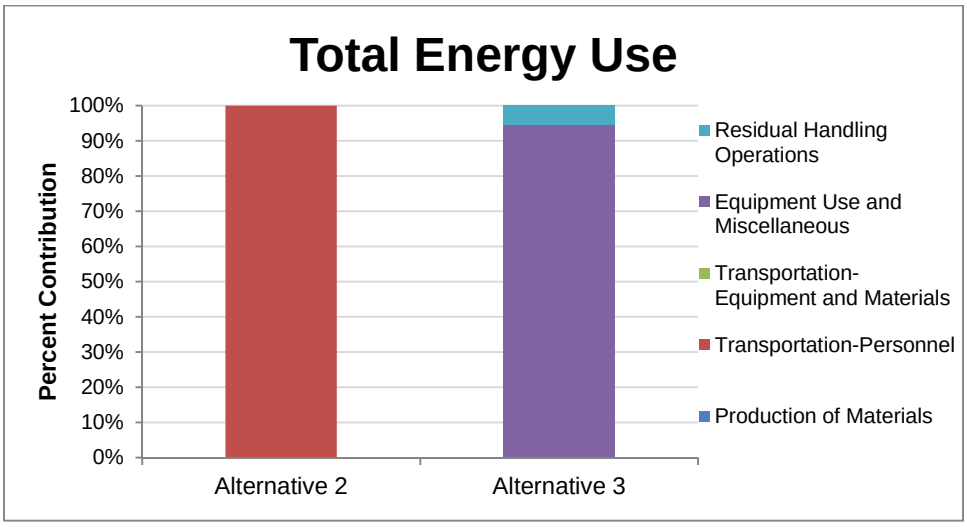


Figure G10: Energy Consumption percentage for Alternatives 2 and 3 at PNS OU8

The total amount of energy consumed by Alternative 2 is 8.63 MMBTU. The only contributor is transportation of personnel.

The total amount of energy consumed by Alternative 3 is 123,785 MMBTU. The activity with the highest energy consumption is the use of equipment and production of materials, utilizing 116,552 MMBTU, corresponding to approximately 94.2 percent of the total energy consumption. The greatest contributors in this category include the production of steel for shoring (70,137 MMBTU and 57.2 percent of the total energy consumption) and the production and handling of backfill (41,836 MMBTU and 34.1 percent of the total

energy consumption). The activity with the third highest energy use is the handling of residuals, where 6,765 MMBTUs are consumed, approximately 5.5 percent of the total energy used during this alternative.

Water Usage

The water consumption of the evaluated alternatives is shown in Figure G11. The x-axis shows the alternatives evaluated and the y-axis shows the amount of water consumed in thousands of gallons. Figure G12 shows the percentage breakdown contribution of the different sectors of the water use through the lifetime of the each of the alternatives.

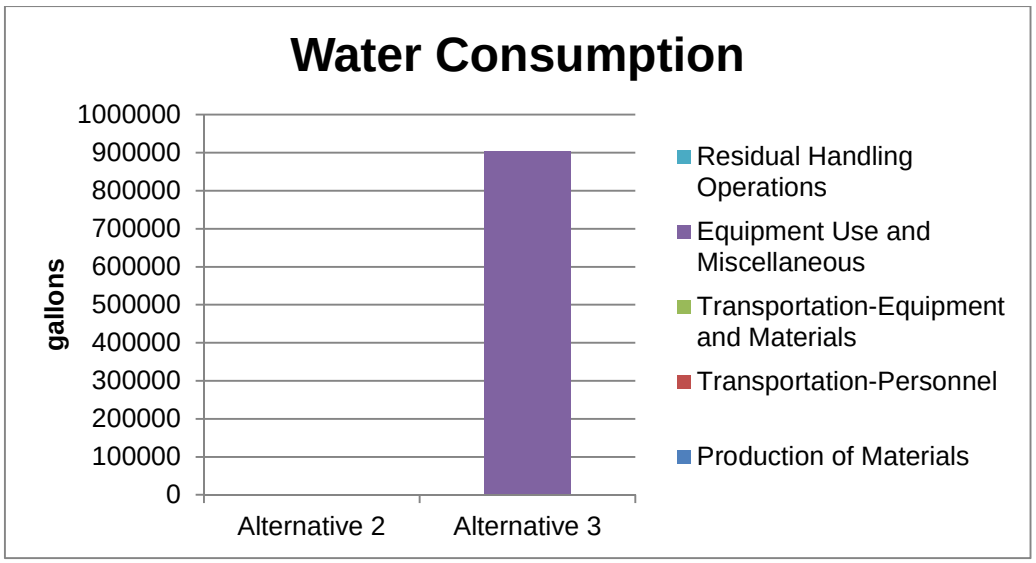


Figure G11: Water Consumption for Alternatives 2 and 3 at PNS OU8

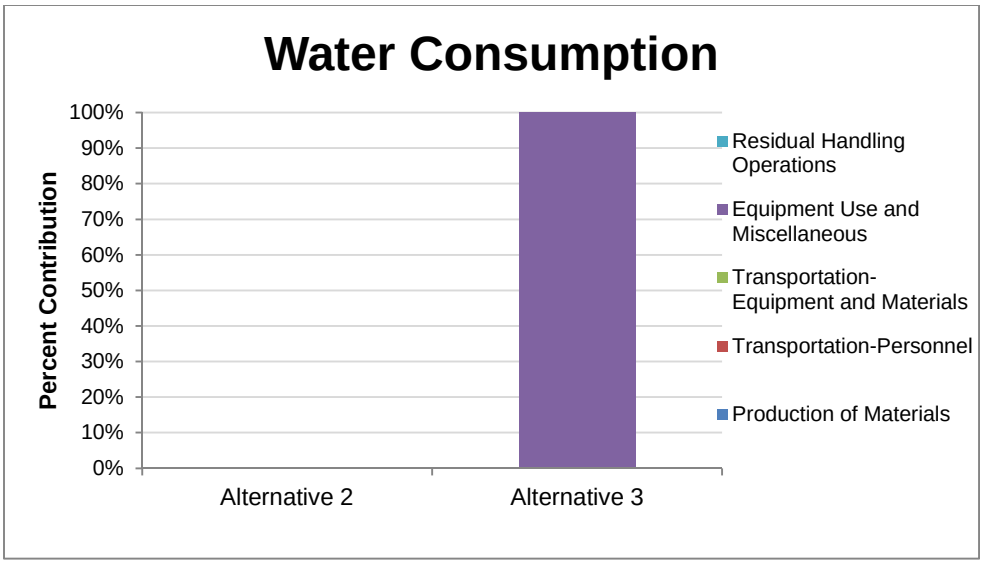


Figure G12: Water Consumption percentage breakdown for Alternatives 2 and 3 at PNS OU8

There is no water consumption associated with Alternative 2.

The total water consumption for Alternative 3 is 903,392.05 gallons of water. All water is consumed in equipment usage, site activities, and materials production, with the largest contributor being the production of steel for shoring and fencing. This activity contributes 875,640 gallons, or 97.0 percent of the total water consumption.

Accident Risk

Accident Risk Fatality

Figure G13 shows the risk of fatality between the evaluated alternatives. The x-axis represents the alternatives evaluated, and the y-axis represents the risk of fatality.

For both alternatives evaluated, the activity with the highest risk of fatality is the transportation of personnel. For Alternative 3, residuals handling also contributes a significant risk, at 43.7 percent compared to 54.7 percent for the transportation of personnel.

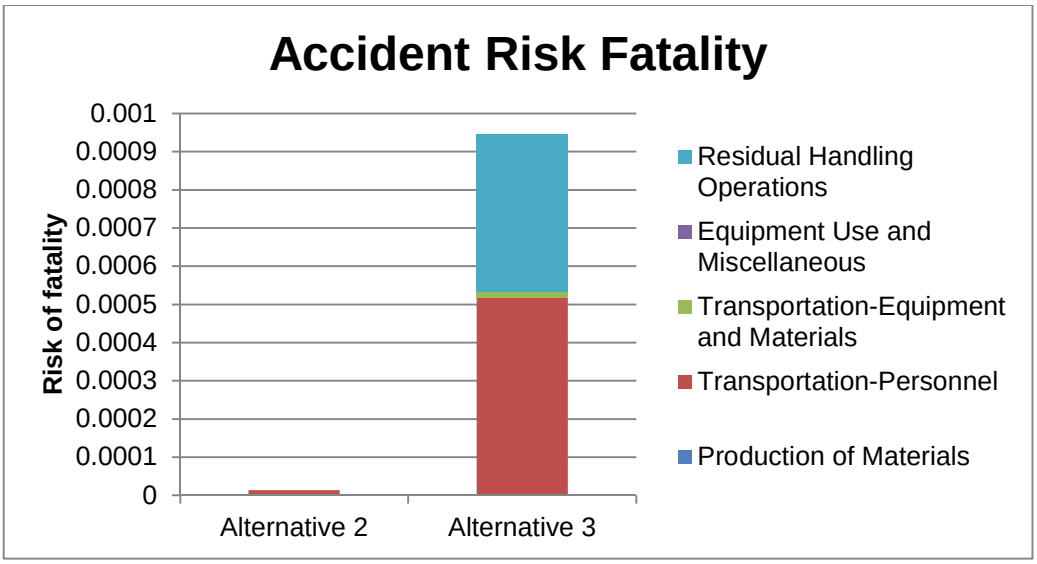


Figure G13 Risk of Fatality for Alternatives 2 and 3 at PNS OU8

Accident Risk Injury

Figure G14 shows the risk of injury between the evaluated alternatives. The x-axis represents the alternatives evaluated, and the y-axis represents the risk of injury.

For both alternatives evaluated, the activity with the highest risk of injury is the transportation of personnel. For Alternative 3, residuals handling also contributes a significant risk, at 43.7 percent compared to 54.7 percent for the transportation of personnel.

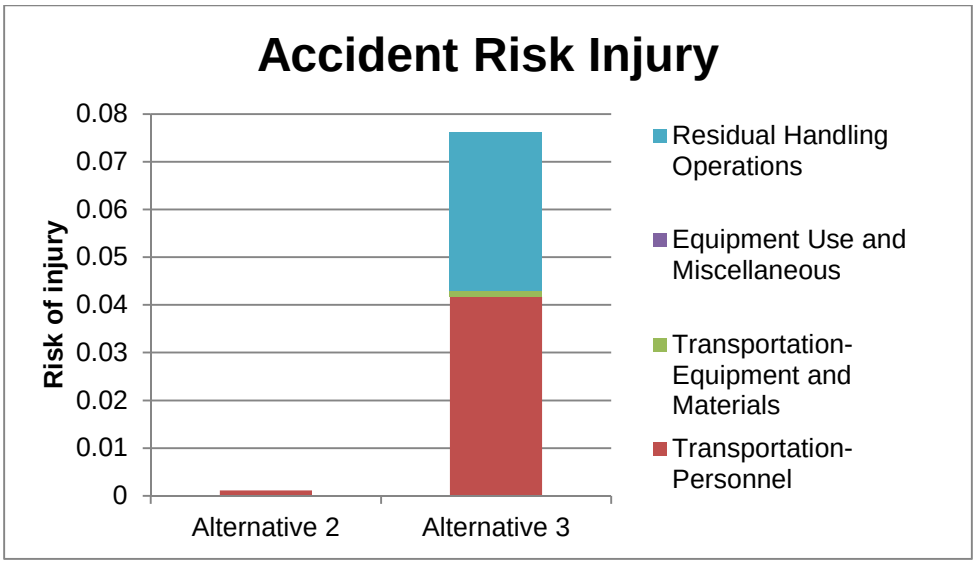


Figure G14 Risk of Injury for Alternatives 2 and 3 at PNS OU8

CONCLUSIONS AND RECOMMENDATIONS

During selection and design of the remedy, a sensitivity analysis considering elements of the remedy that have the greatest impact on remedy effectiveness, life-cycle cost, and environmental footprint metrics may provide additional insight into appropriate optimization. To aid in the sensitivity analysis, an impact analysis summary was created to qualitatively highlight the relative impact of respective metrics for the three alternatives and to identify the primary drivers of emissions, energy consumption, and water usage for each alternative (see Table G2 for details).

Figures G2, G4, G6, G8, G10 and G12 show the percentage breakdown of each of the sectors that take place during the proposed remedial alternatives. In these graphs, it is easy to identify the sector whose contribution is largest from all other sectors to that impact category. Identifying where the large contributions occur optimizes the process for potentially lowering the environmental impacts of each of the phases evaluated. Considering this, the following recommendations could noticeably reduce the environmental footprint of the phases listed below.

- For Alternative 2: Transportation of personnel is the only contributors to all of the impact categories. It is recommended that site personnel travel together when possible to limit the number of cars going to the site, or that LUC inspections be combined with trips to the Shipyard for other reasons.
- For Alternative 3: The production and handling of steel is the largest contributor to most of the impact categories. It is recommended that alternatives be considered for fencing and shoring of the excavated areas, so long as the safety of workers and site personnel is not compromised.
- For Alternative 3: Residuals handling is a secondary contributor that could potentially have a reduced impact if the number of trips to the chosen landfill could be limited, or if a landfill nearer to the site could be used for disposal. The large volume of soil being excavated in Alternative 3 may make it difficult to limit the number of trips for disposal. The impact for this category would also decrease if the water from dewatering operations and decontamination procedures could be discharged safely on site.
- For Alternative 3: Some reduction of the environmental footprint, particularly GHG emissions and energy consumption, could be realized for all phases through the possible use of emission control measures such as alternate fuel sources (e.g. biodiesel), equipment exhaust controls (e.g. diesel), and equipment idle reduction.

<u>REFERENCES</u>

(a) Navy, DoN Guidance for Optimizing Remedy Evaluation, Selection, and Design, March 2010.
(b) Navy, DoN Policy on SiteWise™ Optimization/GSR Tool Usage, email received from Brian Harrison/NAVFAC HQ dated 10 August 2010.

Table G-1
Environmental Footprint Evaluation Results
Operable Unit 8
Portsmouth Naval Shipyard, Kittery, Maine

Alternative	Activities	GHG Emissions	Total Energy Used	Water Impacts	NO_X Emissions	SO_X Emissions	PM_{10} Emissions	Accident Risk Fatality	Accident Risk Injury
		metric ton CO_2e	MMBTU	gallons	metric ton	metric ton	metric ton		
Alternative 2	Materials Production	0.000	0.000	0.000	0.00E+00	0.00E+00	0.00E+00	NA	NA
	Transportation-Personnel	0.686	8.629	NA	2.54E-04	8.94E-06	5.15E-05	1.40E-05	1.13E-03
	Transportation-Equipment	0.000	0.000	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Equipment Use and Misc	0.000	0.000	0.000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Residual Handling	0.000	0.000	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total	0.686	8.629	0.000	0.000	0.000	0.000	0.000	0.001
Alternative 3	Materials Production	0.000	0.000	0.000	0.00E+00	0.00E+00	0.00E+00	NA	NA
	Transportation-Personnel	31.076	391.640	NA	1.24E-02	4.06E-04	2.04E-03	5.18E-04	4.17E-02
	Transportation-Equipment	5.633	77.169	NA	1.82E-03	7.40E-05	1.47E-04	1.50E-05	1.21E-03
	Equipment Use and Misc	1849.098	116551.963	903392.048	5.86E-01	1.21E+00	2.68E+00	0.00E+00	0.00E+00
	Residual Handling	392.856	6764.590	NA	1.34E+00	6.92E-01	3.69E+00	4.13E-04	3.33E-02
	Total	2278.663	123785.362	903392.048	1.942	1.899	6.365	0.001	0.076

Table G-2
Environmental Impact Drivers
Operable Unit 8
Portsmouth Naval Shipyard, Kittery, Maine

Alternatives	GHG Emsissions	Energy Use	Water Consumption	NO_X Emissions	SO_X Emissions	PM_{10} Emissions	Risk of injury	Risk of fatality
Alternative 1	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
	NA	NA	NA	NA	NA	NA	Transportation of Personnel	Transportation of Personnel
Alternative 2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Production of Steel for use in fencing and shoring	Production of Steel for use in fencing and shoring	Production of Steel for use in fencing and shoring	Residuals Handling	Production of Steel for use in fencing and shoring	Residuals Handling	Transportation of Personnel	Transportation of Personnel

0-0.2	low
0.21-0.4	low to moderate
0.4-0.6	moderate
0.61-0.8	moderate to high
0.81-1	high

Input Inventory Alternative 2
Operable Unit 8
Portsmouth Naval Shipyard, Kittery, Maine

Alternative S2: LUCs

RAC			
Materials			
Transportation-Personnel			
Transportation-equipment			
Transportation-materials			
Equipment Use			
Residual Handling			
Transportation-residual handling			
Laboratory Analytical Services			
LTM			
Transportation-Personnel			
Item	Quantity	Units	Comments
Annual Site inspection	1,500	miles	1 visit per year for 30 years, 1 day per visit, 50 miles per day, 1 person
Five-year Review	300	miles	1 visit every 5 years during 30 years, 1 day per visit, 50 miles per year,

Input Inventory Alternative 3
Operable Unit 8
Portsmouth Naval Shipyard, Kittery, Maine

Alternative 3: Limited Excavation and Offsite Disposal and Land Use Controls

RAC			
Materials			
Item	Quantity	Units	Comments
Temporary Equipment Decon Pad Liner	700.47	lb	assume HDPE, Assume 30ftx40ft, 3 mm thick, 0.95 g/cm3
Temporary Equipment Decon Pad Frame	514.68	lb	Assume wood, 4x4 in, (30ftx40ft pad) 140 ft of timber, density for pine 530 kg/m3
Decon water	4,000.00	gal	
stockpile pad lining (LLDPE)	788.72	lbs	
stockpile pad lining (geotextile)	957.56	lbs	
Stockpile pad cushion layer	4,000,000.00	lb	
Fence, 6 ft high chain link	3024	lb	1400 ft, 108 lb per 50 ft long, galvanized steel
Sheetpile shoring	974400	lb	Assume 21,000 feet. 46.4 lbs/ft
backfill, common fill	44511000	lb	14,837 cubic yards, 1.5 ton/cy, 2000 lb/ton
asphalt cover	362,000	lb	Weight = 2500 cu. ft. × 145 pcf = 2827500 lbs.
Transportation-Personnel			
Item	Quantity	Units	Comments
Survey Support Crew transportation	400.00	miles	4 day, 50 miles per day, 2 people
Site Superintendent Transportation	10,000.00	miles	200 days, 50 miles per day, 1 person
Site Health and Safety and QAQC	20,000.00	miles	200 days, 50 miles per day, 2 people
Field officer transportation	10000	miles	200 days, 50 miles per day, 1 person
Site labor	24,000.00	miles	160 days, 50 miles per day, 3 people
Utility clearance	200.00	miles	2 days, 50 miles per day, 2 people
Transportation-equipment			
Item	Quantity	Units	Comments
Decon Water Storage Tank	0.90	ton	6000 gallons capacity, HPDE, 100 miles round trip, 150 lb per 500 gal capacity tank
Clean Water Storage tank	0.60	ton	4000 gallons capacity, HPDE, 100 miles round trip, 150 lb per 500 gal capacity tank
office trailer	10	ton	1 trailers, 10 ton per trailer, 100 miles round trip
storage Trailers	10	ton	1 trailers, 10 ton per trailer, 100 miles round trip
Jersey barrier	360	ton	180 10' barriers, 4,000 pounds, 2 ton, 100 miles round trip
Excavator, 2 cy	20.00	ton	1 excavator, 20 ton per excavator, 100 miles round trip
Pavement Saw, 18 hp	0.14	ton	280 lb per saw, 1 pavement saw, 100 miles round trip
Compactor, 120 hp	20.00	ton	1 compactor, 20 tons per compactor
Sheetpile equipment	40.79	ton	1 piling rig
pump, 20 gpm, 1.5 HP	0.0195	ton	39 lb per pump
Asphalt cutter attachment	0.105	ton	1 A1 Clamp style 18 inch asphalt cutter, 210 lb, 10
Transportation-materials			

Input Inventory Alternative 3
Operable Unit 8
Portsmouth Naval Shipyard, Kittery, Maine

Item	Quantity	Units	Comments
Temporary Equipment Decon Pad Liner	0.35	ton	assume HDPE, Assume 30ftx40ft, 3 mm thick, 0.95 g/cm3
Temporary Equipment Decon Pad Frame	0.26	ton	Assume wood, 4x4 in, (30ftx40ft pad) 140 ft of timber, density for pine 530 kg/m3
stockpile pad lining (LLDPE)	0.39	ton	
stockpile pad lining (geotextile)	0.48	ton	
Stockpile pad cushiojn layer	2,000.00	ton	
Fence, 6 ft high chain link	1.512	ton	108 lb per 50 ft long, galvanized steel
Sheetpile shoring	487.2	ton	Assume 21,000 feet. 46.4 lbs/ft
backfill, common fill	22255.5	ton	14,837 cubic yards, 1.5 ton/cy, 2000 lb/ton
asphalt cover	181	ton	Weight = 2500 cu. ft. × 145 pcf = 2827500 lbs.
Equipment Use			
Item	Quantity	Units	Comments
Excavator, 2 cy	640	hours	100 days. 8 hours per day, 80% utilization
Compactor, 120 hp	256	hours	40 days, 8 hours per day, 80% utilization
Pavement Saw, 18 hp	51.2	hours	8 days, 8 hours per day, 80% utilization
pump, 20 gpm, 1.5 HP	768	hours	160 days, 8 hours per day, 60% utilization
Sheetpile Equipment	12.8	hours	2 days, 8 hours per day, 80% utilization
Residual Handling			
Item	Quantity	Units	Comments
Decon water	16.64	ton	4000 gal, 8.32 ppg, 2000 lb per ton
Disposal of old apshalt	2045	ton	
Disposal of excavated soil	18245	ton	
disposal of water from excavation dewatering	832	ton	200000gal, 8.32 ppg, 2000 lb/ton
Transportation-residual handling			
Item	Quantity	Units	Comments
Decon waste	100.00	miles	
Disposal of old apshalt	100	miles	
Disposal of excavated soil	100.00	miles	
disposal of water from excavation dewatering	100	miles	
Laboratory Analytical Services			
Item	Quantity	Units	Comments
Confirmation samping, lead	14,100.00	dollars	~94 samples, $150 per sample
Waste disposal Characterization	24300	dollars	27 samples, $900 per sample
LTM			
Transportation-Personnel			
Item	Quantity	Units	Comments
Annual Site inspection	1,500	miles	1 visit per year for 30 years, 1 day per visit, 50 miles per day, 1 person
Five-year Review and Cover Repair as needed	300	miles	1 visit every 5 years during 30 years, 1 day per visit, 50 miles per year,

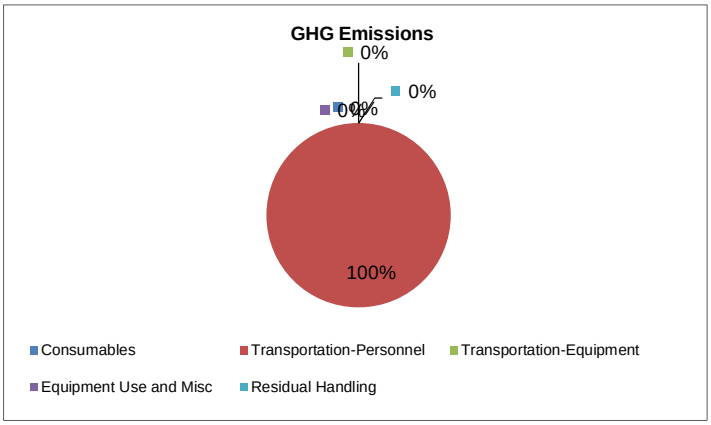
Sustainable Remediation - Environmental Footprint Summary
Alternative 2

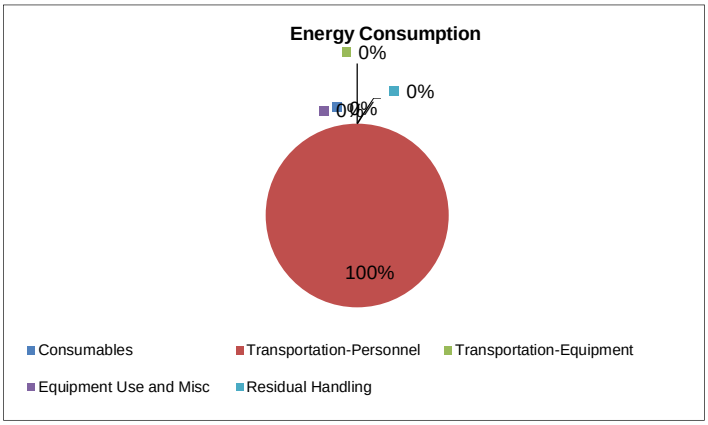
Phase	Activities	GHG Emissions	Total energy Used	Water Consumption	NOx emissions	SOx Emissions	PM10 Emissions	Accident Risk Fatality	Accident Risk Injury
		metric ton	MMBTU	gallons	metric ton	metric ton	metric ton		
Remedial Investigation	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Remedial Action Construction	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Remedial Action Operations	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Longterm Monitoring	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	0.69	8.6E+00	NA	2.5E-04	8.9E-06	5.1E-05	1.4E-05	1.1E-03
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.69	8.63E+00	0.00E+00	2.54E-04	8.94E-06	5.15E-05	1.40E-05	1.13E-03
Total		**6.9E-01**	**8.6E+00**	**0.0E+00**	**2.5E-04**	**8.9E-06**	**5.1E-05**	**1.4E-05**	**1.1E-03**

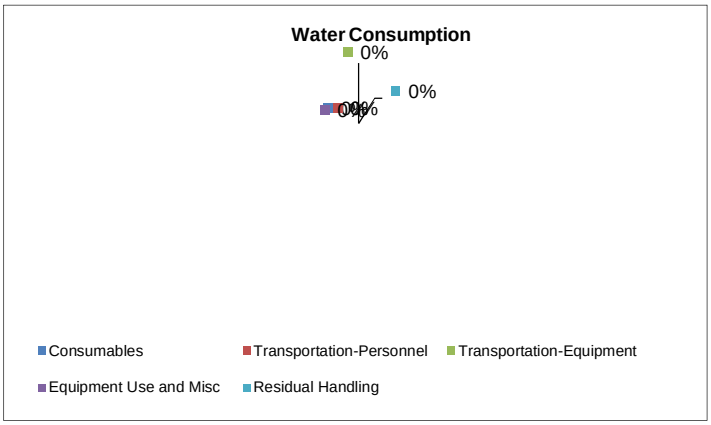
Remedial Alternative Phase	Non-Hazardous Waste Landfill Space	Hazardous Waste Landfill Space	Topsoil Consumption	Costing	Lost Hours - Injury
	tons	tons	cubic yards	$	
Remedial Investigation	0.0E+00	0.0E+00	0.0E+00	0	0.0E+00
Remedial Action Construction	0.0E+00	0.0E+00	0.0E+00	0	0.0E+00
Remedial Action Operations	0.0E+00	0.0E+00	0.0E+00	0	0.0E+00
Longterm Monitoring	0.0E+00	0.0E+00	0.0E+00	0	9.0E-03
Total	**0.0E+00**	**0.0E+00**	**0.0E+00**	**$0**	**9.0E-03**

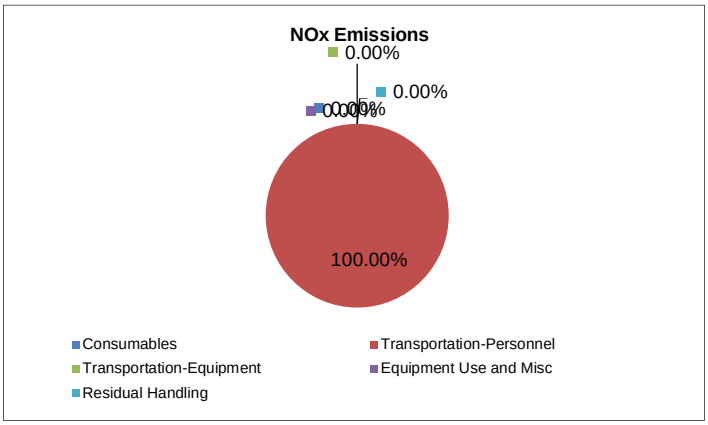
Total Cost with Footprint Reduction
$0

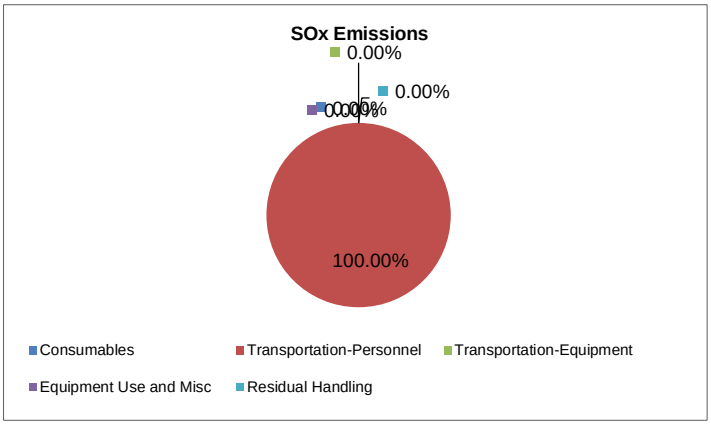
SiteWise™ Results Alternative XX
Residual Action Construction Stage
Site, Place
City, State

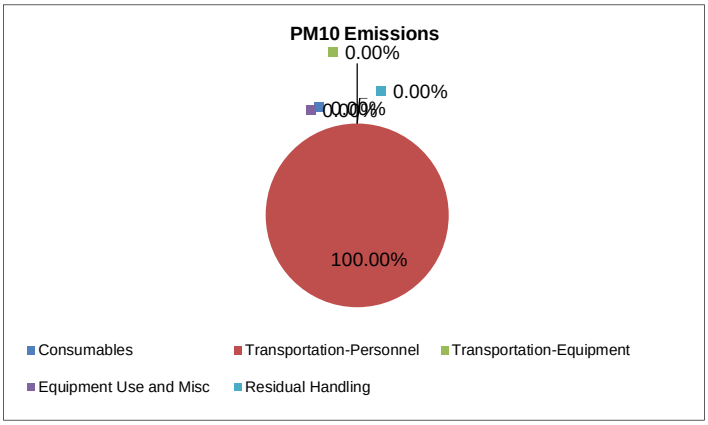


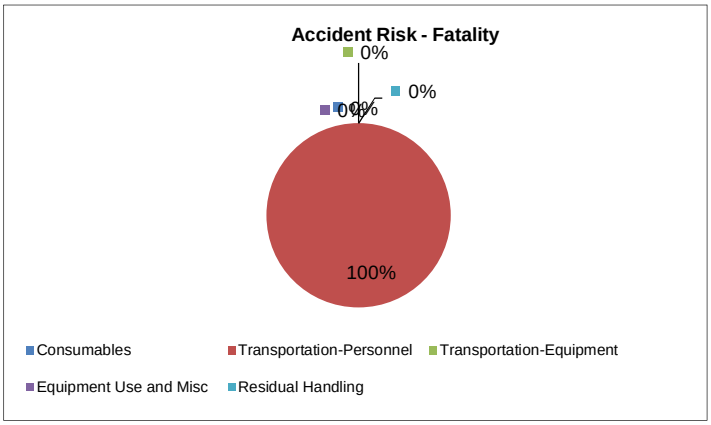


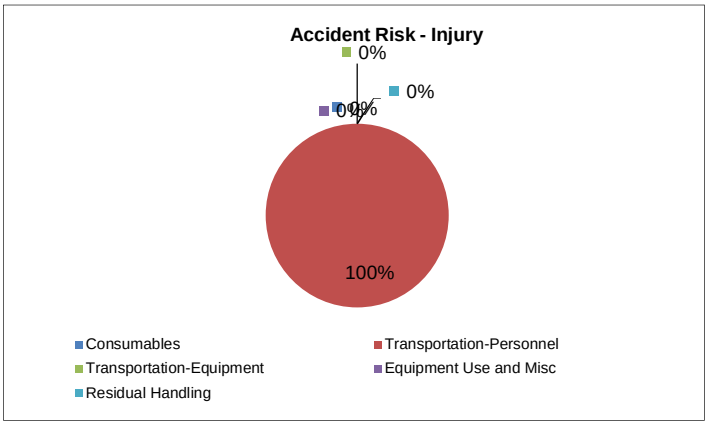


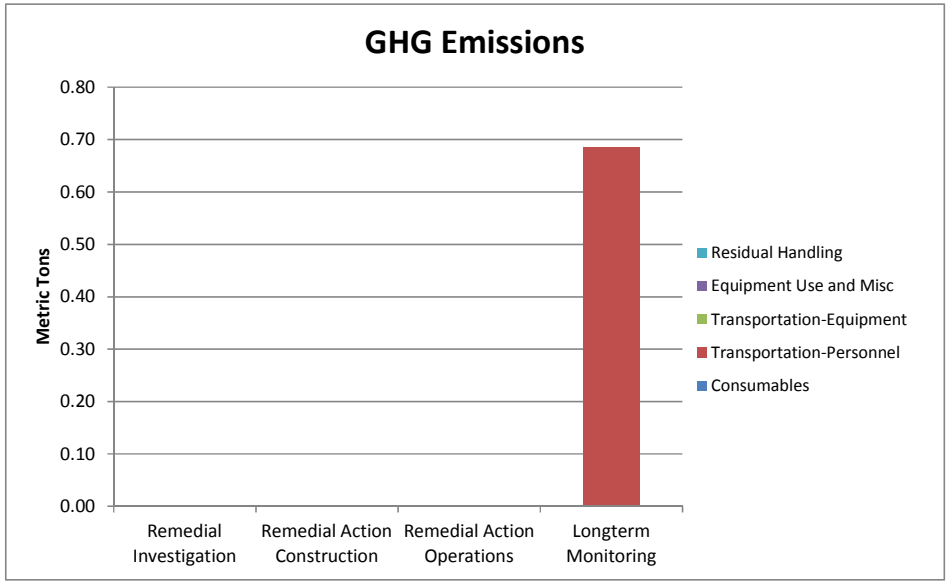


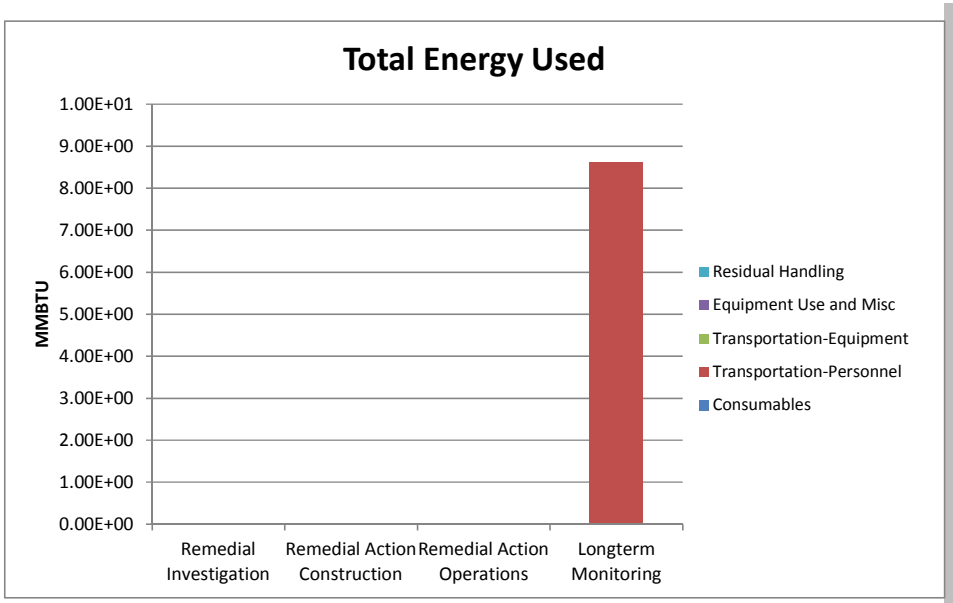


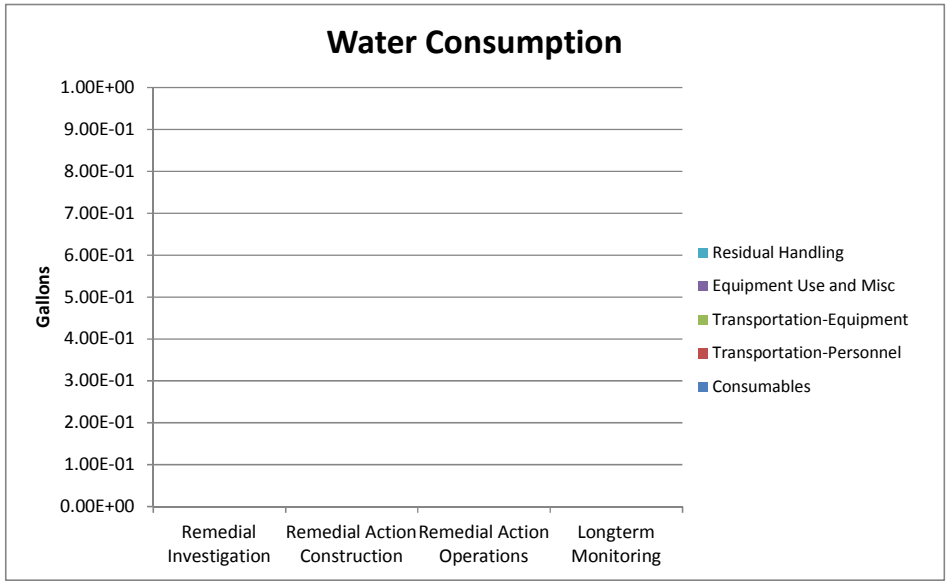


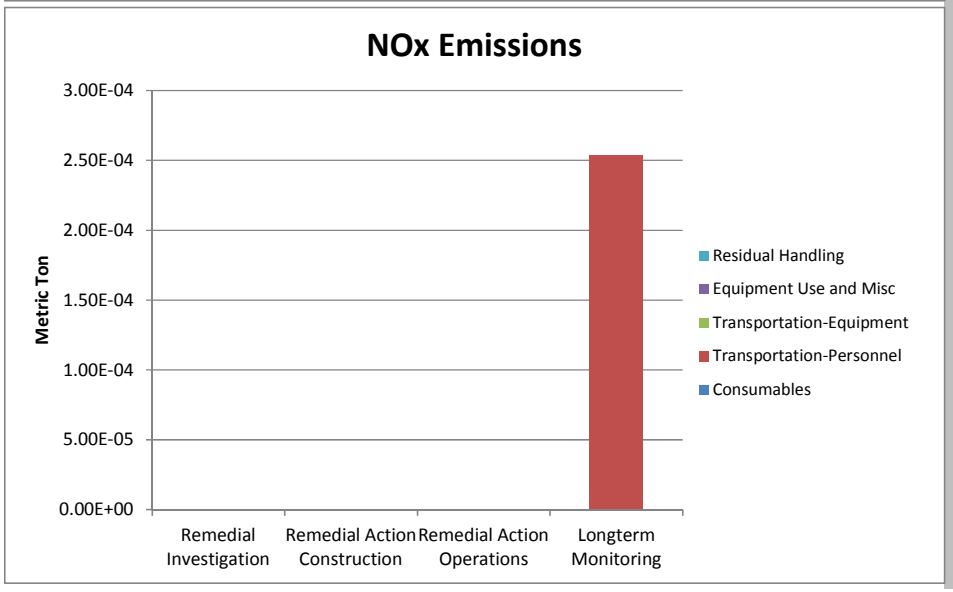


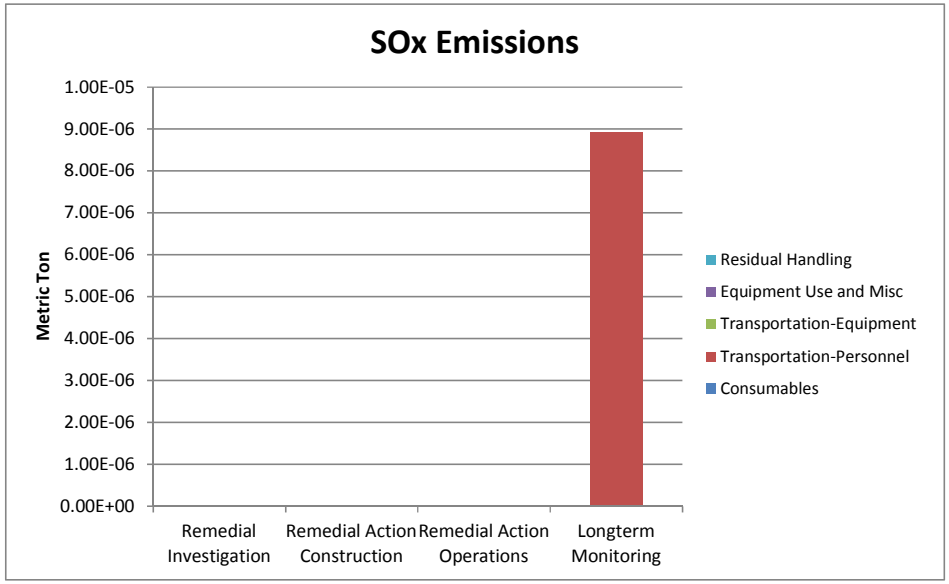


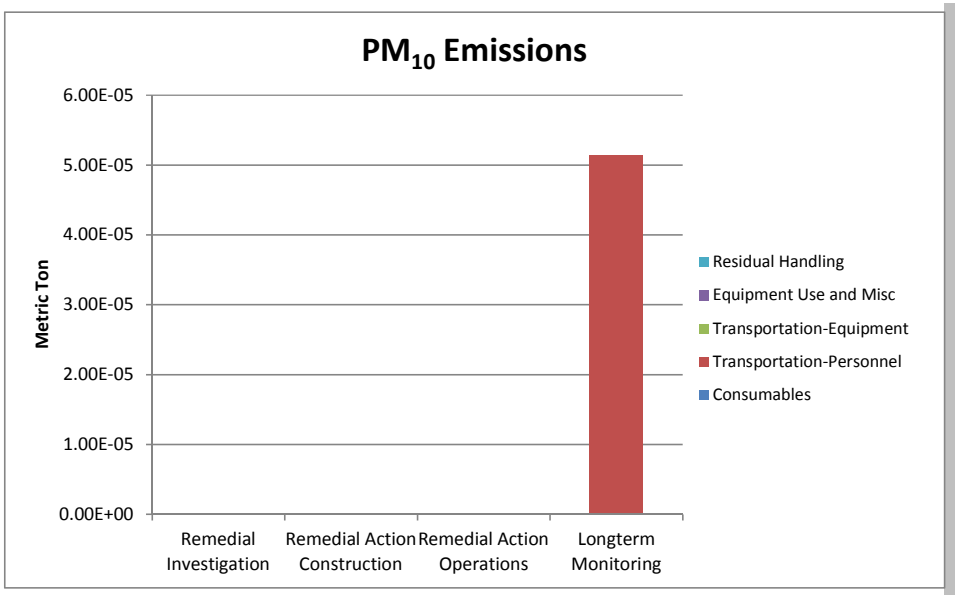

GHG Emissions
Metric Tons
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

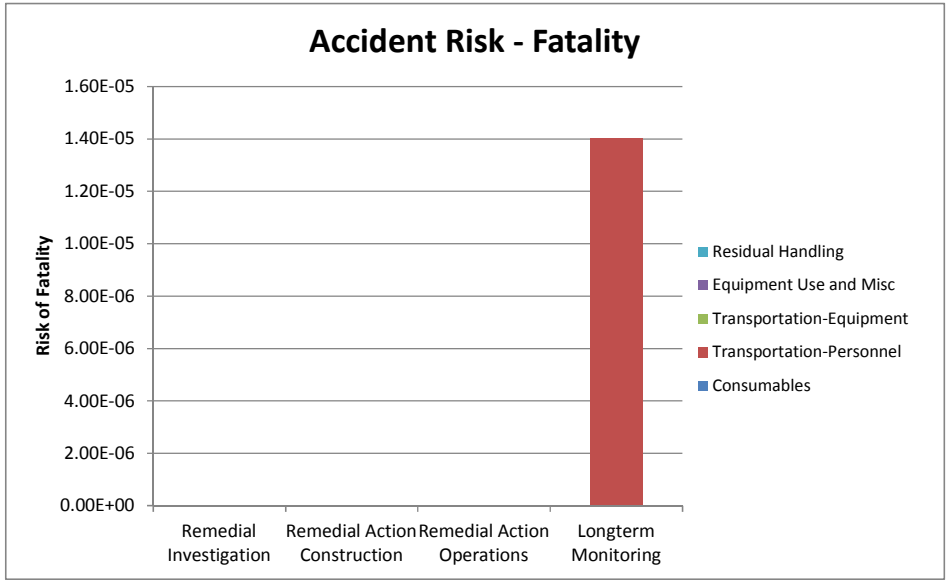

Total Energy Used
MMBTU
1.00E+01
9.00E+00
8.00E+00
7.00E+00
6.00E+00
5.00E+00
4.00E+00
3.00E+00
2.00E+00
1.00E+00
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

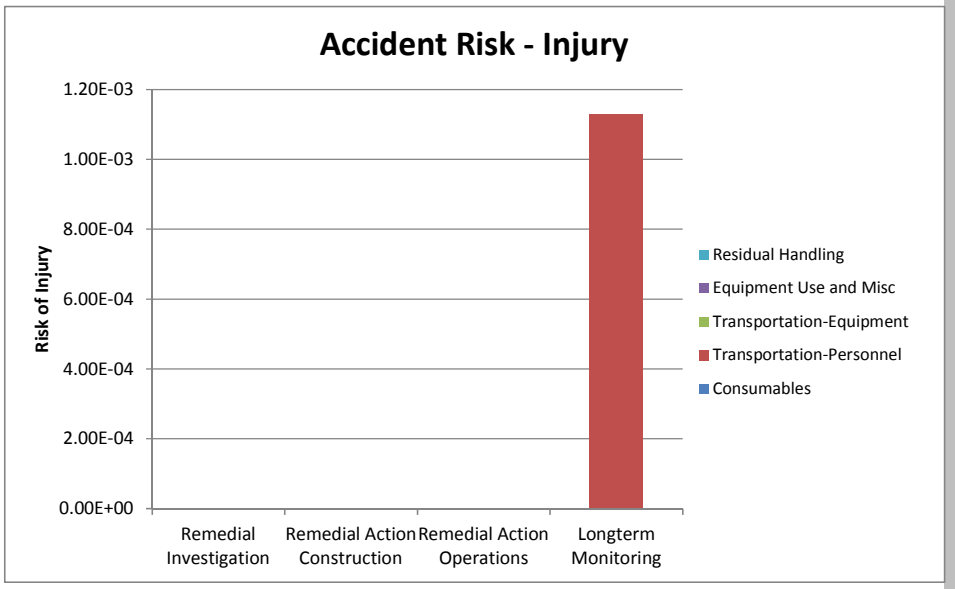

Water Consumption
Gallons
1.00E+00
9.00E-01
8.00E-01
7.00E-01
6.00E-01
5.00E-01
4.00E-01
3.00E-01
2.00E-01
1.00E-01
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


NOx Emissions
Metric Ton
3.00E-04
2.50E-04
2.00E-04
1.50E-04
1.00E-04
5.00E-05
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


SOx Emissions
Metric Ton
1.00E-05
9.00E-06
8.00E-06
7.00E-06
6.00E-06
5.00E-06
4.00E-06
3.00E-06
2.00E-06
1.00E-06
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


PM10 Emissions
Metric Ton
6.00E-05
5.00E-05
4.00E-05
3.00E-05
2.00E-05
1.00E-05
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Accident Risk - Fatality
Risk of Fatality
1.60E-05
1.40E-05
1.20E-05
1.00E-05
8.00E-06
6.00E-06
4.00E-06
2.00E-06
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

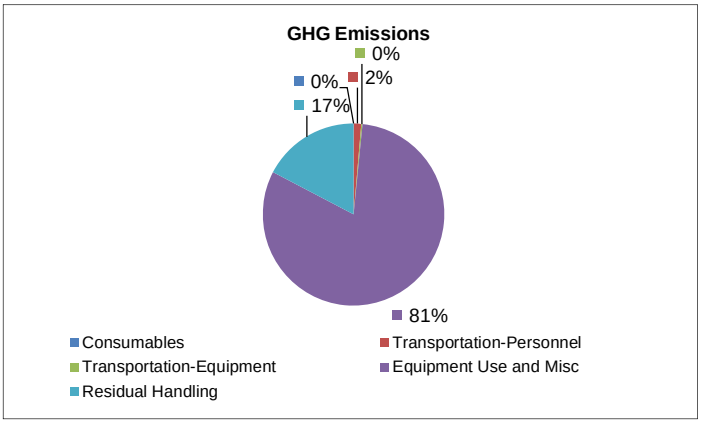

Accident Risk - Injury
Risk of Injury
1.20E-03
1.00E-03
8.00E-04
6.00E-04
4.00E-04
2.00E-04
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

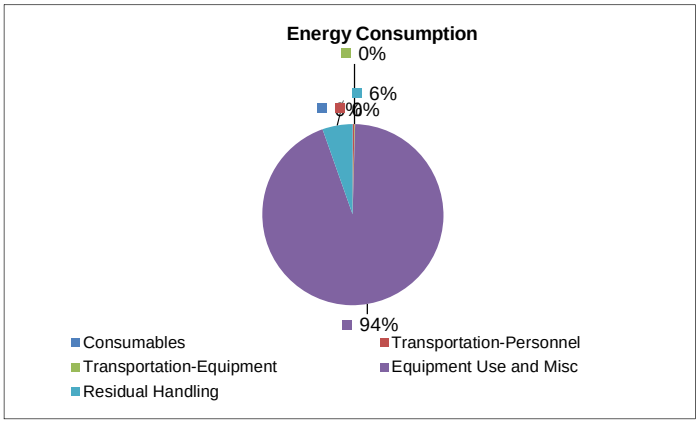
Sustainable Remediation - Environmental Footprint Summary
Alternative 3

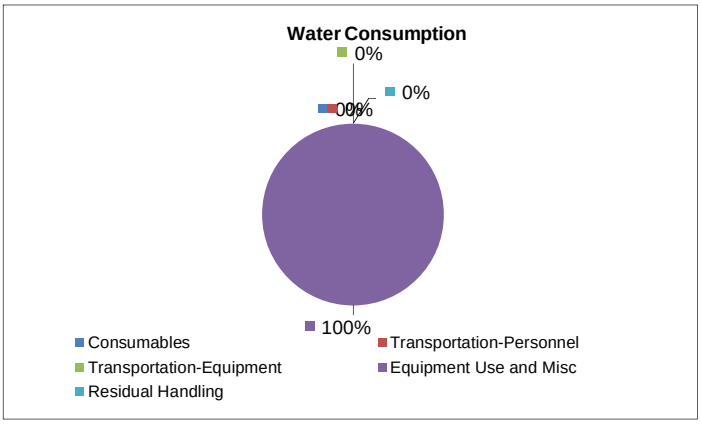
Phase	Activities	GHG Emissions	Total energy Used	Water Consumption	NOx emissions	SOx Emissions	PM10 Emissions	Accident Risk Fatality	Accident Risk Injury
		metric ton	MMBTU	gallons	metric ton	metric ton	metric ton		
Remedial Investigation	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Remedial Action Construction	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	30.39	3.8E+02	NA	1.2E-02	4.0E-04	2.0E-03	5.0E-04	4.1E-02
	Transportation-Equipment	5.63	7.7E+01	NA	1.8E-03	7.4E-05	1.5E-04	1.5E-05	1.2E-03
	Equipment Use and Misc	1,849.10	1.2E+05	9.0E+05	5.9E-01	1.2E+00	2.7E+00	0.0E+00	0.0E+00
	Residual Handling	392.86	6.8E+03	NA	1.3E+00	6.9E-01	3.7E+00	4.1E-04	3.3E-02
	Sub-Total	2,277.98	1.24E+05	9.03E+05	1.94E+00	1.90E+00	6.36E+00	9.32E-04	7.50E-02
Remedial Action Operations	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Longterm Monitoring	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	0.69	8.6E+00	NA	2.5E-04	8.9E-06	5.1E-05	1.4E-05	1.1E-03
	Transportation-Equipment	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.69	8.63E+00	0.00E+00	2.54E-04	8.94E-06	5.15E-05	1.40E-05	1.13E-03
Total		**2.3E+03**	**1.2E+05**	**9.0E+05**	**1.9E+00**	**1.9E+00**	**6.4E+00**	**9.5E-04**	**7.6E-02**

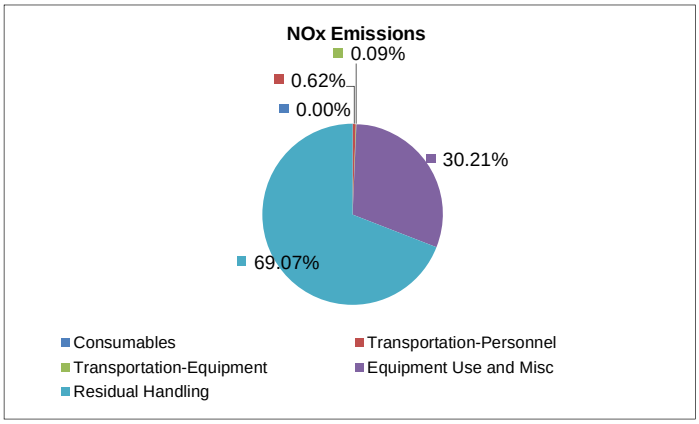
Remedial Alternative Phase	Non-Hazardous Waste Landfill Space	Hazardous Waste Landfill Space	Topsoil Consumption	Costing	Lost Hours - Injury
	tons	tons	cubic yards	$	
Remedial Investigation	0.0E+00	0.0E+00	0.0E+00	0	0.0E+00
Remedial Action Construction	2.0E+04	0.0E+00	0.0E+00	0	6.0E-01
Remedial Action Operations	0.0E+00	0.0E+00	0.0E+00	0	0.0E+00
Longterm Monitoring	0.0E+00	0.0E+00	0.0E+00	0	9.0E-03
Total	**2.0E+04**	**0.0E+00**	**0.0E+00**	**$0**	**6.1E-01**

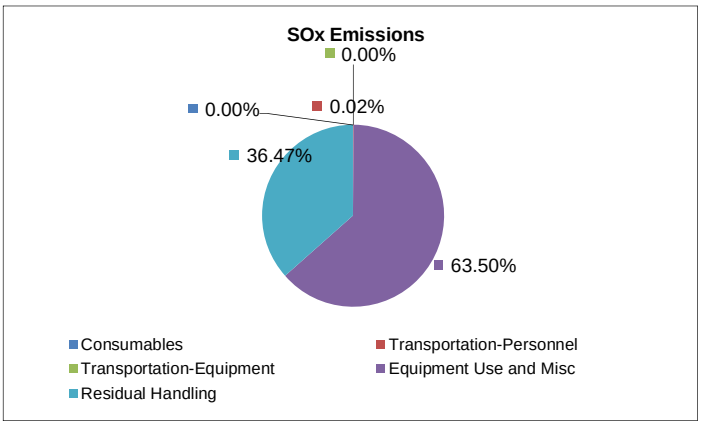
Total Cost with Footprint Reduction
$0

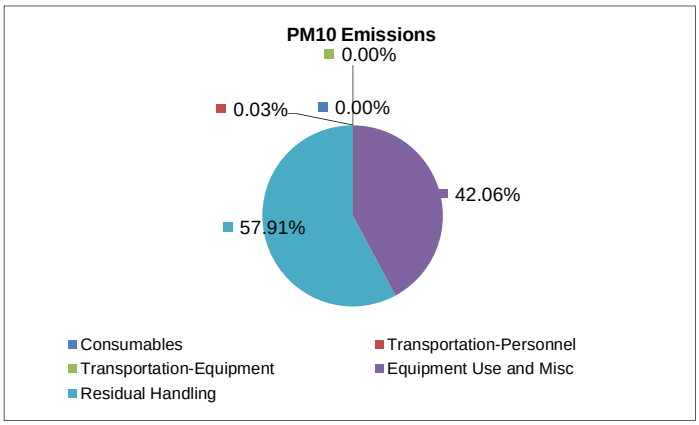

GHG Emissions
0%
2%
0%
17%
81%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

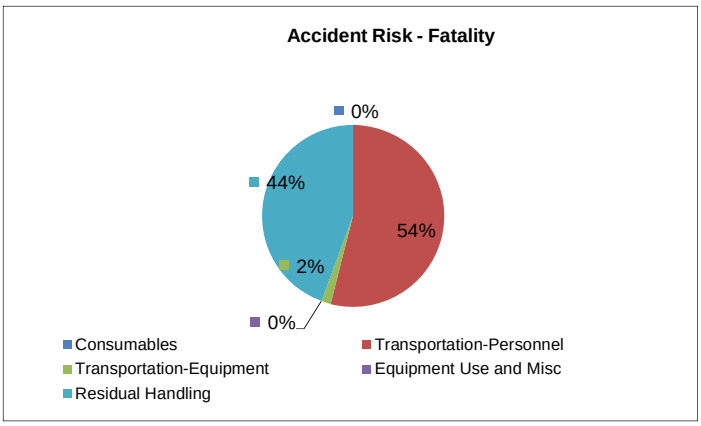

Energy Consumption
0%
6%
94%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

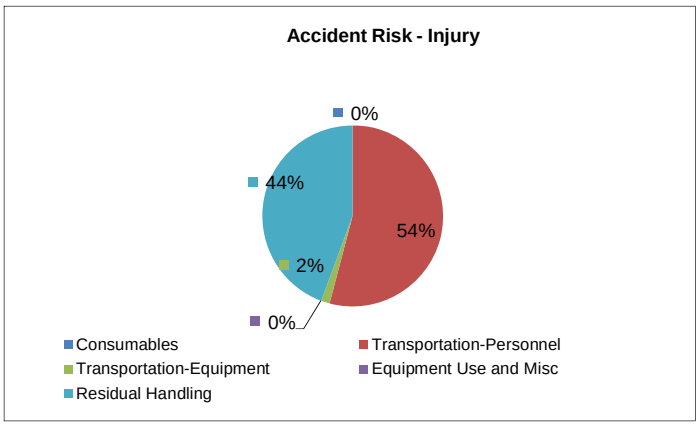

Water Consumption
0%
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


NOx Emissions
0.09%
0.62%
0.00%
30.21%
69.07%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

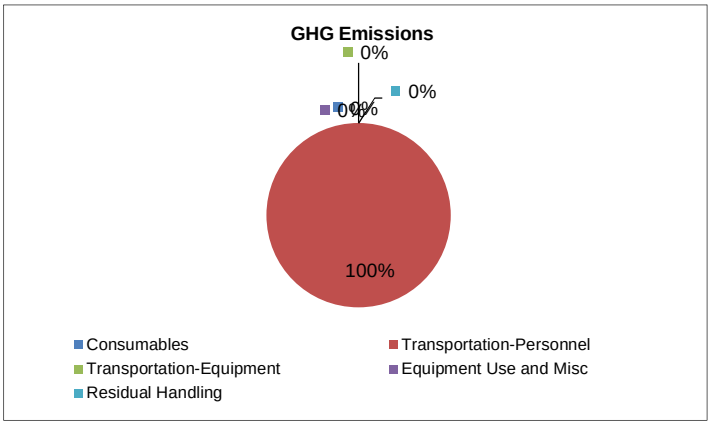

SOx Emissions
0.00%
0.00%
0.02%
36.47%
63.50%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

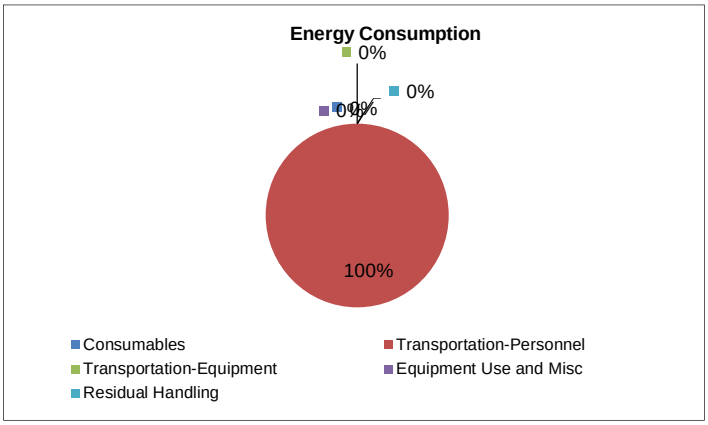

PM10 Emissions
0.00%
0.03%
0.00%
42.06%
57.91%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

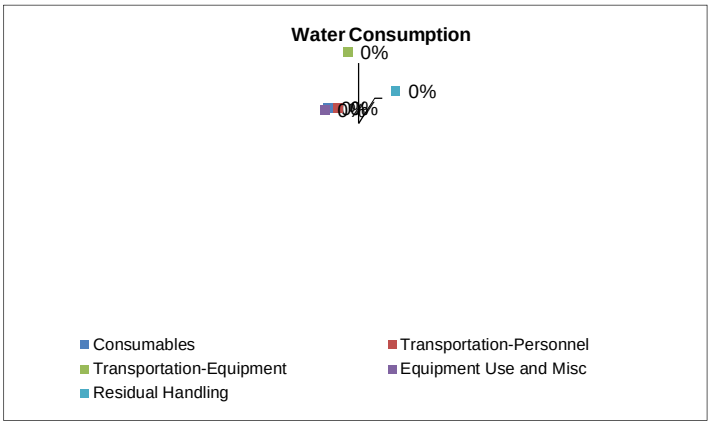

Accident Risk - Fatality
0%
44%
54%
2%
0%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

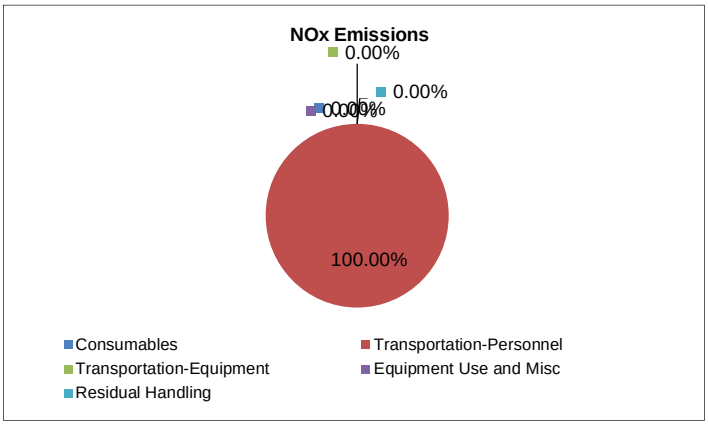

Accident Risk - Injury
0%
44%
54%
2%
0%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

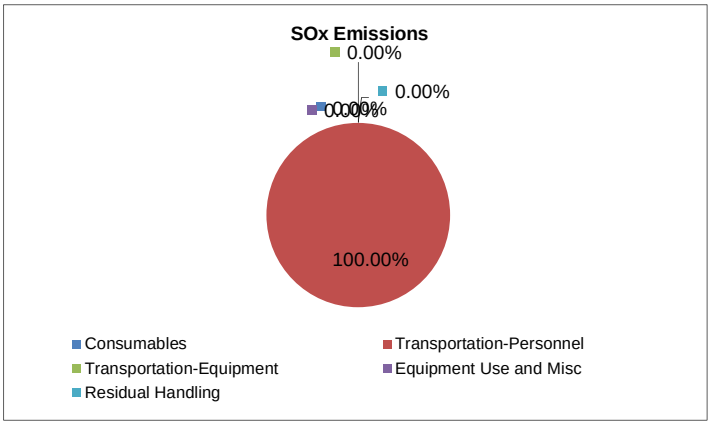
SiteWise™ Results Alternative XX
Residual Action Construction Stage
Site, Place
City, State

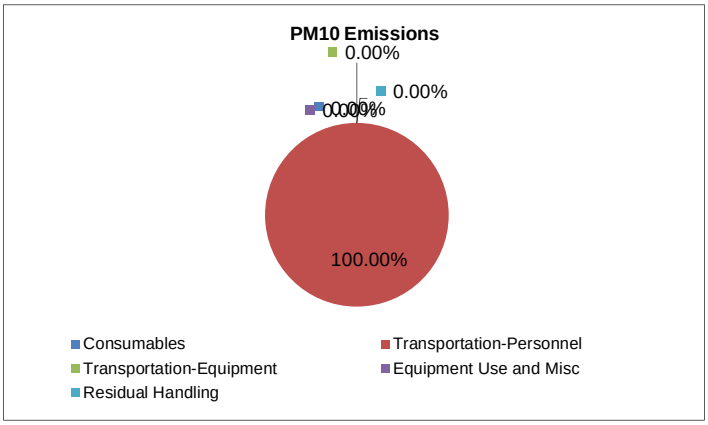


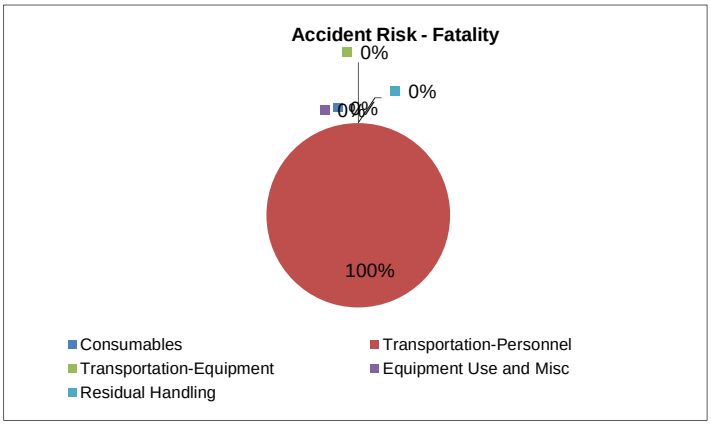


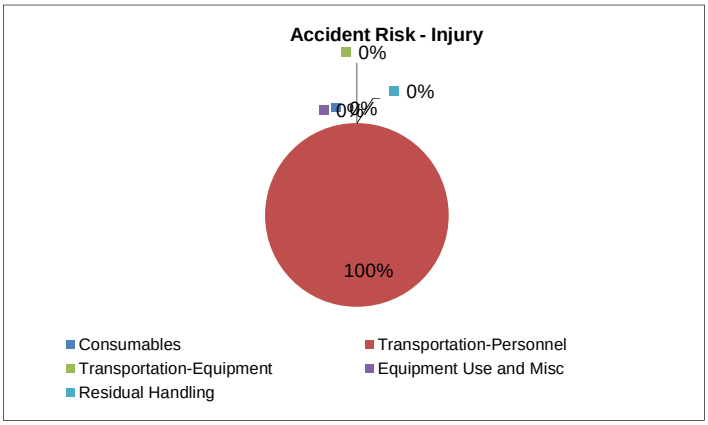


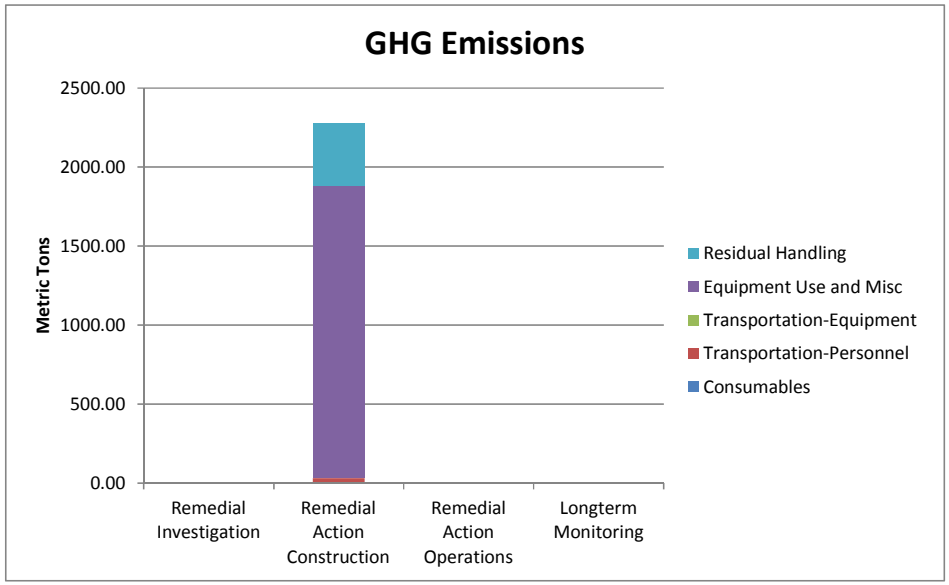


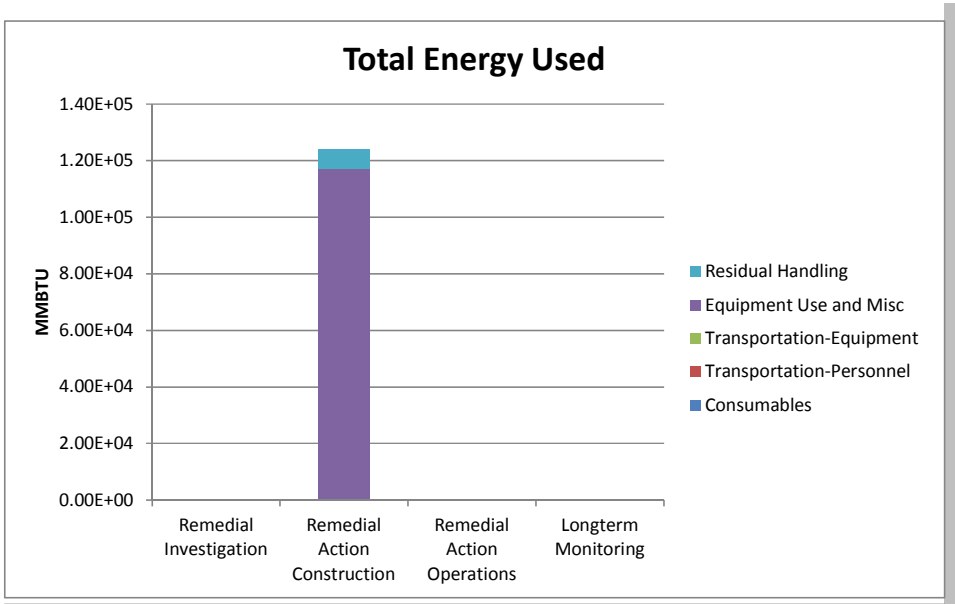


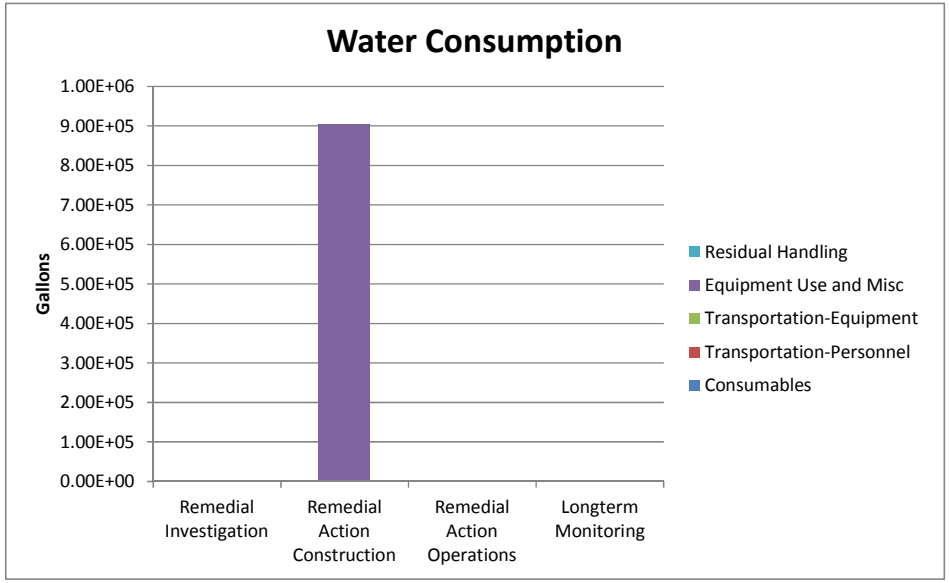


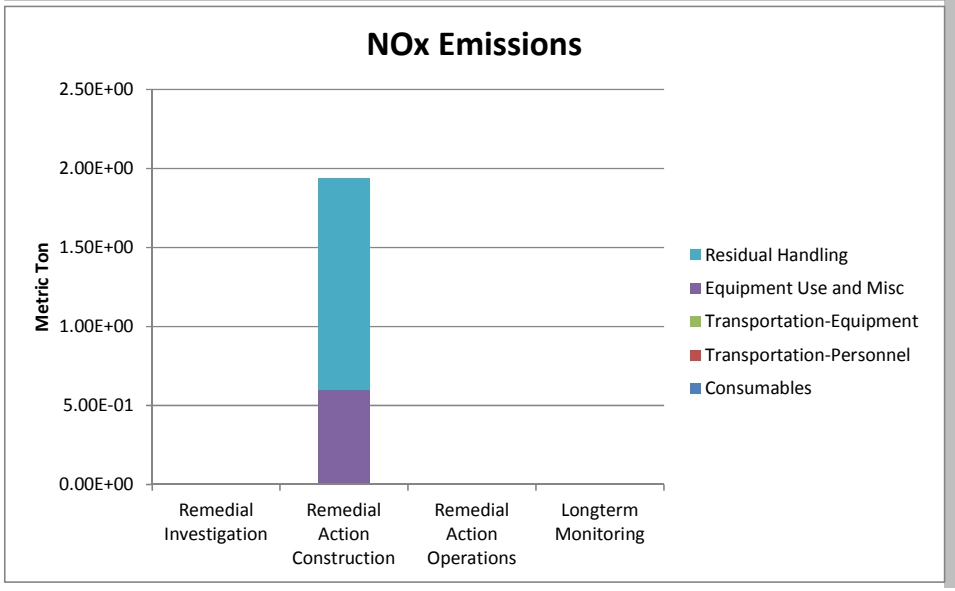


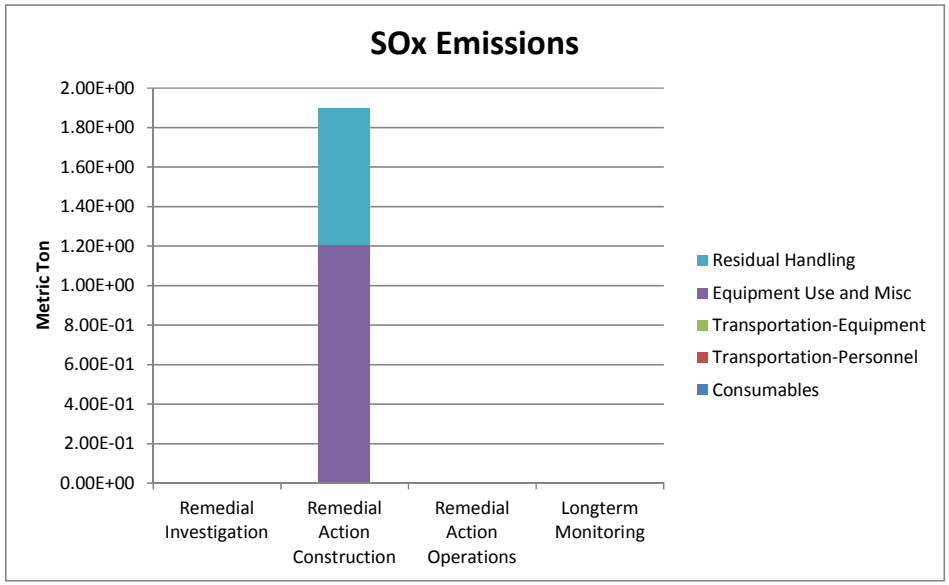


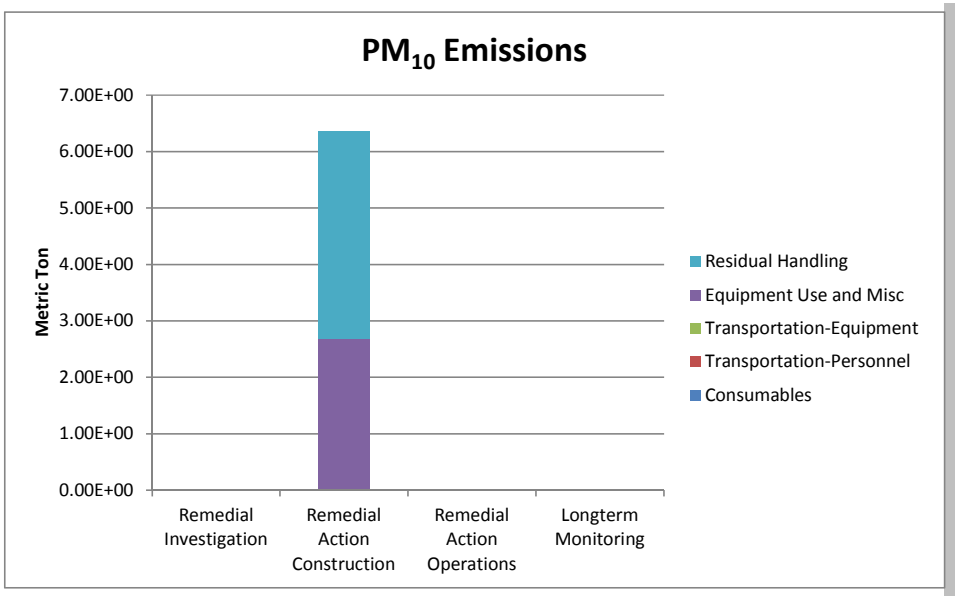

GHG Emissions
Metric Tons
2500.00
2000.00
1500.00
1000.00
500.00
0.00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

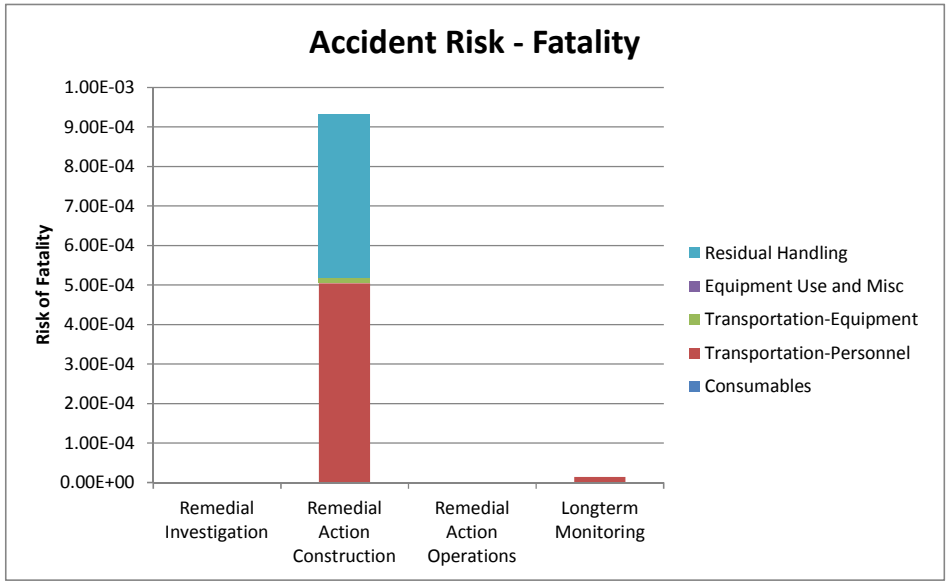

Total Energy Used
MMBTU
1.40E+05
1.20E+05
1.00E+05
8.00E+04
6.00E+04
4.00E+04
2.00E+04
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

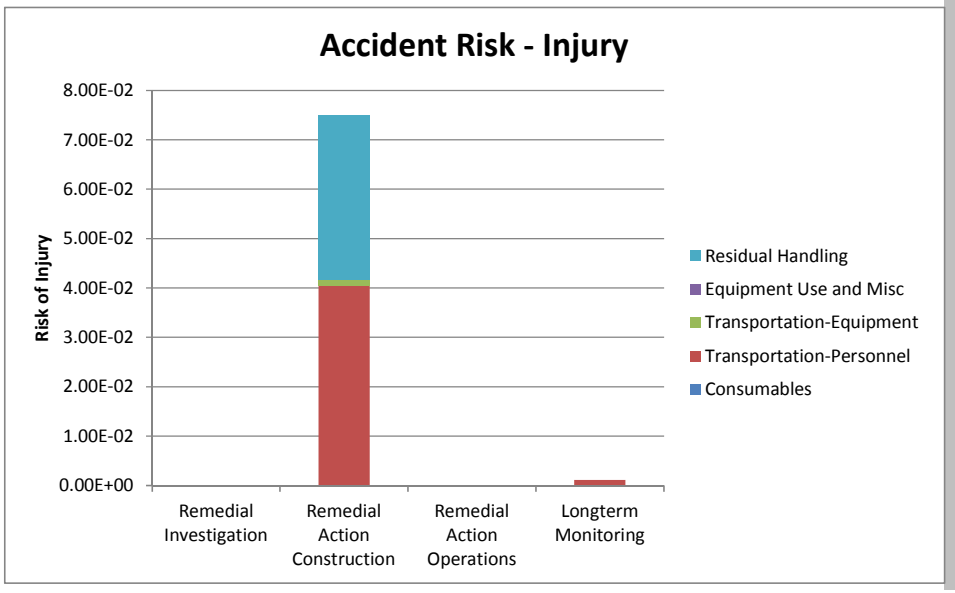

Water Consumption
Gallons
1.00E+06
9.00E+05
8.00E+05
7.00E+05
6.00E+05
5.00E+05
4.00E+05
3.00E+05
2.00E+05
1.00E+05
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


NOx Emissions
Metric Ton
2.50E+00
2.00E+00
1.50E+00
1.00E+00
5.00E-01
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


SOx Emissions
Metric Ton
2.00E+00
1.80E+00
1.60E+00
1.40E+00
1.20E+00
1.00E+00
8.00E-01
6.00E-01
4.00E-01
2.00E-01
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


PM10 Emissions
Metric Ton
7.00E+00
6.00E+00
5.00E+00
4.00E+00
3.00E+00
2.00E+00
1.00E+00
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Accident Risk - Fatality
Risk of Fatality
1.00E-03
9.00E-04
8.00E-04
7.00E-04
6.00E-04
5.00E-04
4.00E-04
3.00E-04
2.00E-04
1.00E-04
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Accident Risk - Injury
Risk of Injury
8.00E-02
7.00E-02
6.00E-02
5.00E-02
4.00E-02
3.00E-02
2.00E-02
1.00E-02
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

GSRx Results Alternative 3
Operable Unit 8
Portsmouth Naval Shipyard, Kittery, Maine

Stage	Technology Module / Phase	Module Components	Comments / Assumptions	Quantity	(Units)	Greenhouse Gas Emissions CO_2e	CO_2	N_20	CH_4	Criteria Pollutant Emission NO_x	SO_x	PM_{10}	Energy Consumption	Water Consumption
	Materials								**Tonnes**				**MWhr**	**gal x 1000**
RAC	Equipment Decon Pad Liner	HDPE	assume HDPE, Assume 30ftx40ft, 3 mm thick, 0.95 g/cm3	700.47	lbs	1.56	0.83	0.00	0.01	0.00	0.00	0.00	9.17	0.25
RAC	Equipment Decon Pad Frame	Wood	Assume wood, 4x4 in, (30ftx40ft pad) 140 ft of timber, density for pine 530 kg/m3	514.68	lbs	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00
RAC	stockpile pad lining	LDPE	Assume LDPE, 50000 sf, 2.50 mm thickness, 0.939 g/cm3 density	788.72	lbs	0.68	0.68	0.00	0.00	0.00	0.00	0.00	43.14	0.00
RAC	stockpile pad lining	HDPE	assume HDPE, Assume 50000ft2, 3 mm thick, 0.95 g/cm3	957.56	lbs	2.14	1.13	0.00	0.01	0.00	0.00	0.00	12.53	0.34
RAC	stockpile pad cushion	Gravel		4,000,000.00	lbs	30.84	30.84	0.00	0.00	0.00	0.00	0.00	735.06	0.00
RAC	fence	Steel	1400 ft, 108 lb per 50 ft long, galvanized steel	3,024.00	lbs	3.85	3.70	0.00	0.00	0.00	0.00	0.00	63.79	2.72
RAC	sheetpile shoring	Steel	Assume 21,000 feet. 46.4 lbs/ft	974,400.00	lbs	1241.66	1193.14	0.13	0.35	0.00	1.02	0.00	20556.13	875.64
RAC	backfill	Soil	14,837 cubic yards, 1.5 ton/cy, 2000 lb/ton	44,511,000.00	lbs	464.29	464.29	0.00	0.00	0.00	0.00	0.00	12269.33	0.00
RAC	Asphalt cover	Asphalt	Weight = 2500 cu. ft. × 145 pcf = 2827500 lbs./2000 lb/ton	362,000	lbs	3.69	3.04	0.00	0.00	0.00	0.00	2.63	16.42	0.00
	Subtotal					**1748.71**	**1697.65**	**0.14**	**0.37**	**0.00**	**1.03**	**2.63**	**33705.57**	**878.95**
	Construction Equipment								**Tonnes**				**MWhr**	**gal x 1000**
RAC	Excavator	Excavator, Hydraulic, 2 CY (diesel)	100 days. 8 hours per day, 80% utilization	640	hrs	62.03	62.03	0.00	0.00	0.39	0.12	0.04	281.57	
RAC	Compactor, 120 hp	Compactor 120 hp	40 days, 8 hours per day, 80% utilization	256	hrs	10.23	10.23	0.00	0.00	0.08	0.00	0.01	47.30	
RAC	pavement saw	Excavator, Hydraulic, 2 CY (diesel)	8 days, 8 hours per day, 80% utilization	51.2	hrs	4.96	4.96	0.00	0.00	0.03	0.01	0.00	22.53	
RAC	Sheetpile equipment	Hydraulic hammer with excavator (25 hp diesel)	2 days, 8 hours per day, 80% utilization	12.8	hrs	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.74	
	Subtotal					**77.32**	**77.32**	**0.00**	**0.00**	**0.51**	**0.12**	**0.05**	**352.14**	**0**
	Operating Consumption						**Tonnes**						**MWhr**	**gal x 1000**
	Input Into Sitewise													0
						0	**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0**	**0**
				Total		**1,826**	**1,775**	**0.14**	**0.37**	**0.51**	**1.15**	**2.68**	**34,058**	**879**

Alternative 1
Values Input into SiteWise as "Other"

Module	Greenhouse Gas Emissions CO_2e	CO_2	N_20 (CO_2e)	CH_4 (CO_2e)	Criteria Pollutant Emission NO_x	SO_x	PM_{10}	Energy Consumption	Water Consumption
				Tonnes				**MMBTU**	**gal**
RI	-	-	-	-	-	-	-	-	-
RAC	1,826.03	1,774.97	43.31	7.76	0.51	1.15	2.68	116,204.90	878,953.93
RAO	-	-	-	-	-	-	-	-	-
LTM	-	-	-	-	-	-	-	-	-

Note: 1 MWhr = 3412141.4799 BTU, 1MMTBU = 10^6 BTU

OTHER KNOWN ONSITE ACTIVITIES	RI	RAC	RAO	LTM
Input energy usage (MMBTU)	0.0E+00	1.2E+05	0.0E+00	0.0E+00
Water consumption (gallon)	0.0E+00	8.8E+05	0.0E+00	0.0E+00
Input CO_2 emission (metric ton)	0.0E+00	1.8E+03	0.0E+00	0.0E+00
Input N_2O emission (metric ton CO_2 e)	0.0E+00	4.3E+01	0.0E+00	0.0E+00
Input CH_4 emissions (metric ton CO_2 e)	0.0E+00	7.8E+00	0.0E+00	0.0E+00
Input NOx emission (metric ton)	0.0E+00	5.1E-01	0.0E+00	0.0E+00
Input SOx emission (metric ton)	0.0E+00	1.2E+00	0.0E+00	0.0E+00
Input PM_{10} emission (metric ton)	0.0E+00	2.7E+00	0.0E+00	0.0E+00
Input fatality risk				
Input injury risk				

APPENDIX H

RESPONSES TO COMMENTS ON THE REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT FOR OU8

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAUL R. LEPAGE
GOVERNOR

PAUL MERCER
COMMISSIONER

July 5, 2016

ATTN: L.L. Cole, BLDG Z-144, 1st FLOOR
COMMANDING OFFICER
NAVFAC MIDLANT
9324 VIRGINIA AVE
NORFOLK, VA 23511-3095

re: Navy Responses to MEDEP Comments, Draft Remedial Investigation/Feasibility Study Report for Operable Unit 8, Portsmouth Naval Shipyard, Kittery, Maine.

Dear Linda,

The Maine Department of Environmental Protection has completed its review of the subject document. In our June 14 comment letter the MEDEP made several comments regarding aspects of the human health risk assessment that either did not follow State of Maine guidance or needed updating. For various reasons the Navy indicated it would not make most of the requested changes. Some of these changes would have resulted in higher risk values.

Normally, we would not accept the Navy's responses that indicated no changes would be made to the risk assessment based on our comments. However, two of the three remedial options evaluated in the Feasibility Study, Land Use Controls and Limited Excavation, protect all receptors evaluated in the risk assessment, including the most sensitive potential future residential receptors (the Navy has never considered using the No Action alternative at the Portsmouth Naval Shipyard and would not be acceptable to MEDEP).

So while we believe the Human Health Risk Assessment presented in the OU8 RI Report is not entirely accurate, whichever of the two remedies mentioned above is chosen will be protective of all receptors. Therefore, we have no further comments on this report.

Please feel free to contact me at (207) 592-2981 if you have any questions (note new contact number).

Sincerely,

Ivor McLeod
Project Manager
Bureau of Remediation and Waste Management

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AUGUSTA, MAINE 04333-0017
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PRESQUE ISLE, MAINE 04769
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website: www.maine.gov/dep

pc: Chris Evans, MEDEP
Matt Audet, USEPA
Lisa Joy, US Navy
Matt Thyng, US Navy
Debbie Cohen, TtNUS
Paul Dombrowski, Resolution
PNSY RAB
Timothy Stone, StoneHill Env.
Doug Grout, NH Fish and Game

RESPONSES TO USEPA COMMENTS DATED JUNE 7, 2016
DRAFT OPERABLE UNIT 8 REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

1. **Comment:** Section 6.1, page 6-5: the next-to-last bullet indicates that the June 2015 Regional Screening Level table was used. Since this is a draft, EPA expects the final risk assessment to use the latest version which is May, 2016. Please review the "What's New?" section of the RSL website for versions back to June 2015 to identify any of the Site COPCs that may have changed. If, as I suspect, none have changed, please note this in the final version somewhere in the text or as a footnote to the COPC selection tables, or preferably change the citation (i.e. USEPA, June 2015a) to USEPA, May, 2016. If any have changed, please update the COPC selection and risk assessment results, as appropriate.

   Response: Any necessary updates to the text and tables will be made to incorporate the United States Environmental Protection Agency (USEPA) May 2016 Regional Screening Levels (RSLs). The updates to the RSL table do not affect the results of the Human Health Risk Assessment (HHRA). The chemicals selected as chemicals of potential concern (COPCs) would not change if the May 2016 RSL are used in this HHRA instead of the June 2015 RSLs.

2. **Comment:** Section 6.5.4, page 6-21: In the subsection entitled "Non-carcinogenic Risks-CTE Evaluation" change the first sentence from "…under the CTE scenario are less than 1 that no adverse…" to "…under the CTE scenario are less than 1, indicating that no adverse…"

   Response: Agree, the text will be revised as suggested.

3. **Comment:** Section 6.5.4, page 6-21: In the subsection entitled "Non-carcinogenic Risks-CTE Evaluation" change the 4th sentence from "The associated target organ (thyroid) exceeds 1." to "The associated target organ (thyroid) HI exceeds 1."

   Response: Agree, the text will be revised as suggested.

4. **Comment:** Section 6.6.1, page 6-27: In the subsection entitled "Chemicals Eliminated Due to Background" prior to the in-text table, it is stated that the cumulative site risks were calculated and are presented in Appendix D.8.1, which could not be found on the CD. Please provide this in the final and send a copy as soon as possible for EPA review.

   Response: Appendix D.8.1 is an incorrect reference; the correct location of the cumulative site risks is Appendix C.8.1. This reference will be corrected in the Section 6.6.1 text.

5. **Comment:** Section 6.6.2, page 6-31: Please add a footnote explaining "NA" in the unnumbered table on this page.

   Response: A footnote will be added to this table to define "NA" as "Not applicable".

6. **Comment:** Figure 6-1: This figure indicates an incomplete pathway for subsurface soil direct contact for occupational worker, recreational user, and future resident; however subsurface soil PRGs are developed for recreational user, industrial worker, and resident in Appendix D. Please clarify in the text. Although changes in land use are unlikely, institutional controls should be instituted to prevent exposure of these receptors to subsurface soils if it cannot be demonstrated that the subsurface soil PRGs are met.

   Response: Figure 6-1 will be revised to show footnote 2 in the boxes for dermal contact, incidental ingestion, and inhalation of subsurface soil for the construction worker, occupational worker, recreational user, and future resident, with footnote 2 updated as follows:

   "Direct contact with subsurface soil is considered to be an incomplete pathway for occupational workers, recreational users, and residents because site conditions make it unlikely that

subsurface soil will be brought to the surface. However, exposure to subsurface soil for these receptors is considered as part of the uncertainty analysis, because if site conditions changed in the future, this could become a complete pathway for future users."

The Navy agrees that, although changes in the land use are unlikely for the foreseeable future, the unacceptable risks for potential hypothetical future exposure must be addressed. Therefore, these incomplete current pathways were evaluated as part of the HHRA and considered in developing alternatives.

7. **Comment:** Section 7.4, page 7-4: The sentence prior to in-text Table 7-4 indicates that ARAR-based PRGs were used for lead; however, subsurface PRGs are developed for the subsurface soil lead PRGs for industrial workers and recreational users in the table are based on blood lead modeling, which is risk based, rather than ARAR-based. Please clarify.

   Response: The Preliminary Remediation Goal (PRG) for the hypothetical future resident is an Applicable or Relevant and Appropriate Requirement (ARAR)-based value, and the PRGs for the industrial worker and hypothetical future recreational user are based on site-specific risk based PRGs using the blood lead model. The text will be revised as follows for clarity:

   "Site-specific risk-based PRGs were developed for all of the OU8 COCs except lead for hypothetical residential users. An ARAR-based PRG was used for lead for hypothetical residential users."

RESPONSES TO MEDEP COMMENTS DATED JUNE 14, 2016
DRAFT OPERABLE UNIT 8 REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

General Comment

1. **Comment:** The Navy still needs to submit the analytical, field and water level data to MEDEP in a properly formatted electronic data deliverable (EDD). Details on the EDD are located at the MEDEP website: http://www.maine.gov/dep/maps-data/egad/index.html .

   Response: The Maine Department of Environmental Protection (MEDEP) EDD will be submitted on CD with the Final version of the RI/FS Report, and can be submitted electronically prior to the Final version. Tetra Tech will work with MEDEP based on their preference.

Specific Comments

2. **Comment:** Section 1.3.2, OU8 History: There is an extra line of text at the end of the first paragraph on page 1-5, please revise as needed.

   Response: The sentence referenced was intentionally included to describe the activities at OU8 between the 1920s and 1940s. This sentence will be shifted to earlier in the paragraph referenced (after the 4th sentence) for clarity.

3. **Comment:** Section 1.4, p. 1-7 last paragraph. The Navy agreed to analyze for EPH for informational purposes and to confirm that petroleum hydrocarbons contamination is not present. The EPA's RSL calculator has screening levels for petroleum hydrocarbon fractions. Risks can be calculated and should be included in cumulative site risk estimates. If there is sufficient DRO/GRO data it should be converted to equivalent carbon fraction using the Maine Petroleum Guidance to estimate potential site related petroleum hydrocarbon fraction risks.

   Response: No revisions are required based on this comment. No additional evaluation is necessary for diesel range organic (DRO) or gasoline range organic (GRO) data for OU8. As provided in the Sampling and Analysis Plan (SAP) for the RI for OU8 (Tetra Tech, May 2015), polycyclic aromatic hydrocarbon (PAH) data are sufficient to evaluate potential risks for the RI and therefore DRO data are not necessary. There is no indication that volatile organic compounds (VOCs) are contaminants associated with OU8 and therefore, neither VOC nor GRO data are necessary for the RI. The Navy agreed to collected extractable petroleum hydrocarbon (EPH) data as requested by MEDEP for informational purposes and confirm that petroleum hydrocarbon contamination is not present. As discussed on pages 4-3 and 4-4 of the RI/FS Report, petroleum hydrocarbon contamination is not a concern for OU8.

4. **Comment:** Section 3.6, Surface Water Use and Hydrology: Please clarify in the text that the flood elevations listed reference the Shipyard's vertical datum rather than the North American Vertical Datum (NAVD) 1988, as reported by FEMA. FEMA has released a preliminary revised map for the area (2013) that indicates portions of OU8 are in the 100-year flood zone, if the final versions are consistent than this issue may need to be revisited.

   Response: The information about the PNS datum is included in the beginning of Section 3.0 (see page 3-1). The NAVD 1988 elevations will be included parenthetically (i.e., the 100-year flood zone elevation of 105 feet in PNS 2002 datum is 9 feet NAVD 1988) in the referenced paragraph in Section 3.6. The comment about the revised Federal Emergency Management Agency (FEMA) map has been noted, and upon review of the preliminary revised map (2013), the Navy agrees that lower portions of OU8 would be in the 100-year floodplain (106 feet PNS 2002 Datum/10 feet NAVD1988) on this version. The Navy agrees that at such time the updated FEMA maps are finalized, the location of the 100-year flood zone would be updated and the

impact to the remedial action for OU8 would be evaluated. However, it is noted that while change in the flood zone may impact use of the site, it would not likely impact the contaminant fate and analysis or risks for the site because the majority of soil/fill material at OU8 is within the tidally saturated or saturated zone, the site is covered by asphalt or buildings, and the majority of contamination is in the subsurface [greater than 2 feet below ground surface (bgs)].

5. **Comment:** Section 4.2, Groundwater Contamination: MEDEP agrees that there is a disconnect between the soil and groundwater concentrations for metals, likely due to the decades of fill interacting with the shallow groundwater following placement in the timber basin. Manganese in groundwater at MW-05R could be related to the recently placed fill utilized for the expansion of Building 174. That soil may still be equilibrating to the local groundwater.

   Response: Comment noted.

6. **Comment:** Section 7.4, PRGs for OU8: Table 7-4 lists the basis for the surface soil cPAHs as an ILCR of 1.0 x 10-4. Please revise to 1.0 x 10-5, as noted in the table for the subsurface soil cPAH ILCR, and make any corrections needed in the risk calculations.

   Response: No revisions to the text are required based on this comment. Consistent with the approach for the other OUs at PNS, MEDEP's $1x10^{-5}$ guideline is included in the Human Health Risk Assessment (HHRA) for informational purposes; however, it is not used for selecting risk drivers or for calculating preliminary remediation goals (PRGs) because MEDEP's guidelines are not promulgated. In addition, the risk-based PRG for carcinogenic PAHs (cPAHs) for surface soil [1.6 milligram per kilogram (mg/kg)] is consistent with the cPAH level using Maine's background information (using data for individual PAHs) and the benzo(a)pyrene level for rural developed areas (2.1 and 1.5 mg/kg, respectively) (based on information provided in the Re-evaluation of Facility Background Report, Tetra Tech, April 2014). Therefore, the Navy considers the calculated PRG for cPAHs in surface soil to be appropriate.

7. **Comment:** Section 7.5, Remediation Areas and Volumes: The third to last paragraph (page 7-6) lists the maximum lead concentrations incorrectly. Based on the data in Table 4-2 the maximum lead concentration of 20,100 mg/kg was in the two to six-foot interval at WTB-SB09. Based on the data for the deeper intervals listed in the draft text, MEDEP anticipates this will not change the volume estimates, the deeper intervals would still be included in removal calculations.

   Response: Comment noted. The text will be corrected as provided.

The following comments pertain to Section 6.0, Human Health Risk Assessment, and associated appendices.

8. **Comment:** This HHRA was very well prepared which facilitated the review. Several updates are recommended in these comments for consistency with current guidance.

   Response: Comment noted and appreciated. Please see the Navy's responses to remaining comments addressing HHRA updates for consistency with current guidance.

9. **Comment:** This HHRA assumes that there will not be a future residential receptor and that groundwater will never be used for consumption. These site use restrictions should be formalized in order to consider this risk assessment to be health protective for all populations.

   Response: No revisions to the text are required based on this comment. The HHRA assumes that residential use is unlikely given the past, present, and anticipated industrial land use at and adjacent to OU8, but evaluates potential residential exposure to soil at OU8 under the hypothetical future residents (adult and child) scenario. The HHRA shows that there are potential unacceptable risks for this receptor. Therefore, a remedy for OU8 would need to provide some action to address these potential unacceptable risks (as discussed in Section 8.0 of the RI/FS Report, land use controls are the remedy components considered to address these potential

risks). As noted in Section 6.3.3.3 and consistent with the OU8 RI SAP (Tetra Tech, May 2015), hypothetical future residents (adult and child) were not evaluated for exposure to groundwater because the groundwater at OU8 is saline/brackish and unsuitable as a drinking water supply. If the land use were to change in the future and include residential use, the groundwater would still not be a potential drinking water source, and thus was not evaluated as such in the HHRA. Therefore, use restrictions for groundwater are not required for OU8.

10. **Comment:** Blood lead screening levels. Both the US CDC and EPA have now recognized that adverse health effects may occur at blood lead concentrations below 10 micrograms per deciliter (µg/dL) down to 5 µg/dL, and possibly below. Please revise this 2016 RI report to acknowledge that soil screening levels based on the criteria that no more than 5% of the population reach a blood lead level (BLL) of 10 µg/dL, is no longer considered health protective. However, until EPA issues new guidance, it is appropriate to continue to evaluate potential hazards based on the criteria BLL of 10 µg/dL.

    Response: Agreed. A note will be added on page 6-33 acknowledging that the USEPA guidance geometric mean blood lead level may change, and that the Navy will revisit the issue as appropriate (e.g., as part of the five-year review process). The HHRA used the established USEPA goal of no more than 5-percent of receptors having a blood-lead concentration of 10 µg/dL. Based on exceedances of this goal and elevated lead concentrations in subsurface soil, lead was identified as a chemical of concern (COC) for all receptors evaluated in the HHRA (see page 6-46). If USEPA changes the criteria, the impact to OU8 risks and remedial action would be evaluated at that time (e.g., as part of the five-year review process, which requires that screening levels of site COCs are revisited to ensure continued protectiveness of the remedy).

11. **Comment:** Page 6-1 Last sentence. Suggest rewording to "The potential risks to human health at OU8 are estimated based on the assumption that there will be no future residential exposure to soil or use of groundwater, and no actions are taken to control contaminant releases."

    Response: No revisions to the text are required based on this comment. As provided in the Navy's Response to MEDEP Comment No. 9, although stated to be unlikely, the HHRA did evaluate hypothetical future residential exposure to surface soil and subsurface soil, and residential use of groundwater was not excluded due to the limited likelihood of future residential use, but because the groundwater is not potable.

12. **Comment:** Page 6-6. Section 6.2.2 Selection of COPC: Neither the EPA nor Maine allows exclusion chemicals from a HHRA based on comparison to background levels. Chemicals that may exist at background concentrations should be quantitatively evaluated in the risk assessment. The decision to forego action for compounds that are present at levels consistent with background is a risk management decision and should occur as part of the feasibility study, not as part of the risk assessment. Because of this aluminum, arsenic, cobalt, lead and vanadium should be included as soil COPC.

    Response: No revisions to the text are required based on this comment. Evaluation of background as part of the HHRA is consistent with Navy policy and is consistent with the methodology used in risk assessment for the other OUs at PNS (e.g., OU7 RI Report dated July 2011 and OU9 RI Report dated June 2012). As the Navy has indicated in responses to a similar MEDEP comment on the OU7 RI Report, Navy background policy requires that the baseline risk assessments should not be conducted on chemicals that are present at levels less than corresponding background concentrations (e.g., as provided in the response to MEDEP Comment No. 34 dated December 14, 2010 in Appendix E of the OU7 RI Report). In accordance with Navy background policy (Navy, January 2004) chemicals present at background concentrations were not retained as chemicals of potential concern (COPCs).

As also provided in the OU7 and OU9 RI Reports, risks associated with background are discussed as part of the uncertainty analysis. For OU8, cumulative risk estimates including chemicals within background are presented in Appendix C.8.1 and discussed in the subsection titled "Chemicals Eliminated Due to Background" in Section 6.6.1. Conclusions of the evaluation were that the elimination of chemicals within background levels does not add significant uncertainty to the HHRA. As shown on page 6-27, only the lifelong recreational user had cumulative carcinogenic risks including chemicals screened out based on background that were greater than $1x10^{-4}$ when the cumulative carcinogenic risks excluding chemicals screened out based on background was less than $1x10^{-4}$. Arsenic (with an exposure point concentration of 13.7 mg/kg) was the background chemical driving risks to be unacceptable when background is included. The arsenic concentrations in surface soil are also less than Maine's background concentration [16 mg/kg as provided in Maine Remedial Action Guidelines (RAGs), May 2013]. The non-carcinogenic chemicals screened out based on background (aluminum, cobalt, and vanadium), did not contribute significantly to the risks such that the Hazard Indices (His) on a target organ basis exceeded 1 when it did not exceed 1 without including these three chemicals. Lead in surface soil had an exposure point concentration of 213 mg/kg, which is less than USEPA Office of Solid Waste and Emergency Response (OSWER) directive level of 400 mg/kg for residential land use.

13. **Comment:** Page 6-7 3rd paragraph. The assumption that the water is not potable and therefore was not considered as a potential exposure pathway should be established with an environmental covenant, see Comment 9.

    Response: Please see the Navy's Responses to MEDEP Comment Nos. 9 and 11. No restrictions are required for groundwater because groundwater is not potable.

14. **Comment:** Page 6-28 2nd paragraph. Lead may not be eliminated based on background concentration. Furthermore the maximum detect should be compared to the screening level to determine if lead is a COPC (See Comment 12). Therefore lead is a COPC for surface and subsurface soil.

    Response: No revisions to the text are required based on this comment. Please see the Navy's response to MEDEP Comment No. 12 regarding background and COPC selection. The average lead concentration (213 mg/kg) was compared to the regional screening level (RSL) for lead (400 mg/kg) in the second paragraph of page 6-28 to determine if quantitative evaluation of the uncertainty associated with screening lead out as a COPC was needed. Because the average concentration was less than the RSL, quantitative evaluation of the uncertainty associated with lead in surface soil was not necessary.

15. **Comment:** Page 6-28, Section "Absence of COPC Screening Levels". This section states "Exclusion of these chemicals from COPC selection adds some uncertainty to the risk assessment; however, it is assumed that chemicals lacking toxicity criteria would not contribute significantly to overall risks."

    Response: Comment noted. Please see The Navy's response to MEDEP Comment No. 16 for additional information.

16. **Comment:** The assumption that chemicals lacking toxicity criteria would not contribute significantly to site risk is inappropriate speculation. A lack of a regulatory screening level has nothing to do with a chemicals potential toxicity. Please readdress this uncertainty discussion to be more specific about the potential risks that are not being considered. For example:

    - Data for DRO and GRO can be converted to representative carbon fractions using the Maine DEP guidance.
    - HEAST has a cancer slope factor for carbazole.

- The potential toxicity of the C11-C22 aromatic petroleum hydrocarbon fraction may be evaluated using naphthalene as a surrogate.

Response: No revisions to the text are required based on this comment. The detected concentrations of C11-C22 aromatics in surface soil and subsurface soil were compared to available Maine criteria and evaluated qualitatively in the uncertainty section in accordance with the OU8 RI SAP (Tetra Tech, May 2015). Therefore, no further evaluation is needed for C11-C22 aromatics in the HHRA. For DRO and GRO, Maine guidance (Final Development of Risk-Based Cleanup Levels for Petroleum Hydrocarbons Measured as DRO and GRO, MACTEC, April 2010) provides cleanup levels for residential receptors for DRO (3,649 mg/kg) and GRO (3,710 mg/kg) based on unknown products. The maximum detected surface soil and subsurface soil concentrations of DRO (170 mg/kg and 340 mg/kg, respectively) and GRO (3.1 mg/kg and 13 mg/kg, respectively) are less than the Maine values; therefore, no significant uncertainty is added to the HHRA by the lack of screening levels for DRO and GRO.

No toxicity criteria are available for carbazole based on the current online Health Effects Assessment Summary Table (HEAST) database. Additionally, no noncarcinogenic or carcinogenic toxicity criteria are available in USEPA's Provisional Peer Reviewed Toxicity Value (PPRTV) database due to the lack of adequate data for this chemical (USEPA, 2008). Therefore, the 1997 HEAST toxicity criteria will not be used in the HHRA. In addition, as provided in the OU8 RI SAP, non-PAH SVOCs (including carbazole) were not identified as chemicals associated with OU8 for further investigation as part of the RI sampling.

(Reference: USEPA, 2008. Provisional Peer Reviewed Toxicity Values for Carbazole (CASRM 86-74-8). Superfund Health Risk Technical Support Center, National Center for Environmental Assessment, Office of Research and Development. July 23.)

17. **Comment:** Page 6-29, Section "Surrogate Screening Levels". Use of a chemical surrogate toxicity value to generate a screening level is certainly more conservative than to disregard the presence of the chemical entirely. The direction of the bias is clearly conservative.

    Response: Comment noted. The text in the subsection "Surrogate Screening Levels" will be revised to the following: "Applying toxicity values for one compound to another adds to the uncertainty in the risk assessment both in regard to the selection of COPCs and subsequently calculated risks. The direction of the bias is unknown (i.e., it is not known if the surrogate criteria selected for the chemical lacking screening levels is more or less conservative than the actual unavailable screening level would be). However, surrogate screening levels were used to be conservative rather than excluding these chemicals that lack screening levels from COPC selection and the quantitative risk assessment."

18. **Comment:** Page 6-32 last paragraph. The ALM is protective of the blood of the fetus of the pregnant worker. The averaging time should be minimal to conservatively reflect the exposure, use of an annualized daily concentration results in an underestimate of potential blood lead concentrations. Maine typically uses a 0.5 year exposure period for the construction worker (125 days/6 months). For the lead model, it is appropriate to set the averaging time to the exposure duration. The baseline blood lead concentration used in the ALM was 1.0 ug/dL, this should be the model default NHANES III value of 1.5 ug/dL and the geometric standard deviation should be 2. For the recreational user the averaging time should reflect the exposure period, in this case the model's minimum of 90 days should be used.

    Response: According to current USEPA guidance (USEPA, 2009), the geometric standard deviation (GSDi) and baseline blood lead (PbBo) values are 1.8 and 1.0 ug/dL, respectively. These values were used in the HHRA; therefore, no updates are needed for these values. The exposure frequencies used for the construction worker and recreational user in the ALM were 75

days/year and 50 days/year, respectively, based on the central tendency exposure (CTE) assumptions for these receptors, and an averaging time of 365 days per year was used for these receptors. An averaging time of 365 days is appropriate for the construction worker, as construction is assumed to take place over a period of one year. Recreational exposures to soil were assumed to occur over a six-month period (April through September); therefore, the averaging time for the adult recreational user will be updated to 180 days (i.e., approximately six months) in the HHRA. However, the probability that fetal blood lead concentrations exceed 10 µg/dL were much less than the threshold of 5 percent for adult recreational users. Furthermore, lead was already identified as a COC for the adult recreational user based on possible acute risks. Therefore, updating the averaging time for this receptor should not change risk assessment conclusions.

19. **Comment:** Page 6-38 Section "Uncertainty Associated with Evaluation of Arsenic". Please include a discussion of the California EPA cancer potency factor (CPF) for arsenic [9.45 (mg/kg-day)-1], which Maine considers to be appropriate for a conservative estimate of the potential carcinogenicity of arsenic.

    Response: The following text will be added to the uncertainty analysis as the last paragraph in the "Uncertainty Associated with Evaluation of Arsenic" discussion: "In the HHRA, arsenic was evaluated using a CSF of 1.5 $(mg/kg\text{-}day)^{-1}$, which is from IRIS. IRIS is the preferred source of toxicity values (USEPA, December 2003) for human health risk assessments. IRIS normally represents the official Agency scientific position regarding the toxicity of the chemicals based on the data available at the time of the review. IRIS values are Tier 1 values in USEPA's recommended human health toxicity value hierarchy. The California EPA CSF for arsenic is 9.5 $(mg/kg\text{-}day)^{-1}$ (OEHHA, 2004) and is considered to be a Tier 3 value by USEPA. Cancer risk estimates for arsenic be approximately 6 times higher using the Tier 3 California EPA CSF for arsenic."

20. **Comment:** Page 6-39, Section "Use of Chromium Toxicity Criteria". Please provide additional details concerning the tests performed to justify the evaluation of total chromium as 100% chromium (III) in the risk assessment.

    Response: No revisions to the text are required based on this comment. As stated in the "Use of Chromium Toxicity Criteria" discussion, and in the OU8 RI SAP, chromium at OU8 is considered to be in the trivalent oxidation state because hexavalent chromium was not detected in soil during the 1998 Site Screening Investigation (SSI). This information is also provided in Section 1.0 (page 1-7) and Section 4.0 (page 4-3) of the draft RI/FS Report.

Appendix C

21. **Comment:** Table 2.1 Surface soil screening levels. Please see Comment 12 regarding COPC selection and background contaminants.

    Response: No revisions to the text are required based on this comment. Please see the Navy's response to MEDEP Comment No. 12 regarding elimination of chemicals based on background.

22. **Comment:** Table 2.3 Construction Worker screening level for lead 1340 ug/L, please see comment 27.

    Response: No revisions to the text are required based on this comment. Please see the Navy's response to MEDEP Comment No. 27 for additional information.

23. **Comment:** Tables 4.5.RME through 4.10.RME: Maine recommends a soil recreational exposure frequency of 90 days/year and a surface water and sediment exposure frequency of 78 days/year for wading exposures. The exposure frequency of 52 days/year for soil and 7 days/year for sediment and surface water should be changed to 90 days/year and 78 days/year, respectively,

or additional site-specific justification should be provided. In addition, the exposure duration for the recreational scenario is 30 years, not 24 years. A fraction ingested (FI) term of 1 should be used for all media, unless a compelling site-specific justification is provided.

Response: No revisions to the text are required based on this comment. A soil recreational exposure frequency of 100 days/year was used to evaluate recreational user exposures with soil; this exposure frequency is more conservative than the Maine value of 90 day/year. Surface water and sediment were not evaluated in the HHRA because this is not an media at OU8. An exposure duration of 26 years (child plus adult) was used for the recreational user based on current USEPA guidance (USEPA, February 2014). An FI term of 0.5 was used for the recreational user because recreational users are assumed to be at the site only a portion of each day. Given that the current and anticipated future land use of OU8 is industrial, an FI term of 0.5 is considered to be appropriate for a recreational user exposed to soil at the site. Based on these considerations, changes are not needed for the recreational user exposure assumptions (Tables 4.6 through 4.9 of Appendix C) used in the HHRA.

24. **Comment:** Table 4.3 Calculation risks for the Construction Worker assumed a surface water ingestion rate of 10 ml/hour and an exposure duration of 4 hours per day for 30 days over an entire year. Maine uses a Construction Worker surface water ingestion rate of 50 ml/hour, an exposure duration of 8 hours per day, and an exposure frequency of 125 days in a 6 month exposure period (DEP 2011, EPA 1997). The argument that the Construction Worker surface water exposure is transient during the course of the day allows for the 4 hour duration. The ingestion rate of 10 ml/day is justified by the decreased exposure duration. However, the decreased exposure frequency and increased exposure period serve to underestimate potential risks. Please see comment 18.

    Response: No revisions to the text are required based on this comment. The exposure assumptions of 10 mL/day and 4 hours per day for 30 days (over a one-year period) are conservative for construction workers. It is not realistic or reasonable to assume a construction worker is going to be exposed to groundwater 8 hours a day for 125 days; if a construction worker is going to have this kind of contact with groundwater, then it is reasonable to assume they would be wearing some kind of protective gear (i.e., rubber boots, hip waders) that would decrease contact with groundwater. Using an exposure assumptions of 8 hours per day for 125 days would therefore result in overestimating risks.

Appendix A.4 Risk Based Screening Level Development for the Construction Worker Exposed to Groundwater at Portsmouth Naval Shipyard

25. **Comment:** Page 2. Exposure parameters used for derivation of screening levels may be more conservative than those used in the Maine risk assessment guidance, otherwise please harmonize exposure parameters with those in Appendix C. The currently recommended skin surface area used for the Construction Worker is 3,527 cm2.

    Response: No revisions to the text are required based on this comment. The screening level development was provided in the OU8 RI SAP and used a surface area of 3,470 cm^2 in calculating groundwater screening levels for construction workers based on USEPA guidance (USEPA, July 2004) that was current at the time the groundwater screening levels were developed. Using an updated surface area of 3,527 cm^2 (USEPA, February 2014) would not significantly impact the groundwater screening levels. Based on the chemical concentrations in groundwater (PAHs and metals, Table 2.3 in Appendix C.1), calculated screening levels are greater than detected groundwater concentrations by at least one order of magnitude for chemicals other than manganese, which was already selected as a COPC. Therefore, the slight increase of the surface area used for construction workers in the calculation of groundwater screening levels would not be expected to add additional COPCs to the evaluation.

26. **Comment:** Page 3. EPA has made changes to the parameters involved in dermal exposure to water, with an update to the preferred approach for selecting dermal permeability (Kp) values and determination of effective predictive domain (EPD) . The previous hierarchy used RAGS Part E before using EPA's Estimation Programs Interface (EPI) Suite for EPD determination and Kp. Recently released logKows for some chemicals conflicted with those in RAGS Part E. Specifically for the RSL project, the most recent logKow were used to determine EPD status. The RSLs now also calculate the FA (fraction absorbed) values. Please update this draft report to use the most current EPA guidance for dermal permeability. In addition EPA now FA, unfortunately several COC that are currently using a 0 in the OU8 HHRA use an FA of 1 according to EPA. Please check the status of the parameters used for dermal absorbed dose modeling.

    Response: No revisions to the text are required based on this comment. The values used for the parameters involved in calculating dermal exposures to water were current at the time groundwater screening levels were developed. Because the screening levels were finalized in the SAP, they will not be updated in Appendix A.8. For the chemicals detected in groundwater, only fluoranthene, indeno(1,2,3-cd)pyrene, and phenanthrene had FA values of 0 in Appendix A.8. Fluoranthene and indeno(1,2,3-cd)pyrene are still listed as outside the EPD of the dermal model according to the RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search). Phenanthrene is currently listed as within the EPD and has a calculated FA value. However, pyrene criteria were used as surrogate criteria in calculating the screening level presented for phenanthrene on Table 2.3 (Appendix C.1); therefore, updates to FA values that were 0 for several parameters in Appendix A.8 would not result in any changes to the screening levels used in the HHRA.

27. **Comment:** Attachment 1. Derivation of Lead Screening Levels

    Please use the updated geometric standard deviation (GSDi) and baseline blood lead (PbBo) from NHANES III survey (1999-2004) of 1.8 and 1.5 ug/dL respectively. Using the most recent values for these variables in the adapted ALM for water as presented, changes the screening level from 1340 ug/L to 405 ug/L.

    Response: No revisions to the text are required based on this comment. Please see the Navy's response to MEDEP Comment No. 18, which indicates that the GSDi and PbBo values are 1.8 and 1.0 µg/dL, respectively based on current USEPA guidance (2009). These values were used in the HHRA; therefore, no updates are needed to the screening level used for lead in groundwater.