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FOCUSED FEASIBILITY STUDY REPORT FOR INDUSTRAIL OPERATIONS AREA FORMER NAS SOUTH WEYMOUTH MA
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TETRA TECH

Focused Feasibility Study Report

For

Industrial Operations Area

Former Naval Air Station South Weymouth
Weymouth, Massachusetts

Naval Facilities Engineering Command
Mid-Atlantic

Contract Number N62470-08-D-1001
Contract Task Order WE11

April 2015

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FOCUSED FEASIBILITY STUDY REPORT

FOR

INDUSTRIAL OPERATIONS AREA

FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
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TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLES

NUMBER

FIGURES

NUMBER

ABBREVIATIONS AND ACRONYMS

ADAF	age-dependent adjustment factor
AIMD	Aircraft Intermediate Maintenance Division
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirement
AUL	Activity Use Limitation
BAP	benzo(a)pyrene
BCT	BRAC Cleanup Team
bgs	Below Ground Surface
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-term Environmental Action Navy
COC	Contaminant of Concern
cPAH	carcinogenic Polycyclic Aromatic Hydrocarbons
CSF	cancer slope factor
CTO	Contract Task Order
CWA	Clean Water Act
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DOD	Department of Defense
DQO	Data Quality Objectives
EBS	Environmental Baseline Survey
EPC	Exposure Point Concentration
EPH	Extractable Petroleum Hydrocarbon
EU	Exposure Unit
FFS	Focuses Feasibility Study
FS	Feasibility Study
ft	Foot or feet
GHG	Greenhouse Gas
GRA	General Response Action
HHRA	Human Health Risk Assessment
HI	Hazard Index
HPCDD	heptachlorodibenzo-p-dioxins
HPCDF	Heptachlorodibenzofuran

HXCDD	Hexachlorodibenzo-p-dioxin
HXCDF	1,2,3,6,7,8-Hexachlrordibenzofuran
HQ	hazard quotient
IOA	Industrial Operations Area
IR	Installation Restoration
IUR	inhalation unit risk
LDR	Land Disposal Restriction
LOD	Limit of Detection
LUC	Land Use Control
MassDEP	Massachusetts Department of Environmental Protection
MCL	Maximum Contaminant Levels
MCP	Massachusetts Contingency Plan
MUVD	Mixed-Use Village District
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Command
Navy	United States Navy
NCP	National Contingency Plan
NERP	Navy Environmental Restoration Program
NPW	Net Present Worth
NRWQC	National Recommended Water Quality Criteria
OCDD	1,2,3,4,6,7,8,9-octachlorodibenzo-p-dioxin
O&M	Operation and Maintenance
OSHA	Occupational Safety and Health Act
PCBs	Polychlorinated Biphenyls
PAHs	Polycyclic Aromatic Hydrocarbons
PECDF	2,3,4,7,8- pentachlorodibenzofuran
PECDD	1,2,3,7,8-Pentachlorodibenzo-p-dioxin
PEF	particulate emissions factor
PMO	Program Management Office
PPE	Personal Protective Equipment
PRG	Preliminary Remediation Goal
RAGS	Risk Assessment Guidance for Superfund
RAO	Removal Action Objective
RAWP	Removal Action Work Plan
RBA	relative bioavailability
RBC	risk-based concentrations
RCRA	Resource Conservation and Recovery Act

RD	Remedial Design
RecD	Recreation District
RfC	reference concentration
RfD	reference dose
RI	Remedial Investigation
RIA	Review Item Area
RME	Reasonable Maximum Exposure
ROD	Record of Decision
RSL	Regional Screening Level
RTN	Release Tracking Number
SAP	Sampling and Analysis Plan
SSL	soil screening level
SSTTDC	South Shore Tri-Town Development Corporation
SVOC	Semivolatile Organic Compound
TACAN	Tactical Air Navigation
TBC	To Be Considered
TCDD	2,3,7,8-tetra chlorodibenzo-p-dioxin
TCDF	2,3,7,8-Tetrachlorodibenzofuran
TCE	trichloroethene
TEQ	Toxic Equivalents
Tetra Tech	Tetra Tech, Inc.
TPH	Total Petroleum Hydrocarbon
TSCA	Toxic Substances Control Act
TSDF	Treatment, Storage, and Disposal Facility
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VCD	Village Center District
VPH	Volatile Petroleum Hydrocarbons
VOC	Volatile Organic Compound

1.0 INTRODUCTION

1.1 PURPOSE AND ORGANIZATION OF REPORT

1.1.1 Purpose

This Focused Feasibility Study (FFS) was prepared for the Industrial Operations Area (IOA) Site (the Site), located at the former Naval Air Station (NAS) South Weymouth, in Weymouth, Massachusetts (the Base), in accordance with Contract Task Order (CTO) WE11 under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract No. N62470-08-D-1001. The document was prepared to fulfill the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and is consistent with the United States Environmental Protection Agency (USEPA) "Guidance for Conducting Remedial Investigations (RIs) and Feasibility Studies (FSs) Under CERCLA" (1988) and the "Navy Environmental Restoration Program (NERP) Manual," Chapter 8, RI/FS (Navy, 2006).

This FFS Report describes the formulation and evaluation of remedial alternatives for contaminated surface soil at the Site. The FFS focuses on remedial alternatives for contaminated surface soil because risk was determined to be associated with exposure to surface soil only; site-wide subsurface soil, groundwater, sediment, and surface water were determined not to be media of concern (See Section 1.2.3). The FFS establishes Remedial Action Objectives (RAOs) and cleanup goals; screens remedial technologies; and assembles, evaluates, and compares remedial alternatives. The FFS was based on data collected during previous investigations, specifically a series of investigations conducted from 1998 through 2011. The Navy has investigated 16 environmental sites within the IOA under various environmental programs. Historical data from investigations conducted at those sites were supplemented by data collected during a 2011 investigation conducted to compile a complete data set for the IOA. Those investigations culminated in the completion of the IOA Project Report for the Site (Tetra Tech, 2013). The IOA Project Report evaluated contaminant nature, extent, fate and transport, and calculated the potential risks to human health and the environment that are associated with exposure to the identified contaminants.

The purpose of the FFS is to gather and evaluate information sufficient to develop and evaluate a range of remedial alternatives designed to mitigate potential risks to human health resulting from past Navy activities at the Site. Within an FFS report, the investigation results are used to develop and evaluate potential remedial alternatives that permanently and significantly reduce the risks to human health and the environment identified at the Site. The alternatives should provide cost-effective methods to mitigate the identified risks, and the range of alternatives should be adequate so that consensus can be reached between the Navy and regulatory agencies regarding the selected response action.

Subsequent to the FFS, the Navy will present the preferred remedial alternative in a Proposed Plan for public comment. Following a 30-day public comment review period, the Navy will select the remedial alternative(s) and will seek concurrence of the USEPA and the Massachusetts Department of Environmental Protection (MassDEP). The final remedial alternative(s) will be presented in a Record of Decision (ROD).

1.1.2 Document Organization

This document has been organized with the intent of meeting the general format requirements specified in the RI/FS Guidance Document (USEPA, 1988). The report is divided into the following sections:

- Section 1.0 – Introduction: summarizes the purpose of the report, provides site background information, summarizes the findings of the IOA Project Report, and provides the report outline.

- Section 2.0 - RAOs and General Response Actions (GRAs): presents the RAOs, identifies Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered (TBC) criteria, develops surface soil cleanup goals and associated GRAs, and provides estimates of the volumes of contaminated media to be remediated.

- Section 3.0 - Screening of Remediation Technologies and Process Options: provides a two-tiered screening of potentially applicable soil remediation technologies and identifies the technologies that were assembled into remedial alternatives.

- Section 4.0 - Assembly and Detailed Analysis of Remedial Alternatives: assembles the remedial technologies retained from the Section 3.0 screening process into multiple soil remedial alternatives, describes these alternatives, and performs a detailed analysis of these alternatives in accordance with seven of the nine remedy selection criteria set forth in 40 Code of Federal Regulations (CFR) Part 300.430 of USEPA's National Contingency Plan (NCP).

- Section 5.0 - Comparative Analysis of Remedial Alternatives: compares the surface soil remedial alternatives on a criterion-by-criterion basis, for each of the seven CERCLA analysis criteria used in Section 4.

Appendix A contains selected data tables and figures from the IOA Project Report. The IOA Project Report includes all of the analytical data, figures and a comprehensive discussion of the information summarized in Section 1.3. Appendix B contains calculations for surface soil preliminary remediation goals (PRGs). Appendix C contains mass contaminant calculations for site surface soil. Appendix D contains the Sustainability Analysis and Appendix E contains the cost estimates.

1.2 BACKGROUND INFORMATION

The following paragraphs provide background information about the Base and the IOA Site including Base history, study area setting, and site description and history.

1.2.1 <u>NAS South Weymouth</u>

The former NAS South Weymouth is comprised of approximately 1,442 acres located approximately 20 miles southeast of Boston. The Base is located primarily in the Town of Weymouth, Norfolk County, Massachusetts. Portions of the Base also extend into the adjacent towns of Abington and Rockland, Massachusetts; the town of Hingham forms the northeast boundary of the Base. The Base is located in an urban area, with primary access from Route 18 in Weymouth as illustrated on Figure 1-1.

NAS South Weymouth was commissioned during the 1940s to support dirigible aircraft used to patrol the North Atlantic during World War II. The facility was closed in 1949 and then reopened in 1953 as a naval air station for aviation training. NAS South Weymouth was designated for closure under the Base Realignment and Closure Act of 1990 (BRAC), as part of the BRAC Commission's 1995 Base Closure List (BRAC IV). In September 1996, operational closure of NAS South Weymouth began with the transfer of aircraft to other Navy facilities, and through personnel reduction. Between 1996 and 1997, NAS South Weymouth provided facilities for limited ground training to Marine and Naval reserve units (EA, 1998). NAS South Weymouth was closed administratively under BRAC on September 30, 1997. Because of the closure, the facility was placed in caretaker status under the supervision of the Naval Facilities Engineering Command (NAVFAC) and is currently under the supervision of the NAVFAC BRAC Program Management Office (PMO) East. Portions of the Base property have been transferred by the Navy to the local reuse authority and are undergoing redevelopment.

As part of the Base closure, an environmental baseline survey (EBS) was conducted to support the Navy's compliance with CERCLA Section 120, as amended by Public Law 102-426, Community Environmental Response Facilitation Act, and state and local real property transfer disclosure notification regulations. The purpose of the EBS was to support environmental restoration programs, base closure, and property transfers/leases. The Phase I EBS investigation was conducted for those areas of the base property not already addressed by the Installation Restoration (IR) program or the Massachusetts Contingency Plan (MCP). The information collected during the Phase I EBS was used to identify specific areas of environmental concern and to recommend the level of further investigation required for each of these areas. Areas targeted for additional investigation were designated as Phase II EBS review item areas (RIAs) in the Phase I EBS Report. Phase II EBS investigations were conducted at these RIAs. The investigations included collecting environmental samples (soil, groundwater, sediment, surface water) from each RIA and analyzing these samples for target contaminants. Results of environmental sample analyses were evaluated and those RIAs with laboratory results exceeding screening criteria became Areas of Concern (AOCs). AOCs were then investigated in accordance with CERCLA requirements, under the IR program.

1.2.2 Industrial Operations Area

The IOA covers approximately 20 acres and is located in the central part of the Base, east of the former north-south runway (17-35) and north of the former east-west runway (8-26) (Figure 1-1). The IOA contains: 13 inactive buildings, including the former power plant (Building 8), the former aircraft intermediate maintenance division (AIMD) facility (Building 117) and supply warehouse (Building 2); the location of a former water tower; remnants of a railroad spur; and a former hazardous waste accumulation area. The Site is generally flat and mostly covered by asphalt or buildings; there are a few small grassy areas, generally around buildings, and sidewalks. The current wetland delineation for former NAS South Weymouth does not identify wetlands within the IOA Site (Rizzo, 2001).

Figure 1-2 presents a site plan depicting the IOA boundary and previously-investigated environmental AOCs, RIAs, and Massachusetts Contingency Plan (MCP) sites within the IOA. The figure also shows the zoning districts established by South Shore Tri-Town Development Corporation (SSTTDC) for the development of former NAS South Weymouth (SSTTDC, 2005).

The horizontal extent of the IOA is currently defined as the outer perimeter of the area where industrial operations took place and is based on information from aerial photographs and previous investigations. Industrial operations in these areas included, but were not limited to: storage of industrial materials, equipment and coal for the power plant; movement of materials by truck and along the railroad spur; and power plant operations.

1.2.3 Previous Site Investigations

Prior to this FFS, several environmental studies and removal actions were completed within the IOA. The Navy has investigated 16 environmental sites within the IOA under various environmental programs, including: 8 RIAs investigated under the EBS program; 4 AOCs investigated under the CERCLA; and 5 petroleum sites investigated under provisions of the MCP. The various investigations have led to closure of 13 of the sites with 4 sites remaining active. Two were closed with institutional controls in place in the form of Activity Use Limitations (AULs). Locations of these areas are identified on Figure 1-2. The environmental sites and their regulatory status are listed below:

RIAs:

- RIA 16, Sewage lift station; closed in 2003
- RIA 33, AIMD Building Shop; active
- RIA 37, Courier Station (Drum Storage Area); closed in 2003
- RIA 78B, underground storage tank (UST) 44 (Building 140); closed in 2003
- RIA 82, Power House; active
- RIA 88, AIMD (Building 117); closed in 2004
- RIA 89, Courier Station (Septic System); closed in 2002
- RIA 106, Fire House (Building 96); closed in 2004

AOCs:

- AOC 13, Soil along Railroad Tracks near Supply Warehouse; ROD signed April 2006
- AOC 14, Water Tower, stained soil; active
- AOC 15, Water Tower, lead paint; ROD signed April 2006
- AOC 83, Hazardous Waste Storage Area; active

MCP Sites:

- Aviation Gas USTs (Release Tracking Number [RTN] 3-19064); closed in 2001
- Steam Plant, Building 8 (RTN 3-13157); closed in 2000 with AUL
- Supply UST, Building 14 (RTN 3-10316 and 3-15350); closed in 1998
- Gas Station, Building 116 (RTN 3-14180 and 3-15516); closed in 1998
- Oil Water Separator, Building 14 (RTN 3-17527); closed in 2000 with AUL

Soil and groundwater quality analytical data for the environmental sites listed above were compiled and presented along with other information in the 2010 IOA Technical Memorandum; the IOA does not contain any surface water bodies, so sediment and surface water were not included as media of concern (Tetra Tech, 2010a). This compilation of existing sample information and analytical data was requested during a Data Quality Objectives (DQO) meeting with the Navy, the USEPA, and MassDEP to scope an additional investigation of the IOA Site. The information was used by the project team to identify data gaps and assist in scoping a Sampling and Analysis Plan (SAP) (Tetra Tech, 2011) to support additional sampling activities at the IOA.

The Technical Memorandum determined that the existing groundwater data adequately documented the IOA groundwater conditions and no additional groundwater data collection was required; groundwater was determined not to be a medium of concern (Tetra Tech, 2010a). Additionally, during a September 22, 2010 BRAC Cleanup Team (BCT) Meeting, it was agreed that if a review of existing groundwater data showed no exceedances of the MCP GW-2 standards, then no additional groundwater investigation would be necessary for the IOA site (Tetra Tech, 2010b). A review of existing IOA groundwater data was completed and included in the 2010 Technical Memorandum (Tetra Tech, 2010a). The IOA groundwater data review showed that concentrations did not exceed the MCP GW-2 standards. The 2010 Technical Memorandum concluded that the vapor intrusion pathway was not a concern at the IOA site and, therefore, groundwater was not a medium of concern.

Analysis of historic analytical data also showed subsurface soils to contain low levels of contaminants and concentrations generally decreased with depth (Tetra Tech, 2010b). Therefore, it was determined that site-wide subsurface soil was not a medium of concern and the project team recommended that the additional IOA investigation focus on the surface soils within the IOA with targeted collection of subsurface soil samples in the vicinity of RIA 33 and RIA 82 to address contamination remaining from earlier investigations of floor drain and potential UST releases at these locations. Site-wide surface soil samples and subsurface soil samples in the vicinity of RIA 33 and RIA 82 would be collected to address the data gaps identified by the project team.

1.2.4 2011 Investigation

In 2011, the Navy conducted the additional field investigation to address potential low-level dispersed contamination due to industrial operations in the IOA and assess suspected subsurface contamination remaining from floor drain and potential UST releases (RIA 33 and RIA 82, respectively). The field investigation was conducted by Tetra Tech in accordance with the SAP (Tetra Tech, 2011). The SAP was designed to focus on areas not previously sampled based on a review of the historical dataset and to document the potential presence or lack of contaminants associated with operations conducted in the IOA.

A grid approach was used for the surface soil investigation. The 20-acre site was divided into 49 exposure units (EUs) and each EU was approximately 0.5 acres based on a possible future residential use in portions of this area (Figure 1-3). Surface soil samples were collected from 42 EUs; soil samples were not collected in 7 EUs where no surface soil exposure was possible during industrial operations (no likelihood of release to the surface soil) and in closed sites where removal actions were completed or activity and use limits are in place. The surface soil (the depth interval of 0 to 2 feet bgs) target analyte groups included polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and metals. Surface soil samples were collected from the EUs where historical data were not available for one or more of the three analyte groups. The historical data were used along with 2011 surface soil data to complete the data set required for each EU. Surface soil samples were also collected for dioxin analysis at 12 EUs in the vicinity of the power plant (Building 8) based on potential atmospheric deposition of dioxins in those areas.

A separate, targeted approach was used for the subsurface investigation associated with RIA 33 and RIA 82 to determine whether contaminants remained after removal actions at the two RIAs were completed.

Field screening (PetroFLAG for total petroleum hydrocarbon [TPH]) at both RIA 33 and RIA 82 was conducted to select samples for laboratory analysis and reporting. Subsurface soil samples were collected at RIA 33 for field screening from depths below the previous floor drain removal action to the water table. The samples included five floor drain removal action confirmation sample locations and also step-out locations. Subsurface samples at RIA 82 were collected for field screening based on a 10-foot grid, at step out locations surrounding SB06-011, a soil sample location with historical exceedances. Subsurface borings were located within Building 117 (RIA 33) and between Building 117 and Building 8 (RIA 82). The subsurface soil (2 to 10 feet bgs) target analyte groups included volatile organic compounds (VOCs), PAHs, and metals.

The surface and subsurface soil analytical results for the samples included in the IOA data set were compared to USEPA Regional Screening Levels (RSLs) and Base background values (where appropriate). The results of the 2011 field investigation are reported in detail in the IOA Project Report (Tetra Tech, 2013). Appendix A contains selected data tables from the IOA Project Report. A summary of surface and subsurface results is presented in Section 1.3.

1.3 SUMMARY OF INVESTIGATION FINDINGS

1.3.1 Site Geology

Borings at the Site have generally encountered fine to medium sand and gravel, which is likely to be fill within the first few feet of the surface. According to the basewide study (Tetra Tech, 2000); near-surface soils are part of the Hollis-Charlton-Essex-Muck association. These materials consist of soil that formed from glacial till and partially from the underlying bedrock.

Bedrock beneath the Site is Dedham Granite, which is a Proterozoic-age igneous intrusive rock. The rock is described as a light grayish-pink to greenish-gray and has been metamorphosed to varying degrees. Bedrock core samples have been collected during a number of investigations and indicate that bedrock characteristics are relatively consistent throughout the Base. Bedrock is approximately 30 feet bgs.

1.3.2 Hydrogeology

The basewide groundwater flow assessment, which includes wells within the Site boundary, indicates that the groundwater table is generally flat and ranges from approximately 8 to 10 feet bgs. The overall groundwater flow direction at the Site is generally toward the west-southwest. The western portion of the IOA contains an area mapped as a medium-yield potentially productive aquifer (Tetra Tech, 2000).

1.3.3 Surface Water Hydrology

Surface water runoff at the IOA Site follows the site topography and empties into the base-wide storm drainage system, flowing toward the Tactical Air Navigation (TACAN) outfall drainage system, and ultimately discharging into French Stream. French Stream is located within the Southeastern Massachusetts Coastal Drainage Basin. There are no surface water bodies at or near the Site.

1.3.4 Ecological Setting

The IOA Site occupies roughly 20 acres near the center of the Base, as shown in Figure 1-1. This area of the Base is highly industrialized. Most of the Site is covered by pavement, buildings, or the former building slabs as depicted in Figure 1-2. The ecological habitat in the immediate vicinity of the Site is limited by the extensive pavement and urbanization. Because the surface of the Site is largely paved and is located in an urbanized area, the Site lacks any significant potential ecological habitat. No federally protected species are expected to live on the Site; however, it is possible that peregrine falcons could occasionally be observed. One state-listed Species of Special Concern, the Eastern box turtle (*Terrapene carolina*) has been observed in open, wooded areas on the east side of the Base. However, this species has not been observed at the IOA, which does not provide a suitable habitat for this species. No potential vernal pool habitat, as defined in the Massachusetts Wetlands Protection Act (M.G.L. c. 141s. 40) and its implementing regulations (310 Code of Massachusetts Regulations (CMR) 10.00), is present at the Site.

1.3.5 Nature and Extent of Contamination

The predominant contaminants present at the IOA Site are PAHs, PCBs, and metals, found in surface soil. Soil analytical results included in the IOA dataset are presented in Appendix A. Soil EUs and sampling locations are shown on Figure 1-3. The full sets of analytical results were compared to the USEPA RSLs (USEPA, 2014a). The historical extractable petroleum hydrocarbons (EPH) and volatile petroleum hydrocarbons (VPH) results were compared to the current MCP Method 1 S-1/GW-1 values (MassDEP, 2007). Analytical results that exceeded the RSLs were then compared to Base background values, where applicable (Stone & Webster, 2002). Exceedances of the RSL and Base background screening criteria are highlighted in Tables 1-1 through 1-4. The following section provides a summary of the surface and subsurface soil data evaluation for the IOA.

Surface Soil

A surface soil sample was collected in 2011 from any EU where historical data were not available for one or more of the four target analyte groups (PAHs, PCBs, metals, and dioxins) within the EU to complete the data set. A surface soil sample summary is presented in Appendix A-1. Forty-two surface soil samples were collected for analysis of one or more of the target analyte groups. Note that while the 2011 surface soil samples were collected from 0 to 2 feet bgs, some historical surface soil samples were collected from 0 to 3 feet bgs. Tables 1-1 and 1-2 present the exceedances of the screening criteria for PAHs, pesticides, and metals. Note that only the compounds with exceedances of the screening criteria are presented in Tables 1-1 and 1-2 due to the large volume of data associated with the IOA; the entire IOA soil data set is included in Appendix A-2.) If a duplicate sample was collected at a location the original, duplicate, and average concentrations are reported. The results of the data comparison for surface soil are presented below by analyte group.

<u>EPH/VPH</u>

EPH and VPH were detected in the historical surface soil data set, but there were no exceedances of the screening criteria in any of the historical samples. Therefore, the 2011 surface soil samples were not analyzed for EPH or VPH. It is recognized that petroleum, either defined as a separate contaminant or group of contaminants are not addressed under CERCLA unless detected with CERCLA-regulated contaminants. However this data is included in this report for the benefit of the Commonwealth of Massachusetts and other partners in the remedy.

<u>PAHs</u>

PAHs were the only semi-volatile organic compounds (SVOCs) in the historical surface soil data set with concentrations that exceeded screening criteria; therefore the 2011 samples were only analyzed for PAHs. Twenty three PAHs were detected in site surface soils, as presented in Appendix A-2. The PAHs in the historical and 2011 surface soil data set that exceeded the screening criteria were: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene. The highest concentrations of these compounds were from historical samples SB06-001 and SB06-002, associated with AOC 13 (EU28). The data from these two samples were included in the IOA evaluation, however, according to the *Final Removal Action Report for PSSA#1, RIA 100, RIA 3 and RIA 13* (Foster Wheeler, 2002b) and the *Addendum No. 1 to the Closeout Report Action Memorandum for AOC 13* (Tetra Tech EC, 2005), these two surface soil samples were excavated in 2001 and post-excavation confirmatory sampling was conducted in 2001 and again in 2004. Despite these reports and confirmation samples, there is varying representation of the locations of these two samples depicted in past reports and so there is uncertainty as to whether or not these locations have been fully excavated. The Navy recognizes the uncertainty and has determined that additional delineation within AOC 13 is appropriate (See Section 4.2.2 and 4.2.3).

The remaining PAH exceedances were primarily associated with EUs in the vicinity of EU28, including EU29, EU37, EU38, EU39, and EU40. In addition, indeno(1,2,3-cd)pyrene concentrations exceeded the screening criteria in the samples associated with EU08 and EU26 and dibenzo(a,h)anthracene concentrations exceeded the screening criteria in samples associated with 12 additional EUs. Note, the limit of detection (LOD) exceeded the screening criteria (USEPA RSLs) for benzo(a)pyrene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene in a number of samples. PAH results shown in Table 1-1 as not detected were used in the benzo(a)pyrene equivalents calculations described in the contaminant of potential concern (COPC) selection portion of the HHRA (Section 4.1.1 of the IOA Project Report) (Tetra Tech, 2013). In the HHRA, the benzo(a)pyrene equivalents calculations used one-half of the detection limit to represent non-detected results in the calculation. Using one-half of the detection limit for non-detects recognizes that the concentration of a PAH in a specific sample may be greater than zero even though the result is considered not detected above the detection limit specified.

Pesticides

Soil samples collected during the 2011 field investigation were not analyzed for pesticides. Fourteen pesticides were detected in historical surface soil samples, as presented in Appendix A-2. Heptachlor epoxide was the only pesticide with concentrations in historical surface soil samples that exceeded the RSL: at two locations, SB06-001 and SB06-002. These sample locations are associated with AOC 13. As noted above, these samples were included in the IOA evaluation but according to previous reports were excavated and confirmatory sampling was conducted (Foster Wheeler 2002b and Tetra Tech EC, 2005). Despite these reports and confirmation samples, there is varying representation of the locations of these two samples depicted in past reports and so there is uncertainty as to whether or not these locations have been excavated. The Navy recognizes the uncertainty and has determined that additional delineation within AOC 13 is appropriate (See Section 4.2.2 and 4.2.3).

PCBs

Aroclor-1260 was the only PCB analyte detected in surface soil. Concentrations of Aroclor-1260 in 18 of 66 samples analyzed exceeded the RSLs. Eight of these exceedances were reported in historical samples collected at EU15. The remaining exceedances were associated with EUs 7, 8 (two samples), 9, 10, 11, 16, 17, and 18, which are all located in the eastern portion of the Site north and east of EU15. There was also one exceedance, apparently associated with EU43 in the southwest portion of the Site.

Metals

Twenty three metals were detected in Site surface soils, as presented in Appendix A-2. Concentrations of nine metals (aluminum, arsenic, chromium, cobalt, iron, lead, manganese, thallium, and vanadium) exceeded the RSL and/or Base background screening criteria in two or more samples. In addition, calcium and magnesium concentrations exceeded Base background values in many samples; there are no USEPA RSLs for these metals. The maximum concentration of chromium was associated with EU28 (SB06-002) but as noted above, there is uncertainty about the location of this sample and whether or not it was excavated. The maximum concentrations of arsenic and iron were associated with EU49. EU28 and EU49 are located in the south central portion of the Site. The remaining maximum concentrations of metals were spread out: aluminum (EU30), cobalt (EU08), manganese (EU31), and thallium (EU09), which are all located in the northeastern or eastern portion of the Site.

The maximum lead concentrations were detected in EU39 and exceeded the RSL of 400 mg/kg. However, according to the Final Closeout Report for RIA 15 Water Tower – Addendum to Time Critical Removal Action Memorandum, the two surface soil sample locations (SB06-005 and SS06-020) in EU39 with lead concentrations exceeding the RSL were excavated in the March 2002 RIA 15 removal action (Foster Wheeler, 2002a). Therefore, there are no remaining surface soil sample locations with measured lead concentrations exceeding the RSL. Lead concentrations do not exceed the screening level in any other samples or EUs.

Dioxins

Seventeen dioxins were detected in surface soil samples. Recognized as the most toxic dioxin, 2,3,7,8-tetra chlorodibenzo-p-dioxin (TCDD) was reported in samples collected from eight locations, but none of the detected concentrations exceeded the RSL. The only dioxin concentration that exceeded its associated RSL was 2,3,4,7,8- pentachlorodibenzofuran (PECDF) in a sample from EU09. Since each dioxin compound has a different level of toxicity, Toxic Equivalents (TEQ), or weighted dioxin values, were calculated and are presented in Table 1-2. The TEQ, and the TEQ calculated using non-detects at half the detection limit, exceeded the associated RSLs at EU09, EU13, EU26, EU37, EU39, and EU43. The total heptachlorodibenzo-p-dioxins (HPCDD) concentration exceeded the RSL at EU13, EU15, EU37, and EU43. The dioxin analytical results in exceedance of the screening criteria are presented on Table 1-2.

Subsurface Soil

Subsurface soil samples were collected in the vicinity of RIA 33 and RIA 82 to determine whether contaminants remained after removal actions at the two RIAs were completed. Five subsurface soil samples were collected in the vicinity of RIA 33 and analyzed for VOCs, PAHs, and metals. Four subsurface soil samples were collected in the vicinity of RIA 82 and analyzed for PAHs and metals. Subsurface soil samples were collected from 2 to 10 feet bgs. Tables 1-3 and 1-4 present the detected analytical results in exceedances of the screening criteria. If a duplicate sample was collected at a location the original, duplicate, and average concentrations are reported. The complete subsurface soil data set is presented in Appendix A-3. The results of the data comparison for subsurface soil are presented below.

RIA 33:

VOCs

Three VOCs were detected at low levels in the subsurface soil samples collected at RIA 33, none of which exceeded the screening criteria. All three VOCs were detected in the sample collected from IOA-RIA33-SB10 from 3 feet to 5 feet bgs.

PAHs

Up to 17 PAHs were detected in one or more soil samples collected at RIA 33. Concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene exceeded the RSL at one or more sample locations as shown in Table 1-3. The most RSL exceedances were associated with sample location SB02 (four exceedances). Benzo(a)pyrene and dibenzo(a,h)anthracene were not detected in soil sample SB08-0305, but as noted in the data usability assessment, the LOD exceeded the screening criteria and therefore the RSL at this location.

Metals

As many as 20 metals were detected in one or more soil samples collected at RIA 33. Concentrations of aluminum, arsenic, chromium, cobalt, iron, manganese and thallium exceeded the associated screening criteria at one or more locations. Arsenic, chromium, cobalt, and iron concentrations exceeded the RSL at all five sample locations. Manganese concentrations exceeded the RSL at three of the five locations. Aluminum concentrations exceeded the screening criteria in the sample collected at SB14, but the concentration in the duplicate sample from this location did not exceed the criteria. Thallium concentrations exceeded the RSL at only one location (SB10)

RIA 82:

PAHs

There were no PAH detections in the soil samples collected from RIA 82. As noted in the data usability assessment, the LODs for benzo(a)pyrene and dibenzo(a,h)anthracene were greater than the screening criteria indicating the non-detected results may exceed the associated screening criteria.

Metals

Up to 18 metals were detected in one or more subsurface soil samples collected from RIA 82. Concentrations of arsenic, chromium, cobalt, and iron exceeded the associated RSL at one or more locations; none of the concentrations exceeded Base background values. Chromium concentrations exceeded the RSL at all four sample locations. Iron concentrations exceeded the RSL at sample locations SB02A, SB03A, and SB04A. Cobalt concentrations exceeded the RSL at sample locations SB03A and SB04A and arsenic exceeded the RSL at sample location SB04A, only.

1.3.6 Streamlined Human Health Risk Assessment

A streamlined human health risk assessment (HHRA) was performed following the evaluation of the analytical results to further characterize the potential threat to human health from exposure to Site soils. The historical surface and subsurface soil data were compiled with the 2011 analytical data and this complete IOA data set was used in the HHRA. The HHRA included chemicals with concentrations that exceeded both the RSLs and Base background values.

The HHRA identified contaminants of concern (COCs) based on exposures to hypothetical future residents, which was used as a scenario protective of all possible future land uses at the IOA. An ecological risk assessment was not required since the IOA is largely paved and located in the central industrial portion of the Base. The Site lacks any significant potential ecological habitat and there is no complete exposure pathway for ecological receptors. The results of the streamlined HHRA are reported in detail in the IOA Project Report (Tetra Tech, 2013).

The assessment was streamlined in the sense that it focused on two receptors of concern only, the hypothetical future resident and the hypothetical future commercial receptor (both including adult, child, lifetime risk). Risk estimates were provided for these receptors based on exposure point concentrations (EPCs) calculated for two surface soil areas and one subsurface soil exposure unit/area. Risk estimates were also presented on a location-by-location basis for the hypothetical future resident to allow for a more refined understanding of risk across the Site. The HHRA evaluated non-cancer health hazards, cancer risks, and lead exposures through quantitative assessments. The HHRA evaluated only reasonable maximum exposure (RME) risks to receptors as a conservative approach. This approach is in accordance with the Final Streamlined HHRA Work Plan for Areas of Concern at NAS South Weymouth (EA, 2001).

Selection of COPCs

COPCs were selected to represent site contamination and to provide the framework for the quantitative HHRA. The risk screening initially evaluated surface and subsurface soil by comparing data for these media to USEPA RSLs for residential soil (USEPA, 2014a) which provided the basis for screening criteria (risk-based concentrations [RBCs]) used to reduce the number of chemicals and exposure routes considered in the risk assessment. Residential soil criteria were developed with conservative exposure assumptions designed to represent a residential land use scenario. Screening with residential criteria should be protective of any other land use scenarios as well.

USEPA risk-based soil screening levels (SSLs) for the protection of groundwater (USEPA, 2014a) were also used for COPC selection. The groundwater protection SSLs were not used to select COPCs for quantitative risk calculation, but to provide a qualitative evaluation of the potential for chemical migration from soil to groundwater. Chemicals with concentrations exceeding the SSLs may potentially migrate from the soil to groundwater in sufficient quantities to pose concerns regarding groundwater quality. Maximum detected concentrations of each chemical in surface soil and subsurface soil at the Site were compared to the risk-based screening criteria.

A chemical was selected as a COPC if the maximum detected concentration was greater than the associated RBC representing a human cancer risk of 1 x 10^{-6} or a non-cancer hazard quotient (HQ) of 0.1. Chemicals exceeding USEPA risk-based SSLs are discussed qualitatively in the risk assessment (Tetra Tech, 2013). RSLs are based on an HQ of 1, but the screening criteria for non-carcinogens were adjusted to represent an HQ of 0.1. One-tenth of the RSL is recommended for non-carcinogenic chemicals to account for the potential cumulative effects of multiple compounds affecting the same target organ or system. Please refer to the HHRA (Section 4 of the IOA Project Report) for further details regarding the selection of COPCs.

Direct Contact COPC Selection for Surface Soil

The following chemicals were retained as direct contact COPCs for surface soil:

- PAHs: benzo(a)pyrene (BAP) equivalents, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene

- Pesticides/PCBs: Aroclor-1260 and heptachlor epoxide

- Metals: aluminum, arsenic, chromium, cobalt, iron, lead, and manganese

- Dioxins: 2,3,4,7,8-Pentachlorodibenzofuran (PECDF) and 2,3,7,8- Tetrachlorodibenzo-p-dioxin (TCDD) equivalents

These chemicals were identified as direct contact COPCs in surface soil because maximum concentrations exceeded the direct contact screening criteria.

Migration to Groundwater COPC Selection for Surface Soil

The following chemicals were retained as migration to groundwater COPCs for surface soil:

- VOCs: benzene

- SVOCs: 2-methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, chrysene, dibenzo(a,h)athracene, dibenzofuran, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene

- Pesticides/PCBs: 4,4'-dichlorodiphenyldichloroethane (DDD), 4,4'-dichlorodiphenyldichloroethylene (DDE), 4,4'-dichlorodiphenyltrichloroethane (DDT), aldrin, alpha-chlordane, Aroclor-1260, dieldrin, endrin ketone, gamma-chlordane, heptachlor, and heptachlor epoxide

- Metals: arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, and manganese

- Miscellaneous parameters: cyanide

- Dioxins: 1,2,3,4,6,7,8,9-octachlorodibenzo-p-dioxin (OCDD), 1,2,3,4,6,7,8- heptachlorodibenzo-p-dioxins (HPCDD), 1,2,3,4,6,7,8-heptachlorodibenzofuran (HPCDF), 1,2,3,4,7,8-hexachlorodibenzofuran (HXCDF), 1,2,3,6,7,8-hexachlorodibenzo-p-dioxin (HXCDD), 1,2,3,6,7,8-HXCDF, 1,2,3,7,8,9-HXCDD, 1,2,3,7,8-pentachlorodibenzo-p-dioxin (PECDD), 2,3,4,6,7,8-HXCDF, 2,3,4,7,8-PECDF, 2,3,7,8-TCDD, and 2,3,7,8- tetrachlorodibenzofuran (TCDF)

These constituents were identified as migration to groundwater COPCs in surface soil because maximum detected concentrations exceeded USEPA SSLs for groundwater protection, which indicates the potential for chemical migration from soil to groundwater.

Chemicals selected as surface soil COPCs for migration to groundwater were further evaluated to determine if the available soil and groundwater data indicate that these COPCs have negatively impacted groundwater quality. The refined migration to groundwater evaluation determined that only two COPCs (naphthalene and lead) may have negatively impacted groundwater quality. Further, there is no clear-site related pattern for the naphthalene and lead concentrations observed and these chemicals were not detected in available groundwater samples in EUs with surface soil concentrations exceeding the risk-based SSL.

Direct Contact COPC Selection for Subsurface Soil

The following chemicals were retained as direct contact COPCs for subsurface soil:

- SVOCs: BAP equivalents, benzo(a)pyrene, and dibenzo(a,h)anthracene
- Metals: arsenic, chromium, cobalt, and iron

These chemicals were identified as direct contact COPCs in subsurface soil because maximum concentrations exceeded the screening criteria based on the USEPA RSLs for residential soil.

Migration to Groundwater COPC Selection for Subsurface Soil

The following chemicals were retained as migration to groundwater COPCs for subsurface soil:

- VOCs: 1,1-dichloroethane and trichloroethene (TCE)
- SVOCs: benzo(a)pyrene, dibenzo(a,h)anthracene, and naphthalene
- Metals: arsenic, chromium, cobalt, iron, and lead

These chemicals were identified as migration to groundwater COPCs in subsurface soil because maximum concentrations exceeded USEPA SSLs for groundwater protection, which indicate the potential for chemical migration from soil to groundwater.

Chemicals selected as subsurface soil COPCs for migration to groundwater were further evaluated to determine if the available soil and groundwater data indicate that these COPCs have negatively impacted groundwater quality. The refined migration to groundwater evaluation determined that only one COPC (naphthalene) may have negatively impacted groundwater quality. Further, there is no clear-site related pattern for the naphthalene concentrations observed and naphthalene was not detected in available groundwater samples in EUs surrounding the RIA 33 subsurface soil samples.

Chemicals Potentially Attributable to Background

Several chemicals were eliminated as COPCs on the basis of screening against background values during the COPC selection process. In surface soil, thallium and vanadium concentrations were within the background values. In subsurface soil, benzo(a)anthracene, benzo(b)fluoranthene, indeno(1,2,3-cd) pyrene, aluminum, manganese, and thallium concentrations were within the background values. However, benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene concentrations were incorporated into BAP equivalents concentrations, and benzo(a)pyrene equivalents were evaluated in the quantitative HHRA because some of the individual carcinogenic PAH (cPAH)in subsurface soil exceeded screening criteria and background values. Therefore, these three cPAHs were already evaluated quantitatively. Thallium and vanadium in surface soil and aluminum, manganese, and thallium in subsurface soil were evaluated quantitatively to present total risks (i.e., site-related risks plus background risks). The results of the quantitative evaluation of chemicals with concentration within the background values are presented below, and associated risk spreadsheets are presented in Appendix D-6 of the IOA Project Report (Tetra Tech, 2013).

RISK ESTIMATES INCLUDING CHEMICALS OMITTED FROM THE HHRA ON THE BASIS OF BACKGROUND SCREENING – RME SCENARIO		
Receptor	**HI[1]**	**ILCR[1]**
Surface Soil – High Concentrations Area		
Child Commercial Receptor	0.4 (0.4)	1E-04 (1E-04)
Adult Commercial Receptor	0.05 (0.05)	2E-05 (2E-05)
Lifelong Commercial Receptor	NA	1E-04 (1E-04)
Future Child Resident	2[2] (2[2])	5E-04 (5E-04)
Future Adult Resident	0.2 (0.2)	8E-05 (8E-05)
Lifelong Resident	NA	6E-04 (6E-04)
Surface Soil – Low Concentrations Area		
Child Commercial Receptor	0.6 (0.7)	1E-05 (1E-05)
Adult Commercial Receptor	0.07 (0.09)	3E-06 (3E-06)
Lifelong Commercial Receptor	NA	2E-05 (2E-05)
Future Child Resident	3[2] (3[2])	6E-05 (6E-05)
Future Adult Resident	0.3 (0.3)	1E-05 (1E-05)
Lifelong Resident	NA	7E-05 (7E-05)
Subsurface Soil		
Child Commercial Receptor	0.1 (0.2)	1E-05 (1E-05)
Adult Commercial Receptor	0.01 (0.02)	2E-06 (2E-06)
Lifelong Commercial Receptor	NA	1E-05 (1E-05)
Future Child Resident	0.6 (0.9)	4E-05 (4E-05)
Future Adult Resident	0.06 (0.1)	8E-06 (8E-06)
Lifelong Resident	NA	5E-05 (5E-05)

(1) – Risk values not in parentheses are medium-specific risks calculated in the HHRA for COPCs only. Risk values shown in parentheses include chemicals eliminated on the basis of screening against background values.

(2) – Target organ-specific HIs do not exceed 1.

NA – Not applicable.

As shown in the table, cancer risks are equal whether chemicals with concentrations within the background values are included or excluded from the evaluation. HIs are slightly greater but are less than 1 on a target organ-specific basis for all receptors and data sets evaluated.

1.3.7 Summary and Conclusions

Two potential receptor groups were evaluated in the HHRA: future commercial receptors (based on zoning and allowable future land use), and future residents (based on zoning and allowable future land use and to be protective of all possible future land use scenarios). Surface soil was evaluated in two data groupings:

1) high concentrations area EUs; and 2) low concentrations area EUs (primarily based on cPAH results). Subsurface soil results were evaluated as a single data group. Additionally, a location-by-location evaluation was conducted for residents for both surface and subsurface soil. Only the RME exposure scenario was evaluated.

The HHRA determined that non-cancer hazards, estimated as part of the location-by-location evaluation for residents, exceeded 1 for sample locations within EUs 8, 10, 15, 17, 39, 43, and 49. The Hazard Index (HI) exceedances for EUs 8, 10, and 15 are due to Aroclor-1260 (calculated using non-cancer toxicity criteria for Aroclor-1254). Aroclor-1260 is the only chemical contributing to the HIs in EUs 8, 10, and 15, the target organ HIs (immune system) for each of these sample locations also exceeds 1, and Aroclor-1260 is a primary risk driver for each of these EUs. The detected concentrations of Aroclor-1260 reported for these locations were greater than 1 mg/kg, which is a federal Toxic Substances Control Act (TSCA) soil cleanup level for high occupancy areas (USEPA, 2005). In EUs 17, 39, 43, and 49, multiple chemicals contribute to the HI exceedances, including Aroclor-1260, dioxins, pesticides, and metals. However, only Aroclor-1260 and arsenic were identified as a primary risk driver in EU 17 and EU 49, respectively.

The HHRA also concluded that cancer risk, estimated as part of the location-by-location evaluation, exceeded 1×10^{-4} for sample locations in EUs 28, 29, 38, 39, and 40. The exceedances are primarily due to PAHs. At EU 28, heptachlor epoxide, arsenic, and chromium are also risk contributors. Arsenic and chromium are also risk drivers at EUs 29, 38, 39, and 40.

An evaluation of lead risks, based on location-by-location estimates, was also conducted. Lead was identified in EU 39 as a primary risk driver and COC for EU 39. However, according to the Final Closeout Report for RIA 15 Water Tower – Addendum to Time Critical Removal Action Memorandum, the two surface soil sample locations (SB06-005 and SS06-020) in EU 39 contributing to lead risk were excavated in the March 2002 RIA 15 removal action (Foster Wheeler, 2002a). Therefore, there are no remaining surface soil sample locations with measured lead concentrations exceeding the residential soil screening level of 400 mg/kg. Lead concentrations do not exceed the screening level in any other samples or EUs and, therefore, lead has been removed from the list of COCs for the IOA Site.

Chemicals of Concern

The COCs for the two surface soil data groupings and subsurface soil data group evaluation as well as the location-by-location evaluation are presented below. Based on the non-cancer and cancer risk evaluations, the following contaminants with non-cancer HQs greater than 0.1 that contribute to a target organ-specific HI exceeding 1 or with cancer risks greater than 1×10^{-6} in a scenario with total cancer risks greater than 1×10^{-4} were identified as COCs:

Data Groupings Evaluation

Medium/Data Grouping	Receptor	COCs
Surface soil – high concentrations area	Child resident Lifelong resident	BAP equivalents(1)(2), heptachlor epoxide(1)(2), 2,3,7,8-TCDD equivalents(2), arsenic(1)(2), chromium(1)(2)
Surface soil – low concentrations area	--	--
Subsurface soil	--	--

(1) – Selected as a COC based on child resident cancer risk.
(2) – Selected as a COC based on lifelong resident cancer risk.

Location-by-Location Evaluation

Medium/Location	Receptor	COCs
Surface soil – EU 8	Child resident	Aroclor-1260(1)
Surface soil – EU 10	Child resident	Aroclor-1260(1)
Surface soil – EU 15	Child resident	Aroclor-1260(1)
Surface soil – EU 17	Child resident	Aroclor-1260(1)
Surface soil – EU 28	Lifelong resident	cPAHs(2), heptachlor epoxide(2), arsenic(2), chromium(2)
Surface soil – EU 29	Lifelong resident	cPAHs(2), arsenic(2), chromium(2)
Surface soil – EU 38	Lifelong resident	cPAHs(2), arsenic(2), chromium(2)
Surface soil – EU 39	Child resident Lifelong resident	cPAHs(2), arsenic(2), chromium(2)
Surface soil – EU 40	Lifelong resident	cPAHs(2), arsenic(2), chromium(2)
Surface soil – EU 49	Child resident	Arsenic(1)

(1) – Selected as a COC based on child resident non-cancer risk.
(2) – Selected as a COC based on lifelong resident cancer risk.

It is noted that chromium risks are likely overestimated because it was assumed that chromium was present in the hexavalent state (i.e., toxicity criteria for hexavalent chromium were conservatively used in the assessment). Aroclor-1260 was selected as a COC in the location-by-location evaluation for the child resident using non-cancer toxicity criteria for Aroclor-1254. Additionally, naphthalene in surface soil (in several EUs) and subsurface soil (in RIA 33) were identified as COCs based on the migration to groundwater analysis.

Conclusions

The results of the IOA data evaluation and streamlined HHRA indicate that the surface soil was likely impacted by industrial operations, mainly in the center portion of the Site (EU 28, EU29, EU38, EU40 and EU49) where concentrations of PAHs, arsenic, and chromium exceed the risk-based screening criteria and the northeastern portion of the Site (EU8, EU10, EU15, and EU17) where concentrations of Aroclor-1260 exceed the screening criteria. COC exceedances of the risk-based screening criteria in EUs where risk is identified are shown on Figure 1-4.

Concentrations in site-wide soil were observed to decrease with depth bgs (Tetra Tech, 2010b). Additionally, risk to human health from subsurface soil at RIA 33 and RIA 82 was not found to exceed the USEPA target risk range (Tetra Tech, 2013), and therefore subsurface soils were determined not to be a medium of concern.

Based on a review of existing groundwater data, groundwater was determined not to be a medium of concern and no further groundwater sampling was recommended (Tetra Tech, 2010a). Groundwater samples included in the IOA dataset were analyzed for VOCs, SVOCs, PAHs, VPH, EPH, and metals. The groundwater dataset showed few detections of VOCs and few exceedances of the tapwater RSLs for the detected VOCs. In addition, few samples had metals concentrations that exceeded the tapwater RSLs. Vapor intrusion was determined not a future concern given a future residential use for the IOA (Tetra Tech, 2010a).

Surface water and sediment are not present within the IOA and, therefore, not media of concern.

The results of the 2011 field investigation, data evaluation, and HHRA were discussed at a BCT meeting on February 14, 2013. The Navy, USEPA, and MassDEP agreed at that time that the results of the 2011 field investigation, data evaluation, and HHRA provided sufficient evidence to justify a remedial action for surface soil under CERCLA.

2.0 DEVELOPMENT OF REMEDIAL ACTION OBJECTIVES

This section develops RAOs and presents cleanup goals for contaminated surface soil at the Site. The regulatory requirements and guidance (e.g., ARARs) that may potentially govern remedial activities are presented in this section. In addition, this section presents COCs for remedial action and the conceptual pathways through which these chemicals may affect human health and the environment. The cleanup goals for contaminated media are developed in this section, and GRAs that may be suitable to achieve the cleanup goals are presented. Finally, this section presents estimates of the volumes and mass of contaminated surface soils.

The IOA Site is in an area currently zoned for recreation district (RecD), Mixed-Use Village District (MUVD), the Village Center District (VCD), and Main Street Overlay District as designated in the Reuse Plan (SSTTDC, 2005). Based on the foregoing, the reasonably foreseeable future uses of the IOA Site include a broad range of uses that could include one or more of the following: recreational, institutional, commercial, office, retail, residential uses, and open space.

2.1 MEDIA OF CONCERN

Based on the results of the IOA Project Report and HHRA discussed in Sections 1.3.6 and 1.3.7 and the reasonable foreseeable future uses discussed above, the only medium of concern at the Site was determined to be surface soil due to the potential exposure of persons to contaminants in the surface soil under a possible future residential, or unlimited (recreational) use scenario. Therefore, remedial alternatives described in this FFS have been developed to address the potential unacceptable risks to residents, and recreational receptors who could be exposed to COCs in surface soil.

2.2 CHEMICALS OF CONCERN FOR REMEDIATION

COCs were selected based primarily on the cancer and non-cancer risk estimates provided in the HHRA section of the IOA Project Report (Tetra Tech, 2013) as modified by the reasonably foreseeable future uses of the Site as described above. The COCs carried forward in the FFS for the development of remedial alternatives are discussed below. PRGs are developed for the selected COCs in Section 2.4 of the FFS. As noted in Section 1.3.6 since the Site lacks any significant potential ecological habitat and there is no current complete exposure pathway for Site contaminants, an ecological risk assessment was not performed. There are no ecological COCs.

The list of COCs to be evaluated in the FFS include the COCs that contribute significantly to the cancer risk (using a 1 X 10^{-5} target cancer risk level) and/or HI (using a value of 1) for the hypothetical resident exposed to site surface soil:

- Benzo(a)pyrene Equivalents
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b) fluoranthene
- Benzo(k)fluoranthene
- Dibenzo(a,h)anthracene
- Indeno(1,2,3-cd)pyrene
- Aroclor-1260
- Heptachlor Epoxide
- 2,3,7,8-TCDD Equivalents
- Arsenic
- Chromium

2.3 REMEDIAL ACTION OBJECTIVES

RAOs are medium-specific goals that define the objective of conducting remedial actions to protect human health and the environment. The RAOs specify the COCs, potential exposure routes and receptors, and acceptable concentrations (i.e., cleanup goals) for the Site.

The development of cleanup goals is based on the most conservative of the reasonably foreseeable future uses of the Site discussed above and takes into consideration chemical-specific ARARs and TBCs criteria. Section 2.3.2 identifies the ARARs and TBCs for surface soil remediation.

2.3.1 Statement of Remedial Action Objectives

To protect the public from potential current and future health risks under possible future residential use, as well as to protect the environment, the following RAOs have been developed for surface soil at the Site.

- **RAO No. 1:** Prevent exposure (i.e. direct contact or ingestion) to COCs in soils exceeding risk-based cleanup goals.

2.3.2 ARARs and TBC Criteria

ARARs consist of any standard, requirement, criterion, or limitation under federal environmental law and 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.

In addition to ARARs, TBCs, which are non-promulgated, non-enforceable guidelines or criteria that may be useful for developing a remedial action or are necessary for determining what is protective to human health and/or the environment may be identified.

According to 40 CFR 300.430(f)(1)(i)(A), overall protection of human health and the environment and compliance with ARARs are threshold requirements that each remedial alternative must meet to be eligible for selection.

2.3.2.1 Definitions

The NCP at 40 CFR 300.5 provides the following definitions for ARARs:

- 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.

- Relevant and Appropriate Requirements are cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law, although not "applicable" to a hazardous substance, pollutant, contaminant, or remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site.

Per 40 CFR 300.400(g)(3), other advisories, criteria, or guidance are to be considered for a particular release. The TBC category consists of advisories, criteria, or guidance developed by USEPA, other federal agencies, or states that may be useful in developing CERCLA remedies.

Under CERCLA Section 121(d)(4), an ARAR can be waived if one of the following conditions can be demonstrated:

- The remedial action selected is only part of a total remedial action that will attain the ARAR level or standard of control upon completion.

- Compliance with the requirement will result in greater risk to human health and the environment than other alternatives.

- Compliance with the requirement is technically impracticable from an engineering perspective.

- The remedial action selected will attain a standard of performance that is equivalent to that required by the ARAR through the use of another method or approach.

- With respect to a state requirement, the state has not consistently applied the ARAR in similar circumstances at other remedial actions within the state.

- Compliance with the ARAR will not provide a balance between protecting public health, welfare, and the environment at the facility with the availability of Superfund money for response at other facilities (fund-balancing). This condition only applies to Superfund-financed actions.

USEPA, in various guidance documents and the NCP, has divided ARARs into three categories to facilitate identification. Chemical-specific and location-specific ARARs are identified early in the process, generally during the RI, and action-specific ARARs are normally identified during the FS in the detailed analysis of alternatives. These three types of ARARs are defined as follows:

- Chemical-Specific: Health or risk-based numerical values or methodologies that establish concentration or discharge limits for particular contaminants. Examples include maximum contaminant levels (MCLs) and Clean Water Act (CWA) National Recommended Water Quality Criteria (NRWQC).

- Location-Specific: Restrict actions or contaminant concentrations in certain environmentally sensitive areas. Examples of these areas regulated under various federal laws include floodplains, wetlands, and locations where endangered species or historically significant cultural resources are present.

- Action-Specific: Technology or activity-based requirements, limitations on actions, or conditions involving special substances. Examples of action-specific ARARs include Resource Conservation and Recovery Act (RCRA) regulations for generation, characterization, and management of hazardous wastes and CWA effluent limitations and pre-treatment standards for wastewater discharges.

The following section discusses chemical- and location-specific ARARs and TBCs. Action-specific ARARs and TBCs are presented in Section 2.5.2 along with the discussion of GRAs.

2.3.2.2 Chemical-Specific ARARs and TBCs

Federal and state chemical-specific ARARs and TBCs provide some medium-specific guidance on "acceptable" or "permissible" concentrations of contaminants. Table 2-1 presents federal and Massachusetts chemical-specific ARARs and TBCs for this FFS.

2.3.2.3 Location-Specific ARARs and TBCs

Federal and state location-specific ARARs and TBCs place restrictions on concentrations of contaminants or the conduct of activities based on the site's particular characteristics or location. Table 2-2 presents federal and Massachusetts location-specific ARARs for this FFS.

2.4 PRELIMINARY REMEDIATION GOALS

Site-specific PRGs were developed for the Site to establish target cleanup goals for remedial actions to reduce COC concentrations in Site media and mitigate the unacceptable risks to human health and the environment (Table 2-3).

In April 2013, as part of the HHRA, site-specific risk-based PRGs were calculated for the COCs based on exposures of hypothetical future residents to surface soil. In December 2014, PRGs for COCs were reviewed and re-calculated for hypothetical residential receptors to surface soil to accommodate recent updates in exposure assumptions published in scientific literature and in regulatory guidance documents. PRG calculations are included in Appendix B and the differences between the 2013 versus 2014 PRGs for hypothetical residents are presented in *Appendix B-4: PRG Calculation Summary*. No major changes were noted in the residential PRGs.

PRGs developed by risk-based calculations as described above were compared with site background concentrations (as available). Either the PRGs or surface soil background values (whichever greater) were selected as the proposed cleanup goals for each COC (Table 2-3). The concentrations of the COCs in the IOA data set, for those EUs where risks were identified, were then compared to the proposed cleanup goals. Final cleanup goals for the selected Site remedial action will be documented in the ROD.

The methods used to develop candidate PRGs are discussed below.

2.4.1 <u>Human Health Risk-Based Preliminary Remediation Goals</u>

Chemicals that pose unacceptable human health risks were identified as COCs for human receptors as described in Section 2.2. Human health risk-based PRGs were developed for those COCs; Table 2-3 includes a summary of the hypothetical resident PRGs calculated. PRG calculations are included in

Appendix B of this FFS. Refer to Sections 4 and 5 and Appendix F in the IOA Project Report for an in-depth discussion of compound specific risks and calculation of PRGs, respectively (Tetra Tech, 2013).

Risk-based PRGs are proposed cleanup levels that are based on human health risks, and are intended to be protective of human health. PRGs were derived for the COCs identified in Site surface soil. The methodology used to derive PRGs for surface soil at the Site is described below. As such, Table 2-3 presents the PRGs that were developed to be protective of residential exposure to PAHs, PCBs, and metals in surface soil based on the RAO stated in Section 2.3.1.

Direct physical contact with soil at the IOA Site may result in the incidental ingestion of chemicals, dermal absorption of chemicals, and inhalation of fugitive dusts/volatiles from soil. Chemical intakes for these exposure pathways were estimated according to standard USEPA guidance (e.g., USEPA 1989, 1991, 2004, and 2009) and the equations presented in the PRG calculation sheets (Appendix B). Default exposure assumptions described in the standard USEPA guidance (e.g., USEPA, 2014b) were used for estimating intakes and are summarized in the PRG calculation spreadsheets (Appendix B).

As noted in these PRG calculations, a value of 0.6 was used for the relative bioavailability (RBA) for arsenic (USEPA, 2012). An RBA value of 1 was used for all other chemicals.

For calculating dermal exposures, the soil adherence factors presented are those listed in Exhibits 3.3 and 3.5 of Risk Assessment Guidance for Superfund (RAGS) Part E. A value of “0” was used for the absorption factor for chemicals lacking dermal absorption factors in RAGS Part E. The following dermal absorption factors were used (USEPA, 2004): PAHs (0.13), SVOCs (0.1), PCBs (0.14), dioxins/furans (0.03), and arsenic (0.03).

The concentrations of chemicals in air resulting from emissions from soil are developed following procedures presented in USEPA’s Soil Screening Guidance (USEPA, 2002) and calculated using the equations presented in the PRG calculation sheets (Appendix B). The particulate emissions factor (PEF) used in the equation relates the concentration of the chemical in soil to the concentration in dust particles in air. A PEF value of $1.1 \times 10^{+10}$ m^3/kg was obtained from USEPA’s Regional Screening Level Calculator (USEPA, 2015). This is the default PEF for Hartford, Connecticut, which is the closest city to NAS South Weymouth listed for this reference. Ambient air concentrations resulting from the volatilization of chemicals from soil were not calculated because no volatile chemicals were selected as COCs.

The cancer slope factors (CSFs), inhalation unit risks (IURs), reference doses (RfDs), and reference concentrations (RfCs) used in equations were obtained from USEPA literature sources using the hierarchy specified in USEPA guidance (USEPA, 2003). PRGs for mutagenic chemicals were calculated using the equation for mutagenic chemicals presented in PRG calculation sheets and include age-dependent adjustment factors (ADAFs) that are used for the 0- to 2-year- old child, 2- to 6-year-old child, 6- to 16-year-old adult, and 16- to 30-year-old adult (ADAFs are 10, 3, 3, and 1, respectively). PRGs presented in the spreadsheets were calculated using a target cancer risk of 1E-06 for carcinogens and a target hazard index of 1 for non-carcinogens. Please refer to Sections 4 and 5 and Appendix F in the IOA Project Report for further discussion of compounds specific risks and calculation of PRGs, respectively.

For each scenario, the risk-based PRGs were calculated for each COC representing the 1 x 10^{-5} cancer risk level and HI of 1 for each COC based on the exposure routes in each scenario (see Appendix B). The lower of the values was selected as the human health risk-based PRG for each scenario. These selected human health risk-based PRGs represent values protective of both cancer and non-cancer risks. For a given COC, the lowest of the carcinogenic and non-carcinogenic risk values was carried forward for comparison with other potential PRGs.

2.4.2 ARARs and TBCs

Tables 2-1 and 2-2 lists the ARARs and TBCs associated with this FFS. ARAR-based PRGs are applicable standards that are pertinent of the media of concern. Under provisions of the MCP, State standards that are published for contaminants in soil are not considered “applicable” or “relevant and appropriate” as the site is “regulated under CERCLA (310 CMR 40.0111), however, state risk thresholds will be considered as TBCs to meet the intent of the MCP.

Massachusetts has default exposure scenarios (e.g., S-1, S-2, etc.) for soil under the MCP (310 CMR 40.0933). However, according to the MCP the use of default standards (i.e., Method 1 standards) are excluded when a site-specific risk characterization approach is applied, such as a MCP Method 3 risk characterization or a CERCLA risk assessment. As summarized in Section 1.3, the Navy has completed a CERCLA risk assessment for the Site. The Navy has developed site-specific risk-based cleanup goals (Section 2.2) which will be considered in the PRG selection for the Site; State risk thresholds will be considered as TBCs.

2.4.3 Background Concentrations

Background concentrations may be used for consideration as PRGs, since background values represent contaminant concentrations in the absence of Site activities when no excess risk is anticipated. Background concentrations are used in selection of PRGs because it is not reasonable and may not be possible to remediate Site media to concentrations that are lower than background conditions. Further, it is Navy policy to only address those risks associated with chemical concentrations that are elevated as a result of a site-related release. Background values for the selected COCs are presented in Table 2-3.

2.4.4 Selection of Proposed PRGs

The hypothetical resident risk-based PRGs were typically selected except where they were less than the background value. In those cases, the background value was used. The selected PRGs are the COC concentrations that would provide the highest level of protection of human health and the environment, while still being reasonably achievable by current remediation techniques. Table 2-3 presents the selected PRGs and the basis for selection.

2.5 GENERAL RESPONSE ACTIONS AND ACTION-SPECIFIC ARARS

GRAs describe categories of actions that could be implemented to satisfy or address a component of an RAO for the site. Remedial action alternatives will then be developed using GRAs individually or in combination to meet RAOs. The remedial action alternatives, composed of GRAs, will be capable of achieving the RAOs for surface soil above PRGs at the Site.

2.5.1 General Response Actions

The following GRAs will be considered for surface soil at the IOA Site:

- No Action
- Limited Action
- Containment
- Removal

2.5.2 Action-Specific ARARs

Action-specific ARARs and TBCs are technology- or activity-based regulatory requirements or guidance that would control or restrict remedial action. Action-specific ARARs and TBCs for each alternative are developed and presented in Section 4.

2.6 ESTIMATED VOLUME AND MASS OF CONTAMINATED SURFACE SOIL

2.6.1 Volume of Contaminated Surface Soil

The approximate areas of surface soil (Areas 1 through 10) with COC concentrations above PRGs in EUs with identified risk are illustrated on Figure 2-1: Proposed Remedial Action Areas. A description of the approximate remedial action areas (Areas 1 through 10) and the estimated volume of surface soil with COC concentrations above PRGs are provided in Table 2-4. Each remedial action area targets a surface soil sample location with a COC, or COCs, exceeding the selected PRGs. The remedial action areas are approximate areas based on existing IOA data. The remedial action areas and soil quantities to be remediated will be further defined by additional soil sampling to be completed prior to the remedial action which will be described in the Remedial Action Work Plan (RAWP). The lateral extent of the impacted soil is estimated to cover 10 target areas ranging in size from 100 ft^2 to 10,000 ft^2 with a total approximate remedial action area of 25,100 ft^2.

Soil sample data evaluated in the IOA Project Report revealed elevated COC concentrations in surface soils (0 to 2 feet bgs); the IOA Project Report did not identify human health risks associated with exposure to subsurface soils at RIA 33 or RIA 82 (Tetra Tech, 2013). Based on the proposed removal area dimensions derived in the preceding text, the total volume of contaminated surface soil is estimated at 1,862 cubic yards (Table 2-4). It is recognized, however, that these dimensions are subject to change based on additional data collected during the remedial action.

2.6.2 Mass of Contaminants

The masses of contaminants in surface soil were estimated using the IOA dataset and the quantity of affected soils as described above. The estimated mass of contaminants is summarized in Table 2-4; the calculations are included in Appendix C. These calculated values are presented for reference. Actual contaminant mass will be dependent on the final volume of soils addressed by the remedy. For areas where multiple data points are available, an average concentration was used to estimate this mass. For areas where only one data point is currently available, the single concentration reported was used to estimate the mass.

3.0 SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS

This section identifies, screens, and evaluates the potential technologies and process options that may be applicable to the remedial alternatives for the IOA. The primary objective of this phase of the FFS is to develop an appropriate range of remedial technologies and process options to be used for developing the remedial alternatives.

The basis for technology identification and screening began in Section 2.0 with a series of discussions that included the following:

- Identification of ARARs
- Development of RAOs and PRGs
- Identification of GRAs
- Development of estimated areas and volumes of contaminated soil

Technology screening evaluation is performed in this section with the completion of the following analytical steps:

- Identification and screening of remedial technologies and process options
- Evaluation and selection of representative process options

A variety of technologies and process options are identified under each GRA (see Section 2.5.1) and screened. The selection of technologies and process options for initial screening is based on the "Guidance for Conducting RI/FS's under CERCLA" (USEPA, 1988). The screening is first conducted at a preliminary level to focus on relevant technologies and process options. Then the screening is conducted at a more detailed level based on certain evaluation criteria. Finally, process options are selected to represent the technologies that have passed the detailed evaluation and screening.

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

<u>Effectiveness</u>

The effectiveness evaluation is focused on the following elements:

- Potential effectiveness of process options in handling the estimated areas or volumes of media of concern and in meeting the RAO.

- Potential impacts to human health and the environment during the construction and implementation phases.

- Reliability and proven effectiveness of the process with respect to the COCs and the site-specific conditions.

Implementability

The implementability evaluation includes both the technical and institutional (administrative) feasibility of implementing each technology or process option. This initial technology screening eliminates technology types or process options that are clearly ineffective or unworkable at the Site. The institutional aspects considered include the following:

- Potential for obtaining regulatory approval
- Availability of necessary equipment and skilled workers to implement the technology
- Availability of treatment, storage, and disposal services
- Time required for implementation
- Ability to achieve the applicable remediation standards within a reasonable timeframe.

Cost

For this screening evaluation, a qualitative cost analysis is presented to indicate whether costs are prohibitive or if other process options within the same technology type were comparably effective and implementable but less costly. Preliminary cost estimates for the remedial technologies retained in the screening steps are presented in Section 4 as part of each of the remedial alternatives developed from the technologies retained in this section.

3.1 PRELIMINARY SCREENING OF SOIL TECHNOLOGIES AND PROCESS OPTIONS

This section identifies and screens remediation technologies and process options for soil based on implementation with respect to site-specific conditions and COCs. The results of this preliminary screening process are summarized on Table 3-1 which presents the GRAs, identifies the technologies and process options, and provides a brief description of each process option followed by comments about the results of the screening process.

Table 3-1 shows that in-situ treatment and ex-situ treatment GRAs are eliminated as a result of the screening process. The following are the soil technologies and process options remaining for detailed screening in Section 3.2:

General Response Action	Technology	Process Options
No Action	None	Not applicable
Limited Action	LUCs	Site use restrictions
Containment	Surface Cover/Barrier	Asphalt capping
Removal	Excavation	Mechanical

3.2 DETAILED SCREENING OF SOIL TECHNOLOGIES AND PROCESS OPTIONS

3.2.1 No Action

No Action consists of maintaining the status quo at the Site. As required under CERCLA regulations, the No Action alternative is carried through the FFS to provide a baseline for comparison with other alternatives and their effectiveness in mitigating risks posed by site contaminants.

Effectiveness

No action would not be effective in meeting the soil RAOs. No action would not actively reduce the toxicity, mobility, or volume of contaminants in the soil. There would be no reduction in risk through exposure control or treatment. Arsenic contamination would remain and, although PAHs and PCBs might degrade through natural processes over time, this would not be verified.

Implementability

There would be no implementability concerns because no action would be implemented.

Cost

Because hazardous substances, pollutants, or contaminants would be present on the Site in excess of levels that allow for unlimited use and unrestricted exposure, statutory five-year reviews would be conducted. Costs would be low.

Conclusion

No Action is retained because of NCP requirements, although it would not be effective.

3.2.2 Limited Action

Only land use controls (LUCs) are considered under this GRA.

LUCs would be designed to protect public health from residual contamination at environmental restoration sites. LUCs would consist of administrative or legal mechanisms (e.g., deed or zoning restrictions, permits, etc.) designated as institutional controls and/or physical controls (e.g., fencing, security guards, etc.) designated as engineering controls. Site-specific LUCs would typically be formulated through a LUC Remedial Design (RD) that is prepared in accordance with the Navy's LUCs Principles (Department of Defense [DOD], 2003) following approval of the ROD. LUCs would typically also include the performance of regular site inspections to verify continued implementation. Depending upon the site-specific conditions, LUCs can be used alone or in conjunction with other remedial actions.

Effectiveness

Site use restrictions would be effective for minimizing human exposure to site COCs through the use of access controls and/or implementation of deed restrictions. Permanent or interim deed or zoning restrictions could be effectively used to control site use permanently if no other remedial measures were undertaken or temporarily while remediation is ongoing. The effectiveness of these measures would be dependent on adequate enforcement of administrative controls. Signage may be used to indicate that LUCs may be implemented on the Site. Physical restrictions such as fencing, physical barriers, and site security would be applicable during implementation and construction activities. Short-term LUCs could be effectively implemented during performance of the remedial action until the cleanup goals are reached.

Implementability

The site is currently controlled by the Navy, though at some point after the remedy is complete, the property will be transferred to the local reuse developer or other new owner. The IOA is currently zoned for mixed use, and the current use is industrial. There are no unacceptable risks to current site use scenarios, however, since the Site will be redeveloped in the future, limitations on potential use (e.g., residential use restrictions) of the Site would be readily implementable as part of the property transfer process and documentation. Short-term LUCs would be easily implemented until the remedial action is complete.

Cost

Site use restrictions are generally inexpensive, although continued administration, enforcement, and maintenance are required if applied long-term.

Conclusion

LUCs are retained only for use in combination with other process options for the development of soil remedial alternatives.

3.2.3 Containment

The technology considered under this GRA is capping. Capping would consist of maintaining the existing pavement over contamination to prevent direct exposure, or replacing that pavement where existing pavement has become significantly compromised.

Effectiveness

Capping would not of itself remove the soil contaminants or reduce their toxicity. Nonetheless, capping is a well-established and proven technology that would be effective in preventing direct exposure to contaminated soil and preventing off-site erosion. Use of pavement for capping would require ensuring that the pavement is intact to the extent that the pavement provides a protective barrier for preventing access and exposure to the underlying soils. Long-term maintenance of the cap and long-term monitoring through a LUC would ensure the continued effectiveness of the cap. Because the effectiveness of a cap depends on the strict maintenance of its integrity, this technology is typically incompatible with residential development that would make such maintenance very difficult. Capping can sometimes be difficult to maintain in industrial/commercial scenarios, although caps are typically under single ownership and easier to control.

Implementability

Maintenance of the existing pavement over areas of contaminated soil would be relatively easy to implement. Materials and services required to implement this technology are readily available. The maintenance of a cap may also restrict certain future uses of the site if contaminated soil is left in place. Risk of worker exposure to contaminated soil during cap maintenance would be adequately mitigated by the wearing of appropriate personal protective equipment (PPE) and by compliance with Occupational Safety and Health Act (OSHA) regulations and site-specific health and safety procedures. An accompanying LUC may be required to ensure such protections are used during maintenance and installations of underground utilities and foundations.

Cost

Installation of new caps on areas already graded and previously paved is considered low. Complexities could arise if modification of drainage systems, curbs, and utility structures is required. This is particularly problematic when upgrading surface materials to ensure the surface is capped with an adequate barrier thickness. The operation and maintenance (O&M) costs for existing caps would be low to moderate.

Conclusion

Capping is retained for the development of soil remedial alternatives for the site. Capping would be used to prevent exposure to surface soils.

3.2.4 Removal

The technology considered under this GRA is excavation, including off-site landfilling.

A variety of equipment such as front-end loaders, backhoes, and grade-alls could be used to perform surface soil excavation. The type of equipment selected must take into consideration several factors such as the type of material to be removed, the load-bearing capacity of the ground surrounding the removal area, the depth and areal extent of removal, the required rate of removal, and the elevation of the water table. Excavation is the technology of choice for the removal of well-consolidated material such as soil from well-defined areas of ground with significant load-bearing.

The logistics of excavation must take into account the available space for operating the equipment, loading and unloading of the excavated material, location of the site, etc. After excavation is completed, the location would be filled and graded with clean fill material.

Off-site landfilling would consist of transporting excavated soil for burial at an off-site permitted disposal facility. Hazardous waste would be disposed at a permitted treatment, storage, and disposal facility (TSDF). Soil contaminated with PCBs would be disposed of at a TSCA-permitted facility.

Effectiveness

Excavation is a well-proven and effective method of removing contaminated soil from the unsaturated zone. Properly designed and implemented excavation would remove soil with elevated concentrations of COCs, and the remaining soil would not pose an unacceptable risk to human health or the environment. Excavation of soil from below the water table is not very effective because of the difficulty in controlling the excavation and handling the wet, saturated soil.

Although the CERCLA preference for treatment relegates landfilling to a less preferable option, this technology can be an effective disposal option for contaminated soil. Removal of the contaminants eliminates the exposure path and all of the soil RAOs would be met. Off-site 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 hazardous (Subtitle C) landfill are typically more stringent than those of a RCRA non-hazardous (Subtitle D) solid waste landfill. Prior to disposal, the soil, if hazardous, may need to be treated to conform to Land Disposal Restrictions (LDRs). However, based on the measured concentrations of COCs in the target area surface soils, the excavated soil is not anticipated to be hazardous.

Implementability

Excavation of contaminated soil at the IOA would be implementable. Excavation equipment is readily available from multiple vendors. This technology is well proven and established in the construction/remediation industry. During excavation, site-specific health and safety procedures such as the use of PPE and OSHA regulations would have to be complied with to ensure that the exposure of workers to COCs is minimized. Based on previous analytical results, the contaminated soil is not expected to be hazardous, although some of the soil is TSCA-regulated. However, if any of the soil is determined to be hazardous, excavation, stockpiling, and transportation operations would need to conform to RCRA regulations.

Because excavation at this site would be limited to approximately 2 feet bgs, sloping of the sidewalls of the excavation would not excessively increase the footprint of the excavation. Shoring may be needed because there are structures in the vicinity of the contaminated soil, though it is not currently anticipated. Existing utilities lines may need to be guarded, supported or rerouted. The railroad spur will be an obstacle that will need to be removed in some areas, and this is a complication. However, since it is not in use, it will not need to be replaced.

Off-site landfilling would be easily implementable. Facilities and services are available. Disposal of any hazardous soil would require pre-treatment to meet LDRs prior to landfilling.

Cost

Costs for excavation, including off-site landfilling, would be relatively low to moderate.

Conclusion

Excavation, including off-site landfilling, is retained in combination with other process options for the development of soil remedial alternatives.

3.3 SELECTION OF REPRESENTATIVE TECHNOLOGIES AND PROCESS OPTIONS FOR SOIL

The following technologies and process options, under the GRAs as noted, were retained for the development of soil remedial alternatives:

- No Action
- Limited Action: LUCs
- Containment: Asphalt Capping
- Removal: Excavation and Off-Site Disposal

The next step was to select representative process options from each technology to assemble an adequate variety of remedial alternatives and evaluate the alternatives in sufficient detail to aid in the final selection process. These remedial alternatives are presented in Section 4.

4.0 ASSEMBLY AND DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES

This section presents an evaluation of each remedial alternative with respect to the criteria of the NCP (40 CFR Part 300). These criteria and their relative importance are described in the following subsections.

4.1 DEVELOPMENT OF REMEDIAL ALTERNATIVES FOR SURFACE SOIL

As previously outlined in Sections 2.3 and 2.5 of this FFS, RAOs and GRAs for the Site were developed to mitigate unacceptable risks to human health associated with concentrations of PAHs, PCBs, and metals in surface soil. This section presents the development and detailed analysis of the remedial alternatives for surface soil to achieve the Site RAOs. Each alternative was developed from the technologies that were retained from the screening process presented in Section 3. From the technologies retained from the preliminary screening summarized in Table 3-1, the following potential remedial alternatives were developed to mitigate the concentrations of COCs exceeding PRGs in surface soil the Site:

- Alternative S-1: No Action
- Alternative S-2: Excavation and Off-Site Disposal
- Alternative S-3: Asphalt Capping and LUCs

4.1.1 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

The last two evaluation criteria, State Acceptance and Community Acceptance, are not formally addressed until the ROD is prepared. Each of the remaining seven criteria is discussed below.

4.1.1.1 Overall Protection of Human Health and the Environment

Alternatives must be assessed for adequate protection of human health and the environment, in both the short and long term, from unacceptable risks posed by hazardous substances or contaminants present at the Site by eliminating, reducing, or controlling exposure to levels exceeding PRGs. Overall protection draws on the assessments of the other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs.

4.1.1.2 Compliance with ARARs

Alternatives must be assessed to determine whether they attain ARARs under federal environmental laws and state environmental or facility siting laws. CERCLA Section 121(d) specifies in part that remedial actions for cleanup of hazardous substances must comply with requirements and standards under federal or more stringent state environmental laws and regulations that are applicable or relevant and appropriate (i.e., ARARs) to the hazardous substances or particular circumstances at a site or a waiver must be obtained [see also 40 CFR 300.430(f)(1)(ii)(B)]. ARARs include only federal and state environmental or facility siting laws/regulations and do not include occupational safety or worker protection requirements. In addition, per 40 CFR 300.405(g)(3), other advisories, criteria, or guidance may be considered in determining remedies (TBC guidance category).

4.1.1.3 Long-Term Effectiveness and Permanence

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 to be 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 should be considered to the degree that they remain hazardous, taking into account their volume, toxicity, mobility, and propensity to bio-accumulate.

- Adequacy and Reliability of Controls - Controls such as containment systems and LUCs that are necessary to manage treatment residuals and untreated waste must be shown to be reliable. Examples include: the uncertainties associated with land disposal for providing long-term protection from residuals; assessment of the potential need to replace technical components of the alternative such as a cap, a slurry wall, or a treatment system; and potential exposure pathways and risks posed if the remedial action fails.

4.1.1.4 Reduction of Toxicity, Mobility, or Volume through Treatment

In evaluating this criterion, an assessment should be made as to whether treatment is used to reduce principal threats, including the extent to which toxicity, mobility, or volume are reduced either alone or in combination. Factors to be considered, as appropriate, include the following:

- The treatment processes the alternative employs and the materials that these processes will treat.
- The amount of hazardous materials that will be destroyed or treated, including how the principal threat(s) will be addressed.
- The degree of expected reduction in toxicity, mobility, or volume measured as a percentage of reduction (or order of magnitude).
- The degree to which the treatment is irreversible.
- The type and quantity of residuals that will remain following treatment considering the persistence, toxicity, mobility, and propensity to bio-accumulate of such hazardous substances and their constituents.
- The degree to which treatment reduces the inherent hazards posed by the principal threats at the site.

4.1.1.5 Short-Term Effectiveness

The short-term effectiveness of the alternatives must be assessed considering the following:

- Short-term risks that might be posed to the community during implementation.
- Potential impacts on workers during the remedial action and the effectiveness and reliability of protective measures.
- Potential environmental impacts of the remedial action and the effectiveness and reliability of mitigation measures during implementation.
- Time until protection is achieved.

Although not a CERCLA criterion, the sustainability of each alternative is evaluated per Navy policy. Sustainability factors are similar to those evaluated as part of the Short-Term Effectiveness criterion, so they are discussed in this section. Sustainability evaluations provide insight into elements of a remedy that have the greatest impact on the environmental footprint. For example, the amount of greenhouse gas (GHG) emissions related to materials production generally exceeds that from installation, transportation, or operations. Other factors that are considered include emissions of criteria air pollutants, water usage, and energy consumption. Sensitivity analysis of such factors can help provide an optimal design that minimizes the overall environmental footprint of the remedial action. Sustainability evaluations were performed for each remedial alternative and are provided in Appendix D.

4.1.1.6 Implementability

The ease or difficulty of implementing the alternatives must be assessed by 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 ability and time required to obtain any necessary approvals and permits from other agencies (for off-site actions).

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

4.1.1.7 Cost

Capital costs, including both direct and indirect costs and annual O&M costs are provided. A net present value of the capital and O&M costs is also provided. Typically, the cost estimate accuracy range is plus 50 percent to minus 30 percent.

4.1.2 Relative Importance of Criteria

Among the nine criteria, the threshold criteria must be met by the alternatives presented. Threshold criteria are considered to be:

- Overall Protection of Human Health and the Environment
- Compliance with ARARs (excluding those that may be waived)

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 Contaminant Toxicity, Mobility, or Volume through Treatment
- Short-Term Effectiveness
- Implementability
- Cost

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

The remaining two of the nine criteria, State Acceptance and Community Acceptance, are considered to be modifying criteria that must be considered during remedy selection. The state's concerns that must be assessed include the state's position and key concerns related to the preferred alternative and other alternatives and State comments on ARARs or the proposed use of waivers. The assessment of community acceptance consists of responses of the community to the Proposed Plan and includes determining which components of the alternatives interested persons in the community support, have reservations about, or oppose. These last two criteria will be evaluated after the FS has been reviewed by the Commonwealth of Massachusetts and the Proposed Plan has been discussed at a public meeting. Therefore, this document addresses only seven of the nine criteria.

4.1.3 Selection of Remedy

The selection of a remedy is a two-step process. The first step consists of identification of a preferred alternative and presentation of the alternative in a Proposed Plan for the community to review and comment. The preferred alternative must meet the following criteria:

- Protection of human health and the environment.
- Compliance with ARARs unless a waiver is justified.
- Cost effectiveness in protecting human health and environment and in complying with ARARs.
- Utilization of permanent solutions and alternate treatment technologies or resource recovery technologies to the maximum extent practicable.

The second step consists of the review of the public comments and determination of whether or not the preferred alternative continues to be the most appropriate remedial action for the site, in consultation with the Commonwealth of Massachusetts.

4.2 ASSEMBLY AND DETAILED ANALYSIS OF SOIL REMEDIAL ALTERNATIVES

The detailed descriptions and evaluation of the three remedial alternatives developed for site surface soil are presented in Sections 4.2.1 through 4.2.3.

Alternative S-1 was developed and analyzed to serve as a baseline for comparison to other alternatives, as required by CERCLA and the NCP. Alternative S-2 was developed and analyzed to evaluate excavation and off-site disposal of all surface soil with COCs exceeding the cleanup goals. Alternative S-3 was developed and analyzed to evaluate the placement of an asphalt cap over all surface soil with COCs exceeding the cleanup goals and establishing a LUC to limit future use of the capped area and to maintain integrity of the asphalt cap. A description and detailed analysis of these alternatives are presented in the following sections.

4.2.1 Alternative S-1: No Action

4.2.1.1 Description

The No Action alternative maintains the Site as is. This alternative does not address the surface soil contamination and is retained to provide a baseline for comparison to other alternatives. There would be no reduction in toxicity, mobility, or volume of the contaminants. In accordance with CERCLA Section 121(c) and Section 300.430(f)(4)(ii) of the revised NCP, the Navy, with support from USEPA and MassDEP, would conduct 5-year review(s) under the No Action alternative because hazardous substances would remain at the site above levels that allow for unlimited use and unrestricted exposure.

4.2.1.2 Detailed Analysis

Overall Protection of Human Health and the Environment

Alternative S-1 would not provide protection of human health and the environment. There could be unacceptable risks to human health from exposure to contaminated surface soil.

Compliance with ARARs and TBCs

Alternative S-1 would not comply with chemical-specific ARARs or TBCs listed in Table 4-1 because no action would be taken to reduce contaminant concentrations. There are no location- and action-specific ARARs or TBCs.

Long-Term Effectiveness and Permanence

Alternative S-1 would not have long-term effectiveness and permanence because: contaminated surface soil would remain on site; there would be no LUCs to restrict human exposure to surface soils. Although the No Action Alternative would not pose new hazards to the community or site workers, it may result in increased community exposure in the long-term due to the potential future residential zoning of the IOA site established in the reuse plan (SSTTDC, 2005). Five-year site reviews would be conducted to evaluate the site conditions over time although no new data would be available to assist this evaluation.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative S-1 would not reduce toxicity, mobility, or volume of surface soil COCs through remediation because no remedial action would occur.

Short-Term Effectiveness

Because no action would occur, implementation of Alternative S-1 would not have any short-term adverse impact from cleanup activities to the local community or the environment. Alternative S-1 does not achieve the RAOs developed for the site. There are no sustainability impacts to consider because no actions would be implemented.

Implementability

The No Action Alternative is readily implementable in a technical sense because no actions would be taken; however, this alternative is not implementable in an administrative sense because it is not protective and would not achieve the site RAOs.

Cost

Because no actions would be taken other than 5-year reviews of the Site status (conducted as part of the overall 5-year review for former NAS South Weymouth), there would be no capital costs and the O&M costs would be nominal.

4.2.2 Alternative S-2: Excavation and Off-Site Disposal

4.2.2.1 Description

The major components of Alternative S-2 include:

- Pre-Excavation Soil Sampling
- Mobilization/Demobilization
- Site Clearing (i.e. Removal of Asphalt/Pavement)
- Excavation with Confirmation Samples
- Offsite Disposal
- Site Restoration

In Alternative S-2, the surface soil with COC concentrations exceeding cleanup goals would be excavated and transported off-site to a licensed TSDF for final disposal, following waste characterization sampling. Pre-excavation surface soil sampling would be conducted to further define the areas to be excavated. Post-excavation soil sampling would be conducted to confirm the RAOs for the site have been achieved and to document remaining conditions. A Remedial Action Work Plan (RAWP) would be developed upon issuance of the Record of Decision (ROD) that will include a detailed description of the pre- and post-excavation activities and sampling locations.

The proposed soil removal areas (Areas 1 through 10) for Alternative S-2 are illustrated on Figure 4-1, as based on existing data available, though final adjustments would be made based on the analytical results from the pre-excavation sampling described above. For planning purposes, Areas 1 through 6 are oriented to be consistent with the 50 foot by 50 foot sampling grid but may be adjusted within that grid, and bounded by adjacent areas determined (or predicted) to be not impacted based on existing (or future) data. For Areas 7 through 9, excavation areas are oriented based on the expected source of the release and the physical structures currently in-place, and bounded by adjacent areas determined (or predicted) to be not impacted based on existing (or future) data.

A description of the proposed soil removal areas (Areas 1 through 10) and the estimated soil volumes to be excavated are provided in Table 2-4. Each proposed removal area targets a surface soil sample location with a COC, or COCs, exceeding the cleanup goals. Some of these areas are currently covered with asphalt and others are not. Asphalt, pavement, concrete, and other solid materials will be segregated from soil and handled appropriately. The proposed areas to be excavated are approximate areas based on existing IOA data. The removal areas and soil quantities to be excavated will be further defined by pre-excavation soil sampling and described in the RAWP. The total soil removal area under Alternative S-2 is approximately 25,100 ft^2.

The available sampling data indicate elevated COC concentrations at a depth up to 2 ft bgs (refer to Section 1.3). Based on the proposed removal area dimensions the total volume of soil that would be removed is approximately 1,862 cubic yards (Table 2-4). The depth to groundwater in this area is generally between 8 and 10 ft bgs (Tetra Tech, 2013); therefore, dewatering during excavation activities would not be necessary.

It is assumed that all excavated soil would be disposed of as non-hazardous material.

Post-excavation confirmatory sampling of the floor and sidewalls of the excavated area would also be conducted as part of the excavation activities.

Once confirmatory soil sampling determines that the RAOs have been achieved, the site would be restored by backfilling the excavated area with clean fill and covered with a minimum of 3 inches of stone or other clean, stable fill material. The excavation areas are anticipated to be re-worked during later site development so detailed site restoration is unnecessary.

4.2.2.2 Detailed Analysis

Overall Protection of Human Health and the Environment

Alternative S-2 would be protective of human health and the environment by removing surface soil COC concentrations exceeding the cleanup goals and, thus, eliminating risk to residential receptors associated with site surface soils.

Compliance with ARARs and TBCs

Alternative S-2 would comply with chemical-specific ARARs and TBCs through excavation and off-site disposal of surface soil COC concentrations exceeding the cleanup goals. This would be verified through post-excavation confirmatory sampling. Alternative S-2 would also comply with action-specific ARARs and TBCs; there are no location-specific ARARs or TBCs. The chemical-, location-, and action-specific ARARs and TBCs for Alternative S-2 are listed in Tables 4-2, 4-3, and 4-4, respectively.

Long-Term Effectiveness and Permanence

Alternative S-2 would provide long-term effectiveness and permanence through excavation and off-site disposal. Excavation, combined with subsequent off-site treatment and/or disposal, would be a permanent solution and would attain the RAOs for the protection of human health and the environment.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative S-2 would reduce the toxicity, mobility, and volume of surface soil COCs through excavation and off-site disposal. Excavation and off-site disposal would permanently remove approximately 137 pounds of contaminants associated with the surface soil (Table 2-4).

Short-Term Effectiveness

Alternative S-2 would result in few short-term effects. Exposure of workers to contamination during excavation would be minimized by compliance with the requirements of the OSHA, including wearing of appropriate PPE and adherence to site-specific health and safety procedures. Control of fugitive dust may be required during excavation to protect on-site workers and the surrounding community.

Overall, the sustainability impact of Alternative S-2 would be high based on the sustainability analysis using Site Wise™ (see Appendix D). Emissions of carbon dioxide, methane, and nitrous oxide were normalized to carbon dioxide equivalents (CO_2e), which is a cumulative method of weighing GHG emissions relative to global warming potential. Implementation of Alternative 2 would generate high CO_2e emissions (193 tons). Estimated criteria pollutant emissions associated with Alternative 2 for nitrogen oxides (NO_x), sulfur oxides (SO_x), and particulate matter with a diameter of 10 micrometers or less (PM_{10}) were 0.44, 0.19, and 0.54 tons, respectively. Energy demand for Alternative 2 would be high (7,700 million British thermal units [MMBTUs]) and was largely attributed to equipment use. Water usage associated with decontamination activities and the production of materials would be high. The results of the environmental footprint evaluation are provided in Appendix D. These evaluations are required by Navy policy and are not part of the CERCLA evaluation criteria.

Implementability

Excavation is a readily implementable technology for soil at the site and has been used successfully at other areas of former NAS South Weymouth. Excavation contractors are readily available and TSDFs are available for off-site disposal of the excavated materials. Transportation and TSDF requirements must and can be met for off-site disposal of the excavated materials.

The remnants of the former railroad spur are present in remedial action Areas 7 and 9. These remnants, including the steel rails and the ties will require removal and disposal from within the excavation areas prior to excavation of impacted soil. Since the rail spur is no longer functional, there is no need to replace or restore it.

No other special construction or operational issues are known to exist to technically impact implementing this option.

Cost

The relative costs may range from moderate to high due to the quantity of material that must be transported to TSDFs. Excavation of the 10 target areas with COC exceedances would render the site suitable for unlimited use and unrestricted exposure; therefore, there would be no subsequent O&M costs.

The estimated costs for Alternative S-2 are as follows:

Capital Cost:	$	1,391,544
30-Year net present worth (NPW) of Annual Costs:	$	0.00
30-Year NPW:	$	1,351,944

A detailed breakdown of estimated costs for this alternative is provided in Appendix E.

4.2.3 Alternative S-3: Asphalt Capping and LUCs

4.2.3.1 Description

The major components of Alternative S-3 would include:

- Pre-Cap Soil Sampling
- Mobilization/Demobilization
- Site Clearing (i.e. Removal of Asphalt/Pavement)
- Asphalt Cap Placement (6-inch cover consisting of underlayment, a base course, and wearing surface)
- LUCs (including annual inspections and reporting)
- 5-Year Reviews (included as part of the overall 5-year review program for former NAS South Weymouth)

Installation of an asphalt cap is a containment technology that involves installing a barrier over the impacted soil to prevent direct contact with the COCs. A cap composed of bituminous asphalt or concrete are among the most effective single-layer covers and are commonly used to minimize water infiltration at other waste sites. This containment technology uses modified paving construction techniques to reduce COC mobility and protect groundwater. In general, asphalt is used more often than concrete because its flexibility makes it more resistant to degradation; and with proper care, less material can be used to construct the cap at less cost and in a manner that is easier to maintain/repair over time.

Under Alternative S-3, an asphalt cap would be constructed to cover soil containing COCs that exceed the cleanup goals. The lateral extent of the impacted soil is estimated to cover 10 target areas ranging in size from 100 ft^2 to 10,000 ft^2 with a total approximate area of 25,100 ft^2 to be covered, as illustrated on Figure 4-2. Pre-cap soil sampling would be performed to further define the target areas prior to constructing the cap. A RAWP would be developed upon issuance of the ROD that will include a detailed description of the pre-cap activities and sampling locations.

Under Alternative S-3, elevated COC concentrations would remain in soil beneath the asphalt cap. LUCs such as a lease restriction (during Navy ownership) or a deed restriction (in the event of property transfer) would be required in conjunction with capping, to limit the future use of the capped area and to maintain the integrity of the cap. Annual inspections of the LUCs and evaluation of the cap integrity would be required. The cap would need to be maintained with sealant and/or patching over time and eventual replacement after its expected life to prevent exposure to the underlying soil. The proposed LUC boundary is illustrated on Figure 4-2, though final adjustments would be made based on pre-cap sampling.

Installation of an asphalt cap at Areas 7 and 9 may be impeded somewhat by the presence of the rail spur that transects these areas. In order to properly cap and pave these areas, the rails and ties will require removal. Removal of the affected sections is not considered part of the remedy in that it is not considered a contaminated media or a source, rather it is simply an obstacle that needs to be overcome. Once removed, the materials (including the ties and the rails) will need to be addressed accordingly. Since the rail spur is inactive, it will not require replacement or repair.

LUCs would be implemented to prevent both residential and recreation future use of the site. The LUCs are intended to ensure that the land use does not change during future site development, and that the cap material remains in place in the areas needed as demonstrated by the existing data and the delineation sampling described elsewhere in this section. The LUCs would apply to the capped areas and ensure that surface soils and the cap are not interrupted by persons unaware of soil conditions and the need for personal protective gear, management of soil disturbed, and replacement of the cap to the proper specifications. LUCs may be augmented by monitoring (inspection) and signage, depending on the use of the property during and following site development.

Since contamination would remain in place in excess of levels that allow for unrestricted site use and unlimited exposure, 5-year reviews would be required under this alternative to evaluate the continued adequacy of the remedy and to ensure that the Site LUCs continue to be met. The 5-year reviews would describe, at a minimum the findings of the annual LUC inspections, recommendations for repair, and follow up as needed.

4.2.3.2 Detailed Analysis

Overall Protection of Human Health and the Environment

Alternative S-3 would be protective of human health and the environment.

By capping the sources of contamination, an asphalt cap would significantly reduce the potential risks to human health and the environment by providing a barrier between COCs in surface soil and potential receptors. LUCs would ensure protection of human health and the environment by restricting future use of the capped area or actions that may damage the cap. Specifically, the use of the capped area as an unrestricted property (recreational area or residential property) and or disturbing or removing the cap without controls and without replacement of the cap would be considered non-compliant with the LUC. Restricting the use of the capped area would be protective of human health by avoiding unacceptable risks of exposure to contaminated surface soil.

Compliance with ARARs and TBCs

Alternative S-3 would comply with chemical-specific ARARs and TBCs through capping site soils and preventing exposure to COCs in surface soil. Alternative S-3 would also comply with action-specific ARARs and TBCs; there are no location-specific ARARs and TBCs. The chemical-, location-, and action-specific ARARs and TBCs for Alternative S-3 are listed in Tables 4-5, 4-6, and 4-7, respectively.

Long-Term Effectiveness and Permanence

The long-term effectiveness and permanence of Alternative S-3 would depend on long-term maintenance of the asphalt cap as well as monitoring and enforcement of the LUCs.

Long-term maintenance of the asphalt cap would be completed to ensure the cap effectively and permanently prevents exposure to COCs in surface soil. Annual inspections would be completed to verify enforcement of the LUCs.

The administrative controls proposed in this alternative are considered reliable.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative S-3 would isolate surface soil COCs to limit their mobility, but would not decrease their toxicity or volume.

Short-Term Effectiveness

Alternative S-3 would be effective in the short-term achieving the RAOs and protecting the community and site workers during remediation. Exposure of workers to contamination during installation of the cap would be minimized by compliance with OSHA requirements including wearing of appropriate PPE and adherence to site-specific health and safety procedures. Implementation of the components would have an impact in the IOA capped area but would not have adverse impact to the surrounding community or the environment.

Overall, the sustainability impact of Alternative 3 would be low-to-moderate based on the sustainability analysis using Site Wise™ (see Appendix D). Emissions of CO_2, methane, and nitrous oxide were normalized to CO_2e, which is a cumulative method of weighing GHG emissions relative to global warming potential. Alternative S-3 would result in moderate CO_2e emissions (55 tons). Estimated criteria pollutant emissions associated with Alternative 3 for NO_x, SO_x, and PM_{10} emissions were 0.09, 0.05, and 15 tons, respectively. Energy demand for Alternative 3 would be moderate to low (860 MMBTU) and was largely attributed to equipment use. Water usage associated with decontamination activities and production of materials would be high. The results of the environmental footprint evaluation are provided in Appendix D. These evaluations are required by Navy policy and are not part of the CERCLA evaluation criteria.

Implementability

Alternative S-3 is readily implementable for surface soil. The required materials and services for constructing an asphalt cap are readily available. No permits would be necessary for on-site CERCLA activities. Additional administrative requirements such as LUCs would be required in conjunction with the cap to limit the future use of the capped areas or actions that may damage the cap. The 5-year reviews of the site can be incorporated into the overall 5-year review for former NAS South Weymouth. During site development, continued coordination between the Navy, regulatory agencies, and the development authority would be required so as to ensure the integrity of the cap is maintained both during development and after the site is returned to use.

The remnants of the former railroad spur are present in remedial action Areas 7 and 9. These remnants, including the steel rails and the ties will require removal and disposal prior to the pre-cap soil sampling. Since this spur is owned by the Navy, no right-of way logistics need to be addressed. Since the rail spur is no longer functional, there is no need to replace or restore it.

No other special construction or operational issues are known to exist to technically impact implementing this option.

Cost

The relative capital costs for Alternative S-3 are low to moderate. O&M costs are relatively low and would consists of site inspections, reporting, and cap maintenance.

The estimated costs for Alternative S-3 are as follows:

Capital Cost:	$	$ 588,367
30-Year NPW of Annual Costs:	$	$ 166,777
30-Year NPW:	$	$ 755,144

A detailed breakdown of the estimated costs for this alternative is provided in Appendix E.

5.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

This section compares the analyses for each of the surface soil remedial alternatives presented in Section 4.0 of this FFS. The criteria for comparison are identical to those used for the detailed analysis of individual alternatives.

5.1 COMPARISON OF GROUNDWATER REMEDIAL ALTERNATIVES BY CRITERIA

The following remedial alternatives for the IOA Site are compared in this section:

- Alternative S-1: No Action
- Alternative S-2: Excavation and Off-Site Disposal
- Alternative S-3: Asphalt Cap and LUCs

5.1.1 Overall Protection of Human Health and the Environment

Alternatives S-2 and S-3 would provide protection to human health and the environment. Alternative S-2 would provide the greatest protection because it permanently removes the source areas with COC concentrations exceeding the cleanup goals. Alternative S-2 would also allow for the site to be rendered suitable for unlimited use and unrestricted exposure with the exception of the two existing AUL areas. Alternative S-3 would provide the second best protection because installing a cap would prevent exposure to elevated COC concentrations exceeding the cleanup goals, although the elevated COC concentrations would remain in-place and require long term management. Alternative S-3 would not allow for the site to be suitable for unlimited use and unrestricted exposure; implementation of LUCs would be required. LUCs would provide adequate protection of human health with a permanent restriction on the use of surface soil preventing unrestricted or residential uses.

Alternative S-1 would provide no protection of human health and the environment; elevated COC concentrations exceeding the cleanup goals in surface soil would not be mitigated. The absence of a surface soil removal, cover, or LUCs would allow for exposure to contaminated surface soil.

5.1.2 Compliance with ARARs and TBCs

Alternatives S-2 and S-3 would comply with chemical- and action-specific ARARs and TBCs; location-specific ARARs or TBCs would not apply.

Alternative S-1 would not meet chemical-specific ARARs; location-specific and action-specific ARARs or TBCs would not apply.

5.1.3 Long-Term Effectiveness and Permanence

Alternative S-2 would provide the most long-term effectiveness and permanence through excavation and off-site disposal of surface soil with COC concentrations exceeding the cleanup goals. Alternative S-3 would provide the second best long-term effectiveness and permanence through long term maintenance of the asphalt cap and implementation and management of LUCs. The uncertain future use and land development plans requires consideration with respect to effectively maintaining and managing a series of capped areas, but there are mechanisms available to ensure protectiveness over time. Regardless, Alternative S-2 would provide a higher level of permanence compared to Alternative S-3 because the excavation component would permanently remove COC contamination exceeding the cleanup goals.

Alternative S-1 would have no long-term effectiveness and permanence because there would be no LUCs to restrict site use, and the potential would also exist for an unacceptable risk for residential receptors through exposure to surface soil.

5.1.4 Reduction of Toxicity, Mobility, or Volume through Treatment

Neither alternative would provide any active treatment technologies that would achieve reduction in the toxicity, mobility or volume of COCs. However, Alternative S-2 would provide reductions in COC toxicity, mobility, and volume through permanent removal of COCs exceeding the cleanup goals from surface soil through excavation and off-site disposal in facilities designed to secure contaminants; toxicity mobility and volume are thus addressed by managing the contaminants in a secured landfill setting. Alternative S-3 would achieve a lower level reduction in COC mobility through passive treatment by the asphalt cap but would not decrease their toxicity or volume.

Alternative S-1 would not achieve any reduction of toxicity, mobility, or volume of COCs through treatment because there is no action.

5.1.5 Short-Term Effectiveness

Short-term effects of Alternative S-2 would result in a possibility of exposing site workers to contaminated surface soil during excavation. Dust control during excavation may also be required to protect on-site workers and the surrounding community. Alternative S-3 would result in a slightly lower short-term risk, with the potential for exposure only during installation of the asphalt cap. However, these risks of exposure would be effectively controlled by wearing appropriate PPE and compliance with proper site-specific health and safety procedures. Implementation of Alternatives S-2 through S-3 would not adversely impact the surrounding community or environment.

Implementation of Alternative S-1 would not result in risks to site workers or adversely impact the surrounding community or environment because no remedial activities would be performed. Alternative S-1 would not achieve the RAOs.

Alternative 3 would generally generate the least CO_2e, NO_x, and SO_x, emissions, followed by Alternative 2. However, Alternative 3 would generate the most PM_{10} emissions. Because energy demand and emissions are related, the relative ranking of the alternatives based on energy demand is similar to the ranking based on emissions. Alternative 3 would have the lowest energy demand, followed by Alternative 2. Alternative 3 would have the lowest water usage, followed by Alternative 2.

Because no actions would be implemented in Alternative S-1, there would be no impacts on sustainability factors.

5.1.6 Implementability

Alternative S-1 would be the easiest to implement because there would be no action taken.

Alternatives S-2 and S-3 are both readily implementable. The required materials and services for surface soil excavation and off-site disposal and for constructing an asphalt cap are both readily available. However, Alternative S-3 would have additional administrative requirements over the long term such as LUCs and 5-year reviews. Complexities associated with retaining the cap and ensuring the LUCs are maintained during and after redevelopment of the site are manageable but should be recognized.

Use of the property may be affected by the implementation of the alternatives. Alternatives S-2 and S-3, would temporarily impact site use during excavation and installation of the asphalt cap, respectively.

5.1.7 Cost

The capital and O&M costs and NPW of the alternatives are as follows.

Alternative	Capital	NPW of Annual Costs	NPW
S-1	$0	nominal	nominal
S-2	$1,391,544	$0	$1,391,544
S-3	$588,367	$166,777	$755,144

Alternative S-1 includes no actions other than 5-year reviews, therefore, it has the lowest cost. Alternative S-2 has a higher capital cost than Alternative S-3, but there would be no O&M costs over time. Detailed cost estimates are provided in Appendix E.

5.2 SUMMARY OF COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES

Table 5-1 summarizes the comparative analysis of the surface soil remedial alternatives.

REFERENCES

DoD (Department of Defense), 2003. Principles and Procedures for Specifying, Monitoring and Enforcement of Land Use Controls and Other Post-ROD Actions. October.

EA Engineering, Science, and Technology (EA), 1998. Final Phase II Environmental Baseline Survey Sampling Work Plan. November 1998.

EA, 2001. *Final Streamlined Human Health Risk Assessment Work Plan: Areas of Concern at NAS South Weymouth. South Weymouth, Massachusetts*. Work Order No. 29600.75.0500. March.

Foster Wheeler Environmental Corporation (Foster Wheeler), 2002a. Final Closeout Report for RIA 15 Water Tower – Addendum to Time Critical Removal Action Memorandum for Former NAS South Weymouth, Weymouth, Massachusetts. May.

Foster Wheeler, 2002b. Final Removal Action for PSSA#1, RIA 100, RIA 3 and RIA 13, Naval Air Station South Weymouth, Weymouth, Massachusetts. May.

MassDEP (Massachusetts Department of Environmental Protection), 2007. *Massachusetts Contingency Plan (MCP) Method 1: Soil Category S-1 Standards*. 310 CMR 40.0000, December 14.

Rizzo Associates, Inc. (Rizzo), 2001. *Wetland Delineations Redevelopment of Former Naval Air Station, NAS South Weymouth, South Weymouth, MA.* June.

South Shore Tri-Town Development Corporation (SSTTDC), 2005. *Zoning and Land Use By-Laws for the Naval Air Station South Weymouth*. May.

Stone and Webster, 2002. *Supplement to Final Summary Report of Background Data Summary Statistics for NAS South Weymouth*. November.

Tetra Tech EC, Inc., 2005. Addendum No. 1 to the Closeout Report Action Memorandum for Area of Concern 13, Naval Air Station South Weymouth, Weymouth, Massachusetts. February.

Tetra Tech, Inc., 2000. Basewide Groundwater Flow Assessment Phase II Remedial Investigation Naval Air Station South Weymouth, Weymouth, MA. December.

Tetra Tech Inc., 2010a. *Industrial Operations Area Technical Memorandum*. May.

Tetra Tech Inc. 2010b. Meeting Notes, Industrial Operations Area Scoping Meeting, NAS South Weymouth, Weymouth, MA. September 22, 2010.

Tetra Tech Inc., 2011. *Draft Final Sampling and Analysis Plan (Field Sampling and Quality Assurance Project Plan) Industrial Operations Area Site Investigation, Former Naval Air Station South Weymouth, Weymouth, Massachusetts*. August.

Tetra Tech Inc., 2013. Industrial Operations Area Project Report, Former Naval Air Station South Weymouth, Weymouth, Massachusetts. April.

U.S. Environmental Protection Agency (USEPA), 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (Interim Final).* Office of Emergency Remedial Response, United States Environmental Protection Agency, Washington, DC. October.

USEPA, 1989. Risk Assessment Guidance for Superfund: Volume I, Human Health Evaluation Manual, Part A. December.

USEPA, 1991. Risk Assessment Guidance for Superfund: Volume 1 – Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals). Office of Emergency and Remedial Response, Washington, D.C. December.

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, 2003. Human Health Toxicity Values in Superfund Risk Assessments. Office of Superfund Remediation and Technology Innovation, OSWER 9285.7 53, 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 Guidance. July.

USEPA, 2005. *Polychlorinated Biphenyl (PCB) Site Revitalization Guidance Under the Toxic Substances Control Act (TSCA)*. November.

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, 2012. Compilation and Review of Data on Relative Bioavailability of Arsenic in Soil and Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil Documents. OSWER Directive 9200.1-113. Office of Superfund Remediation and Technology Innovation. Washington, D.C. December.

USEPA, 2014a. *Regional Screening Levels for Chemical Contaminants at Superfund Sites*. Oak Ridge National Laboratory (ORNL). http://epa-prgs.ornl.gov/chemicals/index.shtml. May.

USEPA, 2014b. 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, 2015. Regional Screening Level Calculator, Screening Tools for Chemical and Radionuclide Contaminants. Databases and Tools, Waste and Cleanup Risk Assessment. February 20, 2015. http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search

U.S. Navy, 2006. Navy Environmental Restoration Program Manual. August.

TABLES

TABLE 1-1

ANALYTICAL RESULTS COMPARED TO SCREENING CRITERIA - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS
PAGE 1 OF 14

SAMPLE ID			S2SWE	S2SWE-D	S2SWE-AVG	S2SWW	NAS-AOC13-SW01	NAS-AOC13-SW01-D	NAS-AOC13-SW01-AVG	NAS-AOC13-SW04	B116-OSB1AA	B116-OSB1AA-D	B116-OSB1AA-AVG	B116-OSB4AA	B116-OSB4AA-D	B116-OSB4AA-AVG	B14SB09 AA	B8-8SB2AA
LOCATION ID			AOC13-S2-SWE	AOC13-S2-SWE	AOC13-S2-SWE	AOC13-S2-SWW	AOC13-SW01	AOC13-SW01	AOC13-SW01	AOC13-SW04	B116-MW-01	B116-MW-01	B116-MW-01	B116-MW-04	B116-MW-04	B116-MW-04	B14-SB-09	B8-MW-02
SAMPLE DATE			03/11/04	03/11/04	03/11/04	03/11/04	09/29/04	09/29/04	09/29/04	09/30/04	03/12/97	03/12/97	03/12/97	03/13/97	03/13/97	03/13/97	06/14/99	07/30/96
DEPTH			0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	1 - 3 FT	1 - 3 FT	1 - 3 FT	1 - 3 FT	1 - 3 FT	1 - 3 FT	1 - 2 FT	1 - 3 FT
EXPOSURE UNIT			EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU05	EU05	EU05	EU05	EU05	EU05	EU05	EU26
CRITERIA	EPA RSL - Res. Soil[1]	BKG - Surf.Soil[2]																
SEMIVOLATILES (UG/KG)																		
BAP EQUIVALENT-HALFND	15	2130	75.2 J	206 J	141 J	46.1 J	40.7 J	144 J	92.4 J	413	360 U	360 U	360 U	360 U	360 U	360 U	190 U	268 J
BAP EQUIVALENT-POS	15	2130	75.2 J	206 J	141 J	46.1 J	28.7 J	144 J	86.4 J	413	NA	NA	NA	NA	NA	NA	NA	43.8 J
BENZO(A)ANTHRACENE	150	810	54	170	112	25	24	110	67	300	360 U	360 U	360 U	360 U	360 U	360 U	190 U	370 U
BENZO(A)PYRENE	15	1828.78	50	140	95	29	21 J	93	57 J	270	360 U	360 U	360 U	360 U	360 U	360 U	190 U	370 U
BENZO(B)FLUORANTHENE	150	770	64	170	117	46	36	140	88	370	360 U	360 U	360 U	360 U	360 U	360 U	190 U	370 U
BENZO(K)FLUORANTHENE	1500	2700	25	64	44.5	17 J	12 J	46	29 J	130	360 U	360 U	360 U	360 U	360 U	360 U	190 U	370 U
DIBENZO(A,H)ANTHRACENE	15	96	9.2 J	21 J	15.1 J	7 J	24 U	17 J	14.5 J	52	360 U	360 U	360 U	360 U	360 U	360 U	190 U	36 J
INDENO(1,2,3-CD)PYRENE	150	175	39	98	68.5	28	16 J	85	50.5 J	220	360 U	360 U	360 U	360 U	360 U	360 U	190 U	78 J
PESTICIDES/PCBS (UG/KG)																		
AROCLOR-1260	220		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	18 U	NA
HEPTACHLOR EPOXIDE	53		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL AROCLOR	220		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	18 U	NA
METALS (MG/KG)																		
ALUMINUM	7700	10499.13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	7890	NA
ARSENIC	0.39	5.31	NA	NA	NA	NA	NA	NA	NA	NA	2	1.6	1.8	0.98	1.6	1.29	2	NA
CALCIUM		6360	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1620 J	NA
CHROMIUM	0.29	10.1	NA	NA	NA	NA	NA	NA	NA	NA	7.8	5.1	6.45	7.2	8.7	7.95	8.5	NA
COBALT	2.3	3.98	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	NA

BLACK SHADING-ABOVE RSL AND BKG; BLUE SHADING-ABOVE RSL, LESS THAN BKG; GRAY SHADING-DETECTED;
BOLD-EXCEEDS BKG, NO RSL; U - NOT DETECTED; J-QUANTITATION APPROXIMATE; NA-NOT ANALYZED

TABLE 1-1

ANALYTICAL RESULTS COMPARED TO SCREENING CRITERIA - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

SAMPLE ID			S2SWE	S2SWE-D	S2SWE-AVG	S2SWW	NAS-AOC13-SW01	NAS-AOC13-SW01-D	NAS-AOC13-SW01-AVG	NAS-AOC13-SW04	B116-OSB1AA	B116-OSB1AA-D	B116-OSB1AA-AVG	B116-OSB4AA	B116-OSB4AA-D	B116-OSB4AA-AVG	B14SB09AA	B8-8SB2AA
LOCATION ID			AOC13-S2-SWE	AOC13-S2-SWE	AOC13-S2-SWE	AOC13-S2-SWW	AOC13-SW01	AOC13-SW01	AOC13-SW01	AOC13-SW04	B116-MW-01	B116-MW-01	B116-MW-01	B116-MW-04	B116-MW-04	B116-MW-04	B14-SB-09	B8-MW-02
SAMPLE DATE			03/11/04	03/11/04	03/11/04	03/11/04	09/29/04	09/29/04	09/29/04	09/30/04	03/12/97	03/12/97	03/12/97	03/13/97	03/13/97	03/13/97	06/14/99	07/30/96
DEPTH			0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	1 - 3 FT	1 - 3 FT	1 - 3 FT	1 - 3 FT	1 - 3 FT	1 - 3 FT	1 - 2 FT	1 - 3 FT
EXPOSURE UNIT			EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU05	EU05	EU05	EU05	EU05	EU05	EU05	EU26
CRITERIA	EPA RSL - Res. Soil[1]	BKG - Surf.Soil[2]																
IRON	5500	11300	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9740	NA
LEAD	400	301.7	NA	NA	NA	NA	NA	NA	NA	NA	7.3	7.7	7.5	4.6	5.2	4.9	12	NA
MAGNESIUM		1963.38	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1100	NA
MANGANESE	180	313.83	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	113	NA
THALLIUM	0.078	1.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.5 U	NA
VANADIUM	39	89.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	18.2	NA

BLACK SHADING-ABOVE RSL AND BKG; BLUE SHADING-ABOVE RSL, LESS THAN BKG; GRAY SHADING-DETECTED;
BOLD-EXCEEDS BKG, NO RSL; U - NOT DETECTED; J-QUANTITATION APPROXIMATE; NA-NOT ANALYZED

TABLE 1-1

ANALYTICAL RESULTS COMPARED TO SCREENING CRITERIA - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

SAMPLE ID			B8-8SB4AA	IOA-SS-EU01-0002	IOA-SS-EU01-0002-D	IOA-SS-EU01-0002-AVG	IOA-SS-EU02-0002	IOA-SS-EU03-0002	IOA-SS-EU04-0002	IOA-SS-EU06-0002	IOA-SS-EU07-0002	IOA-SS-EU09-0002	IOA-SS-EU10-0002	IOA-SS-EU12-0002	IOA-SS-EU13-0002	IOA-SS-EU14-0002	IOA-SS-EU16-0002	IOA-SS-EU17-0002
LOCATION ID			B8-MW-04	IOA-SS-EU01	IOA-SS-EU01	IOA-SS-EU01	IOA-SS-EU02	IOA-SS-EU03	IOA-SS-EU04	IOA-SS-EU06	IOA-SS-EU07	IOA-SS-EU09	IOA-SS-EU10	IOA-SS-EU12	IOA-SS-EU13	IOA-SS-EU14	IOA-SS-EU16	IOA-SS-EU17
SAMPLE DATE			08/02/96	08/09/11	08/09/11	08/09/11	08/09/11	08/09/11	08/09/11	08/09/11	08/09/11	08/09/11	08/10/11	08/11/11	08/09/11	08/09/11	08/10/11	08/10/11
DEPTH			1 - 2.2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT
EXPOSURE UNIT			EU26	EU01	EU01	EU01	EU02	EU03	EU04	EU06	EU07	EU09	EU10	EU12	EU13	EU14	EU16	EU17
CRITERIA	EPA RSL - Res. Soil[1]	BKG - Surf.Soil[2]																
SEMIVOLATILES (UG/KG)																		
BAP EQUIVALENT-HALFND	15	2130	246 J	445 J	301 J	373 J	94 UJ	164 J	227 J	501 J	161 J	346 J	NA	185 J	257 J	NA	495 J	318 J
BAP EQUIVALENT-POS	15	2130	54 J	445 J	301 J	373 J	NA	5.3 J	122 J	501 J	4.1 J	346 J	NA	86 J	257 J	NA	385 J	318 J
BENZO(A)ANTHRACENE	150	810	39 J	340 J	240 J	290 J	94 UJ	53 J	110 J	380 J	41 J	270 J	NA	99 J	200 J	NA	410 J	200 J
BENZO(A)PYRENE	15	1828.78	46 J	310 J	210 J	260 J	94 UJ	97 UJ	97 J	360 J	94 UJ	240 J	NA	66 J	170 J	NA	300 J	220 J
BENZO(B)FLUORANTHENE	150	770	36 J	400 J	280 J	340 J	94 UJ	97 UJ	130 J	430 J	94 UJ	340 J	NA	100 J	240 J	NA	420 J	340 J
BENZO(K)FLUORANTHENE	1500	2700	45 J	180 J	110 J	145 J	94 UJ	97 UJ	100 J	130 J	94 UJ	110 J	NA	53 UJ	110 J	NA	190 J	130 J
DIBENZO(A,H)ANTHRACENE	15	96	350 U	45 J	29 J	37 J	190 UJ	190 UJ	190 UJ	47 J	190 UJ	35 J	NA	180 UJ	32 J	NA	200 UJ	30 J
INDENO(1,2,3-CD)PYRENE	150	175	350 U	140 J	85 J	112 J	190 UJ	190 UJ	190 UJ	110 J	190 UJ	87 J	NA	180 UJ	100 J	NA	200 UJ	120 J
PESTICIDES/PCBS (UG/KG)																		
AROCLOR-1260	220		NA	27 J	7 J	17 J	7.3 U	9.5 J	7.3 J	150	NA	470	12000	7.2 U	18 J	NA	300	1800
HEPTACHLOR EPOXIDE	53		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL AROCLOR	220		NA	27 J	7 J	17 J	7.3 U	9.5 J	7.3 J	150	NA	470	12000	7.2 U	18 J	NA	300	1800
METALS (MG/KG)																		
ALUMINUM	7700	10499.13	NA	4400	4800	4600	5400	6600	4400	5500	7400	5600	NA	7600	6600	4900	10000	6100
ARSENIC	0.39	5.31	NA	1.5	1.7	1.6	1	1.1	1.7	0.89	2.4	1.4	NA	1.2	1.3	1.9	1.3	1.2
CALCIUM		6360	NA	1500 J	1500 J	1500 J	1100 J	940 J	1000 J	1600 J	1100 J	1100 J	NA	1400	810 J	1100 J	810 J	1100 J
CHROMIUM	0.29	10.1	NA	5.5	5.7	5.6	5.9	15	7.4	6.9	9.5	8.1	NA	9.2	8.6	6.3	13	12
COBALT	2.3	3.98	NA	3.2	3.1	3.15	2.8	3.5	2.9	2.7	5.5	2.8	NA	3.9	1.4	2.5	2.8	2.8

BLACK SHADING-ABOVE RSL AND BKG; BLUE SHADING-ABOVE RSL, LESS THAN BKG; GRAY SHADING-DETECTED;
BOLD-EXCEEDS BKG, NO RSL; U - NOT DETECTED; J-QUANTITATION APPROXIMATE; NA-NOT ANALYZED

ANALYTICAL RESULTS COMPARED TO SCREENING CRITERIA - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

SAMPLE ID			B8-8SB4AA	IOA-SS-EU01-0002	IOA-SS-EU01-0002-D	IOA-SS-EU01-0002-AVG	IOA-SS-EU02-0002	IOA-SS-EU03-0002	IOA-SS-EU04-0002	IOA-SS-EU06-0002	IOA-SS-EU07-0002	IOA-SS-EU09-0002	IOA-SS-EU10-0002	IOA-SS-EU12-0002	IOA-SS-EU13-0002	IOA-SS-EU14-0002	IOA-SS-EU16-0002	IOA-SS-EU17-0002
LOCATION ID			B8-MW-04	IOA-SS-EU01	IOA-SS-EU01	IOA-SS-EU01	IOA-SS-EU02	IOA-SS-EU03	IOA-SS-EU04	IOA-SS-EU06	IOA-SS-EU07	IOA-SS-EU09	IOA-SS-EU10	IOA-SS-EU12	IOA-SS-EU13	IOA-SS-EU14	IOA-SS-EU16	IOA-SS-EU17
SAMPLE DATE			08/02/96	08/09/11	08/09/11	08/09/11	08/09/11	08/09/11	08/09/11	08/09/11	08/09/11	08/09/11	08/10/11	08/11/11	08/09/11	08/09/11	08/10/11	08/10/11
DEPTH			1 - 2.2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT
EXPOSURE UNIT			EU26	EU01	EU01	EU01	EU02	EU03	EU04	EU06	EU07	EU09	EU10	EU12	EU13	EU14	EU16	EU17
CRITERIA	EPA RSL - Res. Soil[1]	BKG - Surf.Soil[2]																
IRON	5500	11300	NA	9800	11000	10400	9600	12000	11000	11000	17000	11000	NA	13000	6100	11000	9900	15000
LEAD	400	301.7	NA	16 J	14 J	15 J	6 J	9 J	5.3 J	16 J	11 J	36 J	NA	11	27 J	13 J	56 J	69 J
MAGNESIUM		1963.38	NA	1600 J	1700 J	1650 J	1700 J	**2000 J**	1400 J	1600 J	**2900 J**	1600 J	NA	1900	900 J	1300 J	1700 J	1800 J
MANGANESE	180	313.83	NA	310 J	270 J	290 J	140 J	180 J	160 J	170 J	330 J	180 J	NA	220 J	75 J	150 J	160 J	390 J
THALLIUM	0.078	1.8	NA	0.39	0.11 U	0.222	0.077 U	0.14 U	0.076 U	0.068 U	0.077 U	0.37	NA	0.1 U	0.069 U	0.078 U	0.082 U	0.07 U
VANADIUM	39	89.1	NA	12	12	12	13	13	14	13	18	15	NA	15	18	18	25	20

BLACK SHADING-ABOVE RSL AND BKG; BLUE SHADING-ABOVE RSL, LESS THAN BKG; GRAY SHADING-DETECTED;
BOLD-EXCEEDS BKG, NO RSL; U - NOT DETECTED; J-QUANTITATION APPROXIMATE; NA-NOT ANALYZED

TABLE 1-1

ANALYTICAL RESULTS COMPARED TO SCREENING CRITERIA - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

SAMPLE ID			IOA-SS-EU19-0002	IOA-SS-EU23-0002	IOA-SS-EU27-0002	IOA-SS-EU29-0002	IOA-SS-EU29-0002-D	IOA-SS-EU29-0002-AVG	IOA-SS-EU30-0002	IOA-SS-EU31-0002	IOA-SS-EU32-0002	IOA-SS-EU32-0002-D	IOA-SS-EU32-0002-AVG	IOA-SS-EU33-0002	IOA-SS-EU34-0002	IOA-SS-EU35-0002	IOA-SS-EU36-0002	IOA-SS-EU40-0002
LOCATION ID			IOA-SS-EU19	IOA-SS-EU23	IOA-SS-EU27	IOA-SS-EU29	IOA-SS-EU29	IOA-SS-EU29	IOA-SS-EU30	IOA-SS-EU31	IOA-SS-EU32	IOA-SS-EU32	IOA-SS-EU32	IOA-SS-EU33	IOA-SS-EU34	IOA-SS-EU35	IOA-SS-EU36	IOA-SS-EU40
SAMPLE DATE			08/11/11	08/10/11	08/10/11	08/10/11	08/10/11	08/10/11	08/10/11	08/10/11	08/11/11	08/11/11	08/11/11	08/10/11	08/10/11	08/10/11	08/10/11	08/10/11
DEPTH			0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT
EXPOSURE UNIT			EU19	EU23	EU27	EU29	EU29	EU29	EU30	EU31	EU32	EU32	EU32	EU33	EU34	EU35	EU36	EU40
CRITERIA	EPA RSL - Res. Soil[1]	BKG - Surf.Soil[2]																
SEMIVOLATILES (UG/KG)																		
BAP EQUIVALENT-HALFND	15	2130	78.4 J	186 J	NA	1880 J	1960 J	1920 J	154 J	95 UJ	47.4 J	40.2 J	43.8 J	75.1 J	85.9 J	30.5 J	648 J	7970 J
BAP EQUIVALENT-POS	15	2130	58 J	154 J	NA	1880 J	1960 J	1920 J	4 J	NA	27 J	19.3 J	23.2 J	57.1 J	63.9 J	0.7 J	648 J	7970 J
BENZO(A)ANTHRACENE	150	810	48 J	110 J	NA	1700 J	1500 J	1600 J	40 J	95 UJ	20 J	16 J	18 J	37 J	51 J	18 UJ	630 J	6300 J
BENZO(A)PYRENE	15	1828.78	46 J	120 J	NA	1300 J	1400 J	1350 J	92 UJ	95 UJ	20 J	15 J	17.5 J	42 J	51 J	18 UJ	440 J	5600 J
BENZO(B)FLUORANTHENE	150	770	69 J	220 J	NA	2000 J	1900 J	1950 J	92 UJ	95 UJ	48 J	26 J	37 J	77 J	74 J	7 J	750 J	7400 J
BENZO(K)FLUORANTHENE	1500	2700	25 J	87 J	NA	800 J	890 J	845 J	92 UJ	95 UJ	20 J	12 J	16 J	53 J	36 J	18 UJ	250 J	3200 J
DIBENZO(A,H)ANTHRACENE	15	96	37 UJ	59 UJ	NA	150 J	150 J	150 J	180 UJ	190 UJ	37 UJ	38 UJ	37.5 UJ	36 UJ	40 UJ	36 UJ	52 J	700 J
INDENO(1,2,3-CD)PYRENE	150	175	37 UJ	59 UJ	NA	480 J	580 J	530 J	180 UJ	190 UJ	37 UJ	38 UJ	37.5 UJ	31 J	40 UJ	36 UJ	150 J	2600 J
PESTICIDES/PCBS (UG/KG)																		
AROCLOR-1260	220		7.4 U	8 J	7.3 U	59	63	61	86	150	7.4 U	7.7 U	7.55 U	7.1 U	7.8 U	7.1 U	7.6 U	46
HEPTACHLOR EPOXIDE	53		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL AROCLOR	220		7.4 U	8 J	7.3 U	59	63	61	86	150	7.4 U	7.7 U	7.55 U	7.1 U	7.8 U	7.1 U	7.6 U	46
METALS (MG/KG)																		
ALUMINUM	7700	10499.13	7400	6800	7100	7800	6000	6900	13000	7000	4800	4500	4650	7100	7600	6500	9400	10000
ARSENIC	0.39	5.31	5.9	2.2	2.1	6.4	5	5.7	1.5	2.2	1.1	1.2	1.15	1.7	1.6	1.2	2.3	5.3
CALCIUM		6360	810	1500	870 J	480 J	320 J	400 J	1100 J	1100 J	760	710	735	1300	1600	1200	1200	1400 J
CHROMIUM	0.29	10.1	8.9	7.5	9.4	14	10	12	17	10	6.2	5.2	5.7	7	8.2	9	15	15
COBALT	2.3	3.98	3.9	3.4	4.4	3	2.1	2.55	3.9	4.1	3.7	3.6	3.65	4.3	5.6	3.6	4.9	3.5

BLACK SHADING-ABOVE RSL AND BKG; BLUE SHADING-ABOVE RSL, LESS THAN BKG; GRAY SHADING-DETECTED;
BOLD-EXCEEDS BKG, NO RSL; U - NOT DETECTED; J-QUANTITATION APPROXIMATE; NA-NOT ANALYZED

TABLE 1-1

ANALYTICAL RESULTS COMPARED TO SCREENING CRITERIA - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

SAMPLE ID			IOA-SS-EU19-0002	IOA-SS-EU23-0002	IOA-SS-EU27-0002	IOA-SS-EU29-0002	IOA-SS-EU29-0002-D	IOA-SS-EU29-0002-AVG	IOA-SS-EU30-0002	IOA-SS-EU31-0002	IOA-SS-EU32-0002	IOA-SS-EU32-0002-D	IOA-SS-EU32-0002-AVG	IOA-SS-EU33-0002	IOA-SS-EU34-0002	IOA-SS-EU35-0002	IOA-SS-EU36-0002	IOA-SS-EU40-0002
LOCATION ID			IOA-SS-EU19	IOA-SS-EU23	IOA-SS-EU27	IOA-SS-EU29	IOA-SS-EU29	IOA-SS-EU29	IOA-SS-EU30	IOA-SS-EU31	IOA-SS-EU32	IOA-SS-EU32	IOA-SS-EU32	IOA-SS-EU33	IOA-SS-EU34	IOA-SS-EU35	IOA-SS-EU36	IOA-SS-EU40
SAMPLE DATE			08/11/11	08/10/11	08/10/11	08/10/11	08/10/11	08/10/11	08/10/11	08/10/11	08/11/11	08/11/11	08/11/11	08/10/11	08/10/11	08/10/11	08/10/11	08/10/11
DEPTH			0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT
EXPOSURE UNIT			EU19	EU23	EU27	EU29	EU29	EU29	EU30	EU31	EU32	EU32	EU32	EU33	EU34	EU35	EU36	EU40
CRITERIA	EPA RSL - Res. Soil[1]	BKG - Surf.Soil[2]																
IRON	5500	11300	10000	12000	14000	21000	17000	19000	16000	18000	8800	8100	8450	15000	22000	12000	18000	16000
LEAD	400	301.7	27	26	25 J	20 J	12 J	16 J	9.3 J	10 J	7.1	6.5	6.8	10	9.9	8.2	32	100 J
MAGNESIUM		1963.38	1700	1700	**3100 J**	1800 J	1100 J	1450 J	**3600 J**	**2600 J**	1700	1600	1650	**2500**	**2100**	**2300**	**3000**	1900 J
MANGANESE	180	313.83	180 J	150 J	140 J	100 J	84 J	92 J	200 J	440 J	210 J	230 J	220 J	240 J	380 J	200 J	350 J	210 J
THALLIUM	0.078	1.8	0.078 U	0.11 U	0.075 U	0.088 U	0.088 U	0.088 U	0.089 U	0.079 U	0.093 U	0.086 U	0.0895 U	0.066 U	0.076 U	0.084 U	0.087 U	0.083 U
VANADIUM	39	89.1	15	20	33	39	30	34.5	21	17	12	11	11.5	19	16	11	19	25

BLACK SHADING-ABOVE RSL AND BKG; BLUE SHADING-ABOVE RSL, LESS THAN BKG; GRAY SHADING-DETECTED;
BOLD-EXCEEDS BKG, NO RSL; U - NOT DETECTED; J-QUANTITATION APPROXIMATE; NA-NOT ANALYZED

TABLE 1-1

ANALYTICAL RESULTS COMPARED TO SCREENING CRITERIA - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

SAMPLE ID			IOA-SS-EU41-0002	IOA-SS-EU42-0002	IOA-SS-EU43-0002	IOA-SS-EU44-0002	IOA-SS-EU45-0002	IOA-SS-EU46-0002	IOA-SS-EU46-0002-D	IOA-SS-EU46-0002-AVG	IOA-SS-EU47-0002	IOA-SS-EU48-0002	IOA-SS-EU49-0002	MW06013-NSO-112498-0	MW11131-NSO-122198-0	SB06001-NSO-120898-0	SB06002-NSO-120898-0	SB06004-NSO-120898-0
LOCATION ID			IOA-SS-EU41	IOA-SS-EU42	IOA-SS-EU43	IOA-SS-EU44	IOA-SS-EU45	IOA-SS-EU46	IOA-SS-EU46	IOA-SS-EU46	IOA-SS-EU47	IOA-SS-EU48	IOA-SS-EU49	MW06-013	MW11-131	SB06-001	SB06-002	SB06-004
SAMPLE DATE			08/10/11	08/10/11	08/10/11	08/10/11	08/10/11	08/10/11	08/10/11	08/10/11	08/10/11	08/10/11	08/10/11	11/24/98	12/21/98	12/08/98	12/08/98	12/08/98
DEPTH			0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT
EXPOSURE UNIT			EU41	EU42	EU43	EU44	EU45	EU46	EU46	EU46	EU47	EU48	EU49	EU37	EU18	EU28	EU28	EU39
CRITERIA	EPA RSL - Res. Soil[1]	BKG - Surf.Soil[2]																
SEMIVOLATILES (UG/KG)																		
BAP EQUIVALENT-HALFND	15	2130	85.4 J	69.3 J	129 J	81 J	469 J	63.6 J	66.8 J	65.2 J	19 UJ	32.2 J	19 UJ	1800 U	87.7 J	6710 J	15600 J	328 J
BAP EQUIVALENT-POS	15	2130	65.1 J	47.3 J	112 J	60.1 J	354 J	43.8 J	47 J	45.4 J	NA	2.21 J	NA	NA	51.7 J	6710 J	15600 J	328 J
BENZO(A)ANTHRACENE	150	810	67 J	38 J	85 J	34 J	290 J	33 J	31 J	32 J	19 UJ	10 J	19 UJ	350 UJ	360 UJ	6000 J	12000 J	350 J
BENZO(A)PYRENE	15	1828.78	50 J	37 J	81 J	47 J	260 J	35 J	38 J	36.5 J	19 UJ	19 UJ	19 UJ	1800 U	34 J	4800 J	11000 J	190 J
BENZO(B)FLUORANTHENE	150	770	80 J	62 J	160 J	93 J	620 J	53 J	56 J	54.5 J	19 UJ	12 J	19 UJ	350 UJ	100 J	6100 J	17000 J	560 J
BENZO(K)FLUORANTHENE	1500	2700	32 J	26 J	67 J	33 J	210 J	20 J	24 J	22 J	19 UJ	19 UJ	19 UJ	350 UJ	100 J	4600 J	9400 J	130 J
DIBENZO(A,H)ANTHRACENE	15	96	37 UJ	40 UJ	35 UJ	38 UJ	210 UJ	36 UJ	36 UJ	36 UJ	38 UJ	37 UJ	37 UJ	2.1 U	6.6 J	290 J	720 J	19 J
INDENO(1,2,3-CD)PYRENE	150	175	37 UJ	40 UJ	55 J	38 UJ	210 UJ	36 UJ	36 UJ	36 UJ	38 UJ	37 UJ	37 UJ	350 UJ	360 UJ	3600 J	8300 J	260 J
PESTICIDES/PCBS (UG/KG)																		
AROCLOR-1260	220		7.4 U	8 U	710	7.6 U	61	5 J	7.1 U	4.28 J	7.6 U	8 J	7.4 U	35 U	480 J	34 U	35 U	36 U
HEPTACHLOR EPOXIDE	53		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.7 U	8.4 J	63 J	200 J	2.7 J
TOTAL AROCLOR	220		7.4 U	8 U	710	7.6 U	61	5 J	7.1 U	4.28 J	7.6 U	8 J	7.4 U	40 U	480 J	39 U	40 U	41.1 U
METALS (MG/KG)																		
ALUMINUM	7700	10499.13	9200	11000	7600	6800	8000	10000	10000	10000	7900	8500	6400	7380 J	5110 J	4740 J	5230 J	5230 J
ARSENIC	0.39	5.31	0.75	2.3	2.1	1.7	7.2	1.4	1.3	1.35	1.3	3.4	36	4.4 J	2.1	2.6	4.1	1.7
CALCIUM		6360	750 J	610	1400	1000	1000	830	900	865	1700	1400	1200	899	725 J	761	640	1550
CHROMIUM	0.29	10.1	10	9.3	11	7.9	14	11	9.6	10.3	16	9.9	7.9	10.6	7.7	11.9	18.7	6.8
COBALT	2.3	3.98	2.6	3.7	4	4.9	3.8	3.1	2.7	2.9	6.3	5.2	4	3.6	2.2 J	3.4	4	2.4 J

BLACK SHADING-ABOVE RSL AND BKG; BLUE SHADING-ABOVE RSL, LESS THAN BKG; GRAY SHADING-DETECTED;
BOLD-EXCEEDS BKG, NO RSL; U - NOT DETECTED; J-QUANTITATION APPROXIMATE; NA-NOT ANALYZED

TABLE 1-1

ANALYTICAL RESULTS COMPARED TO SCREENING CRITERIA - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

SAMPLE ID			IOA-SS-EU41-0002	IOA-SS-EU42-0002	IOA-SS-EU43-0002	IOA-SS-EU44-0002	IOA-SS-EU45-0002	IOA-SS-EU46-0002	IOA-SS-EU46-0002-D	IOA-SS-EU46-0002-AVG	IOA-SS-EU47-0002	IOA-SS-EU48-0002	IOA-SS-EU49-0002	MW06013-NSO-112498-0	MW11131-NSO-122198-0	SB06001-NSO-120898-0	SB06002-NSO-120898-0	SB06004-NSO-120898-0
LOCATION ID			IOA-SS-EU41	IOA-SS-EU42	IOA-SS-EU43	IOA-SS-EU44	IOA-SS-EU45	IOA-SS-EU46	IOA-SS-EU46	IOA-SS-EU46	IOA-SS-EU47	IOA-SS-EU48	IOA-SS-EU49	MW06-013	MW11-131	SB06-001	SB06-002	SB06-004
SAMPLE DATE			08/10/11	08/10/11	08/10/11	08/10/11	08/10/11	08/10/11	08/10/11	08/10/11	08/10/11	08/10/11	08/10/11	11/24/98	12/21/98	12/08/98	12/08/98	12/08/98
DEPTH			0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT
EXPOSURE UNIT			EU41	EU42	EU43	EU44	EU45	EU46	EU46	EU46	EU47	EU48	EU49	EU37	EU18	EU28	EU28	EU39
CRITERIA	EPA RSL - Res. Soil[1]	BKG - Surf.Soil[2]																
IRON	5500	11300	11000	19000	16000	14000	14000	13000	11000	12000	11000	20000	45000	14700	9160 J	11100	13200	8310
LEAD	400	301.7	7.1 J	16	35	20	320	33	24	28.5	10	8.1	16	8.5 J	17.3 J	90.7	114	32.1
MAGNESIUM		1963.38	**2000 J**	**2000**	**2200**	**2400**	1900	**2100**	1900	**2000**	**4900**	**2800**	1700	**2430 J**	995 J	1600	**2160**	1240
MANGANESE	180	313.83	130 J	240 J	310 J	390 J	220 J	160 J	130 J	145 J	220 J	310 J	280 J	150 J	96.7 J	209	294	132
THALLIUM	0.078	1.8	0.075 U	0.1 U	0.066 U	0.077 U	0.092 U	0.077 U	0.074 U	0.0755 U	0.079 U	0.081 U	0.085 U	0.32 U	0.34 U	0.31 U	0.34 U	0.33 U
VANADIUM	39	89.1	16	20	21	15	25	17	16	16.5	17	15	18	14.9 J	14.9 J	33.1	38	16.1

BLACK SHADING-ABOVE RSL AND BKG; BLUE SHADING-ABOVE RSL, LESS THAN BKG; GRAY SHADING-DETECTED;
BOLD-EXCEEDS BKG, NO RSL; U - NOT DETECTED; J-QUANTITATION APPROXIMATE; NA-NOT ANALYZED

TABLE 1-1

ANALYTICAL RESULTS COMPARED TO SCREENING CRITERIA - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

SAMPLE ID			SB06006-NSO-120898-0	SB06007-NSO-120898-0	SB06008-NSO-120898-0	SB06008-NSO-120898-0-D	SB06008-NSO-120898-0-AVG	SB06009-NSO-120898-0	SB06010-NSO-120998-0	SB06011-NSO-120998-0	SB06012-NSO-120998-0	SB06-343-NSO-072503	SB06-351-NSO-072503	SB07-305-NSO-1104025	SB07-305-NSO-1104020	SB07-305-NSO-1104020-D
LOCATION ID			SB06-006	SB06-007	SB06-008	SB06-008	SB06-008	SB06-009	SB06-010	SB06-011	SB06-012	SB06-343	SB06-351	SB07-305	SB07-305	SB07-305
SAMPLE DATE			12/08/98	12/08/98	12/08/98	12/08/98	12/08/98	12/08/98	12/09/98	12/09/98	12/09/98	07/25/03	07/25/03	11/04/02	11/04/02	11/04/02
DEPTH			0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 0.5 FT	0.5 - 1 FT	0.5 - 1 FT
EXPOSURE UNIT			EU38	EU38	EU37	EU37	EU37	EU37	EU26	EU26	EU38	EU24	EU37	EU15	EU15	EU15
CRITERIA	EPA RSL - Res. Soil[1]	BKG - Surf.Soil[2]														
SEMIVOLATILES (UG/KG)																
BAP EQUIVALENT-HALFND	15	2130	3530 J	1220 J	311 J	893 J	602 J	224 J	480 J	89.5 J	2.2 UJ	260 U	300 U	NA	136 J	92.8 J
BAP EQUIVALENT-POS	15	2130	3530 J	1220 J	311 J	893 J	602 J	224 J	480 J	87.8 J	NA	NA	NA	NA	136 J	92.8 J
BENZO(A)ANTHRACENE	150	810	2900 J	3500 J	270 J	430	350 J	280 J	280 J	78 J	370 UJ	260 U	300 U	NA	77 J	79 J
BENZO(A)PYRENE	15	1828.78	2600 J	540 J	160 J	610 J	385 J	100 J	330 J	45 J	2.2 UJ	260 U	300 U	NA	66 J	61 J
BENZO(B)FLUORANTHENE	150	770	2900 J	2000 J	630	1000	815	500	440 J	170 J	370 UJ	260 U	300 U	NA	130 J	110 J
BENZO(K)FLUORANTHENE	1500	2700	2500 J	1700 J	150 J	230 J	190 J	150 J	130 J	340 UJ	370 UJ	260 U	300 U	NA	65 J	48 J
DIBENZO(A,H)ANTHRACENE	15	96	100 J	52 J	31 J	88 J	59.5 J	13 J	57 J	7.9 J	2.2 U	260 U	300 U	NA	40 J	6.6 J
INDENO(1,2,3-CD)PYRENE	150	175	2200 J	560 J	280 J	490	385 J	310 J	190 J	100 J	370 UJ	260 U	300 U	NA	87 J	58 J
PESTICIDES/PCBS (UG/KG)																
AROCLOR-1260	220		35 U	35 U	35 U	36 U	35.5 U	36 U	35 U	34 U	37 U	31 J	31 U	17 J	230	200
HEPTACHLOR EPOXIDE	53		13 J	26 J	9.6 J	7.8 J	8.7 J	12 J	6.2 J	1.7 U	1.8 U	0.81 U	0.99 U	NA	0.85 U	NA
TOTAL AROCLOR	220		39.9 U	39.9 U	40 U	41.1 U	40.6 U	41.1 U	40 U	39 U	42.1 U	31 J	31 U	17 J	230	200
METALS (MG/KG)																
ALUMINUM	7700	10499.13	5230 J	5680 J	6960 J	6280 J	6620 J	4470 J	7620 J	7100 J	8950 J	5600	5900	NA	4900 J	4000 J
ARSENIC	0.39	5.31	10.4	7.3	3.1	4.6	3.85	0.81 J	3 J	2.1	2.8	3 J	11 J	NA	3.7	5.5
CALCIUM		6360	1140	1110	1620	1040	1330	2740	3780	1000 J	676 J	440 U	240 U	NA	600	430
CHROMIUM	0.29	10.1	12.3	10.9	11.8	10.4	11.1	7.6	12	9.1 J	9.2 J	6.8	9.5	NA	9.6	8.1
COBALT	2.3	3.98	3.6	3.6	3.8	3.3	3.55	4	4.5	4.6	3.4	3.9 J	2.7 J	NA	2.8 J	2.4 U

BLACK SHADING-ABOVE RSL AND BKG; BLUE SHADING-ABOVE RSL, LESS THAN BKG; GRAY SHADING-DETECTED; BOLD-EXCEEDS BKG, NO RSL; U - NOT DETECTED; J-QUANTITATION APPROXIMATE; NA-NOT ANALYZED

TABLE 1-1

ANALYTICAL RESULTS COMPARED TO SCREENING CRITERIA - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

SAMPLE ID			SB06006-NSO-120898-0	SB06007-NSO-120898-0	SB06008-NSO-120898-0	SB06008-NSO-120898-0-D	SB06008-NSO-120898-0-AVG	SB06009-NSO-120898-0	SB06010-NSO-120998-0	SB06011-NSO-120998-0	SB06012-NSO-120998-0	SB06-343-NSO-072503	SB06-351-NSO-072503	SB07-305-NSO-1104025	SB07-305-NSO-1104020	SB07-305-NSO-1104020-D
LOCATION ID			SB06-006	SB06-007	SB06-008	SB06-008	SB06-008	SB06-009	SB06-010	SB06-011	SB06-012	SB06-343	SB06-351	SB07-305	SB07-305	SB07-305
SAMPLE DATE			12/08/98	12/08/98	12/08/98	12/08/98	12/08/98	12/08/98	12/09/98	12/09/98	12/09/98	07/25/03	07/25/03	11/04/02	11/04/02	11/04/02
DEPTH			0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 0.5 FT	0.5 - 1 FT	0.5 - 1 FT
EXPOSURE UNIT			EU38	EU38	EU37	EU37	EU37	EU37	EU26	EU26	EU38	EU24	EU37	EU15	EU15	EU15
CRITERIA	EPA RSL - Res. Soil[1]	BKG - Surf.Soil[2]														
IRON	5500	11300	12200	9970	12100	11100	11600	6660	13200 J	13100 J	13400 J	11000	10000	NA	9600	11000
LEAD	400	301.7	141	75.6	62.9	57.5	60.2	11.7	28.9	8.7 J	7.7 J	10	7.8	NA	45	27
MAGNESIUM		1963.38	1850	1760	1880	1730	1800	1380 J	**2560 J**	**2790 J**	**2050 J**	1800	1200	NA	1100	920
MANGANESE	180	313.83	180	138	127	143	135	92.5 J	156 J	233 J	157 J	210	66	NA	100	94
THALLIUM	0.078	1.8	0.30 U	0.33 U	0.32 U	0.31 U	0.315 U	0.37 U	0.30 U	0.32 U	0.29 U	0.62 UJ	0.72 UJ	NA	0.62 UJ	0.67 UJ
VANADIUM	39	89.1	27.9	24.1	34.2	25.6	29.9	13.9 J	39.8 J	13.8 J	16.6 J	20	12	NA	18	20

BLACK SHADING-ABOVE RSL AND BKG; BLUE SHADING-ABOVE RSL, LESS THAN BKG; GRAY SHADING-DETECTED;
BOLD-EXCEEDS BKG, NO RSL; U - NOT DETECTED; J-QUANTITATION APPROXIMATE; NA-NOT ANALYZED

TABLE 1-1

ANALYTICAL RESULTS COMPARED TO SCREENING CRITERIA - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

SAMPLE ID			SB07-305-NSO-1104020-AVG	SB07-306-NSO-1104020	SB07-307-NSO-1104020	SB07-308-NSO-1104025	SB07-308-NSO-1104020	SB07-309-NSO-1104025	SB07-309-NSO-1104020	SB07-310-NSO-0716030	SB07-311-NSO-1104020	SB07-312-NSO-1104020	SB07-326-NSO-0716031	SB07-327-NSO-0716031	SB07-328-NSO-0716031	SB07-329-NSO-0716030
LOCATION ID			SB07-305	SB07-306	SB07-307	SB07-308	SB07-308	SB07-309	SB07-309	SB07-310	SB07-311	SB07-312	SB07-326	SB07-327	SB07-328	SB07-329
SAMPLE DATE			11/04/02	11/04/02	11/04/02	11/04/02	11/04/02	11/04/02	11/04/02	07/16/03	11/04/02	11/04/02	07/16/03	07/16/03	07/16/03	07/16/03
DEPTH			0.5 - 1 FT	0.5 - 1 FT	0.5 - 1 FT	0 - 0.5 FT	0.5 - 1 FT	0 - 0.5 FT	0.5 - 1 FT	0.5 - 1 FT	0.5 - 1 FT	0.5 - 1 FT	1 - 1.5 FT	1 - 1.5 FT	1 - 2 FT	0 - 1 FT
EXPOSURE UNIT			EU15	EU15	EU08	EU08	EU08	EU08	EU08	EU08	EU15	EU14	EU15	EU15	EU15	EU15
CRITERIA	EPA RSL - Res. Soil[1]	BKG - Surf.Soil[2]														
SEMIVOLATILES (UG/KG)																
BAP EQUIVALENT-HALFND	15	2130	114 J	83.6 J	96.7 J	NA	52.3 J	NA	621 J	NA	124	391	NA	NA	NA	NA
BAP EQUIVALENT-POS	15	2130	114 J	73.1 J	69.3 J	NA	51 J	NA	621 J	NA	124	391	NA	NA	NA	NA
BENZO(A)ANTHRACENE	150	810	78 J	59 J	260 U	NA	29 J	NA	310	NA	NA	NA	NA	NA	NA	NA
BENZO(A)PYRENE	15	1828.78	63.5 J	56 J	56	NA	30 J	NA	400	NA	100	330	NA	NA	NA	NA
BENZO(B)FLUORANTHENE	150	770	120 J	70 J	38 J	NA	59 J	NA	610	NA	NA	NA	NA	NA	NA	NA
BENZO(K)FLUORANTHENE	1500	2700	56.5 J	34 J	260 U	NA	260 U	NA	230 J	NA	NA	NA	NA	NA	NA	NA
DIBENZO(A,H)ANTHRACENE	15	96	23.3 J	21 U	9.5 J	NA	7.3 J	NA	95	NA	24	61	NA	NA	NA	NA
INDENO(1,2,3-CD)PYRENE	150	175	72.5 J	38 J	260 U	NA	49 J	NA	310	NA	NA	NA	NA	NA	NA	NA
PESTICIDES/PCBS (UG/KG)																
AROCLOR-1260	220		215	49	20 J	1800	160	250	220	NA	1000 J	170	1500	2900	500	1200
HEPTACHLOR EPOXIDE	53		0.85 U	0.82 U	0.83 U	NA	0.85 U	NA	0.84 U	NA	NA	NA	NA	NA	NA	NA
TOTAL AROCLOR	220		215	49	20 J	1800	160	250	220	NA	1000 J	170	1500	2900	500	1200
METALS (MG/KG)																
ALUMINUM	7700	10499.13	4450 J	2600 J	2800 J	NA	7500 J	NA	8100 J	NA	NA	NA	NA	NA	NA	NA
ARSENIC	0.39	5.31	4.6	5.2	5.2	NA	3.4	NA	2.9	4.5	NA	NA	NA	NA	NA	NA
CALCIUM		6360	515	140 U	320	NA	1200	NA	1100	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	0.29	10.1	8.85	6	5.8	NA	12	NA	11	5.5	NA	NA	NA	NA	NA	NA
COBALT	2.3	3.98	2 J	1.7 U	1.9 U	NA	7.4	NA	6.3 J	NA	NA	NA	NA	NA	NA	NA

BLACK SHADING-ABOVE RSL AND BKG; BLUE SHADING-ABOVE RSL, LESS THAN BKG; GRAY SHADING-DETECTED;
BOLD-EXCEEDS BKG, NO RSL; U - NOT DETECTED; J-QUANTITATION APPROXIMATE; NA-NOT ANALYZED

TABLE 1-1

ANALYTICAL RESULTS COMPARED TO SCREENING CRITERIA - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

SAMPLE ID			SB07-305-NSO-1104020-AVG	SB07-306-NSO-1104020	SB07-307-NSO-1104020	SB07-308-NSO-1104025	SB07-308-NSO-1104020	SB07-309-NSO-1104025	SB07-309-NSO-1104020	SB07-310-NSO-0716030	SB07-311-NSO-1104020	SB07-312-NSO-1104020	SB07-326-NSO-0716031	SB07-327-NSO-0716031	SB07-328-NSO-0716031	SB07-329-NSO-0716030
LOCATION ID			SB07-305	SB07-306	SB07-307	SB07-308	SB07-308	SB07-309	SB07-309	SB07-310	SB07-311	SB07-312	SB07-326	SB07-327	SB07-328	SB07-329
SAMPLE DATE			11/04/02	11/04/02	11/04/02	11/04/02	11/04/02	11/04/02	11/04/02	07/16/03	11/04/02	11/04/02	07/16/03	07/16/03	07/16/03	07/16/03
DEPTH			0.5 - 1 FT	0.5 - 1 FT	0.5 - 1 FT	0 - 0.5 FT	0.5 - 1 FT	0 - 0.5 FT	0.5 - 1 FT	0.5 - 1 FT	0.5 - 1 FT	0.5 - 1 FT	1 - 1.5 FT	1 - 1.5 FT	1 - 2 FT	0 - 1 FT
EXPOSURE UNIT			EU15	EU15	EU08	EU08	EU08	EU08	EU08	EU08	EU15	EU14	EU15	EU15	EU15	EU15
CRITERIA	EPA RSL - Res. Soil[1]	BKG - Surf.Soil[2]														
IRON	5500	11300	10300	8800	10000	NA	15000	NA	15000	NA	NA	NA	NA	NA	NA	NA
LEAD	400	301.7	36	6.4	6.8	NA	40	NA	25	6	NA	NA	NA	NA	NA	NA
MAGNESIUM		1963.38	1010	530	540	NA	**3500**	NA	**3000**	NA	NA	NA	NA	NA	NA	NA
MANGANESE	180	313.83	97	60	68	NA	350	NA	370	NA	NA	NA	NA	NA	NA	NA
THALLIUM	0.078	1.8	0.645 UJ	0.21 J	0.62 UJ	NA	0.67 UJ	NA	0.65 UJ	NA	NA	NA	NA	NA	NA	NA
VANADIUM	39	89.1	19	17	19	NA	20	NA	24	NA	NA	NA	NA	NA	NA	NA

BLACK SHADING-ABOVE RSL AND BKG; BLUE SHADING-ABOVE RSL, LESS THAN BKG; GRAY SHADING-DETECTED;
BOLD-EXCEEDS BKG, NO RSL; U - NOT DETECTED; J-QUANTITATION APPROXIMATE; NA-NOT ANALYZED

TABLE 1-1

ANALYTICAL RESULTS COMPARED TO SCREENING CRITERIA - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

SAMPLE ID			SB07-329-NSO-0716031	SB07-337-NSO-101503	SB07-339-NSO-101503	SB09007-NSO-121698-0	SB09008-NSO-121698-0	SB09009-NSO-121698-0	SB11-201-NSO-0515010
LOCATION ID			SB07-329	SB07-337	SB07-339	SB09-007	SB09-008	SB09-009	SB11-201
SAMPLE DATE			07/16/03	10/15/03	10/15/03	12/16/98	12/16/98	12/16/98	05/15/01
DEPTH			1 - 2 FT	0.5 - 1.5 FT	0.5 - 1.5 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT
EXPOSURE UNIT			EU15	EU15	EU07	EU20	EU21	EU22	EU11
CRITERIA	EPA RSL - Res. Soil[1]	BKG - Surf.Soil[2]							
SEMIVOLATILES (UG/KG)									
BAP EQUIVALENT-HALFND	15	2130	NA	NA	NA	58.1 J	61.8 J	15 J	79.9 J
BAP EQUIVALENT-POS	15	2130	NA	NA	NA	2.6 J	4.7 J	14.6 J	79.9 J
BENZO(A)ANTHRACENE	150	810	NA	NA	NA	350 U	360 UJ	2.5 U	52 J
BENZO(A)PYRENE	15	1828.78	NA	NA	NA	2.6 J	4.7 J	12 J	37 J
BENZO(B)FLUORANTHENE	150	770	NA	NA	NA	350 U	360 UJ	2.5 U	89 J
BENZO(K)FLUORANTHENE	1500	2700	NA	NA	NA	350 U	360 UJ	2.5 U	96 J
DIBENZO(A,H)ANTHRACENE	15	96	NA	NA	NA	2.1 U	2.2 U	2.6 J	23 J
INDENO(1,2,3-CD)PYRENE	150	175	NA	NA	NA	350 U	360 UJ	2.5 U	47 J
PESTICIDES/PCBS (UG/KG)									
AROCLOR-1260	220		600	330	290	NA	NA	NA	440 J
HEPTACHLOR EPOXIDE	53		NA	NA	NA	NA	NA	NA	4 J
TOTAL AROCLOR	220		600	330	290	NA	NA	NA	440 J
METALS (MG/KG)									
ALUMINUM	7700	10499.13	NA	NA	NA	5280 J	6620 J	7330 J	6900 J
ARSENIC	0.39	5.31	NA	NA	NA	1.8 J	1.9 J	1.9 J	3.4
CALCIUM		6360	NA	NA	NA	653 J	702 J	759 J	1100 J
CHROMIUM	0.29	10.1	NA	NA	NA	6.1 J	7.2 J	8	11
COBALT	2.3	3.98	NA	NA	NA	4.6	4	3.4	6

BLACK SHADING-ABOVE RSL AND BKG; BLUE SHADING-ABOVE RSL, LESS THAN BKG; GRAY SHADING-DETECTED; BOLD-EXCEEDS BKG, NO RSL; U - NOT DETECTED; J-QUANTITATION APPROXIMATE; NA-NOT ANALYZED

TABLE 1-1

ANALYTICAL RESULTS COMPARED TO SCREENING CRITERIA - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

SAMPLE ID			SB07-329-NSO-0716031	SB07-337-NSO-101503	SB07-339-NSO-101503	SB09007-NSO-121698-0	SB09008-NSO-121698-0	SB09009-NSO-121698-0	SB11-201-NSO-0515010
LOCATION ID			SB07-329	SB07-337	SB07-339	SB09-007	SB09-008	SB09-009	SB11-201
SAMPLE DATE			07/16/03	10/15/03	10/15/03	12/16/98	12/16/98	12/16/98	05/15/01
DEPTH			1 - 2 FT	0.5 - 1.5 FT	0.5 - 1.5 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT
EXPOSURE UNIT			EU15	EU15	EU07	EU20	EU21	EU22	EU11
CRITERIA	EPA RSL - Res. Soil[1]	BKG - Surf.Soil[2]							
IRON	5500	11300	NA	NA	NA	11500 J	10700 J	11900 J	10000 J
LEAD	400	301.7	NA	NA	NA	8 J	16.5 J	29.8 J	23
MAGNESIUM		1963.38	NA	NA	NA	**2170 J**	1660 J	1710 J	1600
MANGANESE	180	313.83	NA	NA	NA	357 J	191 J	185 J	210
THALLIUM	0.078	1.8	NA	NA	NA	0.29 UJ	0.32 UJ	0.32 UJ	0.96 U
VANADIUM	39	89.1	NA	NA	NA	13 J	16 J	21.6 J	19

Notes:
1) EPA RSL Res. Soil = Project screening level established in the August 2011 Sampling and Analysis Plan, IOA Site Investigation (Tetra Tech, 2011).
2) BKG - Surf. Soil = Base background values established in the Supplement to Final Summary Report of Background Data Summary Statistics (Stone and Webster, 2002).

BLACK SHADING-ABOVE RSL AND BKG; BLUE SHADING-ABOVE RSL, LESS THAN BKG; GRAY SHADING-DETECTED; BOLD-EXCEEDS BKG, NO RSL; U - NOT DETECTED; J-QUANTITATION APPROXIMATE; NA-NOT ANALYZED

TABLE 1-2

DIOXIN ANALYTICAL RESULTS COMPARED TO SCREENING CRITERIA - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

SAMPLE ID		IOA-SS-EU07-0002	IOA-SS-EU09-0002	IOA-SS-EU13-0002	IOA-SS-EU15-0002	IOA-SS-EU15-0002-D	IOA-SS-EU15-0002-AVG	IOA-SS-EU27-0002	IOA-SS-EU28-0002	IOA-SS-EU36-0002	IOA-SS-EU37-0002	IOA-SS-EU38-0002	IOA-SS-EU39-0002
LOCATION ID		IOA-SS-EU07	IOA-SS-EU09	IOA-SS-EU13	IOA-SS-EU15	IOA-SS-EU15	IOA-SS-EU15	IOA-SS-EU27	IOA-SS-EU28	IOA-SS-EU36	IOA-SS-EU37	IOA-SS-EU38	IOA-SS-EU39
SAMPLE DATE		08/09/11	08/09/11	08/09/11	08/09/11	08/09/11	08/09/11	08/10/11	08/09/11	08/10/11	08/09/11	08/09/11	08/09/11
DEPTH		0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT
EXPOSURE UNIT		EU07	EU09	EU13	EU15	EU15	EU15	EU27	EU28	EU36	EU37	EU38	EU39
CRITERIA	EPA RSL RES Soil[1]												
DIOXINS/FURANS (NG/KG)													
1,2,3,4,6,7,8,9-OCDD	15000	415	222	462	470	299	384	544	704	583	359	50.2	203
1,2,3,4,6,7,8,9-OCDF	15000	13.9	20.5	30.4	38.5 J	21.9 J	30.2 J	7.14	6.03	5.07	5.87	0.986 U	24
1,2,3,4,6,7,8-HPCDD	450	15.9	20.5	60.2	40.3	26.8	33.6	37.6	16.7	21.2	12	1.04 J	21.2
1,2,3,4,6,7,8-HPCDF	450	8.14	15.6	27.1	16	9.85	12.9	5.42	4.77	4.1	4.91	0.404 J	17.5
1,2,3,4,7,8,9-HPCDF	450	0.883 U	2.05 J	1.31 J	1.4 J	0.848 J	1.12 J	0.989 U	1.08 U	0.972 U	1.05 U	0.986 U	0.952 J
1,2,3,4,7,8-HXCDD	45	0.314 J	0.384 J	0.957 J	0.379 J	0.368 J	0.374 J	0.344 J	0.254 J	0.486 U	0.135 J	0.493 U	0.408 J
1,2,3,4,7,8-HXCDF	45	0.51 J	5.13	2.22 J	1.8 J	1.05 J	1.42 J	1.04 J	1.3 J	0.892 J	0.994 J	0.247 U	3.92
1,2,3,6,7,8-HXCDD	45	0.598 J	1.33 J	3.03	1.86 J	1.08 J	1.47 J	1.06 J	0.539 U	0.765 J	0.302 J	0.493 U	1.3 J
1,2,3,6,7,8-HXCDF	45	0.519 J	7.61	2.61 J	1.76 J	1.05 J	1.4 J	1.31 J	1.75 J	0.912 J	0.568 J	0.247 U	4.06
1,2,3,7,8,9-HXCDD	45	0.36 J	0.918 J	1.62 J	1.14 J	0.728 J	0.934 J	0.735 J	0.539 U	0.454 J	0.317 J	0.493 U	0.937 J
1,2,3,7,8,9-HXCDF	45	0.883 U	2.02 J	0.811 J	0.974 U	1.07 U	1.02 U	0.989 U	0.502 J	0.972 U	1.05 U	0.986 U	1.09 J
1,2,3,7,8-PECDD	4.5	0.221 U	1.7 J	0.642 J	0.587 J	1.32 J	0.954 J	0.247 U	0.269 U	0.239 J	0.264 U	0.247 U	0.534 J
1,2,3,7,8-PECDF	150	1.49 J	1.01 J	0.739 J	0.427 J	0.248 J	0.338 J	0.28 J	0.539 U	0.281 J	0.294 J	0.493 U	0.87 J
2,3,4,6,7,8-HXCDF	45	0.998 J	17.5	5.19	3.27	2.38 J	2.82 J	2.83	4.23	2.15 J	0.868 J	0.247 U	8.9
2,3,4,7,8-PECDF	15	1.02 J	24.3	6.5	4.63	2.98	3.8	4.04	7.6	3.18	1.32 J	0.142 J	14.6
2,3,7,8-TCDD	4.5	0.177 U	0.366 J	0.623	0.222 U	0.214 U	0.218 U	0.367 UJ	0.219 U	0.422 J	0.439 J	0.197 U	1.68
2,3,7,8-TCDF	45	0.371 U	1.11 J	0.87	0.445 U	0.318 U	0.382 U	0.659 J	0.568 UJ	0.444 U	0.419 U	0.194 UJ	1.15 UJ
TEQ	4.5	1.05 J	13.4 J	6 J	3.74 J	3.36 J	3.55 J	2.61 J	3.51 J	2.57 J	1.44 J	0.0721 J	9.15 J
TEQ HALFND	4.5	1.32 J	13.4 J	6 J	3.92 J	3.53 J	3.72 J	2.98 J	3.85 J	2.67 J	1.65 J	0.477 J	9.2 J
TOTAL HPCDD	94	35.5	45.8	124	96.4	61.7	79	80.2	40.1	50.8	28.4	2.54 J	46.2
TOTAL HPCDF		19.9	39.3	59.8	45.6	27.3	36.4	11.9	10.5 J	8.25	6.72 J	0.563 J	32.3 J
TOTAL HXCDD		5.16 J	12.8	21.3 J	12.9 J	8.39 J	10.6 J	9.93 J	3.3 J	5.21 J	2.64 J	0.493 U	11.7
TOTAL HXCDF		12.2 J	169 J	57.4 J	38	25.3 J	31.6 J	28.6	43.4 J	21 J	9.48 J	0.431 J	92.9
TOTAL PECDD		0.569 J	10.1 J	6.54 J	3.63 J	3.36 J	3.5 J	3.58 J	1.75 J	2.01 J	0.45 J	0.247 U	7.16 J
TOTAL PECDF		12.3 J	225	56.9	41.1 J	27.3 J	34.2 J	39.8 J	57.3 J	27 J	12.2 J	0.664 J	124 J

BLACK SHADING - RSL EXCEEDED; LIGHT SHADING - DETECTED;
U - NOT DETECTED; J - QUANTITATION APPROXIMATE; R - REJECTED

TABLE 1-2

DIOXIN ANALYTICAL RESULTS COMPARED TO SCREENING CRITERIA - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

SAMPLE ID		IOA-SS-EU07-0002	IOA-SS-EU09-0002	IOA-SS-EU13-0002	IOA-SS-EU15-0002	IOA-SS-EU15-0002-D	IOA-SS-EU15-0002-AVG	IOA-SS-EU27-0002	IOA-SS-EU28-0002	IOA-SS-EU36-0002	IOA-SS-EU37-0002	IOA-SS-EU38-0002	IOA-SS-EU39-0002
LOCATION ID		IOA-SS-EU07	IOA-SS-EU09	IOA-SS-EU13	IOA-SS-EU15	IOA-SS-EU15	IOA-SS-EU15	IOA-SS-EU27	IOA-SS-EU28	IOA-SS-EU36	IOA-SS-EU37	IOA-SS-EU38	IOA-SS-EU39
SAMPLE DATE		08/09/11	08/09/11	08/09/11	08/09/11	08/09/11	08/09/11	08/10/11	08/09/11	08/10/11	08/09/11	08/09/11	08/09/11
DEPTH		0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT
EXPOSURE UNIT		EU07	EU09	EU13	EU15	EU15	EU15	EU27	EU28	EU36	EU37	EU38	EU39
CRITERIA	EPA RSL RES Soil[1]												
TOTAL TCDD		0.36 J	2.63 J	4.51 J	2.59 J	0.877 J	1.73 J	1.88 J	0.219 U	1.21 J	0.439 J	0.197 U	4.52 J
TOTAL TCDF		2.67 J	52.8	19.6 J	13.2 J	9.73 J	11.5 J	12.8 J	13.2 J	7.16 J	5.5 J	0.922 J	39 J

BLACK SHADING - RSL EXCEEDED; LIGHT SHADING - DETECTED;
U - NOT DETECTED; J - QUANTITATION APPROXIMATE; R - REJECTED

TABLE 1-2

DIOXIN ANALYTICAL RESULTS COMPARED TO SCREENING CRITERIA - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

SAMPLE ID		IOA-SS-EU43-0002	IOA-SS-EU46-0002	IOA-SS-EU46-0002-D	IOA-SS-EU46-0002-AVG	SB06010-NSO-120998-0	SB06011-NSO-120998-0	SB06-304-NSO-0716030	SB06-343-NSO-072503	SB06-351-NSO-072503
LOCATION ID		IOA-SS-EU43	IOA-SS-EU46	IOA-SS-EU46	IOA-SS-EU46	SB06-010	SB06-011	SB06-304	SB06-343	SB06-351
SAMPLE DATE		08/10/11	08/10/11	08/10/11	08/10/11	12/09/98	12/09/98	07/16/03	07/25/03	07/25/03
DEPTH		0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT
EXPOSURE UNIT		EU43	EU46	EU46	EU46	EU26	EU26	EU26	EU24	EU37
CRITERIA	EPA RSL RES Soil[1]									
DIOXINS/FURANS (NG/KG)										
1,2,3,4,6,7,8,9-OCDD	15000	4610	768	633	700	313.74 R	165.04 U	32	47	1900
1,2,3,4,6,7,8,9-OCDF	15000	20.3	6.39	5.94	6.16	28.27 R	15.99 J	57	0.41 U	47
1,2,3,4,6,7,8-HPCDD	450	270	31	22.2	26.6	13.07 R	7.36 U	2 U	1.7 U	220
1,2,3,4,6,7,8-HPCDF	450	30.6	3.96	3.3	3.63	17.49 R	8.86	32	0.47 U	40
1,2,3,4,7,8,9-HPCDF	450	2.27 J	0.99 U	0.988 U	0.989 U	0.64 R	0.35	0.75 U	0.25 U	2 U
1,2,3,4,7,8-HXCDD	45	2.23 J	0.349 J	0.206 J	0.278 J	0.21 R	0.11 J	0.21 U	0.30 U	2.4 U
1,2,3,4,7,8-HXCDF	45	4.46	0.744 J	0.709 J	0.726 J	4.46 R	2.1	3.5 J	0.20 U	4.1 J
1,2,3,6,7,8-HXCDD	45	5.83	0.814 J	0.525 J	0.67 J	0.56 R	0.24 J	0.21 U	0.28 U	9
1,2,3,6,7,8-HXCDF	45	3.71	1.06 J	0.746 J	0.903 J	1.48 R	0.69	1.9 U	0.19 U	2.8 U
1,2,3,7,8,9-HXCDD	45	4.18	0.791 J	0.4 J	0.596 J	0.52 R	0.17 J	0.20 U	0.83 U	4.1 J
1,2,3,7,8,9-HXCDF	45	0.918 J	0.366 J	0.988 U	0.43 J	0.10 R	0.17 U	0.69 U	0.23 U	0.80 U
1,2,3,7,8-PECDD	4.5	4.1 J	0.318 J	0.247 U	0.221 J	0.16 R	0.09 U	0.37 U	0.47 U	0.67 U
1,2,3,7,8-PECDF	150	1.53 J	0.353 J	0.494 U	0.3 J	0.56 R	0.26	0.68 U	0.33 U	1.1 U
2,3,4,6,7,8-HXCDF	45	7.59	2.31 J	1.69 J	2 J	1.22 R	0.62 J	0.98 U	0.27 U	2.1 U
2,3,4,7,8-PECDF	15	10.6	3.58	2.2 J	2.89 J	0.80 R	0.34	0.62 U	0.33 U	3.2 J
2,3,7,8-TCDD	4.5	0.277 U	0.492 J	0.198 U	0.296 J	6.85 R	0.92	4.2	0.33 U	0.32 U
2,3,7,8-TCDF	45	4.15	0.428 UJ	0.464 UJ	0.446 UJ	0.31 R	0.23 J	0.71 U	0.33 U	7.1
TEQ	4.5	15.1 J	3.12 J	1.53 J	2.32 J	6.85 R	1.54 J	4.9 J	0.0141	6.57 J
TEQ HALFND	4.5	15.2 J	3.15 J	1.84 J	2.5 J	6.85 R	1.66 J	5.44 J	0.612	7.5 J
TOTAL HPCDD	94	827	73.2	51.2	62.2	23.31	12.78	2.2 U	1.9 U	440
TOTAL HPCDF		77.4	9.82	8.16	8.99	25.46	12	35	0.47 U	96
TOTAL HXCDD		67.4	7.67 J	3.92 J	5.8 J	4.2	1.33	0.59 U	4.7	59
TOTAL HXCDF		88.3 J	24 J	15.9 J	20 J	31.51	12.13	18	0.67 U	56
TOTAL PECDD		15.4	2.77 J	0.54 J	1.66 J	1.59	0.34	0.37 U	3.2	2.3 U
TOTAL PECDF		104 J	34.1 J	22.4	28.2 J	34.62	16.29	11	1.3 U	26

BLACK SHADING - RSL EXCEEDED; LIGHT SHADING - DETECTED;
U - NOT DETECTED; J - QUANTITATION APPROXIMATE; R - REJECTED

TABLE 1-2

DIOXIN ANALYTICAL RESULTS COMPARED TO SCREENING CRITERIA - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

SAMPLE ID		IOA-SS-EU43-0002	IOA-SS-EU46-0002	IOA-SS-EU46-0002-D	IOA-SS-EU46-0002-AVG	SB06010-NSO-120998-0	SB06011-NSO-120998-0	SB06-304-NSO-0716030	SB06-343-NSO-072503	SB06-351-NSO-072503
LOCATION ID		IOA-SS-EU43	IOA-SS-EU46	IOA-SS-EU46	IOA-SS-EU46	SB06-010	SB06-011	SB06-304	SB06-343	SB06-351
SAMPLE DATE		08/10/11	08/10/11	08/10/11	08/10/11	12/09/98	12/09/98	07/16/03	07/25/03	07/25/03
DEPTH		0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 2 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT	0 - 1 FT
EXPOSURE UNIT		EU43	EU46	EU46	EU46	EU26	EU26	EU26	EU24	EU37
CRITERIA	EPA RSL RES Soil[1]									
TOTAL TCDD		0.885 J	0.901 J	0.198 U	0.5 J	7.15	0.92	4.8	18	0.32 U
TOTAL TCDF		33.4 J	8.15 J	5.88 J	7.02 J	12.18	6.04	7.9	97	77

Notes:
1) EPA RSL Res. Soil = Project screening level established in the August 2011 Sampling and Analysis Plan, IOA Site Investigation (Tetra Tech, 2011).

BLACK SHADING - RSL EXCEEDED; LIGHT SHADING - DETECTED;
U - NOT DETECTED; J - QUANTITATION APPROXIMATE; R - REJECTED

TABLE 1-3

ANALYTICAL RESULTS COMPARED TO SCREENING CRITERIA - RIA 33 SUBSURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS
PAGE 1 OF 2

SAMPLE ID			IOA-SO-RIA33-SB02-0507	IOA-SO-RIA33-SB04-0305	IOA-SO-RIA33-SB08-0305	IOA-SO-RIA33-SB10-0305	IOA-SO-RIA33-SB14-0507	IOA-SO-RIA33-SB14-0507-D	IOA-SO-RIA33-SB14-0507-AVG
LOCATION ID			IOA-RIA33-SB02	IOA-RIA33-SB04	IOA-RIA33-SB08	IOA-RIA33-SB10	IOA-RIA33-SB14	IOA-RIA33-SB14	IOA-RIA33-SB14
SAMPLE DATE			08/15/11	08/15/11	08/15/11	08/15/11	08/15/11	08/15/11	08/15/11
DEPTH			5 - 7 FT	3 - 5 FT	3 - 5 FT	3 - 5 FT	5 - 7 FT	5 - 7 FT	5 - 7 FT
CRITERIA	EPA RSL RES Soil[1]	BKG Subsurface Soil[2]							
VOLATILES (UG/KG)									
1,1,1-TRICHLOROETHANE	870000		0.41 U	0.36 U	0.39 U	4 J	0.48 U	0.41 U	0.445 U
1,1-DICHLOROETHANE	3300		0.41 U	0.36 U	0.39 U	3 J	0.48 U	0.41 U	0.445 U
TRICHLOROETHENE	910		0.41 U	0.36 U	0.39 U	7 J	0.48 U	0.41 U	0.445 U
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)									
2-METHYLNAPHTHALENE	31000		19 J	17 UJ	17 UJ	33 J	7 J	17 UJ	7.75 J
ACENAPHTHENE	340000		73 J	17 UJ	17 UJ	19 J	17 UJ	17 UJ	17 UJ
ACENAPHTHYLENE	340000		55 J	17 UJ	17 UJ	17 UJ	15 J	11 J	13 J
ANTHRACENE	1700000		150 J	17 UJ	17 UJ	41 J	39 J	29 J	34 J
BAP EQUIVALENT-HALFND	15		584 J	30.6 J	17 UJ	244 J	152 J	121 J	136 J
BAP EQUIVALENT-POS	15		584 J	11.8 J	NA	231 J	135 J	104 J	120 J
BENZO(A)ANTHRACENE	150	600	520 J	15 J	17 UJ	220 J	140 J	110 J	125 J
BENZO(A)PYRENE	15	16	380 J	9 J	17 UJ	170 J	98 J	75 J	86.5 J
BENZO(B)FLUORANTHENE	150	810	650 J	13 J	17 UJ	290 J	170 J	130 J	150 J
BENZO(G,H,I)PERYLENE	170000	330	230 J	17 UJ	17 UJ	92 J	60 J	47 J	53.5 J
BENZO(K)FLUORANTHENE	1500	320	250 J	10 UJ	17 UJ	100 J	78 J	52 J	65 J
CHRYSENE	15000	710	550 J	13 J	17 UJ	240 J	140 J	100 J	120 J
DIBENZO(A,H)ANTHRACENE	15	1.7	64 J	34 UJ	34 UJ	26 UJ	35 UJ	35 UJ	35 UJ
FLUORANTHENE	230000	1100	870 J	24 J	17 UJ	340 J	240 J	200 J	220 J
FLUORENE	230000		89 J	17 UJ	17 UJ	17 J	16 J	11 J	13.5 J
INDENO(1,2,3-CD)PYRENE	150	390	200 J	34 UJ	34 UJ	86 J	49 J	40 J	44.5 J
NAPHTHALENE	3600		33 J	17 UJ	17 UJ	11 J	12 J	17 UJ	10.2 J
PHENANTHRENE	170000	360	610 J	11 J	17 UJ	190 J	150 J	120 J	135 J
PYRENE	170000	10000	910 J	20 J	17 UJ	370 J	210 J	160 J	185 J
METALS (MG/KG)									
ALUMINUM	7700	8518.54	7300	6800	7300	6700	7900	7000	7450
ANTIMONY	3.1	3.65	0.3	0.083 U	0.056 U	0.130 U	0.53	0.45	0.49
ARSENIC	0.39	1.89	1.9	1.7	1.7	2.3	1.5	1.5	1.5
BARIUM	1500	27.03	16	13	12	17	15	14	14.5
BERYLLIUM	16	0.44	0.37	0.4	0.54	0.52	0.38	0.42	0.4
CADMIUM	7	0.115	0.19	0.18	0.19	0.28	0.018 J	0.2	0.19 J
CALCIUM		1546.58	1500	1000	1100	1700	1100	1100	1100
CHROMIUM	0.29	10.15	10	11	9.7	8.9	9.2	7.3	8.25
COBALT	2.3	4.74	4.3	4.7	3.9	4.7	6.8	6.6	6.7
COPPER	310	14.2	9.6	9.7	9.4	12	9	8.3	8.65
IRON	5500	11448.94	13000	14000	18000	11000	14000	14000	14000

BLACK SHADING - EXCEEDS RSL AND BKG; BLUE SHADING - EXCEEDS RSL BUT LESS THAN THE BKG;
GRAY SHADING - DETECTED; U - NOT DETECTED; J - QUANTITATION APPROXIMATE

TABLE 1-3

ANALYTICAL RESULTS COMPARED TO SCREENING CRITERIA - RIA 33 SUBSURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

SAMPLE ID			IOA-SO-RIA33-SB02-0507	IOA-SO-RIA33-SB04-0305	IOA-SO-RIA33-SB08-0305	IOA-SO-RIA33-SB10-0305	IOA-SO-RIA33-SB14-0507	IOA-SO-RIA33-SB14-0507-D	IOA-SO-RIA33-SB14-0507-AVG
LOCATION ID			IOA-RIA33-SB02	IOA-RIA33-SB04	IOA-RIA33-SB08	IOA-RIA33-SB10	IOA-RIA33-SB14	IOA-RIA33-SB14	IOA-RIA33-SB14
SAMPLE DATE			08/15/11	08/15/11	08/15/11	08/15/11	08/15/11	08/15/11	08/15/11
DEPTH			5 - 7 FT	3 - 5 FT	3 - 5 FT	3 - 5 FT	5 - 7 FT	5 - 7 FT	5 - 7 FT
CRITERIA	EPA RSL RES Soil[1]	BKG Subsurface Soil[2]							
LEAD	400	9.27	20	6.6	6.5	16	8.1	7.5	7.8
MAGNESIUM		2246.08	2100	2400	2300	2000	2400	2200	2300
MANGANESE	180	413.84	240 J	170 J	310 J	180 J	320 J	320 J	320 J
MERCURY	1	0.11	0.018 J	0.0022 J	0.002 J	0.012 J	0.0077 J	0.0085 J	0.0081 J
NICKEL	150	6.5	8.5	7.8	7.8	8.9	8.9	7.1	8
POTASSIUM		457.21	290 J	440 J	360 J	360 J	360 J	400 J	380 J
SODIUM		144	57 J	50 J	52 J	58 J	46 J	47 J	46.5 J
THALLIUM	0.078	0.22	0.087 U	0.087 U	0.074 U	0.090 J	0.090 U	0.074 U	0.082 U
VANADIUM	39	17.08	20	15	16	15	15	14	14.5
ZINC	2300	28.74	42	38	40	40	33	36	34.5

Notes:

1) EPA RSL Res. Soil = Project screening level established in the August 2011 Sampling and Analysis Plan, IOA Site Investigation (Tetra Tech, 2011).

2) BKG - Surf. Soil = Base background values established in the Supplement to Final Summary Report of Background Data Summary Statistics (Stone and Webster, 2002).

BLACK SHADING - EXCEEDS RSL AND BKG; BLUE SHADING - EXCEEDS RSL BUT LESS THAN THE BKG;
GRAY SHADING - DETECTED; U - NOT DETECTED; J - QUANTITATION APPROXIMATE

TABLE 1-4

ANALYTICAL RESULTS COMPARED TO SCREENING CRITERIA - RIA 82 SUBSURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

SAMPLE ID			IOA-SO-RIA82-01A-0608	IOA-SO-RIA82-02A-0608	IOA-SO-RIA82-03A-0608	IOA-SO-RIA82-04A-0608
LOCATION ID			IOA-RIA82-SB01A	IOA-RIA82-SB02A	IOA-RIA82-SB03A	IOA-RIA82-SB04A
SAMPLE DATE			08/09/11	08/11/11	08/11/11	08/11/11
DEPTH			6 - 8 FT	6 - 8 FT	6 - 8 FT	6 - 8 FT
CRITERIA	EPA RSL Res Soil[1]	BKG Subsurface Soil[2]				
METALS (MG/KG)						
ALUMINUM	7700	8518.54	3600	4200	4600	4400
ARSENIC	0.39	1.89	0.220 J	0.180 J	0.57	0.130 J
BARIUM	1500	27.03	7.8	11	9.8	9.5
BERYLLIUM	16	0.44	0.170 U	0.260 J	0.27	0.260 U
CADMIUM	7	0.115	0.083 U	0.15	0.14	0.110 U
CALCIUM		1546.58	820	1300	1000	1100
CHROMIUM	0.29	10.15	4.7	6.3	6.2	5.5
COBALT	2.3	4.74	1.9	2.3	2.6	2.6
COPPER	310	14.2	3.6	4.6	6.1	6.5
IRON	5500	11448.94	4900	6000	7100	6000
LEAD	400	9.27	2.6	3.6	3.5	3.5
MAGNESIUM		2246.08	1100	1300	1600	1400
MANGANESE	180	413.84	65 J	90 J	92 J	82 J
NICKEL	150	6.5	3.8	4.5	5.1	5
POTASSIUM		457.21	250 J	310 J	310 J	270 J
SODIUM		144	36 J	51 J	41 J	43 J
VANADIUM	39	17.08	8.5	11	12	9.2
ZINC	2300	28.74	17	19	26	23

Notes:

1) EPA RSL Res. Soil = Project screening level established in the August 2011 Sampling and Analysis Plan, IOA Site Investigation (Tetra Tech, 2011).

2) BKG - Surf. Soil = Base background values established in the Supplement to Final Summary Report of Background Data Summary Statistics (Stone and Webster, 2002).

BLUE SHADING - EXCEEDS RSL BUT LESS THAN BKG; GRAY SHADING - DETECTED;
U - NOT DETECTED; J - QUANTITATION APPROXIMATE

TABLE 2-1

FEDERAL AND STATE CHEMICAL-SPECIFIC ARARs and TBCs*
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Federal				
Cancer Slope Factors (CSFs)	US EPA, Integrated Risk Information System	To be considered (TBC)	Guidance used to compute individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	Used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media. Alternatives must meet the risk-based cleanup goals developed through the use of this guidance.
Reference Doses (RfDs)	US EPA, Integrated Risk Information System	TBC	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	Used to calculate potential non-carcinogenic hazards caused by exposure to contaminants. Alternatives must meet the risk-based cleanup goals developed through the use of this guidance.
Guidelines for Carcinogen Risk Assessment	EPA/630/P-03/001F March 2005	TBC	Guidelines for assessing cancer risk.	Used to calculate potential carcinogenic risks caused by exposure to contaminants. Alternatives must meet the risk-based cleanup goals developed through the use of this guidance.
Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens	EPA.630/R-03/003F March 2005	TBC	Guidance for assessing cancer risks in children.	Used to calculate potential carcinogenic risks to children caused by exposure to contaminants. Alternatives must meet the risk-based cleanup goals developed through the use of this guidance.

* ARARs and TBCs cited are pending review by Navy counsel.

TABLE 2-1

FEDERAL AND STATE CHEMICAL-SPECIFIC ARARs and TBCs*
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
State				
State Risk Thresholds	310 CMR 40.0993 (6)	To be considered (TBC)	When conducting a quantitative risk assessment (Method 3), cumulative risk from multiple contaminants of concern shall be compared to a cancer risk limit of one in one hundred thousand, and non-cancer hazard index of 1	The risk assessment in the IOA project report provided comparisons to these risk limits. The Navy has developed site-specific risk-based cleanup goals (Section 2.2) which will be considered in the PRG selection for the Site; State risk limits will be considered as TBCs during remedy selection.

* ARARs and TBCs cited are pending review by Navy counsel.

TABLE 2-2

FEDERAL AND STATE LOCATION-SPECIFIC ARARs
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken
Federal				
There are no federal location-specific ARARs.				
State				
There are no state location-specific ARARs.				

TABLE 2-3

SUMMARY OF SURFACE SOIL PRGs AND PROPOSED CLEANUP GOALS
INDUSTRIAL OPERATIONS AREA
FORMER NAVAL AIR STATION SOUTH WEMOUTH
WEYMOUTH, MASSACHUSETTS

Contaminant of Concern	Units	Hypothetical Risk-Based PRG[1]	Background Value	Selected PRG/Proposed Cleanup Goal	Basis for Selection
Benzo(a)pyrene Equivalents	µg/kg	150	2130	2130	Background
Benzo(a)anthracene	µg/kg	1500	810	1500	Resident Risk
Benzo(a)pyrene	µg/kg	150	1828.8	1828.8	Background
Benzo(b)fluoranthene	µg/kg	1500	770	1500	Resident Risk
Benzo(k)fluoranthene	µg/kg	15000	2700	15000	Resident Risk
Dibenzo(a,h)anthracene	µg/kg	150	96	150	Resident Risk
Indeno(1,2,3-cd)pyrene	µg/kg	1500	175	1500	Resident Risk
Aroclor-1260	µg/kg	1100*	NA	1100	Resident Risk
Heptachlor Epoxide	µg/kg	590	NA	590	Resident Risk
2,3,7,8-TCDD Equivalents	µg/kg	0.049	NA	0.049	Resident Risk
Arsenic	mg/kg	6.7	5.31	6.7	Resident Risk
Chromium	mg/kg	3.1	10.1	10.1	Background
Lead	mg/kg	400	301.7	400	Resident Risk

Notes:

*Calculated using the non-cancer toxicity criteria for Aroclor-1254.

1) PRG is based on residential exposures. PRG calculations are provided in Appendix B and described in Section 2.4.1.

TABLE 2-4

REMEDIAL ACTION AREAS AND VOLUME/MASS OF CONTAMINATED SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

Remedial Action Area #	COC	Zone Thickness (ft)	Approximate Area Dimensions (ft)[1]	Approximate Surface Area (ft^2) to be Remediated[1]	Approximate Soil Volume (yd^3) to be Remediated[1,2]	Average Concentration of Contaminant (mg/kg)[3]	Approximate Contaminant Mass (lbs) to be Remediated[4]	Area Location & Description
Area 1	Aroclor-1260	2	30 x 60	1,800	133	1.8	0.615	Area 1 is located within AOC 83 (Hazardous Waste Storage Area). The 30 x 60 ft area surrounds a sample location (SB07-308) with a PCB concentration (1,800 ug/kg) exceeding the cleanup goal. The dimensions of the proposed remedial action area are estimated based on existing sample locations to the north (SB07-331, SB07-330, and SB07-340), west (SB07-339), and south (SB07-307 and SB07-310) of SB07-308 with PCB concentrations below the cleanup goal. See Figure 2-1.
Area 2	Aroclor-1260	2	10 x 10	100	8	1.5	0.028	Area 2 is located approximately 50 ft southwest of AOC 83 (Hazardous Waste Storage Area). The 10 x 10 ft area surrounds a sample location (SB07-326) with a PCB concentration (1,500 ug/kg) exceeding the cleanup goal. The dimensions of the proposed remedial action area are estimated based on the close proximity of sample locations (SB07-328, SB07-311, and SB07-338) with PCB concentrations below the cleanup goal. See Figure 2-1.
Area 3	Aroclor-1260	2	10 x 10	100	8	2.9	0.055	Area 3 is located approximately 50 ft southwest of AOC 83 (Hazardous Waste Storage Area). The 10 x 10 ft area surrounds a sample location (SB07-327) with a PCB concentration (2,900 ug/kg) exceeding the cleanup goal. The dimensions of the proposed remedial action area are estimated based on the close proximity of sample locations (SB07-328, SB07-311, SB07-337 and SB07-338) with PCB concentrations below the cleanup goal. See Figure 2-1.
Area 4	Aroclor-1260	2	20 x 20	400	30	1.2	0.091	Area 4 is located within AOC 83 (Hazardous Waste Storage Area). The 20 x 20 ft area surrounds a sample location (SB07-329) with a PCB concentration (1,200 ug/kg) exceeding the cleanup goal. The dimensions of the proposed remedial action area are estimated based on the proximity of sample locations (SB07-305, SB07-306 and SB07-309) with PCB concentrations below the cleanup goal. See Figure 2-1.
Area 5	Aroclor-1260	2	50 x 50	2,500	185	12	5.963	Area 5 is located approximately 40 ft north of the northeast corner of Building 2 (Supply Warehouse). The 50 x 50 ft area surrounds a sample location (SS-EU10) with a PCB concentration (12,000 ug/kg) exceeding the cleanup goal. There are no other sample locations with PCB results in the vicinity of SS-EU10, therefore, a conservative surface area estimate was made assuming a 50 x 50 ft remedial action area. See Figure 2-1.
Area 6	Aroclor-1260	2	50 x 50	2,500	185	1.8	0.854	Area 6 is located approximately 60 ft east of the northeast corner of Building 2 (Supply Warehouse). The 50 x 50 ft area surrounds a sample location (SS-EU17) with a PCB concentration (1,800 ug/kg) exceeding the cleanup goal. There are no other sample locations with PCB results in the vicinity of SS-EU17, therefore, a conservative surface area estimate was made assuming a 50 x 50 ft remedial action area. See Figure 2-1.
Area 7	Benzo(a)anthracene	2	200 x 50	10,000	741	6.5	12.336	Area 7 is located within and north of AOC 13 (Supply Warehouse Railroad Spur) and abuts Building 2. The 200 x 50 ft area surrounds the location of the old railroad track (railroad ties still in -place) and one in-place sample location with PAH and metals concentrations exceeding cleanup goals (SS-EU29). Area 7 also encompasses the location of the old railroad track underneath the roof/awning of Building 2. Area 7 does not include the locations of the 2001 and 2004 AOC 13 removal actions because soil has already been excavated from those areas and confirmatory sampling was completed. The proposed remedial action Area 7 also does not include the area underneath the concrete ramp leading up to the Building 2 entrance or the area underneath the building overhang along the western portion of Building 2. See Figure 2-1.
	Benzo(a)pyrene					5.3	10.058	
	Benzo(b)fluoranthene					8.4	15.942	
	Dibenzo(a,h)anthracene					0.2	0.399	
	Indeno(1,2,3-cd)pyrene					4	7.591	
	Arsenic					5.7	10.818	
	Chromium					14.2	26.949	

TABLE 2-4

REMEDIAL ACTION AREAS AND VOLUME/MASS OF CONTAMINATED SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

Remedial Action Area #	COC	Zone Thickness (ft)	Approximate Area Dimensions (ft)[1]	Approximate Surface Area (ft^2) to be Remediated[1]	Approximate Soil Volume (yd^3) to be Remediated[1,2]	Average Concentration of Contaminant (mg/kg)[3]	Approximate Contaminant Mass (lbs) to be Remediated[4]	Area Location & Description
Area 8	Benzo(a)anthracene	2	10 x 10	100	8	6.3	0.12	Area 8 abuts the southwest corner of Building 2 (Supply Warehouse). The 10 x 10 ft area targets a sample location (SS-EU40) with PAH and chromium concentrations exceeding the cleanup goals. The dimensions of the proposed remedial action area are a conservative estimate and assumes the elevated COC concentrations at SS-EU40 are an isolated occurrence. See Figure 2-1.
	Benzo(a)pyrene					5.6	0.106	
	Benzo(b)fluoranthene					7.4	0.14	
	Dibenzo(a,h)anthracene					0.7	0.013	
	Indeno(1,2,3-cd)pyrene					2.6	0.049	
	Chromium					15.0	0.285	
Area 9	Benzo(a)anthracene	2	150 x 50	7,500	556	3.2	4.555	Area 9 is located within and north of AOC 14 (Water Tower). The 150 x 50 ft area surrounds two sample locations (SB06-006 and SB06-007) with PAHs and metals (arsenic and chromium) concentrations exceeding the cleanup goals. The dimensions of Area 9 are estimated based on sampling results from surrounding sample locations (SB06-012 and SB06-008), the location of the old railroad spur (railroad ties still in-place), and the western limit of the AOC 15 (Water Tower) soil removal action. See Figure 2-1.
	Benzo(a)pyrene					2.6	3.701	
	Benzo(b)fluoranthene					2.5	3.558	
	Indeno(1,2,3-cd)pyrene					2.2	3.131	
	Chromium					11.6	16.511	
	Arsenic					8.9	12.668	
Area 10	Metals (arsenic only)	2	10 x 10	100	8	36	0.683	Area 10 is located approximately 150 ft west of the former location of Hangar 1 and approximately 80 ft south of Building 96. The 10 x 10 ft area surrounds one sample location (SS-EU49) with an arsenic concentration (36 mg/kg) exceeding the cleanup goal. The dimensions of the proposed remedial action area are a conservative estimate and assumes the elevated arsenic concentration at SS-EU49 is an isolated occurrence. See Figure 2-1.
Total Surface Area and Volume to be Remediated				**25,100**	**1,862**			
Total Aroclor-1260							**7.6060**	
Total Benzo(a)anthracene							**17.0110**	
Total Benzo(a)pyrene							**13.8650**	
Total Benzo(b)fluoranthene							**19.6400**	
Total Dibenzo(a,h)anthracene							**0.4120**	
Total Indeno(1,2,3-cd)pyrene							**10.7710**	
Total Arsenic							**24.1690**	
Total Chromium							**43.7450**	
						TOTAL MASS	**137**	

Notes:

1) Surface area and soil volume to be remediated will be further defined based on pre-excavation or pre-cover soil sampling.

2) Soil volumes based on assumed average excavation depth of 2 ft.

3) For Remedial Action Areas that include only one sample locaiton, the COC concentration from the one location is used; an average concentration can not be calculated.

Concentrations of detected COC contaminants used to calculate average concentrations.

4) Bulk density value of 1.52 g/cm^3 was used to represent sand/fill material.

TABLE 3-1

PRELIMINARY SCREENING OF REMEDIAL TECHNOLOGIES AND PROCESS OPTIONS FOR SOIL
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

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 law. Retain for baseline comparison to other technologies.
Limited Action	LUCs	Engineered Controls: Physical Barriers/ Security Guards	Fencing, markers, warning signs, and monitoring to restrict site access.	Eliminate. Site is anticipated to be reused for commercial and /or residential development. Full site must still be accessible.
		Administrative Controls: Deed or Site Use Restrictions	Administrative action using land use prohibitions to restrict future land use to industrial/commercial activities.	Retain. Prohibiting future residential land use in some portions of the IOA will help to prevent unacceptable risks from exposure to contaminated soil.
	Monitoring	Sampling and Analysis	Sampling and analysis of soil to evaluate migration of COCs from the soil to groundwater.	Eliminate. No risks from migration of soil contaminants to groundwater were identified.
	Natural Attenuation	Naturally Occurring Biodegradation and Dispersion	Monitoring of soil to assess the reduction in concentrations of COCs through natural processes.	Eliminate. PAHs, PCBs, and metals are not reduced effectively by biological processes.
Containment	Cover/Barrier	Soil Cap/Asphalt Cap/Multi-Media Cap	Use of semi-permeable or impermeable barriers to minimize direct exposure to contaminants and potential migration from soil to groundwater.	Retain. Surface covering or capping of contaminated areas would reduce exposure of human receptors to site contaminants. Existing asphalt pavement as cap could be incorporated into overall site reuse.
	Erosion Control	Rip-Rap Cover/Vegetation	Use of gravel/cobbles or dense plant growth to minimize migration of contaminated soil.	Eliminate. The IOA is not steeply sloped, and erosion of contaminated soil is not a concern.

General Response Action	Remedial Technology	Process Option	Description	Screening Comment
Removal	Excavation	Mechanical	Means for removal of contaminated soil by backhoe, bulldozer, loader, etc.	Retain. Would be effective to remove contaminated soil.
	Off-Site	Landfilling	Disposal of excavated material at a permitted off-site landfill. Recycling can be incorporated if scrap metal is present.	Retain. Disposal is a viable option for addressing soil contamination. Soil is expected to be a non-hazardous waste. Some soil will be a TSCA-regulated waste.
	On-Site	Consolidation	Excavation and relocation of contaminated soil to minimize space and closure requirements.	Eliminate. Leaving contaminated soil on site would limit site reuse and would trigger landfill and/or disposal facility ARARs.
		Beneficial Reuse	Reuse of treated soil as fill material.	Eliminate. No soil treatment processes are proposed.
In-Situ Treatment	Thermal	Vitrification	Use of high-temperature melting to fuse inorganic contaminants into a glass matrix within vadose zone or the use of moderate temperature heating to volatilize contaminants and remove them from the vadose zone.	Eliminate because vitrified mass would impact reuse of site. Use of this technology is typically limited to highly contaminated or radioactive materials.
		Radio Frequency Heating	Use of radio-frequency energy to heat soil and cause volatilization of contaminants	Eliminate. Not effective for treatment of PAHs, PCBs, and metals.
		Electrical Resistance Heating	Use of an electrical blanket or electrical heating elements within slotted pipes to volatilize contaminants	Eliminate. Not effective for treatment of PAHs, PCBs, and metals.

TABLE 3-1

PRELIMINARY SCREENING OF REMEDIAL TECHNOLOGIES AND PROCESS OPTIONS FOR SOIL
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

General Response Action	Remedial Technology	Process Option	Description	Screening Comment
In-Situ Treatment (Continued)	Physical/ Chemical	Soil Flushing/ Chemical Extraction	Use of water/solvents to remove contaminants from the vadose zone by flushing and collecting the contaminated wastewater in the saturated zone followed by above-ground pumping and treatment.	Eliminate. Increases potential for migration of contaminants from soil to groundwater. Absence of confining layer at the site would make recovery of flushing solution difficult.
		Dynamic Underground Stripping	Steam injection at the periphery of the contaminated area resulting in the vaporization of volatile compounds bound to soil and the movement of contaminants to a centrally located extraction well.	Eliminate. Impractical in regard to cost versus mass removal. Not effective for treatment of PAHs, PCBs, and metals.
	Physical/ Chemical (Continued)	SVE	Use of vacuum and possibly air sparging to volatilize contaminants.	Eliminate. PAHs, PCBs, and metals are not highly volatile, and the effectiveness of SVE would be limited.
		Chemical Fixation/ Solidification	Mixing of chemical agents in the vadose zone to chemically bind, solidify, and reduce contaminant mobility.	Eliminate. Mobility of PAHs, PCBs, and metals is not a concern at this site. Moreover, the treated material would not be suitable for reuse.
	Chemical	Chemical Oxidation	Injection of oxidizer such as Fenton's Reagent into vadose zone soil to oxidize PAHs.	Eliminate. Thin layer of soil and shallow injection depth would also interfere with application of method. Not effective for metals and limited effectiveness for PCBs.

TABLE 3-1

PRELIMINARY SCREENING OF REMEDIAL TECHNOLOGIES AND PROCESS OPTIONS FOR SOIL
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

General Response Action	Remedial Technology	Process Option	Description	Screening Comment
In-Situ Treatment (Continued)	Biological	Biodegradation	Nutrients and amendments are added to surface soil to promote biodegradation of PAHs.	Eliminate. Low solubility of PAHs, strong tendency of PAHs to bind to soil organic matter, and slow degradation rate for multi-ringed PAHs makes this an unfavorable technology. Not effective for PCBs and metals. Application issues similar to chem oxidation.
		Phytoremediation	Use of selected plants for enhancement of biodegradation of organic contaminants and uptake of metals by indigenous microorganisms in the root zone or transpiration process in trees.	Eliminate. Growth and maintenance of trees and plants would limit reuse of site for residential and/or commercial purposes.
Ex-Situ Treatment	Physical/ Chemical	Soil Washing/ Chemical Extraction	Use of solubilization and chemical (oxidation/reduction/neutralization) processes to remove contaminants from the solid phase and convert them into more concentrated forms or less toxic forms in the liquid phase.	Eliminate. Eliminated due to the cost associated with low treatment volumes and relatively low concentration levels. This technology is more cost effective for larger soil treatment areas than these present at the IOA.
		Chemical Fixation/ Solidification	Mixing of chemical agents to bind, solidify, and reduce contaminant mobility.	Eliminate. Mobility of PAHs, PCBs, and metals is not a concern at this site.
	Biological	On-Site Landfarming	Tilling of contaminated soil and waste in layers to remove PAHs and biodegrade organics.	Eliminate. Biological processes are not very effective for treating PAHs, PCBs, and metals. Also, large land area is required for landfarming, which would affect site reuse.
		Bioslurry Treatment	Treatment of soil in a slurry reactor under controlled conditions using microorganisms to biodegrade organics.	Eliminate. Biological processes are not very effective for treating PAHs, PCBs, and metals.

TABLE 3-1

PRELIMINARY SCREENING OF REMEDIAL TECHNOLOGIES AND PROCESS OPTIONS FOR SOIL
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

General Response Action	Remedial Technology	Process Option	Description	Screening Comment
Ex-Situ Treatment (continued)	Thermal	Off-Site Incineration	Use of high temperatures to pyrolize or oxidize organic contaminants into less toxic gases.	Eliminate. This technology is more cost-effective for larger contaminant volumes than those present at the IOA. Process is not effective for metals.
	Thermal (continued)	Off-Site Thermal Desorption	Use of moderate temperatures to volatilize contaminants and remove them from the solid phase into the gaseous phase.	Eliminate. This technology is more cost-effective for larger contaminant volumes than those present at the IOA. Process is not effective for metals.
		On-Site Incineration or Thermal Desorption	Mobile equipment is brought to site for incineration or thermal desorption.	Eliminate. Process has high cost and is usually applied to sites with high contaminant concentrations. Would not be effective for treatment of metals.

IOA – Industrial Operation Area.
LUC - Land use control.
PAH - Polynuclear aromatic hydrocarbon.
PCB - Polychlorinated biphenyl.
SVE - Soil vapor extraction.

TABLE 4-1

FEDERAL AND STATE CHEMICAL-SPECIFIC ARARs and TBCs* – ALTERNATIVE 1 – NO ACTION
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Federal				
Cancer Slope Factors (CSFs)	US EPA, Integrated Risk Information System	To be considered (TBC)	Cancer Slope Factors are used to compute the incremental cancer risk resulting from exposure to site contaminants and represent the most up-to-date information on Cancer Risk from USEPA's Carcinogen Assessment Group.	This alternative will not meet the risk-based cleanup goals developed through the use of this guidance since potential carcinogenic risks caused by exposure to contaminants will not be addressed.
Reference Doses (RfDs)	US EPA, Integrated Risk Information System	TBC	Reference Doses are estimates of daily exposure levels unlikely to cause significant adverse non-carcinogenic health effects over a lifetime.	This alternative will not meet the risk-based cleanup goals developed through the use of this guidance since potential non-carcinogenic hazards caused by exposure to contaminants will not be addressed.
Guidelines for Carcinogen Risk Assessment	EPA/630/P-03/001F March 2005	TBC	Guidelines for assessing cancer risk.	This alternative will not meet the risk-based cleanup goals developed through the use of this guidance since potential carcinogenic risks caused by exposure to contaminants will not be addressed.
Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens	EPA.630/R-03/003F March 2005	TBC	Guidance for assessing cancer risks in children.	This alternative will not meet the risk-based cleanup goals developed through the use of this guidance since potential carcinogenic risks to children caused by exposure to contaminants will not be addressed.

* ARARs and TBCs cited are pending review by Navy counsel.

TABLE 4-1

FEDERAL AND STATE CHEMICAL-SPECIFIC ARARs and TBCs* – ALTERNATIVE 1 – NO ACTION
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
State				
State Risk Thresholds	310 CMR 40.0993 (6)	TBC	When conducting a quantitative risk assessment (Method 3), cumulative risk from multiple contaminants of concern shall be compared to a cancer risk limit of one in one hundred thousand, and non-cancer hazard index of 1	This alternative will not meet the risk-based cleanup goals developed with this comparison since potential carcinogenic risks caused by exposure to contaminants will not be addressed.

* ARARs and TBCs cited are pending review by Navy counsel.

TABLE 4-2

FEDERAL AND STATE CHEMICAL-SPECIFIC ARARs and TBCs* – ALTERNATIVE 2 – EXCAVATION AND OFF-SITE DISPOSAL
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Federal				
Cancer Slope Factors (CSFs)	US EPA, Integrated Risk Information System	To be considered (TBC)	Cancer Slope Factors are used to compute the incremental cancer risk resulting from exposure to site contaminants and represent the most up-to-date information on Cancer Risk from USEPA's Carcinogen Assessment Group.	This alternative will meet the risk-based cleanup goals developed through the use of this guidance since removal of contaminated soil that poses potential carcinogenic risks will address long-term risk.
Reference Doses (RfDs)	US EPA, Integrated Risk Information System	TBC	Reference Doses are estimates of daily exposure levels unlikely to cause significant adverse non-carcinogenic health effects over a lifetime. Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	This alternative will meet the risk-based cleanup goals developed through the use of this guidance since removal of contaminated soil that poses potential non-carcinogenic risks will address long-term risk.
Guidelines for Carcinogen Risk Assessment	EPA/630/P-03/001F March 2005	TBC	Guidelines for assessing cancer risk.	This alternative will meet the risk-based cleanup goals developed through the use of this guidance since removal of contaminated soil that poses potential carcinogenic risks will address long-term risk.
Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens	EPA.630/R-03/003F March 2005	TBC	Guidance for assessing cancer risks in children.	This alternative will meet the risk-based cleanup goals developed through the use of this guidance since removal of contaminated soil that poses potential carcinogenic risks will address long-term risk.

* ARARs and TBCs cited are pending review by Navy counsel.

TABLE 4-2

FEDERAL AND STATE CHEMICAL-SPECIFIC ARARs and TBCs* – ALTERNATIVE 2 – EXCAVATION AND OFF-SITE DISPOSAL
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
State				
State Risk Thresholds	310 CMR 40.0993 (6)	TBC	When conducting a quantitative risk assessment (Method 3), cumulative risk from multiple contaminants of concern shall be compared to a cancer risk limit of one in one hundred thousand, and non-cancer hazard index of 1.	This alternative will meet the risk-based cleanup goals developed from the risk assessment that provided a comparison to a cancer risk limit of one in one hundred thousand, and non-cancer hazard index of 1.

* ARARs and TBCs cited are pending review by Navy counsel.

TABLE 4-3

FEDERAL AND STATE LOCATION-SPECIFIC ARARs – ALTERNATIVE 2 – EXCAVATION AND OFF-SITE DISPOSAL
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken
Federal				
There are no federal location-specific ARARs.				
State				
There are no state location-specific ARARs.				

FEDERAL AND STATE ACTION-SPECIFIC ARARs AND TBCs* – ALTERNATIVE 2 – EXCAVATION AND OFF-SITE DISPOSAL
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Federal				
Resource Conservation and Recovery Act (RCRA)	40 Code of Federal Regulations Part 260 Hazardous Waste Management System Part 261 Identification and Listing of Hazardous Waste Part 262 Standards Applicable to Generators of Hazardous Waste Part 268 Land Disposal Requirements	Applicable	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer the RCRA standards through its state hazardous waste management regulations.	Wastes generated as part of remedial activities that will be disposed of off-site will be characterized as hazardous or non-hazardous. If determined to be hazardous waste, they will be stored, transported, and disposed of in accordance with the substantive portions of these regulations.

* ARARs and TBCs cited are pending review by Navy counsel.

TABLE 4-4

FEDERAL AND STATE ACTION-SPECIFIC ARARs AND TBCs* – ALTERNATIVE 2 – EXCAVATION AND OFF-SITE DISPOSAL
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Toxic Substances Control Act (TSCA)	40 Code of Federal Regulations (CFR) 761.61(c)	Applicable	This section of the TSCA regulations provides risk-based cleanup and disposal options for PCB remediation waste based on the risks posed by the concentrations at which the PCBs are found. Written approval for the proposed risk-based cleanup must be obtained from the Director, Office of Site Remediation and Restoration, USEPA Region 1.	All soil exceeding identified PCB cleanup levels will be addressed in a manner to comply with TSCA. The ROD will contain a finding by the Director, Office of Site Remediation and Restoration, USEPA Region 1 that the cleanup levels selected meet these standards for protectiveness.
Stormwater Requirements for Small Construction Sites	40 CFR 122 (National Pollution Discharge Elimination System [NPDES]), 40 CFR 123 (State Program Reqs.), 40 CFR 124 (Procedures for Decision-Making)	Applicable	Regulates the storm water discharges from construction activities including clearing, grading, and excavating that result in land disturbance of equal to or greater than one acre and less than five acres.	This regulation would be applied only if the area of disturbance is greater than one acre. The estimated area of disturbance is less than 1 acre, but that area could increase in the remedial design.
Guide to Management of Investigation-Derived Wastes	OSWER Publication 9345.3-03FS, January, 1992	To be Considered (TBC)	Management of investigation-derived waste must ensure protectiveness of human health and the environment and comply with regulatory requirements.	Investigation-derived waste will be managed in a way to protect human health and the environment and to comply with regulatory requirements.

* ARARs and TBCs cited are pending review by Navy counsel.

TABLE 4-4

FEDERAL AND STATE ACTION-SPECIFIC ARARs AND TBCs* – ALTERNATIVE 2 – EXCAVATION AND OFF-SITE DISPOSAL
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
State				
Hazardous Waste Rules for Identification and Listing of Hazardous Wastes	310 Code of Massachusetts Regulations (CMR) 30.100	Applicable	Establish requirements for determining whether wastes are hazardous. Defines listed and characteristic hazardous wastes.	These regulations would apply when determining whether or not a solid waste generated as part of this remedial action is classified as hazardous, either by being listed or by exhibiting a hazardous characteristic, such as contaminated soil. Existing data do not indicate that any wastes will be hazardous.
Hazardous Waste Management Rules – Requirements for Generators	310 CMR 30.300	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to off-site disposal.	Any hazardous wastes generated as part of the remedial action will be handled in compliance with the requirements of these regulations.
Massachusetts Contingency Plan - Management Requirements for Storing Remediation Waste	310 CMR 40.0030	Relevant and Appropriate	All Remediation Waste shall be stored in a secure manner to prevent exposure to humans and the environment and will shipped according to the Bill of Lading requirements.	Excavated soil that is stockpiled prior to transport and disposal would be placed on an impermeable liner and covered to minimize the infiltration of precipitation, volatilization of contaminants, and erosion of the stockpile and would be shipped according to the Bill of Lading requirements.
Erosion and Sediment Control Guidance	-	TBC	This guidance includes standards for preventing erosion and sedimentation.	Remedial actions, such as soil excavation, will be managed to control erosion and sedimentation.

* ARARs and TBCs cited are pending review by Navy counsel.

FEDERAL AND STATE ACTION-SPECIFIC ARARs AND TBCs* – ALTERNATIVE 2 – EXCAVATION AND OFF-SITE DISPOSAL
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Air Pollution Control Regulations	310 CMR 7.09	Applicable	This regulation requires control of dust generation to prevent air pollution.	Fugitive dust from remedial operations such as excavation and backfill will be managed using engineering controls such as water sprays.

* ARARs and TBCs cited are pending review by Navy counsel.

TABLE 4-5

FEDERAL AND STATE CHEMICAL-SPECIFIC ARARs and TBCs* – ALTERNATIVE 3 – CAP AND LUCs
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Federal				
Cancer Slope Factors (CSFs)	US EPA, Integrated Risk Information System	To be considered (TBC)	Cancer Slope Factors are used to compute the incremental cancer risk resulting from exposure to site contaminants and represent the most up-to-date information on Cancer Risk from USEPA's Carcinogen Assessment Group.	This alternative will meet the risk based cleanup goals developed through the use of this guidance since covering the contaminated soil that poses potential carcinogenic risks, establishing land use controls, and performing long-term O&M on the cap will address long-term risk.
Reference Doses (RfDs)	US EPA, Integrated Risk Information System	TBC	Reference Doses are estimates of daily exposure levels unlikely to cause significant adverse non-carcinogenic health effects over a lifetime.	This alternative will meet the risk based cleanup goals developed through the use of this guidance since covering the contaminated soil that poses potential carcinogenic risks, establishing land use controls, and performing long-term O&M on the cap will address long-term risk.
Guidelines for Carcinogen Risk Assessment	EPA/630/P-03/001F March 2005	TBC	Guidelines for assessing cancer risk.	This alternative will meet the risk-based cleanup goals developed through the use of this guidance since capping the contaminated soil that poses potential carcinogenic risks, establishing land use controls, and performing long-term O&M on the cap will address long-term risk.

* ARARs and TBCs cited are pending review by Navy counsel.

TABLE 4-5

FEDERAL AND STATE CHEMICAL-SPECIFIC ARARs and TBCs* – ALTERNATIVE 3 – CAP AND LUCs
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens	EPA.630/R-03/003F March 2005	TBC	Guidance for assessing cancer risks in children.	This alternative will meet the risk-based cleanup goals developed through the use of this guidance since capping the contaminated soil that poses potential carcinogenic risks, establishing land use controls, and performing long-term O&M on the cap will address long-term risk.
State				
State Risk Thresholds	310 CMR 40.0993 (6)	TBC	When conducting a quantitative risk assessment (Method 3), cumulative risk from multiple contaminants of concern shall be compared to a cancer risk limit of one in one hundred thousand, and non-cancer hazard index of 1.	This alternative will meet the risk-based cleanup goals which were developed from the risk assessment that provided a comparison to a cancer risk limit of one in one hundred thousand, and non-cancer hazard index of 1.

* ARARs and TBCs cited are pending review by Navy counsel.

TABLE 4-6

FEDERAL AND STATE LOCATION-SPECIFIC ARARs – ALTERNATIVE 3 – CAP AND LUCs
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken
Federal				
There are no federal location-specific ARARs.				
State				
There are no state location-specific ARARs.				

TABLE 4-7

FEDERAL AND STATE ACTION-SPECIFIC ARARs AND TBCs* – ALTERNATIVE 3 – CAP AND LUCs
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Federal				
Resource Conservation and Recovery Act (RCRA)	40 Code of Federal Regulations Part 260 Hazardous Waste Management System Part 261 Identification and Listing of Hazardous Waste Part 262 Standards Applicable to Generators of Hazardous Waste Part 268 Land Disposal Requirements	Applicable	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer the RCRA standards through its state hazardous waste management regulations.	Wastes generated as part of remedial activities that will be disposed of off-site will be characterized as hazardous or non-hazardous. If determined to be hazardous waste, they will be stored, transported, and disposed of in accordance with the substantive portions of these regulations.

* ARARs and TBCs cited are pending review by Navy counsel.

TABLE 4-7

FEDERAL AND STATE ACTION-SPECIFIC ARARs AND TBCs* – ALTERNATIVE 3 – CAP AND LUCs
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Toxic Substances Control Act (TSCA)	40 Code of Federal Regulations (CFR) 761.61(c)	Applicable	This section of the TSCA regulations provides risk-based cleanup and disposal options for PCB remediation waste based on the risks posed by the concentrations at which the PCBs are found. Written approval for the proposed risk-based cleanup must be obtained from the Director, Office of Site Remediation and Restoration, USEPA Region 1.	All soil exceeding identified PCB cleanup levels will be addressed in a manner to comply with TSCA. The proposed cover will satisfy risk-based standards under this regulation for capping PCB-contaminated media. The ROD will contain a finding by the Director, Office of Site Remediation and Restoration, USEPA Region 1 that the cleanup levels selected meet these standards for protectiveness.
Stormwater Requirements for Small Construction Sites	40 CFR 122 (National Pollution Discharge Elimination System [NPDES]), 40 CFR 123 (State Program Reqs.), 40 CFR 124 (Procedures for Decision-Making)	Applicable	Regulates the storm water discharges from construction activities including clearing, grading, and excavating that result in land disturbance of equal to or greater than one acre and less than five acres.	This regulation would be applied only if the area of disturbance is greater than one acre. The estimated area of disturbance (during pavement replacement) is less than 1 acre, but that area could increase in the remedial design.

* ARARs and TBCs cited are pending review by Navy counsel.

FEDERAL AND STATE ACTION-SPECIFIC ARARs AND TBCs* – ALTERNATIVE 3 – CAP AND LUCs
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Guide to Management of Investigation-Derived Wastes	OSWER Publication 9345.3-03FS, January, 1992	To be Considered (TBC)	Management of investigation-derived waste must ensure protectiveness of human health and the environment and comply with regulatory requirements.	Investigation-derived waste will be managed in a way to protect human health and the environment and to comply with regulatory requirements.
State				
Hazardous Waste Rules for Identification and Listing of Hazardous Wastes	310 Code of Massachu-setts Regulations (CMR) 30.100	Applicable	Establish requirements for determining whether wastes are hazardous. Defines listed and characteristic hazardous wastes.	These regulations would apply when determining whether or not a solid waste generated as part of this remedial action is classified as hazardous, either by being listed or by exhibiting a hazardous characteristic, such as existing pavement that is being replaced. Existing data do not indicate that any wastes will be hazardous.
Hazardous Waste Management Rules – Requirements for Generators	310 CMR 30.300	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to off-site disposal.	Any hazardous wastes generated as part of the remedial action will be handled in compliance with the requirements of these regulations.
Massachusetts Contingency Plan - Management Requirements for Storing Remediation Waste	310 CMR 40.0030	Relevant and Appropriate	Any Remediation Waste shall be stored in a secure manner to prevent exposure to humans and the environment and will shipped according to the Bill of Lading requirements.	Any excavated soil or remediation waste not retained under the cap would be placed on an impermeable liner and covered to minimize the infiltration of precipitation, volatilization of contaminants, and erosion of the stockpile and would be shipped according to the Bill of Lading requirements.

* ARARs and TBCs cited are pending review by Navy counsel.

TABLE 4-7

FEDERAL AND STATE ACTION-SPECIFIC ARARs AND TBCs* – ALTERNATIVE 3 – CAP AND LUCs
IOA FOCUSED FEASIBILITY STUDY
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Erosion and Sediment Control Guidance	-	TBC	This guidance includes standards for preventing erosion and sedimentation.	Remedial actions, such as pavement replacement, will be managed to control erosion and sedimentation.
Air Pollution Control Regulations	310 CMR 7.09	Applicable	This regulation requires control of dust generation to prevent air pollution.	Fugitive dust from remedial operations such as pavement replacement will be managed using engineering controls such as water sprays.

* ARARs and TBCs cited are pending review by Navy counsel.

TABLE 5-1

COMPARATIVE ANALYSIS OF ALTERNATIVES
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, MASSACHUSETTS

Shaded cells indicate which alternative(s) best meets each evaluation criteria.

Evaluation Criteria	Alternative #1 No Action	Alternative #2 Excavation & Off-site Disposal	Alternative #3 Asphalt Cap & LUCs
		Effectiveness	
Protectiveness of Human Health and the Environment	Least protective of human health or the environment because elevated COC concentrations in soil would not be mitigated.	Greatest protection of human health and the environment by removing elevated COC concentrations from the site soil.	Capping site soil would protect human health and the environment by preventing potential exposure to COCs in soil.
Compliance with Chemical-Specific ARARs	Does not comply.	Complies.	Complies.
Compliance with Location-Specific ARARs	Not Applicable.	Complies.	Complies.
Compliance with Action-Specific ARARs	Not Applicable.	Complies.	Complies.
Ability to Achieve Removal Action Objectives (RAOs)	Does not achieve RAOs.	Greatest effectiveness at achieving the RAOs. Confirmatory sampling of the floor and sidewalls of the excavation would verify that elevated COC concentrations in soil have been removed.	Achieves the RAOs. Capping would prevent direct exposure to COCs in soil.
Long-Term Effectiveness and Permanence	Least effective in the long-term because elevated COC concentrations in soil would not be mitigated.	Greatest long-term effectiveness and permanence would be achieved through the removal of elevated COC concentrations in soil from the site. Offsite disposal of excavated material at a licensed TSDF or other appropriate (approved) facility would be an effective and permanent final disposal option.	The long-term effectiveness of the soil remedy would require ongoing maintenance of the asphalt cap and upkeep of the land use controls (e.g., inspections, enforcement).

TABLE 5-1

COMPARATIVE ANALYSIS OF ALTERNATIVES
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, MASSACHUSETTS

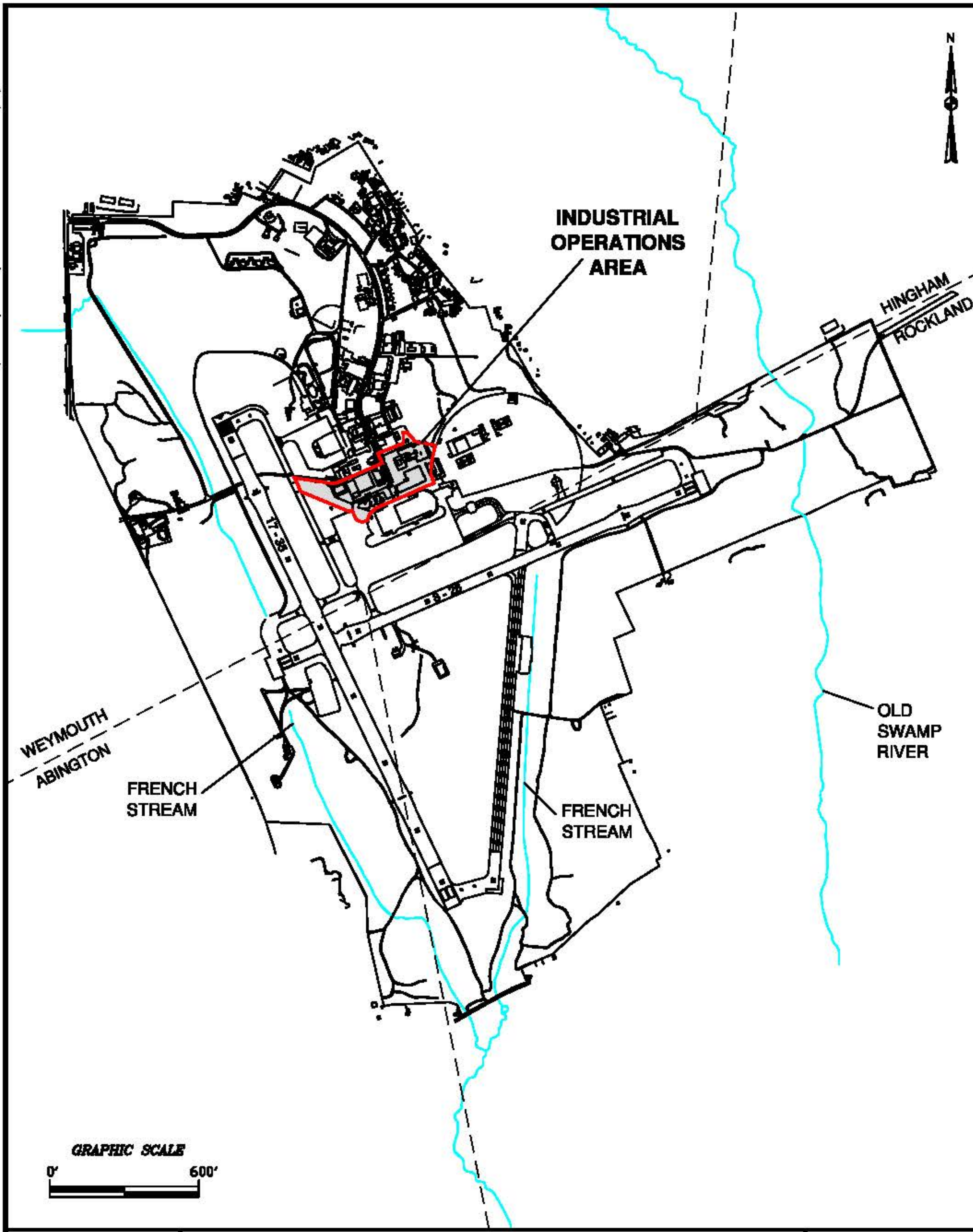
Evaluation Criteria	Alternative #1 No Action	Alternative #2 Excavation & Off-site Disposal	Alternative #3 Asphalt Cap & LUCs
Short-Term Effectiveness	Would not reduce COC concentrations. Would not achieve RAOs. Would not result in increased short-term risks to site workers, the community, or the environment.	Would reduce COC concentrations to achieve RAOs. Although there is a greater potential for worker and community contact with COCs during remedial activities, such concerns can be mitigated by implementing a site health and safety plan (e.g., worker PPE) and standard construction engineering controls (e.g., dust suppression). Can be implemented within 1 year.	Would reduce COC exposure to achieve RAOs. Potential risks to site workers during capping would be mitigated by implementing standard safety controls (e.g., PPE) in accordance with a site health and safety plan. Potential risks to the local community during capping would be addressed through standard engineering controls (e.g., dust suppression). Can be implemented within 1 year.
Reduction of Toxicity, Mobility, and Volume of Contaminants through Treatment	No treatment is specified.	No treatment is specified, although excavation and offsite disposal of soil would reduce the onsite volume of COCs to the greatest extent.	No treatment is specified. A properly maintained asphalt cap would reduce COC exposure.
Implementability			
Technical Feasibility	Easiest to implement because no action would be taken.	There are no special construction or operational considerations. Minor complication to remove and dispose of remnant rail spur components. Excavation is a well-proven remedial option.	Most difficult to implement due to the continual O&M requirements. Minor complication to remove and dispose of remnant rail spur components. Asphalt caps are well-proven remedial options, though they require regular maintenance and inspections.
Administrative Feasibility	Not implementable because primary evaluation criteria would not be achieved.	Implementable. No on-site permits would be required.	Implementable. No on-site permits would be required. Additional administrative requirements would be necessary to implement and upkeep land use controls as well as to evaluate monitoring and other data for the 5-year reviews.
Availability of Required Equipment and Services	None required.	The required equipment and services are readily available.	The required equipment and services are readily available.

TABLE 5-1

COMPARATIVE ANALYSIS OF ALTERNATIVES
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, MASSACHUSETTS

Evaluation Criteria	Alternative #1 No Action	Alternative #2 Excavation & Off-site Disposal	Alternative #3 Asphalt Cap & LUCs
Cost			
Capital Cost	$0	$1,391,544	$588,367
O&M Cost	nominal	$0	$ 2,585 (Annual) $ 25,300 (Every 5 Years)
Total 30-Year Net Present Worth	nominal	$1,391,544	$755,144

FIGURES



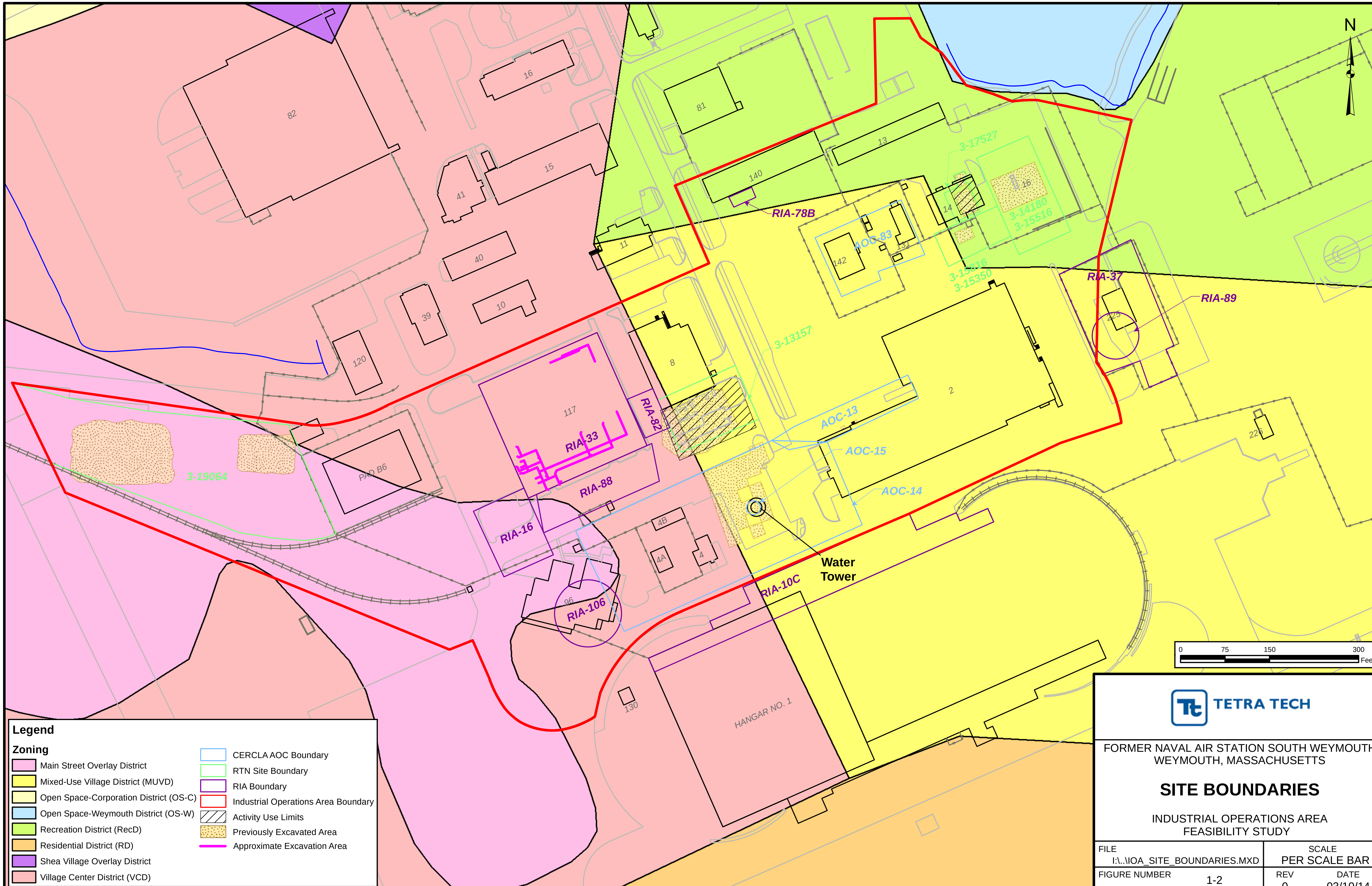
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

MAIN BASE MAP

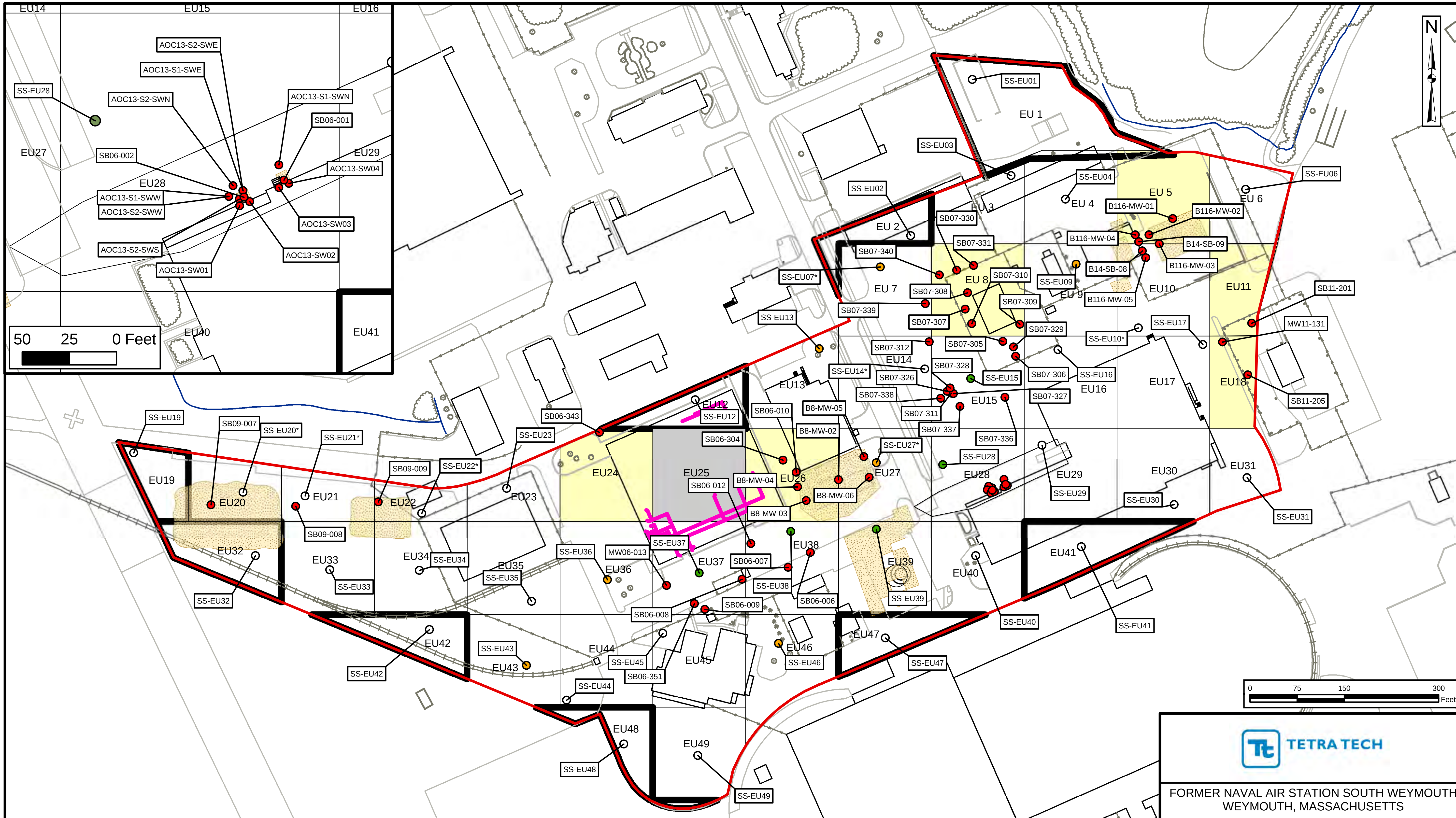
INDUSTRIAL OPERATIONS AREA
FEASIBILITY STUDY

TETRA TECH

SCALE	PER SCALE BAR
FILE	I:\..\IOA_BASE_MAP.DWG
REV 0	DATE 2/3/14
FIGURE NUMBER	1-1



I:\02073\EC.AM\IOA_SITE_BOUNDARIES.MXD DWM/NEC 03/10/14



I:\02073\EC.AM\IOA_SURF_SOIL_EXP_LIMITS.MXD DWM/NEC 04/23/14

Legend

- Existing IOA surface soil sample
- 2011 Samples collected for PAH/PCBs/metals and dioxin
- 2011 Samples collected for PAH/PCBs/metals
- 2011 Complete PAH/PCB/metals dataset. Samples collected for dioxin only.
- Approximate Excavation Area
- Industrial Area Boundary
- Approximate Excavation Area
- Excluded from sampling--building footprint
- Complete PAH/PCB/metals dataset No additional sampling
- Combined areas to form EU

Notes:
* Only a subset of analytes required - see Table 2-1 in IOA Project Report (Tetra Tech, 2013) for details.
1) EUs 24 and 26 have existing surface soil dioxin data.
2) EU size is based on a half-acre grid.
3) Historical information suggests SB06-001 and SB06-002 locations are uncertain.

TETRA TECH

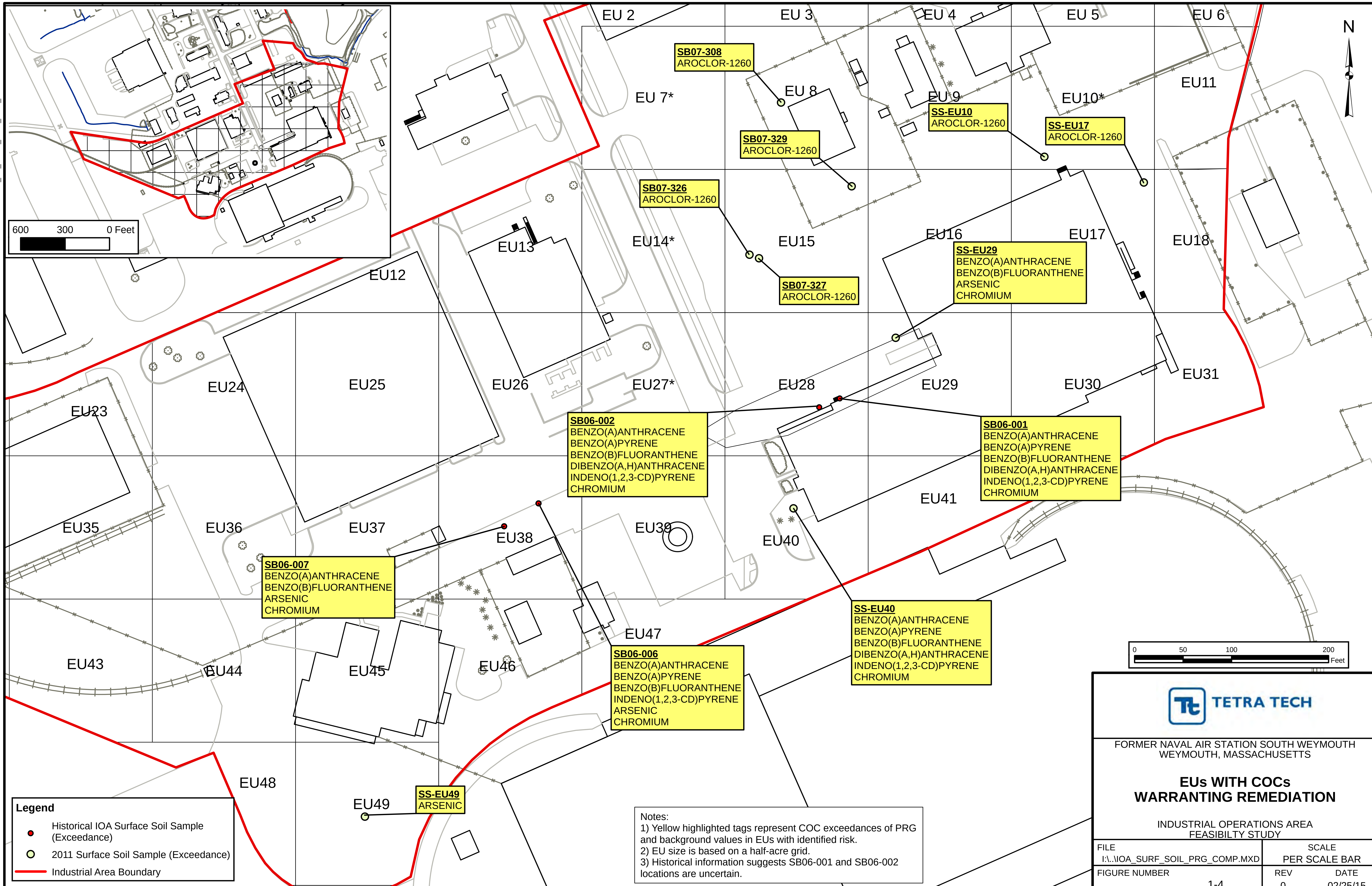
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

SURFACE SOIL EXPOSURE UNITS

INDUSTRIAL OPERATIONS AREA
FEASIBILITY STUDY

FILE	SCALE
I:\..\IOA_SURF_SOIL_EXP_LIMITS.MXD	PER SCALE BAR

FIGURE NUMBER	REV	DATE
1-3	0	02/18/15



Notes:
1) Yellow highlighted tags represent COC exceedances of PRG and background values in EUs with identified risk.
2) EU size is based on a half-acre grid.
3) Historical information suggests SB06-001 and SB06-002 locations are uncertain.

TETRA TECH

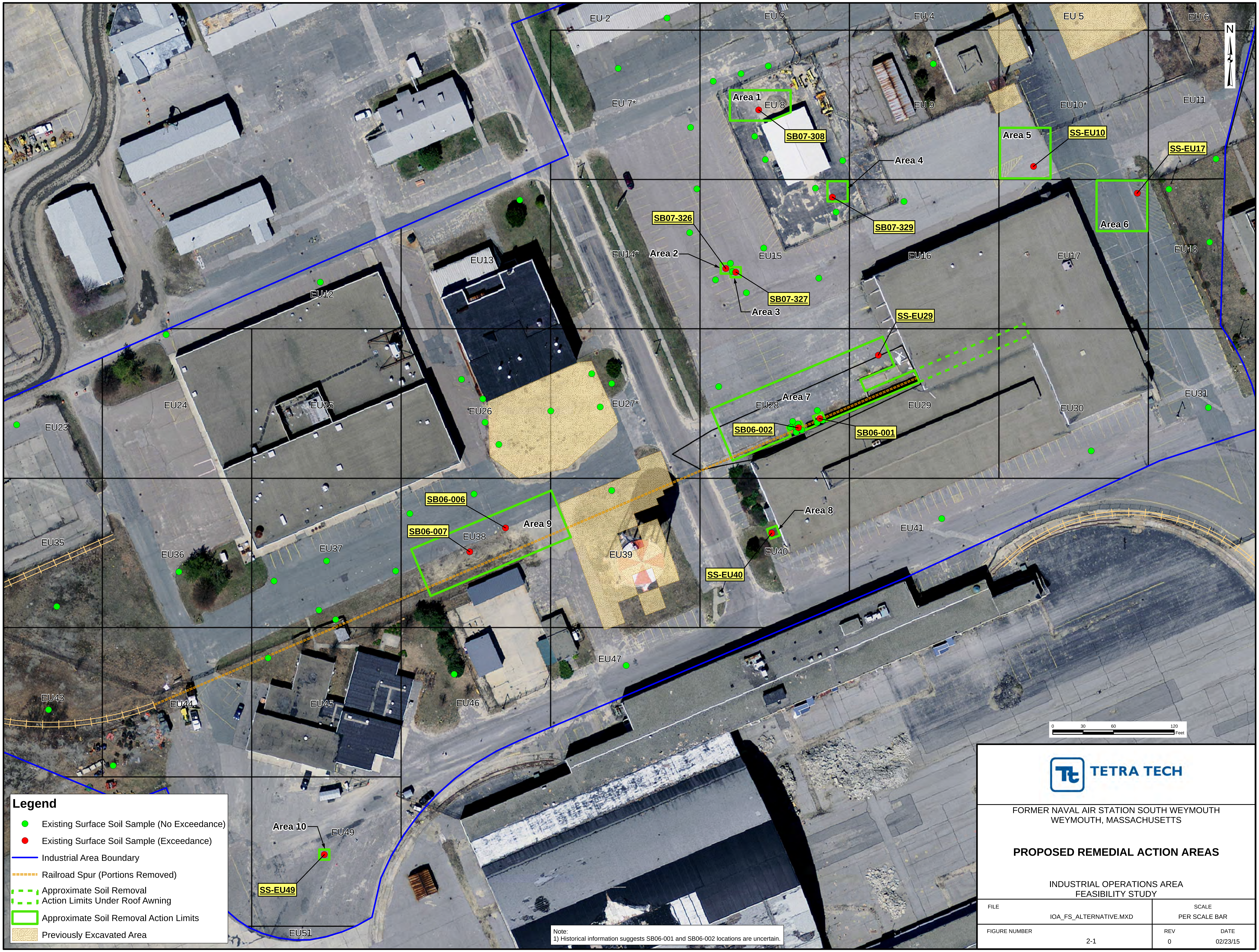
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

EUs WITH COCs WARRANTING REMEDIATION

INDUSTRIAL OPERATIONS AREA
FEASIBILTY STUDY

FILE	SCALE
I:\..\IOA_SURF_SOIL_PRG_COMP.MXD	PER SCALE BAR

FIGURE NUMBER	REV	DATE
1-4	0	02/25/15



Legend

- Existing Surface Soil Sample (No Exceedance)
- Existing Surface Soil Sample (Exceedance)
- Industrial Area Boundary
- Railroad Spur (Portions Removed)
- Approximate Soil Removal Action Limits Under Roof Awning
- Approximate Soil Removal Action Limits
- Previously Excavated Area

Note:
1) Historical information suggests SB06-001 and SB06-002 locations are uncertain.

TETRA TECH

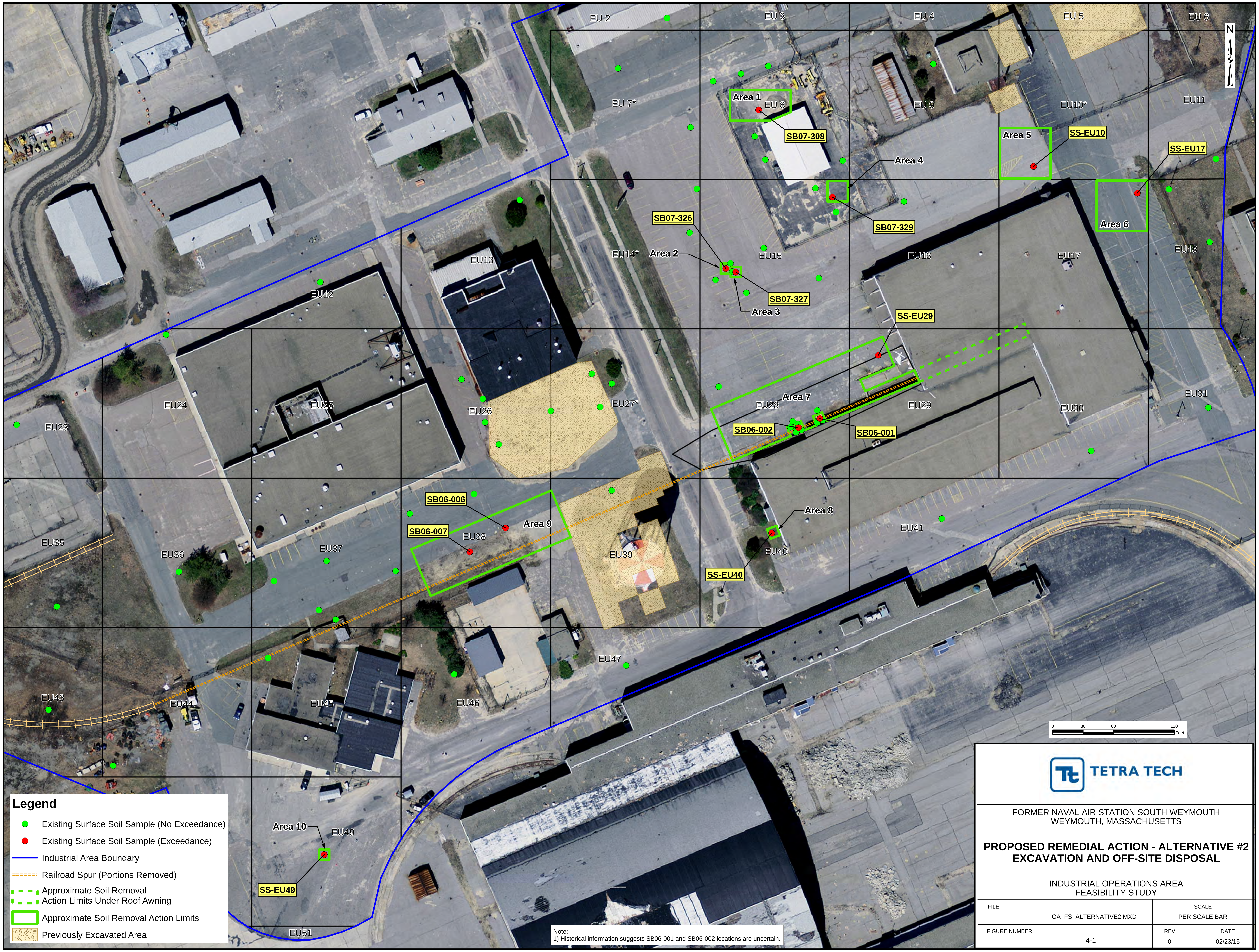
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

PROPOSED REMEDIAL ACTION AREAS

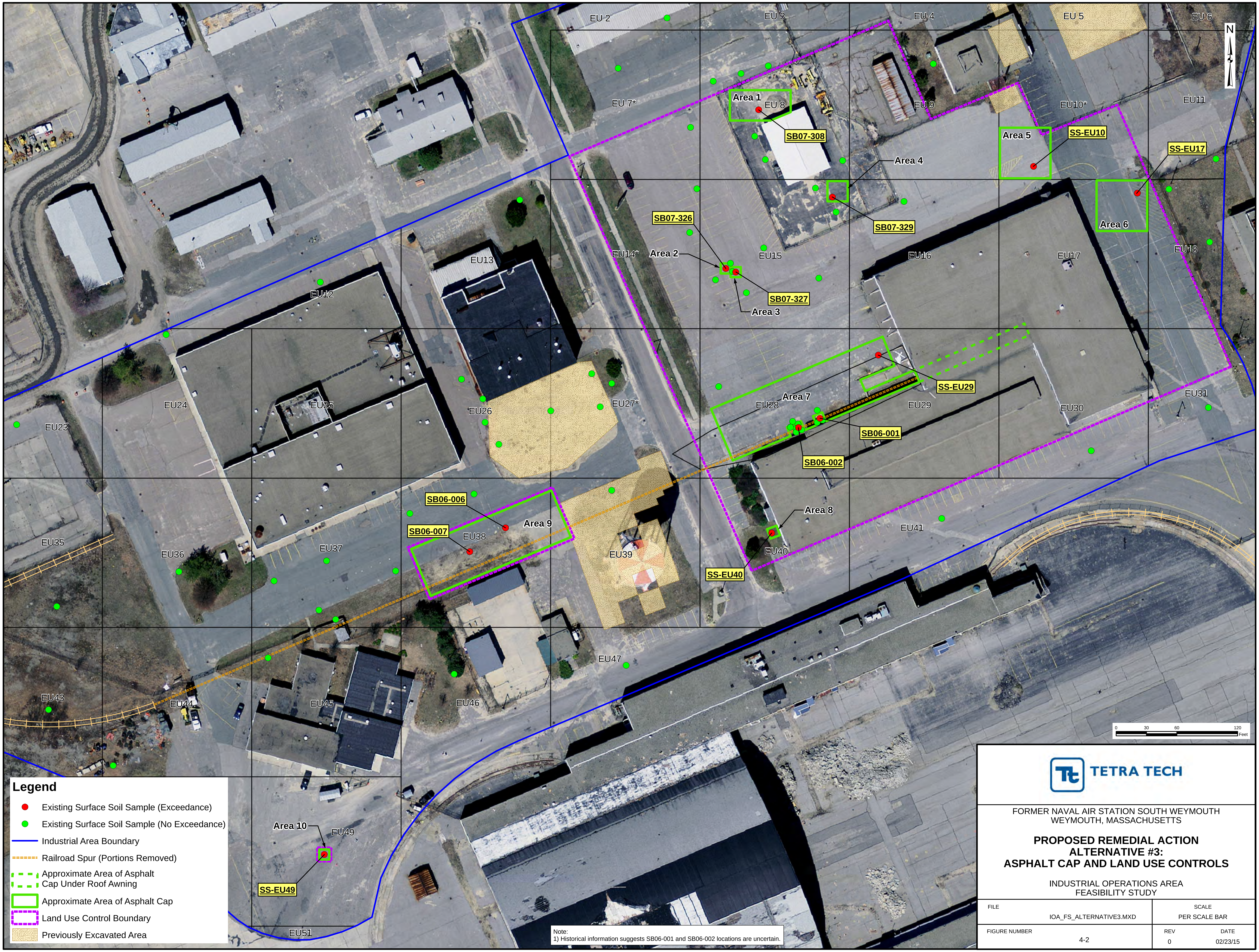
INDUSTRIAL OPERATIONS AREA
FEASIBILITY STUDY

FILE	SCALE	
IOA_FS_ALTERNATIVE.MXD	PER SCALE BAR	
FIGURE NUMBER	REV	DATE
2-1	0	02/23/15

C:\GIS\02073\EC.AM\IOA_FS_ALTERNATIVE.MXD MKB 2/23/2015



C:\GIS\02073\EC.AM\IOA_FS_ALTERNATIVE2.MXD MKB 2/23/2015



TETRA TECH

FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

PROPOSED REMEDIAL ACTION ALTERNATIVE #3: ASPHALT CAP AND LAND USE CONTROLS

INDUSTRIAL OPERATIONS AREA
FEASIBILITY STUDY

FILE	SCALE
IOA_FS_ALTERNATIVE3.MXD	PER SCALE BAR

FIGURE NUMBER	REV	DATE
4-2	0	02/23/15

C:\GIS\02073\EC.AM\IOA_FS_ALTERNATIVE3.MXD MKB 2/23/2015

APPENDIX A

EXISTING DATA

A-1 SURFACE SOIL (0 TO 3 FEET) SAMPLE SUMMARY

TABLE A-1
SURFACE SOIL (0 TO 3 FEET) SAMPLE SUMMARY
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

<table>
<tr><th>Exposure Unit</th><th>PAHs</th><th>PCBs</th><th>Metals</th><th>Dioxins</th></tr>
<tr><td>EU01</td><td colspan="3">EU01</td><td>NA</td></tr>
<tr><td>EU02</td><td colspan="3">EU02</td><td>NA</td></tr>
<tr><td>EU03</td><td colspan="3">EU03</td><td>NA</td></tr>
<tr><td>EU04</td><td colspan="3">EU04</td><td>NA</td></tr>
<tr><td>EU05</td><td>B14-SB-09</td><td>B14-SB-09</td><td>B14-SB-09, B116-MW-01, B116-MW-04</td><td>NA</td></tr>
<tr><td>EU06</td><td colspan="3">EU06</td><td>NA</td></tr>
<tr><td>EU07</td><td>EU07</td><td>SB07-339</td><td>EU07</td><td>EU07</td></tr>
<tr><td>EU08</td><td>SB07-309, SB07-310, SB07-330, SB07-331, SB07-340</td><td>SB07-308, SB07-310</td><td>SB07-307, SB07-308, SB07-309, SB07-310</td><td>NA</td></tr>
<tr><td>EU09</td><td colspan="4">EU09</td></tr>
<tr><td>EU10</td><td>B116-MW03, B116-MW05, B14-SB08</td><td>EU10</td><td>B116-MW03, B116-MW05, B14-SB08</td><td>NA</td></tr>
<tr><td>EU11</td><td colspan="3">SB11-201</td><td>NA</td></tr>
<tr><td>EU12</td><td colspan="3">EU12</td><td>NA</td></tr>
<tr><td>EU13</td><td colspan="4">EU13</td></tr>
<tr><td>EU14</td><td>SB07-312</td><td>SB07-312</td><td>EU14</td><td>NA</td></tr>
<tr><td>EU15</td><td>SB07-305, SB07-311</td><td>SB07-326, SB07-327, SB07-328, SB07-329, SB07-336, SB07-337, SB07-338</td><td>SB07-305, SB07-306</td><td>EU15</td></tr>
<tr><td>EU16</td><td colspan="3">EU16</td><td>NA</td></tr>
<tr><td>EU17</td><td colspan="3">EU17</td><td>NA</td></tr>
<tr><td>EU18</td><td>MW11-131</td><td>MW11-131, SB11-205</td><td>MW11-131</td><td>NA</td></tr>
<tr><td>EU19</td><td colspan="3">EU19</td><td>NA</td></tr>
<tr><td>EU20</td><td>SB09-007</td><td>NA[1]</td><td>SB09-007</td><td>NA</td></tr>
<tr><td>EU21</td><td>SB09-008</td><td>EU21</td><td>SB09-008</td><td>NA</td></tr>
<tr><td>EU22</td><td>SB09-009</td><td>EU22</td><td>SB09-009</td><td>NA</td></tr>
<tr><td>EU23</td><td colspan="3">EU23</td><td>NA</td></tr>
<tr><td>EU24</td><td colspan="4">SB06-343</td></tr>
<tr><td>EU25</td><td>NA[2]</td><td>NA[2]</td><td>NA[2]</td><td>NA[2]</td></tr>
<tr><td>EU26</td><td>SB06-010, B8-MW03, B8-MW04</td><td>SB06-010, SB06-011</td><td>SB06-010, SB06-011</td><td>SB06-010, SB06-304</td></tr>
<tr><td>EU27</td><td>B8-MW02, B8-MW05,B8-MW06</td><td>EU27</td><td>EU27</td><td>EU27</td></tr>
<tr><td>EU28</td><td>SB06-002 S1SWE, S1SWN, S1SWW, S2SWE, S2SWN, S2SWW, AOC13-SW01, AOC13-SW02, AOC13-SW03, AOC13-SW04, SB06-00N</td><td>SB06-002, SB06-001</td><td>SB06-002, SB06-001</td><td>EU28</td></tr>
<tr><td>EU29</td><td colspan="3">EU29</td><td>NA</td></tr>
<tr><td>EU30</td><td colspan="3">EU30</td><td>NA</td></tr>
<tr><td>EU31</td><td colspan="3">EU31</td><td>NA</td></tr>
<tr><td>EU32</td><td colspan="3">EU32</td><td>NA</td></tr>
<tr><td>EU33</td><td colspan="3">EU33</td><td>NA</td></tr>
<tr><td>EU34</td><td colspan="3">EU34</td><td>NA</td></tr>
<tr><td>EU35</td><td colspan="3">EU35</td><td>NA</td></tr>
<tr><td>EU36</td><td colspan="4">EU36</td></tr>
<tr><td>EU37</td><td>SB06-008</td><td>SB06-008, SB06-009, SB06-351, MW06-013</td><td>SB06-008, SB06-009, SB06-351, MW06-013</td><td>SB06-351, EU27</td></tr>
<tr><td>EU38</td><td>SB06-006, SB06-007</td><td>SB06-006, SB06-007, SB06-012</td><td>SB06-006, SB06-007, SB06-012</td><td>EU38</td></tr>
</table>

TABLE A-1
SURFACE SOIL (0 TO 3 FEET) SAMPLE SUMMARY
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

<table>
<tr><th>Exposure Unit</th><th>PAHs</th><th>PCBs</th><th>Metals</th><th>Dioxins</th></tr>
<tr><td>EU39</td><td>SB06-005, SB06-004</td><td>SB06-005, SB06-004</td><td>SB06-005, SB06-004, SS06-020</td><td>EU39</td></tr>
<tr><td>EU40</td><td colspan="3">EU40</td><td>NA</td></tr>
<tr><td>EU41</td><td colspan="3">EU41</td><td>NA</td></tr>
<tr><td>EU42</td><td colspan="3">EU42</td><td>NA</td></tr>
<tr><td>EU43</td><td colspan="4">EU43</td></tr>
<tr><td>EU44</td><td colspan="3">EU44</td><td>NA</td></tr>
<tr><td>EU45</td><td colspan="3">EU45</td><td>NA</td></tr>
<tr><td>EU46</td><td colspan="4">EU46</td></tr>
<tr><td>EU47</td><td colspan="3">EU47</td><td>NA</td></tr>
<tr><td>EU48</td><td colspan="3">EU48</td><td>NA</td></tr>
<tr><td>EU49</td><td colspan="3">EU49</td><td>NA</td></tr>
</table>

Notes:

1) Sample collected but not analyzed by laboratory

2) Sample not collected from EU25 - within the footprint of Building 117

All EUXX samples were collected in 2011 from 0 to 2 feet bgs. All remaining samples were collected during historical invesitgations.

NA = Sample not collected for the analytical compound

A-2 ANALYTICAL RESULTS - SURFACE SOIL

TABLE A-2
ANALYTICAL RESULTS - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

EU	EU01	EU01	EU01	EU02	EU03	EU04	EU05	EU05	EU05	EU05	EU05	EU05	EU05
LOCATION ID	IOA-SS-EU01	IOA-SS-EU01	IOA-SS-EU01	IOA-SS-EU02	IOA-SS-EU03	IOA-SS-EU04	B116-MW-01	B116-MW-01	B116-MW-01	B116-MW-02	B116-MW-03	B116-MW-04	B116-MW-04
SAMPLE ID	IOA-SS-EU01-0002	IOA-SS-EU01-0002-AVG	IOA-SS-EU01-0002-D	IOA-SS-EU02-0002	IOA-SS-EU03-0002	IOA-SS-EU04-0002	B116-OSB1AA	B116-OSB1AA-AVG	B116-OSB1AA-D	B116-OSB2AA	B116-OSB3AA	B116-OSB4AA	B116-OSB4AA-AVG
SAMPLE CODE	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	ORIG	AVG
SAMPLE DATE	20110809	20110809	20110809	20110809	20110809	20110809	19970312	19970312	19970312	19970312	19970313	19970313	19970313
TOP DEPTH	0	0	0	0	0	0	1	1	1	1	1	1	1
BOTTOM DEPTH	2	2	2	2	2	2	3	3	3	3	3	3	3
VOLATILES (UG/KG)													
1,1,1-TRICHLOROETHANE													
1,1,2,2-TETRACHLOROETHANE													
1,1,2-TRICHLOROETHANE													
1,1-DICHLOROETHANE													
1,1-DICHLOROETHENE													
1,2-DIBROMO-3-CHLOROPROPANE													
1,2-DIBROMOETHANE													
1,2-DICHLOROBENZENE													
1,2-DICHLOROETHANE													
1,2-DICHLOROPROPANE													
1,3-DICHLOROBENZENE													
1,4-DICHLOROBENZENE													
2-BUTANONE													
2-HEXANONE													
4-METHYL-2-PENTANONE													
ACETONE													
BENZENE							5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
BROMODICHLOROMETHANE													
BROMOFORM													
BROMOMETHANE													
CARBON DISULFIDE													
CARBON TETRACHLORIDE													
CHLOROBENZENE													
CHLORODIBROMOMETHANE													
CHLOROETHANE													
CHLOROFORM													
CHLOROMETHANE													
CIS-1,2-DICHLOROETHENE													
CIS-1,3-DICHLOROPROPENE													
ETHYLBENZENE							5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
M+P-XYLENES													
METHYLENE CHLORIDE													
STYRENE													
TETRACHLOROETHENE													
TOLUENE							5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
TOTAL 1,2-DICHLOROETHENE													
TOTAL XYLENES							5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
TRANS-1,2-DICHLOROETHENE													

U - NOT DETECTED; J - QUANTITATION APPROXIMATE; R - REJECTED

EU	EU01	EU01	EU01	EU02	EU03	EU04	EU05	EU05	EU05	EU05	EU05	EU05	EU05
LOCATION ID	IOA-SS-EU01	IOA-SS-EU01	IOA-SS-EU01	IOA-SS-EU02	IOA-SS-EU03	IOA-SS-EU04	B116-MW-01	B116-MW-01	B116-MW-01	B116-MW-02	B116-MW-03	B116-MW-04	B116-MW-04
SAMPLE ID	IOA-SS-EU01-0002	IOA-SS-EU01-0002-AVG	IOA-SS-EU01-0002-D	IOA-SS-EU02-0002	IOA-SS-EU03-0002	IOA-SS-EU04-0002	B116-OSB1AA	B116-OSB1AA-AVG	B116-OSB1AA-D	B116-OSB2AA	B116-OSB3AA	B116-OSB4AA	B116-OSB4AA-AVG
SAMPLE CODE	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	ORIG	AVG
SAMPLE DATE	20110809	20110809	20110809	20110809	20110809	20110809	19970312	19970312	19970312	19970312	19970313	19970313	19970313
TOP DEPTH	0	0	0	0	0	0	1	1	1	1	1	1	1
BOTTOM DEPTH	2	2	2	2	2	2	3	3	3	3	3	3	3
TRANS-1,3-DICHLOROPROPENE													
TRICHLOROETHENE													
VINYL CHLORIDE													
VPH MADEP (UG/KG)													
C5-C8 ALIPHATICS							5900 U	8450 U	11000 U	6600 U	11000 U	12000 U	12000 U
C5-C8 ALIPHATICS (WEIGHTED 0.5)							2900 U	4250 U	5600 U	3300 U	5700 U	5900 U	5900 U
C5-C8 ALIPHATICS-UNADJ													
C9-C10 AROMATICS							2900 U	4250 U	5600 U	3300 U	5800 U	5900 U	5900 U
C9-C10 AROMATICS (WEIGHTED 1.0)							3000 U	4300 U	5600 U	3300 U	5800 U	5900 U	5900 U
C9-C12 ALIPHATICS							14000 U	18000 U	22000 U	1700 U	2900 U	3000 U	3000 U
C9-C12 ALIPHATICS (WEIGHTED 0.05)							720 U	910 U	1100 U	83 U	140 U	150 U	150 U
C9-C12 ALIPHATICS-UNADJ													
METHYL TERT-BUTYL ETHER							11 U	11 U	11 U	11 U	11 U	11 U	11 U
O-XYLENE							1500 U	2150 U	2800 U	1700 U	2900 U	3000 U	3000 U
TOTAL XYLENES							1500 U	2150 U	2800 U	1700 U	2900 U	3000 U	3000 U
VOLATILE PETROLEUM HYDROCARBONS													
SEMIVOLATILES (UG/KG)													
1,2,4-TRICHLOROBENZENE													
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	20 UJ	19.5 UJ	19 UJ	94 UJ	97 UJ	93 UJ	360 U	360 U	360 U	330 U	220 UJ	360 U	360 U
2-METHYLPHENOL													
2-NITROANILINE													
2-NITROPHENOL													
3&4-METHYLPHENOL													
3,3'-DICHLOROBENZIDINE													
3-NITROANILINE													
4,6-DINITRO-2-METHYLPHENOL													
4-BROMOPHENYL PHENYL ETHER													
4-CHLORO-3-METHYLPHENOL													

EU	EU01	EU01	EU01	EU02	EU03	EU04	EU05	EU05	EU05	EU05	EU05	EU05	EU05
LOCATION ID	IOA-SS-EU01	IOA-SS-EU01	IOA-SS-EU01	IOA-SS-EU02	IOA-SS-EU03	IOA-SS-EU04	B116-MW-01	B116-MW-01	B116-MW-01	B116-MW-02	B116-MW-03	B116-MW-04	B116-MW-04
SAMPLE ID	IOA-SS-EU01-0002	IOA-SS-EU01-0002-AVG	IOA-SS-EU01-0002-D	IOA-SS-EU02-0002	IOA-SS-EU03-0002	IOA-SS-EU04-0002	B116-OSB1AA	B116-OSB1AA-AVG	B116-OSB1AA-D	B116-OSB2AA	B116-OSB3AA	B116-OSB4AA	B116-OSB4AA-AVG
SAMPLE CODE	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	ORIG	AVG
SAMPLE DATE	20110809	20110809	20110809	20110809	20110809	20110809	19970312	19970312	19970312	19970312	19970313	19970313	19970313
TOP DEPTH	0	0	0	0	0	0	1	1	1	1	1	1	1
BOTTOM DEPTH	2	2	2	2	2	2	3	3	3	3	3	3	3
4-CHLOROANILINE													
4-CHLOROPHENYL PHENYL ETHER													
4-METHYLPHENOL													
4-NITROANILINE													
4-NITROPHENOL													
ACENAPHTHENE	53 J	47.5 J	42 J	94 UJ	97 UJ	93 UJ	360 U	360 U	360 U	330 U	220 UJ	360 U	360 U
ACENAPHTHYLENE	20 UJ	19.5 UJ	19 UJ	94 UJ	97 UJ	93 UJ	360 U	360 U	360 U	330 U	220 UJ	360 U	360 U
ANTHRACENE	140 J	112 J	83 J	94 UJ	97 UJ	93 UJ	360 U	360 U	360 U	330 U	220 UJ	360 U	360 U
BAP EQUIVALENT-HALFND	445 J	373 J	301 J	94 UJ	164 J	227 J	360 U	360 U	360 U	330 U	220 UJ	360 U	360 U
BAP EQUIVALENT-POS	445 J	373 J	301 J	94 UJ	5.3 J	122 J	360 U	360 U	360 U	330 U	220 UJ	360 U	360 U
BENZO(A)ANTHRACENE	340 J	290 J	240 J	94 UJ	53 J	110 J	360 U	360 U	360 U	330 U	220 UJ	360 U	360 U
BENZO(A)PYRENE	310 J	260 J	210 J	94 UJ	97 UJ	97 J	360 U	360 U	360 U	330 U	220 UJ	360 U	360 U
BENZO(B)FLUORANTHENE	400 J	340 J	280 J	94 UJ	97 UJ	130 J	360 U	360 U	360 U	330 U	220 UJ	360 U	360 U
BENZO(G,H,I)PERYLENE	150 J	109 J	68 J	94 UJ	97 UJ	93 UJ	360 U	360 U	360 U	330 U	220 UJ	360 U	360 U
BENZO(K)FLUORANTHENE	180 J	145 J	110 J	94 UJ	97 UJ	100 J	360 U	360 U	360 U	330 U	220 UJ	360 U	360 U
BIS(2-CHLOROETHOXY)METHANE													
BIS(2-CHLOROETHYL)ETHER													
BIS(2-ETHYLHEXYL)PHTHALATE													
BUTYL BENZYL PHTHALATE													
CARBAZOLE													
CHRYSENE	350 J	280 J	210 J	94 UJ	97 UJ	140 J	360 U	360 U	360 U	330 U	220 UJ	360 U	360 U
DIBENZO(A,H)ANTHRACENE	45 J	37 J	29 J	190 UJ	190 UJ	190 UJ	360 U	360 U	360 U	330 U	220 UJ	360 U	360 U
DIBENZOFURAN													
DIETHYL PHTHALATE													
DIMETHYL PHTHALATE													
DI-N-BUTYL PHTHALATE													
DI-N-OCTYL PHTHALATE													
FLUORANTHENE	760 J	620 J	480 J	94 UJ	76 J	250 J	360 U	360 U	360 U	330 U	220 UJ	360 U	360 U
FLUORENE	54 J	48 J	42 J	94 UJ	97 UJ	93 UJ	360 U	360 U	360 U	330 U	220 UJ	360 U	360 U
HEXACHLOROBENZENE													
HEXACHLOROBUTADIENE													
HEXACHLOROCYCLOPENTADIENE													
HEXACHLOROETHANE													
INDENO(1,2,3-CD)PYRENE	140 J	112 J	85 J	190 UJ	190 UJ	190 UJ	360 U	360 U	360 U	330 U	220 UJ	360 U	360 U
ISOPHORONE													
NAPHTHALENE	20 UJ	19.5 UJ	19 UJ	94 UJ	97 UJ	93 UJ	360 U	360 U	360 U	330 U	220 UJ	360 U	360 U
NITROBENZENE													
N-NITROSO-DI-N-PROPYLAMINE													
N-NITROSODIPHENYLAMINE													

TABLE A-2
ANALYTICAL RESULTS - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

EU	EU01	EU01	EU01	EU02	EU03	EU04	EU05	EU05	EU05	EU05	EU05	EU05	EU05
LOCATION ID	IOA-SS-EU01	IOA-SS-EU01	IOA-SS-EU01	IOA-SS-EU02	IOA-SS-EU03	IOA-SS-EU04	B116-MW-01	B116-MW-01	B116-MW-01	B116-MW-02	B116-MW-03	B116-MW-04	B116-MW-04
SAMPLE ID	IOA-SS-EU01-0002	IOA-SS-EU01-0002-AVG	IOA-SS-EU01-0002-D	IOA-SS-EU02-0002	IOA-SS-EU03-0002	IOA-SS-EU04-0002	B116-OSB1AA	B116-OSB1AA-AVG	B116-OSB1AA-D	B116-OSB2AA	B116-OSB3AA	B116-OSB4AA	B116-OSB4AA-AVG
SAMPLE CODE	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	ORIG	AVG
SAMPLE DATE	20110809	20110809	20110809	20110809	20110809	20110809	19970312	19970312	19970312	19970312	19970313	19970313	19970313
TOP DEPTH	0	0	0	0	0	0	1	1	1	1	1	1	1
BOTTOM DEPTH	2	2	2	2	2	2	3	3	3	3	3	3	3
PENTACHLOROPHENOL													
PHENANTHRENE	510 J	410 J	310 J	94 UJ	97 UJ	120 J	360 U	360 U	360 U	330 U	220 UJ	360 U	360 U
PHENOL													
PYRENE	630 J	505 J	380 J	94 UJ	64 J	210 J	360 U	360 U	360 U	330 U	220 UJ	360 U	360 U
TOTAL PAHS	4060 J	3320 J	2570 J	105 UJ	193 J	1160 J	360 U	360 U	360 U	330 U	220 UJ	360 U	360 U
PESTICIDES/PCBS (UG/KG)													
4,4'-DDD													
4,4'-DDE													
4,4'-DDT													
ALDRIN													
ALPHA-BHC													
ALPHA-CHLORDANE													
AROCLOR-1016	7.8 U	7.65 U	7.5 U	7.3 U	7.7 U	7.4 U							
AROCLOR-1221	7.8 U	7.65 U	7.5 U	7.3 U	7.7 U	7.4 U							
AROCLOR-1232	7.8 U	7.65 U	7.5 U	7.3 U	7.7 U	7.4 U							
AROCLOR-1242	7.8 U	7.65 U	7.5 U	7.3 U	7.7 U	7.4 U							
AROCLOR-1248	7.8 U	7.65 U	7.5 U	7.3 U	7.7 U	7.4 U							
AROCLOR-1254	7.8 U	7.65 U	7.5 U	7.3 U	7.7 U	7.4 U							
AROCLOR-1260	27 J	17 J	7 J	7.3 U	9.5 J	7.3 J							
BETA-BHC													
DELTA-BHC													
DIELDRIN													
ENDOSULFAN I													
ENDOSULFAN II													
ENDOSULFAN SULFATE													
ENDRIN													
ENDRIN ALDEHYDE													
ENDRIN KETONE													
GAMMA-BHC (LINDANE)													
GAMMA-CHLORDANE													
HEPTACHLOR													
HEPTACHLOR EPOXIDE													
METHOXYCHLOR													
TOTAL AROCLOR	27 J	17 J	7 J	7.3 U	9.5 J	7.3 J							
TOXAPHENE													
HERBICIDES (UG/KG)													
2,4,5-T													
2,4,5-TP (SILVEX)													
2,4-D													

U - NOT DETECTED; J - QUANTITATION APPROXIMATE; R - REJECTED

EU	EU01	EU01	EU01	EU02	EU03	EU04	EU05	EU05	EU05	EU05	EU05	EU05	EU05
LOCATION ID	IOA-SS-EU01	IOA-SS-EU01	IOA-SS-EU01	IOA-SS-EU02	IOA-SS-EU03	IOA-SS-EU04	B116-MW-01	B116-MW-01	B116-MW-01	B116-MW-02	B116-MW-03	B116-MW-04	B116-MW-04
SAMPLE ID	IOA-SS-EU01-0002	IOA-SS-EU01-0002-AVG	IOA-SS-EU01-0002-D	IOA-SS-EU02-0002	IOA-SS-EU03-0002	IOA-SS-EU04-0002	B116-OSB1AA	B116-OSB1AA-AVG	B116-OSB1AA-D	B116-OSB2AA	B116-OSB3AA	B116-OSB4AA	B116-OSB4AA-AVG
SAMPLE CODE	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	ORIG	AVG
SAMPLE DATE	20110809	20110809	20110809	20110809	20110809	20110809	19970312	19970312	19970312	19970312	19970313	19970313	19970313
TOP DEPTH	0	0	0	0	0	0	1	1	1	1	1	1	1
BOTTOM DEPTH	2	2	2	2	2	2	3	3	3	3	3	3	3
2,4-DB													
DALAPON													
DICAMBA													
DICHLOROPROP													
DINOSEB													
MCPA													
MCPP													
METALS (MG/KG)													
ALUMINUM	4400	4600	4800	5400	6600	4400							
ANTIMONY	0.15 U	0.13 U	0.11 U	0.084 U	0.13 U	0.1 U							
ARSENIC	1.5	1.6	1.7	1	1.1	1.7	2	1.8	1.6			0.98	1.29
BARIUM	17	17.5	18	17	16	14	12.5	13.6	14.8			22.4	22
BERYLLIUM	0.44	0.312	0.37 U	0.3 U	0.25 U	0.3 U							
CADMIUM	0.28 U	0.24 U	0.2 U	0.15 U	0.2 U	0.17 U	0.05 U	0.0275	0.03			0.04 U	0.055 U
CALCIUM	1500 J	1500 J	1500 J	1100 J	940 J	1000 J							
CHROMIUM	5.5	5.6	5.7	5.9	15	7.4	7.8	6.45	5.1			7.2	7.95
COBALT	3.2	3.15	3.1	2.8	3.5	2.9							
COPPER	7.7	7.75	7.8	4.8	5.8	5.2							
IRON	9800	10400	11000	9600	12000	11000							
LEAD	16 J	15 J	14 J	6 J	9 J	5.3 J	7.3	7.5	7.7	6.3	10.6	4.6	4.9
MAGNESIUM	1600 J	1650 J	1700 J	1700 J	2000 J	1400 J							
MANGANESE	310 J	290 J	270 J	140 J	180 J	160 J							
MERCURY	0.02 J	0.016 J	0.012 J	0.0052 J	0.009 J	0.0019 J	0.02 U	0.02 U	0.02 U			0.02 U	0.02 U
NICKEL	4.7	4.7	4.7	4.3	14	5.2							
POTASSIUM	330	345	360	500	280	370							
SELENIUM	0.87	0.745 J	0.62 J	0.67 J	0.72	0.65 J	0.19 U	0.185 U	0.18 U			0.2 U	0.225 U
SILVER	0.084 U	0.0795 U	0.075 U	0.069 U	0.069 U	0.068 U	0.07 U	0.065 U	0.06 U			0.07 U	0.07 U
SODIUM	50 J	51 J	52 J	51 J	39 J	52 J							
THALLIUM	0.39	0.222	0.11 U	0.077 U	0.14 U	0.076 U							
VANADIUM	12	12	12	13	13	14							
ZINC	29	29	29	21	25	22							
MISCELLANEOUS PARAMETERS (%)													
PERCENT MOISTURE	15	13	11	11	15	11							
PERCENT SOLIDS													
TOTAL SOLIDS													
MISCELLANEOUS PARAMETERS (MG/KG)													
CYANIDE													
EPH MADEP (UG/KG)													

EU	EU01	EU01	EU01	EU02	EU03	EU04	EU05	EU05	EU05	EU05	EU05	EU05	EU05
LOCATION ID	IOA-SS-EU01	IOA-SS-EU01	IOA-SS-EU01	IOA-SS-EU02	IOA-SS-EU03	IOA-SS-EU04	B116-MW-01	B116-MW-01	B116-MW-01	B116-MW-02	B116-MW-03	B116-MW-04	B116-MW-04
SAMPLE ID	IOA-SS-EU01-0002	IOA-SS-EU01-0002-AVG	IOA-SS-EU01-0002-D	IOA-SS-EU02-0002	IOA-SS-EU03-0002	IOA-SS-EU04-0002	B116-OSB1AA	B116-OSB1AA-AVG	B116-OSB1AA-D	B116-OSB2AA	B116-OSB3AA	B116-OSB4AA	B116-OSB4AA-AVG
SAMPLE CODE	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	ORIG	AVG
SAMPLE DATE	20110809	20110809	20110809	20110809	20110809	20110809	19970312	19970312	19970312	19970312	19970313	19970313	19970313
TOP DEPTH	0	0	0	0	0	0	1	1	1	1	1	1	1
BOTTOM DEPTH	2	2	2	2	2	2	3	3	3	3	3	3	3
C11-C22 AROMATICS							160000 J	92800 J	51000 UJ	33000 U	39000 U	14000 U	21500 U
C11-C22 AROMATICS (WEIGHTED 1.0)							160000 J	92800 J	51000 UJ	33000 U	39000 U	14000 U	21500 U
C11-C22 AROMATICS-UNADJ													
C19-C36 ALIPHATICS							410000 J	325000 J	240000 J	28000 J	110000	6000 U	5750 UJ
C19-C36 ALIPHATICS (WEIGHTED 0.005)							2100 J	1650 J	1200 J	140 J	550	30 U	28.5 UJ
C9-C18 ALIPHATICS							190000 J	126000 J	62000 J	20000 U	12000 U	5000 U	6900 UJ
C9-C18 ALIPHATICS (WEIGHTED 0.05)							9300 J	6200 J	3100 J	980 U	580 U	250 U	345 UJ
EXTRACTABLE PETROLEUM HYDROCARBONS													
DIOXINS/FURANS (NG/KG)													
1,2,3,4,6,7,8,9-OCDD													
1,2,3,4,6,7,8,9-OCDF													
1,2,3,4,6,7,8-HPCDD													
1,2,3,4,6,7,8-HPCDF													
1,2,3,4,7,8,9-HPCDF													
1,2,3,4,7,8-HXCDD													
1,2,3,4,7,8-HXCDF													
1,2,3,6,7,8-HXCDD													
1,2,3,6,7,8-HXCDF													
1,2,3,7,8,9-HXCDD													
1,2,3,7,8,9-HXCDF													
1,2,3,7,8-PECDD													
1,2,3,7,8-PECDF													
2,3,4,6,7,8-HXCDF													
2,3,4,7,8-PECDF													
2,3,7,8-TCDD													
2,3,7,8-TCDF													
TEQ													
TEQ HALFND													
TOTAL HPCDD													
TOTAL HPCDF													
TOTAL HXCDD													
TOTAL HXCDF													
TOTAL PECDD													
TOTAL PECDF													
TOTAL TCDD													
TOTAL TCDF													

EU	EU05	EU05	EU06	EU07	EU07	EU08	EU08	EU08	EU08	EU08	EU08	EU08	EU08
LOCATION ID	B116-MW-04	B14-SB-09	IOA-SS-EU06	IOA-SS-EU07	SB07-339	SB07-307	SB07-307	SB07-308	SB07-308	SB07-309	SB07-309	SB07-310	SB07-310
SAMPLE ID	B116-OSB4AA-D	B14SB09AA	IOA-SS-EU06-0002	IOA-SS-EU07-0002	SB07-339-NSO-101503	SB07-307-NSO-1104025	SB07-307-NSO-1104020	SB07-308-NSO-1104025	SB07-308-NSO-1104020	SB07-309-NSO-1104025	SB07-309-NSO-1104020	SB07-310-NSO-0716030	SB07-310-NSO-1104020
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	19970313	19990614	20110809	20110809	20031015	20021104	20021104	20021104	20021104	20021104	20021104	20030716	20021104
TOP DEPTH	1	1	0	0	0.5	0	0.5	0	0.5	0	0.5	0.5	0.5
BOTTOM DEPTH	3	2	2	2	1.5	0.5	1	0.5	1	0.5	1	1	1
VOLATILES (UG/KG)													
1,1,1-TRICHLOROETHANE		4.4 U					4.2 U		5.2 U		4.6 U		
1,1,2,2-TETRACHLOROETHANE		4.4 U					4.2 U		5.2 U		4.6 U		
1,1,2-TRICHLOROETHANE		4.4 U					4.2 U		5.2 U		4.6 U		
1,1-DICHLOROETHANE		4.4 U					4.2 U		5.2 U		4.6 U		
1,1-DICHLOROETHENE		4.4 U					4.2 U		5.2 U		4.6 U		
1,2-DIBROMO-3-CHLOROPROPANE							4.2 U		5.2 U		4.6 U		
1,2-DIBROMOETHANE							4.2 U		5.2 U		4.6 U		
1,2-DICHLOROBENZENE		190 U					260 U		260 U		270 U		
1,2-DICHLOROETHANE		4.4 U					4.2 U		5.2 U		4.6 U		
1,2-DICHLOROPROPANE		4.4 U					4.2 U		5.2 U		4.6 U		
1,3-DICHLOROBENZENE		190 U					260 U		260 U		270 U		
1,4-DICHLOROBENZENE		190 U					260 U		260 U		270 U		
2-BUTANONE		17.1 J					21 R		7.4 J		23 R		
2-HEXANONE		4.4 U					21 U		26 U		23 U		
4-METHYL-2-PENTANONE		4.4 U					21 R		26 R		23 R		
ACETONE		78.6 J					29 J		87		48		
BENZENE	5.5 U	0.88 U					4.2 U		5.2 U		4.6 U		
BROMODICHLOROMETHANE		4.4 U					4.2 U		5.2 U		4.6 U		
BROMOFORM		4.4 U					4.2 U		5.2 U		4.6 U		
BROMOMETHANE		4.4 U					4.2 U		5.2 U		4.6 U		
CARBON DISULFIDE		4.4 U					4.2 U		5.2 U		4.6 U		
CARBON TETRACHLORIDE		4.4 U					4.2 U		5.2 U		4.6 U		
CHLOROBENZENE		4.4 UJ					4.2 U		5.2 U		4.6 U		
CHLORODIBROMOMETHANE		4.4 U					4.2 U		5.2 U		4.6 U		
CHLOROETHANE		4.4 U					4.2 U		5.2 U		4.6 U		
CHLOROFORM		4.4 U					4.2 U		5.2 U		4.6 U		
CHLOROMETHANE		4.4 U					4.2 U		5.2 U		4.6 U		
CIS-1,2-DICHLOROETHENE		4.4 U					4.2 U		5.2 U		4.6 U		
CIS-1,3-DICHLOROPROPENE		4.4 U					4.2 U		5.2 U		4.6 U		
ETHYLBENZENE	5.5 U	0.88 UJ					4.2 U		5.2 U		4.6 U		
M+P-XYLENES		1000 U					4.2 U		5.2 U		4.6 U		
METHYLENE CHLORIDE		4.4 U					21 U		26 U		23 U		
STYRENE		4.4 UJ					4.2 U		5.2 U		4.6 U		
TETRACHLOROETHENE		4.4 U					4.2 U		5.2 U		4.6 U		
TOLUENE	5.5 U	0.88 U					4.2 U		5.2 U		4.6 U		
TOTAL 1,2-DICHLOROETHENE		4.4 U					4.2 U		5.2 U		4.6 U		
TOTAL XYLENES	5.5 U	1 J					4.2 U		5.2 U		4.6 U		
TRANS-1,2-DICHLOROETHENE		4.4 U					4.2 U		5.2 U		4.6 U		

EU	EU05	EU05	EU06	EU07	EU07	EU08	EU08	EU08	EU08	EU08	EU08	EU08	EU08
LOCATION ID	B116-MW-04	B14-SB-09	IOA-SS-EU06	IOA-SS-EU07	SB07-339	SB07-307	SB07-307	SB07-308	SB07-308	SB07-309	SB07-309	SB07-310	SB07-310
SAMPLE ID	B116-OSB4AA-D	B14SB09AA	IOA-SS-EU06-0002	IOA-SS-EU07-0002	SB07-339-NSO-101503	SB07-307-NSO-1104025	SB07-307-NSO-1104020	SB07-308-NSO-1104025	SB07-308-NSO-1104020	SB07-309-NSO-1104025	SB07-309-NSO-1104020	SB07-310-NSO-0716030	SB07-310-NSO-1104020
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	19970313	19990614	20110809	20110809	20031015	20021104	20021104	20021104	20021104	20021104	20021104	20030716	20021104
TOP DEPTH	1	1	0	0	0.5	0	0.5	0	0.5	0	0.5	0.5	0.5
BOTTOM DEPTH	3	2	2	2	1.5	0.5	1	0.5	1	0.5	1	1	1
TRANS-1,3-DICHLOROPROPENE		4.4 U					4.2 U		5.2 U		4.6 U		
TRICHLOROETHENE		4.4 U					4.2 U		5.2 U		4.6 U		
VINYL CHLORIDE		4.4 U					4.2 U		5.2 U		4.6 U		
VPH MADEP (UG/KG)													
C5-C8 ALIPHATICS	12000 U	5290											
C5-C8 ALIPHATICS (WEIGHTED 0.5)	5900 U												
C5-C8 ALIPHATICS-UNADJ													
C9-C10 AROMATICS	5900 U	1000 U											
C9-C10 AROMATICS (WEIGHTED 1.0)	5900 U												
C9-C12 ALIPHATICS	3000 U	1870											
C9-C12 ALIPHATICS (WEIGHTED 0.05)	150 U												
C9-C12 ALIPHATICS-UNADJ													
METHYL TERT-BUTYL ETHER	11 U	4.4 U											
O-XYLENE	3000 U	520 U					4.2 U		5.2 U		4.6 U		
TOTAL XYLENES	3000 U	520 U					4.2 U		5.2 U		4.6 U		
VOLATILE PETROLEUM HYDROCARBONS		7160											
SEMIVOLATILES (UG/KG)													
1,2,4-TRICHLOROBENZENE		190 U					260 U		260 U		270 U		
2,2'-OXYBIS(1-CHLOROPROPANE)		190 U					260 U		260 U		270 U		
2,4,5-TRICHLOROPHENOL		190 U					260 U		260 U		270 U		
2,4,6-TRICHLOROPHENOL		190 U					260 U		260 U		270 U		
2,4-DICHLOROPHENOL		190 U					260 U		260 U		270 U		
2,4-DIMETHYLPHENOL		190 U					260 U		260 U		270 U		
2,4-DINITROPHENOL		760 UJ					520 U		520 U		540 U		
2,4-DINITROTOLUENE		190 U					260 U		260 U		270 U		
2,6-DINITROTOLUENE		190 U					260 U		260 U		270 U		
2-CHLORONAPHTHALENE		190 U					260 U		260 U		270 U		
2-CHLOROPHENOL		190 U					260 U		260 U		270 U		
2-METHYLNAPHTHALENE	360 U	190 U	19 UJ	94 UJ			260 U		260 U		270 U		
2-METHYLPHENOL		190 UJ					260 U		260 U		270 U		
2-NITROANILINE		190 U					520 U		520 U		540 U		
2-NITROPHENOL		190 U					260 U		260 U		270 U		
3&4-METHYLPHENOL		190 U											
3,3'-DICHLOROBENZIDINE		190 U					260 U		260 U		270 U		
3-NITROANILINE		190 U					520 U		520 U		540 U		
4,6-DINITRO-2-METHYLPHENOL		760 UJ					520 U		520 U		540 U		
4-BROMOPHENYL PHENYL ETHER		190 UJ					260 U		260 U		270 U		
4-CHLORO-3-METHYLPHENOL		190 UJ					520 U		520 U		540 U		

TABLE A-2
ANALYTICAL RESULTS - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

EU	EU05	EU05	EU06	EU07	EU07	EU08	EU08	EU08	EU08	EU08	EU08	EU08	EU08
LOCATION ID	B116-MW-04	B14-SB-09	IOA-SS-EU06	IOA-SS-EU07	SB07-339	SB07-307	SB07-307	SB07-308	SB07-308	SB07-309	SB07-309	SB07-310	SB07-310
SAMPLE ID	B116-OSB4AA-D	B14SB09AA	IOA-SS-EU06-0002	IOA-SS-EU07-0002	SB07-339-NSO-101503	SB07-307-NSO-1104025	SB07-307-NSO-1104020	SB07-308-NSO-1104025	SB07-308-NSO-1104020	SB07-309-NSO-1104025	SB07-309-NSO-1104020	SB07-310-NSO-0716030	SB07-310-NSO-1104020
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	19970313	19990614	20110809	20110809	20031015	20021104	20021104	20021104	20021104	20021104	20021104	20030716	20021104
TOP DEPTH	1	1	0	0	0.5	0	0.5	0	0.5	0	0.5	0.5	0.5
BOTTOM DEPTH	3	2	2	2	1.5	0.5	1	0.5	1	0.5	1	1	1
4-CHLOROANILINE		190 U					260 U		260 U		270 U		
4-CHLOROPHENYL PHENYL ETHER		190 UJ					260 U		260 U		270 U		
4-METHYLPHENOL							260 U		260 U		270 U		
4-NITROANILINE		190 U					520 U		520 U		540 U		
4-NITROPHENOL		760 U					520 U		520 U		540 U		
ACENAPHTHENE	360 U	190 U	34 J	94 UJ			260 U		260 U		270 U		
ACENAPHTHYLENE	360 U	190 U	94 J	94 UJ			260 U		260 U		270 U		
ANTHRACENE	360 U	190 U	86 J	94 UJ			260 U		260 U		74 J		
BAP EQUIVALENT-HALFND	360 U	190 U	501 J	161 J			96.7 J		52.3 J		621 J		
BAP EQUIVALENT-POS	360 U	190 U	501 J	4.1 J			69.3 J		51 J		621 J		
BENZO(A)ANTHRACENE	360 U	190 U	380 J	41 J			260 U		29 J		310		
BENZO(A)PYRENE	360 U	190 U	360 J	94 UJ			56		30 J		400		
BENZO(B)FLUORANTHENE	360 U	190 U	430 J	94 UJ			38 J		59 J		610		
BENZO(G,H,I)PERYLENE	360 U	190 U	120 J	94 UJ			260 U		260 U		280		
BENZO(K)FLUORANTHENE	360 U	190 U	130 J	94 UJ			260 U		260 U		230 J		
BIS(2-CHLOROETHOXY)METHANE		190 U					260 U		260 U		270 U		
BIS(2-CHLOROETHYL)ETHER		190 U					260 U		260 U		270 U		
BIS(2-ETHYLHEXYL)PHTHALATE		190 U					260 U		260 U		270 U		
BUTYL BENZYL PHTHALATE		190 U					260 U		260 U		270 U		
CARBAZOLE		190 U					260 U		260 U		79 J		
CHRYSENE	360 U	190 U	370 J	94 UJ			260 U		39 J		420		
DIBENZO(A,H)ANTHRACENE	360 U	190 U	47 J	190 UJ			9.5 J		7.3 J		95		
DIBENZOFURAN		190 U					260 U		260 U		270 U		
DIETHYL PHTHALATE		190 U					260 U		260 U		270 U		
DIMETHYL PHTHALATE		190 U					260 U		260 U		270 U		
DI-N-BUTYL PHTHALATE		190 U					260 U		260 U		270 U		
DI-N-OCTYL PHTHALATE		190 U					260 U		260 U		270 U		
FLUORANTHENE	360 U	17.7 J	430 J	94 UJ			49 J		65 J		810		
FLUORENE	360 U	190 U	30 J	94 UJ			260 U		260 U		270 U		
HEXACHLOROBENZENE		190 U					260 U		260 U		270 U		
HEXACHLOROBUTADIENE		190 U					260 U		260 U		270 U		
HEXACHLOROCYCLOPENTADIENE		760 UJ					260 U		260 U		270 U		
HEXACHLOROETHANE		190 U					260 U		260 U		270 U		
INDENO(1,2,3-CD)PYRENE	360 U	190 U	110 J	190 UJ			260 U		49 J		310		
ISOPHORONE		190 U					260 U		260 U		270 U		
NAPHTHALENE	360 U	190 U	11 J	94 UJ			260 U		260 U		270 U		
NITROBENZENE		190 U					260 U		260 U		270 U		
N-NITROSO-DI-N-PROPYLAMINE		190 U					260 U		260 U		270 U		
N-NITROSODIPHENYLAMINE		190 U					260 U		260 U		270 U		

U - NOT DETECTED; J - QUANTITATION APPROXIMATE; R - REJECTED

EU	EU05	EU05	EU06	EU07	EU07	EU08	EU08	EU08	EU08	EU08	EU08	EU08	EU08
LOCATION ID	B116-MW-04	B14-SB-09	IOA-SS-EU06	IOA-SS-EU07	SB07-339	SB07-307	SB07-307	SB07-308	SB07-308	SB07-309	SB07-309	SB07-310	SB07-310
SAMPLE ID	B116-OSB4AA-D	B14SB09AA	IOA-SS-EU06-0002	IOA-SS-EU07-0002	SB07-339-NSO-101503	SB07-307-NSO-1104025	SB07-307-NSO-1104020	SB07-308-NSO-1104025	SB07-308-NSO-1104020	SB07-309-NSO-1104025	SB07-309-NSO-1104020	SB07-310-NSO-0716030	SB07-310-NSO-1104020
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	19970313	19990614	20110809	20110809	20031015	20021104	20021104	20021104	20021104	20021104	20021104	20030716	20021104
TOP DEPTH	1	1	0	0	0.5	0	0.5	0	0.5	0	0.5	0.5	0.5
BOTTOM DEPTH	3	2	2	2	1.5	0.5	1	0.5	1	0.5	1	1	1
PENTACHLOROPHENOL		760 UJ					520 U		11 U		11 U		11 U
PHENANTHRENE	360 U	190 U	200 J	94 UJ			260 U		260 U		440		
PHENOL		190 U					260 U		260 U		270 U		
PYRENE	360 U	25 J	480 J	94 UJ			36 J		57 J		640		
TOTAL PAHS	360 U	42.7 J	3310 J	41 J			188 J		335 J		4620 J		
PESTICIDES/PCBS (UG/KG)													
4,4'-DDD							1.7 U		1.7 U		1.7 U		
4,4'-DDE							1.7 U		2.1		1.7 U		
4,4'-DDT							1.7 U		18		31 J		
ALDRIN							0.83 U		0.85 U		0.84 U		
ALPHA-BHC							0.83 U		0.85 U		0.84 U		
ALPHA-CHLORDANE							0.83 U		8.4 J		0.84 U		
AROCLOR-1016		18 U	7.6 U		26 U	26 U	26 U	26 U	27 U	26 U	26 U		26 U
AROCLOR-1221		18 U	7.6 U		26 U	26 U	26 U	26 U	27 U	26 U	26 U		26 U
AROCLOR-1232		18 U	7.6 U		26 U	26 U	26 U	26 U	27 U	26 U	26 U		26 U
AROCLOR-1242		18 U	7.6 U		26 U	26 U	26 U	26 U	27 U	26 U	26 U		26 U
AROCLOR-1248		18 U	7.6 U		26 U	26 U	26 U	26 U	27 U	26 U	26 U		26 U
AROCLOR-1254		18 U	7.6 U		26 U	26 U	26 U	26 U	27 U	26 U	26 U		26 U
AROCLOR-1260		18 U	150		290	96 J	20 J	1800	160	250	220		170
BETA-BHC							0.83 U		0.85 U		0.84 U		
DELTA-BHC							0.83 U		0.85 U		0.84 U		
DIELDRIN							1.7 U		1.7 U		1.7 U		
ENDOSULFAN I							0.83 U		0.85 U		0.84 U		
ENDOSULFAN II							1.7 U		1.7 U		1.7 U		
ENDOSULFAN SULFATE							1.7 U		1.7 U		1.7 U		
ENDRIN							1.7 U		1.7 U		1.7 U		
ENDRIN ALDEHYDE							1.7 U		1.7 U		1.7 U		
ENDRIN KETONE							1.7 U		1.7 U		1.7 U		
GAMMA-BHC (LINDANE)							0.83 U		0.85 U		0.84 U		
GAMMA-CHLORDANE							0.83 U		6.1		0.84 U		
HEPTACHLOR							0.83 U		0.91 J		0.84 U		
HEPTACHLOR EPOXIDE							0.83 U		0.85 U		0.84 U		
METHOXYCHLOR							8.3 U		8.5 U		8.4 U		
TOTAL AROCLOR		18 U	150		290	96 J	20 J	1800	160	250	220		170
TOXAPHENE							26 U		27 U		26 U		
HERBICIDES (UG/KG)													
2,4,5-T									23 U		22 U		21 U
2,4,5-TP (SILVEX)									23 U		22 U		21 U
2,4-D									91 U		90 U		85 U

EU	EU05	EU05	EU06	EU07	EU07	EU08	EU08	EU08	EU08	EU08	EU08	EU08	EU08
LOCATION ID	B116-MW-04	B14-SB-09	IOA-SS-EU06	IOA-SS-EU07	SB07-339	SB07-307	SB07-307	SB07-308	SB07-308	SB07-309	SB07-309	SB07-310	SB07-310
SAMPLE ID	B116-OSB4AA-D	B14SB09AA	IOA-SS-EU06-0002	IOA-SS-EU07-0002	SB07-339-NSO-101503	SB07-307-NSO-1104025	SB07-307-NSO-1104020	SB07-308-NSO-1104025	SB07-308-NSO-1104020	SB07-309-NSO-1104025	SB07-309-NSO-1104020	SB07-310-NSO-0716030	SB07-310-NSO-1104020
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	19970313	19990614	20110809	20110809	20031015	20021104	20021104	20021104	20021104	20021104	20021104	20030716	20021104
TOP DEPTH	1	1	0	0	0.5	0	0.5	0	0.5	0	0.5	0.5	0.5
BOTTOM DEPTH	3	2	2	2	1.5	0.5	1	0.5	1	0.5	1	1	1
2,4-DB									91 U		90 U		85 U
DALAPON									46 U		45 U		42 U
DICAMBA									46 U		45 U		42 U
DICHLOROPROP									91 U		90 U		85 U
DINOSEB									14 U		13 U		13 U
MCPA									9100 U		9000 U		8500 U
MCPP									9100 U		9000 U		8500 U
METALS (MG/KG)													
ALUMINUM		7890	5500	7400			2800 J		7500 J		8100 J		
ANTIMONY		6.4 U	0.23 U	0.13 U			0.46 J		1.3		0.92		
ARSENIC	1.6	2	0.89	2.4			5.2		3.4		2.9	4.5	
BARIUM	21.5	25.1	19	19			15 U		17 U		18 U	8.7 J	
BERYLLIUM		0.54 U	0.36	0.36			0.33 U		0.31 U		0.38 U		
CADMIUM	0.07 U	0.54 U	0.25 U	0.37			0.19 J		0.4 J		0.56 J	0.62 U	
CALCIUM		1620 J	1600 J	1100 J			320		1200		1100		
CHROMIUM	8.7	8.5	6.9	9.5			5.8		12		11	5.5	
COBALT		5.4 U	2.7	5.5			1.9 U		7.4		6.3 J		
COPPER		3.7 J	5	11			3.2		15		12		
IRON		9740	11000	17000			10000		15000		15000		
LEAD	5.2	12	16 J	11 J			6.8		40		25	6	
MAGNESIUM		1100	1600 J	2900 J			540		3500		3000		
MANGANESE		113	170 J	330 J			68		350		370		
MERCURY	0.02 U	0.038 UJ	0.0073 J	0.006 J			0.0041 J		0.0061 J		0.024 J	0.05 U	
NICKEL		4.3 U	4.2	9.1			3.6 J		13		12		
POTASSIUM		540 U	290	400			660 J		460 J		520 J		
SELENIUM	0.25 U	11 U	0.62 J	0.58 J			0.62 U		0.48 J		0.65 UJ	0.62 UJ	
SILVER	0.07 U	1.1 U	0.1 U	0.061 U			0.12 UJ		0.13 UJ		0.13 UJ	0.12 UJ	
SODIUM		540 U	59 J	40 J			58 U		87 U		89 U		
THALLIUM		1.5 U	0.068 U	0.077 U			0.62 UJ		0.67 UJ		0.65 UJ		
VANADIUM		18.2	13	18			19		20		24		
ZINC		22.7	27	44			13		43		97		
MISCELLANEOUS PARAMETERS (%)													
PERCENT MOISTURE			14	11	5.6	6	4.2	6.9	7.6	5.5	7.3	6.1	6.2
PERCENT SOLIDS		93.4							87.6		89		94.6
TOTAL SOLIDS													
MISCELLANEOUS PARAMETERS (MG/KG)													
CYANIDE							0.92 U		1.1 U		0.94 U		
EPH MADEP (UG/KG)													

EU	EU05	EU05	EU06	EU07	EU07	EU08	EU08	EU08	EU08	EU08	EU08	EU08	EU08
LOCATION ID	B116-MW-04	B14-SB-09	IOA-SS-EU06	IOA-SS-EU07	SB07-339	SB07-307	SB07-307	SB07-308	SB07-308	SB07-309	SB07-309	SB07-310	SB07-310
SAMPLE ID	B116-OSB4AA-D	B14SB09AA	IOA-SS-EU06-0002	IOA-SS-EU07-0002	SB07-339-NSO-101503	SB07-307-NSO-1104025	SB07-307-NSO-1104020	SB07-308-NSO-1104025	SB07-308-NSO-1104020	SB07-309-NSO-1104025	SB07-309-NSO-1104020	SB07-310-NSO-0716030	SB07-310-NSO-1104020
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	19970313	19990614	20110809	20110809	20031015	20021104	20021104	20021104	20021104	20021104	20021104	20030716	20021104
TOP DEPTH	1	1	0	0	0.5	0	0.5	0	0.5	0	0.5	0.5	0.5
BOTTOM DEPTH	3	2	2	2	1.5	0.5	1	0.5	1	0.5	1	1	1
C11-C22 AROMATICS	29000 U	10000 UJ					51000 U		53000 U		54000 U		
C11-C22 AROMATICS (WEIGHTED 1.0)	29000 U												
C11-C22 AROMATICS-UNADJ													
C19-C36 ALIPHATICS	5500 UJ	10000 U					51000 U		13000 J		54000 U		
C19-C36 ALIPHATICS (WEIGHTED 0.005)	27 UJ												
C9-C18 ALIPHATICS	8800 UJ	10000 U					51000 U		53000 U		54000 U		
C9-C18 ALIPHATICS (WEIGHTED 0.05)	440 UJ												
EXTRACTABLE PETROLEUM HYDROCARBONS		10000 U											
DIOXINS/FURANS (NG/KG)													
1,2,3,4,6,7,8,9-OCDD				415									
1,2,3,4,6,7,8,9-OCDF				13.9									
1,2,3,4,6,7,8-HPCDD				15.9									
1,2,3,4,6,7,8-HPCDF				8.14									
1,2,3,4,7,8,9-HPCDF				0.883 U									
1,2,3,4,7,8-HXCDD				0.314 J									
1,2,3,4,7,8-HXCDF				0.51 J									
1,2,3,6,7,8-HXCDD				0.598 J									
1,2,3,6,7,8-HXCDF				0.519 J									
1,2,3,7,8,9-HXCDD				0.36 J									
1,2,3,7,8,9-HXCDF				0.883 U									
1,2,3,7,8-PECDD				0.221 U									
1,2,3,7,8-PECDF				1.49 J									
2,3,4,6,7,8-HXCDF				0.998 J									
2,3,4,7,8-PECDF				1.02 J									
2,3,7,8-TCDD				0.177 U									
2,3,7,8-TCDF				0.371 U									
TEQ				1.05 J									
TEQ HALFND				1.32 J									
TOTAL HPCDD				35.5									
TOTAL HPCDF				19.9									
TOTAL HXCDD				5.16 J									
TOTAL HXCDF				12.2 J									
TOTAL PECDD				0.569 J									
TOTAL PECDF				12.3 J									
TOTAL TCDD				0.36 J									
TOTAL TCDF				2.67 J									

EU	EU08	EU08	EU08	EU08	EU08	EU09	EU10	EU10	EU10	EU11	EU12	EU13	EU14
LOCATION ID	SB07-330	SB07-330	SB07-331	SB07-331	SB07-340	IOA-SS-EU09	B116-MW-05	B14-SB-08	IOA-SS-EU10	SB11-201	IOA-SS-EU12	IOA-SS-EU13	IOA-SS-EU14
SAMPLE ID	SB07-330-NSO-0716030	SB07-330-NSO-0716031	SB07-331-NSO-0716030	SB07-331-NSO-0716031	SB07-340-NSO-101503	IOA-SS-EU09-0002	B116-OSB5AA	B14SB08AA	IOA-SS-EU10-0002	SB11-201-NSO-0515010	IOA-SS-EU12-0002	IOA-SS-EU13-0002	IOA-SS-EU14-0002
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20030716	20030716	20030716	20030716	20031015	20110809	19970313	19990614	20110810	20010515	20110811	20110809	20110809
TOP DEPTH	0	1	0	1	0.5	0	1	1	0	0	0	0	0
BOTTOM DEPTH	1	2	1	2	1.5	2	3	2	2	1	2	2	2
VOLATILES (UG/KG)													
1,1,1-TRICHLOROETHANE										0.5 U			
1,1,2,2-TETRACHLOROETHANE										0.6 U			
1,1,2-TRICHLOROETHANE										0.6 U			
1,1-DICHLOROETHANE										0.4 U			
1,1-DICHLOROETHENE										0.5 U			
1,2-DIBROMO-3-CHLOROPROPANE													
1,2-DIBROMOETHANE													
1,2-DICHLOROBENZENE										1 U			
1,2-DICHLOROETHANE										0.6 U			
1,2-DICHLOROPROPANE										0.6 U			
1,3-DICHLOROBENZENE										0.6 U			
1,4-DICHLOROBENZENE										0.8 U			
2-BUTANONE										2 U			
2-HEXANONE										2 U			
4-METHYL-2-PENTANONE										1 U			
ACETONE										51 UJ			
BENZENE							5.5 U	260 U		0.6 U			
BROMODICHLOROMETHANE										0.7 U			
BROMOFORM										0.9 U			
BROMOMETHANE										0.6 U			
CARBON DISULFIDE										0.4 U			
CARBON TETRACHLORIDE										0.5 U			
CHLOROBENZENE										0.9 U			
CHLORODIBROMOMETHANE										1 U			
CHLOROETHANE										1 U			
CHLOROFORM										0.6 U			
CHLOROMETHANE										0.6 U			
CIS-1,2-DICHLOROETHENE										0.6 U			
CIS-1,3-DICHLOROPROPENE										0.6 U			
ETHYLBENZENE							0.8 J	260 U		0.5 U			
M+P-XYLENES								1000 U		1 U			
METHYLENE CHLORIDE										13 UJ			
STYRENE										1 U			
TETRACHLOROETHENE										0.6 UJ			
TOLUENE							4 J	790 U		0.7 U			
TOTAL 1,2-DICHLOROETHENE										0.6 U			
TOTAL XYLENES							3 J	1000 U		1 U			
TRANS-1,2-DICHLOROETHENE										0.6 U			

EU	EU08	EU08	EU08	EU08	EU08	EU09	EU10	EU10	EU10	EU11	EU12	EU13	EU14
LOCATION ID	SB07-330	SB07-330	SB07-331	SB07-331	SB07-340	IOA-SS-EU09	B116-MW-05	B14-SB-08	IOA-SS-EU10	SB11-201	IOA-SS-EU12	IOA-SS-EU13	IOA-SS-EU14
SAMPLE ID	SB07-330-NSO-0716030	SB07-330-NSO-0716031	SB07-331-NSO-0716030	SB07-331-NSO-0716031	SB07-340-NSO-101503	IOA-SS-EU09-0002	B116-OSB5AA	B14SB08AA	IOA-SS-EU10-0002	SB11-201-NSO-0515010	IOA-SS-EU12-0002	IOA-SS-EU13-0002	IOA-SS-EU14-0002
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20030716	20030716	20030716	20030716	20031015	20110809	19970313	19990614	20110810	20010515	20110811	20110809	20110809
TOP DEPTH	0	1	0	1	0.5	0	1	1	0	0	0	0	0
BOTTOM DEPTH	1	2	1	2	1.5	2	3	2	2	1	2	2	2
TRANS-1,3-DICHLOROPROPENE										0.9 U			
TRICHLOROETHENE										0.7 U			
VINYL CHLORIDE										0.5 U			
VPH MADEP (UG/KG)													
C5-C8 ALIPHATICS							48000 J	17100					
C5-C8 ALIPHATICS (WEIGHTED 0.5)							24000 J						
C5-C8 ALIPHATICS-UNADJ													
C9-C10 AROMATICS							5600 U	1060					
C9-C10 AROMATICS (WEIGHTED 1.0)							5600 U						
C9-C12 ALIPHATICS							32000 J	3200					
C9-C12 ALIPHATICS (WEIGHTED 0.05)							1600 J						
C9-C12 ALIPHATICS-UNADJ													
METHYL TERT-BUTYL ETHER							11 U	790 U					
O-XYLENE							2800 U	520 U		0.8 U			
TOTAL XYLENES							2800 U	520 U		0.8 U			
VOLATILE PETROLEUM HYDROCARBONS								21400					
SEMIVOLATILES (UG/KG)													
1,2,4-TRICHLOROBENZENE										24 U			
2,2'-OXYBIS(1-CHLOROPROPANE)										57 U			
2,4,5-TRICHLOROPHENOL										64 U			
2,4,6-TRICHLOROPHENOL										57 U			
2,4-DICHLOROPHENOL										63 U			
2,4-DIMETHYLPHENOL										59 U			
2,4-DINITROPHENOL										180 UJ			
2,4-DINITROTOLUENE										38 U			
2,6-DINITROTOLUENE										51 U			
2-CHLORONAPHTHALENE										48 U			
2-CHLOROPHENOL										63 U			
2-METHYLNAPHTHALENE						11 J	360 U	410 U		24 U	90 UJ	20 UJ	
2-METHYLPHENOL										69 U			
2-NITROANILINE										39 U			
2-NITROPHENOL										64 U			
3&4-METHYLPHENOL													
3,3'-DICHLOROBENZIDINE										52 U			
3-NITROANILINE										33 U			
4,6-DINITRO-2-METHYLPHENOL										51 U			
4-BROMOPHENYL PHENYL ETHER										46 U			
4-CHLORO-3-METHYLPHENOL										48 U			

TABLE A-2
ANALYTICAL RESULTS - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

EU	EU08	EU08	EU08	EU08	EU08	EU09	EU10	EU10	EU10	EU11	EU12	EU13	EU14
LOCATION ID	SB07-330	SB07-330	SB07-331	SB07-331	SB07-340	IOA-SS-EU09	B116-MW-05	B14-SB-08	IOA-SS-EU10	SB11-201	IOA-SS-EU12	IOA-SS-EU13	IOA-SS-EU14
SAMPLE ID	SB07-330-NSO-0716030	SB07-330-NSO-0716031	SB07-331-NSO-0716030	SB07-331-NSO-0716031	SB07-340-NSO-101503	IOA-SS-EU09-0002	B116-OSB5AA	B14SB08AA	IOA-SS-EU10-0002	SB11-201-NSO-0515010	IOA-SS-EU12-0002	IOA-SS-EU13-0002	IOA-SS-EU14-0002
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20030716	20030716	20030716	20030716	20031015	20110809	19970313	19990614	20110810	20010515	20110811	20110809	20110809
TOP DEPTH	0	1	0	1	0.5	0	1	1	0	0	0	0	0
BOTTOM DEPTH	1	2	1	2	1.5	2	3	2	2	1	2	2	2
4-CHLOROANILINE										45 U			
4-CHLOROPHENYL PHENYL ETHER										42 U			
4-METHYLPHENOL										150 U			
4-NITROANILINE										45 U			
4-NITROPHENOL										82 U			
ACENAPHTHENE						58 J	360 U	410 U		44 U	90 UJ	16 J	
ACENAPHTHYLENE						19 UJ	360 U	410 U		37 U	90 UJ	20 J	
ANTHRACENE						91 J	360 U	410 U		24 U	90 UJ	47 J	
BAP EQUIVALENT-HALFND						346 J	360 U	410 U		79.9 J	185 J	257 J	
BAP EQUIVALENT-POS						346 J	360 U	410 U		79.9 J	86 J	257 J	
BENZO(A)ANTHRACENE						270 J	360 U	410 U		52 J	99 J	200 J	
BENZO(A)PYRENE						240 J	360 U	410 U		37 J	66 J	170 J	
BENZO(B)FLUORANTHENE						340 J	360 U	410 U		89 J	100 J	240 J	
BENZO(G,H,I)PERYLENE						95 J	360 U	410 U		49 J	90 UJ	100 J	
BENZO(K)FLUORANTHENE						110 J	360 U	410 U		96 J	53 UJ	110 J	
BIS(2-CHLOROETHOXY)METHANE										31 U			
BIS(2-CHLOROETHYL)ETHER										43 U			
BIS(2-ETHYLHEXYL)PHTHALATE										89 J			
BUTYL BENZYL PHTHALATE										39 U			
CARBAZOLE										30 U			
CHRYSENE						280 J	360 U	410 U		94 J	91 J	200 J	
DIBENZO(A,H)ANTHRACENE						35 J	360 U	410 U		23 J	180 UJ	32 J	
DIBENZOFURAN										36 U			
DIETHYL PHTHALATE										27 U			
DIMETHYL PHTHALATE										26 U			
DI-N-BUTYL PHTHALATE										36 J			
DI-N-OCTYL PHTHALATE										20 UJ			
FLUORANTHENE						580 J	360 U	410 U		130 J	150 J	370 J	
FLUORENE						52 J	360 U	410 U		44 U	90 UJ	19 J	
HEXACHLOROBENZENE										39 U			
HEXACHLOROBUTADIENE										84 U			
HEXACHLOROCYCLOPENTADIENE										120 U			
HEXACHLOROETHANE										62 U			
INDENO(1,2,3-CD)PYRENE						87 J	360 U	410 U		47 J	180 UJ	100 J	
ISOPHORONE										43 U			
NAPHTHALENE						16 J	360 U	410 U		29 U	90 UJ	20 UJ	
NITROBENZENE										70 U			
N-NITROSO-DI-N-PROPYLAMINE										42 U			
N-NITROSODIPHENYLAMINE										26 U			

EU	EU08	EU08	EU08	EU08	EU08	EU09	EU10	EU10	EU10	EU11	EU12	EU13	EU14
LOCATION ID	SB07-330	SB07-330	SB07-331	SB07-331	SB07-340	IOA-SS-EU09	B116-MW-05	B14-SB-08	IOA-SS-EU10	SB11-201	IOA-SS-EU12	IOA-SS-EU13	IOA-SS-EU14
SAMPLE ID	SB07-330-NSO-0716030	SB07-330-NSO-0716031	SB07-331-NSO-0716030	SB07-331-NSO-0716031	SB07-340-NSO-101503	IOA-SS-EU09-0002	B116-OSB5AA	B14SB08AA	IOA-SS-EU10-0002	SB11-201-NSO-0515010	IOA-SS-EU12-0002	IOA-SS-EU13-0002	IOA-SS-EU14-0002
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20030716	20030716	20030716	20030716	20031015	20110809	19970313	19990614	20110810	20010515	20110811	20110809	20110809
TOP DEPTH	0	1	0	1	0.5	0	1	1	0	0	0	0	0
BOTTOM DEPTH	1	2	1	2	1.5	2	3	2	2	1	2	2	2
PENTACHLOROPHENOL										310 U			
PHENANTHRENE						400 J	360 U	410 U		85 J	63 J	190 J	
PHENOL										70 U			
PYRENE						480 J	360 U	410 U		140 J	170 J	300 J	
TOTAL PAHS						3140 J	360 U	410 U		842 J	739 J	2110 J	
PESTICIDES/PCBS (UG/KG)													
4,4'-DDD										3.4 U			
4,4'-DDE										8.6 J			
4,4'-DDT										20 J			
ALDRIN										1.7 U			
ALPHA-BHC										1.7 U			
ALPHA-CHLORDANE										9.3			
AROCLOR-1016	25 U	26 U	26 U	26 U	25 U	38 U			400 U	34 U	7.2 U	8.2 U	
AROCLOR-1221	25 U	26 U	26 U	26 U	25 U	38 U			400 U	69 U	7.2 U	8.2 U	
AROCLOR-1232	25 U	26 U	26 U	26 U	25 U	38 U			400 U	34 U	7.2 U	8.2 U	
AROCLOR-1242	25 U	26 U	26 U	26 U	25 U	38 U			400 U	34 U	7.2 U	8.2 U	
AROCLOR-1248	25 U	26 U	26 U	26 U	25 U	38 U			400 U	34 U	7.2 U	8.2 U	
AROCLOR-1254	25 U	26 U	26 U	26 U	25 U	38 U			400 U	34 U	7.2 U	8.2 U	
AROCLOR-1260	11 J	31	18 J	26 U	4.1 J	470			12000	440 J	7.2 U	18 J	
BETA-BHC										1.7 U			
DELTA-BHC										1.7 U			
DIELDRIN										3.4 U			
ENDOSULFAN I										1.7 U			
ENDOSULFAN II										3.4 U			
ENDOSULFAN SULFATE										3.4 U			
ENDRIN										3.4 U			
ENDRIN ALDEHYDE										29 J			
ENDRIN KETONE										3.4 U			
GAMMA-BHC (LINDANE)										1.7 U			
GAMMA-CHLORDANE										7.9			
HEPTACHLOR										1.7 U			
HEPTACHLOR EPOXIDE										4 J			
METHOXYCHLOR										17 U			
TOTAL AROCLOR	11 J	31	18 J	26 U	4.1 J	470			12000	440 J	7.2 U	18 J	
TOXAPHENE										170 U			
HERBICIDES (UG/KG)													
2,4,5-T													
2,4,5-TP (SILVEX)													
2,4-D													

EU	EU08	EU08	EU08	EU08	EU08	EU09	EU10	EU10	EU10	EU11	EU12	EU13	EU14
LOCATION ID	SB07-330	SB07-330	SB07-331	SB07-331	SB07-340	IOA-SS-EU09	B116-MW-05	B14-SB-08	IOA-SS-EU10	SB11-201	IOA-SS-EU12	IOA-SS-EU13	IOA-SS-EU14
SAMPLE ID	SB07-330-NSO-0716030	SB07-330-NSO-0716031	SB07-331-NSO-0716030	SB07-331-NSO-0716031	SB07-340-NSO-101503	IOA-SS-EU09-0002	B116-OSB5AA	B14SB08AA	IOA-SS-EU10-0002	SB11-201-NSO-0515010	IOA-SS-EU12-0002	IOA-SS-EU13-0002	IOA-SS-EU14-0002
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20030716	20030716	20030716	20030716	20031015	20110809	19970313	19990614	20110810	20010515	20110811	20110809	20110809
TOP DEPTH	0	1	0	1	0.5	0	1	1	0	0	0	0	0
BOTTOM DEPTH	1	2	1	2	1.5	2	3	2	2	1	2	2	2
2,4-DB													
DALAPON													
DICAMBA													
DICHLOROPROP													
DINOSEB													
MCPA													
MCPP													
METALS (MG/KG)													
ALUMINUM						5600				6900 J	7600	6600	4900
ANTIMONY						0.24				4.8 UJ	0.089 U	0.19 U	0.14 U
ARSENIC						1.4				3.4	1.2	1.3	1.9
BARIUM						22				23	15	21	16
BERYLLIUM						0.3 U				0.36	0.35 J	0.22 U	0.38
CADMIUM						0.3 U				0.48 U	0.19 J	0.25 U	0.18 U
CALCIUM						1100 J				1100 J	1400	810 J	1100 J
CHROMIUM						8.1				11	9.2	8.6	6.3
COBALT						2.8				6	3.9	1.4	2.5
COPPER						9.7				6.6	7.1	6.2	4.4
IRON						11000				10000 J	13000	6100	11000
LEAD						36 J	9			23	11	27 J	13 J
MAGNESIUM						1600 J				1600	1900	900 J	1300 J
MANGANESE						180 J				210	220 J	75 J	150 J
MERCURY						0.02 J				0.01	0.017 J	0.038	0.0023 J
NICKEL						4.6				5.7	7.2	5.3	4.2
POTASSIUM						240				430	340 J	260	320
SELENIUM						0.65 J				0.96 U	0.76 U	0.88	0.7 J
SILVER						0.063 U				0.48 U	0.082 U	0.11 J	0.089 U
SODIUM						51 J				96 U	43 J	41 J	60 J
THALLIUM						0.37				0.96 U	0.1 U	0.069 U	0.078 U
VANADIUM						15				19	15	18	18
ZINC						37				31	33	25	23
MISCELLANEOUS PARAMETERS (%)													
PERCENT MOISTURE	4.3	5.1	4.3	4.9	3.9	14			18		7	19	7
PERCENT SOLIDS								94.1					
TOTAL SOLIDS													
MISCELLANEOUS PARAMETERS (MG/KG)													
CYANIDE										0.26 U			
EPH MADEP (UG/KG)													

EU	EU08	EU08	EU08	EU08	EU08	EU09	EU10	EU10	EU10	EU11	EU12	EU13	EU14
LOCATION ID	SB07-330	SB07-330	SB07-331	SB07-331	SB07-340	IOA-SS-EU09	B116-MW-05	B14-SB-08	IOA-SS-EU10	SB11-201	IOA-SS-EU12	IOA-SS-EU13	IOA-SS-EU14
SAMPLE ID	SB07-330-NSO-0716030	SB07-330-NSO-0716031	SB07-331-NSO-0716030	SB07-331-NSO-0716031	SB07-340-NSO-101503	IOA-SS-EU09-0002	B116-OSB5AA	B14SB08AA	IOA-SS-EU10-0002	SB11-201-NSO-0515010	IOA-SS-EU12-0002	IOA-SS-EU13-0002	IOA-SS-EU14-0002
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20030716	20030716	20030716	20030716	20031015	20110809	19970313	19990614	20110810	20010515	20110811	20110809	20110809
TOP DEPTH	0	1	0	1	0.5	0	1	1	0	0	0	0	0
BOTTOM DEPTH	1	2	1	2	1.5	2	3	2	2	1	2	2	2
C11-C22 AROMATICS							92000 UJ	10000 U					
C11-C22 AROMATICS (WEIGHTED 1.0)							92000 UJ						
C11-C22 AROMATICS-UNADJ													
C19-C36 ALIPHATICS							400000 J	10000 U					
C19-C36 ALIPHATICS (WEIGHTED 0.005)							2000 J						
C9-C18 ALIPHATICS							120000 J	10000 U					
C9-C18 ALIPHATICS (WEIGHTED 0.05)							5800 J						
EXTRACTABLE PETROLEUM HYDROCARBONS								10000 U					
DIOXINS/FURANS (NG/KG)													
1,2,3,4,6,7,8,9-OCDD						222						462	
1,2,3,4,6,7,8,9-OCDF						20.5						30.4	
1,2,3,4,6,7,8-HPCDD						20.5						60.2	
1,2,3,4,6,7,8-HPCDF						15.6						27.1	
1,2,3,4,7,8,9-HPCDF						2.05 J						1.31 J	
1,2,3,4,7,8-HXCDD						0.384 J						0.957 J	
1,2,3,4,7,8-HXCDF						5.13						2.22 J	
1,2,3,6,7,8-HXCDD						1.33 J						3.03	
1,2,3,6,7,8-HXCDF						7.61						2.61 J	
1,2,3,7,8,9-HXCDD						0.918 J						1.62 J	
1,2,3,7,8,9-HXCDF						2.02 J						0.811 J	
1,2,3,7,8-PECDD						1.7 J						0.642 J	
1,2,3,7,8-PECDF						1.01 J						0.739 J	
2,3,4,6,7,8-HXCDF						17.5						5.19	
2,3,4,7,8-PECDF						24.3						6.5	
2,3,7,8-TCDD						0.366 J						0.623	
2,3,7,8-TCDF						1.11 J						0.87	
TEQ						13.4 J						6 J	
TEQ HALFND						13.4 J						6 J	
TOTAL HPCDD						45.8						124	
TOTAL HPCDF						39.3						59.8	
TOTAL HXCDD						12.8						21.3 J	
TOTAL HXCDF						169 J						57.4 J	
TOTAL PECDD						10.1 J						6.54 J	
TOTAL PECDF						225						56.9	
TOTAL TCDD						2.63 J						4.51 J	
TOTAL TCDF						52.8						19.6 J	

EU	EU14	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15
LOCATION ID	SB07-312	IOA-SS-EU15	IOA-SS-EU15	IOA-SS-EU15	SB07-305	SB07-305	SB07-305	SB07-305	SB07-306	SB07-306	SB07-311	SB07-326	SB07-326
SAMPLE ID	SB07-312-NSO-1104020	IOA-SS-EU15-0002	IOA-SS-EU15-0002-AVG	IOA-SS-EU15-0002-D	SB07-305-NSO-1104025	SB07-305-NSO-1104020	SB07-305-NSO-1104020-AVG	SB07-305-NSO-1104020-D	SB07-306-NSO-1104025	SB07-306-NSO-1104020	SB07-311-NSO-1104020	SB07-326-NSO-0716031	SB07-326-NSO-0716032
SAMPLE CODE	NORMAL	ORIG	AVG	DUP	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20021104	20110809	20110809	20110809	20021104	20021104	20021104	20021104	20021104	20021104	20021104	20030716	20030716
TOP DEPTH	0.5	0	0	0	0	0.5	0.5	0.5	0	0.5	0.5	1	1.5
BOTTOM DEPTH	1	2	2	2	0.5	1	1	1	0.5	1	1	1.5	2
VOLATILES (UG/KG)													
1,1,1-TRICHLOROETHANE						4.5 U	4.4 U	4.3 U		4.7 U			
1,1,2,2-TETRACHLOROETHANE						4.5 U	4.4 U	4.3 U		4.7 U			
1,1,2-TRICHLOROETHANE						4.5 U	4.4 U	4.3 U		4.7 U			
1,1-DICHLOROETHANE						4.5 U	4.4 U	4.3 U		4.7 U			
1,1-DICHLOROETHENE						4.5 U	4.4 U	4.3 U		4.7 U			
1,2-DIBROMO-3-CHLOROPROPANE						4.5 U	4.4 U	4.3 U		4.7 U			
1,2-DIBROMOETHANE						4.5 U	4.4 U	4.3 U		4.7 U			
1,2-DICHLOROBENZENE						260 U	265 U	270 U		260 U			
1,2-DICHLOROETHANE						4.5 U	4.4 U	4.3 U		4.7 U			
1,2-DICHLOROPROPANE						4.5 U	4.4 U	4.3 U		4.7 U			
1,3-DICHLOROBENZENE						260 U	265 U	270 U		260 U			
1,4-DICHLOROBENZENE						260 U	265 U	270 U		260 U			
2-BUTANONE						12 J	17.5 J	23 J		24 R			
2-HEXANONE						23 U	22 U	21 U		24 U			
4-METHYL-2-PENTANONE						23 R	22 R	21 R		24 R			
ACETONE						50 J	80 J	110 J		25 J			
BENZENE						4.5 U	2.22 J	2.2 J		4.7 U			
BROMODICHLOROMETHANE						4.5 U	4.4 U	4.3 U		4.7 U			
BROMOFORM						4.5 U	4.4 U	4.3 U		4.7 U			
BROMOMETHANE						4.5 U	4.4 U	4.3 U		4.7 U			
CARBON DISULFIDE						4.5 U	4.4 U	4.3 U		4.7 U			
CARBON TETRACHLORIDE						4.5 U	4.4 U	4.3 U		4.7 U			
CHLOROBENZENE						4.5 U	4.4 U	4.3 U		4.7 U			
CHLORODIBROMOMETHANE						4.5 U	4.4 U	4.3 U		4.7 U			
CHLOROETHANE						4.5 U	4.4 U	4.3 U		4.7 U			
CHLOROFORM						4.5 U	4.4 U	4.3 U		4.7 U			
CHLOROMETHANE						4.5 U	4.4 U	4.3 U		4.7 U			
CIS-1,2-DICHLOROETHENE						4.5 U	4.4 U	4.3 U		4.7 U			
CIS-1,3-DICHLOROPROPENE						4.5 U	4.4 U	4.3 U		4.7 U			
ETHYLBENZENE						4.5 U	4.4 U	4.3 U		4.7 U			
M+P-XYLENES						1.3 J	3.8 J	6.3		4.7 U			
METHYLENE CHLORIDE						23 U	22 U	21 U		24 U			
STYRENE						4.5 U	4.4 U	4.3 U		4.7 U			
TETRACHLOROETHENE						4.5 U	4.4 U	4.3 U		4.7 U			
TOLUENE						1.1 J	3.8 J	6.5		4.7 U			
TOTAL 1,2-DICHLOROETHENE						4.5 U	4.4 U	4.3 U		4.7 U			
TOTAL XYLENES						1.3 J	3.8 J	6.3		4.7 U			
TRANS-1,2-DICHLOROETHENE						4.5 U	4.4 U	4.3 U		4.7 U			

U - NOT DETECTED; J - QUANTITATION APPROXIMATE; R - REJECTED

EU	EU14	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15
LOCATION ID	SB07-312	IOA-SS-EU15	IOA-SS-EU15	IOA-SS-EU15	SB07-305	SB07-305	SB07-305	SB07-305	SB07-306	SB07-306	SB07-311	SB07-326	SB07-326
SAMPLE ID	SB07-312-NSO-1104020	IOA-SS-EU15-0002	IOA-SS-EU15-0002-AVG	IOA-SS-EU15-0002-D	SB07-305-NSO-1104025	SB07-305-NSO-1104020	SB07-305-NSO-1104020-AVG	SB07-305-NSO-1104020-D	SB07-306-NSO-1104025	SB07-306-NSO-1104020	SB07-311-NSO-1104020	SB07-326-NSO-0716031	SB07-326-NSO-0716032
SAMPLE CODE	NORMAL	ORIG	AVG	DUP	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20021104	20110809	20110809	20110809	20021104	20021104	20021104	20021104	20021104	20021104	20021104	20030716	20030716
TOP DEPTH	0.5	0	0	0	0	0.5	0.5	0.5	0	0.5	0.5	1	1.5
BOTTOM DEPTH	1	2	2	2	0.5	1	1	1	0.5	1	1	1.5	2
TRANS-1,3-DICHLOROPROPENE						4.5 U	4.4 U	4.3 U		4.7 U			
TRICHLOROETHENE						4.5 U	4.4 U	4.3 U		4.7 U			
VINYL CHLORIDE						4.5 U	4.4 U	4.3 U		4.7 U			
VPH MADEP (UG/KG)													
C5-C8 ALIPHATICS													
C5-C8 ALIPHATICS (WEIGHTED 0.5)													
C5-C8 ALIPHATICS-UNADJ													
C9-C10 AROMATICS													
C9-C10 AROMATICS (WEIGHTED 1.0)													
C9-C12 ALIPHATICS													
C9-C12 ALIPHATICS (WEIGHTED 0.05)													
C9-C12 ALIPHATICS-UNADJ													
METHYL TERT-BUTYL ETHER													
O-XYLENE						0.67 J	1.74 J	2.8 J		4.7 U			
TOTAL XYLENES						0.67 J	1.74 J	2.8 J		4.7 U			
VOLATILE PETROLEUM HYDROCARBONS													
SEMIVOLATILES (UG/KG)													
1,2,4-TRICHLOROBENZENE						260 U	265 U	270 U		260 U			
2,2'-OXYBIS(1-CHLOROPROPANE)						260 UJ	265 UJ	270 U		260 U			
2,4,5-TRICHLOROPHENOL						260 U	265 U	270 U		260 U			
2,4,6-TRICHLOROPHENOL						260 U	265 U	270 U		260 U			
2,4-DICHLOROPHENOL						260 U	265 U	270 U		260 U			
2,4-DIMETHYLPHENOL						260 U	265 U	270 U		260 U			
2,4-DINITROPHENOL						520 U	525 U	530 U		530 U			
2,4-DINITROTOLUENE						260 U	265 U	270 U		260 U			
2,6-DINITROTOLUENE						260 U	265 U	270 U		260 U			
2-CHLORONAPHTHALENE						260 U	265 U	270 U		260 U			
2-CHLOROPHENOL						260 U	265 U	270 U		260 U			
2-METHYLNAPHTHALENE						220 J	165 J	110 J		260 U			
2-METHYLPHENOL						260 U	265 U	270 U		260 U			
2-NITROANILINE						520 U	525 U	530 U		530 U			
2-NITROPHENOL						260 U	265 U	270 U		260 U			
3&4-METHYLPHENOL													
3,3'-DICHLOROBENZIDINE						260 U	265 U	270 U		260 U			
3-NITROANILINE						520 U	525 U	530 U		530 U			
4,6-DINITRO-2-METHYLPHENOL						520 U	525 U	530 U		530 U			
4-BROMOPHENYL PHENYL ETHER						260 U	265 U	270 U		260 U			
4-CHLORO-3-METHYLPHENOL						520 U	525 U	530 U		530 U			

EU	EU14	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15
LOCATION ID	SB07-312	IOA-SS-EU15	IOA-SS-EU15	IOA-SS-EU15	SB07-305	SB07-305	SB07-305	SB07-305	SB07-306	SB07-306	SB07-311	SB07-326	SB07-326
SAMPLE ID	SB07-312-NSO-1104020	IOA-SS-EU15-0002	IOA-SS-EU15-0002-AVG	IOA-SS-EU15-0002-D	SB07-305-NSO-1104025	SB07-305-NSO-1104020	SB07-305-NSO-1104020-AVG	SB07-305-NSO-1104020-D	SB07-306-NSO-1104025	SB07-306-NSO-1104020	SB07-311-NSO-1104020	SB07-326-NSO-0716031	SB07-326-NSO-0716032
SAMPLE CODE	NORMAL	ORIG	AVG	DUP	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20021104	20110809	20110809	20110809	20021104	20021104	20021104	20021104	20021104	20021104	20021104	20030716	20030716
TOP DEPTH	0.5	0	0	0	0	0.5	0.5	0.5	0	0.5	0.5	1	1.5
BOTTOM DEPTH	1	2	2	2	0.5	1	1	1	0.5	1	1	1.5	2
4-CHLOROANILINE						260 U	265 U	270 U		260 U			
4-CHLOROPHENYL PHENYL ETHER						260 U	265 U	270 U		260 U			
4-METHYLPHENOL						260 U	265 U	270 U		260 U			
4-NITROANILINE						520 U	525 U	530 U		530 U			
4-NITROPHENOL						520 U	525 U	530 U		530 U			
ACENAPHTHENE						260 U	260 U	260 U		260 U			
ACENAPHTHYLENE						260 U	260 U	260 U		260 U			
ANTHRACENE						260 U	260 U	260 U		260 U			
BAP EQUIVALENT-HALFND	391					136 J	114 J	92.8 J		83.6 J	124		
BAP EQUIVALENT-POS	391					136 J	114 J	92.8 J		73.1 J	124		
BENZO(A)ANTHRACENE						77 J	78 J	79 J		59 J			
BENZO(A)PYRENE	330					66 J	63.5 J	61 J		56 J	100		
BENZO(B)FLUORANTHENE						130 J	120 J	110 J		70 J			
BENZO(G,H,I)PERYLENE						90 J	68.5 J	47 J		260 U			
BENZO(K)FLUORANTHENE						65 J	56.5 J	48 J		34 J			
BIS(2-CHLOROETHOXY)METHANE						260 U	265 U	270 U		260 U			
BIS(2-CHLOROETHYL)ETHER						260 U	265 U	270 U		260 U			
BIS(2-ETHYLHEXYL)PHTHALATE						260 U	265 U	270 U		260 U			
BUTYL BENZYL PHTHALATE						260 U	265 U	270 U		260 U			
CARBAZOLE						260 U	265 U	270 U		260 U			
CHRYSENE						86 J	77 J	68 J		58 J			
DIBENZO(A,H)ANTHRACENE	61					40 J	23.3 J	6.6 J		21 U	24		
DIBENZOFURAN						260 U	265 U	270 U		260 U			
DIETHYL PHTHALATE						260 U	265 U	270 U		260 U			
DIMETHYL PHTHALATE						260 U	265 U	270 U		260 U			
DI-N-BUTYL PHTHALATE						260 U	265 U	270 U		260 U			
DI-N-OCTYL PHTHALATE						260 U	265 U	270 U		260 U			
FLUORANTHENE						150 J	150 J	150 J		130 J			
FLUORENE						260 U	260 U	260 U		260 U			
HEXACHLOROBENZENE						260 U	265 U	270 U		260 U			
HEXACHLOROBUTADIENE						260 U	265 U	270 U		260 U			
HEXACHLOROCYCLOPENTADIENE						260 U	265 U	270 U		260 U			
HEXACHLOROETHANE						260 U	265 U	270 U		260 U			
INDENO(1,2,3-CD)PYRENE						87 J	72.5 J	58 J		38 J			
ISOPHORONE						260 U	265 U	270 U		260 U			
NAPHTHALENE						140 J	130 J	120 EB		260 U			
NITROBENZENE						260 U	265 U	270 U		260 U			
N-NITROSO-DI-N-PROPYLAMINE						260 U	265 U	270 U		260 U			
N-NITROSODIPHENYLAMINE						260 U	265 U	270 U		260 U			

EU	EU14	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15
LOCATION ID	SB07-312	IOA-SS-EU15	IOA-SS-EU15	IOA-SS-EU15	SB07-305	SB07-305	SB07-305	SB07-305	SB07-306	SB07-306	SB07-311	SB07-326	SB07-326
SAMPLE ID	SB07-312-NSO-1104020	IOA-SS-EU15-0002	IOA-SS-EU15-0002-AVG	IOA-SS-EU15-0002-D	SB07-305-NSO-1104025	SB07-305-NSO-1104020	SB07-305-NSO-1104020-AVG	SB07-305-NSO-1104020-D	SB07-306-NSO-1104025	SB07-306-NSO-1104020	SB07-311-NSO-1104020	SB07-326-NSO-0716031	SB07-326-NSO-0716032
SAMPLE CODE	NORMAL	ORIG	AVG	DUP	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20021104	20110809	20110809	20110809	20021104	20021104	20021104	20021104	20021104	20021104	20021104	20030716	20030716
TOP DEPTH	0.5	0	0	0	0	0.5	0.5	0.5	0	0.5	0.5	1	1.5
BOTTOM DEPTH	1	2	2	2	0.5	1	1	1	0.5	1	1	1.5	2
PENTACHLOROPHENOL						11 U	11 U	11 U		530 U			
PHENANTHRENE						62 J	53 J	44 J		85 J			
PHENOL						260 U	265 U	270 U		260 U			
PYRENE						160 J	155 J	150 J		100 J			
TOTAL PAHS	391					1370 J	1210 J	1050 J		630 J	124		
PESTICIDES/PCBS (UG/KG)													
4,4'-DDD						1.7 U	1.7 U			1.6 U			
4,4'-DDE						1.7 U	1.7 U			1.6 U			
4,4'-DDT						1.7 U	1.7 U			1.6 U			
ALDRIN						0.85 U	0.85 U			0.82 U			
ALPHA-BHC						0.85 U	0.85 U			0.82 U			
ALPHA-CHLORDANE						64 J	64 J			0.82 U			
AROCLOR-1016	26 U				26 U	27 U	26.5 U	26 U	25 U	26 U	26 U	26 U	28 U
AROCLOR-1221	26 U				26 U	27 U	26.5 U	26 U	25 U	26 U	26 U	26 U	28 U
AROCLOR-1232	26 U				26 U	27 U	26.5 U	26 U	25 U	26 U	26 U	26 U	28 U
AROCLOR-1242	26 U				26 U	27 U	26.5 U	26 U	25 U	26 U	26 U	26 U	28 U
AROCLOR-1248	26 U				26 U	27 U	26.5 U	26 U	25 U	26 U	26 U	26 U	28 U
AROCLOR-1254	26 U				26 U	27 U	26.5 U	26 U	25 U	26 U	26 U	26 U	28 U
AROCLOR-1260	170				17 J	230	215	200	170	49	1000 J	1500	12 J
BETA-BHC						0.85 U	0.85 U			0.82 U			
DELTA-BHC						0.85 U	0.85 U			0.82 U			
DIELDRIN						1.7 U	1.7 U			1.6 U			
ENDOSULFAN I						0.85 U	0.85 U			0.82 U			
ENDOSULFAN II						1.7 U	1.7 U			1.6 U			
ENDOSULFAN SULFATE						1.7 U	1.7 U			1.6 U			
ENDRIN						1.7 U	1.7 U			1.6 U			
ENDRIN ALDEHYDE						1.7 U	1.7 U			1.6 U			
ENDRIN KETONE						1.7 U	1.7 U			1.6 U			
GAMMA-BHC (LINDANE)						0.85 U	0.85 U			0.82 U			
GAMMA-CHLORDANE						52 J	52 J			0.82 U			
HEPTACHLOR						0.85 U	0.85 U			0.82 U			
HEPTACHLOR EPOXIDE						0.85 U	0.85 U			0.82 U			
METHOXYCHLOR						8.5 U	8.5 U			8.2 U			
TOTAL AROCLOR	170				17 J	230	215	200	170	49	1000 J	1500	12 J
TOXAPHENE						27 U	27 U			26 U			
HERBICIDES (UG/KG)													
2,4,5-T						21 U	21 U	21 U					
2,4,5-TP (SILVEX)						21 U	21 U	21 U					
2,4-D						85 U	85 U	85 U					

TABLE A-2
ANALYTICAL RESULTS - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

EU	EU14	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15
LOCATION ID	SB07-312	IOA-SS-EU15	IOA-SS-EU15	IOA-SS-EU15	SB07-305	SB07-305	SB07-305	SB07-305	SB07-306	SB07-306	SB07-311	SB07-326	SB07-326
SAMPLE ID	SB07-312-NSO-1104020	IOA-SS-EU15-0002	IOA-SS-EU15-0002-AVG	IOA-SS-EU15-0002-D	SB07-305-NSO-1104025	SB07-305-NSO-1104020	SB07-305-NSO-1104020-AVG	SB07-305-NSO-1104020-D	SB07-306-NSO-1104025	SB07-306-NSO-1104020	SB07-311-NSO-1104020	SB07-326-NSO-0716031	SB07-326-NSO-0716032
SAMPLE CODE	NORMAL	ORIG	AVG	DUP	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20021104	20110809	20110809	20110809	20021104	20021104	20021104	20021104	20021104	20021104	20021104	20030716	20030716
TOP DEPTH	0.5	0	0	0	0	0.5	0.5	0.5	0	0.5	0.5	1	1.5
BOTTOM DEPTH	1	2	2	2	0.5	1	1	1	0.5	1	1	1.5	2
2,4-DB						85 U	85 U	85 U					
DALAPON						43 U	42.5 U	42 U					
DICAMBA						43 U	42.5 U	42 U					
DICHLOROPROP						85 U	85 U	85 U					
DINOSEB						13 U	13 U	13 U					
MCPA						8500 U	8500 U	8500 U					
MCPP						8500 U	8500 U	8500 U					
METALS (MG/KG)													
ALUMINUM						4900 J	4450 J	4000 J		2600 J			
ANTIMONY						0.92	0.775 J	0.63 J		0.33 J			
ARSENIC						3.7	4.6	5.5		5.2			
BARIUM						23 J	15.8 J	17 U		11 U			
BERYLLIUM						0.35 U	0.355 U	0.36 U		0.29 U			
CADMIUM						0.35 J	0.32 J	0.29 J		0.19 J			
CALCIUM						600	515	430		140 U			
CHROMIUM						9.6	8.85	8.1		6			
COBALT						2.8 J	2 J	2.4 U		1.7 U			
COPPER						8	8.35	8.7		2.4 U			
IRON						9600	10300	11000		8800			
LEAD						45	36	27		6.4			
MAGNESIUM						1100	1010	920		530			
MANGANESE						100	97	94		60			
MERCURY						0.017 J	0.014 J	0.011 J		0.0066 J			
NICKEL						5.2	5.35	5.5		3.9 J			
POTASSIUM						540 J	490 J	440 J		450 J			
SELENIUM						0.62 U	0.645 U	0.67 U		0.62 J			
SILVER						0.12 UJ	0.125 UJ	0.13 UJ		0.13 UJ			
SODIUM						69 U	64 U	59 U		51 U			
THALLIUM						0.62 UJ	0.645 UJ	0.67 UJ		0.21 J			
VANADIUM						18	19	20		17			
ZINC						32	29	26		18			
MISCELLANEOUS PARAMETERS (%)													
PERCENT MOISTURE	4.2				4.6	6.5	6.45	6.4	5.9	6.4	7.2	5	13.8
PERCENT SOLIDS						93.9	94	94.1					
TOTAL SOLIDS													
MISCELLANEOUS PARAMETERS (MG/KG)													
CYANIDE						0.93 U	0.94 U	0.95 U		1 U			
EPH MADEP (UG/KG)													

EU	EU14	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15
LOCATION ID	SB07-312	IOA-SS-EU15	IOA-SS-EU15	IOA-SS-EU15	SB07-305	SB07-305	SB07-305	SB07-305	SB07-306	SB07-306	SB07-311	SB07-326	SB07-326
SAMPLE ID	SB07-312-NSO-1104020	IOA-SS-EU15-0002	IOA-SS-EU15-0002-AVG	IOA-SS-EU15-0002-D	SB07-305-NSO-1104025	SB07-305-NSO-1104020	SB07-305-NSO-1104020-AVG	SB07-305-NSO-1104020-D	SB07-306-NSO-1104025	SB07-306-NSO-1104020	SB07-311-NSO-1104020	SB07-326-NSO-0716031	SB07-326-NSO-0716032
SAMPLE CODE	NORMAL	ORIG	AVG	DUP	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20021104	20110809	20110809	20110809	20021104	20021104	20021104	20021104	20021104	20021104	20021104	20030716	20030716
TOP DEPTH	0.5	0	0	0	0	0.5	0.5	0.5	0	0.5	0.5	1	1.5
BOTTOM DEPTH	1	2	2	2	0.5	1	1	1	0.5	1	1	1.5	2
C11-C22 AROMATICS						52000 U	52000 U	52000 U		52000 U			
C11-C22 AROMATICS (WEIGHTED 1.0)													
C11-C22 AROMATICS-UNADJ													
C19-C36 ALIPHATICS						12000 J	11500 J	11000 J		52000 U			
C19-C36 ALIPHATICS (WEIGHTED 0.005)													
C9-C18 ALIPHATICS						19000 J	22500 J	26000 J		52000 U			
C9-C18 ALIPHATICS (WEIGHTED 0.05)													
EXTRACTABLE PETROLEUM HYDROCARBONS													
DIOXINS/FURANS (NG/KG)													
1,2,3,4,6,7,8,9-OCDD		470	384	299									
1,2,3,4,6,7,8,9-OCDF		38.5 J	30.2 J	21.9 J									
1,2,3,4,6,7,8-HPCDD		40.3	33.6	26.8									
1,2,3,4,6,7,8-HPCDF		16	12.9	9.85									
1,2,3,4,7,8,9-HPCDF		1.4 J	1.12 J	0.848 J									
1,2,3,4,7,8-HXCDD		0.379 J	0.374 J	0.368 J									
1,2,3,4,7,8-HXCDF		1.8 J	1.42 J	1.05 J									
1,2,3,6,7,8-HXCDD		1.86 J	1.47 J	1.08 J									
1,2,3,6,7,8-HXCDF		1.76 J	1.4 J	1.05 J									
1,2,3,7,8,9-HXCDD		1.14 J	0.934 J	0.728 J									
1,2,3,7,8,9-HXCDF		0.974 U	1.02 U	1.07 U									
1,2,3,7,8-PECDD		0.587 J	0.954 J	1.32 J									
1,2,3,7,8-PECDF		0.427 J	0.338 J	0.248 J									
2,3,4,6,7,8-HXCDF		3.27	2.82 J	2.38 J									
2,3,4,7,8-PECDF		4.63	3.8	2.98									
2,3,7,8-TCDD		0.222 U	0.218 U	0.214 U									
2,3,7,8-TCDF		0.445 U	0.382 U	0.318 U									
TEQ		3.74 J	3.55 J	3.36 J									
TEQ HALFND		3.92 J	3.72 J	3.53 J									
TOTAL HPCDD		96.4	79	61.7									
TOTAL HPCDF		45.6	36.4	27.3									
TOTAL HXCDD		12.9 J	10.6 J	8.39 J									
TOTAL HXCDF		38	31.6 J	25.3 J									
TOTAL PECDD		3.63 J	3.5 J	3.36 J									
TOTAL PECDF		41.1 J	34.2 J	27.3 J									
TOTAL TCDD		2.59 J	1.73 J	0.877 J									
TOTAL TCDF		13.2 J	11.5 J	9.73 J									

EU	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU16	EU17	EU18	EU18
LOCATION ID	SB07-327	SB07-327	SB07-328	SB07-328	SB07-329	SB07-329	SB07-336	SB07-337	SB07-338	IOA-SS-EU16	IOA-SS-EU17	MW11-131	SB11-205
SAMPLE ID	SB07-327-NSO-0716031	SB07-327-NSO-0716032	SB07-328-NSO-0716030	SB07-328-NSO-0716031	SB07-329-NSO-0716030	SB07-329-NSO-0716031	SB07-336-NSO-101503	SB07-337-NSO-101503	SB07-338-NSO-101503	IOA-SS-EU16-0002	IOA-SS-EU17-0002	MW11131-NSO-122198-0	SB11-205-NSO-0515010
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20030716	20030716	20030716	20030716	20030716	20030716	20031015	20031015	20031015	20110810	20110810	19981221	20010515
TOP DEPTH	1	1.5	0	1	0	1	1	0.5	0.5	0	0	0	0
BOTTOM DEPTH	1.5	2	1	2	1	2	1.5	1.5	1.5	2	2	1	1
VOLATILES (UG/KG)													
1,1,1-TRICHLOROETHANE												5.7 U	
1,1,2,2-TETRACHLOROETHANE												5.7 U	
1,1,2-TRICHLOROETHANE												5.7 U	
1,1-DICHLOROETHANE												5.7 U	
1,1-DICHLOROETHENE												5.7 U	
1,2-DIBROMO-3-CHLOROPROPANE													
1,2-DIBROMOETHANE													
1,2-DICHLOROBENZENE												5.7 UJ	
1,2-DICHLOROETHANE												5.7 U	
1,2-DICHLOROPROPANE												5.7 U	
1,3-DICHLOROBENZENE												5.7 UJ	
1,4-DICHLOROBENZENE												5.7 UJ	
2-BUTANONE												23 UJ	
2-HEXANONE												23 UJ	
4-METHYL-2-PENTANONE												23 UJ	
ACETONE												5.9 J	
BENZENE												5.7 U	
BROMODICHLOROMETHANE												5.7 U	
BROMOFORM												5.7 UJ	
BROMOMETHANE												11 UJ	
CARBON DISULFIDE												5.7 U	
CARBON TETRACHLORIDE												5.7 U	
CHLOROBENZENE												5.7 U	
CHLORODIBROMOMETHANE												5.7 U	
CHLOROETHANE												11 U	
CHLOROFORM												5.7 U	
CHLOROMETHANE												11 U	
CIS-1,2-DICHLOROETHENE													
CIS-1,3-DICHLOROPROPENE												5.7 U	
ETHYLBENZENE												5.7 U	
M+P-XYLENES													
METHYLENE CHLORIDE												5.7 U	
STYRENE												5.7 U	
TETRACHLOROETHENE												5.7 U	
TOLUENE												5.7 U	
TOTAL 1,2-DICHLOROETHENE												5.7 U	
TOTAL XYLENES												5.7 U	
TRANS-1,2-DICHLOROETHENE													

EU	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU16	EU17	EU18	EU18
LOCATION ID	SB07-327	SB07-327	SB07-328	SB07-328	SB07-329	SB07-329	SB07-336	SB07-337	SB07-338	IOA-SS-EU16	IOA-SS-EU17	MW11-131	SB11-205
SAMPLE ID	SB07-327-NSO-0716031	SB07-327-NSO-0716032	SB07-328-NSO-0716030	SB07-328-NSO-0716031	SB07-329-NSO-0716030	SB07-329-NSO-0716031	SB07-336-NSO-101503	SB07-337-NSO-101503	SB07-338-NSO-101503	IOA-SS-EU16-0002	IOA-SS-EU17-0002	MW11131-NSO-122198-0	SB11-205-NSO-0515010
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20030716	20030716	20030716	20030716	20030716	20030716	20031015	20031015	20031015	20110810	20110810	19981221	20010515
TOP DEPTH	1	1.5	0	1	0	1	1	0.5	0.5	0	0	0	0
BOTTOM DEPTH	1.5	2	1	2	1	2	1.5	1.5	1.5	2	2	1	1
TRANS-1,3-DICHLOROPROPENE												5.7 U	
TRICHLOROETHENE												5.7 U	
VINYL CHLORIDE												11 U	
VPH MADEP (UG/KG)													
C5-C8 ALIPHATICS													
C5-C8 ALIPHATICS (WEIGHTED 0.5)													
C5-C8 ALIPHATICS-UNADJ													
C9-C10 AROMATICS													
C9-C10 AROMATICS (WEIGHTED 1.0)													
C9-C12 ALIPHATICS													
C9-C12 ALIPHATICS (WEIGHTED 0.05)													
C9-C12 ALIPHATICS-UNADJ													
METHYL TERT-BUTYL ETHER													
O-XYLENE													
TOTAL XYLENES													
VOLATILE PETROLEUM HYDROCARBONS													
SEMIVOLATILES (UG/KG)													
1,2,4-TRICHLOROBENZENE												360 U	
2,2'-OXYBIS(1-CHLOROPROPANE)												360 U	
2,4,5-TRICHLOROPHENOL												1800 U	
2,4,6-TRICHLOROPHENOL												360 U	
2,4-DICHLOROPHENOL												360 U	
2,4-DIMETHYLPHENOL												360 U	
2,4-DINITROPHENOL												1800 U	
2,4-DINITROTOLUENE												360 U	
2,6-DINITROTOLUENE												360 U	
2-CHLORONAPHTHALENE												360 U	
2-CHLOROPHENOL												360 U	
2-METHYLNAPHTHALENE										100 UJ	19 UJ	360 U	
2-METHYLPHENOL												360 U	
2-NITROANILINE												1800 U	
2-NITROPHENOL												360 U	
3&4-METHYLPHENOL													
3,3'-DICHLOROBENZIDINE												360 UJ	
3-NITROANILINE												1800 U	
4,6-DINITRO-2-METHYLPHENOL												260 U	
4-BROMOPHENYL PHENYL ETHER												360 U	
4-CHLORO-3-METHYLPHENOL												360 U	

EU	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU16	EU17	EU18	EU18
LOCATION ID	SB07-327	SB07-327	SB07-328	SB07-328	SB07-329	SB07-329	SB07-336	SB07-337	SB07-338	IOA-SS-EU16	IOA-SS-EU17	MW11-131	SB11-205
SAMPLE ID	SB07-327-NSO-0716031	SB07-327-NSO-0716032	SB07-328-NSO-0716030	SB07-328-NSO-0716031	SB07-329-NSO-0716030	SB07-329-NSO-0716031	SB07-336-NSO-101503	SB07-337-NSO-101503	SB07-338-NSO-101503	IOA-SS-EU16-0002	IOA-SS-EU17-0002	MW11131-NSO-122198-0	SB11-205-NSO-0515010
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20030716	20030716	20030716	20030716	20030716	20030716	20031015	20031015	20031015	20110810	20110810	19981221	20010515
TOP DEPTH	1	1.5	0	1	0	1	1	0.5	0.5	0	0	0	0
BOTTOM DEPTH	1.5	2	1	2	1	2	1.5	1.5	1.5	2	2	1	1
4-CHLOROANILINE												360 U	
4-CHLOROPHENYL PHENYL ETHER												360 U	
4-METHYLPHENOL												360 U	
4-NITROANILINE												1800 U	
4-NITROPHENOL												1800 U	
ACENAPHTHENE										48 J	22 J	360 U	
ACENAPHTHYLENE										100 UJ	9 J	360 U	
ANTHRACENE										110 J	60 J	360 U	
BAP EQUIVALENT-HALFND										495 J	318 J	87.7 J	
BAP EQUIVALENT-POS										385 J	318 J	51.7 J	
BENZO(A)ANTHRACENE										410 J	200 J	360 UJ	
BENZO(A)PYRENE										300 J	220 J	34 J	
BENZO(B)FLUORANTHENE										420 J	340 J	100 J	
BENZO(G,H,I)PERYLENE										100 J	130 J	360 UJ	
BENZO(K)FLUORANTHENE										190 J	130 J	100 J	
BIS(2-CHLOROETHOXY)METHANE												360 U	
BIS(2-CHLOROETHYL)ETHER												360 U	
BIS(2-ETHYLHEXYL)PHTHALATE												360 UJ	
BUTYL BENZYL PHTHALATE												360 UJ	
CARBAZOLE												360 U	
CHRYSENE										410 J	250 J	92 J	
DIBENZO(A,H)ANTHRACENE										200 UJ	30 J	6.6 J	
DIBENZOFURAN												360 U	
DIETHYL PHTHALATE												360 U	
DIMETHYL PHTHALATE												360 U	
DI-N-BUTYL PHTHALATE												360 U	
DI-N-OCTYL PHTHALATE												360 UJ	
FLUORANTHENE										830 J	450 J	140 J	
FLUORENE										60 J	25 J	360 U	
HEXACHLOROBENZENE												360 U	
HEXACHLOROBUTADIENE												360 U	
HEXACHLOROCYCLOPENTADIENE												360 U	
HEXACHLOROETHANE												360 U	
INDENO(1,2,3-CD)PYRENE										200 UJ	120 J	360 UJ	
ISOPHORONE												360 U	
NAPHTHALENE										100 UJ	19 UJ	360 U	
NITROBENZENE												360 U	
N-NITROSO-DI-N-PROPYLAMINE												110 U	
N-NITROSODIPHENYLAMINE												360 U	

EU	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU16	EU17	EU18	EU18
LOCATION ID	SB07-327	SB07-327	SB07-328	SB07-328	SB07-329	SB07-329	SB07-336	SB07-337	SB07-338	IOA-SS-EU16	IOA-SS-EU17	MW11-131	SB11-205
SAMPLE ID	SB07-327-NSO-0716031	SB07-327-NSO-0716032	SB07-328-NSO-0716030	SB07-328-NSO-0716031	SB07-329-NSO-0716030	SB07-329-NSO-0716031	SB07-336-NSO-101503	SB07-337-NSO-101503	SB07-338-NSO-101503	IOA-SS-EU16-0002	IOA-SS-EU17-0002	MW11131-NSO-122198-0	SB11-205-NSO-0515010
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20030716	20030716	20030716	20030716	20030716	20030716	20031015	20031015	20031015	20110810	20110810	19981221	20010515
TOP DEPTH	1	1.5	0	1	0	1	1	0.5	0.5	0	0	0	0
BOTTOM DEPTH	1.5	2	1	2	1	2	1.5	1.5	1.5	2	2	1	1
PENTACHLOROPHENOL												1800 U	
PHENANTHRENE										480 J	290 J	91 J	
PHENOL												360 U	
PYRENE										640 J	400 J	170 J	
TOTAL PAHS										4000 J	2680 J	734 J	
PESTICIDES/PCBS (UG/KG)													
4,4'-DDD												3.7 U	
4,4'-DDE												11	
4,4'-DDT												16 J	
ALDRIN												1.8 U	
ALPHA-BHC												1.8 U	
ALPHA-CHLORDANE												42 J	
AROCLOR-1016	27 U	26 U	26 U	26 U	26 U	28 U	28 U	26 U	26 U	7.9 U	75 U	37 U	35 U
AROCLOR-1221	27 U	26 U	26 U	26 U	26 U	28 U	28 U	26 U	26 U	7.9 U	75 U	73 U	70 U
AROCLOR-1232	27 U	26 U	26 U	26 U	26 U	28 U	28 U	26 U	26 U	7.9 U	75 U	37 U	35 U
AROCLOR-1242	27 U	26 U	26 U	26 U	26 U	28 U	28 U	26 U	26 U	7.9 U	75 U	37 U	35 U
AROCLOR-1248	27 U	26 U	26 U	26 U	26 U	28 U	28 U	26 U	26 U	7.9 U	75 U	37 U	35 U
AROCLOR-1254	27 U	26 U	26 U	26 U	26 U	28 U	28 U	26 U	26 U	7.9 U	75 U	37 U	35 U
AROCLOR-1260	2900	14 J	72	500	1200	600	28 U	330	24 J	300	1800	480 J	120
BETA-BHC												1.8 U	
DELTA-BHC												1.8 U	
DIELDRIN												3.7 U	
ENDOSULFAN I												1.8 U	
ENDOSULFAN II												3.7 U	
ENDOSULFAN SULFATE												3.7 U	
ENDRIN												4.9	
ENDRIN ALDEHYDE												18 J	
ENDRIN KETONE												3.7 U	
GAMMA-BHC (LINDANE)												1.8 U	
GAMMA-CHLORDANE												41 J	
HEPTACHLOR												3.5 J	
HEPTACHLOR EPOXIDE												8.4 J	
METHOXYCHLOR												18 U	
TOTAL AROCLOR	2900	14 J	72	500	1200	600	28 U	330	24 J	300	1800	480 J	120
TOXAPHENE												180 U	
HERBICIDES (UG/KG)													
2,4,5-T													
2,4,5-TP (SILVEX)													
2,4-D													

EU	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU16	EU17	EU18	EU18
LOCATION ID	SB07-327	SB07-327	SB07-328	SB07-328	SB07-329	SB07-329	SB07-336	SB07-337	SB07-338	IOA-SS-EU16	IOA-SS-EU17	MW11-131	SB11-205
SAMPLE ID	SB07-327-NSO-0716031	SB07-327-NSO-0716032	SB07-328-NSO-0716030	SB07-328-NSO-0716031	SB07-329-NSO-0716030	SB07-329-NSO-0716031	SB07-336-NSO-101503	SB07-337-NSO-101503	SB07-338-NSO-101503	IOA-SS-EU16-0002	IOA-SS-EU17-0002	MW11131-NSO-122198-0	SB11-205-NSO-0515010
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20030716	20030716	20030716	20030716	20030716	20030716	20031015	20031015	20031015	20110810	20110810	19981221	20010515
TOP DEPTH	1	1.5	0	1	0	1	1	0.5	0.5	0	0	0	0
BOTTOM DEPTH	1.5	2	1	2	1	2	1.5	1.5	1.5	2	2	1	1
2,4-DB													
DALAPON													
DICAMBA													
DICHLOROPROP													
DINOSEB													
MCPA													
MCPP													
METALS (MG/KG)													
ALUMINUM										10000	6100	5110 J	
ANTIMONY										0.15 U	0.71	0.21 U	
ARSENIC										1.3	1.2	2.1	
BARIUM										21	21	15.8	
BERYLLIUM										0.29 U	0.43	0.28 J	
CADMIUM										0.55	0.57	0.24 U	
CALCIUM										810 J	1100 J	725 J	
CHROMIUM										13	12	7.7	
COBALT										2.8	2.8	2.2 J	
COPPER										7	8.3	4.5	
IRON										9900	15000	9160 J	
LEAD										56 J	69 J	17.3 J	
MAGNESIUM										1700 J	1800 J	995 J	
MANGANESE										160 J	390 J	96.7 J	
MERCURY										0.031 J	0.011 J	0.05 U	
NICKEL										7.6	6.9	3.7 J	
POTASSIUM										240	290	246 J	
SELENIUM										0.98	1.1	0.33 U	
SILVER										0.06 J	0.087 J	0.28 UJ	
SODIUM										49 J	44 J	43.6	
THALLIUM										0.082 U	0.07 U	0.34 U	
VANADIUM										25	20	14.9 J	
ZINC										36	70	30.7 J	
MISCELLANEOUS PARAMETERS (%)													
PERCENT MOISTURE	6.3	7	5.8	7.7	4.5	10	11.6	5.6	5.6	17	11		
PERCENT SOLIDS													
TOTAL SOLIDS												90	
MISCELLANEOUS PARAMETERS (MG/KG)													
CYANIDE												0.23 U	
EPH MADEP (UG/KG)													

EU	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU15	EU16	EU17	EU18	EU18
LOCATION ID	SB07-327	SB07-327	SB07-328	SB07-328	SB07-329	SB07-329	SB07-336	SB07-337	SB07-338	IOA-SS-EU16	IOA-SS-EU17	MW11-131	SB11-205
SAMPLE ID	SB07-327-NSO-0716031	SB07-327-NSO-0716032	SB07-328-NSO-0716030	SB07-328-NSO-0716031	SB07-329-NSO-0716030	SB07-329-NSO-0716031	SB07-336-NSO-101503	SB07-337-NSO-101503	SB07-338-NSO-101503	IOA-SS-EU16-0002	IOA-SS-EU17-0002	MW11131-NSO-122198-0	SB11-205-NSO-0515010
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20030716	20030716	20030716	20030716	20030716	20030716	20031015	20031015	20031015	20110810	20110810	19981221	20010515
TOP DEPTH	1	1.5	0	1	0	1	1	0.5	0.5	0	0	0	0
BOTTOM DEPTH	1.5	2	1	2	1	2	1.5	1.5	1.5	2	2	1	1
C11-C22 AROMATICS												18000 U	
C11-C22 AROMATICS (WEIGHTED 1.0)													
C11-C22 AROMATICS-UNADJ												18000 U	
C19-C36 ALIPHATICS												8700 U	
C19-C36 ALIPHATICS (WEIGHTED 0.005)													
C9-C18 ALIPHATICS												6500 U	
C9-C18 ALIPHATICS (WEIGHTED 0.05)													
EXTRACTABLE PETROLEUM HYDROCARBONS													
DIOXINS/FURANS (NG/KG)													
1,2,3,4,6,7,8,9-OCDD													
1,2,3,4,6,7,8,9-OCDF													
1,2,3,4,6,7,8-HPCDD													
1,2,3,4,6,7,8-HPCDF													
1,2,3,4,7,8,9-HPCDF													
1,2,3,4,7,8-HXCDD													
1,2,3,4,7,8-HXCDF													
1,2,3,6,7,8-HXCDD													
1,2,3,6,7,8-HXCDF													
1,2,3,7,8,9-HXCDD													
1,2,3,7,8,9-HXCDF													
1,2,3,7,8-PECDD													
1,2,3,7,8-PECDF													
2,3,4,6,7,8-HXCDF													
2,3,4,7,8-PECDF													
2,3,7,8-TCDD													
2,3,7,8-TCDF													
TEQ													
TEQ HALFND													
TOTAL HPCDD													
TOTAL HPCDF													
TOTAL HXCDD													
TOTAL HXCDF													
TOTAL PECDD													
TOTAL PECDF													
TOTAL TCDD													
TOTAL TCDF													

EU	EU19	EU20	EU21	EU21	EU22	EU22	EU23	EU24	EU26	EU26	EU26	EU26	EU26
LOCATION ID	IOA-SS-EU19	SB09-007	IOA-SS-EU21	SB09-008	IOA-SS-EU22	SB09-009	IOA-SS-EU23	SB06-343	B8-MW-02	B8-MW-03	B8-MW-04	SB06-010	SB06-011
SAMPLE ID	IOA-SS-EU19-0002	SB09007-NSO-121698-0	IOA-SS-EU21-0002	SB09008-NSO-121698-0	IOA-SS-EU22-0002	SB09009-NSO-121698-0	IOA-SS-EU23-0002	SB06-343-NSO-072503	B8-8SB2AA	B8-8SB3AA	B8-8SB4AA	SB06010-NSO-120998-0	SB06011-NSO-120998-0
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20110811	19981216	20110811	19981216	20110811	19981216	20110810	20030725	19960730	19960731	19960802	19981209	19981209
TOP DEPTH	0	0	0	0	0	0	0	0	1	1	1	0	0
BOTTOM DEPTH	2	1	2	1	2	1	2	1	3	3	2.2	1	1
VOLATILES (UG/KG)													
1,1,1-TRICHLOROETHANE								4.8 UJ				5.3 U	5.2 U
1,1,2,2-TETRACHLOROETHANE								4.8 UJ				5.3 U	5.2 U
1,1,2-TRICHLOROETHANE								4.8 UJ				5.3 U	5.2 U
1,1-DICHLOROETHANE								4.8 UJ				5.3 U	5.2 U
1,1-DICHLOROETHENE								4.8 UJ				5.3 U	5.2 U
1,2-DIBROMO-3-CHLOROPROPANE								4.8 UJ					
1,2-DIBROMOETHANE								4.8 UJ					
1,2-DICHLOROBENZENE								260 U				5.3 UJ	5.2 UJ
1,2-DICHLOROETHANE								4.8 UJ				5.3 U	5.2 U
1,2-DICHLOROPROPANE								4.8 UJ				5.3 U	5.2 U
1,3-DICHLOROBENZENE								260 U				5.3 UJ	5.2 UJ
1,4-DICHLOROBENZENE								260 U				5.3 UJ	5.2 UJ
2-BUTANONE								24 UJ				21 U	21 U
2-HEXANONE								24 R				21 U	21 U
4-METHYL-2-PENTANONE								24 R				21 U	21 U
ACETONE								74 J				21 U	21 U
BENZENE		140 U		160 U		220 U		4.8 UJ	290 U	280 U	280 U	5.3 U	5.2 U
BROMODICHLOROMETHANE								4.8 UJ				5.3 U	5.2 U
BROMOFORM								4.8 UJ				5.3 U	5.2 U
BROMOMETHANE								4.8 UJ				11 U	10 U
CARBON DISULFIDE								4.8 UJ				5.3 U	5.2 U
CARBON TETRACHLORIDE								4.8 UJ				5.3 U	5.2 U
CHLOROBENZENE								4.8 UJ				5.3 U	5.2 U
CHLORODIBROMOMETHANE								4.8 UJ				5.3 U	5.2 U
CHLOROETHANE								4.8 UJ				11 U	10 U
CHLOROFORM								4.8 UJ				5.3 U	5.2 U
CHLOROMETHANE								4.8 UJ				11 UJ	10 UJ
CIS-1,2-DICHLOROETHENE								4.8 UJ					
CIS-1,3-DICHLOROPROPENE								4.8 UJ				5.3 U	5.2 U
ETHYLBENZENE		140 U		160 U		220 U		4.8 UJ	290 U	280 U	280 U	5.3 U	5.2 U
M+P-XYLENES								4.8 UJ					
METHYLENE CHLORIDE								24 UJ				5.3 U	5.2 U
STYRENE								4.8 UJ				5.3 U	5.2 U
TETRACHLOROETHENE								4.8 UJ				5.3 U	5.2 U
TOLUENE		140 U		160 U		220 U		4.8 UJ	880 U	840 U	840 U	5.3 U	1.3 J
TOTAL 1,2-DICHLOROETHENE								4.8 UJ				5.3 U	5.2 U
TOTAL XYLENES		140 U		160 U		220 U		4.8 UJ	1200 U	1100 U	1100 U	5.3 U	5.2 U
TRANS-1,2-DICHLOROETHENE								4.8 UJ					

EU	EU19	EU20	EU21	EU21	EU22	EU22	EU23	EU24	EU26	EU26	EU26	EU26	EU26
LOCATION ID	IOA-SS-EU19	SB09-007	IOA-SS-EU21	SB09-008	IOA-SS-EU22	SB09-009	IOA-SS-EU23	SB06-343	B8-MW-02	B8-MW-03	B8-MW-04	SB06-010	SB06-011
SAMPLE ID	IOA-SS-EU19-0002	SB09007-NSO-121698-0	IOA-SS-EU21-0002	SB09008-NSO-121698-0	IOA-SS-EU22-0002	SB09009-NSO-121698-0	IOA-SS-EU23-0002	SB06-343-NSO-072503	B8-8SB2AA	B8-8SB3AA	B8-8SB4AA	SB06010-NSO-120998-0	SB06011-NSO-120998-0
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20110811	19981216	20110811	19981216	20110811	19981216	20110810	20030725	19960730	19960731	19960802	19981209	19981209
TOP DEPTH	0	0	0	0	0	0	0	0	1	1	1	0	0
BOTTOM DEPTH	2	1	2	1	2	1	2	1	3	3	2.2	1	1
TRANS-1,3-DICHLOROPROPENE								4.8 UJ				5.3 U	5.2 U
TRICHLOROETHENE								4.8 UJ				5.3 U	5.2 U
VINYL CHLORIDE								4.8 UJ				11 U	10 U
VPH MADEP (UG/KG)													
C5-C8 ALIPHATICS		2800 U		6030		4400 U			295 U	280 U	280 U		
C5-C8 ALIPHATICS (WEIGHTED 0.5)													
C5-C8 ALIPHATICS-UNADJ		2800 U		6030		4400 U							
C9-C10 AROMATICS		2800 U		3200 U		4400 U			590 U	560 U	3400		
C9-C10 AROMATICS (WEIGHTED 1.0)													
C9-C12 ALIPHATICS		2800 U		3200 U		4400 U			29.5 UJ	28 UJ	480 J		
C9-C12 ALIPHATICS (WEIGHTED 0.05)													
C9-C12 ALIPHATICS-UNADJ		2800 U		3200 U		4400 U							
METHYL TERT-BUTYL ETHER		140 U		160 U		220 U			880 U	840 U	840 U		
O-XYLENE		140 U		160 U		220 U		4.8 UJ	590 U	560 U	560 U		
TOTAL XYLENES		140 U		160 U		220 U		4.8 UJ	590 U	560 U	560 U		
VOLATILE PETROLEUM HYDROCARBONS													
SEMIVOLATILES (UG/KG)													
1,2,4-TRICHLOROBENZENE		350 U		360 U		360 U		260 U				350 U	340 U
2,2'-OXYBIS(1-CHLOROPROPANE)		350 U		360 U		360 U		260 U				350 U	340 U
2,4,5-TRICHLOROPHENOL		1700 U		1800 U		1800 U		260 U				1800 U	1700 U
2,4,6-TRICHLOROPHENOL		350 U		360 U		360 U		260 U				350 U	340 U
2,4-DICHLOROPHENOL		350 U		360 U		360 U		260 U				350 U	340 U
2,4-DIMETHYLPHENOL		350 U		360 U		360 U		260 U				350 U	340 U
2,4-DINITROPHENOL		1700 U		1800 UJ		1800 UJ		520 U				1800 U	1700 U
2,4-DINITROTOLUENE		350 U		360 U		360 U		260 U				350 U	340 U
2,6-DINITROTOLUENE		350 U		360 U		360 U		260 U				350 U	340 U
2-CHLORONAPHTHALENE		350 U		360 U		360 U		260 U				350 U	340 U
2-CHLOROPHENOL		350 U		360 U		360 U		260 U				350 U	340 U
2-METHYLNAPHTHALENE	19 UJ	350 U		1040		2.5 U	29 UJ	260 U	370 U	350 U	350 U	350 U	100 J
2-METHYLPHENOL		350 U		360 U		360 U		260 U				350 U	340 U
2-NITROANILINE		1700 U		1800 U		1800 U		520 U				1800 U	1700 U
2-NITROPHENOL		350 U		360 U		360 U		260 U				350 U	340 U
3&4-METHYLPHENOL													
3,3'-DICHLOROBENZIDINE		350 U		360 UJ		360 UJ		260 U				350 U	340 UJ
3-NITROANILINE		1700 U		1800 U		1800 U		520 U				1800 U	1700 U
4,6-DINITRO-2-METHYLPHENOL		250 U		260 UJ		260 UJ		520 U				250 U	250 U
4-BROMOPHENYL PHENYL ETHER		350 U		360 UJ		360 UJ		260 U				350 U	340 U
4-CHLORO-3-METHYLPHENOL		350 U		360 U		360 U		520 U				350 U	340 U

EU	EU19	EU20	EU21	EU21	EU22	EU22	EU23	EU24	EU26	EU26	EU26	EU26	EU26
LOCATION ID	IOA-SS-EU19	SB09-007	IOA-SS-EU21	SB09-008	IOA-SS-EU22	SB09-009	IOA-SS-EU23	SB06-343	B8-MW-02	B8-MW-03	B8-MW-04	SB06-010	SB06-011
SAMPLE ID	IOA-SS-EU19-0002	SB09007-NSO-121698-0	IOA-SS-EU21-0002	SB09008-NSO-121698-0	IOA-SS-EU22-0002	SB09009-NSO-121698-0	IOA-SS-EU23-0002	SB06-343-NSO-072503	B8-8SB2AA	B8-8SB3AA	B8-8SB4AA	SB06010-NSO-120998-0	SB06011-NSO-120998-0
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20110811	19981216	20110811	19981216	20110811	19981216	20110810	20030725	19960730	19960731	19960802	19981209	19981209
TOP DEPTH	0	0	0	0	0	0	0	0	1	1	1	0	0
BOTTOM DEPTH	2	1	2	1	2	1	2	1	3	3	2.2	1	1
4-CHLOROANILINE		350 U		360 U		360 U		260 U				350 U	340 U
4-CHLOROPHENYL PHENYL ETHER		350 U		360 U		360 U		260 U				350 U	340 U
4-METHYLPHENOL		350 U		360 U		360 U		260 U				350 U	340 U
4-NITROANILINE		1700 U		1800 U		1800 U		520 U				1800 U	1700 U
4-NITROPHENOL		1700 U		1800 U		1800 U		520 U				1800 U	1700 U
ACENAPHTHENE	19 UJ	350 U		360 U		2.5 U	29 UJ	260 U	370 U	350 U	350 U	350 U	340 U
ACENAPHTHYLENE	19 UJ	350 U		360 U		2.5 U	15 J	260 U	370 U	350 U	350 U	350 U	340 U
ANTHRACENE	19 UJ	350 U		360 UJ		2.5 U	35 J	260 U	370 U	350 U	350 U	350 U	340 U
BAP EQUIVALENT-HALFND	78.4 J	58.1 J		61.8 J		15 J	186 J	260 U	268 J	350 U	246 J	480 J	89.5 J
BAP EQUIVALENT-POS	58 J	2.6 J		4.7 J		14.6 J	154 J	260 U	43.8 J	350 U	54 J	480 J	87.8 J
BENZO(A)ANTHRACENE	48 J	350 U		360 UJ		2.5 U	110 J	260 U	370 U	350 U	39 J	280 J	78 J
BENZO(A)PYRENE	46 J	2.6 J		4.7 J		12 J	120 J	260 U	370 U	350 U	46 J	330 J	45 J
BENZO(B)FLUORANTHENE	69 J	350 U		360 UJ		2.5 U	220 J	260 U	370 U	350 U	36 J	440 J	170 J
BENZO(G,H,I)PERYLENE	27 J	350 U		360 UJ		2.5 U	59 J	50 J	140 J	350 U	40 J	200 J	87 J
BENZO(K)FLUORANTHENE	25 J	350 U		360 UJ		2.5 U	87 J	260 U	370 U	350 U	45 J	130 J	340 UJ
BIS(2-CHLOROETHOXY)METHANE		350 U		360 U		360 U		260 U				350 U	340 U
BIS(2-CHLOROETHYL)ETHER		350 U		360 U		360 U		260 U				350 U	340 U
BIS(2-ETHYLHEXYL)PHTHALATE		350 U		360 UJ		360 UJ		260 U				350 U	340 UJ
BUTYL BENZYL PHTHALATE		350 U		360 UJ		360 UJ		260 U				350 U	340 UJ
CARBAZOLE		350 U		360 UJ		360 UJ		260 U				350 U	340 U
CHRYSENE	52 J	350 U		360 UJ		2.5 U	140 J	260 U	370 U	350 U	49 J	320 J	120 J
DIBENZO(A,H)ANTHRACENE	37 UJ	2.1 U		2.2 U		2.6 J	59 UJ	260 U	36 J	350 U	350 U	57 J	7.9 J
DIBENZOFURAN		350 U		360 U		360 U		260 U				350 U	340 U
DIETHYL PHTHALATE		350 U		360 U		360 U		260 U				350 U	340 U
DIMETHYL PHTHALATE		350 U		360 U		360 U		260 U				350 U	340 U
DI-N-BUTYL PHTHALATE		350 U		360 UJ		360 UJ		260 U				350 U	340 U
DI-N-OCTYL PHTHALATE		350 U		360 UJ		360 UJ		260 U				350 UJ	340 UJ
FLUORANTHENE	74 J	350 U		360 UJ		2.5 U	280 J	260 U	370 U	350 U	67 J	550	100 J
FLUORENE	19 UJ	350 U		360 U		2.5 U	29 UJ	260 U	370 U	350 U	350 U	350 U	340 U
HEXACHLOROBENZENE		350 U		360 UJ		360 UJ		260 U				350 U	340 U
HEXACHLOROBUTADIENE		350 U		360 U		360 U		260 U				350 U	340 U
HEXACHLOROCYCLOPENTADIENE		350 U		360 U		360 U		260 U				350 U	340 U
HEXACHLOROETHANE		350 U		360 U		360 U		260 U				350 U	340 U
INDENO(1,2,3-CD)PYRENE	37 UJ	350 U		360 UJ		2.5 U	59 UJ	260 U	78 J	350 U	350 U	190 J	100 J
ISOPHORONE		350 U		360 U		360 U		260 U				350 U	340 U
NAPHTHALENE	19 UJ	140 U		160 U		2.5 U	29 UJ	260 U	370 U	350 U	350 U	350 U	340 U
NITROBENZENE		350 U		360 U		360 U		260 U				350 U	340 U
N-NITROSO-DI-N-PROPYLAMINE		100 U		110 U		110 U		260 U				100 U	100 U
N-NITROSODIPHENYLAMINE		350 U		360 UJ		360 UJ		260 U				350 U	340 U

EU	EU19	EU20	EU21	EU21	EU22	EU22	EU23	EU24	EU26	EU26	EU26	EU26	EU26
LOCATION ID	IOA-SS-EU19	SB09-007	IOA-SS-EU21	SB09-008	IOA-SS-EU22	SB09-009	IOA-SS-EU23	SB06-343	B8-MW-02	B8-MW-03	B8-MW-04	SB06-010	SB06-011
SAMPLE ID	IOA-SS-EU19-0002	SB09007-NSO-121698-0	IOA-SS-EU21-0002	SB09008-NSO-121698-0	IOA-SS-EU22-0002	SB09009-NSO-121698-0	IOA-SS-EU23-0002	SB06-343-NSO-072503	B8-8SB2AA	B8-8SB3AA	B8-8SB4AA	SB06010-NSO-120998-0	SB06011-NSO-120998-0
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20110811	19981216	20110811	19981216	20110811	19981216	20110810	20030725	19960730	19960731	19960802	19981209	19981209
TOP DEPTH	0	0	0	0	0	0	0	0	1	1	1	0	0
BOTTOM DEPTH	2	1	2	1	2	1	2	1	3	3	2.2	1	1
PENTACHLOROPHENOL		1700 U		1800 UJ		1800 UJ		520 U				1800 U	1700 U
PHENANTHRENE	27 J	350 U		360 UJ		2.5 U	170 J	260 U	370 U	350 U	36 J	400	76 J
PHENOL		350 U		360 U		360 U		260 U				350 U	340 U
PYRENE	97 J	350 U		360 UJ		74 J	340 J	260 U	370 U	350 U	59 J	740	190 J
TOTAL PAHS	465 J	2.6 J		1040 J		88.6 J	1580 J	50 J	254 J	350 U	417 J	3640 J	1070 J
PESTICIDES/PCBS (UG/KG)													
4,4'-DDD								1.6 U				3.5 U	3.4 U
4,4'-DDE								1.6 U				3.5 U	3.4 U
4,4'-DDT								3.2 J				3.5 U	3.4 J
ALDRIN								0.81 U				1.8 U	1.7 U
ALPHA-BHC								0.81 U				1.8 U	1.7 U
ALPHA-CHLORDANE								0.81 U				1.8 U	1.7 U
AROCLOR-1016	7.4 U		7.6 U		8.2 U		7.7 U	25 U				35 U	34 U
AROCLOR-1221	7.4 U		7.6 U		8.2 U		7.7 U	25 U				70 U	69 U
AROCLOR-1232	7.4 U		7.6 U		8.2 U		7.7 U	25 U				35 U	34 U
AROCLOR-1242	7.4 U		7.6 U		8.2 U		7.7 U	25 U				35 U	34 U
AROCLOR-1248	7.4 U		7.6 U		8.2 U		7.7 U	25 U				35 U	34 U
AROCLOR-1254	7.4 U		7.6 U		8.2 U		7.7 U	25 U				35 U	34 U
AROCLOR-1260	7.4 U		7.6 U		10 J		8 J	31 J				35 U	34 U
BETA-BHC								0.81 U				1.8 U	1.7 U
DELTA-BHC								0.81 UJ				1.8 U	1.7 U
DIELDRIN								1.6 U				3.5 U	3.4 U
ENDOSULFAN I								0.81 U				1.8 U	1.7 U
ENDOSULFAN II								1.6 U				3.5 U	3.4 U
ENDOSULFAN SULFATE								1.6 U				3.5 U	3.4 U
ENDRIN								1.6 U				3.5 U	3.4 U
ENDRIN ALDEHYDE								1.6 U				3.5 U	3.4 U
ENDRIN KETONE								1.6 U				3.5 U	3.4 U
GAMMA-BHC (LINDANE)								0.81 U				1.8 U	1.7 U
GAMMA-CHLORDANE								0.81 U				1.8 U	1.7 U
HEPTACHLOR								0.81 U				1.8 U	1.7 U
HEPTACHLOR EPOXIDE								0.81 U				6.2 J	1.7 U
METHOXYCHLOR								8.1 U				18 U	17 U
TOTAL AROCLOR	7.4 U		7.6 U		10 J		8 J	31 J				40 U	39 U
TOXAPHENE								25 U				180 U	170 U
HERBICIDES (UG/KG)													
2,4,5-T													
2,4,5-TP (SILVEX)													
2,4-D													

EU	EU19	EU20	EU21	EU21	EU22	EU22	EU23	EU24	EU26	EU26	EU26	EU26	EU26
LOCATION ID	IOA-SS-EU19	SB09-007	IOA-SS-EU21	SB09-008	IOA-SS-EU22	SB09-009	IOA-SS-EU23	SB06-343	B8-MW-02	B8-MW-03	B8-MW-04	SB06-010	SB06-011
SAMPLE ID	IOA-SS-EU19-0002	SB09007-NSO-121698-0	IOA-SS-EU21-0002	SB09008-NSO-121698-0	IOA-SS-EU22-0002	SB09009-NSO-121698-0	IOA-SS-EU23-0002	SB06-343-NSO-072503	B8-8SB2AA	B8-8SB3AA	B8-8SB4AA	SB06010-NSO-120998-0	SB06011-NSO-120998-0
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20110811	19981216	20110811	19981216	20110811	19981216	20110810	20030725	19960730	19960731	19960802	19981209	19981209
TOP DEPTH	0	0	0	0	0	0	0	0	1	1	1	0	0
BOTTOM DEPTH	2	1	2	1	2	1	2	1	3	3	2.2	1	1
2,4-DB													
DALAPON													
DICAMBA													
DICHLOROPROP													
DINOSEB													
MCPA													
MCPP													
METALS (MG/KG)													
ALUMINUM	7400	5280 J		6620 J		7330 J	6800	5600				7620 J	7100 J
ANTIMONY	0.097 U	0.18 UJ		0.21 J		0.2 UJ	0.22 U	0.6 U				0.18 UJ	0.2 UJ
ARSENIC	5.9	1.8 J		1.9 J		1.9 J	2.2	3 J				3 J	2.1
BARIUM	21	9 J		14.6 J		16.9 J	19	12 J				23.5 J	12.2 J
BERYLLIUM	0.34	0.31 J		0.35 J		0.38 J	0.38	0.39 J				0.5	0.33 J
CADMIUM	0.21	0.21 U		0.23 U		0.23 J	0.44	0.028 J				0.21 UJ	0.23 U
CALCIUM	810	653 J		702 J		759 J	1500	440 U				3780	1000 J
CHROMIUM	8.9	6.1 J		7.2 J		8	7.5	6.8				12	9.1 J
COBALT	3.9	4.6		4		3.4	3.4	3.9 J				4.5	4.6
COPPER	8.5	6.3		5		6	6.6 J	6.7				10.9	10.7
IRON	10000	11500 J		10700 J		11900 J	12000	11000				13200 J	13100 J
LEAD	27	8 J		16.5 J		29.8 J	26	10				28.9	8.7 J
MAGNESIUM	1700	2170 J		1660 J		1710 J	1700	1800				2560 J	2790 J
MANGANESE	180 J	357 J		191 J		185 J	150 J	210				156 J	233 J
MERCURY	0.031	0.04 U		0.05 U		0.05 U	0.023 J	0.0098 J					0.04 UJ
NICKEL	8	7.1 J		5.5 J		6.5 J	8.7	6.3				11.6	7.8
POTASSIUM	240 J	260 J		240 U		314 J	310 J	300 U				596 J	286
SELENIUM	0.58 U	0.29 UJ		0.32 UJ		0.32 UJ	0.29 J	0.62 U				0.29 UJ	0.32 U
SILVER	0.084 U	0.07 U		0.07 U		0.08 U	0.06 J	0.12 R				0.07 UJ	0.27 UJ
SODIUM	38 J	40.9 U		36.1 J		46.5 J	29 J	62 U				77.5 J	44.6
THALLIUM	0.078 U	0.29 UJ		0.32 UJ		0.32 UJ	0.11 U	0.62 UJ				0.3 U	0.32 U
VANADIUM	15	13 J		16 J		21.6 J	20	20				39.8 J	13.8 J
ZINC	35	29.2 J		26.3 J		29.9 J	40	40				55.6 J	33.8 J
MISCELLANEOUS PARAMETERS (%)													
PERCENT MOISTURE	11		15		4		15	4.8					
PERCENT SOLIDS													
TOTAL SOLIDS		97										95	93
MISCELLANEOUS PARAMETERS (MG/KG)													
CYANIDE		0.21 U		0.21 U		0.23 U		1 U				0.22 U	0.21 U
EPH MADEP (UG/KG)													

EU	EU19	EU20	EU21	EU21	EU22	EU22	EU23	EU24	EU26	EU26	EU26	EU26	EU26
LOCATION ID	IOA-SS-EU19	SB09-007	IOA-SS-EU21	SB09-008	IOA-SS-EU22	SB09-009	IOA-SS-EU23	SB06-343	B8-MW-02	B8-MW-03	B8-MW-04	SB06-010	SB06-011
SAMPLE ID	IOA-SS-EU19-0002	SB09007-NSO-121698-0	IOA-SS-EU21-0002	SB09008-NSO-121698-0	IOA-SS-EU22-0002	SB09009-NSO-121698-0	IOA-SS-EU23-0002	SB06-343-NSO-072503	B8-8SB2AA	B8-8SB3AA	B8-8SB4AA	SB06010-NSO-120998-0	SB06011-NSO-120998-0
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20110811	19981216	20110811	19981216	20110811	19981216	20110810	20030725	19960730	19960731	19960802	19981209	19981209
TOP DEPTH	0	0	0	0	0	0	0	0	1	1	1	0	0
BOTTOM DEPTH	2	1	2	1	2	1	2	1	3	3	2.2	1	1
C11-C22 AROMATICS		15000 U		736000		85 U			65000	9000 U	9100 U	24000	17000 U
C11-C22 AROMATICS (WEIGHTED 1.0)													
C11-C22 AROMATICS-UNADJ		15000 U		737000		85 U							
C19-C36 ALIPHATICS		7200 U		7800 U		68200			1250	21 U	21.5 U	52000	18000
C19-C36 ALIPHATICS (WEIGHTED 0.005)													
C9-C18 ALIPHATICS		5400 U		5800 U		6400 U			2500	160 U	160 U	8900 J	8200 J
C9-C18 ALIPHATICS (WEIGHTED 0.05)													
EXTRACTABLE PETROLEUM HYDROCARBONS												85000 J	30000 U
DIOXINS/FURANS (NG/KG)													
1,2,3,4,6,7,8,9-OCDD								47				313.74 R	165.04 U
1,2,3,4,6,7,8,9-OCDF								0.41 U				28.27 R	15.99 J
1,2,3,4,6,7,8-HPCDD								1.7 U				13.07 R	7.36 U
1,2,3,4,6,7,8-HPCDF								0.47 U				17.49 R	8.86
1,2,3,4,7,8,9-HPCDF								0.25 U				0.64 R	0.35
1,2,3,4,7,8-HXCDD								0.3 U				0.21 R	0.11 J
1,2,3,4,7,8-HXCDF								0.2 U				4.46 R	2.1
1,2,3,6,7,8-HXCDD								0.28 U				0.56 R	0.24 J
1,2,3,6,7,8-HXCDF								0.19 U				1.48 R	0.69
1,2,3,7,8,9-HXCDD								0.83 U				0.52 R	0.17 J
1,2,3,7,8,9-HXCDF								0.23 U				0.1 R	0.17 U
1,2,3,7,8-PECDD								0.47 U				0.16 R	0.09 U
1,2,3,7,8-PECDF								0.33 U				0.56 R	0.26
2,3,4,6,7,8-HXCDF								0.27 U				1.22 R	0.62 J
2,3,4,7,8-PECDF								0.33 U				0.8 R	0.34
2,3,7,8-TCDD								0.33 U				6.85 R	0.92
2,3,7,8-TCDF								0.33 U				0.31 R	0.23 J
TEQ								0.0141				6.85 R	1.54
TEQ HALFND								0.612				6.85 R	1.65
TOTAL HPCDD								1.9 U				23.31	12.78
TOTAL HPCDF								0.47 U				25.46	12
TOTAL HXCDD								4.7				4.2	1.33
TOTAL HXCDF								0.67 U				31.51	12.13
TOTAL PECDD								3.2				1.59	0.34
TOTAL PECDF								1.3 U				34.62	16.29
TOTAL TCDD								18				7.15	0.92
TOTAL TCDF								97				12.18	6.04

TABLE A-2
ANALYTICAL RESULTS - SURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

EU	EU26	EU27	EU27	EU27	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU28
LOCATION ID	SB06-304	B8-MW-05	B8-MW-06	IOA-SS-EU27	AOC13-S1-SWE	AOC13-S1-SWN	AOC13-S1-SWW	AOC13-S2-SWE	AOC13-S2-SWE	AOC13-S2-SWE	AOC13-S2-SWN	AOC13-S2-SWW	AOC13-SW01
SAMPLE ID	SB06-304-NSO-0716030	B8-8SB5AA	B8-8SB6AA	IOA-SS-EU27-0002	S1SWE	S1SWN	S1SWW	S2SWE	S2SWE-AVG	S2SWE-D	S2SWN	S2SWW	NAS-AOC13-SW01
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	ORIG
SAMPLE DATE	20030716	19960805	19960805	20110810	20040311	20040311	20040311	20040311	20040311	20040311	20040311	20040311	20040929
TOP DEPTH	0	1	1	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	1	3	3	2	1	1	1	1	1	1	1	1	1
VOLATILES (UG/KG)													
1,1,1-TRICHLOROETHANE													
1,1,2,2-TETRACHLOROETHANE													
1,1,2-TRICHLOROETHANE													
1,1-DICHLOROETHANE													
1,1-DICHLOROETHENE													
1,2-DIBROMO-3-CHLOROPROPANE													
1,2-DIBROMOETHANE													
1,2-DICHLOROBENZENE													
1,2-DICHLOROETHANE													
1,2-DICHLOROPROPANE													
1,3-DICHLOROBENZENE													
1,4-DICHLOROBENZENE													
2-BUTANONE													
2-HEXANONE													
4-METHYL-2-PENTANONE													
ACETONE													
BENZENE		310 U	270 U										
BROMODICHLOROMETHANE													
BROMOFORM													
BROMOMETHANE													
CARBON DISULFIDE													
CARBON TETRACHLORIDE													
CHLOROBENZENE													
CHLORODIBROMOMETHANE													
CHLOROETHANE													
CHLOROFORM													
CHLOROMETHANE													
CIS-1,2-DICHLOROETHENE													
CIS-1,3-DICHLOROPROPENE													
ETHYLBENZENE		310 U	270 U										
M+P-XYLENES													
METHYLENE CHLORIDE													
STYRENE													
TETRACHLOROETHENE													
TOLUENE		940 U	820 U										
TOTAL 1,2-DICHLOROETHENE													
TOTAL XYLENES		1200 U	1100 U										
TRANS-1,2-DICHLOROETHENE													

EU	EU26	EU27	EU27	EU27	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU28
LOCATION ID	SB06-304	B8-MW-05	B8-MW-06	IOA-SS-EU27	AOC13-S1-SWE	AOC13-S1-SWN	AOC13-S1-SWW	AOC13-S2-SWE	AOC13-S2-SWE	AOC13-S2-SWE	AOC13-S2-SWN	AOC13-S2-SWW	AOC13-SW01
SAMPLE ID	SB06-304-NSO-0716030	B8-8SB5AA	B8-8SB6AA	IOA-SS-EU27-0002	S1SWE	S1SWN	S1SWW	S2SWE	S2SWE-AVG	S2SWE-D	S2SWN	S2SWW	NAS-AOC13-SW01
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	ORIG
SAMPLE DATE	20030716	19960805	19960805	20110810	20040311	20040311	20040311	20040311	20040311	20040311	20040311	20040311	20040929
TOP DEPTH	0	1	1	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	1	3	3	2	1	1	1	1	1	1	1	1	1
TRANS-1,3-DICHLOROPROPENE													
TRICHLOROETHENE													
VINYL CHLORIDE													
VPH MADEP (UG/KG)													
C5-C8 ALIPHATICS		315 U	270 U										
C5-C8 ALIPHATICS (WEIGHTED 0.5)													
C5-C8 ALIPHATICS-UNADJ													
C9-C10 AROMATICS		630 U	540 U										
C9-C10 AROMATICS (WEIGHTED 1.0)													
C9-C12 ALIPHATICS		31.5 U	27 U										
C9-C12 ALIPHATICS (WEIGHTED 0.05)													
C9-C12 ALIPHATICS-UNADJ													
METHYL TERT-BUTYL ETHER		940 U	820 U										
O-XYLENE		630 U	540 U										
TOTAL XYLENES		630 U	540 U										
VOLATILE PETROLEUM HYDROCARBONS													
SEMIVOLATILES (UG/KG)													
1,2,4-TRICHLOROBENZENE													
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		390 U	520 U		22 U	21 U	22 U	22 U	21.5 U	21 U	22 U	21 U	24 U
2-METHYLPHENOL													
2-NITROANILINE													
2-NITROPHENOL													
3&4-METHYLPHENOL													
3,3'-DICHLOROBENZIDINE													
3-NITROANILINE													
4,6-DINITRO-2-METHYLPHENOL													
4-BROMOPHENYL PHENYL ETHER													
4-CHLORO-3-METHYLPHENOL													

EU	EU26	EU27	EU27	EU27	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU28
LOCATION ID	SB06-304	B8-MW-05	B8-MW-06	IOA-SS-EU27	AOC13-S1-SWE	AOC13-S1-SWN	AOC13-S1-SWW	AOC13-S2-SWE	AOC13-S2-SWE	AOC13-S2-SWE	AOC13-S2-SWN	AOC13-S2-SWW	AOC13-SW01
SAMPLE ID	SB06-304-NSO-0716030	B8-8SB5AA	B8-8SB6AA	IOA-SS-EU27-0002	S1SWE	S1SWN	S1SWW	S2SWE	S2SWE-AVG	S2SWE-D	S2SWN	S2SWW	NAS-AOC13-SW01
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	ORIG
SAMPLE DATE	20030716	19960805	19960805	20110810	20040311	20040311	20040311	20040311	20040311	20040311	20040311	20040311	20040929
TOP DEPTH	0	1	1	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	1	3	3	2	1	1	1	1	1	1	1	1	1
4-CHLOROANILINE													
4-CHLOROPHENYL PHENYL ETHER													
4-METHYLPHENOL													
4-NITROANILINE													
4-NITROPHENOL													
ACENAPHTHENE		390 U	520 U		22 U	21 U	22 U	5.4 J	16.2 J	27	22 U	21 U	24 U
ACENAPHTHYLENE		390 U	520 U		22 U	21 U	22 U	22 U	21.5 U	21 U	22 U	21 U	24 U
ANTHRACENE		390 U	520 U		22 U	21 U	22 U	19 J	48 J	77	22 U	5.5 J	8.4 J
BAP EQUIVALENT-HALFND		390 U	520 U		22 U	21 U	22 U	75.2 J	141 J	206 J	22.5 J	46.1 J	40.7 J
BAP EQUIVALENT-POS		390 U	520 U		22 U	21 U	22 U	75.2 J	141 J	206 J	11.4 J	46.1 J	28.7 J
BENZO(A)ANTHRACENE		390 U	520 U		22 U	21 U	22 U	54	112	170	9.3 J	25	24
BENZO(A)PYRENE		390 U	520 U		22 U	21 U	22 U	50	95	140	8.7 J	29	21 J
BENZO(B)FLUORANTHENE		390 U	520 U		22 U	21 U	22 U	64	117	170	11 J	46	36
BENZO(G,H,I)PERYLENE		390 U	520 U		22 U	21 U	22 U	34	57.5	81	22 U	24	15 J
BENZO(K)FLUORANTHENE		390 U	520 U		22 U	21 U	22 U	25	44.5	64	22 U	17 J	12 J
BIS(2-CHLOROETHOXY)METHANE													
BIS(2-CHLOROETHYL)ETHER													
BIS(2-ETHYLHEXYL)PHTHALATE													
BUTYL BENZYL PHTHALATE													
CARBAZOLE													
CHRYSENE		390 U	520 U		22 U	21 U	22 U	53	102	150	9 J	31	28
DIBENZO(A,H)ANTHRACENE		390 U	520 U		22 U	21 U	22 U	9.2 J	15.1 J	21 J	22 U	7 J	24 U
DIBENZOFURAN													
DIETHYL PHTHALATE													
DIMETHYL PHTHALATE													
DI-N-BUTYL PHTHALATE													
DI-N-OCTYL PHTHALATE													
FLUORANTHENE		390 U	520 U		22 U	21 U	22 U	110	235	360	17 J	52	70
FLUORENE		390 U	520 U		22 U	21 U	22 U	22 U	20.5	30	22 U	21 U	24 U
HEXACHLOROBENZENE													
HEXACHLOROBUTADIENE													
HEXACHLOROCYCLOPENTADIENE													
HEXACHLOROETHANE													
INDENO(1,2,3-CD)PYRENE		390 U	520 U		22 U	21 U	22 U	39	68.5	98	6.3 J	28	16 J
ISOPHORONE													
NAPHTHALENE		390 U	520 U		22 U	21 U	22 U	22 U	21.5 U	21 U	22 U	21 U	24 U
NITROBENZENE													
N-NITROSO-DI-N-PROPYLAMINE													
N-NITROSODIPHENYLAMINE													

EU	EU26	EU27	EU27	EU27	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU28
LOCATION ID	SB06-304	B8-MW-05	B8-MW-06	IOA-SS-EU27	AOC13-S1-SWE	AOC13-S1-SWN	AOC13-S1-SWW	AOC13-S2-SWE	AOC13-S2-SWE	AOC13-S2-SWE	AOC13-S2-SWN	AOC13-S2-SWW	AOC13-SW01
SAMPLE ID	SB06-304-NSO-0716030	B8-8SB5AA	B8-8SB6AA	IOA-SS-EU27-0002	S1SWE	S1SWN	S1SWW	S2SWE	S2SWE-AVG	S2SWE-D	S2SWN	S2SWW	NAS-AOC13-SW01
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	ORIG
SAMPLE DATE	20030716	19960805	19960805	20110810	20040311	20040311	20040311	20040311	20040311	20040311	20040311	20040311	20040929
TOP DEPTH	0	1	1	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	1	3	3	2	1	1	1	1	1	1	1	1	1
PENTACHLOROPHENOL													
PHENANTHRENE		390 U	520 U		22 U	21 U	22 U	64	167	270	22 U	17 J	48
PHENOL													
PYRENE		390 U	2100 J		22 U	21 U	22 U	88	179	270	13 J	43	55
TOTAL PAHS		390 U	2100 J		22 U	21 U	22 U	615 J	1270 J	1930 J	74.3 J	324 J	333 J
PESTICIDES/PCBS (UG/KG)													
4,4'-DDD													
4,4'-DDE													
4,4'-DDT													
ALDRIN													
ALPHA-BHC													
ALPHA-CHLORDANE													
AROCLOR-1016				7.3 U									
AROCLOR-1221				7.3 U									
AROCLOR-1232				7.3 U									
AROCLOR-1242				7.3 U									
AROCLOR-1248				7.3 U									
AROCLOR-1254				7.3 U									
AROCLOR-1260				7.3 U									
BETA-BHC													
DELTA-BHC													
DIELDRIN													
ENDOSULFAN I													
ENDOSULFAN II													
ENDOSULFAN SULFATE													
ENDRIN													
ENDRIN ALDEHYDE													
ENDRIN KETONE													
GAMMA-BHC (LINDANE)													
GAMMA-CHLORDANE													
HEPTACHLOR													
HEPTACHLOR EPOXIDE													
METHOXYCHLOR													
TOTAL AROCLOR				7.3 U									
TOXAPHENE													
HERBICIDES (UG/KG)													
2,4,5-T													
2,4,5-TP (SILVEX)													
2,4-D													

EU	EU26	EU27	EU27	EU27	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU28
LOCATION ID	SB06-304	B8-MW-05	B8-MW-06	IOA-SS-EU27	AOC13-S1-SWE	AOC13-S1-SWN	AOC13-S1-SWW	AOC13-S2-SWE	AOC13-S2-SWE	AOC13-S2-SWE	AOC13-S2-SWN	AOC13-S2-SWW	AOC13-SW01
SAMPLE ID	SB06-304-NSO-0716030	B8-8SB5AA	B8-8SB6AA	IOA-SS-EU27-0002	S1SWE	S1SWN	S1SWW	S2SWE	S2SWE-AVG	S2SWE-D	S2SWN	S2SWW	NAS-AOC13-SW01
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	ORIG
SAMPLE DATE	20030716	19960805	19960805	20110810	20040311	20040311	20040311	20040311	20040311	20040311	20040311	20040311	20040929
TOP DEPTH	0	1	1	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	1	3	3	2	1	1	1	1	1	1	1	1	1
2,4-DB													
DALAPON													
DICAMBA													
DICHLOROPROP													
DINOSEB													
MCPA													
MCPP													
METALS (MG/KG)													
ALUMINUM				7100									
ANTIMONY				0.26 U									
ARSENIC				2.1									
BARIUM				19									
BERYLLIUM				0.33 U									
CADMIUM				0.18 U									
CALCIUM				870 J									
CHROMIUM				9.4									
COBALT				4.4									
COPPER				7.1									
IRON				14000									
LEAD				25 J									
MAGNESIUM				3100 J									
MANGANESE				140 J									
MERCURY				0.075									
NICKEL				16									
POTASSIUM				330									
SELENIUM				0.5 J									
SILVER				0.1 U									
SODIUM				37 J									
THALLIUM				0.075 U									
VANADIUM				33									
ZINC				57									
MISCELLANEOUS PARAMETERS (%)													
PERCENT MOISTURE	6.9			9	11.1	5.7	9.9	8.2	8.1	8	8.9	4.4	16.8
PERCENT SOLIDS													
TOTAL SOLIDS													
MISCELLANEOUS PARAMETERS (MG/KG)													
CYANIDE													
EPH MADEP (UG/KG)													

EU	EU26	EU27	EU27	EU27	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU28
LOCATION ID	SB06-304	B8-MW-05	B8-MW-06	IOA-SS-EU27	AOC13-S1-SWE	AOC13-S1-SWN	AOC13-S1-SWW	AOC13-S2-SWE	AOC13-S2-SWE	AOC13-S2-SWE	AOC13-S2-SWN	AOC13-S2-SWW	AOC13-SW01
SAMPLE ID	SB06-304-NSO-0716030	B8-8SB5AA	B8-8SB6AA	IOA-SS-EU27-0002	S1SWE	S1SWN	S1SWW	S2SWE	S2SWE-AVG	S2SWE-D	S2SWN	S2SWW	NAS-AOC13-SW01
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	ORIG
SAMPLE DATE	20030716	19960805	19960805	20110810	20040311	20040311	20040311	20040311	20040311	20040311	20040311	20040311	20040929
TOP DEPTH	0	1	1	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	1	3	3	2	1	1	1	1	1	1	1	1	1
C11-C22 AROMATICS		10000 U	8800 U										
C11-C22 AROMATICS (WEIGHTED 1.0)													
C11-C22 AROMATICS-UNADJ													
C19-C36 ALIPHATICS		24 U	21 U										
C19-C36 ALIPHATICS (WEIGHTED 0.005)													
C9-C18 ALIPHATICS		180 U	155 U										
C9-C18 ALIPHATICS (WEIGHTED 0.05)													
EXTRACTABLE PETROLEUM HYDROCARBONS													
DIOXINS/FURANS (NG/KG)													
1,2,3,4,6,7,8,9-OCDD	32			544									
1,2,3,4,6,7,8,9-OCDF	57			7.14									
1,2,3,4,6,7,8-HPCDD	2 U			37.6									
1,2,3,4,6,7,8-HPCDF	32			5.42									
1,2,3,4,7,8,9-HPCDF	0.75 U			0.989 U									
1,2,3,4,7,8-HXCDD	0.21 U			0.344 J									
1,2,3,4,7,8-HXCDF	3.5 J			1.04 J									
1,2,3,6,7,8-HXCDD	0.21 U			1.06 J									
1,2,3,6,7,8-HXCDF	1.9 U			1.31 J									
1,2,3,7,8,9-HXCDD	0.2 U			0.735 J									
1,2,3,7,8,9-HXCDF	0.69 U			0.989 U									
1,2,3,7,8-PECDD	0.37 U			0.247 U									
1,2,3,7,8-PECDF	0.68 U			0.28 J									
2,3,4,6,7,8-HXCDF	0.98 U			2.83									
2,3,4,7,8-PECDF	0.62 U			4.04									
2,3,7,8-TCDD	4.2			0.367 UJ									
2,3,7,8-TCDF	0.71 U			0.659 J									
TEQ	4.9			2.61 J									
TEQ HALFND	5.44			2.98 J									
TOTAL HPCDD	2.2 U			80.2									
TOTAL HPCDF	35			11.9									
TOTAL HXCDD	0.59 U			9.93 J									
TOTAL HXCDF	18			28.6									
TOTAL PECDD	0.37 U			3.58 J									
TOTAL PECDF	11			39.8 J									
TOTAL TCDD	4.8			1.88 J									
TOTAL TCDF	7.9			12.8 J									

EU	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU29	EU29	EU29	EU30	EU31
LOCATION ID	AOC13-SW01	AOC13-SW01	AOC13-SW02	AOC13-SW03	AOC13-SW04	IOA-SS-EU28	SB06-001	SB06-002	IOA-SS-EU29	IOA-SS-EU29	IOA-SS-EU29	IOA-SS-EU30	IOA-SS-EU31
SAMPLE ID	NAS-AOC13-SW01-AVG	NAS-AOC13-SW01-D	NAS-AOC13-SW02	NAS-AOC13-SW03	NAS-AOC13-SW04	IOA-SS-EU28-0002	SB06001-NSO-120898-0	SB06002-NSO-120898-0	IOA-SS-EU29-0002	IOA-SS-EU29-0002-AVG	IOA-SS-EU29-0002-D	IOA-SS-EU30-0002	IOA-SS-EU31-0002
SAMPLE CODE	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL
SAMPLE DATE	20040929	20040929	20040929	20040930	20040930	20110809	19981208	19981208	20110810	20110810	20110810	20110810	20110810
TOP DEPTH	0	0	0	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	1	1	1	1	1	2	1	1	2	2	2	2	2
VOLATILES (UG/KG)													
1,1,1-TRICHLOROETHANE							6.6 R	5.8 U					
1,1,2,2-TETRACHLOROETHANE							6.6 R	5.8 U					
1,1,2-TRICHLOROETHANE							6.6 R	5.8 U					
1,1-DICHLOROETHANE							6.6 R	5.8 U					
1,1-DICHLOROETHENE							6.6 R	5.8 U					
1,2-DIBROMO-3-CHLOROPROPANE													
1,2-DIBROMOETHANE													
1,2-DICHLOROBENZENE							6.6 R	5.8 UJ					
1,2-DICHLOROETHANE							6.6 R	5.8 U					
1,2-DICHLOROPROPANE							6.6 R	5.8 U					
1,3-DICHLOROBENZENE							6.6 R	5.8 UJ					
1,4-DICHLOROBENZENE							6.6 R	5.8 UJ					
2-BUTANONE							19 J	23 U					
2-HEXANONE							26 R	23 U					
4-METHYL-2-PENTANONE							26 R	23 U					
ACETONE							81 J	91 J					
BENZENE							6.6 R	5.8 U					
BROMODICHLOROMETHANE							6.6 R	5.8 U					
BROMOFORM							6.6 R	5.8 U					
BROMOMETHANE							13 R	12 U					
CARBON DISULFIDE							6.6 R	5.8 U					
CARBON TETRACHLORIDE							6.6 R	5.8 U					
CHLOROBENZENE							6.6 R	5.8 U					
CHLORODIBROMOMETHANE							6.6 R	5.8 U					
CHLOROETHANE							13 R	12 U					
CHLOROFORM							6.6 R	5.8 U					
CHLOROMETHANE							13 R	12 UJ					
CIS-1,2-DICHLOROETHENE													
CIS-1,3-DICHLOROPROPENE							6.6 R	5.8 U					
ETHYLBENZENE							6.6 R	5.8 U					
M+P-XYLENES													
METHYLENE CHLORIDE							6.6 R	5.8 U					
STYRENE							6.6 R	5.8 U					
TETRACHLOROETHENE							6.6 R	5.8 U					
TOLUENE							6.6 R	5.8 U					
TOTAL 1,2-DICHLOROETHENE							6.6 R	5.8 U					
TOTAL XYLENES							6.6 R	5.8 U					
TRANS-1,2-DICHLOROETHENE													

EU	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU29	EU29	EU29	EU30	EU31
LOCATION ID	AOC13-SW01	AOC13-SW01	AOC13-SW02	AOC13-SW03	AOC13-SW04	IOA-SS-EU28	SB06-001	SB06-002	IOA-SS-EU29	IOA-SS-EU29	IOA-SS-EU29	IOA-SS-EU30	IOA-SS-EU31
SAMPLE ID	NAS-AOC13-SW01-AVG	NAS-AOC13-SW01-D	NAS-AOC13-SW02	NAS-AOC13-SW03	NAS-AOC13-SW04	IOA-SS-EU28-0002	SB06001-NSO-120898-0	SB06002-NSO-120898-0	IOA-SS-EU29-0002	IOA-SS-EU29-0002-AVG	IOA-SS-EU29-0002-D	IOA-SS-EU30-0002	IOA-SS-EU31-0002
SAMPLE CODE	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL
SAMPLE DATE	20040929	20040929	20040929	20040930	20040930	20110809	19981208	19981208	20110810	20110810	20110810	20110810	20110810
TOP DEPTH	0	0	0	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	1	1	1	1	1	2	1	1	2	2	2	2	2
TRANS-1,3-DICHLOROPROPENE							6.6 R	5.8 U					
TRICHLOROETHENE							6.6 R	5.8 U					
VINYL CHLORIDE							13 R	12 U					
VPH MADEP (UG/KG)													
C5-C8 ALIPHATICS													
C5-C8 ALIPHATICS (WEIGHTED 0.5)													
C5-C8 ALIPHATICS-UNADJ													
C9-C10 AROMATICS													
C9-C10 AROMATICS (WEIGHTED 1.0)													
C9-C12 ALIPHATICS													
C9-C12 ALIPHATICS (WEIGHTED 0.05)													
C9-C12 ALIPHATICS-UNADJ													
METHYL TERT-BUTYL ETHER													
O-XYLENE													
TOTAL XYLENES													
VOLATILE PETROLEUM HYDROCARBONS													
SEMIVOLATILES (UG/KG)													
1,2,4-TRICHLOROBENZENE							2800 U	350 U					
2,2'-OXYBIS(1-CHLOROPROPANE)							2800 U	350 U					
2,4,5-TRICHLOROPHENOL							4000 U	1800 U					
2,4,6-TRICHLOROPHENOL							2800 U	350 U					
2,4-DICHLOROPHENOL							2800 U	350 U					
2,4-DIMETHYLPHENOL							2800 U	350 U					
2,4-DINITROPHENOL							4000 U	1800 U					
2,4-DINITROTOLUENE							2800 U	350 U					
2,6-DINITROTOLUENE							2800 U	350 U					
2-CHLORONAPHTHALENE							2800 U	350 U					
2-CHLOROPHENOL							2800 U	350 U					
2-METHYLNAPHTHALENE	24 U	24 U	23 U	21 U	7.4 J		1600 UJ	580	18 J	29.5 J	41 J	92 UJ	95 UJ
2-METHYLPHENOL							2800 U	350 U					
2-NITROANILINE							4000 U	1800 U					
2-NITROPHENOL							2800 U	350 U					
3&4-METHYLPHENOL													
3,3'-DICHLOROBENZIDINE							2800 U	350 UJ					
3-NITROANILINE							4000 U	1800 U					
4,6-DINITRO-2-METHYLPHENOL							2000 U	250 U					
4-BROMOPHENYL PHENYL ETHER							2800 U	350 U					
4-CHLORO-3-METHYLPHENOL							2800 U	350 U					

U - NOT DETECTED; J - QUANTITATION APPROXIMATE; R - REJECTED

EU	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU29	EU29	EU29	EU30	EU31
LOCATION ID	AOC13-SW01	AOC13-SW01	AOC13-SW02	AOC13-SW03	AOC13-SW04	IOA-SS-EU28	SB06-001	SB06-002	IOA-SS-EU29	IOA-SS-EU29	IOA-SS-EU29	IOA-SS-EU30	IOA-SS-EU31
SAMPLE ID	NAS-AOC13-SW01-AVG	NAS-AOC13-SW01-D	NAS-AOC13-SW02	NAS-AOC13-SW03	NAS-AOC13-SW04	IOA-SS-EU28-0002	SB06001-NSO-120898-0	SB06002-NSO-120898-0	IOA-SS-EU29-0002	IOA-SS-EU29-0002-AVG	IOA-SS-EU29-0002-D	IOA-SS-EU30-0002	IOA-SS-EU31-0002
SAMPLE CODE	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL
SAMPLE DATE	20040929	20040929	20040929	20040930	20040930	20110809	19981208	19981208	20110810	20110810	20110810	20110810	20110810
TOP DEPTH	0	0	0	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	1	1	1	1	1	2	1	1	2	2	2	2	2
4-CHLOROANILINE							2800 U	350 U					
4-CHLOROPHENYL PHENYL ETHER							2800 U	350 U					
4-METHYLPHENOL							2800 U	350 U					
4-NITROANILINE							4000 U	1800 U					
4-NITROPHENOL							4000 U	1800 U					
ACENAPHTHENE	16 J	20 J	23 U	21 U	63		920	2800 J	330 J	275 J	220 J	92 UJ	95 UJ
ACENAPHTHYLENE	24 U	24 U	23 U	21 U	24 U		1600 UJ	340 J	13 J	28.8 J	89 UJ	92 UJ	95 UJ
ANTHRACENE	24.7 J	41	23 U	21 U	130		2500 J	5400 J	660 J	585 J	510 J	92 UJ	95 UJ
BAP EQUIVALENT-HALFND	92.4 J	144 J	23 U	21 U	413		6710 J	15600 J	1880 J	1920 J	1960 J	154 J	95 UJ
BAP EQUIVALENT-POS	86.4 J	144 J	23 U	21 U	413		6710 J	15600 J	1880 J	1920 J	1960 J	4 J	95 UJ
BENZO(A)ANTHRACENE	67	110	23 U	21 U	300		6000 J	12000 J	1700 J	1600 J	1500 J	40 J	95 UJ
BENZO(A)PYRENE	57 J	93	23 U	21 U	270		4800 J	11000 J	1300 J	1350 J	1400 J	92 UJ	95 UJ
BENZO(B)FLUORANTHENE	88	140	23 U	21 U	370		6100 J	17000 J	2000 J	1950 J	1900 J	92 UJ	95 UJ
BENZO(G,H,I)PERYLENE	43 J	71	23 U	21 U	210		2900 J	8200 J	480 J	535 J	590 J	92 UJ	95 UJ
BENZO(K)FLUORANTHENE	29 J	46	23 U	21 U	130		4600 J	9400 J	800 J	845 J	890 J	92 UJ	95 UJ
BIS(2-CHLOROETHOXY)METHANE							2800 U	350 U					
BIS(2-CHLOROETHYL)ETHER							2800 U	350 U					
BIS(2-ETHYLHEXYL)PHTHALATE							610	1400 J					
BUTYL BENZYL PHTHALATE							2800 U	150 J					
CARBAZOLE							960	2200					
CHRYSENE	69	110	23 U	21 U	320		6800 J	14000 J	1800 J	1700 J	1600 J	92 UJ	95 UJ
DIBENZO(A,H)ANTHRACENE	14.5 J	17 J	23 U	21 U	52		290 J	720 J	150 J	150 J	150 J	180 UJ	190 UJ
DIBENZOFURAN							2800 U	1300					
DIETHYL PHTHALATE							2800 U	350 U					
DIMETHYL PHTHALATE							2800 U	350 U					
DI-N-BUTYL PHTHALATE							2800 U	350 U					
DI-N-OCTYL PHTHALATE							2800 UJ	350 UJ					
FLUORANTHENE	185	300	23 U	21 U	730		14000 J	28000 J	2600 J	3050 J	3500 J	39 J	95 UJ
FLUORENE	16.5 J	21 J	23 U	21 U	57		850	2500 J	250 J	235 J	220 J	92 UJ	95 UJ
HEXACHLOROBENZENE							2800 U	350 U					
HEXACHLOROBUTADIENE							2800 U	350 U					
HEXACHLOROCYCLOPENTADIENE							2800 U	350 U					
HEXACHLOROETHANE							2800 U	350 U					
INDENO(1,2,3-CD)PYRENE	50.5 J	85	23 U	21 U	220		3600 J	8300 J	480 J	530 J	580 J	180 UJ	190 UJ
ISOPHORONE							2800 U	350 U					
NAPHTHALENE	24 U	24 U	23 U	21 U	7.1 J		1600 UJ	670	19 J	45 J	71 J	92 UJ	95 UJ
NITROBENZENE							2800 U	350 U					
N-NITROSO-DI-N-PROPYLAMINE							820 U	100 U					
N-NITROSODIPHENYLAMINE							2800 U	350 U					

EU	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU29	EU29	EU29	EU30	EU31
LOCATION ID	AOC13-SW01	AOC13-SW01	AOC13-SW02	AOC13-SW03	AOC13-SW04	IOA-SS-EU28	SB06-001	SB06-002	IOA-SS-EU29	IOA-SS-EU29	IOA-SS-EU29	IOA-SS-EU30	IOA-SS-EU31
SAMPLE ID	NAS-AOC13-SW01-AVG	NAS-AOC13-SW01-D	NAS-AOC13-SW02	NAS-AOC13-SW03	NAS-AOC13-SW04	IOA-SS-EU28-0002	SB06001-NSO-120898-0	SB06002-NSO-120898-0	IOA-SS-EU29-0002	IOA-SS-EU29-0002-AVG	IOA-SS-EU29-0002-D	IOA-SS-EU30-0002	IOA-SS-EU31-0002
SAMPLE CODE	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL
SAMPLE DATE	20040929	20040929	20040929	20040930	20040930	20110809	19981208	19981208	20110810	20110810	20110810	20110810	20110810
TOP DEPTH	0	0	0	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	1	1	1	1	1	2	1	1	2	2	2	2	2
PENTACHLOROPHENOL							4000 U	1800 U					
PHENANTHRENE	134	220	23 U	21 U	560		9900 J	18000 J	1800 J	2000 J	2200 J	92 UJ	95 UJ
PHENOL							2800 U	350 U					
PYRENE	138	220	23 U	21 U	560		13000 J	33000 J	2900 J	2950 J	3000 J	92 UJ	95 UJ
TOTAL PAHS	912 J	1490 J	23 U	21 U	3990 J		76300 J	172000 J	17300 J	17800 J	18400 J	79 J	106 UJ
PESTICIDES/PCBS (UG/KG)													
4,4'-DDD							33 J	53 J					
4,4'-DDE							29	110 J					
4,4'-DDT							66 J	130 J					
ALDRIN							1.7 U	5.1 J					
ALPHA-BHC							1.7 U	1.7 U					
ALPHA-CHLORDANE							1.7 U	18 J					
AROCLOR-1016							34 U	35 U	7.2 U	7.2 U	7.2 U	7.3 U	7.6 U
AROCLOR-1221							34 U	35 U	7.2 U	7.2 U	7.2 U	7.3 U	7.6 U
AROCLOR-1232							69 U	70 U	7.2 U	7.2 U	7.2 U	7.3 U	7.6 U
AROCLOR-1242							34 U	35 U	7.2 U	7.2 U	7.2 U	7.3 U	7.6 U
AROCLOR-1248							34 U	35 U	7.2 U	7.2 U	7.2 U	7.3 U	7.6 U
AROCLOR-1254							34 U	35 U	7.2 U	7.2 U	7.2 U	7.3 U	7.6 U
AROCLOR-1260							34 U	35 U	59	61	63	86	150
BETA-BHC							1.7 U	1.7 U					
DELTA-BHC							1.7 U	1.7 U					
DIELDRIN							3.4 U	3.5 U					
ENDOSULFAN I							1.7 U	1.7 U					
ENDOSULFAN II							7.8 J	26 J					
ENDOSULFAN SULFATE							11 J	53 J					
ENDRIN							3.4 U	3.5 U					
ENDRIN ALDEHYDE							23 J	41 J					
ENDRIN KETONE							16 J	74 J					
GAMMA-BHC (LINDANE)							1.7 U	1.7 U					
GAMMA-CHLORDANE							1.7 U	2.5 J					
HEPTACHLOR							1.7 U	1.7 U					
HEPTACHLOR EPOXIDE							63 J	200 J					
METHOXYCHLOR							38 J	17 U					
TOTAL AROCLOR							39 U	40 U	59	61	63	86	150
TOXAPHENE							170 U	170 U					
HERBICIDES (UG/KG)													
2,4,5-T													
2,4,5-TP (SILVEX)													
2,4-D													

EU	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU29	EU29	EU29	EU30	EU31
LOCATION ID	AOC13-SW01	AOC13-SW01	AOC13-SW02	AOC13-SW03	AOC13-SW04	IOA-SS-EU28	SB06-001	SB06-002	IOA-SS-EU29	IOA-SS-EU29	IOA-SS-EU29	IOA-SS-EU30	IOA-SS-EU31
SAMPLE ID	NAS-AOC13-SW01-AVG	NAS-AOC13-SW01-D	NAS-AOC13-SW02	NAS-AOC13-SW03	NAS-AOC13-SW04	IOA-SS-EU28-0002	SB06001-NSO-120898-0	SB06002-NSO-120898-0	IOA-SS-EU29-0002	IOA-SS-EU29-0002-AVG	IOA-SS-EU29-0002-D	IOA-SS-EU30-0002	IOA-SS-EU31-0002
SAMPLE CODE	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL
SAMPLE DATE	20040929	20040929	20040929	20040930	20040930	20110809	19981208	19981208	20110810	20110810	20110810	20110810	20110810
TOP DEPTH	0	0	0	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	1	1	1	1	1	2	1	1	2	2	2	2	2
2,4-DB													
DALAPON													
DICAMBA													
DICHLOROPROP													
DINOSEB													
MCPA													
MCPP													
METALS (MG/KG)													
ALUMINUM							4740 J	5230 J	7800	6900	6000	13000	7000
ANTIMONY							0.19 UJ	0.21 UJ	0.24 U	0.22 U	0.2 U	0.1 U	0.092 U
ARSENIC							2.6	4.1	6.4	5.7	5	1.5	2.2
BARIUM							13.5	18	18	16.5	15	17	17
BERYLLIUM							0.4 J	0.43 J	0.46	0.42	0.38	0.42	0.41
CADMIUM							0.33 J	0.24 U	0.24 U	0.22 U	0.2 U	0.15 U	0.27 U
CALCIUM							761	640	480 J	400 J	320 J	1100 J	1100 J
CHROMIUM							11.9	18.7	14	12	10	17	10
COBALT							3.4	4	3	2.55	2.1	3.9	4.1
COPPER							61.9	62.8	4.2	3.75	3.3	5.7	9.2
IRON							11100	13200	21000	19000	17000	16000	18000
LEAD							90.7	114	20 J	16 J	12 J	9.3 J	10 J
MAGNESIUM							1600	2160	1800 J	1450 J	1100 J	3600 J	2600 J
MANGANESE							209	294	100 J	92 J	84 J	200 J	440 J
MERCURY							0.07 U	0.2 UJ	0.0073 J	0.0073 J	0.0073 J	0.019 J	0.0014 J
NICKEL							8.9	11.3	7.7	6.35	5	11	9
POTASSIUM							281	292	480	435	390	230	440
SELENIUM							0.31 U	0.37 J	0.79 J	0.635 J	0.48 J	0.85 J	0.48 J
SILVER							0.26 UJ	0.28 U	0.092 U	0.0795 U	0.067 U	0.095 U	0.06 U
SODIUM							40.6 U	38.8 U	38 J	33 J	28 J	46 J	59 J
THALLIUM							0.31 U	0.34 U	0.088 U	0.088 U	0.088 U	0.089 U	0.079 U
VANADIUM							33.1	38	39	34.5	30	21	17
ZINC							53.2	70	29	25	21	34	36
MISCELLANEOUS PARAMETERS (%)													
PERCENT MOISTURE	16.6	16.4	11.4	7.7	15.4				8	7.5	7	10	12
PERCENT SOLIDS													
TOTAL SOLIDS							94	94					
MISCELLANEOUS PARAMETERS (MG/KG)													
CYANIDE							0.22 U	0.22 U					
EPH MADEP (UG/KG)													

EU	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU28	EU29	EU29	EU29	EU30	EU31
LOCATION ID	AOC13-SW01	AOC13-SW01	AOC13-SW02	AOC13-SW03	AOC13-SW04	IOA-SS-EU28	SB06-001	SB06-002	IOA-SS-EU29	IOA-SS-EU29	IOA-SS-EU29	IOA-SS-EU30	IOA-SS-EU31
SAMPLE ID	NAS-AOC13-SW01-AVG	NAS-AOC13-SW01-D	NAS-AOC13-SW02	NAS-AOC13-SW03	NAS-AOC13-SW04	IOA-SS-EU28-0002	SB06001-NSO-120898-0	SB06002-NSO-120898-0	IOA-SS-EU29-0002	IOA-SS-EU29-0002-AVG	IOA-SS-EU29-0002-D	IOA-SS-EU30-0002	IOA-SS-EU31-0002
SAMPLE CODE	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL
SAMPLE DATE	20040929	20040929	20040929	20040930	20040930	20110809	19981208	19981208	20110810	20110810	20110810	20110810	20110810
TOP DEPTH	0	0	0	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	1	1	1	1	1	2	1	1	2	2	2	2	2
C11-C22 AROMATICS							110000 J	260000 J					
C11-C22 AROMATICS (WEIGHTED 1.0)													
C11-C22 AROMATICS-UNADJ													
C19-C36 ALIPHATICS							71000 J	73000					
C19-C36 ALIPHATICS (WEIGHTED 0.005)													
C9-C18 ALIPHATICS							8400 J	12000 J					
C9-C18 ALIPHATICS (WEIGHTED 0.05)													
EXTRACTABLE PETROLEUM HYDROCARBONS							190000 J	340000 J					
DIOXINS/FURANS (NG/KG)													
1,2,3,4,6,7,8,9-OCDD						704							
1,2,3,4,6,7,8,9-OCDF						6.03							
1,2,3,4,6,7,8-HPCDD						16.7							
1,2,3,4,6,7,8-HPCDF						4.77							
1,2,3,4,7,8,9-HPCDF						1.08 U							
1,2,3,4,7,8-HXCDD						0.254 J							
1,2,3,4,7,8-HXCDF						1.3 J							
1,2,3,6,7,8-HXCDD						0.539 U							
1,2,3,6,7,8-HXCDF						1.75 J							
1,2,3,7,8,9-HXCDD						0.539 U							
1,2,3,7,8,9-HXCDF						0.502 J							
1,2,3,7,8-PECDD						0.269 U							
1,2,3,7,8-PECDF						0.539 U							
2,3,4,6,7,8-HXCDF						4.23							
2,3,4,7,8-PECDF						7.6							
2,3,7,8-TCDD						0.219 U							
2,3,7,8-TCDF						0.568 UJ							
TEQ						3.51 J							
TEQ HALFND						3.85 J							
TOTAL HPCDD						40.1							
TOTAL HPCDF						10.5 J							
TOTAL HXCDD						3.3 J							
TOTAL HXCDF						43.4 J							
TOTAL PECDD						1.75 J							
TOTAL PECDF						57.3 J							
TOTAL TCDD						0.219 U							
TOTAL TCDF						13.2 J							

EU	EU32	EU32	EU32	EU33	EU34	EU35	EU36	EU37	EU37	EU37	EU37	EU37	EU37
LOCATION ID	IOA-SS-EU32	IOA-SS-EU32	IOA-SS-EU32	IOA-SS-EU33	IOA-SS-EU34	IOA-SS-EU35	IOA-SS-EU36	IOA-SS-EU37	MW06-013	SB06-008	SB06-008	SB06-008	SB06-009
SAMPLE ID	IOA-SS-EU32-0002	IOA-SS-EU32-0002-AVG	IOA-SS-EU32-0002-D	IOA-SS-EU33-0002	IOA-SS-EU34-0002	IOA-SS-EU35-0002	IOA-SS-EU36-0002	IOA-SS-EU37-0002	MW06013-NSO-112498-0	SB06008-NSO-120898-0	SB06008-NSO-120898-0-AVG	SB06008-NSO-120898-0-D	SB06009-NSO-120898-0
SAMPLE CODE	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL
SAMPLE DATE	20110811	20110811	20110811	20110810	20110810	20110810	20110810	20110809	19981124	19981208	19981208	19981208	19981208
TOP DEPTH	0	0	0	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	2	2	2	2	2	2	2	2	1	1	1	1	1
VOLATILES (UG/KG)													
1,1,1-TRICHLOROETHANE									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
1,1,2,2-TETRACHLOROETHANE									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
1,1,2-TRICHLOROETHANE									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
1,1-DICHLOROETHANE									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
1,1-DICHLOROETHENE									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
1,2-DIBROMO-3-CHLOROPROPANE													
1,2-DIBROMOETHANE													
1,2-DICHLOROBENZENE									5.1 R	5.5 UJ	5.55 UJ	5.6 UJ	5.1 UJ
1,2-DICHLOROETHANE									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
1,2-DICHLOROPROPANE									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
1,3-DICHLOROBENZENE									5.1 R	5.5 UJ	5.55 UJ	5.6 UJ	5.1 UJ
1,4-DICHLOROBENZENE									5.1 R	5.5 UJ	5.55 UJ	5.6 UJ	5.1 UJ
2-BUTANONE									21 R	22 U	22 U	22 U	21 U
2-HEXANONE									21 R	22 U	22 U	22 U	21 U
4-METHYL-2-PENTANONE									21 R	22 U	22 U	22 U	21 U
ACETONE									21 R	13 J	14 J	15 J	16 J
BENZENE									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
BROMODICHLOROMETHANE									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
BROMOFORM									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
BROMOMETHANE									10 R	11 U	11 U	11 U	10 U
CARBON DISULFIDE									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
CARBON TETRACHLORIDE									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
CHLOROBENZENE									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
CHLORODIBROMOMETHANE									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
CHLOROETHANE									10 R	11 U	11 U	11 U	10 U
CHLOROFORM									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
CHLOROMETHANE									10 R	11 UJ	11 UJ	11 UJ	10 UJ
CIS-1,2-DICHLOROETHENE													
CIS-1,3-DICHLOROPROPENE									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
ETHYLBENZENE									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
M+P-XYLENES													
METHYLENE CHLORIDE									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
STYRENE									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
TETRACHLOROETHENE									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
TOLUENE									5.1 R	5.5 U	2.12 J	1.5 J	3.7 J
TOTAL 1,2-DICHLOROETHENE									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
TOTAL XYLENES									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
TRANS-1,2-DICHLOROETHENE													

EU	EU32	EU32	EU32	EU33	EU34	EU35	EU36	EU37	EU37	EU37	EU37	EU37	EU37
LOCATION ID	IOA-SS-EU32	IOA-SS-EU32	IOA-SS-EU32	IOA-SS-EU33	IOA-SS-EU34	IOA-SS-EU35	IOA-SS-EU36	IOA-SS-EU37	MW06-013	SB06-008	SB06-008	SB06-008	SB06-009
SAMPLE ID	IOA-SS-EU32-0002	IOA-SS-EU32-0002-AVG	IOA-SS-EU32-0002-D	IOA-SS-EU33-0002	IOA-SS-EU34-0002	IOA-SS-EU35-0002	IOA-SS-EU36-0002	IOA-SS-EU37-0002	MW06013-NSO-112498-0	SB06008-NSO-120898-0	SB06008-NSO-120898-0-AVG	SB06008-NSO-120898-0-D	SB06009-NSO-120898-0
SAMPLE CODE	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL
SAMPLE DATE	20110811	20110811	20110811	20110810	20110810	20110810	20110810	20110809	19981124	19981208	19981208	19981208	19981208
TOP DEPTH	0	0	0	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	2	2	2	2	2	2	2	2	1	1	1	1	1
TRANS-1,3-DICHLOROPROPENE									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
TRICHLOROETHENE									5.1 R	5.5 U	5.55 U	5.6 U	5.1 U
VINYL CHLORIDE									10 R	11 U	11 U	11 U	10 U
VPH MADEP (UG/KG)													
C5-C8 ALIPHATICS													
C5-C8 ALIPHATICS (WEIGHTED 0.5)													
C5-C8 ALIPHATICS-UNADJ													
C9-C10 AROMATICS													
C9-C10 AROMATICS (WEIGHTED 1.0)													
C9-C12 ALIPHATICS													
C9-C12 ALIPHATICS (WEIGHTED 0.05)													
C9-C12 ALIPHATICS-UNADJ													
METHYL TERT-BUTYL ETHER													
O-XYLENE													
TOTAL XYLENES													
VOLATILE PETROLEUM HYDROCARBONS													
SEMIVOLATILES (UG/KG)													
1,2,4-TRICHLOROBENZENE									350 U	350 U	355 U	360 U	360 U
2,2'-OXYBIS(1-CHLOROPROPANE)									350 U	350 U	355 U	360 U	360 U
2,4,5-TRICHLOROPHENOL									1700 U	1800 U	1800 U	1800 U	1800 U
2,4,6-TRICHLOROPHENOL									350 U	350 U	355 U	360 U	360 U
2,4-DICHLOROPHENOL									350 U	350 U	355 U	360 U	360 U
2,4-DIMETHYLPHENOL									350 U	350 U	355 U	360 U	360 U
2,4-DINITROPHENOL									1700 UJ	1800 U	1800 U	1800 U	1800 U
2,4-DINITROTOLUENE									350 U	350 U	355 U	360 U	360 U
2,6-DINITROTOLUENE									350 U	350 U	355 U	360 U	360 U
2-CHLORONAPHTHALENE									350 U	350 U	355 U	360 U	360 U
2-CHLOROPHENOL									350 U	350 U	355 U	360 U	360 U
2-METHYLNAPHTHALENE	19 UJ	19 UJ	19 UJ	18 UJ	20 UJ	18 UJ	13 J		350 U	310 J	295 J	280 J	180 J
2-METHYLPHENOL									350 U	350 U	355 U	360 U	360 U
2-NITROANILINE									1700 U	1800 U	1800 U	1800 U	1800 U
2-NITROPHENOL									350 U	350 U	355 U	360 U	360 U
3&4-METHYLPHENOL													
3,3'-DICHLOROBENZIDINE									350 UJ	350 U	355 U	360 U	360 UJ
3-NITROANILINE									1700 U	1800 U	1800 U	1800 U	1800 U
4,6-DINITRO-2-METHYLPHENOL									250 UJ	260 U	260 U	260 U	260 UJ
4-BROMOPHENYL PHENYL ETHER									350 U	350 U	355 U	360 U	360 UJ
4-CHLORO-3-METHYLPHENOL									350 U	350 U	355 U	360 U	360 U

EU	EU32	EU32	EU32	EU33	EU34	EU35	EU36	EU37	EU37	EU37	EU37	EU37	EU37
LOCATION ID	IOA-SS-EU32	IOA-SS-EU32	IOA-SS-EU32	IOA-SS-EU33	IOA-SS-EU34	IOA-SS-EU35	IOA-SS-EU36	IOA-SS-EU37	MW06-013	SB06-008	SB06-008	SB06-008	SB06-009
SAMPLE ID	IOA-SS-EU32-0002	IOA-SS-EU32-0002-AVG	IOA-SS-EU32-0002-D	IOA-SS-EU33-0002	IOA-SS-EU34-0002	IOA-SS-EU35-0002	IOA-SS-EU36-0002	IOA-SS-EU37-0002	MW06013-NSO-112498-0	SB06008-NSO-120898-0	SB06008-NSO-120898-0-AVG	SB06008-NSO-120898-0-D	SB06009-NSO-120898-0
SAMPLE CODE	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL
SAMPLE DATE	20110811	20110811	20110811	20110810	20110810	20110810	20110810	20110809	19981124	19981208	19981208	19981208	19981208
TOP DEPTH	0	0	0	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	2	2	2	2	2	2	2	2	1	1	1	1	1
4-CHLOROANILINE									350 U	350 U	355 U	360 U	360 U
4-CHLOROPHENYL PHENYL ETHER									350 U	350 U	355 U	360 U	360 U
4-METHYLPHENOL									350 U	350 U	355 U	360 U	360 U
4-NITROANILINE									1700 U	1800 U	1800 U	1800 U	1800 U
4-NITROPHENOL									1700 U	1800 U	1800 U	1800 U	1800 U
ACENAPHTHENE	19 UJ	19 UJ	19 UJ	18 UJ	8 J	18 UJ	120 J		350 U	350 U	355 U	360 U	360 U
ACENAPHTHYLENE	19 UJ	19 UJ	19 UJ	13 J	20 UJ	18 UJ	10 J		350 U	350 U	355 U	360 U	360 U
ANTHRACENE	19 UJ	19 UJ	19 UJ	11 J	19 J	18 UJ	210 J		350 U	350 U	134 J	93 J	88 J
BAP EQUIVALENT-HALFND	47.4 J	43.8 J	40.2 J	75.1 J	85.9 J	30.5 J	648 J		1800 U	311 J	602 J	893 J	224 J
BAP EQUIVALENT-POS	27 J	23.2 J	19.3 J	57.1 J	63.9 J	0.7 J	648 J		1800 U	311 J	602 J	893 J	224 J
BENZO(A)ANTHRACENE	20 J	18 J	16 J	37 J	51 J	18 UJ	630 J		350 UJ	270 J	350 J	430	280 J
BENZO(A)PYRENE	20 J	17.5 J	15 J	42 J	51 J	18 UJ	440 J		1800 U	160 J	385 J	610 J	100 J
BENZO(B)FLUORANTHENE	48 J	37 J	26 J	77 J	74 J	7 J	750 J		350 UJ	630	815	1000	500
BENZO(G,H,I)PERYLENE	19 UJ	19 UJ	19 UJ	36 J	31 J	18 UJ	150 J		350 UJ	270 J	335 J	400	260 J
BENZO(K)FLUORANTHENE	20 J	16 J	12 J	53 J	36 J	18 UJ	250 J		350 UJ	150 J	190 J	230 J	150 J
BIS(2-CHLOROETHOXY)METHANE									350 U	350 U	355 U	360 U	360 U
BIS(2-CHLOROETHYL)ETHER									350 U	350 U	355 U	360 U	360 U
BIS(2-ETHYLHEXYL)PHTHALATE									350 UJ	170 J	145 J	120 J	360 UJ
BUTYL BENZYL PHTHALATE									350 UJ	140 J	160 J	360 U	360 UJ
CARBAZOLE									350 U	350 U	355 U	360 U	360 UJ
CHRYSENE	33 J	25.5 J	18 J	53 J	67 J	18 UJ	700 J		350 UJ	630	695	760	470 J
DIBENZO(A,H)ANTHRACENE	37 UJ	37.5 UJ	38 UJ	36 UJ	40 UJ	36 UJ	52 J		2.1 U	31 J	59.5 J	88 J	13 J
DIBENZOFURAN									350 U	200 J	180 J	160 J	120 J
DIETHYL PHTHALATE									350 U	350 U	355 U	360 U	360 U
DIMETHYL PHTHALATE									350 U	350 U	355 U	360 U	360 U
DI-N-BUTYL PHTHALATE									350 U	350 U	355 U	360 U	360 UJ
DI-N-OCTYL PHTHALATE									350 UJ	350 U	355 U	360 U	360 U
FLUORANTHENE	49 J	37.5 J	26 J	68 J	150 J	7 J	1300 J		350 U	450	580	710	600 J
FLUORENE	19 UJ	19 UJ	19 UJ	18 UJ	20 UJ	18 UJ	97 J		350 U	350 U	355 U	360 U	360 U
HEXACHLOROBENZENE									350 U	350 U	355 U	360 U	360 UJ
HEXACHLOROBUTADIENE									350 U	350 U	355 U	360 U	360 U
HEXACHLOROCYCLOPENTADIENE									350 U	350 U	355 U	360 U	360 U
HEXACHLOROETHANE									350 U	350 U	355 U	360 U	360 U
INDENO(1,2,3-CD)PYRENE	37 UJ	37.5 UJ	38 UJ	31 J	40 UJ	36 UJ	150 J		350 UJ	280 J	385 J	490	310 J
ISOPHORONE									350 U	350 U	355 U	360 U	360 U
NAPHTHALENE	19 UJ	19 UJ	19 UJ	18 UJ	20 UJ	18 UJ	21 J		350 U	280 J	300 J	320 J	250 J
NITROBENZENE									350 U	350 U	355 U	360 U	360 U
N-NITROSO-DI-N-PROPYLAMINE									100 U	110 U	110 U	110 U	110 U
N-NITROSODIPHENYLAMINE									350 U	350 U	355 U	360 U	360 UJ

EU	EU32	EU32	EU32	EU33	EU34	EU35	EU36	EU37	EU37	EU37	EU37	EU37	EU37
LOCATION ID	IOA-SS-EU32	IOA-SS-EU32	IOA-SS-EU32	IOA-SS-EU33	IOA-SS-EU34	IOA-SS-EU35	IOA-SS-EU36	IOA-SS-EU37	MW06-013	SB06-008	SB06-008	SB06-008	SB06-009
SAMPLE ID	IOA-SS-EU32-0002	IOA-SS-EU32-0002-AVG	IOA-SS-EU32-0002-D	IOA-SS-EU33-0002	IOA-SS-EU34-0002	IOA-SS-EU35-0002	IOA-SS-EU36-0002	IOA-SS-EU37-0002	MW06013-NSO-112498-0	SB06008-NSO-120898-0	SB06008-NSO-120898-0-AVG	SB06008-NSO-120898-0-D	SB06009-NSO-120898-0
SAMPLE CODE	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL
SAMPLE DATE	20110811	20110811	20110811	20110810	20110810	20110810	20110810	20110809	19981124	19981208	19981208	19981208	19981208
TOP DEPTH	0	0	0	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	2	2	2	2	2	2	2	2	1	1	1	1	1
PENTACHLOROPHENOL									1700 U	1800 U	1800 U	1800 U	1800 UJ
PHENANTHRENE	11 J	10.2 J	19 UJ	30 J	95 J	18 UJ	1000 J		350 U	500	570	640	510 J
PHENOL									350 U	170 J	175 J	360 U	360 U
PYRENE	55 J	41.5 J	28 J	61 J	110 J	18 UJ	1300 J		350 UJ	470	635	800	450 J
TOTAL PAHS	256 J	198 J	141 J	512 J	692 J	14 J	7190 J		415 UJ	4430 J	5640 J	6850 J	4160 J
PESTICIDES/PCBS (UG/KG)													
4,4'-DDD									3.5 U	3.5 U	3.22 J	4.7 J	3.6 U
4,4'-DDE									3.5 U	5 J	7.45 J	9.9 J	3.7 J
4,4'-DDT									3.5 U	23 J	24.5 J	26 J	17 J
ALDRIN									1.7 U	2.7 J	1.8 J	1.8 U	2.6 J
ALPHA-BHC									1.7 U	1.7 U	1.75 U	1.8 U	1.8 U
ALPHA-CHLORDANE									1.7 U	1.7 U	1.75 U	1.8 U	1.8 U
AROCLOR-1016	7.4 U	7.55 U	7.7 U	7.1 U	7.8 U	7.1 U	7.6 U		35 U	35 U	35.5 U	36 U	36 U
AROCLOR-1221	7.4 U	7.55 U	7.7 U	7.1 U	7.8 U	7.1 U	7.6 U		35 U	35 U	35.5 U	36 U	36 U
AROCLOR-1232	7.4 U	7.55 U	7.7 U	7.1 U	7.8 U	7.1 U	7.6 U		70 U	70 U	71 U	72 U	72 U
AROCLOR-1242	7.4 U	7.55 U	7.7 U	7.1 U	7.8 U	7.1 U	7.6 U		35 U	35 U	35.5 U	36 U	36 U
AROCLOR-1248	7.4 U	7.55 U	7.7 U	7.1 U	7.8 U	7.1 U	7.6 U		35 U	35 U	35.5 U	36 U	36 U
AROCLOR-1254	7.4 U	7.55 U	7.7 U	7.1 U	7.8 U	7.1 U	7.6 U		35 U	35 U	35.5 U	36 U	36 U
AROCLOR-1260	7.4 U	7.55 U	7.7 U	7.1 U	7.8 U	7.1 U	7.6 U		35 U	35 U	35.5 U	36 U	36 U
BETA-BHC									1.7 U	1.7 U	1.75 U	1.8 U	1.8 U
DELTA-BHC									1.7 U	1.7 U	1.75 U	1.8 U	1.8 U
DIELDRIN									3.5 U	3.5 U	3.55 U	3.6 U	3.6 U
ENDOSULFAN I									1.7 U	1.7 U	1.75 U	1.8 U	1.8 U
ENDOSULFAN II									3.5 U	3.5 U	3.55 U	3.6 U	3.6 U
ENDOSULFAN SULFATE									3.5 U	3.5 U	3.55 U	3.6 U	3.6 U
ENDRIN									3.5 U	3.5 U	3.55 U	3.6 U	3.6 U
ENDRIN ALDEHYDE									3.5 U	3.5 U	2.78	3.8	3.6 U
ENDRIN KETONE									3.5 U	4.9 J	5.6 J	6.3 J	4.2
GAMMA-BHC (LINDANE)									1.7 U	1.7 U	1.75 U	1.8 U	1.8 U
GAMMA-CHLORDANE									1.7 U	1.7 U	1.75 U	1.8 U	1.8 U
HEPTACHLOR									1.7 U	1.7 U	1.75 U	1.8 U	1.8 U
HEPTACHLOR EPOXIDE									1.7 U	9.6 J	8.7 J	7.8 J	12 J
METHOXYCHLOR									17 U	17 U	13.8 J	19 J	18 U
TOTAL AROCLOR	7.4 U	7.55 U	7.7 U	7.1 U	7.8 U	7.1 U	7.6 U		40 U	40 U	40.6 U	41.1 U	41.1 U
TOXAPHENE									170 U	170 U	175 U	180 U	180 U
HERBICIDES (UG/KG)													
2,4,5-T													
2,4,5-TP (SILVEX)													
2,4-D													

EU	EU32	EU32	EU32	EU33	EU34	EU35	EU36	EU37	EU37	EU37	EU37	EU37	EU37
LOCATION ID	IOA-SS-EU32	IOA-SS-EU32	IOA-SS-EU32	IOA-SS-EU33	IOA-SS-EU34	IOA-SS-EU35	IOA-SS-EU36	IOA-SS-EU37	MW06-013	SB06-008	SB06-008	SB06-008	SB06-009
SAMPLE ID	IOA-SS-EU32-0002	IOA-SS-EU32-0002-AVG	IOA-SS-EU32-0002-D	IOA-SS-EU33-0002	IOA-SS-EU34-0002	IOA-SS-EU35-0002	IOA-SS-EU36-0002	IOA-SS-EU37-0002	MW06013-NSO-112498-0	SB06008-NSO-120898-0	SB06008-NSO-120898-0-AVG	SB06008-NSO-120898-0-D	SB06009-NSO-120898-0
SAMPLE CODE	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL
SAMPLE DATE	20110811	20110811	20110811	20110810	20110810	20110810	20110810	20110809	19981124	19981208	19981208	19981208	19981208
TOP DEPTH	0	0	0	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	2	2	2	2	2	2	2	2	1	1	1	1	1
2,4-DB													
DALAPON													
DICAMBA													
DICHLOROPROP													
DINOSEB													
MCPA													
MCPP													
METALS (MG/KG)													
ALUMINUM	4800	4650	4500	7100	7600	6500	9400		7380 J	6960 J	6620 J	6280 J	4470 J
ANTIMONY	0.088 U	0.08 U	0.072 U	0.1 U	0.097 U	0.085 U	0.16 U		0.2 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.23 UJ
ARSENIC	1.1	1.15	1.2	1.7	1.6	1.2	2.3		4.4 J	3.1	3.85	4.6	0.81 J
BARIUM	11	12.5	14	16	22	12	22		20.2 J	24.3	22.8	21.2	15.9
BERYLLIUM	0.36 J	0.34 J	0.32 J	0.4	0.53	0.31 J	0.45		0.67	0.38 J	0.39 J	0.4 J	0.28 J
CADMIUM	0.13 U	0.108 J	0.15 J	0.18	0.21	0.16 J	0.33		0.23 UJ	4	2.75	1.5	0.27 U
CALCIUM	760	735	710	1300	1600	1200	1200		899	1620	1330	1040	2740
CHROMIUM	6.2	5.7	5.2	7	8.2	9	15		10.6	11.8	11.1	10.4	7.6
COBALT	3.7	3.65	3.6	4.3	5.6	3.6	4.9		3.6	3.8	3.55	3.3	4
COPPER	7.8	7.6	7.4	7.8 J	6.1 J	7.9 J	13 J		12.2 J	13.6	14.2	14.8	5.6
IRON	8800	8450	8100	15000	22000	12000	18000		14700	12100	11600	11100	6660
LEAD	7.1	6.8	6.5	10	9.9	8.2	32		8.5 J	62.9	60.2	57.5	11.7
MAGNESIUM	1700	1650	1600	2500	2100	2300	3000		2430 J	1880	1800	1730	1380 J
MANGANESE	210 J	220 J	230 J	240 J	380 J	200 J	350 J		150 J	127	135	143	92.5 J
MERCURY	0.011 U	0.0038 J	0.002 J	0.004 J	0.003 J	0.002 J	0.022 J		0.05 UJ	0.11 UJ	0.1 UJ	0.09 UJ	0.07 UJ
NICKEL	6.7	6.1	5.5	7.1	7.7	7.7	9.9		9	10.4	9.25	8.1	6.6
POTASSIUM	280 J	265 J	250 J	480 J	310 J	320 J	440 J		384	401	372	344	314
SELENIUM	0.7 U	0.67 U	0.64 U	0.35 J	0.24 J	0.63 U	0.65 U		0.61 J	0.68 J	0.415 J	0.3 U	0.37 U
SILVER	0.096 U	0.082 U	0.068 U	0.078 U	0.1 U	0.085 U	0.1 U		0.26 UJ	0.26 UJ	0.255 UJ	0.25 UJ	0.31 U
SODIUM	37 J	35.5 J	34 J	54 J	47 J	49 J	58 J		73.9	92.2	77.8	63.3	53.1 U
THALLIUM	0.093 U	0.0895 U	0.086 U	0.066 U	0.076 U	0.084 U	0.087 U		0.32 U	0.32 U	0.315 U	0.31 U	0.37 U
VANADIUM	12	11.5	11	19	16	11	19		14.9 J	34.2	29.9	25.6	13.9 J
ZINC	30	29.5	29	38	33	33	44		35.5 J	42.6	37.6	32.6	33.9
MISCELLANEOUS PARAMETERS (%)													
PERCENT MOISTURE	11	12	13	7	16	6	14						
PERCENT SOLIDS													
TOTAL SOLIDS									81	94	93.5	93	83
MISCELLANEOUS PARAMETERS (MG/KG)													
CYANIDE									0.21 U	0.22 U	0.22 U	0.22 U	0.22
EPH MADEP (UG/KG)													

EU	EU32	EU32	EU32	EU33	EU34	EU35	EU36	EU37	EU37	EU37	EU37	EU37	EU37
LOCATION ID	IOA-SS-EU32	IOA-SS-EU32	IOA-SS-EU32	IOA-SS-EU33	IOA-SS-EU34	IOA-SS-EU35	IOA-SS-EU36	IOA-SS-EU37	MW06-013	SB06-008	SB06-008	SB06-008	SB06-009
SAMPLE ID	IOA-SS-EU32-0002	IOA-SS-EU32-0002-AVG	IOA-SS-EU32-0002-D	IOA-SS-EU33-0002	IOA-SS-EU34-0002	IOA-SS-EU35-0002	IOA-SS-EU36-0002	IOA-SS-EU37-0002	MW06013-NSO-112498-0	SB06008-NSO-120898-0	SB06008-NSO-120898-0-AVG	SB06008-NSO-120898-0-D	SB06009-NSO-120898-0
SAMPLE CODE	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL
SAMPLE DATE	20110811	20110811	20110811	20110810	20110810	20110810	20110810	20110809	19981124	19981208	19981208	19981208	19981208
TOP DEPTH	0	0	0	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	2	2	2	2	2	2	2	2	1	1	1	1	1
C11-C22 AROMATICS									20000 U	25000 J	23500 J	22000 J	23000 J
C11-C22 AROMATICS (WEIGHTED 1.0)													
C11-C22 AROMATICS-UNADJ													
C19-C36 ALIPHATICS									15000	33000	33000	33000	42000
C19-C36 ALIPHATICS (WEIGHTED 0.005)													
C9-C18 ALIPHATICS									8100 J	28000 J	32500 J	37000 J	9700 J
C9-C18 ALIPHATICS (WEIGHTED 0.05)													
EXTRACTABLE PETROLEUM HYDROCARBONS									34000 U	86000 J	89000 J	92000 J	74000 J
DIOXINS/FURANS (NG/KG)													
1,2,3,4,6,7,8,9-OCDD							583	359					
1,2,3,4,6,7,8,9-OCDF							5.07	5.87					
1,2,3,4,6,7,8-HPCDD							21.2	12					
1,2,3,4,6,7,8-HPCDF							4.1	4.91					
1,2,3,4,7,8,9-HPCDF							0.972 U	1.05 U					
1,2,3,4,7,8-HXCDD							0.486 U	0.135 J					
1,2,3,4,7,8-HXCDF							0.892 J	0.994 J					
1,2,3,6,7,8-HXCDD							0.765 J	0.302 J					
1,2,3,6,7,8-HXCDF							0.912 J	0.568 J					
1,2,3,7,8,9-HXCDD							0.454 J	0.317 J					
1,2,3,7,8,9-HXCDF							0.972 U	1.05 U					
1,2,3,7,8-PECDD							0.239 J	0.264 U					
1,2,3,7,8-PECDF							0.281 J	0.294 J					
2,3,4,6,7,8-HXCDF							2.15 J	0.868 J					
2,3,4,7,8-PECDF							3.18	1.32 J					
2,3,7,8-TCDD							0.422 J	0.439 J					
2,3,7,8-TCDF							0.444 U	0.419 U					
TEQ							2.57 J	1.44 J					
TEQ HALFND							2.67 J	1.65 J					
TOTAL HPCDD							50.8	28.4					
TOTAL HPCDF							8.25	6.72 J					
TOTAL HXCDD							5.21 J	2.64 J					
TOTAL HXCDF							21 J	9.48 J					
TOTAL PECDD							2.01 J	0.45 J					
TOTAL PECDF							27 J	12.2 J					
TOTAL TCDD							1.21 J	0.439 J					
TOTAL TCDF							7.16 J	5.5 J					

EU	EU37	EU38	EU38	EU38	EU38	EU39	EU39	EU39	EU39	EU39	EU39	EU40	EU41
LOCATION ID	SB06-351	IOA-SS-EU38	SB06-006	SB06-007	SB06-012	IOA-SS-EU39	SB06-004	SB06-005	SS06-020	SS06-020	SS06-020	IOA-SS-EU40	IOA-SS-EU41
SAMPLE ID	SB06-351-NSO-072503	IOA-SS-EU38-0002	SB06006-NSO-120898-0	SB06007-NSO-120898-0	SB06012-NSO-120998-0	IOA-SS-EU39-0002	SB06004-NSO-120898-0	SB06005-NSO-120898-0	SS06-020-NSO-102798	SS06-020-NSO-102798-AVG	SS06-020-NSO-102798-D	IOA-SS-EU40-0002	IOA-SS-EU41-0002
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL
SAMPLE DATE	20030725	20110809	19981208	19981208	19981209	20110809	19981208	19981208	19981027	19981027	19981027	20110810	20110810
TOP DEPTH	0	0	0	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	1	2	1	1	1	2	1	1	1	1	1	2	2
VOLATILES (UG/KG)													
1,1,1-TRICHLOROETHANE	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
1,1,2,2-TETRACHLOROETHANE	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
1,1,2-TRICHLOROETHANE	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
1,1-DICHLOROETHANE	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
1,1-DICHLOROETHENE	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
1,2-DIBROMO-3-CHLOROPROPANE	5.2 UJ												
1,2-DIBROMOETHANE	5.2 UJ												
1,2-DICHLOROBENZENE	300 U		5.4 UJ	5.5 UJ	250 UJ		6 UJ	6.1 UJ					
1,2-DICHLOROETHANE	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
1,2-DICHLOROPROPANE	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
1,3-DICHLOROBENZENE	300 U		5.4 UJ	5.5 UJ	250 UJ		6 UJ	6.1 UJ					
1,4-DICHLOROBENZENE	300 U		5.4 UJ	5.5 UJ	250 UJ		6 UJ	6.1 UJ					
2-BUTANONE	26 UJ		22 U	2.2 J	140 J		24 U	24 U					
2-HEXANONE	26 R		22 U	22 U	990 U		24 U	24 U					
4-METHYL-2-PENTANONE	26 R		22 U	22 U	990 U		24 U	24 U					
ACETONE	43 J		20 J	19 J	92 J		140 J	21 J					
BENZENE	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
BROMODICHLOROMETHANE	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
BROMOFORM	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
BROMOMETHANE	5.2 UJ		11 U	11 U	490 UJ		12 U	12 U					
CARBON DISULFIDE	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
CARBON TETRACHLORIDE	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
CHLOROBENZENE	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
CHLORODIBROMOMETHANE	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
CHLOROETHANE	5.2 UJ		11 U	11 U	490 UJ		12 U	12 U					
CHLOROFORM	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
CHLOROMETHANE	5.2 UJ		11 UJ	11 UJ	490 UJ		12 UJ	12 UJ					
CIS-1,2-DICHLOROETHENE	5.2 UJ												
CIS-1,3-DICHLOROPROPENE	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
ETHYLBENZENE	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
M+P-XYLENES	5.2 UJ												
METHYLENE CHLORIDE	26 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
STYRENE	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
TETRACHLOROETHENE	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
TOLUENE	5.2 UJ		5.4 U	5.5 U	250 U		1.6 J	6.1 U					
TOTAL 1,2-DICHLOROETHENE	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
TOTAL XYLENES	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
TRANS-1,2-DICHLOROETHENE	5.2 UJ												

EU	EU37	EU38	EU38	EU38	EU38	EU39	EU39	EU39	EU39	EU39	EU39	EU40	EU41
LOCATION ID	SB06-351	IOA-SS-EU38	SB06-006	SB06-007	SB06-012	IOA-SS-EU39	SB06-004	SB06-005	SS06-020	SS06-020	SS06-020	IOA-SS-EU40	IOA-SS-EU41
SAMPLE ID	SB06-351-NSO-072503	IOA-SS-EU38-0002	SB06006-NSO-120898-0	SB06007-NSO-120898-0	SB06012-NSO-120998-0	IOA-SS-EU39-0002	SB06004-NSO-120898-0	SB06005-NSO-120898-0	SS06-020-NSO-102798	SS06-020-NSO-102798-AVG	SS06-020-NSO-102798-D	IOA-SS-EU40-0002	IOA-SS-EU41-0002
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL
SAMPLE DATE	20030725	20110809	19981208	19981208	19981209	20110809	19981208	19981208	19981027	19981027	19981027	20110810	20110810
TOP DEPTH	0	0	0	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	1	2	1	1	1	2	1	1	1	1	1	2	2
TRANS-1,3-DICHLOROPROPENE	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
TRICHLOROETHENE	5.2 UJ		5.4 U	5.5 U	250 U		6 U	6.1 U					
VINYL CHLORIDE	5.2 UJ		11 U	11 U	490 UJ		12 U	12 U					
VPH MADEP (UG/KG)													
C5-C8 ALIPHATICS													
C5-C8 ALIPHATICS (WEIGHTED 0.5)													
C5-C8 ALIPHATICS-UNADJ													
C9-C10 AROMATICS													
C9-C10 AROMATICS (WEIGHTED 1.0)													
C9-C12 ALIPHATICS													
C9-C12 ALIPHATICS (WEIGHTED 0.05)													
C9-C12 ALIPHATICS-UNADJ													
METHYL TERT-BUTYL ETHER													
O-XYLENE	5.2 UJ												
TOTAL XYLENES	5.2 UJ												
VOLATILE PETROLEUM HYDROCARBONS													
SEMIVOLATILES (UG/KG)													
1,2,4-TRICHLOROBENZENE	300 U		350 U	350 U	370 U		360 U	360 U					
2,2'-OXYBIS(1-CHLOROPROPANE)	300 U		350 U	350 U	370 U		360 U	360 U					
2,4,5-TRICHLOROPHENOL	300 U		1700 U	1700 U	1800 U		1800 U	1800 U					
2,4,6-TRICHLOROPHENOL	300 U		350 U	350 U	370 U		360 U	360 U					
2,4-DICHLOROPHENOL	300 U		350 U	350 U	370 U		360 U	360 U					
2,4-DIMETHYLPHENOL	300 U		350 U	350 U	370 U		360 U	360 U					
2,4-DINITROPHENOL	610 U		1700 U	1700 U	1800 U		1800 U	1800 U					
2,4-DINITROTOLUENE	300 U		350 U	350 U	370 U		360 U	360 U					
2,6-DINITROTOLUENE	300 U		350 U	350 U	370 U		360 U	360 U					
2-CHLORONAPHTHALENE	300 U		350 U	350 U	370 U		360 U	360 U					
2-CHLOROPHENOL	300 U		350 U	350 U	370 U		360 U	360 U					
2-METHYLNAPHTHALENE	300 U		550	720	370 U		360 U	760				210 J	18 UJ
2-METHYLPHENOL	300 U		350 U	350 U	370 U		360 U	360 U					
2-NITROANILINE	610 U		1700 U	1700 U	1800 U		1800 U	1800 U					
2-NITROPHENOL	300 U		350 U	350 U	370 U		360 U	360 U					
3&4-METHYLPHENOL													
3,3'-DICHLOROBENZIDINE	300 U		350 U	350 UJ	370 UJ		360 UJ	360 UJ					
3-NITROANILINE	610 U		1700 U	1700 U	1800 U		1800 U	1800 U					
4,6-DINITRO-2-METHYLPHENOL	610 U		250 U	250 U	260 U		260 U	260 U					
4-BROMOPHENYL PHENYL ETHER	300 U		350 U	350 U	370 U		360 U	360 U					
4-CHLORO-3-METHYLPHENOL	610 U		350 U	350 U	370 U		360 U	360 U					

EU	EU37	EU38	EU38	EU38	EU38	EU39	EU39	EU39	EU39	EU39	EU39	EU40	EU41
LOCATION ID	SB06-351	IOA-SS-EU38	SB06-006	SB06-007	SB06-012	IOA-SS-EU39	SB06-004	SB06-005	SS06-020	SS06-020	SS06-020	IOA-SS-EU40	IOA-SS-EU41
SAMPLE ID	SB06-351-NSO-072503	IOA-SS-EU38-0002	SB06006-NSO-120898-0	SB06007-NSO-120898-0	SB06012-NSO-120998-0	IOA-SS-EU39-0002	SB06004-NSO-120898-0	SB06005-NSO-120898-0	SS06-020-NSO-102798	SS06-020-NSO-102798-AVG	SS06-020-NSO-102798-D	IOA-SS-EU40-0002	IOA-SS-EU41-0002
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL
SAMPLE DATE	20030725	20110809	19981208	19981208	19981209	20110809	19981208	19981208	19981027	19981027	19981027	20110810	20110810
TOP DEPTH	0	0	0	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	1	2	1	1	1	2	1	1	1	1	1	2	2
4-CHLOROANILINE	300 U		350 U	350 U	370 U		360 U	360 U					
4-CHLOROPHENYL PHENYL ETHER	300 U		350 U	350 U	370 U		360 U	360 U					
4-METHYLPHENOL	300 U		350 U	350 U	370 U		360 U	360 U					
4-NITROANILINE	610 U		1700 U	1700 U	1800 U		1800 U	1800 U					
4-NITROPHENOL	610 U		1700 U	1700 U	1800 U		1800 U	1800 U					
ACENAPHTHENE	300 U		120 J	590	370 U		360 U	360 J				1400 J	10 J
ACENAPHTHYLENE	300 U		130 J	110 J	370 U		360 U	180 J				59 J	18 UJ
ANTHRACENE	300 U		290 J	3000	370 U		96 J	660				2200 J	24 J
BAP EQUIVALENT-HALFND	300 U		3530 J	1220 J	2.2 UJ		328 J	1560 J				7970 J	85.4 J
BAP EQUIVALENT-POS	300 U		3530 J	1220 J	2.2 UJ		328 J	1560 J				7970 J	65.1 J
BENZO(A)ANTHRACENE	300 U		2900 J	3500 J	370 UJ		350 J	2700 J				6300 J	67 J
BENZO(A)PYRENE	300 U		2600 J	540 J	2.2 UJ		190 J	750 J				5600 J	50 J
BENZO(B)FLUORANTHENE	300 U		2900 J	2000 J	370 UJ		560 J	2800 J				7400 J	80 J
BENZO(G,H,I)PERYLENE	300 U		2200 J	570 J	370 UJ		270 J	1400 J				2500 J	20 J
BENZO(K)FLUORANTHENE	300 U		2500 J	1700 J	370 UJ		130 J	2800 J				3200 J	32 J
BIS(2-CHLOROETHOXY)METHANE	300 U		350 U	350 U	370 U		360 U	360 U					
BIS(2-CHLOROETHYL)ETHER	300 U		350 U	350 U	370 U		360 U	360 U					
BIS(2-ETHYLHEXYL)PHTHALATE	300 U		140 J	170 J	370 UJ		140 J	320 J					
BUTYL BENZYL PHTHALATE	300 U		350 U	350 UJ	370 UJ		360 UJ	93 J					
CARBAZOLE	300 U		260 J	210 J	370 U		360 U	540					
CHRYSENE	300 U		3800 J	4400 J	370 UJ		370 J	3300 J				6500 J	73 J
DIBENZO(A,H)ANTHRACENE	300 U		100 J	52 J	2.2 U		19 J	87 J				700 J	37 UJ
DIBENZOFURAN	300 U		360	720	370 U		360 U	810					
DIETHYL PHTHALATE	300 U		350 U	350 U	370 U		360 U	360 U					
DIMETHYL PHTHALATE	300 U		350 U	350 U	370 U		360 U	360 U					
DI-N-BUTYL PHTHALATE	300 U		350 U	350 U	370 U		360 U	360 U					
DI-N-OCTYL PHTHALATE	300 U		350 U	350 UJ	370 UJ		360 UJ	360 UJ					
FLUORANTHENE	300 U		7000 J	12000	370 U		620	6200				10000 J	160 J
FLUORENE	300 U		150 J	590	370 U		360 U	360				1200 J	18 UJ
HEXACHLOROBENZENE	300 U		350 U	350 U	370 U		360 U	360 U					
HEXACHLOROBUTADIENE	300 U		350 U	350 U	370 U		360 U	360 U					
HEXACHLOROCYCLOPENTADIENE	300 U		350 U	350 U	370 U		360 U	360 U					
HEXACHLOROETHANE	300 U		350 U	350 U	370 U		360 U	360 U					
INDENO(1,2,3-CD)PYRENE	300 U		2200 J	560 J	370 UJ		260 J	1400 J				2600 J	37 UJ
ISOPHORONE	300 U		350 U	350 U	370 U		360 U	360 U					
NAPHTHALENE	300 U		540	550	370 U		360 U	900				700 J	18 UJ
NITROBENZENE	300 U		350 U	350 U	370 U		360 U	360 U					
N-NITROSO-DI-N-PROPYLAMINE	300 U		100 U	100 U	110 U		110 U	110 U					
N-NITROSODIPHENYLAMINE	300 U		350 U	350 U	370 U		360 U	360 U					

EU	EU37	EU38	EU38	EU38	EU38	EU39	EU39	EU39	EU39	EU39	EU39	EU40	EU41
LOCATION ID	SB06-351	IOA-SS-EU38	SB06-006	SB06-007	SB06-012	IOA-SS-EU39	SB06-004	SB06-005	SS06-020	SS06-020	SS06-020	IOA-SS-EU40	IOA-SS-EU41
SAMPLE ID	SB06-351-NSO-072503	IOA-SS-EU38-0002	SB06006-NSO-120898-0	SB06007-NSO-120898-0	SB06012-NSO-120998-0	IOA-SS-EU39-0002	SB06004-NSO-120898-0	SB06005-NSO-120898-0	SS06-020-NSO-102798	SS06-020-NSO-102798-AVG	SS06-020-NSO-102798-D	IOA-SS-EU40-0002	IOA-SS-EU41-0002
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL
SAMPLE DATE	20030725	20110809	19981208	19981208	19981209	20110809	19981208	19981208	19981027	19981027	19981027	20110810	20110810
TOP DEPTH	0	0	0	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	1	2	1	1	1	2	1	1	1	1	1	2	2
PENTACHLOROPHENOL	610 U		1700 U	1700 U	1800 U		1800 U	1800 U					
PHENANTHRENE	300 U		5900 J	6000	370 U		550	3900				8500 J	91 J
PHENOL	300 U		350 U	350 U	370 U		360 U	360 U					
PYRENE	300 U		6200 J	11000 J	370 UJ		1100 J	8000 J				11000 J	140 J
TOTAL PAHS	300 U		40100 J	47900 J	327 UJ		4520 J	36600 J				70100 J	747 J
PESTICIDES/PCBS (UG/KG)													
4,4'-DDD	2 U		6.7 J	6 J	3.7 U		8.5 J	12 J					
4,4'-DDE	2 U		13	9.7	3.7 U		3.8	24					
4,4'-DDT	2 U		43 J	24 J	3.7 U		11 J	35 J					
ALDRIN	0.99 U		1.7 U	1.7 U	1.8 U		1.8 U	1.8 U					
ALPHA-BHC	0.99 U		1.7 U	1.7 U	1.8 U		1.8 U	1.8 U					
ALPHA-CHLORDANE	2.6 R		3.5 J	1.7 U	1.8 U		1.8 U	1.8 U					
AROCLOR-1016	31 U		35 U	35 U	37 U		36 U	36 U				8.5 U	7.4 U
AROCLOR-1221	31 U		35 U	35 U	73 U		36 U	36 U				8.5 U	7.4 U
AROCLOR-1232	31 U		69 U	69 U	37 U		72 U	72 U				8.5 U	7.4 U
AROCLOR-1242	31 U		35 U	35 U	37 U		36 U	36 U				8.5 U	7.4 U
AROCLOR-1248	31 U		35 U	35 U	37 U		36 U	36 U				8.5 U	7.4 U
AROCLOR-1254	31 U		35 U	35 U	37 U		36 U	36 U				8.5 U	7.4 U
AROCLOR-1260	31 U		35 U	35 U	37 U		36 U	36 U				46	7.4 U
BETA-BHC	0.99 U		1.7 U	1.7 U	1.8 U		1.8 U	1.8 U					
DELTA-BHC	0.99 UJ		1.7 U	1.7 U	1.8 U		1.8 U	1.8 U					
DIELDRIN	2 U		3.5 U	3.5 U	3.7 U		22 J	3.6 U					
ENDOSULFAN I	0.99 U		1.7 U	1.7 U	1.8 U		1.8 U	1.8 U					
ENDOSULFAN II	2 U		3.5 U	9 J	3.7 U		3.6 U	4.8 J					
ENDOSULFAN SULFATE	2 U		5 J	12 J	3.7 U		3.6 U	4.2 J					
ENDRIN	2 U		3.5 U	3.5 U	3.7 U		3.6 U	3.6 U					
ENDRIN ALDEHYDE	3.7 R		3.5 U	4.3	3.7 U		3.6 U	7.6 J					
ENDRIN KETONE	2 U		9.4 J	23	3.7 U		3.6 U	13					
GAMMA-BHC (LINDANE)	0.99 U		1.7 U	1.7 U	1.8 U		1.8 U	1.8 U					
GAMMA-CHLORDANE	0.99 U		2.3 J	1.7 U	1.8 U		1.8 U	1.8 U					
HEPTACHLOR	0.99 U		1.7 U	1.7 U	1.8 U		1.8 U	1.8 U					
HEPTACHLOR EPOXIDE	0.99 U		13 J	26 J	1.8 U		2.7 J	21 J					
METHOXYCHLOR	9.9 U		26 J	58 J	18 U		18 U	30 J					
TOTAL AROCLOR	31 U		39.9 U	39.9 U	42.1 U		41.1 U	41.1 U				46	7.4 U
TOXAPHENE	31 U		170 U	170 U	180 U		180 U	180 U					
HERBICIDES (UG/KG)													
2,4,5-T													
2,4,5-TP (SILVEX)													
2,4-D													

EU	EU37	EU38	EU38	EU38	EU38	EU39	EU39	EU39	EU39	EU39	EU39	EU40	EU41
LOCATION ID	SB06-351	IOA-SS-EU38	SB06-006	SB06-007	SB06-012	IOA-SS-EU39	SB06-004	SB06-005	SS06-020	SS06-020	SS06-020	IOA-SS-EU40	IOA-SS-EU41
SAMPLE ID	SB06-351-NSO-072503	IOA-SS-EU38-0002	SB06006-NSO-120898-0	SB06007-NSO-120898-0	SB06012-NSO-120998-0	IOA-SS-EU39-0002	SB06004-NSO-120898-0	SB06005-NSO-120898-0	SS06-020-NSO-102798	SS06-020-NSO-102798-AVG	SS06-020-NSO-102798-D	IOA-SS-EU40-0002	IOA-SS-EU41-0002
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL
SAMPLE DATE	20030725	20110809	19981208	19981208	19981209	20110809	19981208	19981208	19981027	19981027	19981027	20110810	20110810
TOP DEPTH	0	0	0	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	1	2	1	1	1	2	1	1	1	1	1	2	2
2,4-DB													
DALAPON													
DICAMBA													
DICHLOROPROP													
DINOSEB													
MCPA													
MCPP													
METALS (MG/KG)													
ALUMINUM	5900		5230 J	5680 J	8950 J		5230 J	8890 J				10000	9200
ANTIMONY	0.72 U		0.19 UJ	0.2 UJ	0.18 UJ		0.2 UJ	1.4 UJ				0.35	0.07 U
ARSENIC	11 J		10.4	7.3	2.8		1.7	8.1				5.3	0.75
BARIUM	13 J		22.4	22.2	15.8 J		19	123				39	15
BERYLLIUM	0.4 J		0.45 J	0.37 J	0.8		0.4 J	0.76				0.4	0.27 U
CADMIUM	0.33 J		0.22 U	0.25 J	0.21 U		0.23 U	0.32 J				0.42	0.1 U
CALCIUM	240 U		1140	1110	676 J		1550	2570				1400 J	750 J
CHROMIUM	9.5		12.3	10.9	9.2 J		6.8	149				15	10
COBALT	2.7 J		3.6	3.6	3.4		2.4 J	5.9				3.5	2.6
COPPER	36		11.8	9.3	17		6.5	18.2				15	3.4
IRON	10000		12200	9970	13400 J		8310	16100				16000	11000
LEAD	7.8		141	75.6	7.7 J		32.1	1280	550	503	456	100 J	7.1 J
MAGNESIUM	1200		1850	1760	2050 J		1240	2320				1900 J	2000 J
MANGANESE	66		180	138	157 J		132	207				210 J	130 J
MERCURY	0.036 J		0.09 UJ	0.09 UJ	0.07 UJ		0.08 UJ	0.05 UJ				0.15	0.011 J
NICKEL	5.5 J		9.2	8.8	6.6		5.9	14.6				9.2	6.5
POTASSIUM	170 U		292	321	237		283	602				290	320
SELENIUM	2.6 J		0.33 J	0.32 U	0.82 J		0.32 U	0.52 J				0.96	0.6 J
SILVER	0.14 R		0.25 UJ	0.27 UJ	0.24 UJ		0.27 UJ	0.23 UJ				0.39	0.078 U
SODIUM	73 U		54	50.2 U	53.5		41.7 U	235				58 J	51 J
THALLIUM	0.72 UJ		0.3 U	0.33 U	0.29 U		0.33 U	0.28 U				0.083 U	0.075 U
VANADIUM	12		27.9	24.1	16.6 J		16.1	45.2				25	16
ZINC	21		46.2	41.3	28 J		55.6	150				78	23
MISCELLANEOUS PARAMETERS (%)													
PERCENT MOISTURE	12.6											22	11
PERCENT SOLIDS													
TOTAL SOLIDS			96	96	91		91	92					
MISCELLANEOUS PARAMETERS (MG/KG)													
CYANIDE	1.2 U		0.21 U	0.22 U	0.23 U		0.23 U	0.22 U					
EPH MADEP (UG/KG)													

EU	EU37	EU38	EU38	EU38	EU38	EU39	EU39	EU39	EU39	EU39	EU39	EU40	EU41
LOCATION ID	SB06-351	IOA-SS-EU38	SB06-006	SB06-007	SB06-012	IOA-SS-EU39	SB06-004	SB06-005	SS06-020	SS06-020	SS06-020	IOA-SS-EU40	IOA-SS-EU41
SAMPLE ID	SB06-351-NSO-072503	IOA-SS-EU38-0002	SB06006-NSO-120898-0	SB06007-NSO-120898-0	SB06012-NSO-120998-0	IOA-SS-EU39-0002	SB06004-NSO-120898-0	SB06005-NSO-120898-0	SS06-020-NSO-102798	SS06-020-NSO-102798-AVG	SS06-020-NSO-102798-D	IOA-SS-EU40-0002	IOA-SS-EU41-0002
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL
SAMPLE DATE	20030725	20110809	19981208	19981208	19981209	20110809	19981208	19981208	19981027	19981027	19981027	20110810	20110810
TOP DEPTH	0	0	0	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	1	2	1	1	1	2	1	1	1	1	1	2	2
C11-C22 AROMATICS			60000 J	34000 J	18000 U		23000 UJ	43000 J					
C11-C22 AROMATICS (WEIGHTED 1.0)													
C11-C22 AROMATICS-UNADJ													
C19-C36 ALIPHATICS			14000	26000	6600 U		43000	16000					
C19-C36 ALIPHATICS (WEIGHTED 0.005)													
C9-C18 ALIPHATICS			9000 J	8900 J	8200 J		8000 J	9800 J					
C9-C18 ALIPHATICS (WEIGHTED 0.05)													
EXTRACTABLE PETROLEUM HYDROCARBONS			83000 J	69000 J	31000 U		74000 J	69000 J					
DIOXINS/FURANS (NG/KG)													
1,2,3,4,6,7,8,9-OCDD	1900	50.2				203							
1,2,3,4,6,7,8,9-OCDF	47	0.986 U				24							
1,2,3,4,6,7,8-HPCDD	220	1.04 J				21.2							
1,2,3,4,6,7,8-HPCDF	40	0.404 J				17.5							
1,2,3,4,7,8,9-HPCDF	2 U	0.986 U				0.952 J							
1,2,3,4,7,8-HXCDD	2.4 U	0.493 U				0.408 J							
1,2,3,4,7,8-HXCDF	4.1 J	0.247 U				3.92							
1,2,3,6,7,8-HXCDD	9	0.493 U				1.3 J							
1,2,3,6,7,8-HXCDF	2.8 U	0.247 U				4.06							
1,2,3,7,8,9-HXCDD	4.1 J	0.493 U				0.937 J							
1,2,3,7,8,9-HXCDF	0.8 U	0.986 U				1.09 J							
1,2,3,7,8-PECDD	0.67 U	0.247 U				0.534 J							
1,2,3,7,8-PECDF	1.1 U	0.493 U				0.87 J							
2,3,4,6,7,8-HXCDF	2.1 U	0.247 U				8.9							
2,3,4,7,8-PECDF	3.2 J	0.142 J				14.6							
2,3,7,8-TCDD	0.32 U	0.197 U				1.68							
2,3,7,8-TCDF	7.1	0.194 UJ				1.15 UJ							
TEQ	6.57	0.0721 J				9.15 J							
TEQ HALFND	7.5	0.477 J				9.2 J							
TOTAL HPCDD	440	2.54 J				46.2							
TOTAL HPCDF	96	0.563 J				32.3 J							
TOTAL HXCDD	59	0.493 U				11.7							
TOTAL HXCDF	56	0.431 J				92.9							
TOTAL PECDD	2.3 U	0.247 U				7.16 J							
TOTAL PECDF	26	0.664 J				124 J							
TOTAL TCDD	0.32 U	0.197 U				4.52 J							
TOTAL TCDF	77	0.922 J				39 J							

EU	EU42	EU43	EU44	EU45	EU46	EU46	EU46	EU47	EU48	EU49
LOCATION ID	IOA-SS-EU42	IOA-SS-EU43	IOA-SS-EU44	IOA-SS-EU45	IOA-SS-EU46	IOA-SS-EU46	IOA-SS-EU46	IOA-SS-EU47	IOA-SS-EU48	IOA-SS-EU49
SAMPLE ID	IOA-SS-EU42-0002	IOA-SS-EU43-0002	IOA-SS-EU44-0002	IOA-SS-EU45-0002	IOA-SS-EU46-0002	IOA-SS-EU46-0002-AVG	IOA-SS-EU46-0002-D	IOA-SS-EU47-0002	IOA-SS-EU48-0002	IOA-SS-EU49-0002
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20110810	20110810	20110810	20110810	20110810	20110810	20110810	20110810	20110810	20110810
TOP DEPTH	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	2	2	2	2	2	2	2	2	2	2
VOLATILES (UG/KG)										
1,1,1-TRICHLOROETHANE										
1,1,2,2-TETRACHLOROETHANE										
1,1,2-TRICHLOROETHANE										
1,1-DICHLOROETHANE										
1,1-DICHLOROETHENE										
1,2-DIBROMO-3-CHLOROPROPANE										
1,2-DIBROMOETHANE										
1,2-DICHLOROBENZENE										
1,2-DICHLOROETHANE										
1,2-DICHLOROPROPANE										
1,3-DICHLOROBENZENE										
1,4-DICHLOROBENZENE										
2-BUTANONE										
2-HEXANONE										
4-METHYL-2-PENTANONE										
ACETONE										
BENZENE										
BROMODICHLOROMETHANE										
BROMOFORM										
BROMOMETHANE										
CARBON DISULFIDE										
CARBON TETRACHLORIDE										
CHLOROBENZENE										
CHLORODIBROMOMETHANE										
CHLOROETHANE										
CHLOROFORM										
CHLOROMETHANE										
CIS-1,2-DICHLOROETHENE										
CIS-1,3-DICHLOROPROPENE										
ETHYLBENZENE										
M+P-XYLENES										
METHYLENE CHLORIDE										
STYRENE										
TETRACHLOROETHENE										
TOLUENE										
TOTAL 1,2-DICHLOROETHENE										
TOTAL XYLENES										
TRANS-1,2-DICHLOROETHENE										

EU	EU42	EU43	EU44	EU45	EU46	EU46	EU46	EU47	EU48	EU49
LOCATION ID	IOA-SS-EU42	IOA-SS-EU43	IOA-SS-EU44	IOA-SS-EU45	IOA-SS-EU46	IOA-SS-EU46	IOA-SS-EU46	IOA-SS-EU47	IOA-SS-EU48	IOA-SS-EU49
SAMPLE ID	IOA-SS-EU42-0002	IOA-SS-EU43-0002	IOA-SS-EU44-0002	IOA-SS-EU45-0002	IOA-SS-EU46-0002	IOA-SS-EU46-0002-AVG	IOA-SS-EU46-0002-D	IOA-SS-EU47-0002	IOA-SS-EU48-0002	IOA-SS-EU49-0002
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20110810	20110810	20110810	20110810	20110810	20110810	20110810	20110810	20110810	20110810
TOP DEPTH	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	2	2	2	2	2	2	2	2	2	2
TRANS-1,3-DICHLOROPROPENE										
TRICHLOROETHENE										
VINYL CHLORIDE										
VPH MADEP (UG/KG)										
C5-C8 ALIPHATICS										
C5-C8 ALIPHATICS (WEIGHTED 0.5)										
C5-C8 ALIPHATICS-UNADJ										
C9-C10 AROMATICS										
C9-C10 AROMATICS (WEIGHTED 1.0)										
C9-C12 ALIPHATICS										
C9-C12 ALIPHATICS (WEIGHTED 0.05)										
C9-C12 ALIPHATICS-UNADJ										
METHYL TERT-BUTYL ETHER										
O-XYLENE										
TOTAL XYLENES										
VOLATILE PETROLEUM HYDROCARBONS										
SEMIVOLATILES (UG/KG)										
1,2,4-TRICHLOROBENZENE										
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	20 UJ	17 UJ	19 UJ	55 J	18 UJ	18 UJ	18 UJ	19 UJ	19 UJ	19 UJ
2-METHYLPHENOL										
2-NITROANILINE										
2-NITROPHENOL										
3&4-METHYLPHENOL										
3,3'-DICHLOROBENZIDINE										
3-NITROANILINE										
4,6-DINITRO-2-METHYLPHENOL										
4-BROMOPHENYL PHENYL ETHER										
4-CHLORO-3-METHYLPHENOL										

EU	EU42	EU43	EU44	EU45	EU46	EU46	EU46	EU47	EU48	EU49
LOCATION ID	IOA-SS-EU42	IOA-SS-EU43	IOA-SS-EU44	IOA-SS-EU45	IOA-SS-EU46	IOA-SS-EU46	IOA-SS-EU46	IOA-SS-EU47	IOA-SS-EU48	IOA-SS-EU49
SAMPLE ID	IOA-SS-EU42-0002	IOA-SS-EU43-0002	IOA-SS-EU44-0002	IOA-SS-EU45-0002	IOA-SS-EU46-0002	IOA-SS-EU46-0002-AVG	IOA-SS-EU46-0002-D	IOA-SS-EU47-0002	IOA-SS-EU48-0002	IOA-SS-EU49-0002
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20110810	20110810	20110810	20110810	20110810	20110810	20110810	20110810	20110810	20110810
TOP DEPTH	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	2	2	2	2	2	2	2	2	2	2
4-CHLOROANILINE										
4-CHLOROPHENYL PHENYL ETHER										
4-METHYLPHENOL										
4-NITROANILINE										
4-NITROPHENOL										
ACENAPHTHENE	20 UJ	17 UJ	19 UJ	110 UJ	18 UJ	18 UJ	18 UJ	19 UJ	19 UJ	19 UJ
ACENAPHTHYLENE	8 J	38 J	19 UJ	110 J	18 UJ	18 UJ	18 UJ	19 UJ	19 UJ	19 UJ
ANTHRACENE	10 J	38 J	9 J	190 J	8 J	8 J	8 J	19 UJ	19 UJ	19 UJ
BAP EQUIVALENT-HALFND	69.3 J	129 J	81 J	469 J	63.6 J	65.2 J	66.8 J	19 UJ	32.2 J	19 UJ
BAP EQUIVALENT-POS	47.3 J	112 J	60.1 J	354 J	43.8 J	45.4 J	47 J	19 UJ	2.21 J	19 UJ
BENZO(A)ANTHRACENE	38 J	85 J	34 J	290 J	33 J	32 J	31 J	19 UJ	10 J	19 UJ
BENZO(A)PYRENE	37 J	81 J	47 J	260 J	35 J	36.5 J	38 J	19 UJ	19 UJ	19 UJ
BENZO(B)FLUORANTHENE	62 J	160 J	93 J	620 J	53 J	54.5 J	56 J	19 UJ	12 J	19 UJ
BENZO(G,H,I)PERYLENE	23 J	51 J	26 J	200 J	22 J	23 J	24 J	19 UJ	19 UJ	19 UJ
BENZO(K)FLUORANTHENE	26 J	67 J	33 J	210 J	20 J	22 J	24 J	19 UJ	19 UJ	19 UJ
BIS(2-CHLOROETHOXY)METHANE										
BIS(2-CHLOROETHYL)ETHER										
BIS(2-ETHYLHEXYL)PHTHALATE										
BUTYL BENZYL PHTHALATE										
CARBAZOLE										
CHRYSENE	49 J	110 J	69 J	400 J	38 J	41 J	44 J	19 UJ	7 J	19 UJ
DIBENZO(A,H)ANTHRACENE	40 UJ	35 UJ	38 UJ	210 UJ	36 UJ	36 UJ	36 UJ	38 UJ	37 UJ	37 UJ
DIBENZOFURAN										
DIETHYL PHTHALATE										
DIMETHYL PHTHALATE										
DI-N-BUTYL PHTHALATE										
DI-N-OCTYL PHTHALATE										
FLUORANTHENE	81 J	200 J	100 J	570 J	68 J	63 J	58 J	19 UJ	14 J	19 UJ
FLUORENE	20 UJ	10 J	19 UJ	110 UJ	18 UJ	18 UJ	18 UJ	19 UJ	19 UJ	19 UJ
HEXACHLOROBENZENE										
HEXACHLOROBUTADIENE										
HEXACHLOROCYCLOPENTADIENE										
HEXACHLOROETHANE										
INDENO(1,2,3-CD)PYRENE	40 UJ	55 J	38 UJ	210 UJ	36 UJ	36 UJ	36 UJ	38 UJ	37 UJ	37 UJ
ISOPHORONE										
NAPHTHALENE	20 UJ	17 UJ	19 UJ	110 UJ	18 UJ	18 UJ	18 UJ	19 UJ	19 UJ	19 UJ
NITROBENZENE										
N-NITROSO-DI-N-PROPYLAMINE										
N-NITROSODIPHENYLAMINE										

EU	EU42	EU43	EU44	EU45	EU46	EU46	EU46	EU47	EU48	EU49
LOCATION ID	IOA-SS-EU42	IOA-SS-EU43	IOA-SS-EU44	IOA-SS-EU45	IOA-SS-EU46	IOA-SS-EU46	IOA-SS-EU46	IOA-SS-EU47	IOA-SS-EU48	IOA-SS-EU49
SAMPLE ID	IOA-SS-EU42-0002	IOA-SS-EU43-0002	IOA-SS-EU44-0002	IOA-SS-EU45-0002	IOA-SS-EU46-0002	IOA-SS-EU46-0002-AVG	IOA-SS-EU46-0002-D	IOA-SS-EU47-0002	IOA-SS-EU48-0002	IOA-SS-EU49-0002
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20110810	20110810	20110810	20110810	20110810	20110810	20110810	20110810	20110810	20110810
TOP DEPTH	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	2	2	2	2	2	2	2	2	2	2
PENTACHLOROPHENOL										
PHENANTHRENE	35 J	98 J	64 J	320 J	29 J	26 J	23 J	19 UJ	19 UJ	19 UJ
PHENOL										
PYRENE	69 J	160 J	98 J	610 J	59 J	58 J	57 J	19 UJ	15 J	19 UJ
TOTAL PAHS	438 J	1150 J	573 J	3840 J	365 J	364 J	363 J	21.2 UJ	58 J	21.1 UJ
PESTICIDES/PCBS (UG/KG)										
4,4'-DDD										
4,4'-DDE										
4,4'-DDT										
ALDRIN										
ALPHA-BHC										
ALPHA-CHLORDANE										
AROCLOR-1016	8 U	69 U	7.6 U	8.5 U	7.1 U	7.1 U	7.1 U	7.6 U	7.3 U	7.4 U
AROCLOR-1221	8 U	69 U	7.6 U	8.5 U	7.1 U	7.1 U	7.1 U	7.6 U	7.3 U	7.4 U
AROCLOR-1232	8 U	69 U	7.6 U	8.5 U	7.1 U	7.1 U	7.1 U	7.6 U	7.3 U	7.4 U
AROCLOR-1242	8 U	69 U	7.6 U	8.5 U	7.1 U	7.1 U	7.1 U	7.6 U	7.3 U	7.4 U
AROCLOR-1248	8 U	69 U	7.6 U	8.5 U	7.1 U	7.1 U	7.1 U	7.6 U	7.3 U	7.4 U
AROCLOR-1254	8 U	69 U	7.6 U	8.5 U	7.1 U	7.1 U	7.1 U	7.6 U	7.3 U	7.4 U
AROCLOR-1260	8 U	710	7.6 U	61	5 J	4.28 J	7.1 U	7.6 U	8 J	7.4 U
BETA-BHC										
DELTA-BHC										
DIELDRIN										
ENDOSULFAN I										
ENDOSULFAN II										
ENDOSULFAN SULFATE										
ENDRIN										
ENDRIN ALDEHYDE										
ENDRIN KETONE										
GAMMA-BHC (LINDANE)										
GAMMA-CHLORDANE										
HEPTACHLOR										
HEPTACHLOR EPOXIDE										
METHOXYCHLOR										
TOTAL AROCLOR	8 U	710	7.6 U	61	5 J	4.28 J	7.1 U	7.6 U	8 J	7.4 U
TOXAPHENE										
HERBICIDES (UG/KG)										
2,4,5-T										
2,4,5-TP (SILVEX)										
2,4-D										

EU	EU42	EU43	EU44	EU45	EU46	EU46	EU46	EU47	EU48	EU49
LOCATION ID	IOA-SS-EU42	IOA-SS-EU43	IOA-SS-EU44	IOA-SS-EU45	IOA-SS-EU46	IOA-SS-EU46	IOA-SS-EU46	IOA-SS-EU47	IOA-SS-EU48	IOA-SS-EU49
SAMPLE ID	IOA-SS-EU42-0002	IOA-SS-EU43-0002	IOA-SS-EU44-0002	IOA-SS-EU45-0002	IOA-SS-EU46-0002	IOA-SS-EU46-0002-AVG	IOA-SS-EU46-0002-D	IOA-SS-EU47-0002	IOA-SS-EU48-0002	IOA-SS-EU49-0002
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20110810	20110810	20110810	20110810	20110810	20110810	20110810	20110810	20110810	20110810
TOP DEPTH	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	2	2	2	2	2	2	2	2	2	2
2,4-DB										
DALAPON										
DICAMBA										
DICHLOROPROP										
DINOSEB										
MCPA										
MCPP										
METALS (MG/KG)										
ALUMINUM	11000	7600	6800	8000	10000	10000	10000	7900	8500	6400
ANTIMONY	0.12 U	0.21	0.24 U	0.55	0.16 U	0.16 U	0.16 U	0.07 U	0.11 U	0.12 U
ARSENIC	2.3	2.1	1.7	7.2	1.4	1.35	1.3	1.3	3.4	36
BARIUM	21	22	19	35	17	16.5	16	11	21	26
BERYLLIUM	0.39 J	0.43	0.58	0.36	0.53	0.405 J	0.28 J	0.27 J	0.45	0.56
CADMIUM	0.21	0.36	0.34	0.58	0.25	0.235	0.22	0.18	0.19	0.2
CALCIUM	610	1400	1000	1000	830	865	900	1700	1400	1200
CHROMIUM	9.3	11	7.9	14	11	10.3	9.6	16	9.9	7.9
COBALT	3.7	4	4.9	3.8	3.1	2.9	2.7	6.3	5.2	4
COPPER	6.9 J	10 J	11 J	25 J	5.7 J	5.25 J	4.8 J	7.9 J	8.7 J	6 J
IRON	19000	16000	14000	14000	13000	12000	11000	11000	20000	45000
LEAD	16	35	20	320	33	28.5	24	10	8.1	16
MAGNESIUM	2000	2200	2400	1900	2100	2000	1900	4900	2800	1700
MANGANESE	240 J	310 J	390 J	220 J	160 J	145 J	130 J	220 J	310 J	280 J
MERCURY	0.017 J	0.012 J	0.007 J	0.06	0.044	0.038	0.032	0.002 J	0.001 J	0.002 J
NICKEL	7.2	7.7	8.8	8.9	7.6	7.35	7.1	14	9.3	6.1
POTASSIUM	380 J	620 J	400 J	340 J	320 J	315 J	310 J	300 J	420 J	330 J
SELENIUM	0.42 J	0.31 J	0.3 J	0.38 J	0.38 J	0.34 J	0.3 J	0.59 U	0.6 U	0.64 U
SILVER	0.095 J	0.079 U	0.08 U	0.076 J	0.094 U	0.096 U	0.098 U	0.091 U	0.077 U	0.075 U
SODIUM	45 J	77	58 J	43 J	45 J	52 J	59 J	85	80 J	120
THALLIUM	0.1 U	0.066 U	0.077 U	0.092 U	0.077 U	0.0755 U	0.074 U	0.079 U	0.081 U	0.085 U
VANADIUM	20	21	15	25	17	16.5	16	17	15	18
ZINC	38	44	58	81	40	38.5	37	40	36	29
MISCELLANEOUS PARAMETERS (%)										
PERCENT MOISTURE	17	4	13	22	8	7.5	7	12	10	10
PERCENT SOLIDS										
TOTAL SOLIDS										
MISCELLANEOUS PARAMETERS (MG/KG)										
CYANIDE										
EPH MADEP (UG/KG)										

EU	EU42	EU43	EU44	EU45	EU46	EU46	EU46	EU47	EU48	EU49
LOCATION ID	IOA-SS-EU42	IOA-SS-EU43	IOA-SS-EU44	IOA-SS-EU45	IOA-SS-EU46	IOA-SS-EU46	IOA-SS-EU46	IOA-SS-EU47	IOA-SS-EU48	IOA-SS-EU49
SAMPLE ID	IOA-SS-EU42-0002	IOA-SS-EU43-0002	IOA-SS-EU44-0002	IOA-SS-EU45-0002	IOA-SS-EU46-0002	IOA-SS-EU46-0002-AVG	IOA-SS-EU46-0002-D	IOA-SS-EU47-0002	IOA-SS-EU48-0002	IOA-SS-EU49-0002
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20110810	20110810	20110810	20110810	20110810	20110810	20110810	20110810	20110810	20110810
TOP DEPTH	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	2	2	2	2	2	2	2	2	2	2
C11-C22 AROMATICS										
C11-C22 AROMATICS (WEIGHTED 1.0)										
C11-C22 AROMATICS-UNADJ										
C19-C36 ALIPHATICS										
C19-C36 ALIPHATICS (WEIGHTED 0.005)										
C9-C18 ALIPHATICS										
C9-C18 ALIPHATICS (WEIGHTED 0.05)										
EXTRACTABLE PETROLEUM HYDROCARBONS										
DIOXINS/FURANS (NG/KG)										
1,2,3,4,6,7,8,9-OCDD		4610			768	700	633			
1,2,3,4,6,7,8,9-OCDF		20.3			6.39	6.16	5.94			
1,2,3,4,6,7,8-HPCDD		270			31	26.6	22.2			
1,2,3,4,6,7,8-HPCDF		30.6			3.96	3.63	3.3			
1,2,3,4,7,8,9-HPCDF		2.27 J			0.99 U	0.989 U	0.988 U			
1,2,3,4,7,8-HXCDD		2.23 J			0.349 J	0.278 J	0.206 J			
1,2,3,4,7,8-HXCDF		4.46			0.744 J	0.726 J	0.709 J			
1,2,3,6,7,8-HXCDD		5.83			0.814 J	0.67 J	0.525 J			
1,2,3,6,7,8-HXCDF		3.71			1.06 J	0.903 J	0.746 J			
1,2,3,7,8,9-HXCDD		4.18			0.791 J	0.596 J	0.4 J			
1,2,3,7,8,9-HXCDF		0.918 J			0.366 J	0.43 J	0.988 U			
1,2,3,7,8-PECDD		4.1 J			0.318 J	0.221 J	0.247 U			
1,2,3,7,8-PECDF		1.53 J			0.353 J	0.3 J	0.494 U			
2,3,4,6,7,8-HXCDF		7.59			2.31 J	2 J	1.69 J			
2,3,4,7,8-PECDF		10.6			3.58	2.89 J	2.2 J			
2,3,7,8-TCDD		0.277 U			0.492 J	0.296 J	0.198 U			
2,3,7,8-TCDF		4.15			0.428 UJ	0.446 UJ	0.464 UJ			
TEQ		15.1 J			3.12 J	2.32 J	1.53 J			
TEQ HALFND		15.2 J			3.15 J	2.5 J	1.84 J			
TOTAL HPCDD		827			73.2	62.2	51.2			
TOTAL HPCDF		77.4			9.82	8.99	8.16			
TOTAL HXCDD		67.4			7.67 J	5.8 J	3.92 J			
TOTAL HXCDF		88.3 J			24 J	20 J	15.9 J			
TOTAL PECDD		15.4			2.77 J	1.66 J	0.54 J			
TOTAL PECDF		104 J			34.1 J	28.2 J	22.4			
TOTAL TCDD		0.885 J			0.901 J	0.5 J	0.198 U			
TOTAL TCDF		33.4 J			8.15 J	7.02 J	5.88 J			

A-3 ANALYTICAL RESULTS –SUBSURFACE SOIL – RIA 33 AND RIA 82

TABLE A-3

ANALYTICAL RESULTS - SUBSURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

RIA ID	RIA33	RIA33	RIA33	RIA33	RIA33	RIA33	RIA33	RIA82	RIA82	RIA82	RIA82
LOCATION ID	IOA-RIA33-SB02	IOA-RIA33-SB04	IOA-RIA33-SB08	IOA-RIA33-SB10	IOA-RIA33-SB14	IOA-RIA33-SB14	IOA-RIA33-SB14	IOA-RIA82-SB01A	IOA-RIA82-SB02A	IOA-RIA82-SB03A	IOA-RIA82-SB04A
SAMPLE ID	IOA-SO-RIA33-SB02-0507	IOA-SO-RIA33-SB04-0305	IOA-SO-RIA33-SB08-0305	IOA-SO-RIA33-SB10-0305	IOA-SO-RIA33-SB14-0507	IOA-SO-RIA33-SB14-0507-AVG	IOA-SO-RIA33-SB14-0507-D	IOA-SO-RIA82-01A-0608	IOA-SO-RIA82-02A-0608	IOA-SO-RIA82-03A-0608	IOA-SO-RIA82-04A-0608
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20110815	20110815	20110815	20110815	20110815	20110815	20110815	20110809	20110811	20110811	20110811
TOP DEPTH	5	3	3	3	5	5	5	6	6	6	6
BOTTOM DEPTH	7	5	5	5	7	7	7	8	8	8	8
VOLATILES (UG/KG)											
1,1,1-TRICHLOROETHANE	0.41 U	0.36 U	0.39 U	4 J	0.48 U	0.445 U	0.41 U				
1,1,2,2-TETRACHLOROETHANE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
1,1,2-TRICHLOROETHANE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
1,1,2-TRICHLOROTRIFLUOROETHANE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
1,1-DICHLOROETHANE	0.41 U	0.36 U	0.39 U	3 J	0.48 U	0.445 U	0.41 U				
1,1-DICHLOROETHENE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
1,2,4-TRICHLOROBENZENE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
1,2-DIBROMO-3-CHLOROPROPANE	0.69 U	0.61 U	0.64 U	0.81 UJ	0.8 U	0.745 U	0.69 U				
1,2-DIBROMOETHANE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
1,2-DICHLOROBENZENE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
1,2-DICHLOROETHANE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
1,2-DICHLOROPROPANE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
1,3-DICHLOROBENZENE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
1,4-DICHLOROBENZENE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
2-BUTANONE	3.5 U	3 U	3.2 U	4 UJ	4 U	3.7 U	3.4 U				
2-HEXANONE	0.41 UJ	0.36 UJ	0.39 UJ	0.48 UJ	0.48 UJ	0.445 UJ	0.41 UJ				
4-METHYL-2-PENTANONE	0.41 UJ	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
ACETONE	28 U	14 U	13 U	9 U	37 U	34 U	31 U				
BENZENE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
BROMODICHLOROMETHANE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
BROMOFORM	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
BROMOMETHANE	0.41 UJ	0.36 UJ	0.39 UJ	0.48 UJ	0.48 UJ	0.445 UJ	0.41 UJ				
CARBON DISULFIDE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
CARBON TETRACHLORIDE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
CHLOROBENZENE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
CHLORODIBROMOMETHANE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
CHLOROETHANE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				

TABLE A-3

ANALYTICAL RESULTS - SUBSURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

RIA ID	RIA33	RIA33	RIA33	RIA33	RIA33	RIA33	RIA33	RIA82	RIA82	RIA82	RIA82
LOCATION ID	IOA-RIA33-SB02	IOA-RIA33-SB04	IOA-RIA33-SB08	IOA-RIA33-SB10	IOA-RIA33-SB14	IOA-RIA33-SB14	IOA-RIA33-SB14	IOA-RIA82-SB01A	IOA-RIA82-SB02A	IOA-RIA82-SB03A	IOA-RIA82-SB04A
SAMPLE ID	IOA-SO-RIA33-SB02-0507	IOA-SO-RIA33-SB04-0305	IOA-SO-RIA33-SB08-0305	IOA-SO-RIA33-SB10-0305	IOA-SO-RIA33-SB14-0507	IOA-SO-RIA33-SB14-0507-AVG	IOA-SO-RIA33-SB14-0507-D	IOA-SO-RIA82-01A-0608	IOA-SO-RIA82-02A-0608	IOA-SO-RIA82-03A-0608	IOA-SO-RIA82-04A-0608
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20110815	20110815	20110815	20110815	20110815	20110815	20110815	20110809	20110811	20110811	20110811
TOP DEPTH	5	3	3	3	5	5	5	6	6	6	6
BOTTOM DEPTH	7	5	5	5	7	7	7	8	8	8	8
CHLOROFORM	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
CHLOROMETHANE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
CIS-1,2-DICHLOROETHENE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
CIS-1,3-DICHLOROPROPENE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
CYCLOHEXANE	0.69 U	0.61 U	0.64 U	0.81 UJ	0.8 U	0.745 U	0.69 U				
DICHLORODIFLUOROMETHANE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
ETHYLBENZENE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
ISOPROPYLBENZENE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
M+P-XYLENES	0.83 U	0.73 U	0.77 U	0.97 UJ	0.96 U	0.895 U	0.83 U				
METHYL ACETATE	0.69 U	0.61 UR	0.64 UR	0.81 UR	0.8 UR	0.745 UR	0.69 UR				
METHYL CYCLOHEXANE	0.41 U	0.61 U	0.64 U	0.81 UJ	0.8 U	0.745 U	0.69 U				
METHYLENE CHLORIDE	0.41 UJ	0.36 UJ	0.39 UJ	0.48 UR	0.48 UJ	0.445 UJ	0.41 UJ				
O-XYLENE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
STYRENE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
TETRACHLOROETHENE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
TOLUENE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
TOTAL 1,2-DICHLOROETHENE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
TOTAL XYLENES	1 U	0.91 U	0.97 U	1.2 UJ	1.2 U	1.1 U	1 U				
TRANS-1,2-DICHLOROETHENE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
TRANS-1,3-DICHLOROPROPENE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
TRICHLOROETHENE	0.41 U	0.36 U	0.39 U	7 J	0.48 U	0.445 U	0.41 U				
TRICHLOROFLUOROMETHANE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
VINYL CHLORIDE	0.41 U	0.36 U	0.39 U	0.48 UJ	0.48 U	0.445 U	0.41 U				
SEMIVOLATILES (UG/KG)											
2-METHYLNAPHTHALENE	19 J	17 UJ	17 UJ	33 J	7 J	7.75 J	17 UJ	19 UJ	20 UJ	18 UJ	19 UJ
ACENAPHTHENE	73 J	17 UJ	17 UJ	19 J	17 UJ	17 UJ	17 UJ	19 UJ	20 UJ	18 UJ	19 UJ
ACENAPHTHYLENE	55 J	17 UJ	17 UJ	17 UJ	15 J	13 J	11 J	19 UJ	20 UJ	18 UJ	19 UJ
ANTHRACENE	150 J	17 UJ	17 UJ	41 J	39 J	34 J	29 J	19 UJ	20 UJ	18 UJ	19 UJ

U - NOT DETECTED; J - QUANTITATION APPROXIMATE; R - REJECTED

TABLE A-3

ANALYTICAL RESULTS - SUBSURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

RIA ID	RIA33	RIA33	RIA33	RIA33	RIA33	RIA33	RIA33	RIA82	RIA82	RIA82	RIA82
LOCATION ID	IOA-RIA33-SB02	IOA-RIA33-SB04	IOA-RIA33-SB08	IOA-RIA33-SB10	IOA-RIA33-SB14	IOA-RIA33-SB14	IOA-RIA33-SB14	IOA-RIA82-SB01A	IOA-RIA82-SB02A	IOA-RIA82-SB03A	IOA-RIA82-SB04A
SAMPLE ID	IOA-SO-RIA33-SB02-0507	IOA-SO-RIA33-SB04-0305	IOA-SO-RIA33-SB08-0305	IOA-SO-RIA33-SB10-0305	IOA-SO-RIA33-SB14-0507	IOA-SO-RIA33-SB14-0507-AVG	IOA-SO-RIA33-SB14-0507-D	IOA-SO-RIA82-01A-0608	IOA-SO-RIA82-02A-0608	IOA-SO-RIA82-03A-0608	IOA-SO-RIA82-04A-0608
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20110815	20110815	20110815	20110815	20110815	20110815	20110815	20110809	20110811	20110811	20110811
TOP DEPTH	5	3	3	3	5	5	5	6	6	6	6
BOTTOM DEPTH	7	5	5	5	7	7	7	8	8	8	8
BAP EQUIVALENT-HALFND	584 J	30.6 J	17 UJ	244 J	152 J	136 J	121 J	19 UJ	20 UJ	18 UJ	19 UJ
BAP EQUIVALENT-POS	584 J	11.8 J	17 UJ	231 J	135 J	120 J	104 J	19 UJ	20 UJ	18 UJ	19 UJ
BENZO(A)ANTHRACENE	520 J	15 J	17 UJ	220 J	140 J	125 J	110 J	19 UJ	20 UJ	18 UJ	19 UJ
BENZO(A)PYRENE	380 J	9 J	17 UJ	170 J	98 J	86.5 J	75 J	19 UJ	20 UJ	18 UJ	19 UJ
BENZO(B)FLUORANTHENE	650 J	13 J	17 UJ	290 J	170 J	150 J	130 J	19 UJ	20 UJ	18 UJ	19 UJ
BENZO(G,H,I)PERYLENE	230 J	17 UJ	17 UJ	92 J	60 J	53.5 J	47 J	19 UJ	20 UJ	18 UJ	19 UJ
BENZO(K)FLUORANTHENE	250 J	10 UJ	17 UJ	100 J	78 J	65 J	52 J	19 UJ	20 UJ	18 UJ	19 UJ
CHRYSENE	550 J	13 J	17 UJ	240 J	140 J	120 J	100 J	19 UJ	20 UJ	18 UJ	19 UJ
DIBENZO(A,H)ANTHRACENE	64 J	34 UJ	34 UJ	26 UJ	35 UJ	35 UJ	35 UJ	37 UJ	40 UJ	36 UJ	37 UJ
FLUORANTHENE	870 J	24 J	17 UJ	340 J	240 J	220 J	200 J	19 UJ	20 UJ	18 UJ	19 UJ
FLUORENE	89 J	17 UJ	17 UJ	17 J	16 J	13.5 J	11 J	19 UJ	20 UJ	18 UJ	19 UJ
INDENO(1,2,3-CD)PYRENE	200 J	34 UJ	34 UJ	86 J	49 J	44.5 J	40 J	37 UJ	40 UJ	36 UJ	37 UJ
NAPHTHALENE	33 J	17 UJ	17 UJ	11 J	12 J	10.2 J	17 UJ	19 UJ	20 UJ	18 UJ	19 UJ
PHENANTHRENE	610 J	11 J	17 UJ	190 J	150 J	135 J	120 J	19 UJ	20 UJ	18 UJ	19 UJ
PYRENE	910 J	20 J	17 UJ	370 J	210 J	185 J	160 J	19 UJ	20 UJ	18 UJ	19 UJ
TOTAL PAHS	5650 J	105 J	19 UJ	2220 J	1420 J	1250 J	1080 J	21.1 UJ	22.4 UJ	20.1 UJ	21.1 UJ
METALS (MG/KG)											
ALUMINUM	7300	6800	7300	6700	7900	7450	7000	3600	4200	4600	4400
ANTIMONY	0.3	0.083 U	0.056 U	0.13 U	0.53	0.49	0.45	0.066 U	0.094 U	0.069 U	0.065 U
ARSENIC	1.9	1.7	1.7	2.3	1.5	1.5	1.5	0.22 J	0.18 J	0.57	0.13 J
BARIUM	16	13	12	17	15	14.5	14	7.8	11	9.8	9.5
BERYLLIUM	0.37	0.4	0.54	0.52	0.38	0.4	0.42	0.17 U	0.26 J	0.27	0.26 U
CADMIUM	0.19	0.18	0.19	0.28	0.18 J	0.19 J	0.2	0.083 U	0.15	0.14	0.11 U
CALCIUM	1500	1000	1100	1700	1100	1100	1100	820	1300	1000	1100
CHROMIUM	10	11	9.7	8.9	9.2	8.25	7.3	4.7	6.3	6.2	5.5
COBALT	4.3	4.7	3.9	4.7	6.8	6.7	6.6	1.9	2.3	2.6	2.6
COPPER	9.6	9.7	9.4	12	9	8.65	8.3	3.6	4.6	6.1	6.5
IRON	13000	14000	18000	11000	14000	14000	14000	4900	6000	7100	6000

U - NOT DETECTED; J - QUANTITATION APPROXIMATE; R - REJECTED

ANALYTICAL RESULTS - SUBSURFACE SOIL
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

RIA ID	RIA33	RIA33	RIA33	RIA33	RIA33	RIA33	RIA33	RIA82	RIA82	RIA82	RIA82
LOCATION ID	IOA-RIA33-SB02	IOA-RIA33-SB04	IOA-RIA33-SB08	IOA-RIA33-SB10	IOA-RIA33-SB14	IOA-RIA33-SB14	IOA-RIA33-SB14	IOA-RIA82-SB01A	IOA-RIA82-SB02A	IOA-RIA82-SB03A	IOA-RIA82-SB04A
SAMPLE ID	IOA-SO-RIA33-SB02-0507	IOA-SO-RIA33-SB04-0305	IOA-SO-RIA33-SB08-0305	IOA-SO-RIA33-SB10-0305	IOA-SO-RIA33-SB14-0507	IOA-SO-RIA33-SB14-0507-AVG	IOA-SO-RIA33-SB14-0507-D	IOA-SO-RIA82-01A-0608	IOA-SO-RIA82-02A-0608	IOA-SO-RIA82-03A-0608	IOA-SO-RIA82-04A-0608
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	20110815	20110815	20110815	20110815	20110815	20110815	20110815	20110809	20110811	20110811	20110811
TOP DEPTH	5	3	3	3	5	5	5	6	6	6	6
BOTTOM DEPTH	7	5	5	5	7	7	7	8	8	8	8
LEAD	20	6.6	6.5	16	8.1	7.8	7.5	2.6	3.6	3.5	3.5
MAGNESIUM	2100	2400	2300	2000	2400	2300	2200	1100	1300	1600	1400
MANGANESE	240 J	170 J	310 J	180 J	320 J	320 J	320 J	65 J	90 J	92 J	82 J
MERCURY	0.018 J	0.0022 J	0.002 J	0.012 J	0.0077 J	0.0081 J	0.0085 J	0.01 U	0.013 U	0.011 U	0.01 U
NICKEL	8.5	7.8	7.8	8.9	8.9	8	7.1	3.8	4.5	5.1	5
POTASSIUM	290 J	440 J	360 J	360 J	360 J	380 J	400 J	250 J	310 J	310 J	270 J
SELENIUM	0.65 U	0.65 U	0.56 U	0.53 U	0.67 U	0.61 U	0.55 U	0.62 U	0.56 U	0.48 U	0.68 U
SILVER	0.092 U	0.084 U	0.08 U	0.09 U	0.082 U	0.0815 U	0.081 U	0.082 U	0.086 U	0.079 U	0.081 U
SODIUM	57 J	50 J	52 J	58 J	46 J	46.5 J	47 J	36 J	51 J	41 J	43 J
THALLIUM	0.087 U	0.087 U	0.074 U	0.09 J	0.09 U	0.082 U	0.074 U	0.083 U	0.074 U	0.065 U	0.091 U
VANADIUM	20	15	16	15	15	14.5	14	8.5	11	12	9.2
ZINC	42	38	40	40	33	34.5	36	17	19	26	23
MISCELLANEOUS PARAMETERS (%)											
PERCENT MOISTURE	5	2	2	4	4	4	4	10	18	8	11

APPENDIX B

PRELIMINARY REMEDIATION GOAL (PRG) CALCULATIONS

B-1 ADULT RESIDENT –SOIL

B-2 CHILD RESIDENT –SOIL

B-3 LIFELONG RESIDENT –SOIL

B-4 PRG CALCULATIONS SUMMARY

B-1 ADULT RESIDENT –SOIL

APPENDIX B-1
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL

SITE NAME: **NAS SOUTH WEYMOUTH**
EXPOSURE POINT: **INDUSTRIAL OPERATIONS AREA**
EXPOSURE SCENARIO: **ADULT RESIDENTS**
MEDIA: **SURFACE SOIL**
DATE: **DECEMBER 8, 2014**

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 = :	1E-06		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)
	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 = :	1.10E+10		Particulate emission factor (m^3/kg)
	VF = :	Chemical Specific		Volatilization factor (m^3/kg)

CHEMICAL	ABS	Cancer Slope Factor Oral $(mg/kg/day)^{-1}$	Cancer Slope Factor Dermal $(mg/kg/day)^{-1}$	Cancer Slope Factor Inhalation $(ug/m^3)^{-1}$	Reference Dose[1] Oral (mg/kg/day)	Reference Dose[1] Dermal (mg/kg/day)	Reference Dose[1] Inhalation (mg/m^3)	ADAF Ages 6 - 16	ADAF Ages >16
Benzo(a)anthracene	0.13	7.3E-01	7.3E-01	1.1E-04	NA	NA	NA	3	1
Benzo(a)pyrene Equivalents	0.13	7.3E+00	7.3E+00	1.1E-03	NA	NA	NA	3	1
Benzo(b)fluoranthene	0.13	7.3E-01	7.3E-01	1.1E-04	NA	NA	NA	3	1
Benzo(k)fluoranthene	0.13	7.3E-02	7.3E-02	1.1E-04	NA	NA	NA	3	1
Dibenzo(a,h)anthracene	0.13	7.3E+00	7.3E+00	1.1E-03	NA	NA	NA	3	1
Indeno(1,2,3-cd)pyrene	0.13	7.3E-01	7.3E-01	1.1E-04	NA	NA	NA	3	1
Aroclor-1260	0.14	2.0E+00	2.0E+00	5.7E-04	2.0E-05	2.0E-05	NA	1	1
Heptachlor epoxide	0.1	9.1E+00	9.1E+00	2.6E-03	1.3E-05	1.3E-05	NA	1	1
2,3,7,8-TCDD Equivalents	0.03	1.3E+05	1.3E+05	3.8E+01	7.0E-10	7.0E-10	4.0E-08	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
Chromium VI	0	5.0E-01	2.0E+01	8.4E-02	3.0E-03	7.5E-05	1.0E-04	3	1
Lead	NA	NA	NA	NA	NA	NA	NA	1	1

CHEMICAL	Carcinogenic Intake Factors[2] Oral (kg/kg/day)	Carcinogenic Intake Factors[2] Dermal (kg/kg/day)	Carcinogenic Intake Factors[2] Inhalation (kg/m^3)	Noncarcinogenic Intake Factors[2] Oral (kg/kg/day)	Noncarcinogenic Intake Factors[2] Dermal (kg/kg/day)	Noncarcinogenic Intake Factors[2] Inhalation (kg/m^3)
Benzo(a)anthracene	6.85E-07	3.76E-07	4.98E-11	1.20E-06	6.58E-07	8.72E-11
Benzo(a)pyrene Equivalents	6.85E-07	3.76E-07	4.98E-11	1.20E-06	6.58E-07	8.72E-11
Benzo(b)fluoranthene	6.85E-07	3.76E-07	4.98E-11	1.20E-06	6.58E-07	8.72E-11
Benzo(k)fluoranthene	6.85E-07	3.76E-07	4.98E-11	1.20E-06	6.58E-07	8.72E-11
Dibenzo(a,h)anthracene	6.85E-07	3.76E-07	4.98E-11	1.20E-06	6.58E-07	8.72E-11
Indeno(1,2,3-cd)pyrene	6.85E-07	3.76E-07	4.98E-11	1.20E-06	6.58E-07	8.72E-11
Aroclor-1260	3.42E-07	2.02E-07	2.49E-11	1.20E-06	7.09E-07	8.72E-11
Heptachlor epoxide	3.42E-07	1.45E-07	2.49E-11	1.20E-06	5.06E-07	8.72E-11
2,3,7,8-TCDD Equivalents	3.42E-07	4.34E-08	2.49E-11	1.20E-06	1.52E-07	8.72E-11
Arsenic	2.05E-07	4.34E-08	2.49E-11	7.19E-07	1.52E-07	8.72E-11
Chromium VI	6.85E-07	0.00E+00	4.98E-11	1.20E-06	0.00E+00	8.72E-11
Lead	NA	NA	NA	NA	NA	NA

CHEMICAL	Soil Concentration Carcinogenic (mg/kg)	Soil Concentration Noncarcinogenic (mg/kg)
Benzo(a)anthracene	1.3	NA
Benzo(a)pyrene Equivalents	0.13	NA
Benzo(b)fluoranthene	1.3	NA
Benzo(k)fluoranthene	13	NA
Dibenzo(a,h)anthracene	0.13	NA
Indeno(1,2,3-cd)pyrene	1.3	NA
Aroclor-1260	0.92	10
Heptachlor epoxide	0.23	7.6
2,3,7,8-TCDD Equivalents	0.000020	0.00052
Arsenic	2.7	344
Chromium VI	2.9	2497
Lead	NA	NA

Notes:
1 - The reference dose for Aroclor-1254 was used as a surrogate for Aroclor-1260.
2 - A relative bioavailability factor (RBA) of 0.6 was used for arsenic.

B-2 CHILD RESIDENT –SOIL

APPENDIX B-2
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL (PAGE ONE OF TWO)

SITE NAME: NAS SOUTH WEYMOUTH
EXPOSURE POINT: INDUSTRIAL OPERATIONS AREA
EXPOSURE SCENARIO: CHILD RESIDENTS
MEDIA: SURFACE SOIL
DATE: DECEMBER 8, 2014

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

$$PRG_{soil} = \frac{TCR}{Intake_{ages\ 0\text{-}2} \times ADAF_{ages\ 0\text{-}2} + Intake_{ages\ 2\text{-}6} \times ADAF_{ages\ 2\text{-}6}}$$

Noncarcinogens

$$PRG_{soil} = \frac{THI}{\left(\frac{Intake_{oral}}{RfD_{oral}}\right) + \left(\frac{Intake_{derm}}{RfD_{derm}}\right) + \left(\frac{EC_{air}}{RfC}\right)}$$

$$Intake_{oral} = \frac{IR \times EF \times ED \times FI \times CF}{BW \times AT}$$

$$Intake_{derm} = \frac{SA \times AF \times ABS \times EF \times ED \times CF}{BW \times AT}$$

$$EC_{air} = \frac{ET \times EF \times ED \times [1/PEF + 1/VF]}{AT \times 24 \text{ hours/day}}$$

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 = :	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)
	FI = :	1	1	Fraction from contaminated source (unitless)
Dermal Contact	SA = :	2,690	2,690	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 = :	1.10E+10		Particulate emission factor (m^3/kg)
	VF = :	Chemical Specific		Volatilization factor (m^3/kg)

CHEMICAL	ABS	Cancer Slope Factor Oral $(mg/kg/day)^{-1}$	Cancer Slope Factor Dermal $(mg/kg/day)^{-1}$	Cancer Slope Factor Inhalation $(ug/m^3)^{-1}$	Reference Dose[1] Oral (mg/kg/day)	Reference Dose[1] Dermal (mg/kg/day)	Reference Dose[1] Inhalation (mg/m^3)	ADAF Ages 0 - 2	ADAF Ages 2 - 6
Benzo(a)anthracene	0.13	7.3E-01	7.3E-01	1.1E-04	NA	NA	NA	3	1
Benzo(a)pyrene	0.13	7.3E+00	7.3E+00	1.1E-03	NA	NA	NA	3	1
Benzo(b)fluoranthene	0.13	7.3E-01	7.3E-01	1.1E-04	NA	NA	NA	3	1
Benzo(k)fluoranthene	0.13	7.3E-02	7.3E-02	1.1E-04	NA	NA	NA	3	1
Dibenzo(a,h)anthracene	0.13	7.3E+00	7.3E+00	1.1E-03	NA	NA	NA	3	1
Indeno(1,2,3-cd)pyrene	0.13	7.3E-01	7.3E-01	1.1E-04	NA	NA	NA	3	1
Aroclor-1260	0.14	2.0E+00	2.0E+00	5.7E-04	2.0E-05	2.0E-05	NA	1	1
Heptachlor epoxide	0.1	9.1E+00	9.1E+00	2.6E-03	1.3E-05	1.3E-05	NA	1	1
2,3,7,8-TCDD Equivalents	0.03	1.3E+05	1.3E+05	3.8E+01	7.0E-10	7.0E-10	4.0E-08	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
Chromium VI	0	5.0E-01	2.0E+01	8.4E-02	3.0E-03	7.5E-05	1.0E-04	3	1
Lead	NA	NA	NA	NA	NA	NA	NA	1	1

CHEMICAL	Carcinogenic Intake Factors[2] Oral (kg/kg/day)	Carcinogenic Intake Factors[2] Dermal (kg/kg/day)	Carcinogenic Intake Factors[2] Inhalation (kg/m^3)	Noncarcinogenic Intake Factors[2] Oral (kg/kg/day)	Noncarcinogenic Intake Factors[2] Dermal (kg/kg/day)	Noncarcinogenic Intake Factors[2] Inhalation (kg/m^3)
Benzo(a)anthracene	1.83E-06	6.39E-07	1.25E-11	1.28E-05	4.47E-06	8.72E-11
Benzo(a)pyrene	1.83E-06	6.39E-07	1.25E-11	1.28E-05	4.47E-06	8.72E-11
Benzo(b)fluoranthene	1.83E-06	6.39E-07	1.25E-11	1.28E-05	4.47E-06	8.72E-11
Benzo(k)fluoranthene	1.83E-06	6.39E-07	1.25E-11	1.28E-05	4.47E-06	8.72E-11
Dibenzo(a,h)anthracene	1.83E-06	6.39E-07	1.25E-11	1.28E-05	4.47E-06	8.72E-11
Indeno(1,2,3-cd)pyrene	1.83E-06	6.39E-07	1.25E-11	1.28E-05	4.47E-06	8.72E-11
Aroclor-1260	1.10E-06	4.13E-07	7.47E-12	1.28E-05	4.81E-06	8.72E-11
Heptachlor epoxide	1.10E-06	2.95E-07	7.47E-12	1.28E-05	3.44E-06	8.72E-11
2,3,7,8-TCDD Equivalents	1.10E-06	8.84E-08	7.47E-12	1.28E-05	1.03E-06	8.72E-11
Arsenic	6.58E-07	8.84E-08	7.47E-12	7.67E-06	1.03E-06	8.72E-11
Chromium VI	1.83E-06	0.00E+00	1.25E-11	1.28E-05	0.00E+00	8.72E-11
Lead	NA	NA	NA	NA	NA	NA

CHEMICAL	Soil Concentration Carcinogenic (mg/kg)	Soil Concentration Noncarcinogenic (mg/kg)
Benzo(a)anthracene	0.56	NA
Benzo(a)pyrene	0.056	NA
Benzo(b)fluoranthene	0.56	NA
Benzo(k)fluoranthene	5.6	NA
Dibenzo(a,h)anthracene	0.056	NA
Indeno(1,2,3-cd)pyrene	0.56	NA
Aroclor-1260	0.33	1.1
Heptachlor epoxide	0.079	0.80
2,3,7,8-TCDD Equivalents	0.0000065	0.000051
Arsenic	0.89	34
Chromium VI	1.1	235
Lead	NA	NA

Notes:
1 - The reference dose for Aroclor-1254 was used as a surrogate for Aroclor-1260.
2 - A relative bioavailability factor (RBA) of 0.6 was used for arsenic.

B-3 LIFELONG RESIDENT –SOIL

APPENDIX B-3
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL (PAGE ONE OF THREE)

SITE NAME: **NAS SOUTH WEYMOUTH**
EXPOSURE POINT: **INDUSTRIAL OPERATIONS AREA**
EXPOSURE SCENARIO: **HYPOTHETICAL LIFELONG RESIDENTS**
MEDIA: **SURFACE SOIL**
DATE: **DECEMBER 8, 2014**

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

$$PRG_{soil} = \frac{THI}{\left(\frac{Intake_{oral}}{RfD_{oral}}\right) + \left(\frac{Intake_{derm}}{RfD_{derm}}\right) + \left(\frac{EC_{air}}{RfC}\right)}$$

$$Intake_{oral} = \frac{IR \times EF \times ED \times FI \times CF}{BW \times AT}$$

$$Intake_{derm} = \frac{SA \times AF \times ABS \times EF \times ED \times CF}{BW \times AT}$$

$$EC_{air} = \frac{ET \times EF \times ED \times [1/PEF + 1/VF]}{AT \times 24\ hours/day}$$

INPUT ASSUMPTIONS:

	Parameter	Child Ages 0 - 2	Child Ages 2 - 6	Adult Ages 6 - 16	Adult Ages > 16	Definition
General	TCR = :	1E-06				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)
	FI = :	1	1	1	1	Fraction from contaminated source (unitless)
Dermal Contact	SA = :	2,690	2,690	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 = :	1.10E+10				Particulate emission factor (m^3/kg)
	VF = :	Chemical Specific				Volatilization factor (m^3/kg)

CHEMICAL	ABS	Cancer Slope Factor Oral $(mg/kg/day)^{-1}$	Cancer Slope Factor Dermal $(mg/kg/day)^{-1}$	Cancer Slope Factor Inhalation $(ug/m^3)^{-1}$	Reference Dose[1] Oral (mg/kg/day)	Reference Dose[1] Dermal (mg/kg/day)	Reference Dose[1] Inhalation (mg/m^3)
Benzo(a)anthracene	0.13	7.3E-01	7.3E-01	1.1E-04	NA	NA	NA
Benzo(a)pyrene	0.13	7.3E+00	7.3E+00	1.1E-03	NA	NA	NA
Benzo(b)fluoranthene	0.13	7.3E-01	7.3E-01	1.1E-04	NA	NA	NA
Benzo(k)fluoranthene	0.13	7.3E-02	7.3E-02	1.1E-04	NA	NA	NA
Dibenzo(a,h)anthracene	0.13	7.3E+00	7.3E+00	1.1E-03	NA	NA	NA
Indeno(1,2,3-cd)pyrene	0.13	7.3E-01	7.3E-01	1.1E-04	NA	NA	NA
Aroclor-1260	0.14	2.0E+00	2.0E+00	5.7E-04	2.0E-05	2.0E-05	NA
Heptachlor epoxide	0.1	9.1E+00	9.1E+00	2.6E-03	1.3E-05	1.3E-05	NA
2,3,7,8-TCDD Equivalents	0.03	1.3E+05	1.3E+05	3.8E+01	7.0E-10	7.0E-10	4.0E-08
Arsenic	0.03	1.5E+00	1.5E+00	4.3E-03	3.0E-04	3.0E-04	1.5E-05
Chromium VI	0	5.0E-01	2.0E+01	8.4E-02	3.0E-03	7.5E-05	1.0E-04
Lead	NA	NA	NA	NA	NA	NA	NA

CHEMICAL	Age Dependent Adjustment Factor Ages 0 - 2	Ages 2 - 6	Ages 6 - 16	Ages >16
Benzo(a)anthracene	10	3	3	1
Benzo(a)pyrene	10	3	3	1
Benzo(b)fluoranthene	10	3	3	1
Benzo(k)fluoranthene	10	3	3	1
Dibenzo(a,h)anthracene	10	3	3	1
Indeno(1,2,3-cd)pyrene	10	3	3	1
Aroclor-1260	1	1	1	1
Heptachlor epoxide	1	1	1	1
2,3,7,8-TCDD Equivalents	1	1	1	1
Arsenic	1	1	1	1
Chromium VI	10	3	3	1
Lead	1	1	1	1

APPENDIX B-3
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

RISK ASSESSMENT SPREADSHEET - CALCULATION OF RISK-BASED CONCENTRATIONS FOR SOIL (PAGE TWO OF THREE)

SITE NAME: NAS SOUTH WEYMOUTH
EXPOSURE POINT: INDUSTRIAL OPERATIONS AREA
EXPOSURE SCENARIO: HYPOTHETICAL LIFELONG RESIDENTS
MEDIA: SURFACE SOIL
DATE: DECEMBER 8, 2014

CHEMICAL	Carcinogenic Intake Factors(2)			Noncarcinogenic Intake Factors(2)		
	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)anthracene	6.53E-06	2.42E-06	8.97E-11	1.28E-05	4.47E-06	8.72E-11
Benzo(a)pyrene	6.53E-06	2.42E-06	8.97E-11	1.28E-05	4.47E-06	8.72E-11
Benzo(b)fluoranthene	6.53E-06	2.42E-06	8.97E-11	1.28E-05	4.47E-06	8.72E-11
Benzo(k)fluoranthene	6.53E-06	2.42E-06	8.97E-11	1.28E-05	4.47E-06	8.72E-11
Dibenzo(a,h)anthracene	6.53E-06	2.42E-06	8.97E-11	1.28E-05	4.47E-06	8.72E-11
Indeno(1,2,3-cd)pyrene	6.53E-06	2.42E-06	8.97E-11	1.28E-05	4.47E-06	8.72E-11
Aroclor-1260	1.44E-06	6.15E-07	3.24E-11	1.28E-05	4.81E-06	8.72E-11
Heptachlor epoxide	1.44E-06	4.39E-07	3.24E-11	1.28E-05	3.44E-06	8.72E-11
2,3,7,8-TCDD Equivalents	1.44E-06	1.32E-07	3.24E-11	1.28E-05	1.03E-06	8.72E-11
Arsenic	8.63E-07	1.32E-07	3.24E-11	7.67E-06	1.03E-06	8.72E-11
Chromium VI	6.53E-06	0.00E+00	8.97E-11	1.28E-05	0.00E+00	8.72E-11
Lead	NA	NA	NA	NA	NA	NA

CHEMICAL	Soil Concentration	
	Carcinogenic (mg/kg)	Noncarcinogenic (mg/kg)(3)
Benzo(a)anthracene	0.15	NA
Benzo(a)pyrene	0.015	NA
Benzo(b)fluoranthene	0.15	NA
Benzo(k)fluoranthene	1.5	NA
Dibenzo(a,h)anthracene	0.015	NA
Indeno(1,2,3-cd)pyrene	0.15	NA
Aroclor-1260	0.24	1.1
Heptachlor epoxide	0.059	0.80
2,3,7,8-TCDD Equivalents	0.0000049	0.000051
Arsenic	0.67	34
Chromium VI	0.31	235
Lead	NA	NA

Notes:
1 - The reference dose for Aroclor-1254 was used as a surrogate for Aroclor-1260.
2 - A relative bioavailability factor (RBA) of 0.6 was used for arsenic.
3 - Noncarcinogenic concentration is based on the child resident.

B-4 PRG CALCULATIONS SUMMARY

APPENDIX B-4
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

Weymouth Industrial Operations Area – Calculation of Preliminary Remedial Goals

Preliminary remedial goals (PRGs) for chemicals of concern (COCs) were calculated for hypothetical residential receptors using current exposure assumptions. PRGs for residential receptors were previously calculated in April 2013, and some of these previous residential PRGs differ slightly from the current PRGs due to updates in exposure assumptions.

Differences in exposure assumptions are as follows:

Exposure Assumption	Previous	Current
Exposure Duration – Adult	24 years	20 years
Body Weight – Adult	70 kg	80 kg
Surface Area – Child	2,800 cm^2	2,690 cm^2
Surface Area – Adult	5,700 cm2	6,032 cm^2

The current exposure assumptions values are based on USEPA guidance (USEPA, 2014).

In addition, a relative bioavailability factor (RBA) of 0.6 was used for arsenic (USEPA, 2012), and a value of 1 was used for all other chemicals. The RBA of 0.6 was not used in the previous PRG calculations from April 2013.

The differences in PRGs for hypothetical residents are identified in the table below (shaded rows indicate current and previous PRGs that differ):

Contaminant of Concern	Units	Current Residential PRG	Previous Residential PRG
Benzo(a)anthracene	ug/kg	1500	1500
Benzo(a)pyrene	ug/kg	150	150
Benzo(b)fluoranthene	ug/kg	1500	1500
Benzo(k)fluoranthene	ug/kg	15000	15000
Dibenzo(a,h)anthracene	ug/kg	150	150
Indeno(1,2,3-cd)pyrene	ug/kg	1500	1500
Aroclor-1260	ug/kg	1100	1100
Heptachlor epoxide	ug/kg	590	530
2,3,7,8-TCDD Equivalents	ug/kg	0.049	0.045
Arsenic	mg/kg	6.7	3.9
Chromium VI	mg/kg	3.1	3.0
Lead	mg/kg	400	400

Residential PRGs for four chemicals have increased only slightly due to the changes in the exposure assumptions and, for arsenic, also due to the use of an RBA factor of 0.6. No major changes were noted for the PRGs.

References:

USEPA, 2012. Compilation and Review of Data on Relative Bioavailability of Arsenic in Soil and Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil Documents. OSWER Directive 9200.1-113. Office of Superfund Remediation and Technology Innovation. Washington, D.C. December.

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.

APPENDIX C

MASS CALCULATIONS

APPENDIX C
COC MASS CALCULATION
INDUSTRIAL OPERATIONS AREA
FORMER NAS SOUTH WEYMOUTH, WEYMOUTH, MA

Zone Thickness (ft)	Location/Remedial Action Area	COC	Area (ft^2)	Total Volume in Place (ft^3)	Bulk Density (g/cm^3)[1]	Soil: Average Concentration of Contaminant (mg/kg)[2,3]	Soil: Mass Contaminant (lb)[4]
2	Area 1	Aroclor-1260	1,800	3,600	1.52	1.8	0.615
2	Area 2	Aroclor-1260	100	200	1.52	1.5	0.028
2	Area 3	Aroclor-1260	100	200	1.52	2.9	0.055
2	Area 4	Aroclor-1260	400	800	1.52	1.2	0.091
2	Area 5	Aroclor-1260	2,500	5,000	1.52	12.0	5.693
2	Area 6	Aroclor-1260	2,500	5,000	1.52	1.8	0.854
2	Area 7	Benzo(a)anthracene	10,000	20,000	1.52	6.5	12.336
		Benzo(a)pyrene				5.3	10.058
		Benzo(b)fluoranthene				8.4	15.942
		Dibenzo(a,h)anthracene				0.2	0.399
		Indeno(1,2,3-cd)pyrene				4.0	7.591
		Arsenic				5.7	10.818
		Chromium				14.2	26.949
2	Area 8	Benzo(a)anthracene	100	200	1.52	6.3	0.120
		Benzo(a)pyrene				5.6	0.106
		Benzo(b)fluoranthene				7.4	0.140
		Dibenzo(a,h)anthracene				0.7	0.013
		Indeno(1,2,3-cd)pyrene				2.6	0.049
		Chromium				15.0	0.285
2	Area 9	Benzo(a)anthracene	7,500	15,000	1.52	3.2	4.555
		Benzo(a)pyrene				2.6	3.701
		Benzo(b)fluoranthene				2.5	3.558
		Indeno(1,2,3-cd)pyrene				2.2	3.131
		Chromium				11.6	16.511
		Arsenic				8.9	12.668
2	Area 10	Arsenic	100	200	1.52	36.0	0.683

Total Aroclor-1260	**7.3369**
Total Benzo(a)anthracene	**17.0101**
Total Benzo(a)pyrene	**13.8654**
Total Benzo(b)fluoranthene	**19.6404**
Total Dibenzo(a,h)anthracene	**0.4118**
Total Indeno(1,2,3-cd)pyrene	**10.7720**
Total Arsenic	**24.1686**
Total Chromium	**43.7445**
TOTAL	**137**

Note:
1) Bulk density value represents sand/fill material.
2) For Remedial Action Areas that include only one sample location, the COC concentration from the one location is used; an average concentration of contaminant could not be calculated.
3) Concentrations of detected COC contaminants used to calculate average concentrations.
4) Values are subject to change based on actual volumes of soil addressed by the remedy.

APPENDIX D

SUSTAINABILITY ANALYSIS

APPENDIX D

Environmental Footprint Evaluation
Industrial Operations Area
Former NAS South Weymouth
South Weymouth, MA
February 2015

OBJECTIVE

This Environmental Footprint Evaluation of remedial alternatives is provided as an Appendix D to the Focused Feasibility Study (FFS) for the Industrial Operations Area located at former Naval Air Station (NAS) South Weymouth in South Weymouth, MA. 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 (NAVFAC, 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 U.S. 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 Industrial Operations Area FFS 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 FFS 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 Industrial Operations Area FFS located at former NAS South Weymouth:

- Alternative 2: Excavation and Off-Site Disposal
- Alternative 3: Asphalt Cover 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 D-2 and D-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 D1.

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 D1 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 D2 shows the breakdown of the percent that each of the main activities of each alternative (x-axis) contributes to the GHG emissions (y-axis).

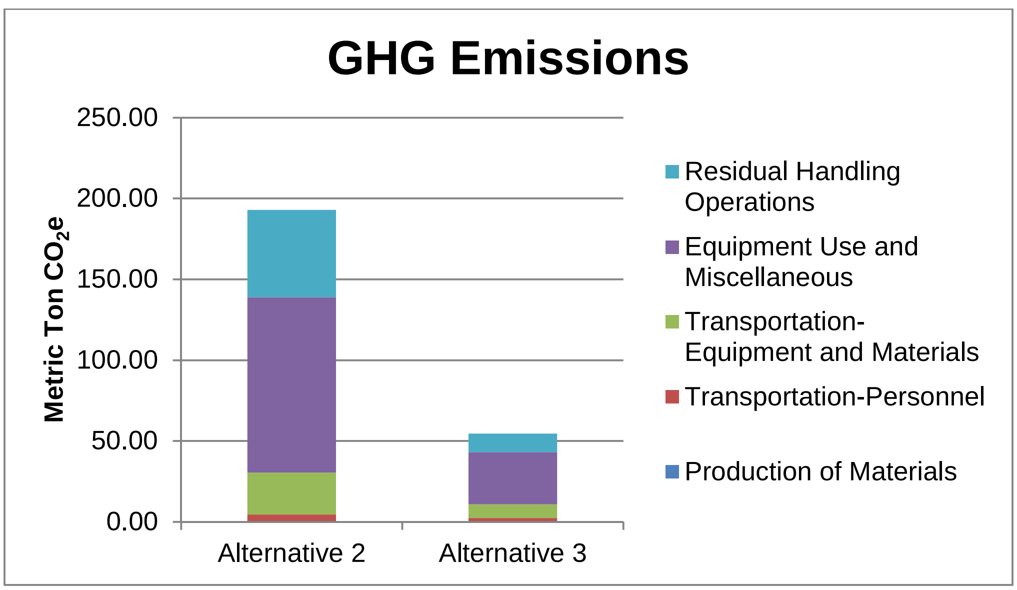


Figure D1: GHG Emissions for Alternatives at former Naval Air Station South Weymouth Industrial Operations Area

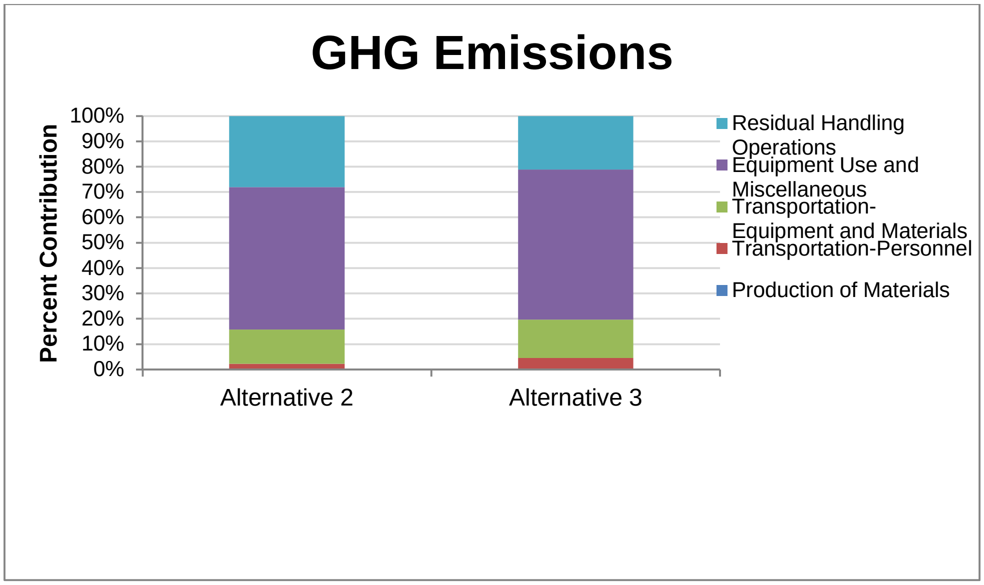


Figure D2: GHG Emissions percentage breakdown for Alternatives at former Naval Air Station South Weymouth Industrial Operations Area

The total amount of GHG emissions from Alternative 2 is 192.93 metric ton of CO_2e. The main contributor for the GHG emissions is the use of equipment and materials, including the excavation of soil and production and handling of backfill, and the amount of emissions resulting from this activity is 108.44 metric ton of CO_2e, corresponding to 56.2 percent of the total GHG emissions. The handling of residuals is the activity with the second highest contribution to GHG emissions with 54.10 metric ton of CO_2e released, corresponding to approximately 28.0 percent of the total GHG emissions. Transportation of equipment and materials to and from the site is the activity with the third highest contribution to the CO_2e emissions, with 25.97 metric ton being released corresponding to 13.5 percent of the total GHG emissions.

The total amount of GHG emissions from Alternative 3 is 54.69 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 32.36 metric ton of CO_2e, corresponding to 59.2 percent of the total GHG emissions. The handling of residuals to and from the site is the activity with the second highest contribution to GHG emissions with 11.56 metric ton of CO_2e released, corresponding to approximately 21.1 percent of the total GHG emissions. Transportation of equipment and materials to and from the site is the activity with the third highest contribution to the CO_2e emissions, with 8.34 metric ton being released corresponding to 15.2 percent of the total GHG emissions.

Criteria Pollutant Emissions

NO_X

Figure D3 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 D4 shows the breakdown of the percent that each of main activities of each alternative (x-axis) contributes to the NO_X emissions (y-axis).

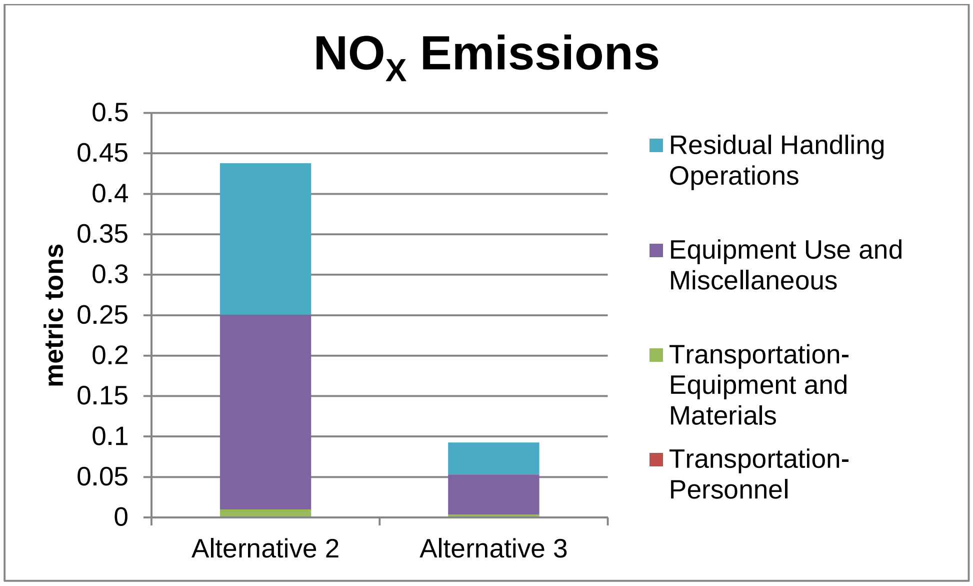


Figure D3 NO_X Emissions for Alternatives at former Naval Air Station South Weymouth Industrial Operations Area

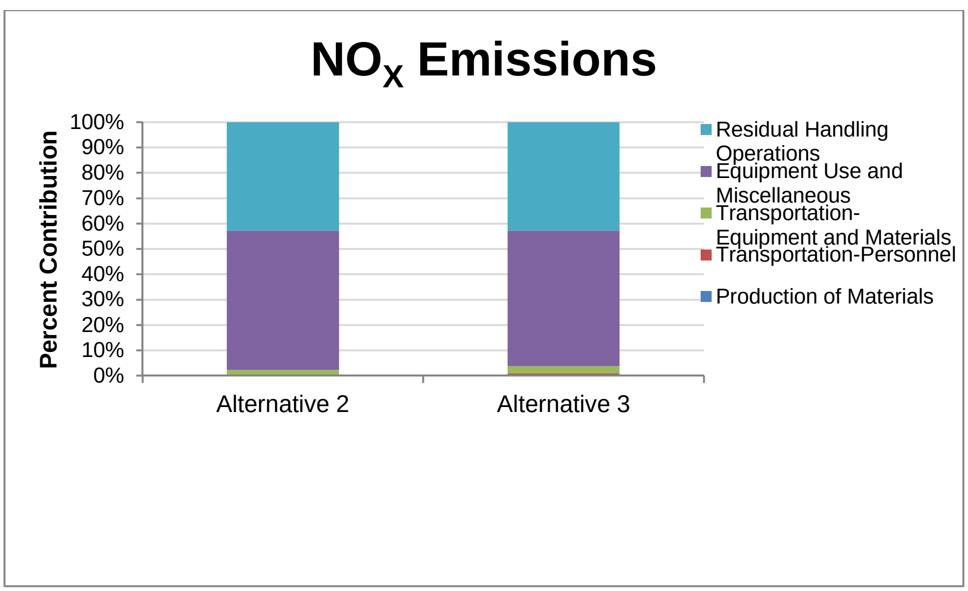


Figure D4: NO_X Emissions percentage breakdown for Alternatives at former Naval Air Station South Weymouth Industrial Operations Area

The total amount of NO_X emissions from Alternative 2 is 0.44 metric ton. The highest contributor to NO_X emissions is equipment use and materials production, emitting 0.24 metric ton of NO_X, corresponding to approximately 55.0 percent of the total NO_X emissions. The activity with the second highest contribution to NO_X emissions is residuals handling, emitting 0.19 metric ton of NO_X, corresponding to approximately 42.7 percent of the total NO_X emissions.

The total amount of NO_X emissions from Alternative 3 is 0.09 metric ton. The activity with the highest contribution to NO_X emissions is equipment use and materials production, emitting 0.05 metric ton of NO_X, corresponding to approximately 53.3 percent of the total NO_X emissions. The activity with the second highest contribution to NO_X emissions is residuals handling, emitting 0.04 metric ton of NO_X, corresponding to approximately 42.8 percent of the total NO_X emissions.

SO_X

Figure D5 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 D6 shows the breakdown of the percent that each of main activities of each alternative (x-axis) contributes to the SO_X emissions (y-axis).

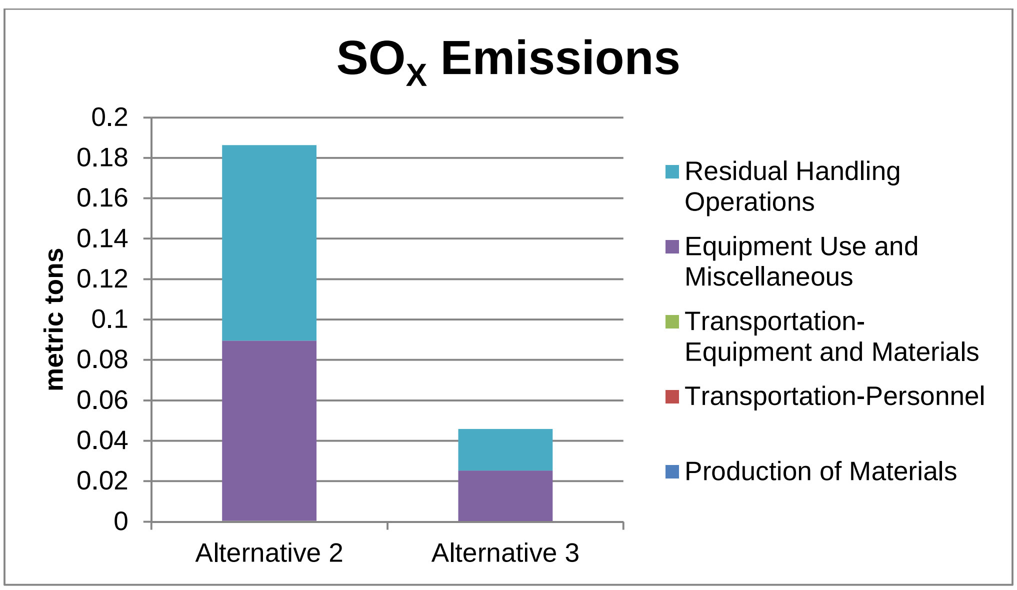


Figure D5: SO_X Emissions for Alternatives at former Naval Air Station South Weymouth Industrial Operations Area

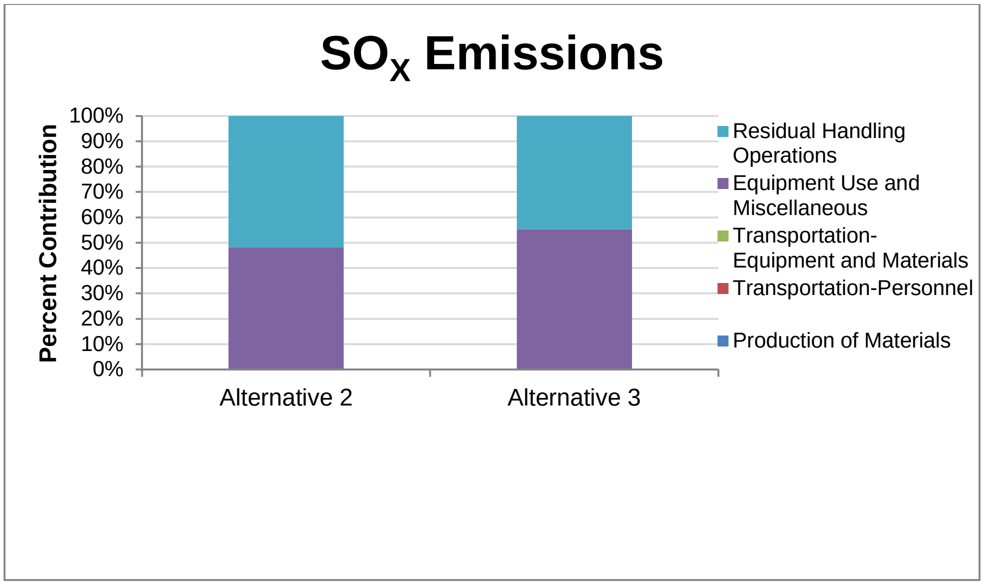


Figure D6: SO_X Emissions percentage breakdown for Alternatives at former Naval Air Station South Weymouth Industrial Operations Area

The total amount of SO_X emissions from Alternative 2 is 0.19 metric ton. The activity with the highest contribution to SO_X emissions is residuals handling, emitting 0.10 metric ton of SO_X, corresponding to 51.9 percent of the total SO_X emissions. The use of equipment and materials production is the activity with the second highest contribution and emits 0.09 metric ton of SO_X, corresponding to approximately 47.9 percent of the total emissions.

The total amount of SO_X emissions from Alternative 3 is 0.05 metric ton. The activity with the highest contribution to SO_X emissions is the use of equipment, emitting 0.03 metric ton of SO_X, corresponding to 55.0 percent of the total SO_X emissions. The handling of residuals is the activity with the second highest contribution and emits 0.02 metric ton of SO_X, corresponding to approximately 44.7 percent of the total emissions.

PM_{10}

Figure D7 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 D8 shows the breakdown of the percent that each of main activities of each alternative (x-axis) contributes to the PM_{10} emissions (y-axis).

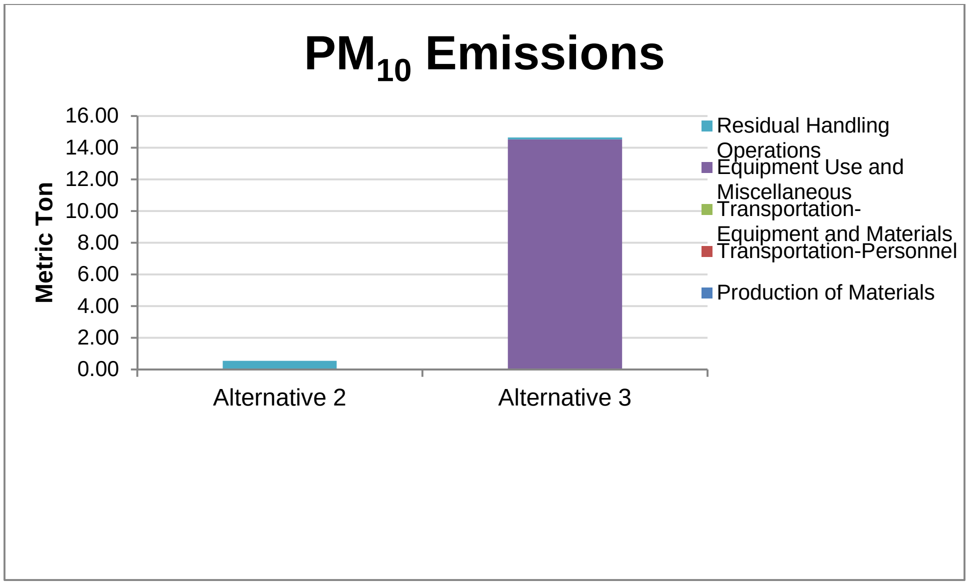


Figure D7: PM_{10} Emissions for Alternatives at former Naval Air Station South Weymouth Industrial Operations Area

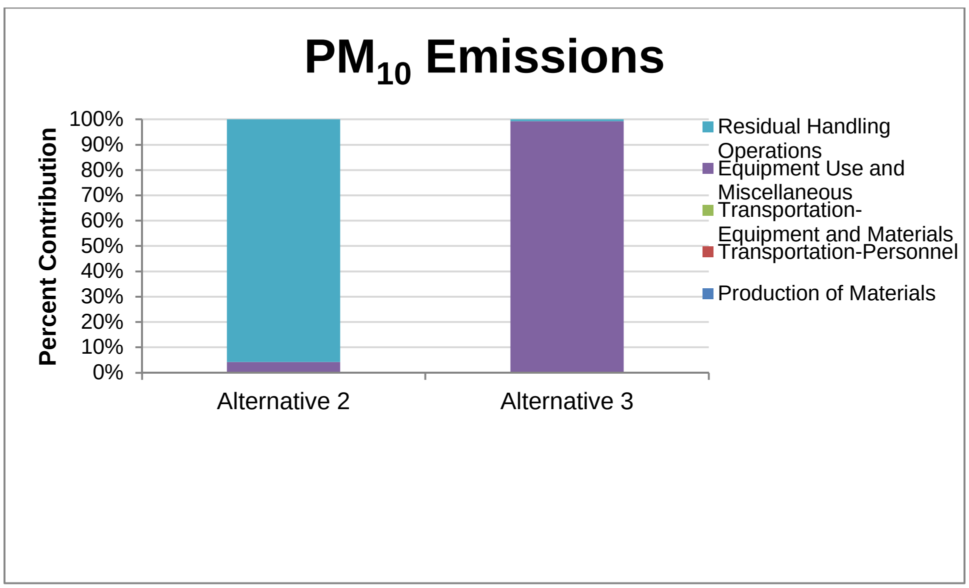


Figure D8: PM_{10} Emissions percentage breakdown for Alternatives at former Naval Air Station South Weymouth Industrial Operations Area

The total PM_{10} emissions resulting from Alternative 2.is 0.54 metric ton. The activity with the highest contribution to these emissions is residuals handling, emitting 0.51 metric ton of PM_{10}, approximately 95.8 percent of the total PM_{10} emissions. Equipment use is the activity with the second highest contribution and emits 0.02 metric ton of PM_{10}, corresponding to approximately 4.0 percent of the total emissions.

The total PM_{10} emissions resulting from Alternative 3 is 14.64 metric ton. The activity with the highest contribution to these emissions is the production of materials, emitting 14.53 metric ton of PM_{10}, approximately 99.3 percent of the total PM_{10} emissions. Residuals handling is the activity with the second highest contribution and emits 0.11 metric ton of PM_{10}, corresponding to approximately 0.7 percent of the total emissions.

Energy Consumption

Figure D9 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 D10 shows the percentage breakdown contribution of energy consumption from the different activity groups for each alternative.

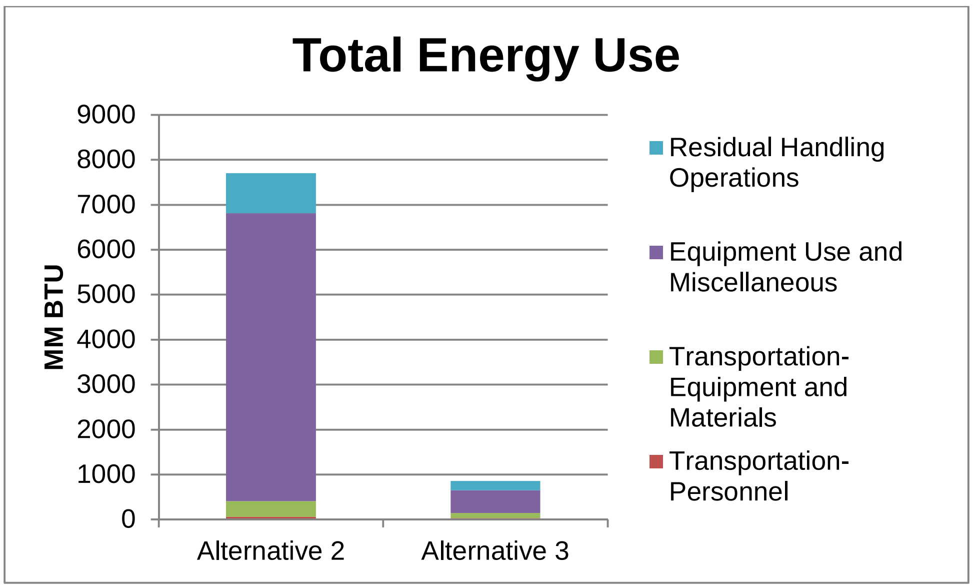


Figure D9: Energy Consumption for Alternatives at former Naval Air Station South Weymouth Industrial Operations Area

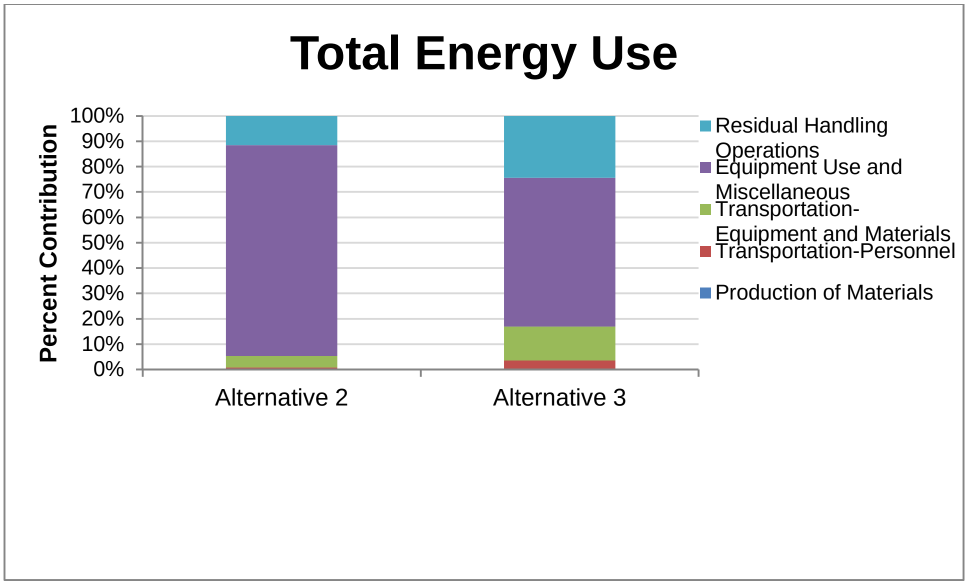


Figure D10: Energy Consumption percentage for Alternatives at former Naval Air Station South Weymouth Industrial Operations Area

The total amount of energy consumed by Alternative 2 is 7,700.5 MMBTU. The activity with the highest energy consumption is the use of equipment, utilizing 6,405.01 MMBTU, corresponding to approximately 83.2 percent of the total energy consumption. The activity with the second highest energy use is residuals handling, consuming 884.04 MMBTU, approximately 11.5 percent of the total energy consumption of this alternative. The third highest activity consuming energy corresponds to transportation of equipment, where 355.85 MMBTUs are consumed, approximately 4.6 percent of the total energy used during this alternative.

The total amount of energy consumed by Alternative 3 is 857.18 MMBTU. The activity with the highest energy consumption is the use of equipment and production of materials, utilizing 503.43 MMBTU, corresponding to approximately 58.7 percent of the total energy consumption. The activity with the second highest energy use is the handling of residuals, where 208.88 MMBTUs are consumed, approximately 24.4 percent of the total energy used during this alternative.

<u>Water Usage</u>

The water consumption of the evaluated alternatives is shown in Figure D11. The x-axis shows the alternatives evaluated and the y-axis shows the amount of water consumed in thousands of gallons. Figure D12 shows the percentage breakdown contribution of the different sectors of the water use through the lifetime of the each of the alternatives.

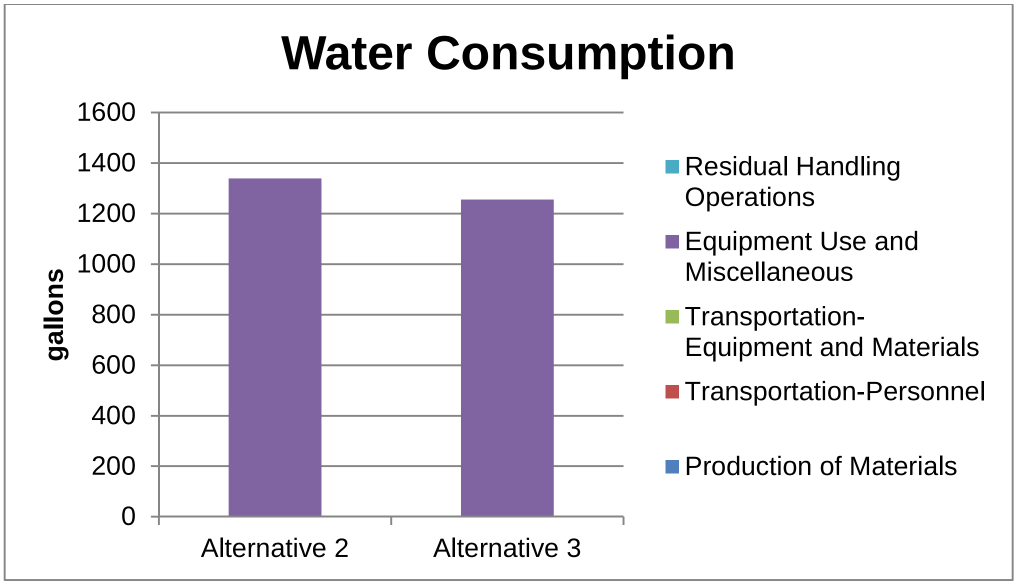


Figure D11: Water Consumption for Alternatives at former Naval Air Station South Weymouth Industrial Operations Area

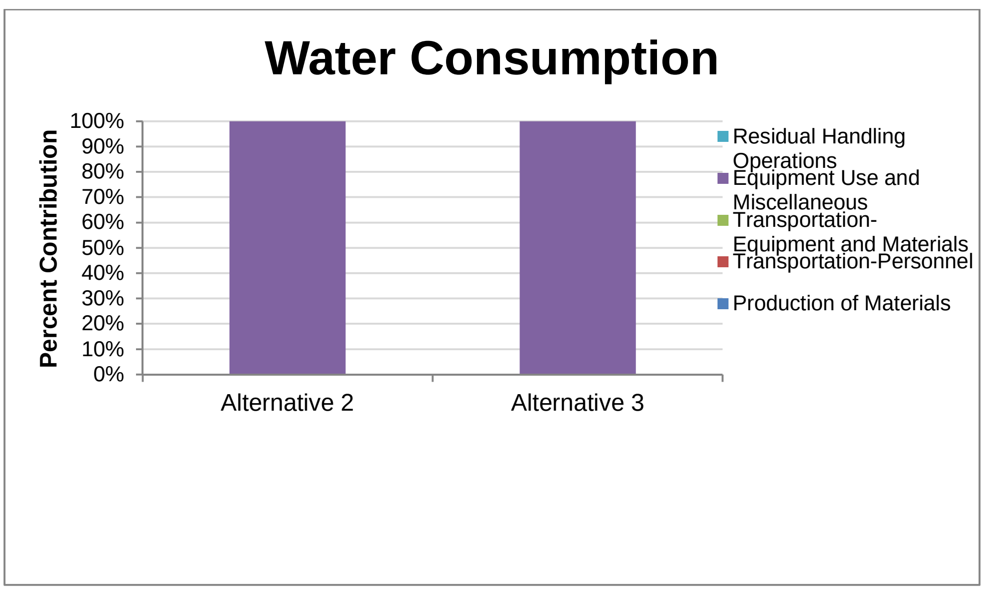


Figure D12: Water Consumption percentage breakdown for Alternatives at former Naval Air Station South Weymouth Industrial Operations Area

The total water consumption for Alternative 2 is 1,339.26 gallons of water. All water is consumed in equipment usage and site activities.

The total water consumption for Alternative 3 is 1,255.33 gallons of water. All water is consumed in equipment usage and site activities.

Accident Risk

Accident Risk Fatality

Figure D13 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.

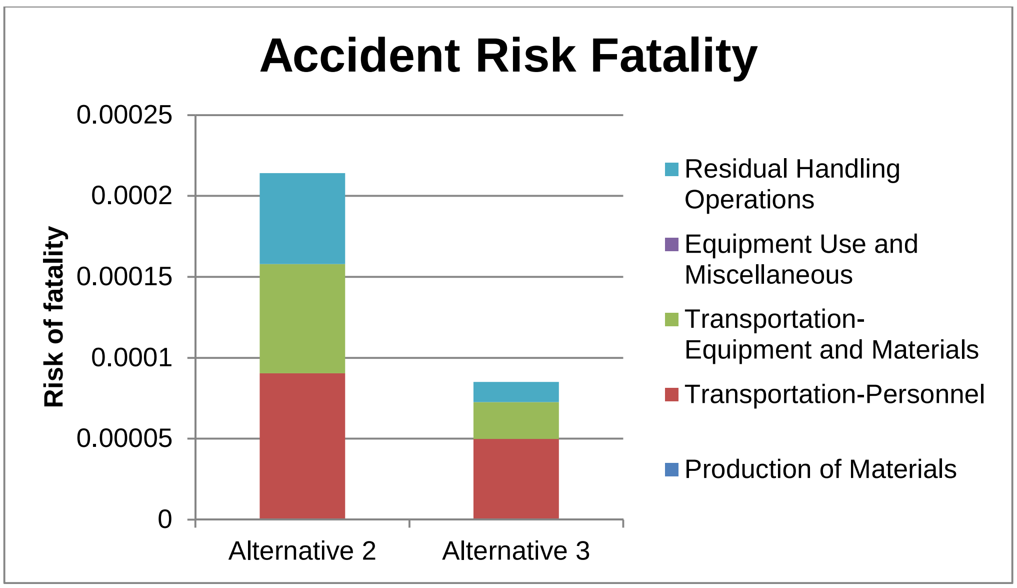


Figure D13 Risk of Fatality for Alternatives at former Naval Air Station South Weymouth Industrial Operations Area

Accident Risk Injury

Figure D14 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.

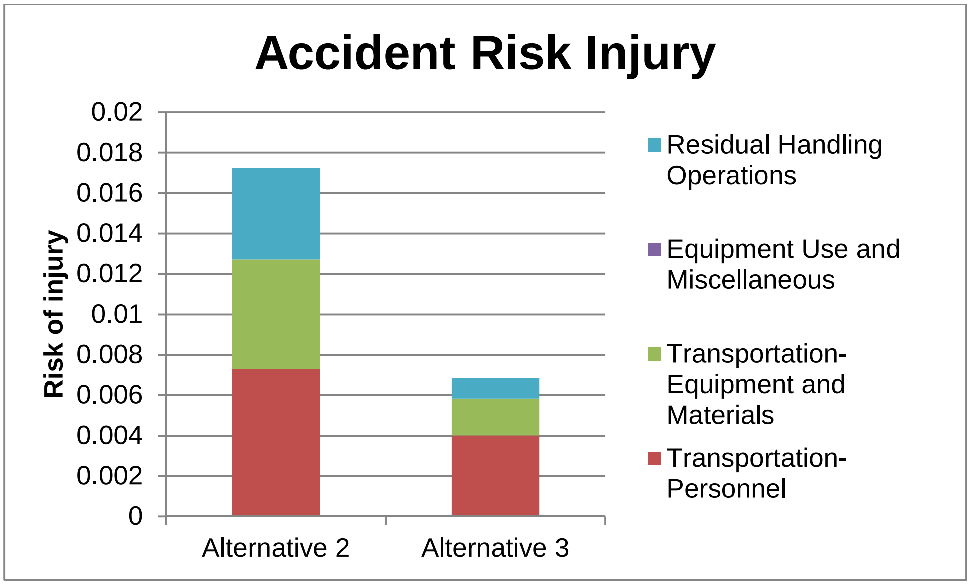


Figure D14 Risk of Injury for Alternatives at former Naval Air Station South Weymouth Industrial Operations Area

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 D2 for details).

Figures D2, D4, D6, D8, D10 and D12 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: Equipment usage and site activities are the largest contributors to most of the impact categories. It is recommended that the use of necessary equipment be limited as much as possible through clear and concise planning.
- For Alternative 3: The production and handling of asphalt is the largest contributor to most of the impact categories. It is recommended that any pavement on the affected areas that can be reused is used it possible, to limit the amount of asphalt required for the cover.

- For Alternative 2: 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.
- For both Alternatives: 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) NAVFAC, DON Guidance for Optimizing Remedy Evaluation, Selection, and Design, March 2010

(b) NAVFAC, DON Policy on SiteWise™ Optimization/GSR Tool Usage, email received from Brian Harrison/NAVFAC HQ dated 10 AUG 2010

Table D-1
Environmental Footprint Evaluation Results
Industrial Operations Area, Former NAS South Weymouth
South Weymouth, MA

Alternative	Activities	GHG Emissions (metric ton CO_2e)	Total Energy Used (MMBTU)	Water Impacts (gallons)	NO_X Emissions (metric ton)	SO_X Emissions (metric ton)	PM_{10} Emissions (metric ton)	Accident Risk Fatality	Accident Risk Injury
Alternative 2	Materials Production	0.000	0.000	0.000	0.00E+00	0.00E+00	0.00E+00	NA	NA
	Transportation-Personnel	4.421	55.606	NA	1.64E-03	5.76E-05	3.32E-04	9.05E-05	7.28E-03
	Transportation-Equipment	25.974	355.845	NA	8.37E-03	3.41E-04	6.78E-04	6.75E-05	5.44E-03
	Equipment Use and Misc	108.439	6405.076	1339.257	2.41E-01	8.92E-02	2.14E-02	0.00E+00	0.00E+00
	Residual Handling	54.099	884.038	NA	1.87E-01	9.67E-02	5.15E-01	5.62E-05	4.52E-03
	Total	192.933	7700.566	1339.257	0.438	0.186	0.537	0.000	0.017
Alternative 3	Materials Production	0.000	0.000	0.000	0.00E+00	0.00E+00	0.00E+00	NA	NA
	Transportation-Personnel	2.439	30.679	NA	9.02E-04	3.18E-05	1.83E-04	4.99E-05	4.02E-03
	Transportation-Equipment	8.335	114.196	NA	2.69E-03	1.09E-04	2.18E-04	2.26E-05	1.82E-03
	Equipment Use and Misc	32.358	503.497	1255.328	4.94E-02	2.52E-02	1.45E+01	0.00E+00	0.00E+00
	Residual Handling	11.556	208.876	NA	3.96E-02	2.05E-02	1.09E-01	1.25E-05	1.00E-03
	Total	54.689	857.247	1255.328	0.093	0.046	14.640	0.000	0.007

Table D-2
Environmental Impact Drivers
Industrial Operations Area, Former NAS South Weymouth
South Weymouth, MA

Alternatives	GHG Emsissions	Energy Use	Water Consumption	NO_X Emissions	SO_X Emissions	PM_{10} Emissions	Risk of injury	Risk of fatality
Alternative 2	1.00	1.00	1.00	1.00	1.00	0.04	1.00	1.00
	Excavator and Dozer Use	Excavator Use	Equipment Use	Excavator and Dozer Use	Residuals Handling	Excavator and Dozer Use	Transportation of Personnel	Transportation of Personnel
Alternative 3	0.28	0.11	0.94	0.21	0.25	1.00	0.40	0.40
	Asphalt Production and Handling	Asphalt Production and Handling	Equipment Use	Asphalt Production and Handling	Asphalt Production and Handling	Asphalt Production and Handling	Transportation of Personnel	Transportation of Personnel

Legend:

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

AlternativeS2: Excavation and Off-Site Disposal

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	1,000.00	gal	
Staging Area liner	233.49	lb	assume HDPE, Assume 30ftx40ft, 1 mm thick, 0.95 g/cm3
Backfill, common fill	5,019,000.00	lb	1673 cy, assume 1.5 ton/cy, 2000 lb/ton, assume soil
Stone, stable fill, 3 inches	753.30	ton	Assuming 2700 lb/cy gravel, 558 cy
Transportation-Personnel			
Item	Quantity	Units	Comments
Survey Support Crew transportation	400.00	miles	4 day, 50 miles per day, 2 people
Site Superintendent Transportation	1,500.00	miles	30 days, 50 miles per day, 1 person
Site Health and Safety and QAQC	3,000.00	miles	30 days, 50 miles per day, 2 people
Site labor transportation	6,000.00	miles	60 days, 50 miles per day, 2 people
Pre-excavation labor	500.00	miles	5 days, 50 miles per day, 2 people
Utility clearance	200.00	miles	2 days, 50 miles per day, 2 people
Transportation-equipment			
Item	Quantity	Units	Comments
Decon Water Storage Tank	0.15	ton	1000 gallons capacity, HPDE, 100 miles round trip, 150 lb per 500 gal capacity tank
Clean Water Storage tank	0.15	ton	1000 gallons capacity, HPDE, 100 miles round trip, 150 lb per 500 gal capacity tank
Dozer 300hp	28.00	ton	1 dozer, 28 ton per dozer, 100 miles round trip
Excavator 1.5 CY	22.5	ton	1 excavator, 45,000 lb, 100 miles round trip
Front End Loader	20.492	ton	1 front end loader, 20.4 tons
DPT Drill Rig	3.05		1 drill rig, 6100 lb, 100 miles round trip
Asphalt cutter attachment	0.105	ton	1 A1 Clamp style 18 inch asphalt cutter, 210 lb, 10
storage Trailers	10	ton	1 trailers, 10 ton per trailer, 100 miles round trip
Transportation-materials			
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
Backfill, common fill	2,509.50	ton	1673 cy, assume 1.5 ton/cy, 2000 lb/ton, assume soil
Stone, stable fill, 3 inches	753.30	ton	Assuming 2700 lb/cy gravel, 558 cy

Item	Quantity	Units	Comments
Equipment Use			
Item	Quantity	Units	Comments
Excavator, 1.5 CY	192.00	hours	30 days, 8 hours per day, 80% utilization
Dozer, 300 hp	64.00	hours	10 days, 8 hours per day, 80% utilization
Front End Loader	128.00	hours	20 days, 8 hours per day, 80% utilization
DPT drill rig	32.00	hours	5 days, 8 hours per day, 80% utilization
Asphalt cutting w/ excavator	12.80	hours	2 days, 8 hours per day, 80% utilization
Residual Handling			
Item	Quantity	Units	Comments
Decon water	4.16	ton	1000 gal, 8.32 ppg, 2000 lb per ton
Transportation and Disposal of non hazardous soil	2,235.00	ton	
Transportation and Disposal of asphalt	600	ton	
Transportation-residual handling			
Item	Quantity	Units	Comments
Decon water	100.00	miles	
Transportation and Disposal of non hazardous soil	100.00	miles	2235 ton, 40 ton/load, 56 loads
Transportation and Disposal of asphalt	100	miles	600 ton, 40 ton/load, 15 loads
Laboratory Analytical Services			
Item	Quantity	Units	Comments
Analytical sampling	12,000.00	dollars	60 samples, $200 per sample,
Waste disposal characterization	1,400.00	dollars	7 samples, $200 per sample
Pre-excavation sampling	13,400.00	dollars	~49 samples, $200 per sample

Alternative 3: Aspahlt Cover and Land Use Controls

	Item	Quantity	Units	Comments
	RAC			
	Materials			
	Item	Quantity	Units	Comments
y	Temporary Equipment Decon Pad Liner	700.47	lb	assume HDPE, Assume 30ftx40ft, 3 mm thick, 0.95 g/cm3
y	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	1,000.00	gal	
	asphalt cover	1,001	ton	Weight = 13805 cu. ft. × 145 pcf = 2827500 lbs
	Transportation-Personnel			
	Item	Quantity	Units	Comments
yy	Survey Support Crew transportation	300.00	miles	3 day, 50 miles per day, 2 people
yy	Site Superintendent Transportation	700.00	miles	14 days, 50 miles per day, 1 person
yy	Site Health and Safety and QAQC	1,400.00	miles	14 days, 50 miles per day, 2 people
	Site laborer transportation	1500	miles	10 days, 50 miles per day, 3 people
	Pre-cover labor	500.00	miles	5 days, 50 miles per day, 2 people
	Utility clearance	200.00	miles	2 days, 50 miles per day, 2 people
	Transportation-equipment			
	Item	Quantity	Units	Comments
5.3	Decon Water Storage Tank	0.15	ton	1000 gallons capacity, HPDE, 100 miles round trip, 150 lb per 500 gal capacity tank
5.4	Clean Water Storage tank	0.15	ton	1000 gallons capacity, HPDE, 100 miles round trip, 150 lb per 500 gal capacity tank
	storage Trailers	10	ton	1 trailers, 10 ton per trailer, 100 miles round trip
	Compactor, 120 hp	20.00	ton	1 compactor, 20 tons per compactor
	skid steer	3.5	ton	1 skeed steer, 4 tons per skid steer, 100 miles round trip
	Backhoe-loader, 48 hp	3.88	ton	1 unit, 7760 lb per unit, 100 miles round trip
	Asphalt cutter attachment	0.105	ton	1 A1 Clamp style 18 inch asphalt cutter, 210 lb, 10
	DPT Drill Rig	3.05		1 drill rig, 6100 lb, 100 miles round trip
	Transportation-materials			
	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
	asphalt cover	1001	ton	Weight = 13805 cu. ft. × 145 pcf = 2827500 lbs
	Equipment Use			
	Item	Quantity	Units	Comments
	Backhoe-loader, 48 hp	38.4	hours	6 days, 8 hours per day, 80% utilization
	Compactor, 120 hp	25.6	hours	4 days, 8 hours per day, 80% utilization
	skid steer	12.8	hours	2 days, 8 hours per day, 80% utilization
	Asphalt cutter on skid steer	12.8	hours	2 days, 8 hours per day, 80% utilization
	DPT Drill Rig	32.00	hours	5 days, 8 hours per day, 80% utilization

Residual Handling			
Item	Quantity	Units	Comments
Decon water	4.16	ton	1000 gal, 8.32 ppg, 2000 lb per ton
Disposal of old apshalt	600	ton	
Transportation-residual handling			
Item	Quantity	Units	Comments
Decon waste	100.00	miles	
Disposal of old apshalt	100	miles	
Laboratory Analytical Services			
Item	Quantity	Units	Comments
Pre-excavation sampling	13,400.00	dollars	~49 samples, $200 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,

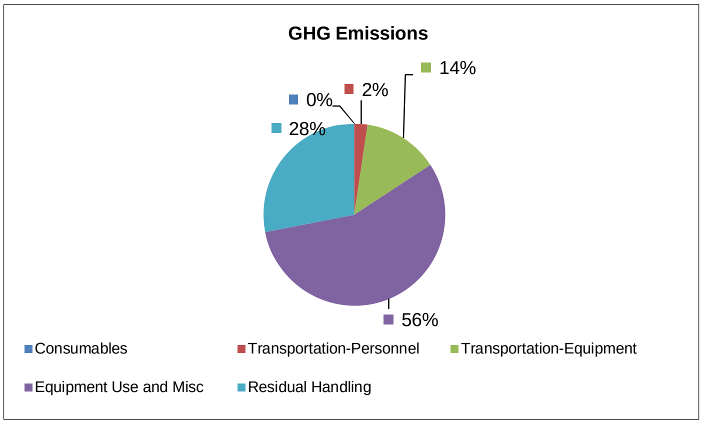
Sustainable Remediation - Environmental Footprint Summary
Alternative 2

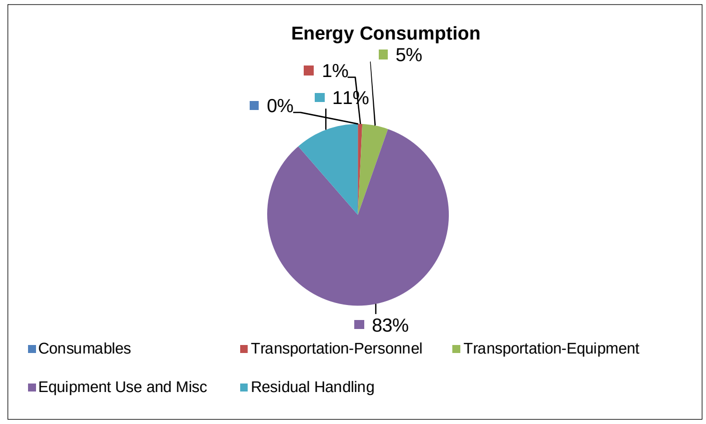
Phase	Activities	GHG Emissions (metric ton)	Total energy Used (MMBTU)	Water Consumption (gallons)	NOx emissions (metric ton)	SOx Emissions (metric ton)	PM10 Emissions (metric ton)	Accident Risk Fatality	Accident Risk Injury
Remedial Investigation	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	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	4.42	5.6E+01	NA	1.6E-03	5.8E-05	3.3E-04	9.0E-05	7.3E-03
	Transportation-Equipment	25.97	3.6E+02	NA	8.4E-03	3.4E-04	6.8E-04	6.8E-05	5.4E-03
	Equipment Use and Misc	108.44	6.4E+03	1.3E+03	2.4E-01	8.9E-02	2.1E-02	0.0E+00	0.0E+00
	Residual Handling	54.10	8.8E+02	NA	1.9E-01	9.7E-02	5.1E-01	5.6E-05	4.5E-03
	Sub-Total	192.93	7.70E+03	1.34E+03	4.38E-01	1.86E-01	5.37E-01	2.14E-04	1.72E-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	0.00	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
Total		**1.9E+02**	**7.7E+03**	**1.3E+03**	**4.4E-01**	**1.9E-01**	**5.4E-01**	**2.1E-04**	**1.7E-02**

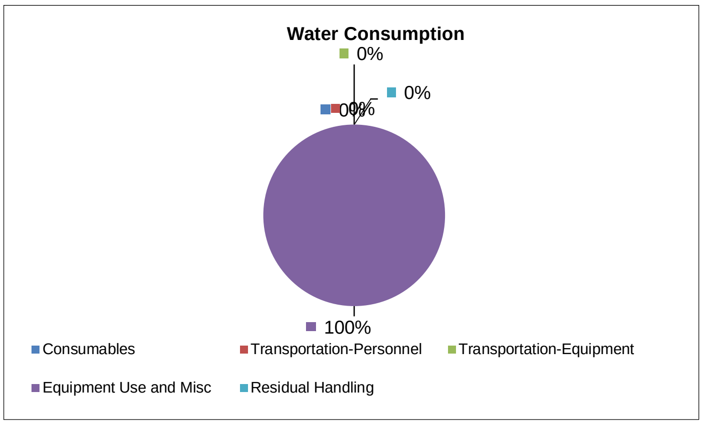
Remedial Alternative Phase	Non-Hazardous Waste Landfill Space (tons)	Hazardous Waste Landfill Space (tons)	Topsoil Consumption (cubic yards)	Costing ($)	Lost Hours - Injury
Remedial Investigation	0.0E+00	0.0E+00	0.0E+00	0	0.0E+00
Remedial Action Construction	2.8E+03	0.0E+00	0.0E+00	0	1.4E-01
Remedial 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	0.0E+00
Total	**2.8E+03**	**0.0E+00**	**0.0E+00**	**$0**	**1.4E-01**

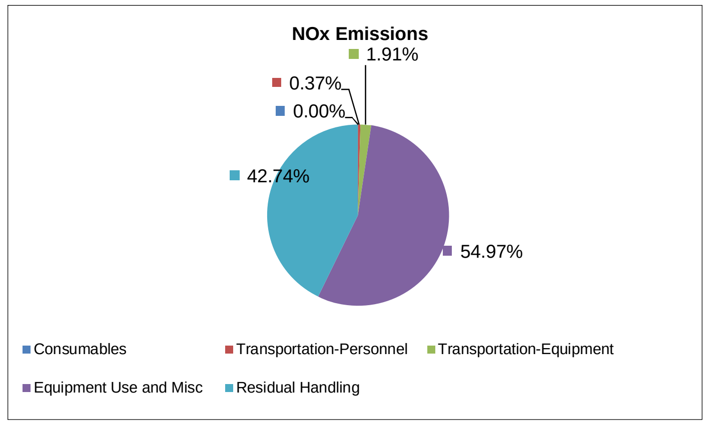
Total Cost with Footprint Reduction
$0

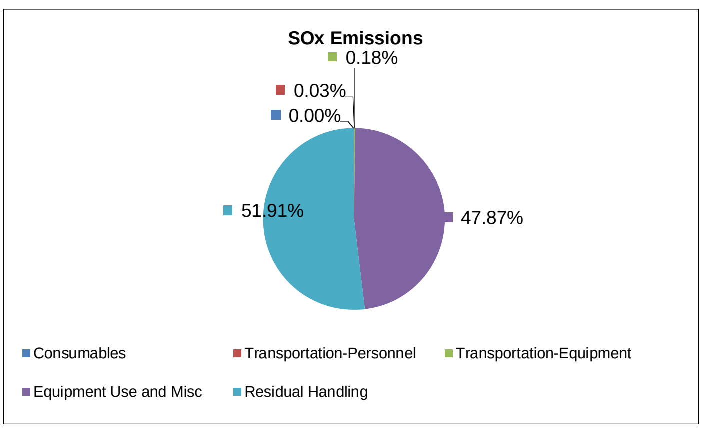
SiteWise™ Results Alternative XX
Residual Action Construction Stage
Site, Place
City, State

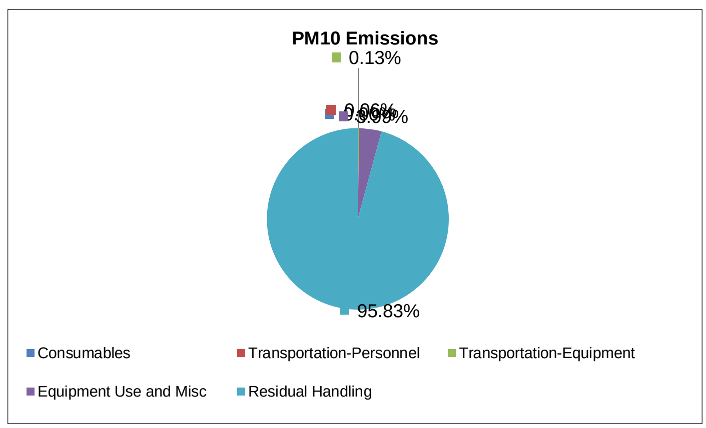


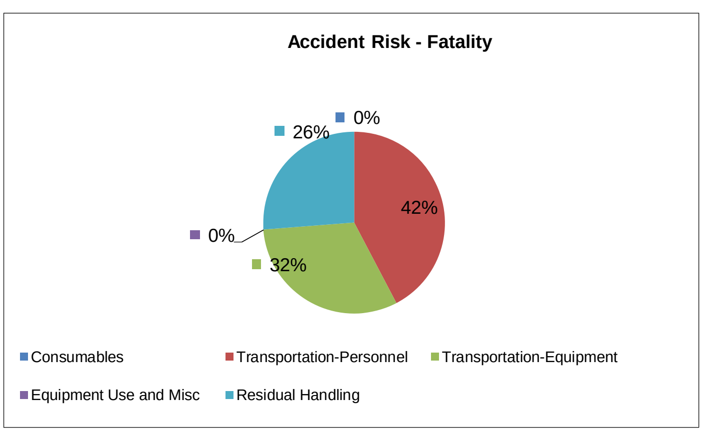


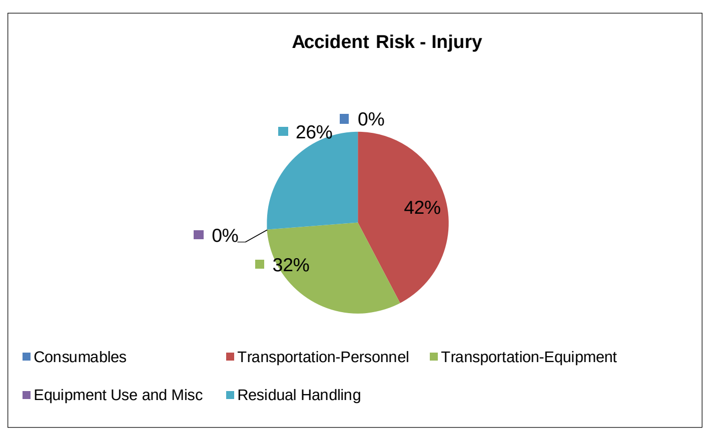




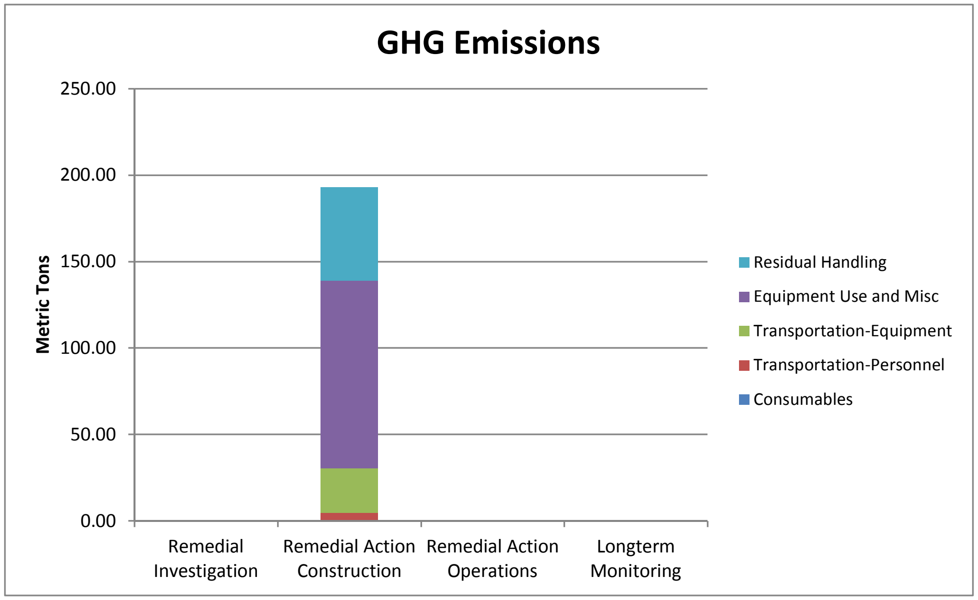


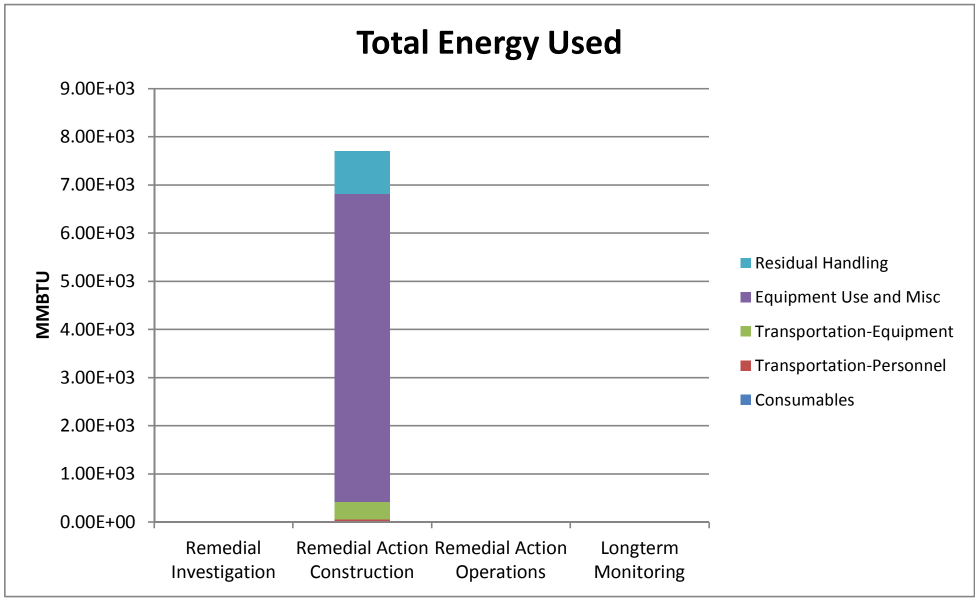


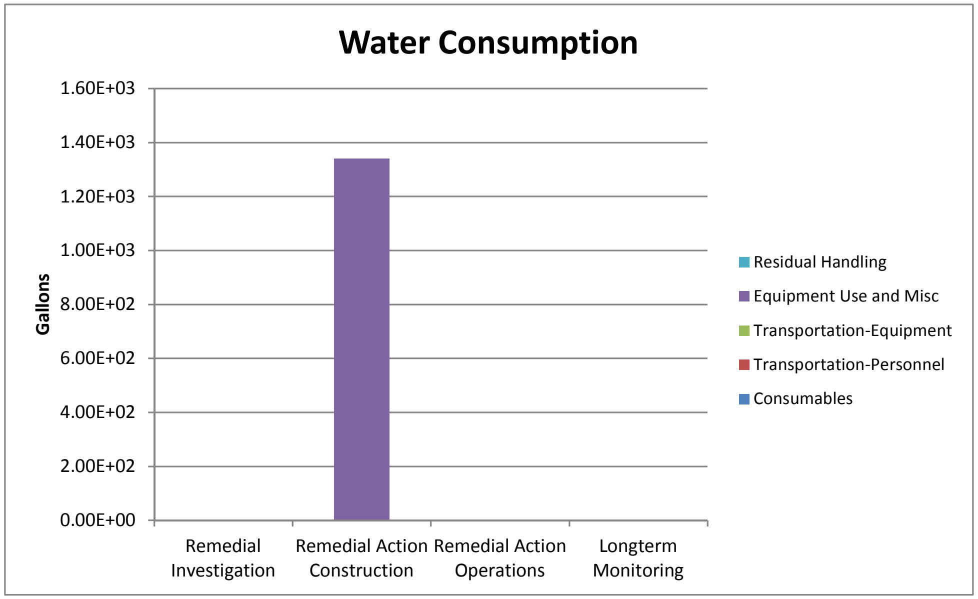


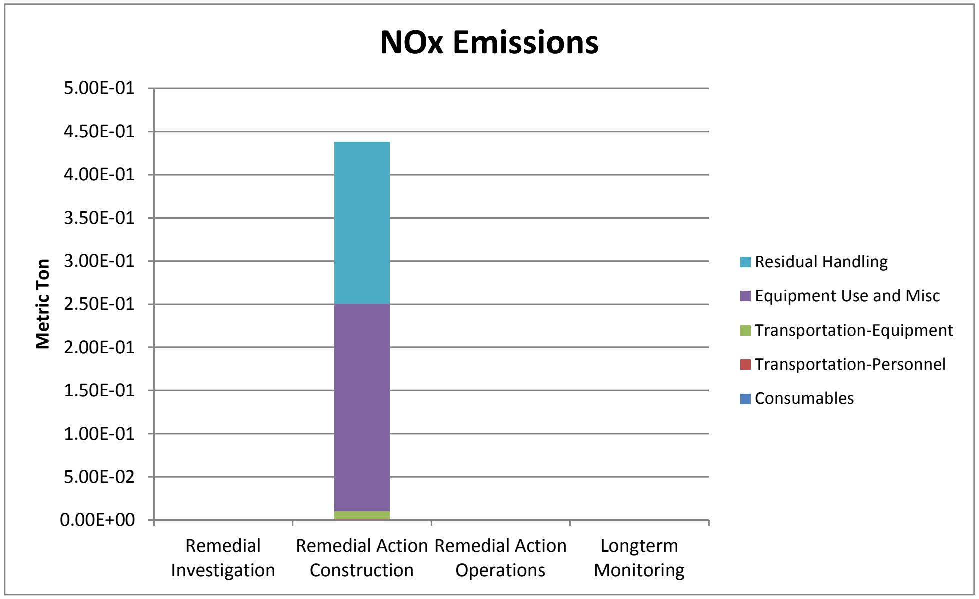


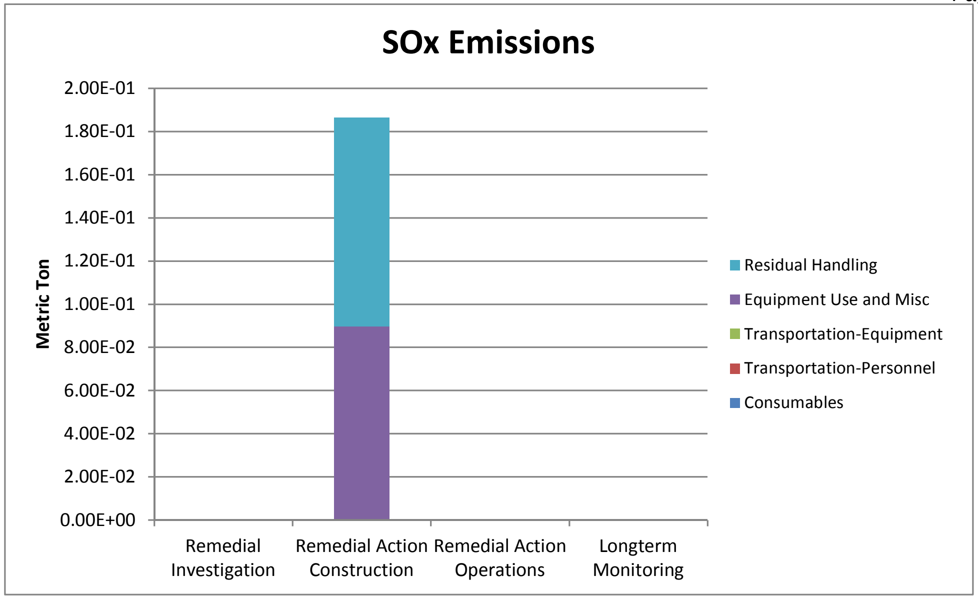
SiteWise™ Results Alternative XX
Site, Place
City, State










SOx Emissions
Metric Ton
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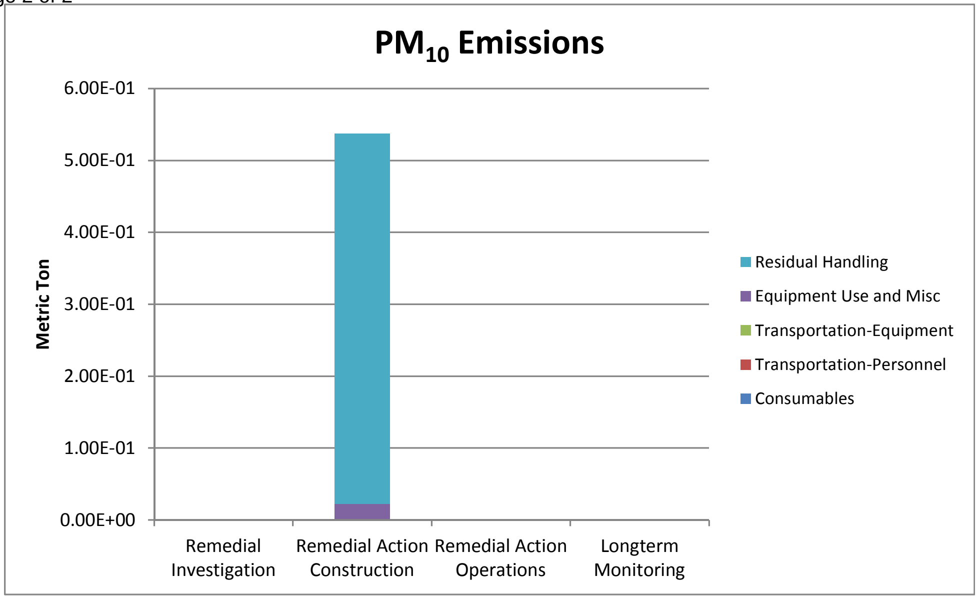
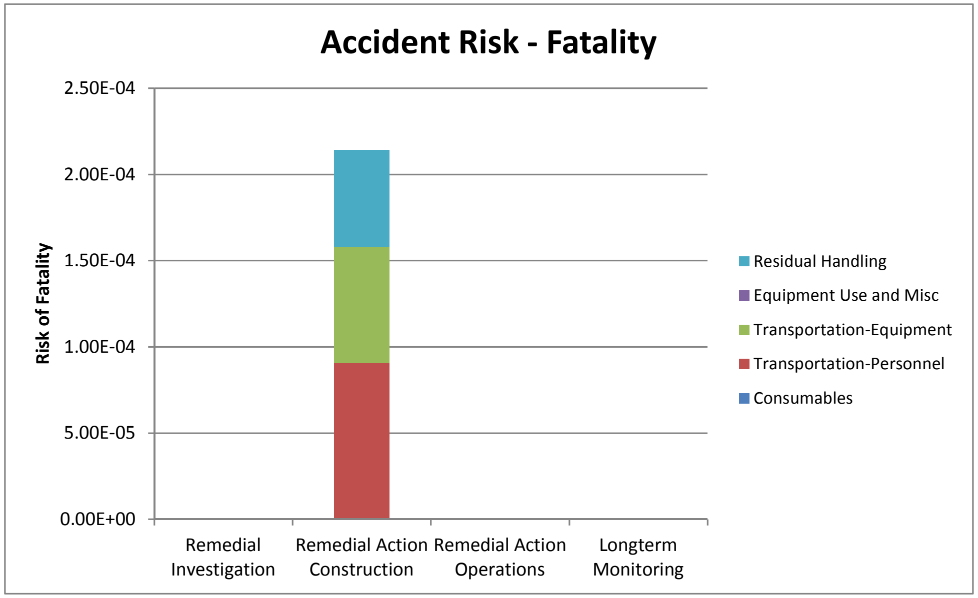
1.80E-01
1.60E-01
1.40E-01
1.20E-01
1.00E-01
8.00E-02
6.00E-02
4.00E-02
2.00E-02
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


PM_{10} Emissions
Metric Ton
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


Accident Risk - Fatality
Risk of Fatality
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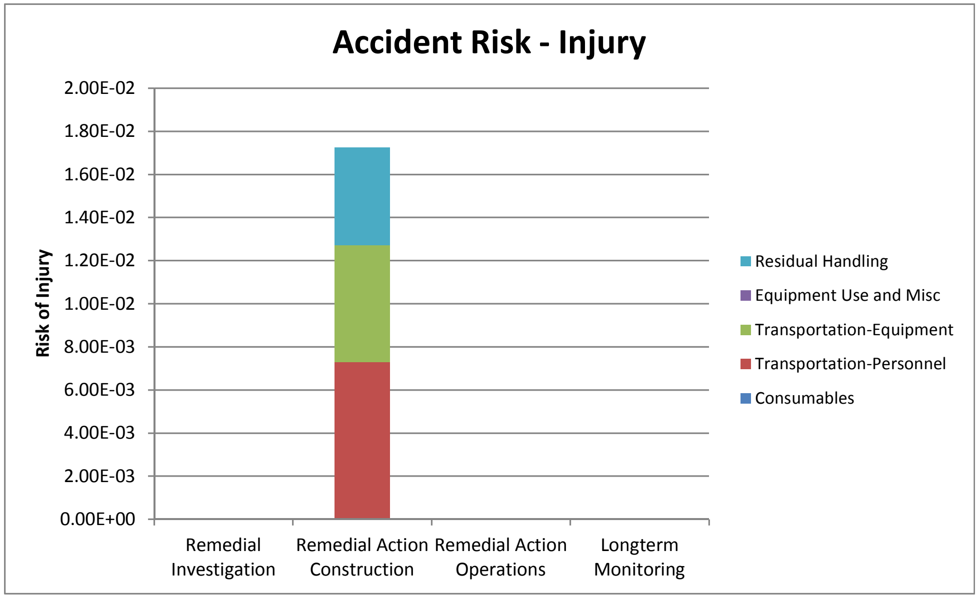
2.00E-04
1.50E-04
1.00E-04
5.00E-05
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Accident Risk - Injury
Risk of Injury
2.00E-02
1.80E-02
1.60E-02
1.40E-02
1.20E-02
1.00E-02
8.00E-03
6.00E-03
4.00E-03
2.00E-03
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 2
Industrial Operations Area, Former NAS South Weymouth
South Weymouth, MA

						Greenhouse Gas Emissions				Criteria Pollutant Emission			Energy Consumption	Water Consumption
	Technology Module / Phase	Module Components	Comments / Assumptions	Quantity	(Units)	CO_2e	CO_2	N_20	CH_4	NO_x	SO_x	PM_{10}		
Stage	**Materials**					Tonnes							MWhr	gal x 1000
RAC	Temporary 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	Temporary 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	backfill, common fill	Soil	1673 cy, assume 1.5 ton/cy, 2000 lb/ton, assume soil	5,019,000.00	lbs	52.35	52.35	0.00	0.00	0.00	0.00	0.00	1383.47	0.00
RAC	backfill, stone, stable fill	Gravel	558 cy, assume 1.5 ton/cy, 2000 lb/ton, assume soil	1,506,600.00	lbs	11.62	11.62	0.00	0.00	0.00	0.00	0.00	276.86	0.00
RAC	staging area liner	HDPE	assume HDPE, Assume 30ftx40ft, 1 mm thick, 0.95 g/cm3	233.49	lbs	0.52	0.28	0.00	0.00	0.00	0.00	0.00	3.06	0.08
	Construction Equipment					Tonnes							MWhr	gal x 1000
RAC	Excavator	Excavator, Hydraulic, 1.5 CY (diesel)	30 days, 8 hours per day, 80% utilization	204.80	hrs	12.38	12.38	0.00	0.00	0.08	0.02	0.01	65.91	
RAC	Dozer, 300 hp	Dozer, 335 HP (D8) w/U Blade (diesel)	10 days, 8 hours per day, 80% utilization	64.00	hrs	11.57	11.57	0.00	0.00	0.08	0.02	0.01	56.31	
RAC	Front end Loader	Loader, 100 HP, 2 CY (diesel)	20 days, 8 hours per day, 80% utilization	128.00	hrs	2.11	2.11	0.00	0.00	0.02	0.00	0.00	9.39	
RAC	DPT drill rig	Drill Rig, DPT (diesel)	5 days, 8 hours per day, 80% utilization	32	hrs	0.51	0.50	0.00	0.00	0.01	0.00	0.00	3.91	
	Subtotal					**12.38**	**12.38**	**0.00**	**0.00**	**0.08**	**0.02**	**0.01**	**65.91**	**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		**78**	**77**	**0.00**	**0.01**	**0.08**	**0.03**	**0.01**	**1,738**	**0**

Alternative 1
Values Input into SiteWise as "Other"

Module	Greenhouse Gas Emissions				Criteria Pollutant Emission			Energy Consumption	Water Consumption
	CO_2e	CO_2	N_20 (CO_2e)	CH_4 (CO_2e)	NO_x	SO_x	PM_{10}		
	Tonnes							MMBTU	gal
RI	-	-	-	-	-	-	-	-	-
RAC	92.63	91.64	0.81	0.18	0.19	0.05	0.02	6,169.17	339.26
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	6.2E+03	0.0E+00	0.0E+00
Water consumption (gallon)	0.0E+00	3.4E+02	0.0E+00	0.0E+00
Input CO_2 emission (metric ton)	0.0E+00	9.2E+01	0.0E+00	0.0E+00
Input N_2O emission (metric ton CO_2 e)	0.0E+00	8.1E-01	0.0E+00	0.0E+00
Input CH_4 emissions (metric ton CO_2 e)	0.0E+00	1.8E-01	0.0E+00	0.0E+00
Input NOx emission (metric ton)	0.0E+00	1.9E-01	0.0E+00	0.0E+00
Input SOx emission (metric ton)	0.0E+00	5.3E-02	0.0E+00	0.0E+00
Input PM_{10} emission (metric ton)	0.0E+00	2.0E-02	0.0E+00	0.0E+00
Input fatality risk				
Input injury risk				

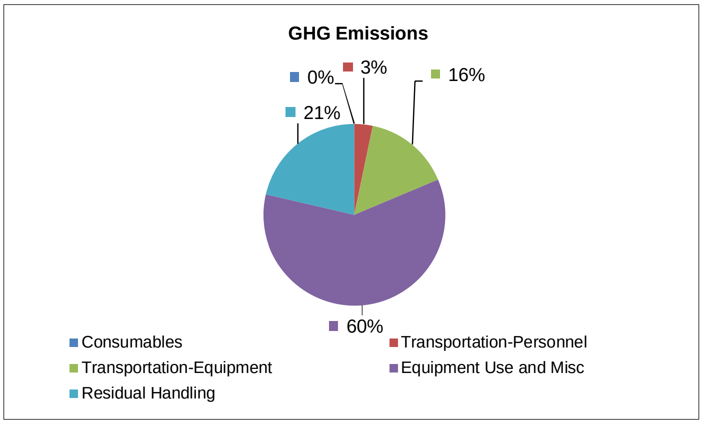
Sustainable Remediation - Environmental Footprint Summary
Alternative 3

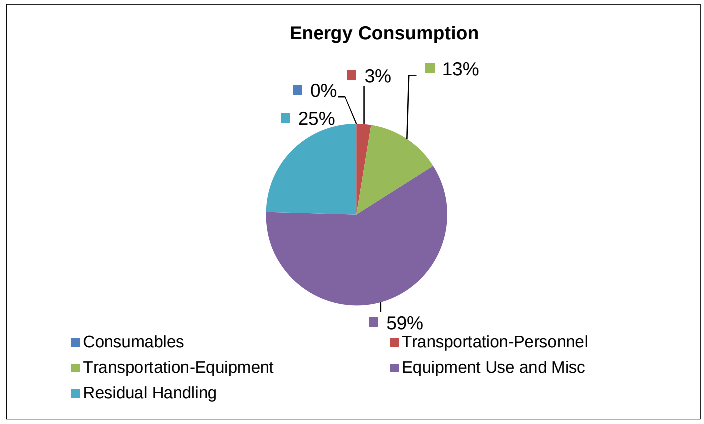
Phase	Activities	GHG Emissions (metric ton)	Total energy Used (MMBTU)	Water Consumption (gallons)	NOx emissions (metric ton)	SOx Emissions (metric ton)	PM10 Emissions (metric ton)	Accident Risk Fatality	Accident Risk Injury
Remedial Investigation	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	NA
	Transportation-Personnel	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	1.75	2.2E+01	NA	6.5E-04	2.3E-05	1.3E-04	3.6E-05	2.9E-03
	Transportation-Equipment	8.34	1.1E+02	NA	2.7E-03	1.1E-04	2.2E-04	2.3E-05	1.8E-03
	Equipment Use and Misc	32.36	5.0E+02	1.3E+03	4.9E-02	2.5E-02	1.5E+01	0.0E+00	0.0E+00
	Residual Handling	11.56	2.1E+02	NA	4.0E-02	2.0E-02	1.1E-01	1.2E-05	1.0E-03
	Sub-Total	54.00	8.49E+02	1.26E+03	9.23E-02	4.58E-02	1.46E+01	7.10E-05	5.71E-03
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		**5.5E+01**	**8.6E+02**	**1.3E+03**	**9.3E-02**	**4.6E-02**	**1.5E+01**	**8.5E-05**	**6.8E-03**

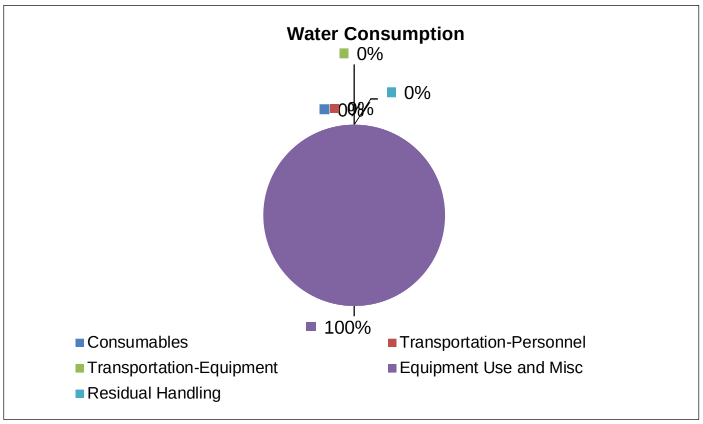
Remedial Alternative Phase	Non-Hazardous Waste Landfill Space (tons)	Hazardous Waste Landfill Space (tons)	Topsoil Consumption (cubic yards)	Costing ($)	Lost Hours - Injury
Remedial Investigation	0.0E+00	0.0E+00	0.0E+00	0	0.0E+00
Remedial Action Construction	6.0E+02	0.0E+00	0.0E+00	0	4.6E-02
Remedial 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	**6.0E+02**	**0.0E+00**	**0.0E+00**	**$0**	**5.5E-02**

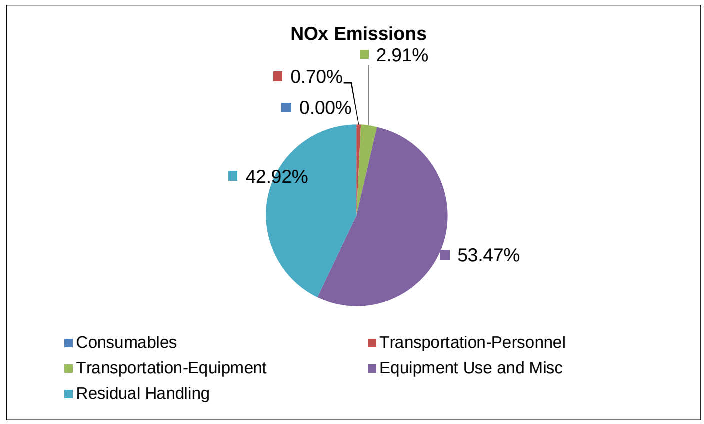
Total Cost with Footprint Reduction
$0

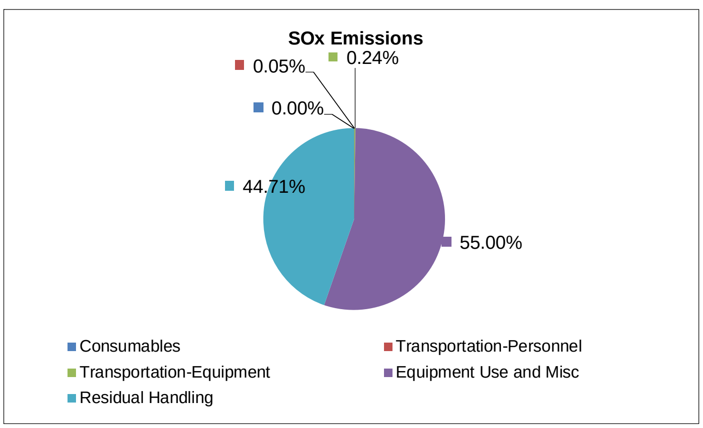
SiteWise™ Results Alternative XX
Residual Action Construction Stage
Site, Place
City, State

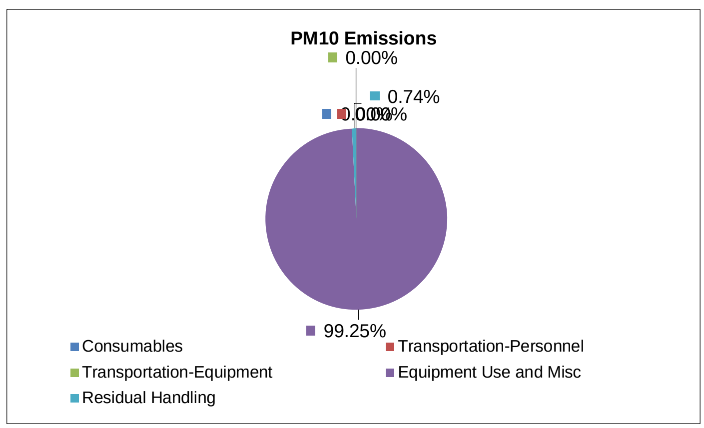


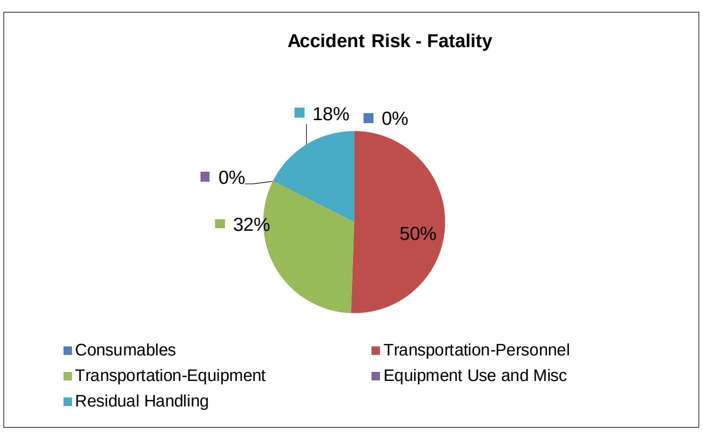


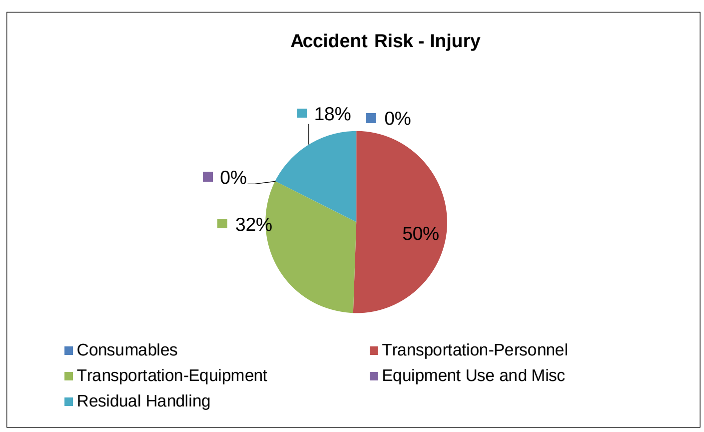




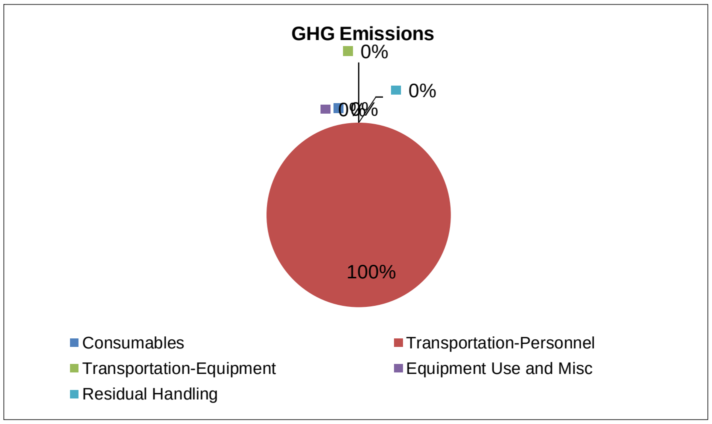


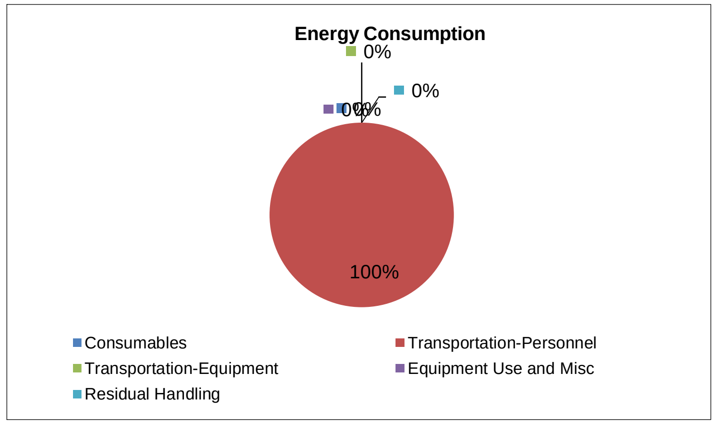


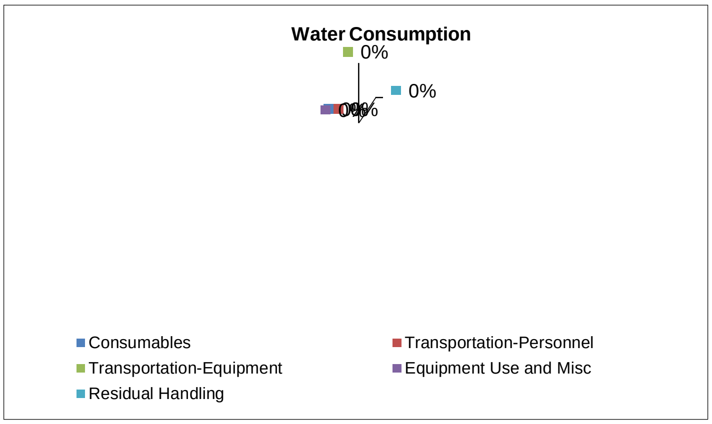


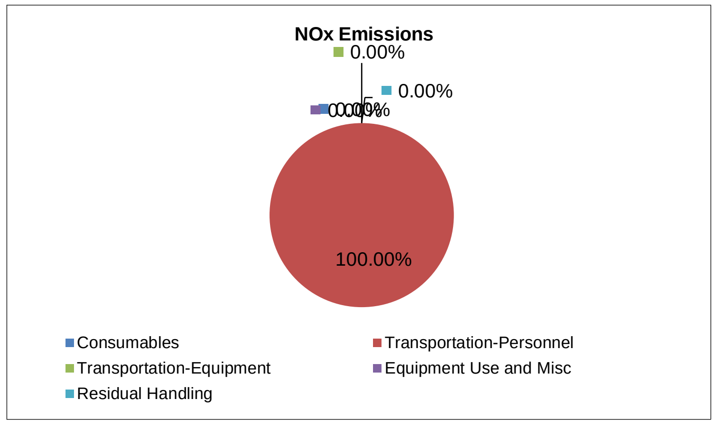


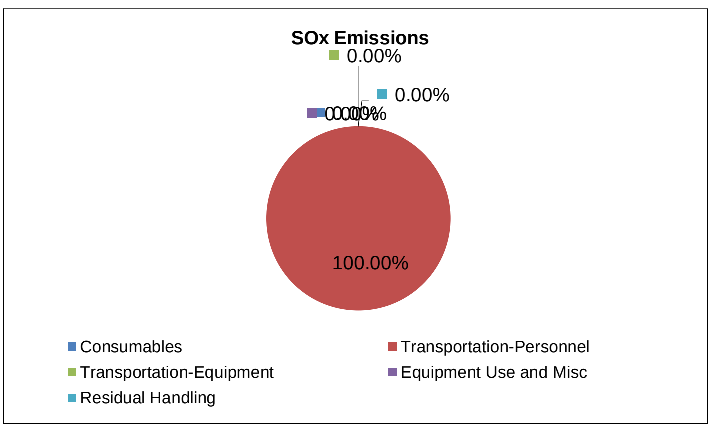
SiteWise™ Results Alternative XX
Residual Action Construction Stage
Site, Place
City, State

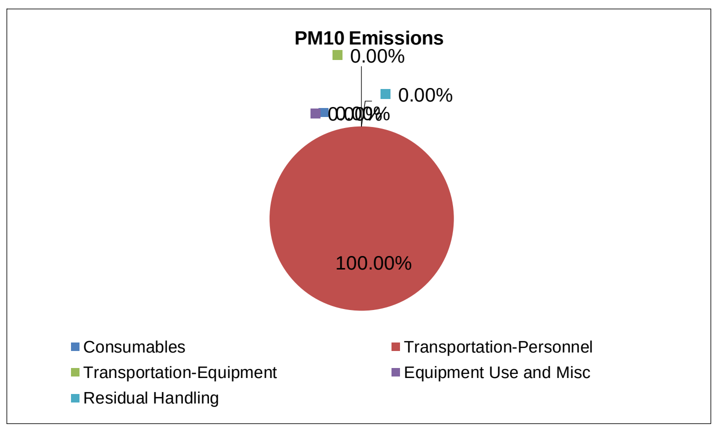


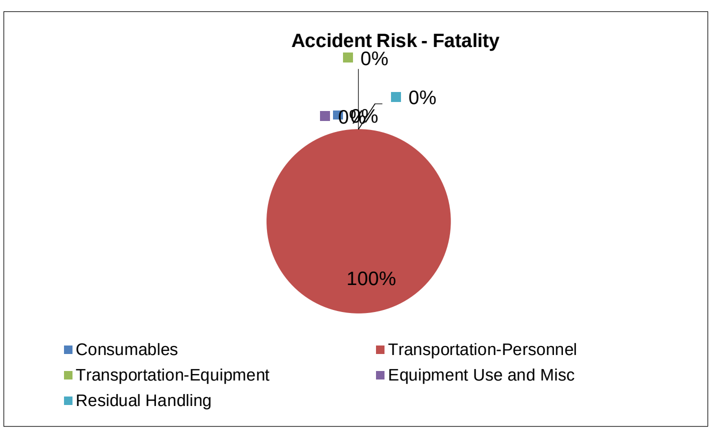


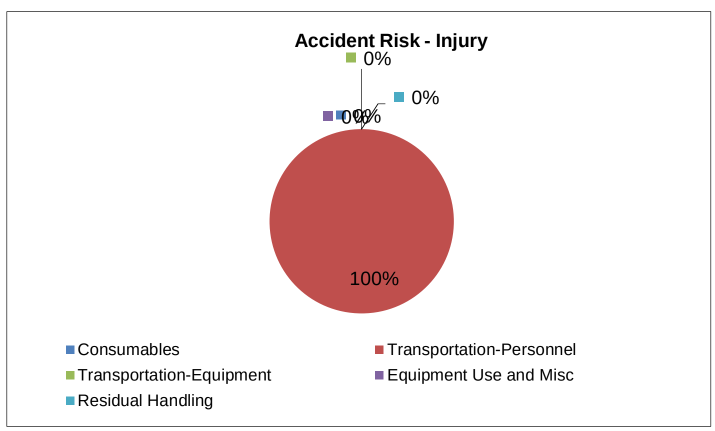




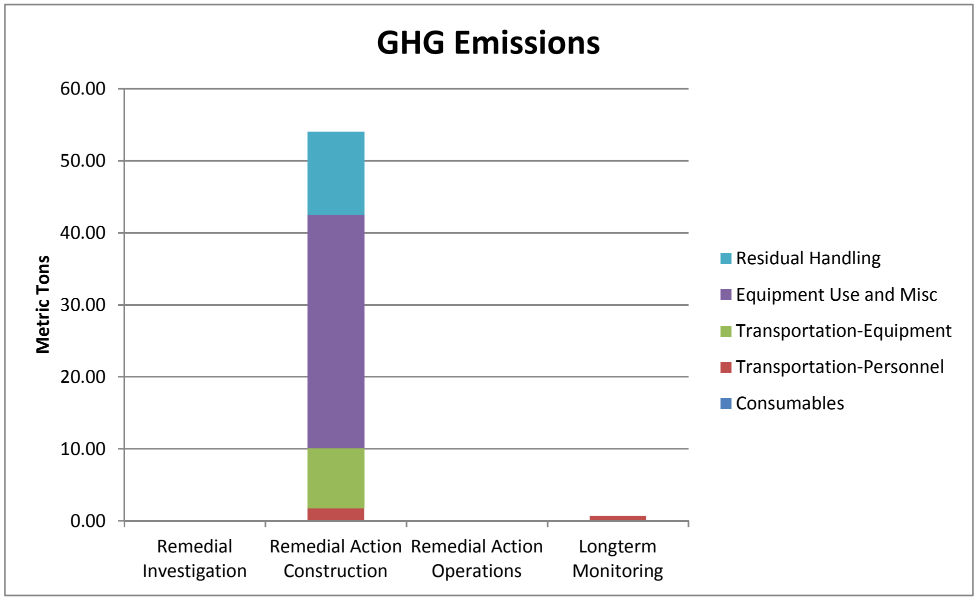


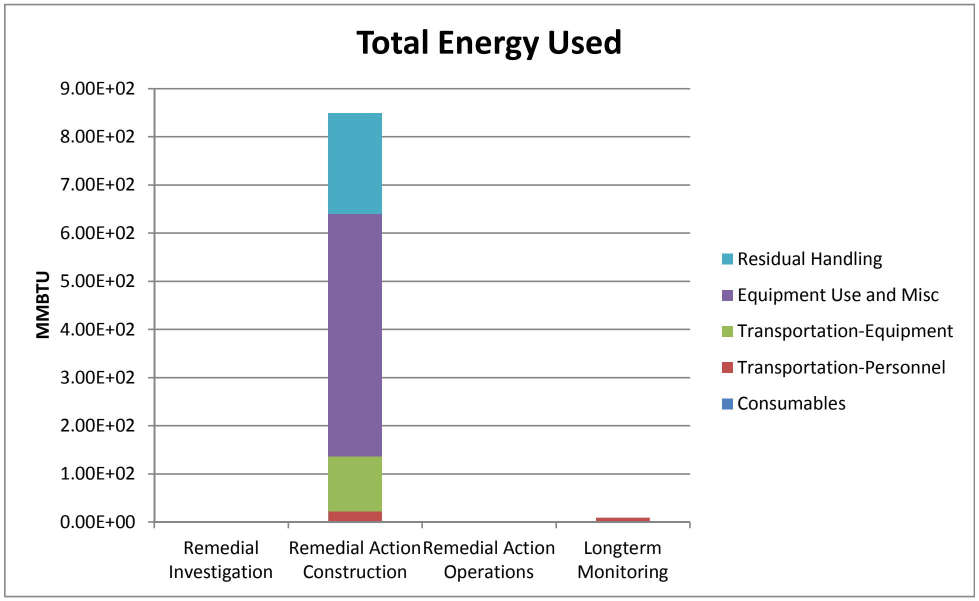


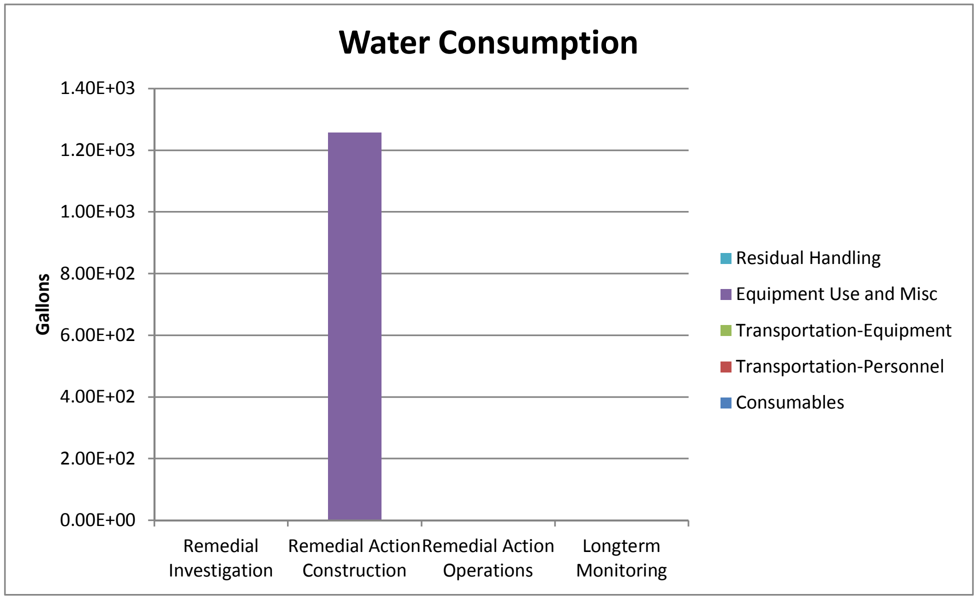


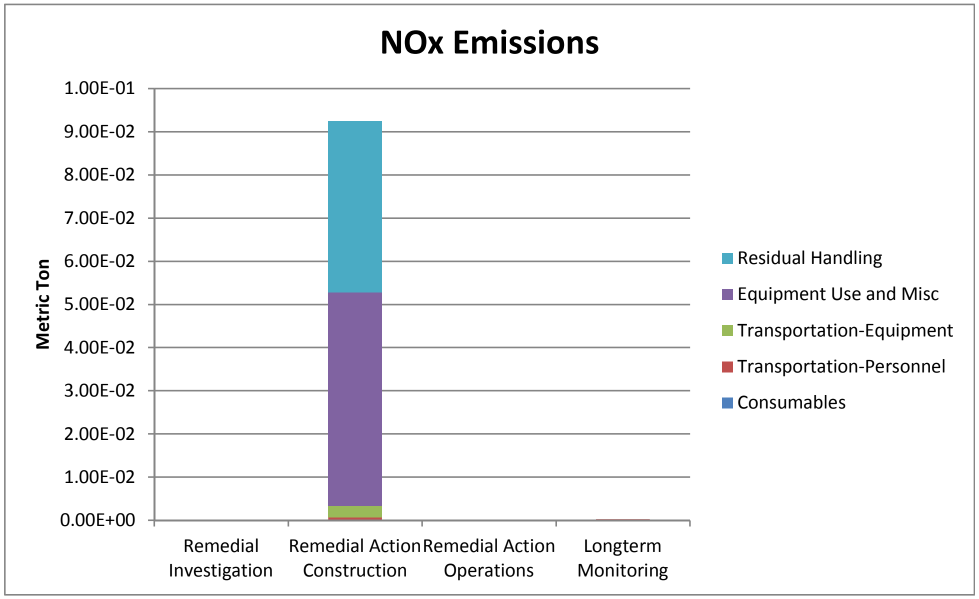


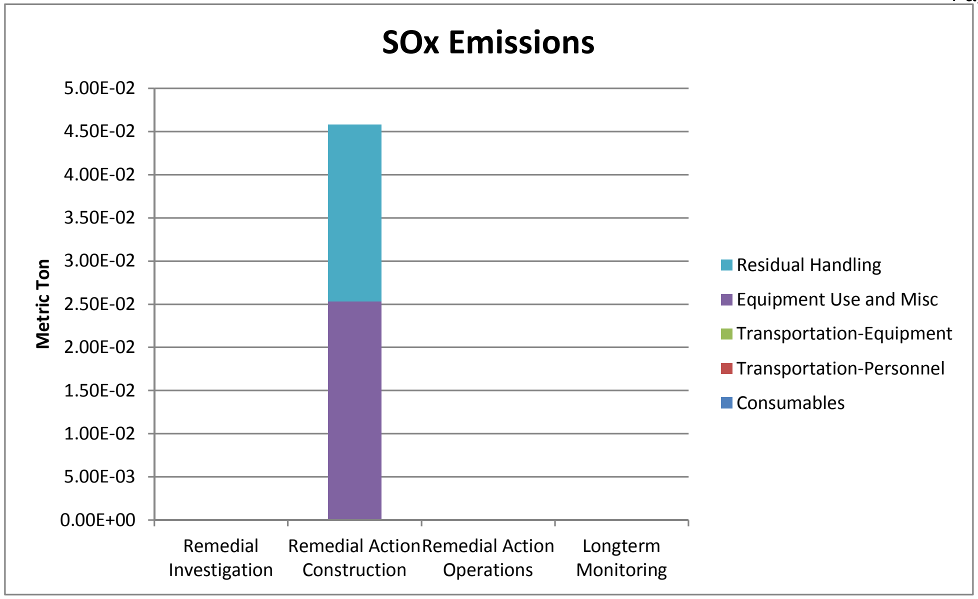
SiteWise™ Results Alternative XX
Site, Place
City, State

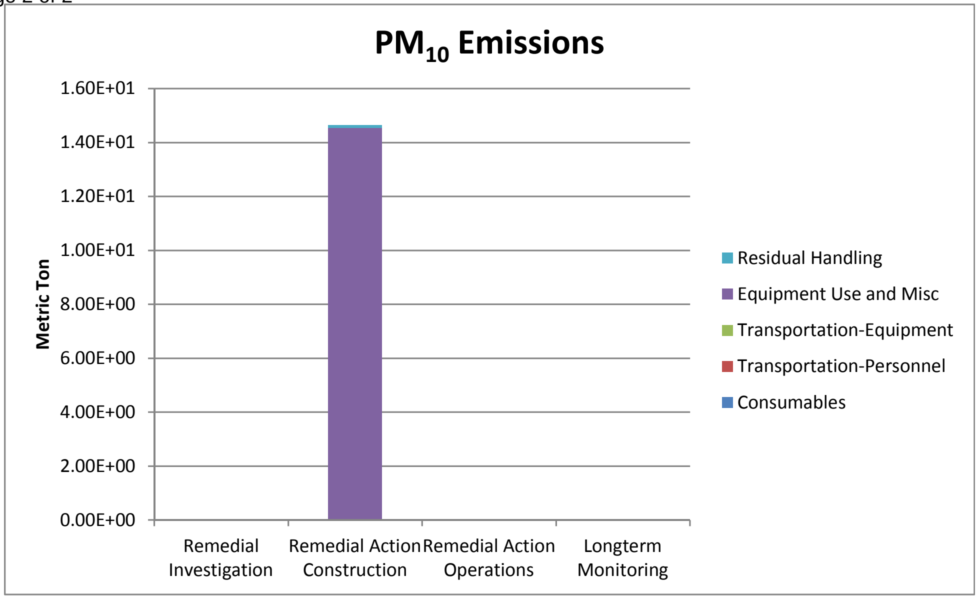


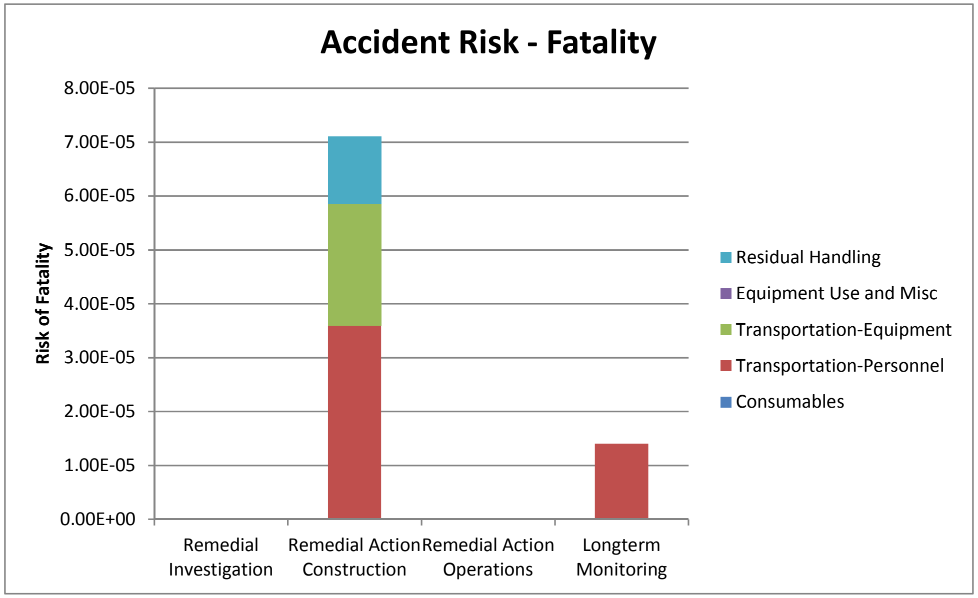


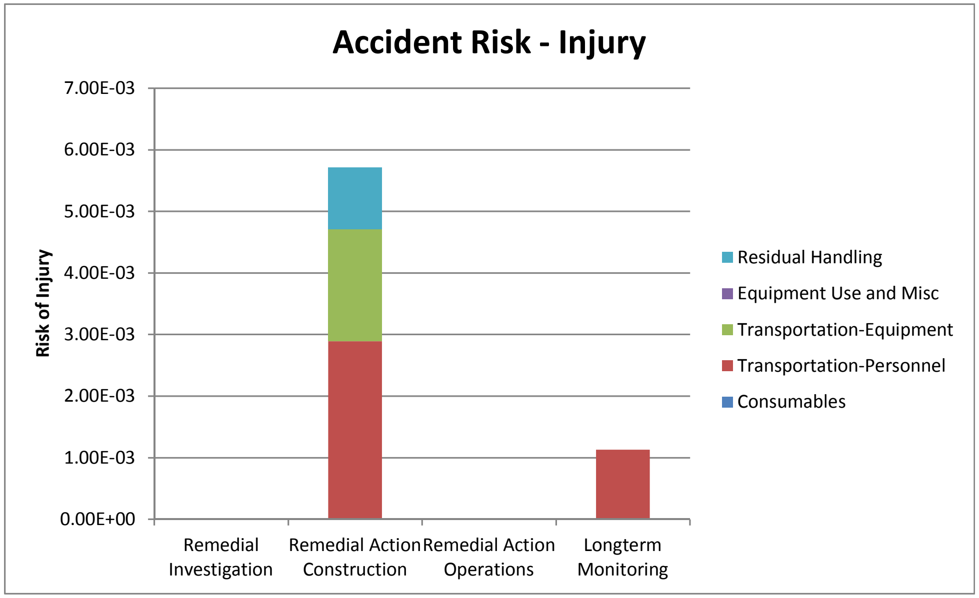





SOx Emissions
Metric Ton
5.00E-02
4.50E-02
4.00E-02
3.50E-02
3.00E-02
2.50E-02
2.00E-02
1.50E-02
1.00E-02
5.00E-03
0.00E+00
Remedial Investigation
Remedial Action Construction
Remedial Action Operations
Longterm Monitoring
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


PM10 Emissions
Metric Ton
1.60E+01
1.40E+01
1.20E+01
1.00E+01
8.00E+00
6.00E+00
4.00E+00
2.00E+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
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


Accident Risk - Injury
Risk of Injury
7.00E-03
6.00E-03
5.00E-03
4.00E-03
3.00E-03
2.00E-03
1.00E-03
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
Industrial Operations Area, Former NAS South Weymouth
South Weymouth, MA

	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
Stage	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	Asphalt cover	Asphalt	Weight = 13805 cu. ft. × 145 pcf = 2827500 lbs./2000 lb/ton	2,002,000	lbs	20.39	16.80	0.01	0.00	0.00	0.00	14.53	90.79	0.00
	Subtotal					**21.95**	**17.63**	**0.01**	**0.01**	**0.00**	**0.01**	**14.53**	**99.97**	**0.26**
	Construction Equipment								**Tonnes**				**MWhr**	**gal x 1000**
RAC	Back Hoe loader	Loader, 100 HP, 2 CY (diesel)	6 days, 8 hours per day, 80% utilization	38.4	hrs	0.63	0.63	0.00	0.00	0.01	0.00	0.00	2.82	
RAC	Compactor, 120 hp	Compactor 120 hp	4 days, 8 hours per day, 80% utilization	25.6	hrs	1.02	1.02	0.00	0.00	0.01	0.00	0.00	4.73	
RAC	skid steer	Skid Steer (diesel)	2 days, 8 hours per day, 80% utilization + 2 days for asphalt cutting	25.6	hrs	0.33	0.31	0.00	0.00	0.00	0.00	0.00	1.56	
RAC	DPT drill rig	Drill Rig, DPT (diesel)	5 days, 8 hours per day, 80% utilization	32	hrs	0.51	0.50	0.00	0.00	0.01	0.00	0.00	3.91	
	Subtotal					**2.50**	**2.47**	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	**13.02**	**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		**24**	**20**	**0.01**	**0.01**	**0.02**	**0.01**	**14.53**	**113**	**0**

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	24.45	20.10	4.13	0.23	0.02	0.01	14.53	385.51	255.33
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	3.9E+02	0.0E+00	0.0E+00
Water consumption (gallon)	0.0E+00	2.6E+02	0.0E+00	0.0E+00
Input CO_2 emission (metric ton)	0.0E+00	2.0E+01	0.0E+00	0.0E+00
Input N_2O emission (metric ton CO_2 e)	0.0E+00	4.1E+00	0.0E+00	0.0E+00
Input CH_4 emissions (metric ton CO_2 e)	0.0E+00	2.3E-01	0.0E+00	0.0E+00
Input NOx emission (metric ton)	0.0E+00	2.2E-02	0.0E+00	0.0E+00
Input SOx emission (metric ton)	0.0E+00	7.0E-03	0.0E+00	0.0E+00
Input PM_{10} emission (metric ton)	0.0E+00	1.5E+01	0.0E+00	0.0E+00
Input fatality risk				
Input injury risk				

APPENDIX E

COSTING CALCULATIONS

E-1 ALTERNATIVE #2: CAPITAL COST ESTIMATE

TABLE E-1
INDUSTRIAL OPERATIONS AREA
Former NAS South Weymouth, MA
Feasibility Study
Alternative 2: Excavation and Off-Site Soil Disposal
Capital Cost Estimate

			Unit Cost				Extended Cost				
Item	Quantity	Unit	Subcontract	Material	Labor	Equipment	Subcontract	Material	Labor	Equipment	Subtotal
1 DOCUMENTS AND CONSTRUCTION PLANNING											
1.1 Prepare RAWP, HASP, Specs,	1	ls		$1,400.00	$30,060.00		$0	$1,400	$30,060	$0	$31,460
2 PRE-EXCAVATION SOIL INVESTIGATION											
2.1 SAP preparation	1	ls		$1,100.00	$15,290.00		$0	$1,100	$15,290	$0	$16,390
2.2 DPT Drilling Services	1	ls	$18,428.00				$18,428	$0	$0	$0	$18,428
2.3 Sampling labor and materials	1	ls		$2,000.00	$16,500.00		$0	$2,000	$16,500	$0	$18,500
2.4 Analytical analysis of soil samples	1	ls	$13,400.00				$13,400	$0	$0	$0	$13,400
3 RA MOBILIZATION AND DEMOBILIZATION											
3.1 Equipment Mobilization/Demobilization	3	ea			$177.00	$610.00	$0	$0	$531	$1,830	$2,361
3.2 Underground Utility Clearances	1	ls	$10,525.00				$10,525	$0	$0	$0	$10,525
3.3 Prepare/Maintain Staging Area with 40 mil HDPE line	1	ls	$5,000.00				$5,000	$0	$0	$0	$5,000
4 RA FIELD SUPPORT AND SITE ACCESS											
4.1 Storage Trailer	1	mo				$92.50	$0	$0	$0	$93	$93
4.2 Survey Support	4	day	$1,075.00				$4,300	$0	$0		$4,300
4.2 Site Superintendent	30	day		$206.00	$384.64		$0	$6,180	$11,539	$0	$17,719
4.3 Site Health & Safety and QA/QC	30	day		$206.00	$307.68		$0	$6,180	$9,230	$0	$15,410
5 RA DECONTAMINATION											
5.1 Equipment Decon Pad	1	ls		$400.00	$1,000.00	$725.00	$0	$400	$1,000	$725	$2,125
5.2 Decon Water	1,000	gal		$0.20			$0	$200	$0	$0	$200
5.3 Decon Water Storage Tank, 1000 gallon	1	mo				$771.00	$0	$0	$0	$771	$771
5.4 Clean Water Storage Tank, 1000 gallon	1	mo				$771.00	$0	$0	$0	$771	$771
5.5 Disposal of Decon Waste, sump water (liquid & solid)	1	ls	$5,200.00				$5,200	$0	$0	$0	$5,200
6 RA EXCAVATION/DISPOSAL											
6.1 Excavator, 1.5 cy	20	day			$464.40	$1,031.00	$0	$0	$9,288	$20,620	$29,908
6.2 Front End Loader	20	day			$355.20	$1,784.00	$0	$0	$7,104	$35,680	$42,784
6.3 Site Labor, (2 laborers)	40	day			$264.80		$0	$0	$10,592	$0	$10,592
6.4 Asphalt Cutting of old asphalt	2	day			$333.40	$689.60	$0	$0	$667	$1,379	$2,046
6.5 Transportation and Disposal of Asphalt	600	ton	$80.00				$48,000	$0	$0	$0	$48,000
6.6 Transport of Soil, non-hazardous	2,235	ton	$40.00				$89,400	$0	$0	$0	$89,400
6.7 Disposal of Soil, non-hazardous	2,235	ton	$80.00				$178,800	$0	$0	$0	$178,800
6.8 Waste Disposal Characterization / Analytical	7	ls	$1,000.00				$7,000	$0	$0	$0	$7,000
6.9 Post Excavation Confirmation Sampling	60	ea	$350.00	$40.00	$60.00	$25.00	$21,000	$2,400	$3,600	$1,500	$28,500
7 RA SITE RESTORATION											
7.1 Excavator, 1.5 cy	10	day			$464.40	$1,031.00	$0	$0	$4,644	$10,310	$14,954
7.2 Dozer	10	day			$333.40	$291.00	$0	$0	$3,334	$2,910	$6,244
7.3 Site Labor, (2 laborers)	20	day			$264.80		$0	$0	$5,296	$0	$5,296
7.4 Backfill, common fill	1,673	cy		$29.50			$0	$49,354	$0	$0	$49,354
7.5 Stone, stable fill, 3 inches	558	cy		$38.50			$0	$21,483	$0	$0	$21,483
7.6 Grading	2,789	sy	$2.81				$7,837	$0	$0	$0	$7,837
8 RA POST CONSTRUCTION COST											
8.1 Contractor Completion Report	150	hr			$37.00		$0	$0	$5,550	$0	$5,550
8.2 Remedial Action Closeout Report	200	hr			$37.00		$0	$0	$7,400	$0	$7,400

Capital Cost Estimate

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
Subtotal							$408,890	$90,697	$141,625	$76,589	$717,801
Overhead on Labor Cost @ 30%									$42,488		$42,488
G & A on Labor, Material, Equipment, & Subs Cost @ 10%							$40,889	$9,070	$14,163	$7,659	$71,780
Tax on Materials and Equipment Cost @ 6.25%								$5,669		$4,787	$10,455
Total Direct Cost							$449,779	$105,435	$198,276	$89,034	$842,524
Indirects on Total Direct Cost @ 25%		(excluding transportation and disposal cost)									$164,631
Profit on Total Direct Cost @ 10%											$84,252
Subtotal											$1,091,407
Health & Safety Monitoring @ 2%											$21,828
Total Field Cost											$1,113,235
Engineering on Total Field Cost @ 5%											$55,662
Contingency on Total Field Cost @ 20%											$222,647
TOTAL CAPITAL COST											**$1,391,544**

E-2 ALTERNATIVE #2: ANNUAL COST ESTIMATE

TABLE E-2
INDUSTRIAL OPERATIONS AREA
Former NAS South Weymouth, MA
Feasibility Study
Alternative 2: Excavation and Off-Site Soil Disposal
Annual Cost Estimate

Item	Item Cost years 1 - 30	Item Cost every 5 years	Notes
Subtotal	$0	$0	
Contingency @ 10%	$0	$0	Cost with contingency is used for Present Worth Analysis.
TOTAL	**$0**	**$0**	

E-3 ALTERNATIVE #2: PRESENT WORTH ANALYSIS

TABLE E-3
INDUSTRIAL OPERATIONS AREA
Former NAS South Weymouth, MA
Feasibility Study
Alternative 2: Excavation and Off-Site Soil Disposal
Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate 2.0%	Present Worth
0	$1,391,544		$1,391,544	1.000	$1,391,544
1		$0	$0	0.980	$0
2		$0	$0	0.961	$0
3		$0	$0	0.942	$0
4		$0	$0	0.924	$0
5		$0	$0	0.906	$0
6		$0	$0	0.888	$0
7		$0	$0	0.871	$0
8		$0	$0	0.853	$0
9		$0	$0	0.837	$0
10		$0	$0	0.820	$0
11		$0	$0	0.804	$0
12		$0	$0	0.788	$0
13		$0	$0	0.773	$0
14		$0	$0	0.758	$0
15		$0	$0	0.743	$0
16		$0	$0	0.728	$0
17		$0	$0	0.714	$0
18		$0	$0	0.700	$0
19		$0	$0	0.686	$0
20		$0	$0	0.673	$0
21		$0	$0	0.660	$0
22		$0	$0	0.647	$0
23		$0	$0	0.634	$0
24		$0	$0	0.622	$0
25		$0	$0	0.610	$0
26		$0	$0	0.598	$0
27		$0	$0	0.586	$0
28		$0	$0	0.574	$0
29		$0	$0	0.563	$0
30		$0	$0	0.552	$0
				TOTAL PRESENT WORTH (30-Year)	**$1,391,544**

E-4 ALTERNATIVE #3: CAPITAL COST ESTIMATE

TABLE E-4
INDUSTRIAL OPERATIONS AREA
Former NAS South Weymouth, MA
Feasibility Study
Alternative 3: Asphalt Cap and Land Use Controls
Capital Cost Estimate

Item	Quantity	Unit	Unit Cost				Extended Cost				Subtotal
			Subcontract	Material	Labor	Equipment	Subcontract	Material	Labor	Equipment	
1 DOUMENTS AND CONSTRUCTION PLANNING											
1.1 Prepare RAWP, HASP, Specs,	1	ls		$1,000.00	$20,040.00		$0	$1,000	$20,040	$0	$21,040
1.2 Prepare LUC RD Documents	1	ls		$1,000.00	$9,100.00		$0	$1,000	$9,100	$0	$10,100
2 PRE-CAP SAMPLING											
2.1 SAP preparation	1	ls		$1,100.00	$15,290.00		$0	$1,100	$15,290	$0	$16,390
2.2 DPT Drilling Services	1	ls	$18,428.00				$18,428	$0	$0	$0	$18,428
2.3 Sampling labor and materials	1	ls		$2,000.00	$16,500.00		$0	$2,000	$16,500	$0	$18,500
2.4 Analytical analysis of soil samples	1	ls	$13,400.00				$13,400	$0	$0	$0	$13,400
3 MOBILIZATION AND DEMOBILIZATION											
3.1 Equipment Mobilization/Demobilization	2	ea			$177.00	$610.00	$0	$0	$354	$1,220	$1,574
3.2 Underground Utility Clearances	1	ls	$10,525.00				$10,525	$0	$0	$0	$10,525
4 FIELD SUPPORT AND SITE ACCESS											
4.1 Storage Trailer	1	mo				$92.50	$0	$0	$0	$93	$93
4.2 Survey Support	3	day	$1,075.00				$3,225	$0	$0	$0	$3,225
4.3 Site Superintendent	14	day		$206.00	$384.64		$0	$2,884	$5,385	$0	$8,269
4.4 Site Health & Safety and QA/QC	14	day		$206.00	$307.68		$0	$2,884	$4,308	$0	$7,192
5 DECONTAMINATION											
5.1 Equipment Decon Pad	1.0	ls		$400.00	$1,000.00	$725.00	$0	$400	$1,000	$725	$2,125
5.2 Decon Water	1,000.0	gal		$0.20			$0	$200	$0	$0	$200
5.3 Decon Water Storage Tank, 1000 gallon	0.5	mo				$771.00	$0	$0	$0	$386	$386
5.4 Clean Water Storage Tank, 1000 gallon	0.5	mo				$771.00	$0	$0	$0	$386	$386
5.5 Disposal of Decon Waste, sump water (liquid & solid)	1.0	ls	$5,200.00				$5,200	$0	$0	$0	$5,200
6 SITE PREPARATION											
6.1 Back-Hoe	2	day			$355.20	$1,784.00	$0	$0	$710	$3,568	$4,278
6.2 Skid-Steer	2	day			$333.40	$291.00	$0	$0	$667	$582	$1,249
6.3 Site Labor, (3 laborers)	6	day			$264.80		$0	$0	$1,589	$0	$1,589
6.4 Asphalt Cutting of old asphalt	2	day			$333.40	$689.60	$0	$0	$667	$1,379	$2,046
6.5 Transportation and Disposal of Asphalt	600	ton	$80.00				$48,000	$0	$0	$0	$48,000
7 PLACE CAP											
7.1 Back-Hoe	4	day			$355.20	$1,784.00	$0	$0	$1,421	$7,136	$8,557
7.3 Site Labor, (3 laborers)	4	day			$264.80		$0	$0	$1,059	$0	$1,059
7.4 Asphalt Paving	27,610	sf	$1.68				$46,385	$0	$0	$0	$46,385
7.5 Compactor, 120 hp	4	day			$343.90	$560.60	$0	$0	$1,376	$2,242	$3,618
8 POST CONSTRUCTION COST											
8.1 Contractor Completion Report	150	hr			$75.00		$0	$0	$11,250	$0	$11,250
8.2 Remedial Action Closeout Report	200	hr			$75.00		$0	$0	$15,000	$0	$15,000

Capital Cost Estimate

Item	Quantity	Unit	Unit Cost				Extended Cost				Subtotal
			Subcontract	Material	Labor	Equipment	Subcontract	Material	Labor	Equipment	
(Continued)											
Subtotal							$145,163	$11,468	$105,715	$17,716	$280,062
Overhead on Labor Cost @	30%								$31,714		$31,714
G & A on Labor, Material, Equipment, & Subs Cost @	10%						$14,516	$1,147	$10,571	$1,772	$28,006
Tax on Materials and Equipment Cost @	7.0%							$803		$1,240	$2,043
Total Direct Cost							$159,679	$13,418	$148,001	$20,728	$341,825
Indirects on Total Direct Cost @	25%	(excluding transportation and disposal cost)									$85,456.33
Profit on Total Direct Cost @	10%										$34,183
Subtotal											$461,464
Health & Safety Monitoring @	2%										$9,229
Total Field Cost											$470,693
Engineering on Total Field Cost @	5%										$23,535
Contingency on Total Field Cost @	20%										$94,139
TOTAL CAPITAL COST											**$588,367**

E-5 ALTERNATIVE #3: ANNUAL COST ESTIMATE

TABLE E-5
INDUSTRIAL OPERATIONS AREA
Former NAS South Weymouth, MA
Feasibility Study
Alternative 3: Asphalt Cap and Land Use Controls
Annual Cost Estimate

Item	Item Cost years 1 - 30	Item Cost every 5 years	Notes
LUCs Inspection & Report	$2,350		One-day visit to verify LUCs with Report
Five -Year Review		$23,000	Assumes that this is a component of the South Weymouth NAS IRP Five Year Reivew
Subtotal	$2,350	$23,000	
Contingency @ 10%	$235	$2,300	Cost with contingency is used for Present Worth Analysis.
TOTAL	**$2,585**	**$25,300**	

E-6 ALTERNATIVE #3: PRESENT WORTH ANALYSIS

TABLE E-6
INDUSTRIAL OPERATIONS AREA
Former NAS South Weymouth, MA
Feasibility Study
Alternative 3: Asphalt Cap and Land Use Controls
Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate 2.0%	Present Worth
0	$588,367		$588,367	1.000	$588,367
1		$2,585	$2,585	0.980	$2,534
2		$2,585	$2,585	0.961	$2,485
3		$2,585	$2,585	0.942	$2,436
4		$2,585	$2,585	0.924	$2,388
5		$27,885	$27,885	0.906	$25,256
6		$2,585	$2,585	0.888	$2,295
7		$2,585	$2,585	0.871	$2,250
8		$2,585	$2,585	0.853	$2,206
9		$2,585	$2,585	0.837	$2,163
10		$27,885	$27,885	0.820	$22,875
11		$2,585	$2,585	0.804	$2,079
12		$2,585	$2,585	0.788	$2,038
13		$2,585	$2,585	0.773	$1,998
14		$2,585	$2,585	0.758	$1,959
15		$27,885	$27,885	0.743	$20,719
16		$2,585	$2,585	0.728	$1,883
17		$2,585	$2,585	0.714	$1,846
18		$2,585	$2,585	0.700	$1,810
19		$2,585	$2,585	0.686	$1,774
20		$27,885	$27,885	0.673	$18,766
21		$2,585	$2,585	0.660	$1,706
22		$2,585	$2,585	0.647	$1,672
23		$2,585	$2,585	0.634	$1,639
24		$2,585	$2,585	0.622	$1,607
25		$27,885	$27,885	0.610	$16,997
26		$2,585	$2,585	0.598	$1,545
27		$2,585	$2,585	0.586	$1,514
28		$2,585	$2,585	0.574	$1,485
29		$2,585	$2,585	0.563	$1,456
30		$27,885	$27,885	0.552	$15,394
				TOTAL PRESENT WORTH	**$755,144**