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FINAL REMEDIAL INVESTIGATION REPORT FOR SITE 17 FORMER BUILIDNG 95 NAS BRUNSWICK ME

7/1/2011

TETRA TECH NUS

Remedial Investigation Report

for

Site 17, Former Building 95
Naval Air Station Brunswick
Brunswick, Maine

BRAC Program Management Office Northeast

Contract Number N62470-08-D-1001
Contract Task Order WE09

July 2011

Rev.2

REMEDIAL INVESTIGATION REPORT

FOR

SITE 17, FORMER BUILDING 95

NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION-NAVY (CLEAN) CONTRACT

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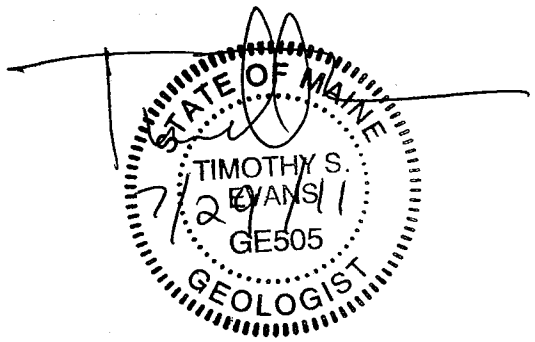
By affixing my seal to the "*Remedial Investigation Report for Site 17 – Former Building 95, Naval Air Station Brunswick, Brunswick, Maine,*" prepared by Tetra Tech NUS, Inc., and dated August 2011, I am certifying that the geologic information and interpretations herein are true and correct to the best of my knowledge. I further certify that I am licensed to practice in the State of Maine and that it is within my professional expertise to verify the correctness of the information.



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ACRONYMS AND ABBREVIATIONS

BERA	baseline ecological risk assessment
bgs	below ground surface
°C	degree Celsius
CD	compact disk
CDC	Center for Disease Control
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	chemical of concern
COPC	chemical of potential concern
CTE	Central Tendency Exposure
CTO	Contract Task Order
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DO	dissolved oxygen
DPT	direct-push technology
DQO	Data Quality Objective
DRO	diesel-range organics
ECC	Environmental Chemical Corporation
EE/CA	Engineering Evaluation/Cost Analysis
EEQ	Ecological Effects Quotient
EPA	United States Environmental Protection Agency
EPC	exposure point concentration
EPH	extractable petroleum hydrocarbons
ERA	Ecological Risk Assessment
ESL	ecological screening level
FID	flame ionization detector
FS	Feasibility Study
HHRA	Human Health Risk Assessment
HI	Hazard Index
HLA	Harding Lawson Associates
HPLC	high-performance liquid chromatography
HQ	Hazard Quotient
IAS	Initial Assessment Study
ID	inside diameter
ILCR	Incremental Lifetime Cancer Risk

K	hydraulic conductivity
K_{oc}	log organic carbon coefficient
K_{ow}	log octanol/water partition coefficient
LOAEL	lowest-observed-adverse-effects level
MCL	Maximum Contaminant Level
msl	mean sea level
MEDEP	Maine Department of Environmental Protection
MEG	Maximum Exposure Guideline
ml	milliliter
MTBE	methyl tert-butyl ether
NAD	North America Datum
NAVD	North America Vertical Datum
NAPL	non-aqueous-phase liquid
NASB	Naval Air Station Brunswick
NGVD	National Geodetic Vertical Datum
NOAEL	no-observable-adverse-effect level
NTU	nephelometric turbidity unit
OD	outside diameter
ORP	oxidation-reduction potential
PCB	polychlorinated biphenyl
PHC	petroleum hydrocarbon
PID	photoionization detector
PRG	preliminary remediation goal
PVC	polyvinyl chloride
RAG	Remedial Action Guideline
RAGS	Risk Assessment Guidance for Superfund
redox	reduction-oxidation
RI	Remedial Investigation
RME	Reasonable Maximum Exposure
RSL	Regional Screening Level
SERA	screening-level ecological risk assessment
SVOC	semivolatile organic compound
TAL	Target Analyte List
TCL	Target Compound List
TOC	total organic carbon
Tetra Tech	Tetra Tech NUS, Inc.
USGS	United States Geological Survey

VOC	volatile organic compound
VPH	volatile petroleum hydrocarbons

EXECUTIVE SUMMARY

Introduction

This Remedial Investigation (RI) Report summarizes the data collected during the RI and subsequent field efforts to determine the nature and extent of current site impacts, evaluate risks posed by contaminants present (using post-removal action data), and recommend a follow-on course of action.

Site 17 is located in the north-central area of the base, one block north of Fitch Avenue at the corner of Pegasus Avenue and Avenue B. The site is small (approximately 0.7 acre) and may be characterized as a disturbed former industrial area bounded to the northeast by the former Old Navy Fuel Farm, to the north by the security guard dog kennel, to the southwest and northwest by Pegasus Avenue, and to the southeast by former railroad tracks. Three buildings (Building 95, Building 31, and a storage shed) previously located north of Avenue B housed pest control operations that included storage, mixing, and disposal of pesticides and herbicides from the 1940s until 1985.

Initial RI field activities were conducted in 2008, and based on preliminary data, additional sampling efforts were accomplished in 2009 through 2010 to further define the nature and extent of site contamination. In December 2010, the Navy initiated a Time-Critical Removal Action to support risk reduction as a result of elevated levels of DDT, DDE, and DDE in site soil. Following this removal action, the RI risk assessment was updated to reflect current conditions (using post-removal soil and groundwater data) at the site.

Site History and Remediation Summary

The Navy began environmental assessment of the 0.7-acre Site 17 as part of the 1983 Initial Assessment Study (IAS). Soil sampling initiated in 1990 led to identification of pesticide-contaminated soil and a decision by the Navy to accomplish soil removal activities. Three soil removal actions in 1994 removed approximately 1,350 cubic yards of contaminated soil from areas of the site north and south of Avenue B. In 2009, 117 tons of subsurface soil that had been excavated in 1994 and then relocated and reburied (covered with clean soil) south of Avenue B (in an area known as the “soil strip”) was removed and disposed of at an off-base location. Groundwater sampling began in 1993, and a long-term monitoring program was initiated in 1995 and continued for 12 years until 2007. During the last 3 years of monitoring (six semi-annual events), no analytes were detected at concentrations greater than Maine Maximum Exposure Guidelines (MEGs) or Maximum Contaminant Levels (MCLs). The United States Environmental Protection Agency (EPA), Maine Department of Environmental Protection (MEDEP), and Navy agreed to suspend monitoring until a comprehensive RI could be completed. Because potentially unacceptable human health risks were estimated based on preliminary RI data, supplemental soil and groundwater sampling were conducted at the site in 2010. In December 2010, an additional 287 tons of

soil were removed from the site to achieve risk-based cleanup levels. In April 2011, an additional round of groundwater samples was collected to assess post-removal site conditions.

Nature and Extent of Contamination Based on Current Conditions

Pesticides and diesel-range organics (DRO) were detected in soil samples at multiple locations throughout Site 17. After soil removal activities, arsenic was the only inorganic detected in soil samples at concentrations exceeding November 2010 EPA residential Regional Screening Levels (RSLs). It is important to note, however, that arsenic is not considered a site-related contaminant because the detections in soil were determined to be attributed to fill material that appears to have been brought on site from other locations.

In post-removal action groundwater samples (April 2011), concentrations of pesticides exceeding MEDEP MEGs were only detected at MW-17-02R (4,4'-DDD at 1.2 µg/L) and MW-NASB-097 (4,4'-DDT in the sample and duplicate at 1.3 and 1.6 µg/L, respectively). Methyl tert-butyl ether (MTBE) was detected in two April 2011 groundwater samples but at concentrations significantly less than the MEG. MCLs are not available for 4,4'-DDD, 4,4'-DDT, or MTBE.

Risk Assessment Results

A Human Health Risk Assessment (HHRA) and Ecological Risk Assessment (ERA) were conducted using RI and post-removal action soil concentrations and post-removal action (April 2011) groundwater sampling results to assess potential risks at Site 17. For site-specific risks under the reasonable maximum exposure (RME) scenario, Hazard Indices (HIs) for all receptors were less than 1.0, and incremental lifetime cancer risks (ILCRs) for all receptors were within EPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$ and equal to or less than the MEDEP target risk guidance value of $1x10^{-5}$; therefore, no adverse non-carcinogenic or carcinogenic risks are anticipated for any of the receptors, on a medium-specific basis, evaluated based on exposure to soil or groundwater at Site 17. Upon completion of the HHRA, no chemicals were retained as chemicals of concern (COCs) in soil or groundwater, and based on the results of the ERA, no chemicals were retained as ecological chemicals of potential concern (COPCs) for further evaluation of plants, invertebrates, or wildlife.

Conclusions

Based on current data and the conceptual site model for Site 17, no unacceptable human health risks are anticipated for any of the scenarios evaluated based on exposure to soil or groundwater at Site 17. The ERA concluded that no chemicals required further evaluation of potential risk to plants, invertebrates and wildlife. This is likely the result of numerous removal actions accomplished by the Navy since the early 1990s to support risk mitigation. As a result, it is recommended that Site 17 soils proceed to a No Further Action Record of Decision. For groundwater, although no unacceptable risks were estimated, three

additional rounds of post-excavation sampling are recommended to confirm representative post-excavation groundwater concentrations.

1.0 INTRODUCTION

This Remedial Investigation (RI) Report for Site 17, Former Building 95, at Naval Air Station Brunswick (NASB) located in Brunswick, Maine, was prepared by Tetra Tech NUS, Inc. (Tetra Tech) under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract No. N62467-03-D-0057, Contract Task Order (CTO) WE09.

1.1 OBJECTIVES AND SCOPE

This report describes the field activities and findings of the RI implemented in October 2008 and subsequent investigations and removal actions through April 2011. The objectives of the investigations were to collect the necessary data to fully characterize the site, to support the removal actions implemented, and to support human health and ecological risk assessments and a Feasibility Study (FS), if necessary.

As part of the RI scoping process, a Data Quality Objective (DQO) meeting was held with the United States Environmental Protection Agency (EPA) and Maine Department of Environmental Protection (MEDEP) on November 7 through November 9, 2007. The DQO meeting concluded that the following data gaps/objectives should be addressed for Site 17 as part of the RI:

- Determine if there is unacceptable current or future risk to human or ecological receptors
- Define the extent of soil and groundwater contamination, both vertically and horizontally
- Determine if groundwater is contaminated and if contamination is migrating off site
- Determine the appropriate options for remediating the relocated “soil strip” south of Avenue B

The Site 17 RI was implemented by Tetra Tech in October 2008 and included soil boring advancement, well installation, hydraulic conductivity testing, soil and groundwater sampling and chemical analysis, and a sample location survey. Post-RI supplemental soil sampling investigations were conducted in 2009 and 2010 to further refine areas requiring remediation, and post-RI soil removal actions were conducted in July 2009 and December 2010 based on RI and supplemental sampling results. In addition, the long-term groundwater monitoring program that had been suspended in 2007 pending evaluation of RI results was restarted. Monitoring events were conducted in September 2010 and April 2011 (the first event after the 2010 removal action). The objectives of this RI Report are to evaluate the data collected during these field efforts to determine the nature and extent of current site impacts, evaluate risks posed by contaminants present (using post-removal action data), and recommend a follow-on course of action.

The information presented in this report is formatted as follows:

- Section 1.0 presents the objectives and scope of the RI, summarizes background information about the site including a site description and history, and includes a brief discussion of pre- and post-RI investigations and removal actions.

- Section 2.0 presents a description of the RI field activities. Sample collection procedures and analytical parameters are also described in this section.

- Section 3.0 presents a summary of the physical conditions at the site including basic site features, topography and drainage, geology, and hydrogeology. Information collected and observations made during the field investigations were used to provide updated descriptions of site physical characteristics.

- Section 4.0 presents the analytical results of soil and groundwater samples collected during 2008 RI field activities and during subsequent post-RI sampling events.

- Section 5.0 presents contaminant fate and transport information summarizing potential contaminant migration routes and physical, chemical, and biological factors that affect contaminant migration.

- Section 6.0 presents a summary evaluation of current (post-excavation) site risks based on human health and ecological risk assessments.

- Section 7.0 presents a summary of the results of RI and post-RI sampling and provides conclusions drawn from the data assessment and recommendations for further actions at the site.

Appendix A contains soil boring logs, field sampling sheets, well construction logs, and any other pertinent field information and data sheets, and Appendix B contains analytical information for those sample locations with results that are representative of current site conditions (i.e., results from sample locations that have not been excavated) and also includes a summary of the results of analytical data validation performed for the samples collected during the 2008 RI. Appendix C includes a detailed description of the risk assessment and supporting tables/calculations, Appendix D contains RI soil and groundwater analytical results and associated data validation memoranda, and Appendix E contains supporting information for post-RI soil sampling and removal actions. Appendix F contains regulator comments and Navy responses.

1.2 BACKGROUND INFORMATION

This section presents background information for Site 17. A description of the environmental setting, history of the site and surrounding area, and summaries of previous environmental investigations and post-RI sampling and removal actions are presented below.

1.2.1 Site Location and Description

NASB is located approximately 20 miles northeast of Portland, Maine, in Brunswick, Cumberland County, near the mid-coastal region of Maine (Figure 1-1). NASB is situated just south of the Androscoggin River and is located north of several coves (Harpswell, Buttermilk, and Woodward) that connect with Casco Bay. NASB is currently in the process of being closed and turned over for non-Navy uses.

Site 17 is located in the north-central area of the base, one block north of Fitch Avenue at the corner of Pegasus Avenue and Avenue B. The site (approximately 0.7 acre) is bounded to the northeast by the former Old Navy Fuel Farm, to the north by the security guard dog kennel, to the southwest and northwest by Pegasus Avenue, and to the southeast by a former railroad bed (Figure 1-2). A line of transformers was located in the vicinity of the former railroad tracks, which were removed in 1994. North of the site, a fence separates the area from the dog kennel.

1.2.2 Environmental Setting

Currently, a large portion of the site (north of Avenue B) is covered with grass and low brush. South of Avenue B, the site is grass covered (maintained) with a few trees. There are no delineated wetlands or water bodies on site.

According to the United States Geological Survey (USGS) Brunswick, Maine, 7.5-Minute Quadrangle (1980), elevations at the site range from approximately 72 to 76 feet above mean sea level (msl) relative to the National Geodetic Vertical Datum (NGVD) of 1929. The southeastern portion of the site is level, and the northwestern portion is relatively level, with small undulations (approximately 4 feet or less) throughout the area. The site surface slopes gently to the east and southeast with no distinct surface water drainage features. The surrounding area is relatively level.

The site is underlain by fill, fine sand (Upper Sand), interbedded fine sand and silt (Transition Unit), and silty clay (Presumpscot Formation). The Upper Sand is present from the ground surface to approximately 13 to 14 feet below ground surface (bgs) and includes an interbedded black organic material and clay subunit between 8 and 10 feet bgs at one boring (MW-NASB-098). Depths to groundwater during the RI

ranged from 2 to 5 feet bgs, and the direction of groundwater flow was generally to the south-southeast with some slight seasonal variation. The hydraulic gradient is relatively flat across Site 17.

1.2.3 Site History

Three buildings (Building 95, Building 31, and a storage shed) were previously located within Site 17 north of Avenue B (Figure 1-2). The buildings housed pest control operations that included storage, mixing, and disposal of pesticides and herbicides from the 1940s until 1985. During the winter months, chemicals were stored in Building 95 to avoid freezing. Additional storage space was available in the detached storage building located to the north. In 1985, pest control operations moved from Building 95 to Building 647.

The histories of the three former buildings located on the site are summarized as follows (ABB Environmental Services, Inc., 1992):

- Building 95 was constructed in the late 1940s as a one-story wooden building on a cinder block foundation. A drum storage rack was located outside along the eastern side of the building. The building was served by a 500-gallon stainless steel septic tank and associated tile overflow pipe. The building and septic tank were removed from the site in 1994.

- Building 31 was located east of Building 95. The date of construction of Building 31 is unknown. This building was used by NASB workers conducting asbestos abatement for changing and showering. Reportedly, shower and lavatory facilities were connected to and shared by the septic system that served Building 95. Building 31 was demolished and removed from the site in 1994.

- A storage shed located north of Building 95 was used to store asbestos abatement equipment only. The storage shed was demolished and removed from the property in 1994.

NASB personnel working at the pest control operations facility responded to service calls on an as-needed basis. Pesticide and herbicide chemicals and a carrier such as water or kerosene were mixed as needed. Prior to 1976, any materials left over after service calls were reportedly dumped behind Building 95. Empty containers were rinsed, crushed, and placed in the trash for disposal.

The Initial Assessment Survey (IAS) details past pesticide and herbicide use at the site, including estimated quantities of use per year (R.F. Weston, Inc, 1983). The following pesticides were identified in the IAS as being stored at Building 95: malathion, diazinon, baygon (propoxur), pyrethrin, cyndgas, sevin, esmethrin, 4,4'-dichlorodiphenyltrichloroethane (DDT) (used from 1955 to 1970), chlordane (used from

1955 to 1970), dieldrin (used in 1960), zinc phosphide (used from 1970 to 1975), arsenic lead (used from 1960 to at least 1983), rotanone (used from 1960 to at least 1983), and avitrol (used from 1960 to 1980). Lindane may also have been used. The following herbicides were identified in the IAS as being stored at Building 95: drexel, simazine, monuron, 2,4-dichlorophenoxyacetic acid (used from 1955 to at least 1983), 2,4,5-trichlorophenoxyacetic acid (used in 1978), and maleic hydrazide. The most commonly used liquid chemicals, such as malthion, DDT, and drexel, were reportedly stored in drums on a rack outside of Building 95.

Between January and February 1994, Buildings 31 and 95, the storage shed, septic tank, and railroad tracks were demolished and removed from the site. Prior to demolition, an asbestos abatement contractor removed and properly disposed of all asbestos-containing materials from these structures. After the asbestos abatement was complete, the buildings were demolished and the debris transported for disposal. The septic tank was removed in 1994, cleaned, cut into pieces, and disposed of off base. The septic tank was found to contain a black “cake-type” sludge, which was removed and stockpiled with excavated soil for off-site transportation and disposal. Railroad ties were removed from approximately 150 feet of abandoned rail line south of Avenue B and disposed of off site.

1.3 SITE INVESTIGATIONS AND REMOVAL ACTIONS

1.3.1 Soil

1.3.1.1 Pre-RI Soil Investigations and Removal Actions

In September 1990, four surface soil samples were collected by the Navy in the vicinity of Building 95 and analyzed for Target Compound List (TCL) pesticides and polychlorinated biphenyls (PCBs). Sampling results indicated that the soils were impacted with DDT and its degradation products, dichlorodiphenyldichloroethane (DDD) and dichlorodiphenyldichloroethylene (DDE). No PCBs were detected. Based on these data and the area of the site (less than 1 acre), the Navy performed an Engineering Evaluation/Cost Analysis (EE/CA) in support of a soil removal action (ABB Environmental Services, Inc, 1992).

Additional investigations identified the presence of several herbicides and pesticides including 4,4’-DDT, 4,4’-DDD, 4,4’-DDE, pyrethrins, dieldrin, and chlordane in soil and on structures (detected in wipe samples) at the site. DDT was detected at depths of up to 15 feet bgs at a concentration of 2,200 µg/kg. Overall, individual pesticides were collocated with DDT and pyrethrins.

The baseline risk assessment conducted as part of the EE/CA concluded that exposure to contaminated soil at the site posed a risk to both human and ecological receptors. The greatest risks to humans for

both carcinogenic and non-carcinogenic effects were associated with exposure to DDT, DDD, and DDE. DDT was also found to pose the greatest acute and chronic risks to ecological receptors. Maximum concentrations of DDT were detected in shallow surface soil.

Three removal (soil excavation) actions were conducted in 1994 in areas determined based on the preliminary remediation goals (PRGs) established for the site, 0.5 mg/kg for DDT in surface soil (0 to 2 feet bgs), 135 mg/kg for DDT in subsurface soil (2 to 4 feet bgs), and 10 mg/kg for total pyrethrins. In February and March 1994, 1,310 cubic yards of soil from north and south of Avenue B were excavated from the site, but confirmatory soil samples collected at the limits of the excavation indicated contaminants at concentrations exceeding PRGs (ECC, 2008b). In October 1994, an additional 45 cubic yards of material were excavated from four areas north of Avenue B based on February 1994 confirmatory soil sample results. Also during 1994 excavation activities, pesticide concentrations in surface soil samples collected immediately south of Avenue B were found to exceed surface soil PRGs but not subsurface soil PRGs (ECC, 2008b). The soil from this area was excavated, relocated to within the previously excavated (and yet to be backfilled) area south of Avenue B (subsequently referred to as the “soil strip”), spread as a 6-inch layer, and covered with geotextile fabric (HLA, 1998). The geotextile fabric was then covered with 2 feet of common fill during site restoration (ECC, 2008b) (to effectively render the material as subsurface soil, for which PRGs were not exceeded). In December 1994, an additional 5 cubic yards of soil were removed from two areas around the former septic tank and leach bed based on the results of confirmatory samples collected after the October 1994 excavation event.

RI Soil Investigation

The Site 17 RI was conducted in 2008 and focused on soil and groundwater characterization. The scope and results of RI field work are detailed in Sections 2 through 4 of this RI Report.

1.3.1.2 Post-RI Soil Investigations and Removal Actions

After 2008 RI field activities and as part of preparation of the draft RI Report, potentially unacceptable risks to human health and the environment were estimated based on industrial and hypothetical future residential exposure to pesticides in soil at Site 17. To address these unacceptable risks, the Navy decided to conduct additional sampling to further refine the extent of contamination in support of additional focused removal actions. Supplemental soil sampling was conducted in April 2009 and July 2010 to delineate pesticide exceedances detected during 2008 RI sampling. Based on preliminary RI results and the results of April 2009 supplemental soil sampling, a soil removal action was conducted in July 2009 to remove contaminated soil that had been excavated in October 1994 and relocated/buried south of Avenue B (soil strip). Based on preliminary RI results and the results of April 2009 and July 2010 supplemental sampling (and post-RI risk calculations), a removal action was conducted in December 2010 north of Avenue B to remove soil estimated to pose unacceptable risks to human health (Charter

Environmental, Inc., 2011). As a result of all excavation activities to date, the majority of the site has been excavated to a depth of 1 to 2 feet bgs (in 1994) (although soil was removed to a depth of 7 feet at one location), the relocated soil strip south of Avenue B was excavated to an approximate depth of 3 feet bgs (July 2009), and an area north of Avenue B within the 1994 excavation area was excavated to an approximate depth of 6 feet bgs (December 2010). These sampling events and removal actions are discussed further below, and associated documents are included in Appendix E.

April 2009 Supplemental Soil Sampling

Based on preliminary RI results, additional soil sampling was conducted in April 2009 to further delineate the extent of soil with pesticide concentrations exceeding of EPA residential Regional Screening Levels (RSLs). Ten soil borings were advanced on April 23, 2009, using direct-push technology (DPT), and one soil sample was collected from each boring, SB-17-146 through SB-17-155, and submitted for laboratory analysis of TCL chlorinated pesticides (Tetra Tech, 2009). Four borings, SB-17-146 through SB-17-149, were drilled in the area surrounding SB-17-112, and six borings, SB-17-150 through SB-17-155, were drilled in the area surrounding SB-17-120 and SB-17-121. These supplemental borings were positioned approximately 20 feet from the three RI soil borings that had exceedances of EPA residential RSLs for several pesticides, with the exception of SB-17-149, which was stepped out an additional 20 feet south-southwest of boring SB-17-112, and SB-17-155, which was stepped out an additional 20 feet west southwest of borings SB-17-120 and SB-17-121. Samples were collected from the 1- to 4-foot depth range from the supplemental borings surrounding SB-17-112 and from the 2- to 5-foot depth range from the supplemental borings surrounding SB-17-120 and SB-17-121 to correspond to the sample depth ranges where exceedances were detected in RI borings.

2008 and 2009 ECC Soil Strip Sampling

In October 2008, nine composite soil samples were collected by ECC from three test pits south of Avenue B to verify the location of the relocated soil and to confirm the presence of the geotextile fabric reportedly placed under relocated soils in 1995. In July 2009, pre-excavation soil samples were collected by ECC from beneath the geotextile layer observed during test pitting activities to provide additional delineation and waste characterization data (ECC, 2010).

July 2010 Supplemental Soil Investigation

In July 2010, soil samples were collected from five locations (SB-17-201 through SB-17-205) north of Avenue B in the vicinity of soil boring SB-17-121 to more accurately delineate areas potentially requiring excavation due to pesticide levels, and soil samples were collected from five locations immediately south of Avenue B (SB-17-206 through SB-17-210) to evaluate potential impacts from soil disturbance associated with utility work in this area (Tetra Tech, 2010). Composite samples were collected from the 2- to 5-foot depth interval from each of the five supplemental borings surrounding SB-17-121, and

composite soil samples were collected from borings advanced along the utility corridor from the 0- to 1- and 1- to 3-foot depth intervals. All soil samples were analyzed for pesticides, and soil samples collected from borings advanced along the utility corridor south of Avenue B were also analyzed for arsenic, lead, zinc, and cyanide.

2009 Soil Strip Excavation

In July 2009, approximately 117 tons of soil were excavated from the soil strip area south of Avenue B to remove soil that had been previously relocated to (and buried in) this area (ECC, 2010). When excavation was complete, 24 confirmatory soil samples (S17-PB-01 through S17-PB-18, S17-SW-01 through S17-SW-06) were collected to confirm the effectiveness of the removal action. PRGs were not developed/applicable for the removal because the objective was to remove a specific amount of soil previously relocated to this area and differentiated from underlying soil by placement of a geotextile. Additional details are provided in the ECC report provided in Appendix E.2.

2010 Excavation

To remove soil with pesticide concentrations associated with unacceptable residential risks, a removal action was completed in December 2010 in an area north of Avenue B and approximately midway between Pegasus Avenue and Sixth Street. The excavated area encompassed the MW-17-02 and boring SB-17-121 location, at which RI soil pesticide concentrations exceeded EPA residential RSLs, and associated post-RI delineation samples with pesticide concentrations exceeding the risk-based PRGs calculated for this removal action (see Appendix E.7 for PRG calculation details). The risk-based PRGs for the removal action were determined using site-specific residential risks and exposure point concentrations (EPCs) to correspond to a target cancer risk of $1x10^{-5}$ (the MEDEP risk guidance value, which is within EPA's target risk range) and were as follows:

- 22 mg/kg for 4,4'-DDD
- 15 mg/kg for 4,4'-DDE
- 25 mg/kg for 4,4'-DDT

The initial area to be excavated (20 by 20 feet by 6 feet deep) was delineated via the soil sampling activities discussed above. Well MW-17-02 was removed during excavation activities. Composite confirmatory soil samples were collected to assess whether initial excavation activities were complete. The 4,4'-DDT concentration in one soil sample exceeded the PRG, and additional soil was excavated in this area. An additional confirmatory soil sample was collected at the limit of the newly excavated area, and results were less than PRGs. A total of approximately 287 tons of pesticide-contaminated soil were excavated and disposed of off-site during this removal action (Charter Environmental, Inc., 2011).

1.3.2 Groundwater

1.3.2.1 Pre-RI Groundwater Investigations

In February 1993, groundwater samples were collected from monitoring wells MW-NASB-065 through MW-NASB-068 and analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, herbicides, and Target Analyte List (TAL) metals. Six pesticides were detected in the groundwater samples, DDT, DDE, endrin, alpha-chlordane, gamma-chlordane, and heptachlor epoxide. Concentrations of endrin (MW-NASB-065), gamma-chlordane (MW-NASB-067), and heptachlor epoxide (MW-NASB-068) in groundwater exceeded Maine Maximum Exposure Guidelines (MEGs), and the concentration of gamma-chlordane in the sample from MW-NASB-067 also exceeded the federal Maximum Contaminant Level (MCL). Concentrations of other parameters were less than their respective MEGs and MCLs.

A groundwater monitoring program was implemented at Site 17 from March 1995 (after the 1994 removal actions) to September 2007, with various changes in sampling frequency, analyses, and wells included in the program as presented in approved monitoring reports and updated work plans. From 2000 to 2007, sampling was conducted bi-annually, generally in April and September. In the report associated with the September 2007 event (ECC, 2008c), the Navy recommended discontinuing monitoring because no analytes had been detected at concentrations greater than MEGs or MCLs during the previous six sampling rounds (3 years). However, because the RI was underway at that time, it was decided that the sampling program would only be suspended and that the determination of the need for further monitoring would be determined as part of the RI.

RI Groundwater Investigation

The Site 17 RI was conducted in 2008 and focused on soil and groundwater characterization. The scope and results of RI field work are detailed in Sections 2 and 4 of this RI Report.

1.3.2.2 Post-RI Groundwater Investigations

As stated above, the Site 17 groundwater monitoring program was suspended after the September 2007 event pending the results of the RI, but because preliminary RI results indicated that 4,4'-DDT and dieldrin concentrations in one well (MW-17-02) exceeded MEGs (see Section 4.2.1), bi-annual groundwater monitoring was restarted in September 2010 (prior to December 2010 excavation activities). Groundwater samples were collected by H&S Environmental, Inc., in September 2010 from MW-NASB-065, MW-NASB-066, MW-NASB-067, MW-NASB-068, MW-NASB-097, MW-NASB-098, MW-17-01, MW-17-02, MW-17-03, and MW-17-04 and analyzed for TCL chlorinated pesticides, volatile petroleum hydrocarbons (VPH), and extractable petroleum hydrocarbons (EPH). During the September 2010 monitoring event, pesticides were detected in 4 of the 10 wells sampled, and concentrations exceeded MEGs in samples from two wells. Dieldrin was not detected in MW-17-02, but 4,4'-DDD and 4,4'-DDT

were detected at concentrations greater than MEGs. In addition, the heptachlor epoxide concentration at MW-17-04 exceeded the MEG. VPH and/or EPH were detected in 5 of 10 wells; however, the only MEG exceedance was the EPH (C_{11}-C_{22} aromatics) concentration in the original sample at MW-NASB-097 (H&S Environmental, Inc., 2011). The groundwater concentration of C_{11}-C_{22} aromatics was 241 µg/L, greater than the MEG (200 µg/L); however, the C_{11}-C_{22} aromatics concentration of 170 µg/L in the duplicate sample at that location was less than the MEG.

Because monitoring well MW-17-02 was destroyed during the December 2010 soil removal, a replacement well, MW-17-02R, was installed at the same location and sampled and analyzed for pesticides in March 2011. No pesticides were detected.

In April 2011, H&S Environmental, Inc., collected a comprehensive round of post-removal action groundwater samples (H&S Environmental, Inc., 2011). Trace levels of methyl tert-butyl ether (MTBE) (a VPH constituent), 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT were sporadically detected. No EPH or VPH compounds other than MTBE were detected in any samples. The only exceedances of screening levels (MEGs) were the three DDx detections (maximum 1.6 µg/L 4,4'-DDT)

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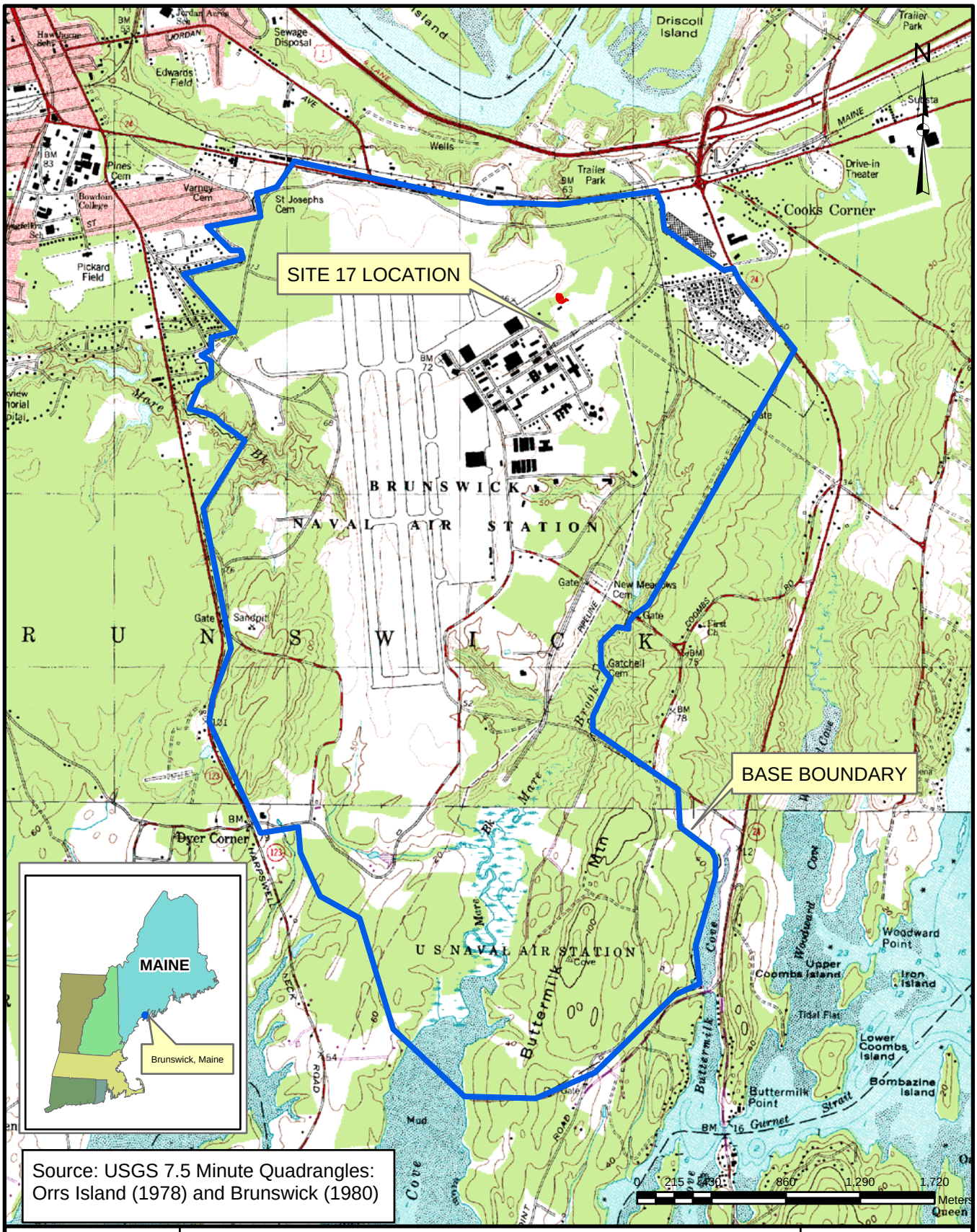

Source: USGS 7.5 Minute Quadrangles: Orrs Island (1978) and Brunswick (1980)

Tetra Tech NUS, Inc.

SITE 17
SITE LOCATION MAP
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE

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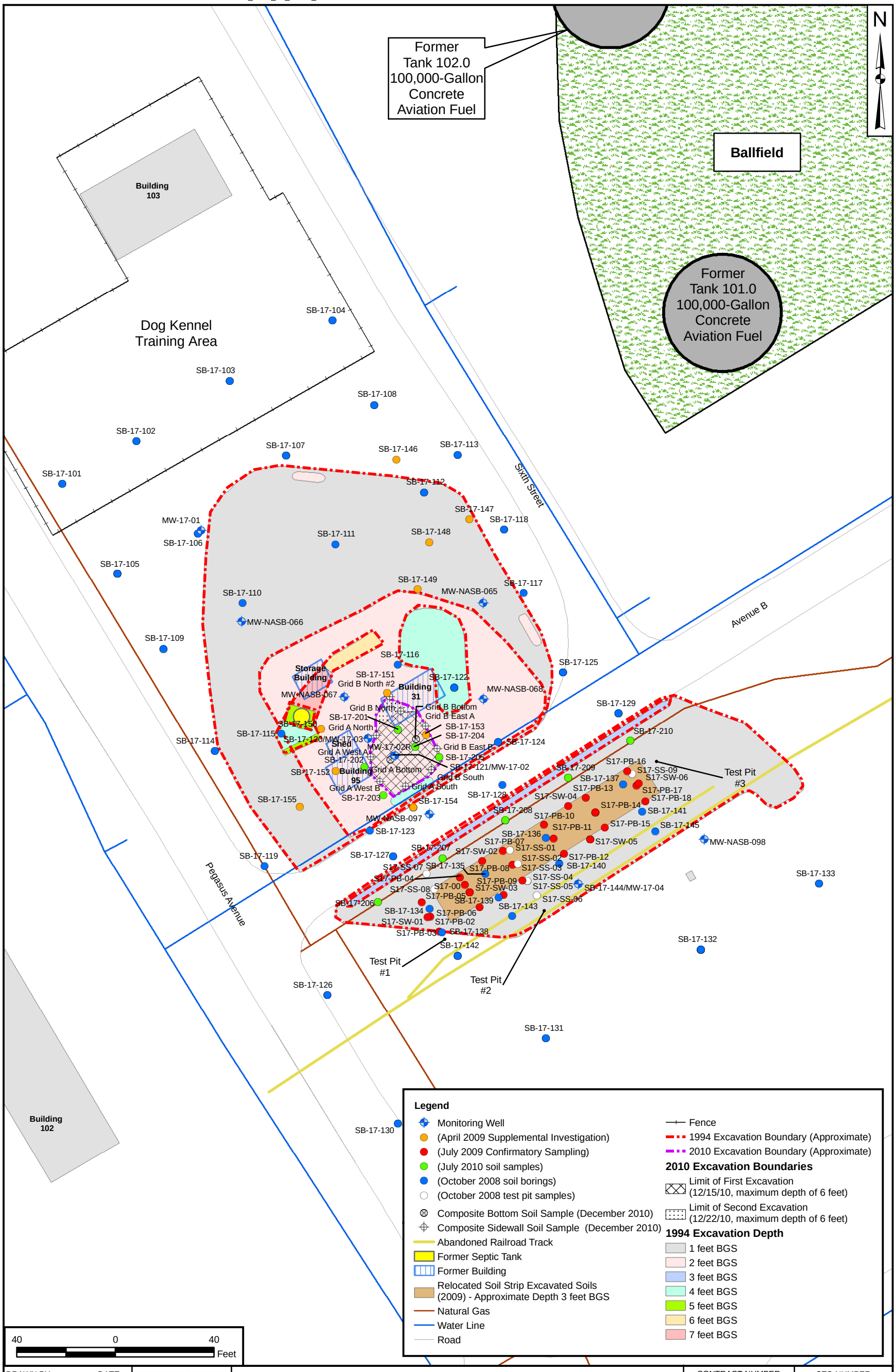

DRAWN BY: K. MOORE	DATE: 03/17/11	SITE PLAN SITE 17 NAVAL AIR STATION BRUNSWICK, MAINE	CONTRACT NUMBER: _____
CHECKED BY: M. KRAUS	DATE: 07/22/11		CTO NUMBER: WE 49
REVISED BY: J. ENGLISH	DATE: 07/27/11		APPROVED BY: M. MESSMER DATE: 03/30/11
SCALE: AS NOTED			APPROVED BY: — DATE: —
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2.0 SITE CHARACTERIZATION ACTIVITIES

This section presents a summary description of the following field investigation activities conducted in October 2008 as part of the RI:

- Soil boring advancement
- Soil sampling/chemical analysis
- Monitoring well installation and development
- Groundwater sampling/chemical analysis
- Water level measurement
- Hydraulic conductivity testing
- Sample location survey
- Review of threatened and endangered species

Physical site characteristics based on RI field data are presented in Section 3, and sample analytical results are presented in Section 4 of this report. The following sections present a description of the field activities performed to support the RI at Site 17. Post-RI sampling and soil remedial activities are discussed in Section 1.3, and associated documents presenting sampling methods and results and removal action information are included in Appendix E.

2.1 SOIL INVESTIGATION

Forty-five soil borings were advanced using DPT during the 2008 RI. A Tetra Tech geologist directed soil boring activities and documented findings. Soil boring locations are shown on Figure 1-2. Soil borings were advanced to facilitate soil sampling and subsurface lithologic characterization. In addition, monitoring wells were installed at soil boring locations SB-17-106 (MW-17-01), SB17-120 (MW-17-03), SB-17-121 (MW-17-02), and SB-17-144 (MW-17-04). Table 2-1 summarizes the soil boring locations and associated rationales. A lithologic description of each borehole is provided on the boring logs in Appendix A-1.

Borings were advanced using a GeoProbe® Model 6620 DT direct-push drill rig. Surface and subsurface soil samples were collected with a GeoProbe® Macro-Core® soil sampling system. The Macro-Core® sampler consists of 1.5-inch inside diameter (ID) 5-foot-long core barrel with a clear acetate liner. As each sample was opened, the soils were monitored for organic vapors using a flame ionization detector (FID) and photoionization detector (PID) equipped with a 10.2 eV lamp. In addition, an aliquot was collected for FID jar headspace screening. Table 2-2 summarizes the FID and PID screening and headspace readings collected during soil boring advancement. The borehole and the breathing zone of

the field crew were periodically monitored for organic vapors in accordance with the Site-Specific Health and Safety Plan (Tetra Tech, 2008b).

Soil samples were described according to the Unified Soil Classification System, with descriptions recorded on soil boring logs presented in Appendix A-1, to provide a lithologic record of subsurface materials encountered.

A total of 80 soil samples (72 field samples and eight duplicates) were collected in October 2008 and submitted for laboratory analysis from soil borings SB-17-101 through SB-17-145. Soil collected for laboratory analysis was homogenized in a dedicated aluminum pan, and aliquots were transferred into appropriate laboratory-supplied bottleware. If additional soil was needed to fulfill volume requirements, an additional acetate liner was obtained from the desired depth and homogenized with the original soil.

Soil samples were collected from three areas on the site: the main site area that was previously excavated and covered with fill; a small area across Avenue B that was excavated, partially backfilled with slightly contaminated soil (exceeded surface soil PRGs but not subsurface soil PRGs) and then covered with fill (the soil strip); and fringe areas that were not excavated as part of any pre-RI soil removal activities. Figure 1-2 shows boring locations relative to pre-RI excavation areas, and Table 2-3 provides details regarding boring locations and depths where samples were collected for analysis. Within these three areas, soil samples were collected as follows:

- In the main excavated area, soil samples were collected at the bottom of the fill layer and below.

- In the soil strip, soil samples were collected from 2 to 3 feet bgs, corresponding to the depth where slightly contaminated soils were previously placed.

- In previously unexcavated areas, soil samples were collected from 0 to 1 foot and from 1 to 4 feet bgs.

At three locations, an additional soil sample was collected to determine if contamination was associated with a black layer (“peat”) that had elevated FID headspace measurements. At location SB-17-125, the additional soil sample was collected from 6 to 8 feet bgs. At borings SB-17-132 and SB-17-141, additional soil samples were collected from 4 to 8 feet bgs and from 3 to 7 feet bgs, respectively.

The remedial design for the 1994 removal action specified that a geotextile fabric be placed in the excavated area prior to backfilling and compaction (ABB Environmental Services, Inc., 1992). The existence of the geotextile was confirmed prior to DPT soil sampling during test pitting activities

performed by ECC on October 12 and October 13, 2008 (MEDEP, 2008). The geotextile was identified at approximately 2 feet bgs in several borings advanced in October 2008.

Soil samples were collected and placed in laboratory-supplied containers for each of the analysis types and were shipped to the analytical laboratory under proper chain of custody. Soil samples from soil borings were analyzed for the following parameters:

- TCL chlorinated pesticides by EPA Method 8081A
- Chlorinated herbicides by EPA Method 8151A
- Chlorinated pesticides (pyrethrin and esmethrin) by EPA Method 8081A
- Organophosphorus and organonitrogen pesticides by EPA Method 8141A
- Pesticides and herbicides [high-performance liquid chromatography (HPLC)] by EPA Method 8321A
- TAL metals by EPA Method 6010B
- Cyanide by EPA Method 9012M

Select samples were also analyzed for diesel-range organics (DRO) by MEDEP Method 4.1.25 and total organic carbon (TOC) by EPA Method 9060A.

2.2 GROUNDWATER INVESTIGATION

Four monitoring wells were installed and developed and four existing monitoring wells were redeveloped to facilitate groundwater sampling during the October 2008 RI. The following text describes RI groundwater investigation activities.

Groundwater monitoring wells were installed in four soil borings (SB-17-106, SB-17-120, SB-17-121, and SB-17-144) advanced during the RI. Monitoring well locations were selected to characterize site groundwater quality, provide groundwater elevation control points to further define site groundwater flow direction, and provide upgradient (site background) groundwater sampling locations (Tetra Tech, 2008a). Well MW-17-01 (at SB-17-106) is located hydraulically upgradient of previously detected contamination and outside of the excavated area. Two wells were installed in 2008 as a shallow and deep couplet, MW-17-02 (at SB17-121) and MW-17-03 (at SB-17-120), respectively, to evaluate contamination between former Buildings 31 and 95. Contamination was previously detected in the vicinity of this location at 15 feet bgs. The fourth new monitoring well was installed as an additional downgradient location in the soil strip (MW-17-04 at SB-17-144). The existing wells were selected for sampling to provide data in the vicinity of the 1994 excavation (MW-NASB-065, MW-NASB-066, and MW-NASB-068) located north of Avenue B and to provide data downgradient of the soil strip excavation area (MW-NASB-098) (see Figure 1-2).

2.2.1 Monitoring Well Installation

All new monitoring wells were completed in the overburden. Monitoring wells MW-17-01 and MW-17-03 were completed with well screens set above the first observed silt/clay unit, and well MW-17-02 was a water table well paired with MW-17-03. The well screen interval of monitoring well MW-17-04 was selected to bracket a zone of elevated FID readings, as shown in Table 2-2. Table 2-4 provides a summary of well construction details for each of the newly installed monitoring wells, and copies of well construction logs are provided in Appendix A-2.

Manufactured pre-packed well screens consisting of 2.5-inch outer diameter (OD), 1-inch ID flush-threaded, Schedule 40 polyvinyl chloride (PVC) machine-slotted well screen (0.010-inch slot openings) with silica sand surrounding the well screen were used for each new well. Two 5-foot-long pre-packed well screens were threaded together for three of the wells to create 10-foot-long well screens, and each monitoring well was fitted with a bottom plug. A steel outer protective casing (4.5-inch ID by 5 feet long) was installed and grouted in place around each new monitoring well. New monitoring wells were locked with keyed-alike locks.

A black mark was drawn on the top of the PVC well riser using a permanent marker to serve as a reference point for well survey and groundwater depth measurements upon completion of each well. The horizontal and vertical locations of all new wells were surveyed following the completion of well construction (see Section 2.4).

2.2.2 Well Development

The four newly installed wells (MW-17-01, MW-17-02, MW-17-03 and MW-17-04) were developed using a peristaltic pump due to the high level of silt in the geologic formation. Fine-grained material around the pre-packed well screens was drawn into the well using the peristaltic pump and removed by agitating the well water while simultaneously pumping water from the well at a discharge rate of approximately 0.1 gallon per minute. The four existing wells were developed using a Waterra® inertial pump equipped with a surge block. Fine-grained material around the well screens was drawn into the well using the Waterra® pump and removed by agitating the well water with the surge block and simultaneously pumping water from the well at a discharge rate of approximately 0.1 to 0.5 gallon per minute.

Groundwater extracted from the new and existing monitoring wells during development was monitored for turbidity at 10-minute intervals. Well development continued until the turbidity readings were less than 10 nephelometric turbidity units (NTUs) or well development was performed for 1 hour, whichever occurred first. Turbidities in wells MW-17-01, MW-17-02, and MW-17-03 stabilized at less than 10 NTUs within

approximately 1 hour from the start of development. Stabilized turbidity levels in the other wells ranged from 20 to 140 NTUs after development was completed. Additional details regarding well development are provided on the log sheets in Appendix A-3.

2.2.3 Water Level Measurements

A synoptic round of water level measurements was collected from the site monitoring wells on December 10, 2008, to provide data for evaluation of overburden groundwater flow direction and hydraulic gradients at the site. Groundwater level measurements were obtained using an electronic water level indicator, and an oil/water interface probe was also used to check for the presence of non-aqueous-phase liquid (NAPL) in each well. NAPL was not identified in any of the wells. Water level measurements were recorded from the highest point of the top of the PVC riser (marked in black) and were measured to the nearest 0.01 foot. Water level data are summarized on Table 2-4, and groundwater flow directions and gradients are discussed in Section 3.0.

2.2.4 Groundwater Sampling

Groundwater samples were collected from eight wells (four new and four previously installed) in December 2008 and submitted for laboratory analysis as summarized in Table 2-3. The groundwater analytical data were compared to MCLs (EPA, 2009b), Maine MEGs for Drinking Water (Maine CDC, 2011), and EPA Volatilization Screening Levels listed in the Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (2002b).

Peristaltic pumps with dedicated ¼-inch ID Teflon-lined tubing were used for groundwater sampling. Monitoring wells were purged at flow rates between 150 and 500 milliliters (ml) per minute, depending on the drawdown observed during purging. Turbidity, pH, temperature, oxidation-reduction potential (ORP), specific conductance, and dissolved oxygen (DO) were recorded at 5- to 10-minute intervals during groundwater sampling, and results are summarized on Table 2-5 and shown on the logs provided in Appendix A-5. Purging continued until all parameters had stabilized in each of the wells. When three consecutive readings differed less than 10 percent for ORP and DO, when three consecutive readings differed less than 3 percent for temperature and specific conductance, when pH varied by +/-0.1 or less, and when turbidity was less than 5 NTUs, the well was considered stable and ready for sampling.

Groundwater samples were placed in laboratory-supplied containers, shipped to the laboratory under proper chain of custody, and analyzed for the following parameters:

- TCL chlorinated pesticides by EPA Method 8081A
- Chlorinated herbicides by EPA Method 8151A

- Chlorinated pesticides (pyrethrin and esmethrin) by EPA Method 8081A
- Organophosphorus and organonitrogen pesticides by EPA Method 8141A
- Pesticides and herbicides (HPLC) by EPA Method 8321A
- TAL metals by EPA Method 6010B
- Cyanide by EPA Method 9012M

Four of eight RI groundwater samples were also analyzed for DRO by MEDEP Method 4.1.25.

2.3 HYDRAULIC CONDUCTIVITY TESTING

Tetra Tech performed in-situ hydraulic conductivity (K) "slug" tests in each of the newly installed wells. Groundwater levels were measured using an electronic water level indicator prior to initiating slug testing in each well. An electronic water level/pressure transducer was then lowered into each well to either 1 foot above the bottom of the well (in shallow wells) or at least 10 feet below groundwater level (in deep wells). Slug testing was initiated after the static water level was re-established in each well.

Rising-head slug tests were performed in each of the monitoring wells by inserting into the well either a 0.04 by 5-foot slug for 1-inch wells or 0.13 by 3-foot slug for 2-inch wells then withdrawing the slug from the well after the water level returned to static conditions. The slug tests continued until water levels recovered to at least 90 percent of the static level. Water level measurements were collected using the pressure transducer, and water level data were evaluated using the Bouwer and Rice Method (Fetter, 1994). Slug test calculations are included in Appendix A-4, and results are discussed in Section 3.0.

2.4 SURVEYING

A sample location survey was performed by a State of Maine-licensed surveyor following the 2008 field investigation to document the horizontal locations and vertical elevations of new monitoring wells and soil borings. Survey control was maintained by referencing measured elevations to the Maine State Grid coordinate North American Datum (NAD) 1983 West Zone (horizontal) and North American Vertical Datum (NAVD) of 1988. Elevations were referenced to a USGS benchmark. Surveyed features were horizontally located to within 0.1 foot. The tops of PVC well risers, tops of protective casings, and ground elevations were surveyed to within 0.01 foot vertically.

2.5 REVIEW OF THREATENED AND ENDANGERED SPECIES

State and federal agencies were contacted to identify endangered, protected, or threatened species that may inhabit or use the environments associated with Site 17. Findings are presented in Section 3.4.4.

TABLE 2-1
SOIL BORING RATIONALE
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Boring	Location	Rationale
SB 101 – SB 104	Northern area, northwest and inside of fence, between Pegasus Avenue and Sixth Street in a line through the dog kennel training area.	Four grid points north and hydraulically upgradient of previous excavation boundary to delineate extent of site contamination.
SB 105 – SB 108	Northern area, south of fence between Pegasus Avenue and Sixth Street. SB106 new upgradient well boring.	Four grid points north of previous excavation boundary to delineate extent of site contamination.
SB 109 – SB 113	Northwest of former buildings, between Pegasus Avenue and Sixth Street.	Five grid points in and near the previous excavation boundary to further delineate extent of site contamination and further investigate contamination under Sixth Street. (SB-17-110, SB-17-111, and SB-17-112 within excavation boundary).
SB 114 – SB 118	Near former storage building, between Pegasus Avenue and Sixth Street.	Five grid points in and near the previous excavation boundary to further delineate extent of site contamination. SB-17-115 grid point near former storage building is moved slightly southeast to further delineate vertical contamination in 7-foot excavation area. (SB-17-115 and SB-17-116 are within the excavation boundary).
SB 119 – SB 122	Close proximity to Buildings 95 and 31; between Pegasus Avenue and Sixth Street. SB 120/SB 121 new co-located shallow/deep well borings.	Four grid points in and near the previous excavation boundary to further delineate extent of site contamination. SB-17-120/121 grid point were moved slightly north to further delineate vertical contamination west of Building 31; SB-17-122 grid point is moved slightly northwest to further delineate vertical contamination east of Building 31 in 4-foot excavation area. (SB-17-120, SB-17-121, and SB-17-122 are within the excavation boundaries).
SB 123 – SB 125	North of Avenue B; between Pegasus Avenue and Sixth Street.	Three grid points near the previous excavation boundary to further delineate extent of site contamination.
SB 127 – SB 129	Along Avenue B.	Three grid points near the previous excavation boundary to further delineate extent of site contamination and further investigate contamination under Avenue B and Sixth Street. SB-17-127 is near the steps of Building 95 to capture potential downgradient contamination.
SB-126 SB 130 – 133	South and west of soil strip; east of Pegasus Avenue and west, south, and east of transformer pads	Four grid points south of railroad tracks and the previous excavation boundary and one grid point west of the previous excavation boundary to delineate extent of site contamination. SB 132 was moved slightly south to go around transformer pads; SB 133 was moved slightly east to cover area south of excavation area “dog leg.”
SB 134 – 145	Soil strip, south of Avenue B.	12 grid points to locate and delineate soil strip.

TABLE 2-2
FIELD SCREENING RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Location	Sample Interval Depth (ft bgs)	FID Headspace Reading (ppm)	PID Screening Reading (ppm)
SB-17-101	0 - 1	NA	ND
	1 - 4	NA	ND
SB-17-102	0 - 1	30.3	ND
	1 - 4	0.3	ND
SB-17-103	0 - 1	5.1	ND
	1 - 4	6.0	ND
SB-17-104	0 - 1	3.1	ND
	1 - 2	51.1	ND
SB-17-105	0 - 1.3	NA	ND
	1.3 - 4.3	ND	ND
SB-17-106 (MW-17-01)	0 - 1	NA	ND
	1 - 4	NA	ND
	4 - 9	NA	ND
	9 - 14	NA	ND
	14 - 19	NA	ND
	19 - 24	NA	ND
	24 - 29	NA	ND
SB-17-107	0 - 1	ND	NA
	1 - 4	4,560	ND
	4 - 8	7,240	0.1
SB-17-108	0 - 1	ND	NA
	1 - 4	ND	NA
SB-17-109	0 - 1	NA	ND
	1 - 4	NA	0.2
SB-17-110	0 - 1	NA	ND
	1 - 4	NA	ND
	4 - 9	NA	ND
	9 - 14	NA	ND
SB-17-111	0 - 1	ND	NA
	1 - 4	ND	NA
SB-17-112	0 - 1	ND	NA
	1 - 4	2,589	ND
	4 - 8	NA	NA
SB-17-113	0 - 1	ND	NA
	1 - 4	2,811	NA
SB-17-114	0 - 1	NA	ND
	1 - 4	NA	ND
SB-17-115	0 - 1	NA	1.0
	1 - 2	NA	0.6
	2 - 3	NA	ND
	3 - 4	NA	ND
	7 - 8	NA	ND
SB-17-116	0 - 4	NA	ND
	04-07	NA	ND

TABLE 2-2
FIELD SCREENING RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Location	Sample Interval Depth (ft bgs)	FID Headspace Reading (ppm)	PID Screening Reading (ppm)
SB-17-117	0 - 1	NA	ND
	1 - 4	NA	ND
	4 - 7	15.3	0.3
SB-17-118	0 - 1	ND	NA
	1 - 4	104.1	NA
	4 - 8	1,753	NA
SB-17-119	0 - 1	NA	ND
	1 - 4	NA	ND
SB-17-120 (MW-17-03)	0 - 2	NA	ND
	2 - 5	NA	ND
	5 - 10	NA	ND
	10 - 15	NA	ND
	15 - 20	NA	ND
	20 - 25	NA	ND
SB-17-121 (MW-17-02)	0 - 2	NA	ND
	2 - 5	NA	0.3
	5 - 7	NA	0.6
	7 - 10	NA	ND
	10 - 12	NA	ND
	12 - 15	NA	ND
SB-17-122	0 - 4	NA	ND
	4 - 7	163	ND
SB-17-123	0 - 1.1	ND	ND
	1.1 - 4.1	ND	ND
SB-17-124	0 - 1	NA	ND
	1 - 4	NA	ND
	4 - 5	NA	0.4
	5 - 8	NA	ND
SB-17-125	0 - 1	ND	ND
	1 - 4	0.4	ND
SB-17-126	0 - 1	NA	ND
	1 - 4	NA	ND
SB-17-127	0 - 1	ND	ND
	1 - 3	ND	ND
	3 - 6	NA	ND
SB-17-128	0 - 3	ND	ND
	3 - 6	ND	ND
SB-17-129	0 - 3	NA	ND
	3 - 6	NA	ND
SB-17-130	0 - 1	ND	ND
	1 - 4	ND	ND
SB-17-131	0 - 1.1	NA	ND
	1.1 - 4.1	NA	ND

TABLE 2-2
FIELD SCREENING RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Location	Sample Interval Depth (ft bgs)	FID Headspace Reading (ppm)	PID Screening Reading (ppm)
SB-17-132	0 - 1	NA	ND
	1 - 4	NA	ND
	4 - 8	3,695	ND
SB-17-133	0 - 1	NA	7.9
	2 - 3	NA	1.5
	3 - 4	NA	ND
SB-17-134	0 - 2	ND	ND
	2 - 3	ND	ND
SB-17-135	0 - 2	ND	ND
SB-17-136	0 - 2	NA	ND
	2 - 3	ND	ND
SB-17-137	0 - 2	ND	ND
	2 - 3	ND	ND
SB-17-138	0 - 2	NA	ND
	2 - 3	NA	ND
	2 - 6	ND	ND
SB-17-139	0 - 2	ND	ND
	2 - 3	ND	ND
SB-17-140	0 - 2	ND	ND
	2 - 3	NA	ND
SB-17-141	0 - 2	NA	ND
	2 - 3	NA	ND
	3 - 7	2,532	NA
SB-17-142	0 - 2	ND	ND
	2 - 3	NA	ND
SB-17-143	0 - 2	NA	ND
	2 - 3	NA	ND
SB-17-144 (MW-17-04)	0 - 2	ND	ND
	2 - 3	ND	ND
	3 - 5	ND	ND
	5 - 10	68	ND
	10 - 15	ND	ND
	15 - 20	ND	ND
	20 - 24	ND	ND
	24 - 28	ND	ND
	28 - 32	ND	ND
SB-17-145	0 - 2	ND	ND
	2 - 3	ND	ND

NA = Not screened.
ND = Not detected.
PID screening occurred immediately after opening the acetate liner, after slightly disturbing the soil.
FID headspace readings were taken from a small composite of the sample from the acetate liner, at least 10 had been placed in a plastic bag.

TABLE 2-3
SAMPLE ANALYSIS SUMMARY
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Location	Sample Interval Depth (ft bgs)	Type of Area - Main Excavation, Soil Strip Excavation, or Unexcavated	TCL Chlorinated Pesticides by EPA Method 8081A	Organophosphorus and Organonitrogen Pesticides by EPA Method 8141A	Chlorinated Pesticides (Pyrethrin and Esmethrin) by EPA Method 8081A	Pesticides/Herbicides by HPLC by EPA Method 8321A	Chlorinated Herbicides by EPA Method 8151A	TAL Metals/Cyanide by EPA Method 6010B and EPA Method 9012M	DRO by MEDEP 4.1.25	TOC by EPA Method 9060A
2008 RI Surface and Subsurface Soil Samples										
SB-17-101	0 - 1	Unexcavated	X	X	X	X	X	X		
	1 - 4		X	X	X	X	X	X		
SB-17-102	0 - 1	Unexcavated	X	X	X	X	X	X		
	1 - 4		X	X	X	X	X	X		
SB-17-103	0 - 1	Unexcavated	X	X	X	X	X	X		
	1 - 4		X	X	X	X	X	X		
SB-17-104	0 - 1	Unexcavated	X	X	X	X	X	X		
	1 - 4		X	X	X	X	X	X		
SB-17-105	0 - 1	Unexcavated	X	X	X	X	X	X		
	1 - 4		X	X	X	X	X	X		
SB-17-106 (MW-17-01)	0 - 1	Unexcavated	X	X	X	X	X	X		
	1 - 4		X	X	X	X	X	X		
SB-17-107	0 - 1	Unexcavated	X	X	X	X	X	X		
	1 - 4		X	X	X	X	X	X		
	4 - 8		X	X	X	X	X	X		
SB-17-108	0 - 1	Unexcavated	X	X	X	X	X	X		
	1 - 4		X	X	X	X	X	X		
SB-17-109	0 - 1	Unexcavated	X	X	X	X	X	X		
	1 - 4		X	X	X	X	X	X		
SB-17-110	1 - 4	Main excavation	X	X	X	X	X	X		
SB-17-111	1 - 4		X	X	X	X	X	X	X	
SB-17-112	0 - 1	Main excavation	X	X	X	X	X	X		
	1 - 4		X	X	X	X	X	X		
SB-17-113	0 - 1	Unexcavated	X	X	X	X	X	X		
	1 - 4		X	X	X	X	X	X		
SB-17-114	0 - 1	Unexcavated	X	X	X	X	X	X		
	1 - 4		X	X	X	X	X	X		
SB-17-115	7 - 10	Main excavation	X	X	X	X	X	X	X	X
SB-17-116	4 - 7	Main excavation	X	X	X	X	X	X		
SB-17-117	1 - 4	Unexcavated	X	X	X	X	X	X		
SB-17-118	0 - 1	Unexcavated	X	X	X	X	X	X		
	1 - 4		X	X	X	X	X	X		
SB-17-119	1 - 4	Unexcavated	X	X	X	X	X	X		
SB-17-120 (MW-17-02)	2 - 5	Main excavation	X	X	X	X	X	X		X
SB-17-121 (MW-17-03)	2 - 5	Main excavation	X	X	X	X	X	X	X	
	7 - 10		X	X	X	X	X	X	X	
	12-15		X	X	X	X	X	X	X	
SB-17-122	4 - 7	Main excavation	X	X	X	X	X	X	X	
SB-17-123	0 - 1	Main excavation	X	X	X	X	X	X		
	1 - 4		X	X	X	X	X	X		
SB-17-124	0 - 1	Main excavation	X	X	X	X	X	X		
	1 - 4		X	X	X	X	X	X		
SB-17-125	0 - 1	Main excavation	X	X	X	X	X	X		
	1 - 4		X	X	X	X	X	X		
	6 - 8[1]	Main excavation	X	X	X	X	X	X		
SB-17-126	0 - 1	Unexcavated	X	X	X	X	X	X		
	1 - 4		X	X	X	X	X	X		
SB-17-127	3 - 6	Unexcavated	X	X	X	X	X	X		
SB-17-128	3 - 6		X	X	X	X	X	X		

TABLE 2-3
SAMPLE ANALYSIS SUMMARY
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Location	Sample Interval Depth (ft bgs)	Type of Area - Main Excavation, Soil Strip Excavation, or Unexcavated	TCL Chlorinated Pesticides by EPA Method 8081A	Organophosphorus and Organonitrogen Pesticides by EPA Method 8141A	Chlorinated Pesticides (Pyrethrin and Esmethrin) by EPA Method 8081A	Pesticides/Herbicides by HPLC by EPA Method 8321A	Chlorinated Herbicides by EPA Method 8151A	TAL Metals/Cyanide by EPA Method 6010B and EPA Method 9012M	DRO by MEDEP 4.1.25	TOC by EPA Method 9060A
SB-17-129	3 - 6	Unexcavated	X	X	X	X	X	X		
SB-17-130	0 - 1	Unexcavated	X	X	X	X	X	X		
	1 - 4		X	X	X	X	X	X		
SB-17-131	0 - 1	Unexcavated	X	X	X	X	X	X		
	1 - 4		X	X	X	X	X	X		
SB-17-132	0 - 1	Unexcavated	X	X	X	X	X	X		
	1 - 4		X	X	X	X	X	X		
	4 - 8[(1)]		X	X	X	X	X	X		
SB-17-133	0 - 1	Unexcavated	X	X	X	X	X	X		
	1 - 4		X	X	X	X	X	X		
SB-17-134	2 - 3	Soil strip excavation	X		X		X			
SB-17-135	2 - 3	Soil strip excavation	X		X		X			
SB-17-136	2 - 3	Soil strip excavation	X		X		X			
SB-17-137	2 - 3	Soil strip excavation	X		X		X			
SB-17-138	2 - 3	Soil strip excavation	X		X		X			
SB-17-139	2 - 3	Soil strip excavation	X		X		X			
SB-17-140	2 - 3	Soil strip excavation	X		X		X			
SB-17-141	2 - 3	Soil strip excavation	X		X		X			
	3 - 7[(1)]	Soil strip excavation	X	X	X	X	X	X		
SB-17-142	2 - 3	Unexcavated	X		X		X			
SB-17-143	2 - 3	Soil strip excavation	X		X		X			
SB-17-144 (MW-17-04)	2 - 3	Soil strip excavation	X		X		X			
SB-17-145	2 - 3	Soil strip excavation	X		X		X			
2008 RI GroundwaterSamples										
MW-17-01	20	NA	X	X	X	X	X	X	X	
MW-17-02	6.3	NA	X	X	X	X	X	X	X	
MW-17-03	14	NA	X	X	X	X	X	X	X	
MW-17-04	12.5	NA	X	X	X	X	X	X	X	
MW-NASB-065	12.5	NA	X	X	X	X	X	X		
MW-NASB-066	18	NA	X	X	X	X	X	X		
MW-NASB-068	12.5	NA	X	X	X	X	X	X		
MW-NASB-098	12	NA	X	X	X	X	X	X		

1 Additional samples collected to determine if any contamination was assocaited with black layer/FID readings in the soil.
ft bgs - feet below ground surface.
TCL - Target Compound List.
HPLC- High-performance liquid chromatography.
DRO- Diesel-range organics.
TOC - Total organic carbon.
TAL- Target Analyte List.
NA - Not applicable - groundwater sample.

TABLE 2-4
WELL CONSTRUCTION/WATER LEVEL SUMMARY
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Well Identification	Year Installed	Aquifer Screened	Diameter (in)	TPVC Elevation (ft above msl)	Ground Elevation (ft above msl)	Screened Interval (ft bgs)	December 10, 2008	
							Depth to Water (ft from TPVC)	Groundwater Elevation (ft above msl)
MW-NASB-065	1993	Upper Sand	2	73.64	72.32	3 to 13	2.55	71.09
MW-NASB-066	1993	Upper Sand/ Transition Unit	2	78.14	76.93	8 to 18	6.79	71.35
MW-NASB-067	1993	Upper Sand/ Transition Unit	2	74.21	Unknown	4 to 14	NM	--
MW-NASB-068	1993	Upper Sand	2	75.88	72.81	3.2 to 13.2	3.45	72.43
MW-NASB-097	2000	Upper Sand	2	73.53	73.58	2.2 to 13.2	NM	--
MW-NASB-098	2000	Upper Sand	2	75.88	73.40	3 to 13	5.74	70.14
MW-17-01	2008	Upper Sand/ Transition Unit	1	77.94	76.28	13 to 23	6.59	71.35
MW-17-02	2008	Upper Sand/ Transition Unit	1	75.31	72.51	3.8 to 8.8	4.65	70.66
MW-17-02R	2010	Fill/ Upper Sand	1	74.94	72.59	3.8 to 8.8	NI	--
MW-17-03	2008	Upper Sand	1	74.93	72.61	6 to 16	4.20	70.73
MW-17-04	2008	Upper Sand	1	75.18	73.25	5.2 to 15.2	5.10	70.08

1 Elevations are based on feet mean sea level (NAVD 1988).
msl - Mean sea level.
bgs - Below ground surface.
NAVD - North American Vertical Datum.
TPVC - Top of polyvinyl chloride riser.
NM - Not measured.

TABLE 2-5
GROUNDWATER SAMPLE FINAL FIELD PARAMETER DATA
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Well ID	Sample Date	Depth Sampled (ft bgs)	Pump Type Bladder/Perisaltic	Initial Clock Time	Final Clock Time	Time of Reading	Water Depth Below MP (ft)	Purge Rate (mL/min)	Cum. Volume Purged (approx. gal)	Temp (^{o}C)	Spec. Cond. (µS/cm)	pH	ORP (mV)	DO (mg/L)	Turbidity (NTU)
MW-17-01	12/9/2008	20	Peristaltic	1230	1320	1240	6.72	300	1.0	9.62	200	5.74	-20.8	0.75	7.0
						1315	6.72	320	4	10.05	200	5.76	-51.8	0.74	2.4
MW-17-02[(1)]	12/8/2008	6.3	Peristaltic	1145	1225	1200	4.9	180	0.75	6.79	120	5.73	111.9	1.53	4.1
						1225	4.89	180	2	6.91	121	5.74	95.0	1.19	0.0
MW-17-03	12/8/2008	14	Peristaltic	1140	1310	1150	4.36	330	0.2	6.60	221	5.83	53.7	0.84	19.0
						1305	4.37	230	4.8	7.41	190	5.62	-120.5	1.10	4.5
MW-17-04[(1)(2)]	12/9/2008	12.5	Peristaltic	1425	1515	1435	5.27	250	0.7	35.07	62	5.63	128.5	0.96	19.0
						1510	5.30	250	3.3	34.41	61	5.57	43.9	0.43	0.0
MW-NASB-065[(1)]	12/9/2008	10.5	Peristaltic	850	945	905	3.25	220	0.9	8.59	173	5.88	-26.3	0.73	17.0
						945	3.25	220	2	8.51	154	5.76	-46.9	0.34	3.8
MW-NASB-066[(1)]	12/9/2008	16	Peristaltic	845	1035	900	6.89	150	0.6	7.22	97	5.13	165.9	1.64	50.0
						1030	6.91	230	4.75	8.60	95	5.04	212.7	1.26	4.3
MW-NASB-068[(1)(2)]	12/8/2008	11.7	Peristaltic	1210	1315	1220	3.91	225	0.6	8.23	90	5.89	94.2	0.95	60.0
						1315	3.92	225	3.9	36.63	65	5.79	60.9	0.29	3.6
MW-NASB-098	12/9/2008	10	Peristaltic	1425	1525	1445	6.20	200	1.5	9.51	88	5.7	150.4	1.63	8.9
						1520	6.20	200	4.2	9.77	102	5.67	128.1	0.41	2.5

1 Cumulative volume purged not recorded on log sheets, volume was estimated from purge rate and length of purge.
2 Temperature probe giving false readings, possibluy due to extremely cold temperatures during groundwater sampling.

^{o}C - Degrees Celsius.
µS/cm - MicroSiemens per centimeter.
DO - Dissolved oxygen.
ft bgs - Feet below ground surface.
gal - Gallons.
mg/L - Milligrams per liter.
mL/min - Milliliters per minute.
MP - Measuring point.
mV - Millivolts.
NTU - Nephelometric turbidity units.
ORP - Oxidation-reduction potential.

3.0 PHYSICAL SITE CHARACTERISTICS

This section presents a description of Site 17 physical conditions based on information presented in Section 2.0 including boring logs, groundwater flow measurements, and results of other site investigation activities.

3.1 GEOLOGY

Three geologic cross-section lines were generated based on activities discussed in Section 2.0. Approximate cross-section locations are shown on Figure 3-1A. One cross section, A-A', is oriented approximately parallel to interpreted groundwater flow in a north-to-south direction (Figure 3-1B), and two cross sections (B-B' and C-C') are oriented approximately perpendicular to interpreted groundwater flow, west to east across the site (Figures 3-1C and 3-1D). Subsurface stratigraphic units encountered during site investigations in stratigraphic order, were as follows:

- **Fill** – Fill materials consist of tan or light brown fine to medium sand with varying minor amounts of fines and coarse gravel. In the soil strip area, the geotextile liner had previously been observed, and pieces of the liner were observed during drilling at approximately 2 feet bgs (SB-17-135 and SB-17-136). In the excavation area, the geotextile liner was not observed during drilling. Due to the similar geologic nature of the natural material and clean fill, it was sometimes difficult to determine where natural material began. Table 3-1 summarizes the borings within the noted fill areas and the physical evidence used to determine the thickness of the fill. Where there was no physical evidence to aid in determining when natural materials were encountered, the thickness of the fill was determined based on previous excavation depths. The fill was approximately 2 feet thick in the soil strip removal area and ranged in thickness from approximately 1 to 7 feet in the excavation area north of Avenue B.

- **Upper Sand Unit** – This unit occurs at the ground surface or underlies the fill and consists of dark brown to light brown and orange brown fine to medium sand with minor amounts of silt. This unit ranged in observed thickness from approximately 11 feet at SB-17-121 (center of the site) to 18 feet at SB-17-106 (northern portion of the site) and 18 feet at SB-17-144 (southern portion of the site). Most soil borings were terminated at 8 feet or less; therefore, the total thickness of the Upper Sand Unit was not determined in the majority of borings.

- **Black Organic Layer** – The black organic layer (possibly peat) consists of black silt with varying minor amounts of fine sand and organic material (wood chunks, fibrous material, etc.). FID headspace screening measurements were often elevated in samples of the black organic layer relative to PID measurements in the same aliquot, as shown on boring logs provided in Appendix A-1.

Elevated FID measurements may be the result of methane generation, which occurs during anaerobic degradation of organic matter (methanogenesis). Peat was previously noted within the Upper Sand Unit generally in the southeastern portion of the site (MW-NASB-098) and in some of the borings advanced during the RI. During the RI, a thin black organic layer (possibly peat) was noted in soil borings throughout the site and was associated with elevated FID readings. A number of borings at the site were only advanced to a depth of 3 or 4 feet bgs, so the black organic layer (or peat) may be present at additional locations but was not encountered during this investigation. Depths to the top of the black organic layer (or peat) ranged from 2.5 (SB-17-112) to 5.7 feet bgs (SB-17-144). Where encountered, the black organic layer ranged in thickness from 0.4 foot at SB-17-116 to 1.3 feet at SB-17-112. The black organic layer was encountered at the bottom of boring SB-17-135 at approximately 2.9 feet, and the boring was terminated at 3 feet, so the full extent of the black organic layer at this location is unknown.

- **Transition Unit** – This unit underlies the Upper Sand Unit and consists of light brown/tan/brown to gray fine sand and silt with interbedded clay. The Transition Unit was observed during the RI in soil borings advanced to greater depths for monitoring well installations (SB-17-106, SB-17-120, SB-17-121, and SB-17-144). The Transition Unit ranged in thickness from approximately 3 feet in the center of the site (SB-17-120) to 6 feet in the northeastern portion of the site (SB-17-106) and to approximately 8 feet in the southern portion of the site (SB-17-144). SB-17-121 was not advanced to the clay unit, so the thickness of the Transition Unit is not known in this area. The depth to the top of the Transition Unit ranged from approximately 13 feet bgs in the center portion of the site (SB-17-121) to 18 feet bgs in the northern portion of the site (SB-17-106) and to 20 feet bgs in the southern portion of the site (SB-17-144).

- **Glaciomarine Silt/Clay (Presumpscot Clay)** – This unit underlies the Transition Unit and consists of gray (weathered), cohesive, plastic silt/clay. This unit was only observed in three of the well borings (SB-17-106, SB-17-120, and SB-17-144). At these locations where the Presumpscot Clay was observed, the depth to the top of unit was approximately 18 feet bgs in the center of the site (SB-17-120), 24 feet bgs in the northern portion of the site (SB-17-106), and 28 feet bgs in the southern portion of the site (SB-17-144). Borings were not advanced through the Presumpscot Clay; therefore, the thickness of the Presumpscot in this area is unknown.

3.2 HYDROGEOLOGY

Groundwater was encountered in fill, Upper Sand Unit, and Transition Unit at the site. The permeable nature of the surficial materials in the unsaturated zone above the water table suggests a high infiltration capacity. Groundwater movement below the water table (saturated zone) occurs preferentially through

the Upper Sand Unit and fine sand interbeds within the underlying Transition Unit. The underlying Presumpscot Clay separates the surficial aquifer from the underlying bedrock aquifer and acts as an aquitard limiting downward movement of groundwater. Groundwater movement in bedrock is not known in the site area.

A synoptic round of groundwater levels was collected on December 10, 2008, in newly installed and select previously installed monitoring wells. Depths to groundwater ranged from approximately 0.5 to 5 feet bgs across the site. Groundwater elevations calculated for each monitoring well are presented in Table 2-4. Groundwater generally flows to the south-southeast, as shown on Figure 3-2, which is consistent with topography and surface drainage at the site. Historically, groundwater flow has been from the northwest to the southeast in this area.

Lateral hydraulic gradients in the inferred direction of groundwater flow across the site were calculated between the Upper Sand and Transition Unit. Lateral gradients in overburden were calculated between upgradient and downgradient equipotential lines in the eastern and western portions of the site. The calculated lateral hydraulic gradient was 0.0071 in the eastern portion of the site and was 0.0067 in the western portion of the site, showing minimal spatial variability. This evaluation indicates that groundwater flow gradient across the site is relatively uniform.

K values were estimated from in-situ slug tests in five wells completed in the Upper Sand Unit and three wells completed in the Upper Sand and Transition Unit. The results of the slug tests are summarized in Table 3-2, and slug test calculations are presented in Appendix A-4. The slug test data were analyzed using the Bouwer and Rice (1976) method. The calculated K values for wells screened in the Upper Sand ranged from 4.86 to 18.10 feet per day, with an estimated geometric mean of 11.4 feet per day. The calculated K values for wells screened in the Upper Sand and Transition Unit ranged from 8.81 to 11.10 feet per day, with an estimated geometric mean of 9.8 feet per day. The overall geometric mean K for all wells was 10.8 feet per day. The K values estimated from these slug tests are consistent with silty sands, fine sands, and well-sorted sands.

Groundwater flow velocities were estimated using the modified Darcy equation ($V=Ki/n$) and slug test results, groundwater elevations, and representative effective porosities. The geometric mean K value, presented in Table 3-2, was used in the groundwater flow velocity calculations. Based on the overall geometric mean K of approximately 10.8 feet per day, an overall average gradient (i) of 0.0069, and an effective porosity (n) of 0.20, the calculated average groundwater flow velocity across the site is 0.37 feet per day.

3.3 HABITAT AND BIOTA

The site compasses an area of approximately 0.7 acre within an industrial area of the base. Currently, a large portion of the site is covered with grass and low brush. South of Avenue B, the site is grass covered and contains an abandoned railroad bed with a few trees and a parking lot further south. North of Avenue B, between Fifth and Sixth Street, the area is primarily low brush and shrubs. These plants serve as a source of food and shelter for organisms and help prevent soil erosion and excessive surface runoff.

Terrestrial ecological receptors likely present at Site 17 include plants, soil invertebrates (worms, etc.), mammals, birds, and reptiles. Soil invertebrates promote plant growth by aiding in the formation of soil and through redistribution and decomposition of organic matter and serve as a food source for many mammals and birds. Most terrestrial receptors are not substantially exposed to subsurface soils or to groundwater that has not discharged to surface water. There are no surface water bodies on or near site 17.

3.4 THREATENED AND ENDANGERED SPECIES

According to correspondence dated March 16, 2009, from the Maine Department of Inland Fisheries and Wildlife and March 13, 2009, correspondence from the United States Department of the Interior, there are no known threatened/endangered fish species or habitat in the vicinity of the site. According to the Final Environmental Impact Statement for the Disposal and Reuse of Naval Air Station Brunswick, Maine, there are no federally listed threatened or endangered species located on NAS Brunswick, and although three state-listed threatened or endangered species are known to occur at the facility (grasshopper sparrow, upland sandpiper, and clothed sedge), Site 17 is not within the habitat areas of these species (Navy, 2011).

TABLE 3-1
FILL THICKNESS SUMMARY
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Soil Boring ID	Depth to Bottom of Fill (feet bgs)	Evidence Used to Determine Thickness of Fill
SB-17-110	1.9	Color change
SB-17-111	1	Estimated depth of excavation in this area
SB-17-112	1	FID reading (screening and headspace) from 1 to 4 feet bgs
SB-17-115	7	Estimated depth of excavation in this area
SB-17-116	4	No gravel present below 4 feet bgs
SB-17-120 (MW-17-03)	2	Color change
SB-17-121 (MW-17-02)	2	Color change
SB-17-122	4	Color change
SB-17-123	2	Estimated depth of excavation in this area
SB-17-124	2	Increased soil density
SB-17-134	2	No gravel present below 2 feet bgs
SB-17-135	2	No gravel present below 2 feet bgs
SB-17-136	2	Below noted fill material (gravel and asphalt)
SB-17-137	2	No rock fragments below 2 feet bgs
SB-17-139	2	Estimated depth of excavation in this area
SB-17-140	2	No gravel present below 2 feet bgs
SB-17-141	2	No rock fragments below 2 feet bgs
SB-17-143	2	Estimated depth of excavation in this area
SB-17-144 (MW-17-04)	2	Estimated depth of excavation in this area
SB-17-145	2	No rock fragments below 2 feet bgs

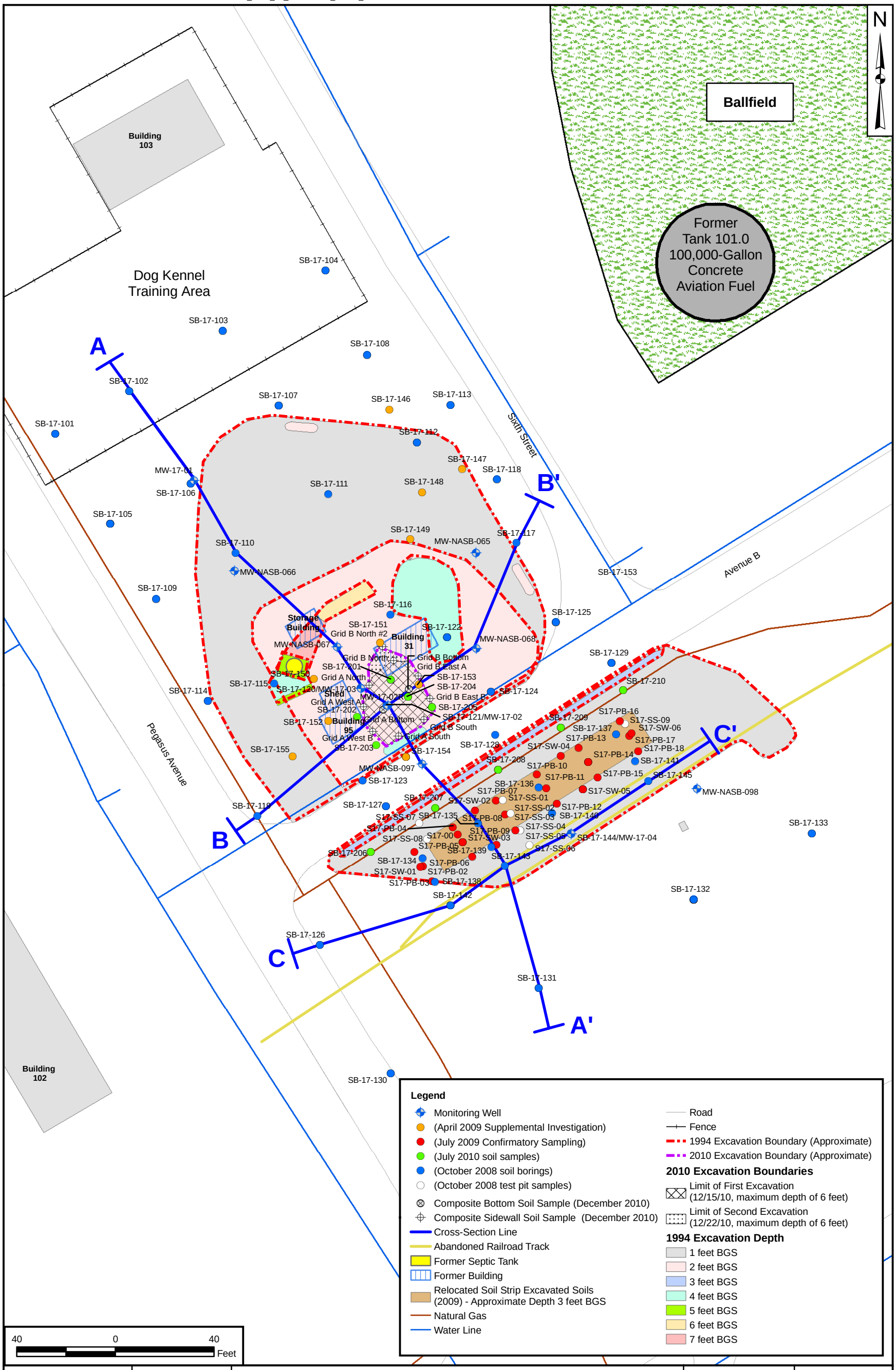
ft bgs - Feet below ground surface.
FID - Flame ionization detector.

TABLE 3-2
HYDRAULIC CONDUCTIVITY SUMMARY
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Well ID	Aquifer Screened	K[1]		Geologic Materials[2]
		(cm/s)	(ft/d)	
Hydraulic Conductivity Results - Overburden Wells				
MW-17-01	Upper Sand/Transition Unit	3.11E-03	8.81	Silty sands, fine sands, well sorted sands
MW-17-02	Upper Sand	3.46E-03	9.81	Silty sands, fine sands, well sorted sands
MW-17-03	Upper Sand/Transition Unit	3.92E-03	11.10	Silty sands, fine sands, well sorted sands
MW-17-04	Upper Sand	6.40E-03	18.14	Silty sands, fine sands, well sorted sands
MW-NASB-065	Upper Sand	4.56E-03	12.92	Silty sands, fine sands, well sorted sands
MW-NASB-066	Upper Sand/Transition Unit	3.36E-03	9.53	Silty sands, fine sands, well sorted sands
MW-NASB-068	Upper Sand	6.18E-03	17.51	Silty sands, fine sands, well sorted sands
MW-NASB-098	Upper Sand	1.71E-03	4.86	Silty sands, fine sands, well sorted sands
Minimum	Upper Sand/Transition Unit	3.11E-03	8.81	
Maximum	Upper Sand/Transition Unit	3.92E-03	11.10	
Geometric Mean	Upper Sand/Transition Unit	3.45E-03	9.8	
Minimum	Upper Sand	1.71E-03	4.86	
Maximum	Upper Sand	6.40E-03	18.14	
Geometric Mean	Upper Sand	4.03E-03	11.4	
Minimum	All wells	1.71E-03	4.86	
Maximum	All wells	6.40E-03	18.14	
Geometric Mean	All wells	3.80E-03	10.8	

1 Hydraulic conductivity estimates using the Bouwer and Rice method (Aqtesolv).
2 Interpretation based on range of hydraulic conductivity values presented by Fetter (1994).
cm/s - Centimeters per second.
ft/d - Feet per day.
Reference: Fetter, C. W., 1994. Applied Hydrogeology. Prentice-Hall, Inc., pp. 98, 101-102; 243-256.

PGH P:\GIS\BRUNSWICK\MAPDOCS\MXD\WILMINGTON\NASB_SITE_17_XSECTION_LINES_ALT.MXD 07/27/11 JEE



DRAWN BY: J. ENGLISH	DATE: 07/26/11	GEOLOGIC CROSS-SECTION LINES SITE 17 NAVAL AIR STATION BRUNSWICK, MAINE	CONTRACT NUMBER: _____
CHECKED BY: M. KRAUS	DATE: 07/27/11		CTO NUMBER: WE 49
REVISED BY: ___	DATE: ___		APPROVED BY: M. MESSMER DATE: 03/30/11
SCALE: AS NOTED			APPROVED BY: ___ DATE: ___
			FIGURE NO.: 3 - 1A REV: 0

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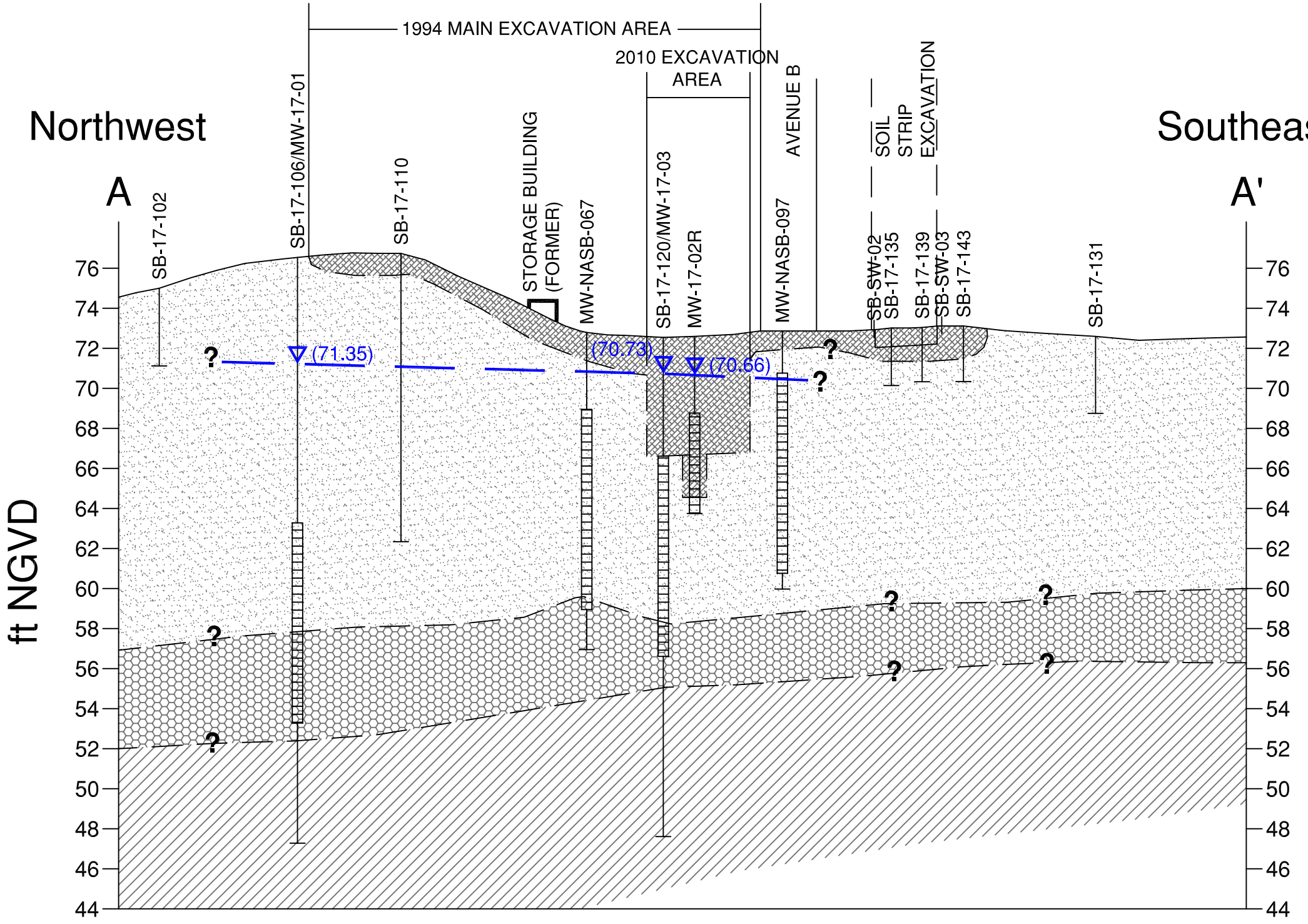


UPPER SAND UNIT

TRANSITION UNIT

PRESUMPSCOT CLAY

FILL

SCREENED WELL OR BORING

MW-NASB-097 SOIL BORING / WELL LOCATION ID

GROUND SURFACE

TOP OF SCREEN

(70.73) WATER ELEVATION MEASURED ON DECEMBER 10, 2008

BOTTOM OF SCREEN

BOTTOM OF BORING

GROUNDWATER ELEVATION (DASHED WHERE INFERRED) (DECEMBER 10, 2008)

NOTES:
1. PLAN NOT TO BE USED FOR DESIGN.
2. ALL LOCATIONS AND CONTACTS ARE TO BE CONSIDERED APPROXIMATE.
3. HORIZONTAL DATUM IS BASED ON THE MAINE STATE PLANE COORDINATE SYSTEM NAD1983. VERTICAL DATUM IS BASED ON NGVD 1988. VERTICAL EXAGGERATION IS 5 TIMES THE HORIZONTAL.
4. CONTACT LINES DASHED WHERE INFERRED.

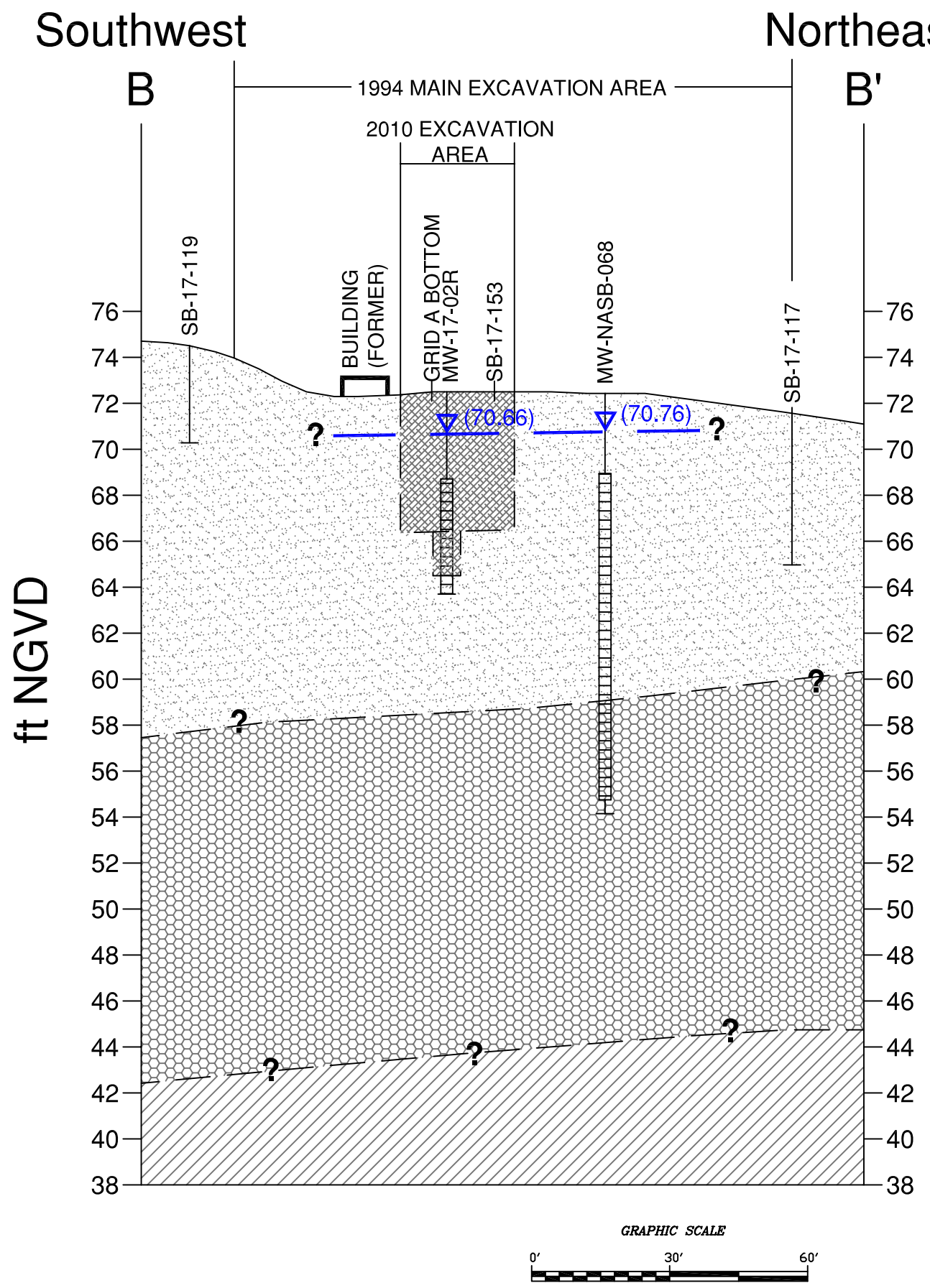
GRAPHIC SCALE
0' 30' 60'

TETRA TECH NUS, INC.

GEOLOGIC CROSS SECTION A–A'
SITE 17 REMEDIAL INVESTIGATION
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE

FILE	SCALE
\..\SITE_17_X-SECTION_A-A'.DWG	AS NOTED
FIGURE NUMBER 3-1B	REV 0 / DATE 3/30/11

ACAD:I:\02063\0720\SITE_17_X-SECTION_B-B'.DWG 3/30/11 DWM



UPPER SAND UNIT

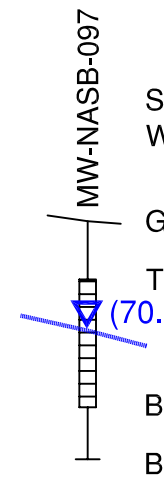
TRANSITION UNIT

PRESUMPSCOT CLAY

FILL

GROUNDWATER ELEVATION (DASHED WHERE INFERRED) (DECEMBER 10, 2008)

SCREENED WELL OR BORING



SOIL BORING / WELL LOCATION ID

GROUND SURFACE

TOP OF SCREEN

WATER ELEVATION MEASURED ON DECEMBER 10, 2008

BOTTOM OF SCREEN

BOTTOM OF BORING

NOTES:
1. PLAN NOT TO BE USED FOR DESIGN.
2. ALL LOCATIONS AND CONTACTS ARE TO BE CONSIDERED APPROXIMATE.
3. HORIZONTAL DATUM IS BASED ON THE MAINE STATE PLANE COORDINATE SYSTEM NAD1983. VERTICAL DATUM IS BASED ON NGVD 1988. VERTICAL EXAGGERATION IS 5 TIMES THE HORIZONTAL.
4. CONTACT LINES DASHED WHERE INFERRED.

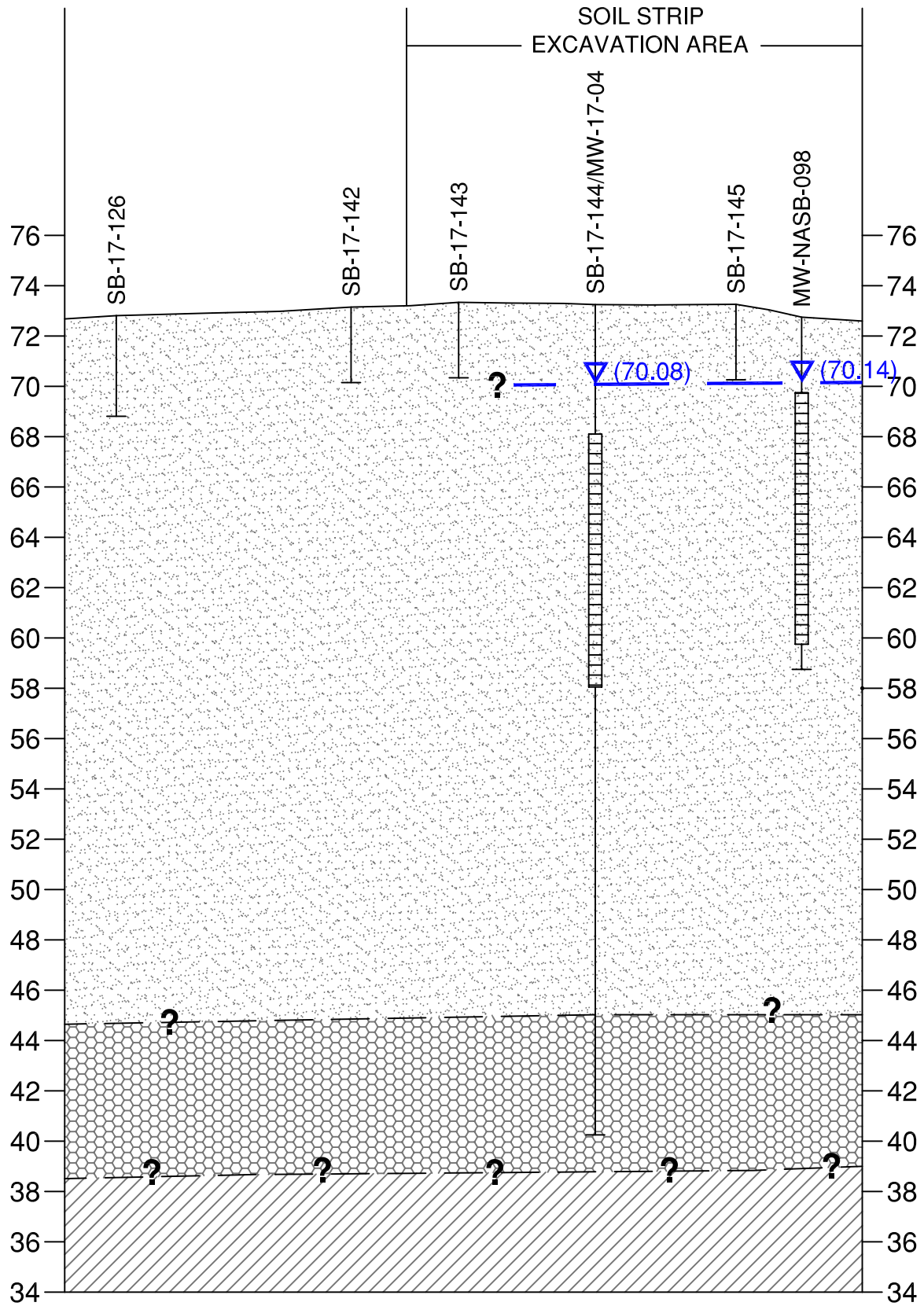
TETRA TECH NUS, INC.

GEOLOGIC CROSS SECTION B–B'
SITE 17 REMEDIAL INVESTIGATION
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE

FILE	SCALE
\..\SITE_17_X-SECTION_B-B'.DWG	AS NOTED
FIGURE NUMBER 3-1C	REV 0 / DATE 3/30/11

ACAD:I:\02063\0720\SITE_17_X-SECTION_C-C'.DWG 3/29/11 DWM

Southwest C — Northeast C'



UPPER SAND UNIT

TRANSITION UNIT

PRESUMPSCOT CLAY

GROUNDWATER ELEVATION
(DASHED WHERE INFERRED)
(DECEMBER 10, 2008)

NOTES:
1. PLAN NOT TO BE USED FOR DESIGN.
2. ALL LOCATIONS AND CONTACTS ARE TO BE CONSIDERED APPROXIMATE.
3. HORIZONTAL DATUM IS BASED ON THE MAINE STATE PLANE COORDINATE SYSTEM NAD1983. VERTICAL DATUM IS BASED ON NGVD 1988. VERTICAL EXAGGERATION IS 5 TIMES THE HORIZONTAL.
4. CONTACT LINES DASHED WHERE INFERRED.

SCREENED WELL OR BORING

SOIL BORING / WELL LOCATION ID

GROUND SURFACE

TOP OF SCREEN

WATER ELEVATION MEASURED ON DECEMBER 10, 2008

BOTTOM OF SCREEN

BOTTOM OF BORING

GRAPHIC SCALE
0′ 30′ 60′

TETRA TECH NUS, INC.

GEOLOGIC CROSS SECTION C–C'
SITE 17 REMEDIAL INVESTIGATION
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE

FILE	SCALE
\..\SITE_17_X-SECTION_C-C'.DWG	AS NOTED
FIGURE NUMBER 3-1D	REV 0 / DATE 3/29/11

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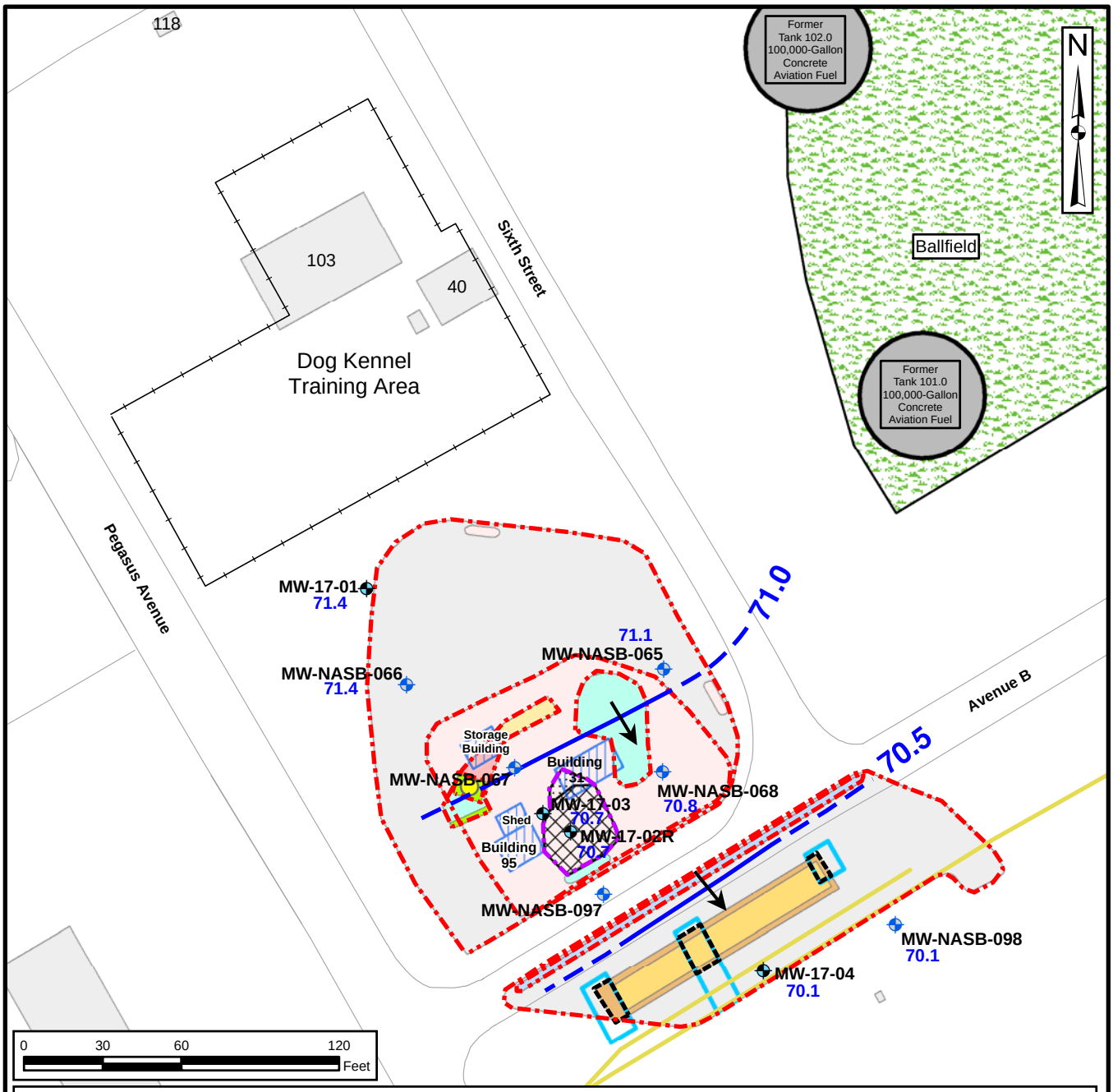

Legend

- New Monitoring Well
- Monitoring Well
- Natural Gas Line
- Sewer Line
- Water Line
- Abandoned Railroad Track
- Road
- Fence
- Test Pit Locations
- Test Pit Excavated At A Later Date
- Former Septic Tank
- Former Building
- Former ONFF USTs
- Groundwater Elevation Contour (Dashed Where Inferred)
- Groundwater Directional Flow

Excavation Boundary (Approximate)

- 1994 Excavation Boundary (Approximate)
- 2010 Excavation Boundary (Approximate)

Soil Reclamation Area (Approximate)

- Area of Excavated Soils (2009) - Depth 6 feet BGS
- Soil Relocation Area (Approximate)

2010 Excavation Boundaries

- Limit of First Excavation (12/15/10)
- Limit of Second Excavation (12/22/10)

1994 Excavation Depth

- 1 feet BGS
- 2 feet BGS
- 3 feet BGS
- 4 feet BGS
- 5 feet BGS
- 6 feet BGS
- 7 feet BGS

Tetra Tech NUS, Inc.

GROUNDWATER FLOW DIRECTIONS - DECEMBER 10, 2008

SITE 17

NAVAL AIR STATION BRUNSWICK

BRUNSWICK, MAINE

SCALE	AS NOTED
FILE	/../NASB_SITE_17_GW_CONT_1208.MXD
REV	0
DATE	03/30/11
FIGURE NUMBER	3-2

4.0 NATURE AND EXTENT OF CONTAMINATION

This section presents soil and groundwater analytical results from samples collected during the 2008 RI field investigation and summarizes results included in the updated data set reflecting current (post-excavation) conditions at the site. A discussion of the updated conceptual site model is also presented in this section.

4.1 2008 RI SOIL SAMPLING RESULTS

During the 2008 RI, a total of 80 soil samples (72 field samples and eight duplicates) were collected and submitted for laboratory analysis from soil borings SB-17-101 through SB-17-145. Analytical results for detected parameters in soil are presented in Table 4-1, a comprehensive listing of qualified soil data is included in Appendix D-1, and data validation memoranda for RI soil data are included in Appendix D-3.

The analytical data presented in Table 4-1 is compared to EPA residential RSLs for Chemical Contaminants at Superfund Sites (2010), Maine Remedial Action Guidelines (RAGs) for Contaminated Soil (Maine CDC, 2011), and the Baseline 2 (BL-2) cleanup goal for DRO listed in Procedural Guidelines for Establishing and Implementing Action Levels and Remediation Goals for the Remediation of Oil Contaminated Soil and Groundwater in Maine (MEDEP, 2009).

4.1.1 Pesticides

Eight pesticides were detected in soil samples collected during the RI, as shown in Table 4-1, including 4,4'-DDD, 4,4'-DDE 4,4'-DDT, alpha- and gamma-chlordane, gamma-BHC, heptachlor, and heptachlor epoxide. In addition, one organophosphorus pesticide, malathion, was detected. At three locations, SB-17-112, SB-17-120, and SB-17-121, concentrations of one or more pesticides exceeded minimum human health screening criteria (EPA residential RSL or MEDEP RAGs) (see Figure 4-1). Concentrations of 4,4'-DDD and 4,4'-DDE exceeded EPA residential RSLs and MEDEP RAGs in one soil sample, SB-17-121-0205 (54 and 25 mg/kg, respectively). Concentrations of 4,4'-DDT exceeded the EPA residential RSL (1.7 mg/kg) in three soil samples, SB-17-112-0104 (7.2 mg/kg), SB-17-120-0205 (2.2 mg/kg in duplicate sample), and SB-17-121-0205 (1,500 mg/kg). Soil borings SB-17-120 and SB-17-121 are located adjacent to the site former buildings, and soil boring SB-17-112 is located at the northeastern edge of the former excavation area, as shown on Figure 4-1.

Seven pesticides (4,4'-DDD, 4,4'-DDE 4,4'-DDT, heptachlor, alpha-chlordane, gamma-chlordane, and gamma-BHC) were detected during the RI at concentrations greater than minimum ecological screening levels (ESLs) (see Figure 4-2). Heptachlor concentrations exceeded the minimum ESL at SB-17-123 and

SB-17-135, alpha- and gamma-chlordane concentrations exceeded minimum ESLs at SB-17-123, and the gamma-BHC concentration exceeded the minimum ESL at SB-17-124. SB-17-123 and SB-17-124 were located just north of Avenue B along the southern edge of the 1994 excavation area. SB-17-135 was located within the relocated soil strip area that was excavated in 2009.

4.1.2 Herbicides

Three herbicides, maleic hydrazide, monuron, and propoxur, were detected in RI soil samples, as shown in Table 4-1. Concentrations of maleic hydrazide and propoxur were less than EPA residential RSLs. There are no Maine RAGs or ESLs for these herbicides. Monuron was detected in soil samples from five borings located within Avenue B and the excavated soil strip (SB-17-128, SB-17-129, SB-17-132, SB-17-133, and SB-17-141). Concentrations of monuron detected in soil samples ranged from 0.017 mg/kg (SB-17-133-0104) to 0.550 mg/kg (SB-17-129-0306). There are no human health or ecological screening criteria for monuron.

4.1.3 Inorganics

Three of the four target inorganics (arsenic, lead, and zinc) were detected in all soil samples analyzed for inorganics, and cyanide was detected in two samples, as shown in Table 4-1. Only arsenic was detected at concentrations exceeding human health screening criteria (both EPA residential RSL and MEDEP RAG). The arsenic minimum screening level (MEDEP RAG) of 0.14 mg/kg was exceeded at all but two sample locations (SB-17-125 and SB-17-127). Maximum arsenic concentrations were detected in surface soil samples collected from the dog kennel training area to the north (18.2 mg/kg at SB-17-103-0001 and 10.7 mg/kg at SB-17-102-001), as shown on Figure 4-3. A statistical comparison of elevated arsenic detections in fill material compared to arsenic concentrations in all other site soils found that the population of arsenic concentrations in fill material is distinct and greater than arsenic concentrations in all other site soils (Appendix E.6). Elevated arsenic concentrations are attributed to fill material that appears to have been brought on site from other locations and therefore not considered to be site related.

As shown on Figure 4-4, concentrations of lead at 12 locations, zinc at two locations, and arsenic at one location exceeded minimum ecological screening criteria.

4.1.4 DRO

Seven soil samples from four soil borings selected based on their proximity to former site buildings, SB-17-111, SB-17-115, SB-17-121, and SB-17-122, were analyzed for DRO. DRO was detected in two soil samples at levels exceeding the BL-2 cleanup goal for DRO listed in Procedural Guidelines for

Establishing and Implementing Action Levels and Remediation Goals for the Remediation of Oil Contaminated Soil and Groundwater in Maine revised on January 1, 2009, as indicated in Table 4-1 (1,700 mg/kg at SB-17-121-0205 and 200 and 120 mg/kg at SB-17-122-0407 in the sample and associated duplicate). The maximum concentration was detected in the soil sample from soil boring SB-17-121, located adjacent to former Building 95, as shown on Figure 4-1.

4.2 2008 RI GROUNDWATER SAMPLING RESULTS

During the RI, a total of nine groundwater samples (eight field samples and one duplicate) were collected and submitted for laboratory analysis from newly installed and existing monitoring wells, as summarized in Table 2-3. Sampling results for detected compounds in groundwater are presented in Table 4-2, a comprehensive listing of qualified groundwater data is presented in Appendix D.2, and data validation memoranda for RI groundwater data are included in Appendix D-3.

The groundwater analytical data was compared to the EPA MCLs (2009), Maine MEGs for Drinking Water (Maine CDC, 2011), and EPA Volatilization Screening Levels listed in Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (2002b).

4.2.1 Pesticides

Trace levels of 11 pesticides were detected in RI groundwater samples, as shown in Table 4-2. Concentrations of 4,4'-DDD, 4,4'-DDT, and dieldrin exceeded Maine MEGs at MW-17-02 (4.3, 2.1, and 1.7 µg/L, respectively), as shown on Figure 4-5. Endosulfan I was detected in the groundwater sample collected from well MW-17-02 at a concentration of 0.95 µg/L, and endrin aldehyde was detected in the sample collected from MW-17-04 at a concentration of 0.027 µg/L. There are no screening criteria for these compounds. Concentrations of remaining pesticides were less than corresponding minimum screening criteria listed on Table 4-2 (lesser of EPA MCLs, MEDEP MEGs, or EPA vapor intrusion criteria).

4.2.2 Herbicides

Trace levels of the herbicides maleic hydrazide and propoxur were detected in RI groundwater samples at concentrations less than minimum screening criteria (lesser of EPA MCLs, MEDEP MEGs, or EPA vapor intrusion criteria), as shown in Table 4-2. Monuron was detected in one groundwater sample collected from MW-17-NASB-98 at a concentration of 0.36 µg/L. There are no screening criteria for monuron in groundwater.

4.2.3 Inorganics

Lead and zinc were detected in groundwater samples at levels less than minimum screening criteria (lesser of EPA MCLs, MEDEP MEGs, or EPA vapor intrusion criteria), as shown in Table 4-2. The other target inorganics (arsenic and cyanide) were not detected in groundwater samples.

4.2.4 DRO

Four groundwater samples and a blind duplicate sample were analyzed for DRO from newly installed monitoring wells. DRO was detected in at all four locations at concentrations ranging from 45 to 210 µg/L. There is no MCL, MEG, or vapor intrusion criterion for DRO; however, DRO concentrations were greater than the MEDEP stringent groundwater clean-up action level of 50 µg/L in samples collected from MW-17-01, MW-17-02, and MW-17-03, as shown on Figure 4-5. It should be noted that the MEDEP screening criterion is for "stringent sites" where groundwater is currently used for drinking water or will likely be used for such in the future. The limited aquifer thickness at Site 17 and the availability of public water make future use of Site 17 groundwater as a potable water supply unlikely.

Because DRO was detected in the upgradient monitoring well, MW-17-01, at a concentration of 85 µg/L, it is possible that an upgradient source of DRO is impacting groundwater at the site. Based on the information currently available, it is not clear whether petroleum-related constituents are related to historical site activities, potential off-site sources, or both. The Navy plans to further investigate petroleum hydrocarbons in the general area during the upcoming Old Navy Fuel Farm Site Assessment.

4.3 CURRENT CONDITIONS

To evaluate current soil and groundwater conditions at the site, taking into account supplement sampling data and soil removal actions and associated sampling, an updated data set was prepared by adding post-RI sampling data and removing RI sampling data for areas excavated during the 2009 and 2010 removal actions. The post-RI sampling events and removal actions are summarized in Section 1.3, and supporting documents associated with these activities are included in Appendix E. These updated data sets reflecting current soil and groundwater conditions at the site are summarized in Tables 4-3 and 4-4, respectively, and associated tag maps showing exceedances of minimum screening criteria in those tables are presented as Figures 4-6 through 4-10.

For soil, the updated data set includes 2009 and 2010 supplemental sampling results and results of samples collected in association with the 2009 and 2010 removal actions and excludes results from samples that were removed as part of these excavations. For groundwater, the updated data set

includes results from the nine wells sampled by H&S Environmental, Inc., during the April 2011 long-term monitoring event (first event after the December 2010 removal action) (H&S Environmental, Inc., 2011). The April 2011 monitoring event was conducted in accordance with the November 2004 Long-Term Monitoring Plan (EA Engineering, Science and Technology, 2004). In addition to the six long-term monitoring wells (MW-NASB-065, MW-NASB-066, MW-NASB-067, MW-NASB-068 and MW-NASB-097, MW-NASB-098), the four wells installed as part of the RI [MW-17-01, MW-17-02R (replaced after the 2010 removal action), MW-17-03, and MW-17-04] were also sampled during the April 2011 event. The risk assessments presented in Section 6.0 used these post-excavation soil and groundwater data sets.

Results from the post-RI soil sample data set include the following (excluding samples that were subsequently excavated):

- Samples collected during 2009 supplemental sampling to delineate contamination detected during the RI at locations SB-17-112, -120, and -121.

- Samples collected in 2008 and 2009 and associated with the 2009 removal of the soil strip south of Avenue B.

- Samples collected during 2010 supplemental sampling to further refine excavation limits near SB-17-121 and to evaluate potential impacts from utility activities immediately south of Avenue B.

Six pesticides were detected in soil samples included in the updated data set at concentrations exceeding minimum human health screening criteria, including 4,4'-DDT, heptachlor, heptachlor epoxide, alpha-chlordane, gamma-chlordane, and dieldrin (see Table 4-3 and Figure 4-6). Based on the updated data set, concentrations of 4,4'-DDT exceeded the minimum human health screening criterion in the following:

- Two of 37 2008 RI samples
- Three of 29 2008/2009 relocated soil strip samples
- Three of 14 2010 supplemental samples
- Three of 10 2010 removal action samples

Concentrations of heptachlor exceeded the minimum human health screening criterion in the following:

- Two of 29 relocated soil strip samples
- One of nine 2009 supplemental samples
- Two of 14 2010 supplemental samples

Based on the updated data set, concentrations of heptachlor epoxide exceeded the minimum human health screening criterion in the following:

- One of 29 relocated soil strip samples
- Five of 10 2010 supplemental sampling locations (6 of 14 samples)

Based on the updated data set, concentrations of alpha- and gamma-chlordane exceeded minimum human health screening criteria in 2 of 14 2010 supplemental samples, and the concentration of dieldrin exceeded the minimum human health screening criterion in one of nine 2009 supplemental samples.

Eight pesticides were detected in soil samples included in the updated data set at concentrations exceeding minimum ESLs, including 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, heptachlor, heptachlor epoxide, alpha-chlordane, gamma-chlordane and gamma-BHC (see Table 4-3 and Figures 4-7A and 4-7B). Based on the updated data set, one or more pesticide concentrations exceeded minimum ESLs at the following:

- 22 of 37 locations in 2008 RI samples (29 of 67 samples)
- Eight of nine 2009 supplemental samples
- Nineteen of 29 relocated soil strip samples
- 9 of 10 locations in 2010 supplemental samples (12 of 14 samples)
- Eight of 10 2010 removal action samples

All detected concentrations of 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT exceeded avian and mammalian ESLs, and the maximum concentration of 4,4'-DDT also exceeded the plant and invertebrate ESLs. Pesticides at concentrations exceeded minimum ESLs were detected across the site, within previously excavated (1994 excavation area) and unexcavated areas.

Concentrations of inorganics exceeding human health and ecological screening criteria are presented on Figures 4-7 and 4-8, respectively. Arsenic concentrations in post-excavation samples exceeded the minimum human health criteria at multiple locations; however, as discussed in Section 4.1.3, elevated arsenic concentrations were are not considered site related. Post-excavation inorganic exceedances of minimum ESLs included lead at 14 locations, zinc at two locations, and arsenic at one location.

During the April 2011 post-excavation groundwater monitoring event, 4,4'-DDD, 4,4'-DDE, and/or 4,4'-DDT were detected at three of nine wells sampled. Concentrations of 4,4'-DDD at MW-17-02R (1.2 µg/L) and 4,4'-DDT at MW-NASB-097 (1.3 and 1.6 µg/L in sample and duplicate) exceeded Maine MEGs (1 µg/L for both).

4.4 CONCEPTUAL SITE MODEL

This section presents the conceptual model for the site that was developed based on historical information and the findings presented in the previous sections. Information used to develop the conceptual site model included new boring and well construction logs, site hydrogeologic interpretations, comprehensive analytical results, and historical information.

4.4.1 Contaminant Source Areas

Site 17 was used for pest control operations that included storage, mixing, and disposal of pesticides and herbicides from the 1940s until 1985. Former Buildings 95, Building 31, and a storage shed were located at the site until removal in 1994. During winter months, chemicals were stored inside of former Building 95 to avoid freezing. Soil removal activities were conducted at the site after the buildings were removed in 1994 and 2010. Maximum contaminant concentrations were detected within close proximity to the former locations of Building 95 and Building 31.

Concentrations of six pesticides (4,4'-DDT, heptachlor, heptachlor epoxide, alpha-chlordane, gamma-chlordane, and dieldrin) exceeding screening human health levels (residential RSLs and/or RAGs) were detected in soil samples collected from soil boring SB-17-112 (1 to 4 feet bgs) located at the northern edge of the 1994 main excavation area,in samples located in the vicinity of the former buildings and 2010 excavation area, and in samples collected from the soil strip excavation area south of Avenue B, as shown on Figure 4-6. With the exception of arsenic, concentrations of inorganics were less than minimum screening levels in soil samples collected after soil removal activities. Maximum DRO concentrations were detected in soil samples from borings SB-17-121 (2 to 5 feet bgs; subsequently excavated) and SB-17-122 (4 to 7 feet bgs), as shown on Figure 4-1. Arsenic was the only inorganic detected at concentrations exceeding EPA residential RSLs. Arsenic is not considered a site-related contaminant because the elevated detections in soil are attributed to fill material (Appendix E.6). In post-removal action groundwater samples (April 2011), concentrations of pesticides in groundwater exceeding MEDEP MEGs were only detected at MW-17-02R (4,4'-DDD at 1.2 µg/L) and MW-NASB-097 (4,4'-DDT in the sample and duplicate at 1.3 and 1.6 µg/L, respectively) (see Figure 4-10). MTBE was detected in two April 2011 groundwater samples but at concentrations significantly less than the MEG. MCLs are not available for 4,4'-DDD, 4,4'-DDT, or MTBE.

Eight pesticides were detected in soil at concentrations exceeding minimum ESLs, including 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, heptachlor, heptachlor epoxide, alpha-chlordane, gamma-chlordane and gamma-BHC (see Table 4-3). Pesticides at concentrations exceeded minimum ESLs were detected within

previously excavated (1994 excavation area) and unexcavated areas of the site (see Figures 4-7A and 4-7B).

4.4.2 Geologic/Hydrogeologic Controls on Contaminant Migration

Contaminant migration at the site is controlled by various geological and hydrogeologic factors. Precipitation infiltrates through the generally permeable surficial materials, including fill materials. Upon reaching the water table, groundwater moves laterally south and southeast through the permeable Upper Sand and Transition Units. Vertical groundwater migration is limited by the presence of the underlying Presumpscot Formation, which is primarily clay.

The pesticides and arsenic detected in site soil generally have limited mobility and tend to sorb onto soils rather than migrate to groundwater. Arsenic mobility in groundwater is controlled by pH and other biogeochemical factors, and arsenic was not detected in site groundwater. Arsenic is naturally occurring, and as stated above, arsenic concentrations at Site 17 are not considered site related.

During sampling associated with the 2009 soil strip removal, PCE was detected in one soil sample (S17-00) collected from 2.75 to 3 feet bgs from the soil strip excavation area. PCE is fairly mobile in the subsurface with a higher density than water. In water, PCE is degraded very slowly by hydrolysis, and it is persistent under aerobic conditions. It is degraded through reductive dechlorination under anaerobic conditions, with degradation products including trichloroethene, dichloroethene, vinyl chloride, ethene, and ethane. PCE has not been detected in other Site 17 soil or groundwater samples.

As discussed above, the pesticides 4,4’-DDD and 4,4’-DDT were detected in groundwater from two wells at concentrations greater than MEGs. 4,4'-DDT and its metabolites are generally persistent chemicals that undergo extensive adsorption to soil and are not highly soluble. Biodegradation may occur under both aerobic and anaerobic conditions in the presence of certain soil microorganisms. Pesticides are not considered to be very mobile in the environment because of their tendency to remain affixed to soil particles. Migration of pesticides generally occurs primarily by erosion via the action of wind or water.

TABLE 4-1
SUMMARY OF 2008 RI ANALYTICAL DATA - SOIL
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RESIDENTIAL RAG[2]	MINIMUM SCREENING LEVEL	ECOLOGICAL SCREENING LEVELS					SB-17-101		SB-17-102	
				PLANT	INVERTE-BRATE	AVIAN	MAMMAL	MINIMUM	0 to 1 ft bgs	1 to 4 ft bgs	0 to 1 ft bgs	1 to 4 ft bgs
Pesticides/PCBs (µg/kg)												
4,4'-DDD	2000	4500	2000	12000	12000	93	21	21	3.8 UJ	3.5 U	3.5 UJ	3.6 U
4,4'-DDE	1400	3200	1400	12000	12000	93	21	21	13	1.3 J	0.7 J	3.6 U
4,4'-DDT	1700	3800	1700	12000	12000	93	21	21	12 U	13 U	3.5 U	3.6 U
ALPHA-CHLORDANE	1600	--	1600	224	--	--	--	224	1.9 U	1.8 U	1.8 U	1.9 U
GAMMA-BHC (LINDANE)	520	120	120	5	--	--	--	5	1.9 U	1.8 U	1.8 U	1.9 U
GAMMA-CHLORDANE	1600	--	1600	224	--	--	--	224	1.9 U	1.8 U	1.8 U	1.9 U
HEPTACHLOR	110	240	110	--	--	--	5.98	5.98	1.9 U	1.8 U	1.8 U	1.9 U
HEPTACHLOR EPOXIDE	53	120	53	--	--	--	152	152	1.9 U	1.8 U	1.8 U	1.9 U
Petroleum Hydrocarbons (mg/kg)												
DIESEL RANGE ORGANICS	--	--	100[3]	--	--	--	--	--	--	--	--	--
Organophosphorous Pesticides (µg/kg)												
MALATHION	1200000	530000	530000	--	--	--	--	--	56 U	53 U	53 U	56 U
Herbicides (µg/kg)												
MALEIC HYDRAZIDE	31000000	--	31000000	--	--	--	--	--	22 UJ	21 U	21 U	22 U
MONURON	--	--	--	--	--	--	--	--	22 U	21 U	21 U	22 U
PROPOXUR	240000	--	240000	--	--	--	--	--	22 U	21 U	21 U	22 U
Inorganics (mg/kg)												
ARSENIC	0.39	0.14	0.14	18	17	43	46	17	**2**	**1.3**	**10.7**	**4.6**
CYANIDE	1600	680	680	0.9	0.9	--	--	0.9	0.55 U	0.5 U	0.5 U	0.55 U
LEAD	400	170	170	120	1700	11	56	11	8.1	2.5	10	2.4
ZINC	23000	10000	10000	160	120	46	79	46	11.7	10.3	21.9	16.6
Miscellaneous Parameters (mg/kg)												
TOTAL ORGANIC CARBON	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-1
SUMMARY OF 2008 RI ANALYTICAL DATA - SOIL
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE
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PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RESIDENTIAL RAG[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	SB-17-103		SB-17-104		SB-17-105		
					0 to 1 ft bgs	1 to 4 ft bgs	0 to 1 ft bgs	1 to 4 ft bgs	0 to 1 ft bgs		1 to 4 ft bgs
									Sample	Duplicate	
Pesticides/PCBs (µg/kg)											
4,4'-DDD	2000	4500	2000	21	3.5 UJ	10	3.6 UJ	6.5	3.7 U	3.6 U	3.4 U
4,4'-DDE	1400	3200	1400	21	0.88 J	3.6 J	0.8 J	1.7 J	17	14	3.4 U
4,4'-DDT	1700	3800	1700	21	3.5 U	**53**	4.2 U	4 U	**28 J**	**28 J**	3.4 UJ
ALPHA-CHLORDANE	1600	--	1600	224	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.8 U
GAMMA-BHC (LINDANE)	520	120	120	5	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.8 U
GAMMA-CHLORDANE	1600	--	1600	224	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.8 U
HEPTACHLOR	110	240	110	5.98	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.8 U
HEPTACHLOR EPOXIDE	53	120	53	152	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.8 U
Petroleum Hydrocarbons (mg/kg)											
DIESEL RANGE ORGANICS	--	--	100[3]	--	--	--	--	--	--	--	--
Organophosphorous Pesticides (µg/kg)											
MALATHION	1200000	530000	530000	--	53 U	56 U	54 U	57 U	56 U	57 U	69 U
Herbicides (µg/kg)											
MALEIC HYDRAZIDE	31000000	--	31000000	--	21 UJ	23 U	22 U	23 U	22 UJ	23 U	28 U
MONURON	--	--	--	--	21 UJ	23 U	22 U	23 U	22 UJ	23 UJ	28 U
PROPOXUR	240000	--	240000	--	21 U	23 U	22 U	23 U	22 U	23 UJ	28 U
Inorganics (mg/kg)											
ARSENIC	0.39	0.14	0.14	17	**18.2**	**6.1**	**9.4**	**8.1**	**1.4**	**1.6**	**1.5**
CYANIDE	1600	680	680	0.9	0.55 U	0.55 U	0.55 U	0.55 U	0.55 UJ	0.55 UJ	0.5 UJ
LEAD	400	170	170	11	**11.1**	5.1	11	3.4	**11.4**	7.8	3
ZINC	23000	10000	10000	46	25.8	17.8	26.7	17.9	13.2	10.9	11.9
Miscellaneous Parameters (mg/kg)											
TOTAL ORGANIC CARBON	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-1
SUMMARY OF 2008 RI ANALYTICAL DATA - SOIL
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RESIDENTIAL RAG[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	SB-17-106		SB-17-107		
					0 to 1 ft bgs	1 to 4 ft bgs	0 to 1 ft bgs	1 to 4 ft bgs	4 to 8 ft bgs
Pesticides/PCBs (µg/kg)									
4,4'-DDD	2000	4500	2000	21	10	3.5 U	4.1 U	4 U	4.2 U
4,4'-DDE	1400	3200	1400	21	8.3	3.5 U	4.1 U	4 U	4.2 U
4,4'-DDT	1700	3800	1700	21	**210**	24 UJ	19 J	5 UJ	4.2 UJ
ALPHA-CHLORDANE	1600	--	1600	224	1.8 U	1.8 U	1.1 J	2 U	2.1 U
GAMMA-BHC (LINDANE)	520	120	120	5	1.8 U	1.8 U	2.1 U	2 U	2.1 U
GAMMA-CHLORDANE	1600	--	1600	224	1.8 U	1.8 U	1 J	2 U	2.1 U
HEPTACHLOR	110	240	110	5.98	1.8 U	1.8 U	2.1 U	2 U	2.1 U
HEPTACHLOR EPOXIDE	53	120	53	152	1.8 U	1.8 U	2.1 U	2 U	2.1 U
Petroleum Hydrocarbons (mg/kg)									
DIESEL RANGE ORGANICS	--	--	100[3]	--	--	--	--	--	--
Organophosphorous Pesticides (µg/kg)									
MALATHION	1200000	530000	530000	--	55 U	53 U	55 U	69 U	64 U
Herbicides (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	22 U	21 U	22 UJ	28 U	26 UJ
MONURON	--	--	--	--	22 UJ	21 UJ	22 U	28 U	26 U
PROPOXUR	240000	--	240000	--	22 UJ	21 U	22 U	28 U	26 U
Inorganics (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	**2.4**	**1.7**	**7.8**	**6.8**	**1.5**
CYANIDE	1600	680	680	0.9	0.5 U	0.55 U	0.6 UJ	0.6 UJ	0.6 UJ
LEAD	400	170	170	11	**23.2**	7.5	9	5.6	2.5
ZINC	23000	10000	10000	46	21.8	10.6	25	18.4	11.9
Miscellaneous Parameters (mg/kg)									
TOTAL ORGANIC CARBON	--	--	--	--	--	--	--	--	--

TABLE 4-1
SUMMARY OF 2008 RI ANALYTICAL DATA - SOIL
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE
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PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RESIDENTIAL RAG[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	SB-17-108		SB-17-109		SB-17-110
					0 to 1 ft bgs	1 to 4 ft bgs	0 to 1 ft bgs	1 to 4 ft bgs	1 to 4 ft bgs
Pesticides/PCBs (µg/kg)									
4,4'-DDD	2000	4500	2000	21	3.8 U	4.3 U	11	3.4 UJ	**220**
4,4'-DDE	1400	3200	1400	21	12	4.3 U	9.3 J	3.4 U	**56 J**
4,4'-DDT	1700	3800	1700	21	8.2 J	5 UJ	**180**	3.4 UJ	**1000**
ALPHA-CHLORDANE	1600	--	1600	224	2 U	2.2 U	1.8 U	1.8 U	18 U
GAMMA-BHC (LINDANE)	520	120	120	5	2 U	2.2 U	1.8 U	1.8 U	18 U
GAMMA-CHLORDANE	1600	--	1600	224	2 U	2.2 U	1.8 U	1.8 U	18 U
HEPTACHLOR	110	240	110	5.98	2 U	2.2 U	1.8 U	1.8 U	18 U
HEPTACHLOR EPOXIDE	53	120	53	152	2 U	2.2 U	1.8 U	1.8 U	18 U
Petroleum Hydrocarbons (mg/kg)									
DIESEL RANGE ORGANICS	--	--	100[3]	--	--	--	--	--	--
Organophosphorous Pesticides (µg/kg)									
MALATHION	1200000	530000	530000	--	68 U	60 U	55 U	53 U	54 U
Herbicides (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	27 UJ	24 U	22 U	21 U	22 U
MONURON	--	--	--	--	27 U	24 U	22 UJ	21 UJ	22 UJ
PROPOXUR	240000	--	240000	--	27 U	24 U	22 UJ	21 U	22 U
Inorganics (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	**5.2**	**3.1**	**1.8**	**1.4**	**2.2**
CYANIDE	1600	680	680	0.9	0.55 UJ	0.65 UJ	0.55 U	0.5 U	0.55 U
LEAD	400	170	170	11	6.2	6.2	**14.2**	2.6	3.7
ZINC	23000	10000	10000	46	23	19.9	17.6	11.2	11.7
Miscellaneous Parameters (mg/kg)									
TOTAL ORGANIC CARBON	--	--	--	--	--	--	--	--	--

TABLE 4-1
SUMMARY OF 2008 RI ANALYTICAL DATA - SOIL
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE
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PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RESIDENTIAL RAG[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	SB-17-111	SB-17-112		SB-17-113		SB-17-114	
					1 to 4 ft bgs	0 to 1 ft bgs	1 to 4 ft bgs	0 to 1 ft bgs	1 to 4 ft bgs	0 to 1 ft bgs	1 to 4 ft bgs
Pesticides/PCBs (µg/kg)											
4,4'-DDD	2000	4500	2000	21	3.6 U	**100**	**520**	8.7	**84**	17	3.5 U
4,4'-DDE	1400	3200	1400	21	12	**46**	**80**	15	**84**	**22**	0.51 J
4,4'-DDT	1700	3800	1700	21	**28 J**	**1200 J**	**7200 J**	**45 J**	**580 J**	**380 J**	16 UJ
ALPHA-CHLORDANE	1600	--	1600	224	1.9 U	7	20 U	1.9 U	14 J	1.8 U	1.8 U
GAMMA-BHC (LINDANE)	520	120	120	5	1.9 U	2 U	20 U	1.9 U	2.1 U	1.8 U	1.8 U
GAMMA-CHLORDANE	1600	--	1600	224	1.9 U	7.7	20 U	1.9 U	14	1.8 U	1.8 U
HEPTACHLOR	110	240	110	5.98	1.9 U	2 U	20 U	1.9 UJ	2.1 U	1.8 U	1.8 U
HEPTACHLOR EPOXIDE	53	120	53	152	1.9 U	2 U	20 U	1.9 U	2.1 U	1.8 U	1.8 U
Petroleum Hydrocarbons (mg/kg)											
DIESEL RANGE ORGANICS	--	--	100[3]	--	14	--	--	--	--	--	--
Organophosphorous Pesticides (µg/kg)											
MALATHION	1200000	530000	530000	--	55 U	61 U	60 U	68 U	58 U	55 U	53 U
Herbicides (µg/kg)											
MALEIC HYDRAZIDE	31000000	--	31000000	--	22 U	24 U	24 U	27 U	23 U	22 U	21 U
MONURON	--	--	--	--	22 U	24 UJ	24 U	27 U	23 U	110 UJ	21 U
PROPOXUR	240000	--	240000	--	22 U	24 UJ	24 UJ	27 U	23 U	110 U	21 U
Inorganics (mg/kg)											
ARSENIC	0.39	0.14	0.14	17	**3.4**	**9.4**	**2.2**	**8.3**	**4.1**	**1.8**	**1.8**
CYANIDE	1600	680	680	0.9	0.55 UJ	0.6 UJ	0.6 UJ	0.55 UJ	0.6 UJ	0.55 U	0.5 U
LEAD	400	170	170	11	7.7	4.7	3.6	**12.4**	**32.3**	**17.8**	3.4
ZINC	23000	10000	10000	46	23.7	24.6	18.9	29	21	17.6	13.4
Miscellaneous Parameters (mg/kg)											
TOTAL ORGANIC CARBON	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-1
SUMMARY OF 2008 RI ANALYTICAL DATA - SOIL
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RESIDENTIAL RAG[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	SB-17-115	SB-17-116	SB-17-117	SB-17-118		SB-17-119
					7 to 10 ft bgs	4 to 7 ft bgs	1 to 4 ft bgs	0 to 1 ft bgs	1 to 4 ft bgs	1 to 4 ft bgs
Pesticides/PCBs (µg/kg)										
4,4'-DDD	2000	4500	2000	21	4 U	4.2 UJ	**60**	7.6	3.8 U	3.6 U
4,4'-DDE	1400	3200	1400	21	4 U	19 J	**160**	**52**	10	2.7 J
4,4'-DDT	1700	3800	1700	21	4 U	**96 J**	**1100 J**	**210 J**	**22 J**	9.7 U
ALPHA-CHLORDANE	1600	--	1600	224	2.1 U	2.2 UJ	67	1.8 U	1.3 J	1.2 J
GAMMA-BHC (LINDANE)	520	120	120	5	2.1 U	2.2 UJ	10 U	1.8 U	2 U	1.9 U
GAMMA-CHLORDANE	1600	--	1600	224	2.1 U	2.2 UJ	70	1.8 U	1.1 J	1.2 J
HEPTACHLOR	110	240	110	5.98	2.1 U	2.2 UJ	10 U	1.8 U	2 U	1.9 U
HEPTACHLOR EPOXIDE	53	120	53	152	2.1 U	2.2 UJ	11 J	1.8 U	2 U	1.9 U
Petroleum Hydrocarbons (mg/kg)										
DIESEL RANGE ORGANICS	--	--	100[3]	--	1.3 J	--	--	--	--	--
Organophosphorous Pesticides (µg/kg)										
MALATHION	1200000	530000	530000	--	61 U	65 U	61 U	54 U	58 U	57 U
Herbicides (µg/kg)										
MALEIC HYDRAZIDE	31000000	--	31000000	--	25 U	26 U	24 U	22 U	23 U	23 U
MONURON	--	--	--	--	25 UJ	26 UJ	24 UJ	22 U	23 U	23 U
PROPOXUR	240000	--	240000	--	25 U	100	24 UJ	22 U	23 U	23 U
Inorganics (mg/kg)										
ARSENIC	0.39	0.14	0.14	17	**1.1**	**1.5**	**3**	**6.8**	**3.2**	**1.4**
CYANIDE	1600	680	680	0.9	0.6 U	0.6 U	0.6 U	0.5 UJ	0.6 UJ	0.55 U
LEAD	400	170	170	11	2	4.2	7.4	9.1	6.1	2.4
ZINC	23000	10000	10000	46	12.4	17	23.6	25.1	18	**54.5**
Miscellaneous Parameters (mg/kg)										
TOTAL ORGANIC CARBON	--	--	--	--	400 J	--	--	--	--	--

TABLE 4-1
SUMMARY OF 2008 RI ANALYTICAL DATA - SOIL
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE
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PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RESIDENTIAL RAG[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	SB-17-120		SB-17-121			SB-17-122	
					2 to 5 ft bgs		2 to 5 ft bgs	7 to 10 ft bgs	12 to 15 ft bgs	4 to 7 ft bgs	
					Sample	Duplicate				Sample	Duplicate
Pesticides/PCBs (µg/kg)											
4,4'-DDD	2000	4500	2000	21	**25 J**	**54 J**	**54000**	**32**	15	5.2 U	4.7 U
4,4'-DDE	1400	3200	1400	21	18 J	**33 J**	**25000**	15	4.4	5 U	4.7 U
4,4'-DDT	1700	3800	1700	21	**910 J**	**2200 J**	**1500000**	**830**	**230**	**65 J**	4.8 UJ
ALPHA-CHLORDANE	1600	--	1600	224	19	21	1100 UJ	2.1 U	1.2 J	2.6 U	2.4 U
GAMMA-BHC (LINDANE)	520	120	120	5	2.2 U	2.3 U	1100 UJ	2.1 U	2.1 U	2.6 U	2.4 U
GAMMA-CHLORDANE	1600	--	1600	224	19	21	1100 UJ	2.1 U	1.1 J	2.6 U	2.4 U
HEPTACHLOR	110	240	110	5.98	1.7 J	2.3 U	1100 UJ	2.1 U	2.1 U	2.6 U	2.4 U
HEPTACHLOR EPOXIDE	53	120	53	152	2.2 U	2.3 U	1100 UJ	2.1 U	2.1 U	2.6 U	2.4 U
Petroleum Hydrocarbons (mg/kg)											
DIESEL RANGE ORGANICS	--	--	100[3]	--	--	--	**1700**	6.2 U	13	**200**	**120**
Organophosphorous Pesticides (µg/kg)											
MALATHION	1200000	530000	530000	--	66 U	66 U	31 J	66 U	62 U	91 U	68 U
Herbicides (µg/kg)											
MALEIC HYDRAZIDE	31000000	--	31000000	--	27 U	26 U	24 J	27 U	12 J	36 UJ	27 U
MONURON	--	--	--	--	27 UJ	26 UJ	28 UJ	27 UJ	25 UJ	36 UJ	27 UJ
PROPOXUR	240000	--	240000	--	370	470	140 J	27 U	25 U	36 UJ	27 UJ
Inorganics (mg/kg)											
ARSENIC	0.39	0.14	0.14	17	**2.2**	**1.8**	**1.6**	**1.1**	**5.2**	**1.5**	**1.3**
CYANIDE	1600	680	680	0.9	0.65 U	0.65 U	0.7 U	0.6 U	0.65 U	0.7 U	0.7 U
LEAD	400	170	170	11	5.7	5.6	5.9	2.3	4.9	3	2.9
ZINC	23000	10000	10000	46	25.8	31.7	35.5	14.2	33.9	15.2	14.5
Miscellaneous Parameters (mg/kg)											
TOTAL ORGANIC CARBON	--	--	--	--	28000 J	24000 J	--	--	--	--	--

TABLE 4-1
SUMMARY OF 2008 RI ANALYTICAL DATA - SOIL
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RESIDENTIAL RAG[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	SB-17-123		SB-17-124		SB-17-125		
					0 to 1 ft bgs	1 to 4 ft bgs	0 to 1 ft bgs	1 to 4 ft bgs	0 to 1 ft bgs	1 to 4 ft bgs	6 to 8 ft bgs
Pesticides/PCBs (µg/kg)											
4,4'-DDD	2000	4500	2000	21	3.7 U	20	3.8 U	3.9 U	**53**	**39 J**	3.7 U
4,4'-DDE	1400	3200	1400	21	3.7 U	**49**	3.8 U	8.3	**250**	**67**	3.7 U
4,4'-DDT	1700	3800	1700	21	3.7 U	**530**	3.8 U	**72**	**1200**	**390**	**52**
ALPHA-CHLORDANE	1600	--	1600	224	0.8 J	200 J	2 U	2 U	100	32 J	1.9 U
GAMMA-BHC (LINDANE)	520	120	120	5	1.9 U	9 U	2 U	**91**	9.6 U	2 U	1.9 U
GAMMA-CHLORDANE	1600	--	1600	224	1 J	**280**	2 U	2 U	130	2 U	1.9 U
HEPTACHLOR	110	240	110	5.98	1.9 U	**11**	2 U	2 U	9.6 U	2 U	1.9 U
HEPTACHLOR EPOXIDE	53	120	53	152	1.9 U	9 U	2 U	2 U	9.6 U	2 U	1.9 U
Petroleum Hydrocarbons (mg/kg)											
DIESEL RANGE ORGANICS	--	--	100[3]	--	--	--	--	--	--	--	--
Organophosphorous Pesticides (µg/kg)											
MALATHION	1200000	530000	530000	--	60 U	59 U	62 U	58 U	56 U	58 U	61 UJ
Herbicides (µg/kg)											
MALEIC HYDRAZIDE	31000000	--	31000000	--	24 U	24 U	25 U	23 U	22 U	23 UJ	25 UJ
MONURON	--	--	--	--	24 U	24 U	25 UJ	23 UJ	22 UJ	23 UJ	25 UJ
PROPOXUR	240000	--	240000	--	24 U	24 U	25 UJ	23 UJ	22 UJ	23 UJ	25 UJ
Inorganics (mg/kg)											
ARSENIC	0.39	0.14	0.14	17	**9.1 J**	**1.4 J**	**8.6**	**4.2**	**5.6 J**	**2.7 J**	0.89 UJ
CYANIDE	1600	680	680	0.9	0.5 U	0.5 U	0.55 U	0.55 U	0.34 J	0.55 U	0.5 U
LEAD	400	170	170	11	5.7	1.8	6	4.4	**23**	7	1.9
ZINC	23000	10000	10000	46	32.7	10	36.4	16.6	40.8	24.2	13.6
Miscellaneous Parameters (mg/kg)											
TOTAL ORGANIC CARBON	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-1
SUMMARY OF 2008 RI ANALYTICAL DATA - SOIL
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
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PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RESIDENTIAL RAG[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	SB-17-126		SB-17-127	SB-17-128	SB-17-129	
					0 to 1 ft bgs	1 to 4 ft bgs	3 to 6 ft bgs	5 to 6 ft bgs	3 to 6 ft bgs	
									Sample	Duplicate
Pesticides/PCBs (µg/kg)										
4,4'-DDD	2000	4500	2000	21	3.5 UJ	3.6 UJ	3.9 UJ	4.5 UJ	5.3 U	5.5 U
4,4'-DDE	1400	3200	1400	21	19	3.6 U	3.9 U	4.5 U	5.3 U	5.5 U
4,4'-DDT	1700	3800	1700	21	**110**	4.8 U	3.9 U	4.5 U	5.3 U	5.5 U
ALPHA-CHLORDANE	1600	--	1600	224	13 J	1.9 U	3.5	2.3 U	2.7 U	2.8 U
GAMMA-BHC (LINDANE)	520	120	120	5	1.8 U	1.9 U	2 U	2.3 U	2.7 U	2.8 U
GAMMA-CHLORDANE	1600	--	1600	224	17 J	1.9 U	3.8 J	1.1 J	2.7 U	2.8 U
HEPTACHLOR	110	240	110	5.98	1.8 U	1.9 U	2 U	2.3 U	2.7 U	2.8 U
HEPTACHLOR EPOXIDE	53	120	53	152	1.8 U	1.9 U	2 U	2.3 U	2.7 U	2.8 U
Petroleum Hydrocarbons (mg/kg)										
DIESEL RANGE ORGANICS	--	--	100[3]	--	--	--	--	--	--	--
Organophosphorous Pesticides (µg/kg)										
MALATHION	1200000	530000	530000	--	53 U	55 U	59 U	63 U	63 U	110 UJ
Herbicides (µg/kg)										
MALEIC HYDRAZIDE	31000000	--	31000000	--	21 U	22 U	24 U	25 UJ	25 UJ	42 UJ
MONURON	--	--	--	--	21 UJ	22 U	24 U	61 J	550 J	210 J
PROPOXUR	240000	--	240000	--	21 UJ	22 U	24 U	15 J	94 J	210 UJ
Inorganics (mg/kg)										
ARSENIC	0.39	0.14	0.14	17	**3 J**	**1.6 J**	0.99 UJ	**1.4 J**	**2 J**	**8.7 J**
CYANIDE	1600	680	680	0.9	0.5 U	0.5 U	0.65 U	0.65 U	0.7 U	0.8 U
LEAD	400	170	170	11	**20.6**	2.5	2.1	3.6	4.7	4.3
ZINC	23000	10000	10000	46	38	15	10.3	21.6	17.5	20.2
Miscellaneous Parameters (mg/kg)										
TOTAL ORGANIC CARBON	--	--	--	--	--	--	--	--	--	--

TABLE 4-1
SUMMARY OF 2008 RI ANALYTICAL DATA - SOIL
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE
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PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RESIDENTIAL RAG[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	SB-17-130		SB-17-131		SB-17-132		
					0 to 1 ft bgs	1 to 4 ft bgs	0 to 1 ft bgs	1 to 4 ft bgs	0 to 1 ft bgs	1 to 4 ft bgs	
										Sample	Duplicate
Pesticides/PCBs (µg/kg)											
4,4'-DDD	2000	4500	2000	21	3.6 UJ	3.6 U	3.7 U	3.8 U	3.7 U	4.2 U	4.2 U
4,4'-DDE	1400	3200	1400	21	4.6	3.6 U	**34**	8.4	3.4 J	12	9.9
4,4'-DDT	1700	3800	1700	21	26 U	3.6 U	**77**	**47**	5.4 U	11 U	15 U
ALPHA-CHLORDANE	1600	--	1600	224	0.99 J	1.9 U	1.9 U	0.78 J	1.9 U	2.2 U	2.2 U
GAMMA-BHC (LINDANE)	520	120	120	5	1.8 U	1.9 U	1.9 U	2 U	1.9 U	2.2 U	2.2 U
GAMMA-CHLORDANE	1600	--	1600	224	1.8 U	1.9 U	1.9 U	1 J	1.9 U	2.2 U	2.2 U
HEPTACHLOR	110	240	110	5.98	1.8 U	1.9 U	1 J	2 U	1.9 U	2.2 U	2.2 U
HEPTACHLOR EPOXIDE	53	120	53	152	1.8 U	1.9 U	1.9 U	2 U	1.9 U	2.2 U	2.2 U
Petroleum Hydrocarbons (mg/kg)											
DIESEL RANGE ORGANICS	--	--	100[3]	--	--	--	--	--	--	--	--
Organophosphorous Pesticides (µg/kg)											
MALATHION	1200000	530000	530000	--	53 U	55 U	56 U	58 UJ	55 UJ	64 UR	63 UJ
Herbicides (µg/kg)											
MALEIC HYDRAZIDE	31000000	--	31000000	--	21 U	22 U	22 UJ	23 U	22 U	26 UJ	25 UJ
MONURON	--	--	--	--	21 UJ	22 U	22 U	23 U	22 UJ	26 UJ	130 U
PROPOXUR	240000	--	240000	--	21 UJ	22 U	22 U	23 U	22 UJ	26 UJ	130 U
Inorganics (mg/kg)											
ARSENIC	0.39	0.14	0.14	17	**5.9 J**	**1.7 J**	**6.8 J**	**6 J**	**6.9 J**	**3.4 J**	**3.6 J**
CYANIDE	1600	680	680	0.9	0.5 U	0.6	0.5 U	0.55 U	0.55 U	0.6 U	0.6 U
LEAD	400	170	170	11	**23.8**	4.4	**37.5**	6.2	**12.3**	**12.6**	**12.8**
ZINC	23000	10000	10000	46	46	12.6	**47.7**	25.5	34.4	27.8	29.6
Miscellaneous Parameters (mg/kg)											
TOTAL ORGANIC CARBON	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-1
SUMMARY OF 2008 RI ANALYTICAL DATA - SOIL
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE
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PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RESIDENTIAL RAG[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	SB-17-132		SB-17-133		SB-17-134	
					4 to 8 ft bgs		0 to 1 ft bgs	1 to 4 ft bgs	2 to 3 ft bgs	
					Sample	Duplicate			Sample	Duplicate
Pesticides/PCBs (µg/kg)										
4,4'-DDD	2000	4500	2000	21	8.4 U	6.8 U	4 U	4.1 U	3.6 U	3.6 U
4,4'-DDE	1400	3200	1400	21	8.4 U	6.8 U	**33 J**	1.8 J	0.96 J	0.95 J
4,4'-DDT	1700	3800	1700	21	8.4 UJ	6.8 UJ	31 U	4.1 U	7.6 U	7.5 U
ALPHA-CHLORDANE	1600	--	1600	224	4.3 U	3.5 U	2.1 U	2.1 U	4.3	4.9
GAMMA-BHC (LINDANE)	520	120	120	5	4.3 U	3.5 U	1.5 J	2.1 UJ	1.9 UJ	1.9 UJ
GAMMA-CHLORDANE	1600	--	1600	224	4.3 U	3.5 U	2.1 U	2.1 U	5.9	7.2
HEPTACHLOR	110	240	110	5.98	4.3 U	3.5 U	2.1 U	2.1 U	1.9 U	1.9 U
HEPTACHLOR EPOXIDE	53	120	53	152	4.3 U	3.5 U	2.1 U	2.1 U	1.9 U	1.9 U
Petroleum Hydrocarbons (mg/kg)										
DIESEL RANGE ORGANICS	--	--	100[3]	--	--	--	--	--	--	--
Organophosphorous Pesticides (µg/kg)										
MALATHION	1200000	530000	530000	--	78 U	92 U	61 UJ	67 UJ	--	--
Herbicides (µg/kg)										
MALEIC HYDRAZIDE	31000000	--	31000000	--	31 U	37 U	24 UJ	27 U	--	--
MONURON	--	--	--	--	20 J	140 J	24 U	17 J	--	--
PROPOXUR	240000	--	240000	--	31 U	37 U	24 U	27 U	--	--
Inorganics (mg/kg)										
ARSENIC	0.39	0.14	0.14	17	**4.4**	**3.6**	**7.9 J**	**2 J**	--	--
CYANIDE	1600	680	680	0.9	1.3 UJ	1 UJ	0.6 U	0.6 U	--	--
LEAD	400	170	170	11	6.3	5.2	**16.6**	4.1	--	--
ZINC	23000	10000	10000	46	33.4	25.7	36.1	13.7	--	--
Miscellaneous Parameters (mg/kg)										
TOTAL ORGANIC CARBON	--	--	--	--	--	--	--	--	--	--

TABLE 4-1
SUMMARY OF 2008 RI ANALYTICAL DATA - SOIL
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RESIDENTIAL RAG[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	SB-17-135	SB-17-136	SB-17-137	SB-17-138	SB-17-139	SB-17-140
					2 to 3 ft bgs	2 to 3 ft bgs	2 to 3 ft bgs	2 to 3 ft bgs	2 to 3 ft bgs	2 to 3 ft bgs
Pesticides/PCBs (µg/kg)										
4,4'-DDD	2000	4500	2000	21	20 J	3.8 UJ	4 U	9.8 J	3.6 UJ	3.7 UJ
4,4'-DDE	1400	3200	1400	21	**27 J**	11	4 UJ	**50 J**	7.3	2.5 J
4,4'-DDT	1700	3800	1700	21	**490**	**60**	4 U	**120 J**	**56**	29 U
ALPHA-CHLORDANE	1600	--	1600	224	94	7.6 J	2.1 U	52 J	44	3.9
GAMMA-BHC (LINDANE)	520	120	120	5	1.9 U	1.9 U	2.1 UJ	1.9 UJ	1.9 U	1.9 U
GAMMA-CHLORDANE	1600	--	1600	224	120	10	2.1 U	65	52	4.9
HEPTACHLOR	110	240	110	5.98	**12 J**	1.9 U	2.1 U	1.9 U	4.7	1.1 J
HEPTACHLOR EPOXIDE	53	120	53	152	1.9 U	1.9 U	2.1 U	1.9 U	1.9 U	1.9 U
Petroleum Hydrocarbons (mg/kg)										
DIESEL RANGE ORGANICS	--	--	100[3]	--	--	--	--	--	--	--
Organophosphorous Pesticides (µg/kg)										
MALATHION	1200000	530000	530000	--	--	--	--	--	--	--
Herbicides (µg/kg)										
MALEIC HYDRAZIDE	31000000	--	31000000	--	--	--	--	--	--	--
MONURON	--	--	--	--	--	--	--	--	--	--
PROPOXUR	240000	--	240000	--	--	--	--	--	--	--
Inorganics (mg/kg)										
ARSENIC	0.39	0.14	0.14	17	--	--	--	--	--	--
CYANIDE	1600	680	680	0.9	--	--	--	--	--	--
LEAD	400	170	170	11	--	--	--	--	--	--
ZINC	23000	10000	10000	46	--	--	--	--	--	--
Miscellaneous Parameters (mg/kg)										
TOTAL ORGANIC CARBON	--	--	--	--	--	--	--	--	--	--

TABLE 4-1
SUMMARY OF 2008 RI ANALYTICAL DATA - SOIL
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RESIDENTIAL RAG[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	SB-17-141		SB-17-142		SB-17-143	SB-17-144	SB-17-145
					2 to 3 ft bgs	3 to 7 ft bgs	2 to 3 ft bgs		2 to 3 ft bgs	2 to 3 ft bgs	2 to 3 ft bgs
							Sample	Duplicate			
Pesticides/PCBs (µg/kg)											
4,4'-DDD	2000	4500	2000	21	3.7 U	5 U	3.7 UJ	3.6 UJ	3.6 U	3.8 U	3.6 U
4,4'-DDE	1400	3200	1400	21	0.8 J	5 U	3.7 U	3.6 U	3.6 UJ	13 J	8.9 J
4,4'-DDT	1700	3800	1700	21	3.7 U	13 J	3.7 U	3.6 U	3.6 U	**82 J**	**64**
ALPHA-CHLORDANE	1600	--	1600	224	1.9 U	2.6 U	1.9 U	1.9 U	1.9 U	14	11
GAMMA-BHC (LINDANE)	520	120	120	5	1.9 UJ	2.6 U	1.9 U	1.9 U	1.9 UJ	1.9 UJ	1.9 UJ
GAMMA-CHLORDANE	1600	--	1600	224	1.9 U	2.6 U	1.9 U	1.9 U	1.9 U	17	10
HEPTACHLOR	110	240	110	5.98	1.9 U	2.6 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
HEPTACHLOR EPOXIDE	53	120	53	152	1.9 U	2.6 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Petroleum Hydrocarbons (mg/kg)											
DIESEL RANGE ORGANICS	--	--	100[3]	--	--	--	--	--	--	--	--
Organophosphorous Pesticides (µg/kg)											
MALATHION	1200000	530000	530000	--	--	76 U	--	--	--	--	--
Herbicides (µg/kg)											
MALEIC HYDRAZIDE	31000000	--	31000000	--	--	30 U	--	--	--	--	--
MONURON	--	--	--	--	--	100	--	--	--	--	--
PROPOXUR	240000	--	240000	--	--	30 U	--	--	--	--	--
Inorganics (mg/kg)											
ARSENIC	0.39	0.14	0.14	17	--	**1.9**	--	--	--	--	--
CYANIDE	1600	680	680	0.9	--	0.75 UJ	--	--	--	--	--
LEAD	400	170	170	11	--	3	--	--	--	--	--
ZINC	23000	10000	10000	46	--	15.6	--	--	--	--	--
Miscellaneous Parameters (mg/kg)											
TOTAL ORGANIC CARBON	--	--	--	--	--	--	--	--	--	--	--

This table includes results for all parameters detected in at least one sample in this media subgroup.

1 United States Environmental Protection Agency Regions 3, 6, and 9. (November, 2010). Regional Screening Levels for Chemical Contaminants at Superfund Sites. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm.

2 Maine Remedial Action Guidelines (RAGs) for Soil Contaminated with Hazardous Substances. (January, 2010). http://www.maine.gov/dep/rwm/publications/guidance/index.htm

3 The value listed as the minimum screening criteria for diesel-range organics is the stringent soil remediation goal for oil contaminated soil as presented in the document titled, "Procedural Guidelines for Establishing and Implementing Action Levels and Remediation Goals for the Remediation of Oil Contaminated Soil and Groundwater in Maine" (MEDEP, January 1, 2009).

Grey shading indicates that sample was excavated after 2008 Remedial Investigation field efforts.

U - Not detected.

J - Estimated result.

Exceeds RSL/RAG.

Exceeds minimum ESL.

Exceeds RSL/RAG and minimum ESL.

ESL Sources:

Ecological Soil Screening Levels (Eco SSLs) (EPA, 2008).

Canadian Council of Ministers of the Environment (CCME) Recommended Canadian Soil Quality Guidelines (2006).

EPA, Region 5, RCRA Ecological Screening Levels, August 22, 2003.

TABLE 4-2
SUMMARY OF 2008 ANALYTICAL RESULTS - GROUNDWATER
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Parameter	MEG[1]	MCL[2]	VI[3]	Minimum Screening Criterion	MW-17-01	MW-17-02	MW-17-03		
							Sample	Duplicate	Average
Pesticides/PCBs (µg/L)									
4,4'-DDD	1	NC	NC	1	0.094 U	**4.3**	0.095 U	0.094 U	0.0945 U
4,4'-DDE	1	NC	29	1	0.017 J	0.12	0.095 U	0.017 J	0.017 J
4,4'-DDT	1	NC	NC	1	0.015 J	**2.1**	0.095 U	0.094 U	0.0945 U
ALPHA-CHLORDANE	NC	2	NC	2	0.047 U	0.057	0.048 U	0.047 U	0.0475 U
DIELDRIN	0.02	NC	0.86	0.02	0.016 J	**1.7**	0.095 U	0.094 U	0.0945 U
ENDOSULFAN I	NC	NC	NC	NC	0.047 U	0.95	0.048 U	0.047 U	0.0475 U
ENDRIN ALDEHYDE	NC	NC	NC	NC	0.094 U	0.094 U	0.095 U	0.094 U	0.0945 U
GAMMA-BHC (LINDANE)	0.03	0.2	11	0.03	0.047 U	0.047 U	0.015 J	0.047 U	0.015 J
GAMMA-CHLORDANE	NC	2	NC	2	0.047 U	0.11	0.048 U	0.047 U	0.0475 U
HEPTACHLOR	0.07	0.4	0.4	0.07	0.015 J	0.047 U	0.048 U	0.047 U	0.0475 U
HEPTACHLOR EPOXIDE	0.04	0.2	NC	0.04	0.047 U	0.047 U	0.016 J	0.047 U	0.016 J
Petroleum Hydrocarbons (µg/L)									
DIESEL RANGE ORGANICS	NC	NC	NC	NC	85	210	66	68	67
Herbicides (µg/L)									
MALEIC HYDRAZIDE	4000	NC	NC	4000	1.3 J	1.8 J	1.5 J	2 U	1.5 J
MONURON	NC	NC	NC	NC	1 U	1 U	1 U	1 U	1 U
PROPOXUR	30	NC	NC	30	1 U	0.43 J	1 U	1 U	1 U
Inorganics (µg/L)									
LEAD	10	15	NC	10	0.97 U	0.97 U	0.97 U	0.97 U	0.97 U
ZINC	2000	NC	NC	2000	5.6 J	5.5 J	5.5 J	6 J	5.75 J

TABLE 4-2
SUMMARY OF 2008 ANALYTICAL RESULTS - GROUNDWATER
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE
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Parameter	MEG[1]	MCL[2]	VI[3]	Minimum Screening Criterion	MW-17-04	MW-17-NASB-65	MW-17-NASB-66	MW-17-NASB-68	MW-17-NASB-98
Pesticides/PCBs (µg/L)									
4,4'-DDD	1	NC	NC	1	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U
4,4'-DDE	1	NC	29	1	0.094 U	0.017 J	0.094 U	0.017 J	0.017 J
4,4'-DDT	1	NC	NC	1	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U
ALPHA-CHLORDANE	NC	2	NC	2	0.09	0.018 J	0.047 U	0.047 U	0.047 U
DIELDRIN	0.02	NC	0.86	0.02	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U
ENDOSULFAN I	NC	NC	NC	NC	0.047 U	0.047 U	0.047 U	0.047 U	0.047 U
ENDRIN ALDEHYDE	NC	NC	NC	NC	0.027 J	0.094 U	0.094 U	0.094 U	0.094 U
GAMMA-BHC (LINDANE)	0.03	0.2	11	0.03	0.047 U	0.047 U	0.047 U	0.047 U	0.047 U
GAMMA-CHLORDANE	NC	2	NC	2	0.1	0.018 J	0.047 U	0.047 U	0.047 U
HEPTACHLOR	0.07	0.4	0.4	0.07	0.047 U	0.047 U	0.047 U	0.047 U	0.047 U
HEPTACHLOR EPOXIDE	0.04	0.2	NC	0.04	0.047 U	0.017 J	0.047 U	0.047 U	0.047 U
Petroleum Hydrocarbons (µg/L)									
DIESEL RANGE ORGANICS	NC	NC	NC	NC	45 J	NA	NA	NA	NA
Herbicides (µg/L)									
MALEIC HYDRAZIDE	4000	NC	NC	4000	2 U	1.3 J	2 U	2 U	1.9 J
MONURON	NC	NC	NC	NC	1 U	1 U	1 U	1 U	0.36 J
PROPOXUR	30	NC	NC	30	1 U	1 U	1 U	0.33 J	1 U
Inorganics (µg/L)									
LEAD	10	15	NC	10	1.2 J	0.97 U	0.97 U	0.97 U	0.97 U
ZINC	2000	NC	NC	2000	3.4 J	3.7 J	20.7 J	5.7 J	2.22 U

This table includes results for all parameters detected in at least one sample in media subgroup.

1 Maine CDC, February 4, 2011. Maximum Exposure Guidelines (MEGs) for Drinking Water.

2 United States Environmental Protection Agency Regions 3, 6, and 9. (November, 2010). Regional Screening Levels for Chemical Contaminants at Superfunc http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm

3 Calculated based on methodology in Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils. November 2002. (EPA530-F-02-052)

Grey shading indicates that sample was excavated after 2008 Remedial Investigation field efforts.

Bolded cells indicate that detected concentration exceeds the minimum screening criterion.

U - Not detected.

J - Estimated result.

NA - Not analyzed.

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	ECOLOGICAL SCREENING LEVELS (ESLs)					2010 REMOVAL ACTION SAMPLES		
									GRID A BOTTOM		GRID A NORTH SIDEWALL
									2 to 6 ft bgs		2 to 6 ft bgs
				PLANT	INVERTE-BRATE	AVIAN	MAMMAL	MINIMUM	Sample	Duplicate	
VOLATILES (µg/kg)											
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--	--	--	--
HERBICIDES (µg/kg)											
MALEIC HYDRAZIDE	31000000	--	31000000	--	--	--	--	--	--	--	--
MONURON	--	--	--	--	--	--	--	--	--	--	--
PROPOXUR	240000	--	240000	--	--	--	--	--	--	--	--
PESTICIDES (µg/kg)											
4,4'-DDD	2000	4500	2000	12000	12000	93	21	21	**271**	**265**	3.3 J
4,4'-DDE	1400	3200	1400	12000	12000	93	21	21	**50**	**40**	0.96 U
4,4'-DDT	1700	3800	1700	12000	12000	93	21	21	**9000**	**7450**	**242**
ALDRIN	29	64	29	--	--	--	--	--	2.4 U	2.2 U	0.24 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	--	--	--	224	35	22	0.12 U
BETA-BHC	270	600	270	--	--	--	--	--	3.6 U	3.3 U	0.36 U
DIELDRIN	30	68	30	--	--	--	--	--	1.2 U	1.1 U	0.12 U
ENDOSULFAN I[4]	370000	160000	160000	--	--	--	--	--	3.6 U	3.3 U	0.36 U
ENDRIN	18000	8000	8000	--	--	--	--	--	1.2 U	1.1 U	0.12 U
GAMMA-BHC (LINDANE)	520	120	120	5	NA	NA	NA	5	0.96 U	0.88 U	0.1 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	NA	NA	NA	224	21	20	0.72 U
HEPTACHLOR	110	240	110	NA	NA	NA	5.98	5.98	3.0 J	2.2 U	0.24 U
HEPTACHLOR EPOXIDE	53	120	53	NA	NA	NA	152	152	1.2 U	1.1 U	0.12 U
METHOXYCHLOR	310000	130000	130000	--	--	--	--	--	29 U	26 U	3.1 U
PETROLEUM HYDROCARBONS (mg/kg)											
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--	--	--	--
METALS (mg/kg)											
ARSENIC	0.39	0.14	0.14	18	17	43	46	17	--	--	--
CYANIDE	1600	680	680	0.9	0.9	NA	NA	0.9	--	--	--
LEAD	400	170	170	120	1700	11	56	11	--	--	--
ZINC	23000	10000	10000	160	120	46	79	46	--	--	--
MISCELLANEOUS PARAMETERS											
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	--	--	--	--
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2010 REMOVAL ACTION SAMPLES				
					GRID A SOUTH SIDEWALL	GRID A WEST SIDEWALL A	GRID A WEST SIDEWALL B	GRID B BOTTOM	GRID B EAST SIDEWALL A
					2 to 6 ft bgs	2 to 6 ft bgs	2 to 6 ft bgs	2 to 6 ft bgs	2 to 6 ft bgs
VOLATILES (µg/kg)									
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--	--
HERBICIDES (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	--	--	--	--	--
MONURON	--	--	--	--	--	--	--	--	--
PROPOXUR	240000	--	240000	--	--	--	--	--	--
PESTICIDES (µg/kg)									
4,4'-DDD	2000	4500	2000	21	1.1 J	16	1.7 J	**63**	5.5
4,4'-DDE	1400	3200	1400	21	1.2 J	1 U	1.9 J	11 J	17
4,4'-DDT	1700	3800	1700	21	12	**502**	**34**	**2940**	**150**
ALDRIN	29	64	29	--	0.26 U	0.26 U	0.24 U	2.4 U	0.24 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	7.5	0.13 U	11	1.2 U	0.12 U
BETA-BHC	270	600	270	--	0.39 U	0.39 U	0.36 U	3.6 U	0.36 U
DIELDRIN	30	68	30	--	0.13 U	0.13 U	0.12 U	1.2 U	0.12 U
ENDOSULFAN I[4]	370000	160000	160000	--	0.39 U	0.39 U	0.36 U	3.6 U	0.36 U
ENDRIN	18000	8000	8000	--	0.13 U	0.13 U	0.12 U	1.2 U	0.12 U
GAMMA-BHC (LINDANE)	520	120	120	5	0.10 U	0.1 U	0.10 U	0.96 U	0.10 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	5.1	0.78 U	6.7	7.2 U	0.72 U
HEPTACHLOR	110	240	110	5.98	0.26 U	0.4 J	0.30 J	2.4 U	0.24 U
HEPTACHLOR EPOXIDE	53	120	53	152	0.13 U	0.13 U	3.0	1.2 U	0.12 U
METHOXYCHLOR	310000	130000	130000	--	3.1 U	3.1 U	2.9 U	29 U	2.9 U
PETROLEUM HYDROCARBONS (mg/kg)									
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--	--
METALS (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	--	--	--	--	--
CYANIDE	1600	680	680	0.9	--	--	--	--	--
LEAD	400	170	170	11	--	--	--	--	--
ZINC	23000	10000	10000	46	--	--	--	--	--
MISCELLANEOUS PARAMETERS									
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	--	--
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2010 REMOVAL ACTION SAMPLES			2009 RELOCATED SOIL STRIP SAMPLES	
					GRID B EAST SIDEWALL B	GRID B NORTH SIDEWALL NO 2	GRID B SOUTH SIDEWALL	S17-00	S17-PB-01
					2 to 6 ft bgs	2 to 6 ft bgs	2 to 6 ft bgs	2.75 to 3 ft bgs	2.75 to 3 ft bgs
VOLATILES (µg/kg)									
TETRACHLOROETHENE	550	2600	550	--	--	--	--	170 J	--
HERBICIDES (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	--	--	--	--	--
MONURON	--	--	--	--	--	--	--	--	--
PROPOXUR	240000	--	240000	--	--	--	--	--	--
PESTICIDES (µg/kg)									
4,4'-DDD	2000	4500	2000	21	**313 J**	8.6	0.36 U	**40**	5.6 U
4,4'-DDE	1400	3200	1400	21	**69 J**	4.1	0.96 U	**98**	**24**
4,4'-DDT	1700	3800	1700	21	**15200**	**677**	8.8	**1000**	**420**
ALDRIN	29	64	29	--	2.6 UJ	0.24 U	0.24 U	18	5.6 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	74 J	0.12 U	0.12 U	**550**	140
BETA-BHC	270	600	270	--	3.9 UJ	0.36 U	0.36 U	6.7 U	5.6 U
DIELDRIN	30	68	30	--	1.3 UJ	0.12 U	0.12 U	6.7 U	5.6 U
ENDOSULFAN I[4]	370000	160000	160000	--	3.9 UJ	0.36 U	0.36 U	6.7 U	5.6 U
ENDRIN	18000	8000	8000	--	1.3 UJ	0.12 U	0.12 U	200	120
GAMMA-BHC (LINDANE)	520	120	120	5	1 UJ	0.10 U	0.10 U	6.7 U	5.6 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	68 J	0.72 U	0.72 U	**550**	160
HEPTACHLOR	110	240	110	5.98	**18 J**	0.24 U	0.24 U	**100**	**23**
HEPTACHLOR EPOXIDE	53	120	53	152	1.3 UJ	0.12 U	0.12 U	6.7 U	50
METHOXYCHLOR	310000	130000	130000	--	31 UJ	2.9 U	2.9 U	6.7 U	5.6 U
PETROLEUM HYDROCARBONS (mg/kg)									
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--	--
METALS (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	--	--	--	--	--
CYANIDE	1600	680	680	0.9	--	--	--	--	--
LEAD	400	170	170	11	--	--	--	--	--
ZINC	23000	10000	10000	46	--	--	--	--	--
MISCELLANEOUS PARAMETERS									
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	24.9	11.1
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2009 RELOCATED SOIL STRIP SAMPLES				
					S17-PB-02	S17-PB-03	S17-PB-04	S17-PB-05	
					2.75 to 3 ft bgs	2.75 to 3 ft bgs	2.75 to 3 ft bgs	2.75 to 3 ft bgs	
								Sample	Duplicate
VOLATILES (µg/kg)									
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--	--
HERBICIDES (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	--	--	--	--	--
MONURON	--	--	--	--	--	--	--	--	--
PROPOXUR	240000	--	240000	--	--	--	--	--	--
PESTICIDES (µg/kg)									
4,4'-DDD	2000	4500	2000	21	6.1 U	6.2 U	18	6.9 U	6.5 U
4,4'-DDE	1400	3200	1400	21	**60**	6.2 U	**23**	6.9 U	6.5 U
4,4'-DDT	1700	3800	1700	21	**800**	6.2 U	**290**	**33**	**31**
ALDRIN	29	64	29	--	6.1 U	6.2 U	6.4 U	6.9 U	6.5 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	180	6.2 U	**240**	12	11
BETA-BHC	270	600	270	--	6.1 U	6.2 U	6.4 U	6.9 U	6.5 U
DIELDRIN	30	68	30	--	6.1 U	6.2 U	6.4 U	6.9 U	6.5 U
ENDOSULFAN I[4]	370000	160000	160000	--	6.1 U	6.2 U	50	6.9 U	6.5 U
ENDRIN	18000	8000	8000	--	150	6.2 U	58	6.1 J	6.8
GAMMA-BHC (LINDANE)	520	120	120	5	6.1 U	6.2 U	6.4 U	6.9 U	6.5 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	190	6.2 U	**240**	12	11
HEPTACHLOR	110	240	110	5.98	**27**	6.2 U	**220**	6.9 U	6.5 U
HEPTACHLOR EPOXIDE	53	120	53	152	6.1 U	6.2 U	**130**	6.9 U	6.5 U
METHOXYCHLOR	310000	130000	130000	--	6.1 U	6.2 U	6.4 U	6.9 U	6.5 U
PETROLEUM HYDROCARBONS (mg/kg)									
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--	--
METALS (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	--	--	--	--	--
CYANIDE	1600	680	680	0.9	--	--	--	--	--
LEAD	400	170	170	11	--	--	--	--	--
ZINC	23000	10000	10000	46	--	--	--	--	--
MISCELLANEOUS PARAMETERS									
PERCENT MOISTURE (%)	--	--	--	--	17.6	19.5	21.7	28	23.2
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2009 RELOCATED SOIL STRIP SAMPLES				
					S17-PB-06	S17-PB-07	S17-PB-08	S17-PB-09	S17-PB-10
					2.75 to 3 ft bgs	2.75 to 3 ft bgs	2.75 to 3 ft bgs	2.75 to 3 ft bgs	2.75 to 3 ft bgs
VOLATILES (µg/kg)									
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--	--
HERBICIDES (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	--	--	--	--	--
MONURON	--	--	--	--	--	--	--	--	--
PROPOXUR	240000	--	240000	--	--	--	--	--	--
PESTICIDES (µg/kg)									
4,4'-DDD	2000	4500	2000	21	**53**	6.1 U	14	2.3 J	6.1 U
4,4'-DDE	1400	3200	1400	21	**140**	6.1	**72**	19	6.1 U
4,4'-DDT	1700	3800	1700	21	**1900**	**43**	**600 J**	**79**	4.4 J
ALDRIN	29	64	29	--	31 U	6.1 U	6.4 U	5.9 U	6.1 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	**660**	8.4	22	9.2	6.1 U
BETA-BHC	270	600	270	--	31 U	6.1 U	6.4 U	5.9 U	6.1 U
DIELDRIN	30	68	30	--	31 U	6.1 U	6.4 U	5.9 U	6.1 U
ENDOSULFAN I[4]	370000	160000	160000	--	31 U	6.1 U	6.4 U	5.9 U	6.1 U
ENDRIN	18000	8000	8000	--	410	8.9	95	21	6.1 U
GAMMA-BHC (LINDANE)	520	120	120	5	31 U	6.1 U	6.4 U	5.9 U	6.1 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	**690**	9	23	10	6.1 U
HEPTACHLOR	110	240	110	5.98	**57**	6.1 U	2.6 J	2.5 J	6.1 U
HEPTACHLOR EPOXIDE	53	120	53	152	31 U	6.1 U	6.4 U	5.9 U	6.1 U
METHOXYCHLOR	310000	130000	130000	--	31 U	6.1 U	6.4 U	5.9 U	6.1 U
PETROLEUM HYDROCARBONS (mg/kg)									
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--	--
METALS (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	--	--	--	--	--
CYANIDE	1600	680	680	0.9	--	--	--	--	--
LEAD	400	170	170	11	--	--	--	--	--
ZINC	23000	10000	10000	46	--	--	--	--	--
MISCELLANEOUS PARAMETERS									
PERCENT MOISTURE (%)	--	--	--	--	19.9	18.5	22.8	14.8	18.2
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2009 RELOCATED SOIL STRIP SAMPLES				
					S17-PB-11	S17-PB-12	S17-PB-13	S17-PB-14	
					2.75 to 3 ft bgs	2.75 to 3 ft bgs	2.75 to 3 ft bgs	2.75 to 3 ft bgs	
								Sample	Duplicate
VOLATILES (µg/kg)									
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--	--
HERBICIDES (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	--	--	--	--	--
MONURON	--	--	--	--	--	--	--	--	--
PROPOXUR	240000	--	240000	--	--	--	--	--	--
PESTICIDES (µg/kg)									
4,4'-DDD	2000	4500	2000	21	6.3 U	6.4 U	**52**	**51**	**64**
4,4'-DDE	1400	3200	1400	21	6.3 U	6.4 U	**370**	**79**	**90**
4,4'-DDT	1700	3800	1700	21	6.3 U	2.9 J	**1400**	**1400**	**2000**
ALDRIN	29	64	29	--	6.3 U	6.4 U	29 U	30 U	31 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	6.3 U	5.2 J	83	**270**	**300**
BETA-BHC	270	600	270	--	6.3 U	6.4 U	29 U	30 U	31 U
DIELDRIN	30	68	30	--	6.3 U	6.4 U	29 U	30 U	31 U
ENDOSULFAN I[4]	370000	160000	160000	--	6.3 U	6.4 U	29 U	30 U	31 U
ENDRIN	18000	8000	8000	--	6.3 U	6.4 U	200	290	350
GAMMA-BHC (LINDANE)	520	120	120	5	6.3 U	6.4 U	29 U	30 U	31 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	6.3 U	2.8 J	85	**280**	**300**
HEPTACHLOR	110	240	110	5.98	6.3 U	6.4 U	29 U	**40**	**39**
HEPTACHLOR EPOXIDE	53	120	53	152	6.3 U	6.4 U	29 U	30 U	31 U
METHOXYCHLOR	310000	130000	130000	--	6.3 U	6.4 U	29 U	30 U	31 U
PETROLEUM HYDROCARBONS (mg/kg)									
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--	--
METALS (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	--	--	--	--	--
CYANIDE	1600	680	680	0.9	--	--	--	--	--
LEAD	400	170	170	11	--	--	--	--	--
ZINC	23000	10000	10000	46	--	--	--	--	--
MISCELLANEOUS PARAMETERS									
PERCENT MOISTURE (%)	--	--	--	--	20.8	22.4	12.7	17.8	20.1
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2009 RELOCATED SOIL STRIP SAMPLES				
					S17-PB-15	S17-PB-16	S17-PB-17	S17-PB-18	S17-SS-04
					2.75 to 3 ft bgs	2.75 to 3 ft bgs	2.75 to 3 ft bgs	2.75 to 3 ft bgs	2.42 to 2.67 ft bgs
VOLATILES (µg/kg)									
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--	--
HERBICIDES (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	--	--	--	--	--
MONURON	--	--	--	--	--	--	--	--	--
PROPOXUR	240000	--	240000	--	--	--	--	--	--
PESTICIDES (µg/kg)									
4,4'-DDD	2000	4500	2000	21	6.4 U	6.1 U	6.1 U	6.8 U	**34**
4,4'-DDE	1400	3200	1400	21	6.4 U	6.1 U	6.1 U	6.8 U	**100**
4,4'-DDT	1700	3800	1700	21	3.4 J	6.1 U	6.1 U	6.8 U	**570**
ALDRIN	29	64	29	--	6.4 U	6.1 U	6.1 U	6.8 U	5.8 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	6.4 U	6.1 U	6.1 U	6.8 U	110
BETA-BHC	270	600	270	--	6.4 U	6.1 U	6.1 U	6.8 U	5.8 U
DIELDRIN	30	68	30	--	6.4 U	6.1 U	6.1 U	6.8 U	5.8 U
ENDOSULFAN I[4]	370000	160000	160000	--	6.4 U	6.1 U	6.1 U	6.8 U	66
ENDRIN	18000	8000	8000	--	6.4 U	6.1 U	6.1 U	6.8 U	150
GAMMA-BHC (LINDANE)	520	120	120	5	6.4 U	6.1 U	6.1 U	6.8 U	5.8 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	6.4 U	6.1 U	6.1 U	6.8 U	140
HEPTACHLOR	110	240	110	5.98	6.4 U	6.1 U	6.1 U	6.8 U	**16**
HEPTACHLOR EPOXIDE	53	120	53	152	6.4 U	6.1 U	6.1 U	6.8 U	34
METHOXYCHLOR	310000	130000	130000	--	6.4 U	6.1 U	6.1 U	6.8 U	8.5
PETROLEUM HYDROCARBONS (mg/kg)									
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--	--
METALS (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	--	--	--	--	--
CYANIDE	1600	680	680	0.9	--	--	--	--	--
LEAD	400	170	170	11	--	--	--	--	--
ZINC	23000	10000	10000	46	--	--	--	--	--
MISCELLANEOUS PARAMETERS									
PERCENT MOISTURE (%)	--	--	--	--	22.1	18	17.5	26.7	14.2
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2009 RELOCATED SOIL STRIP SAMPLES				
					S17-SS-05	S17-SS-06	S17-SS-09	S17-SW-01	S17-SW-02
					3.5 to 3.75 ft bgs	2.17 to 2.42 ft bgs	2 to 2.25 ft bgs	2.75 to 3 ft bgs	2.75 to 3 ft bgs
VOLATILES (µg/kg)									
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--	--
HERBICIDES (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	--	--	--	--	--
MONURON	--	--	--	--	--	--	--	--	--
PROPOXUR	240000	--	240000	--	--	--	--	--	--
PESTICIDES (µg/kg)									
4,4'-DDD	2000	4500	2000	21	6.4 U	30 U	30 U	28 U	12
4,4'-DDE	1400	3200	1400	21	5.5 J	**110**	**59**	**320**	**39**
4,4'-DDT	1700	3800	1700	21	**47**	**720**	**190**	**4400**	**600 J**
ALDRIN	29	64	29	--	6.4 U	30 U	30 U	28 U	5.9 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	9.6	**280**	30 U	**940**	44
BETA-BHC	270	600	270	--	6.4 U	30 U	30 U	28 U	5.9 U
DIELDRIN	30	68	30	--	6.4 U	30 U	30 U	28 U	5.9 U
ENDOSULFAN I[4]	370000	160000	160000	--	6.4 U	190	30 U	28 U	5.9 U
ENDRIN	18000	8000	8000	--	13	220	37	840	32
GAMMA-BHC (LINDANE)	520	120	120	5	6.4 U	30 U	30 U	28 U	5.9 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	12	**350**	30 U	**960**	42
HEPTACHLOR	110	240	110	5.98	6.4 U	30 U	30 U	**130**	**6.4**
HEPTACHLOR EPOXIDE	53	120	53	152	6.4 U	30 U	30 U	28 U	5.9 U
METHOXYCHLOR	310000	130000	130000	--	6.4 U	30 U	30 U	28 U	5.9 U
PETROLEUM HYDROCARBONS (mg/kg)									
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--	--
METALS (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	--	--	--	--	--
CYANIDE	1600	680	680	0.9	--	--	--	--	--
LEAD	400	170	170	11	--	--	--	--	--
ZINC	23000	10000	10000	46	--	--	--	--	--
MISCELLANEOUS PARAMETERS									
PERCENT MOISTURE (%)	--	--	--	--	21.5	16.9	15.7	10.5	16.2
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2009 RELOCATED SOIL STRIP SAMPLES				
					S17-SW-03	S17-SW-04	S17-SW-05		S17-SW-06
					2.75 to 3 ft bgs	2.75 to 3 ft bgs	2.75 to 3 ft bgs		2.75 to 3 ft bgs
							Sample	Duplicate	
VOLATILES (µg/kg)									
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--	--
HERBICIDES (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	--	--	--	--	--
MONURON	--	--	--	--	--	--	--	--	--
PROPOXUR	240000	--	240000	--	--	--	--	--	--
PESTICIDES (µg/kg)									
4,4'-DDD	2000	4500	2000	21	6.4 U	6.2 U	6.4 U	6.4 U	6.1 U
4,4'-DDE	1400	3200	1400	21	14	6.2 U	6.4 U	6.4 U	11
4,4'-DDT	1700	3800	1700	21	**43**	3.1 J	6.4 U	6.4 U	**63**
ALDRIN	29	64	29	--	6.4 U	6.2 U	6.4 U	6.4 U	6.1 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	16	6.2 U	6.4 U	6.4 U	4.5 J
BETA-BHC	270	600	270	--	6.4 U	6.2 U	6.4 U	6.4 U	6.1 U
DIELDRIN	30	68	30	--	6.4 U	6.2 U	6.4 U	6.4 U	6.1 U
ENDOSULFAN I[4]	370000	160000	160000	--	6.4	6.2 U	6.4 U	6.4 U	6.1 U
ENDRIN	18000	8000	8000	--	9	6.2 U	6.4 U	6.4 U	11
GAMMA-BHC (LINDANE)	520	120	120	5	6.4 U	6.2 U	6.4 U	6.4 U	6.1 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	17	6.2 U	6.4 U	6.4 U	5 J
HEPTACHLOR	110	240	110	5.98	**6 J**	6.2 U	6.4 U	6.4 U	6.1 U
HEPTACHLOR EPOXIDE	53	120	53	152	12	6.2 U	6.4 U	6.4 U	6.1 U
METHOXYCHLOR	310000	130000	130000	--	6.4 U	6.2 U	6.4 U	6.4 U	6.1 U
PETROLEUM HYDROCARBONS (mg/kg)									
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--	--
METALS (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	--	--	--	--	--
CYANIDE	1600	680	680	0.9	--	--	--	--	--
LEAD	400	170	170	11	--	--	--	--	--
ZINC	23000	10000	10000	46	--	--	--	--	--
MISCELLANEOUS PARAMETERS									
PERCENT MOISTURE (%)	--	--	--	--	21.4	18.8	21.8	22.4	17.6
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2008 REMEDIAL INVESTIGATION SAMPLES			
					SB-17-101		SB-17-102	
					0 to 1 ft bgs	1 to 4 ft bgs	0 to 1 ft bgs	1 to 4 ft bgs
VOLATILES (µg/kg)								
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--
HERBICIDES (µg/kg)								
MALEIC HYDRAZIDE	31000000	--	31000000	--	22 UJ	21 U	21 U	22 U
MONURON	--	--	--	--	22 U	21 U	21 U	22 U
PROPOXUR	240000	--	240000	--	22 U	21 U	21 U	22 U
PESTICIDES (µg/kg)								
4,4'-DDD	2000	4500	2000	21	3.8 UJ	3.5 U	3.5 UJ	3.6 U
4,4'-DDE	1400	3200	1400	21	13	1.3 J	0.7 J	3.6 U
4,4'-DDT	1700	3800	1700	21	12 U	13 U	3.5 U	3.6 U
ALDRIN	29	64	29	--	1.9 U	1.8 U	1.8 U	1.9 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	1.9 U	1.8 U	1.8 U	1.9 U
BETA-BHC	270	600	270	--	1.9 U	1.8 U	1.8 U	1.9 U
DIELDRIN	30	68	30	--	3.8 U	3.5 U	3.5 U	3.6 U
ENDOSULFAN I[4]	370000	160000	160000	--	1.9 U	1.8 U	1.8 U	1.9 U
ENDRIN	18000	8000	8000	--	3.8 U	3.5 U	3.5 U	3.6 U
GAMMA-BHC (LINDANE)	520	120	120	5	1.9 U	1.8 U	1.8 U	1.9 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	1.9 U	1.8 U	1.8 U	1.9 U
HEPTACHLOR	110	240	110	5.98	1.9 U	1.8 U	1.8 U	1.9 U
HEPTACHLOR EPOXIDE	53	120	53	152	1.9 U	1.8 U	1.8 U	1.9 U
METHOXYCHLOR	310000	130000	130000	--	19 U	18 U	18 U	19 U
PETROLEUM HYDROCARBONS (mg/kg)								
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--
METALS (mg/kg)								
ARSENIC	0.39	0.14	0.14	17	**2**	**1.3**	**10.7**	**4.6**
CYANIDE	1600	680	680	0.9	0.55 U	0.5 U	0.5 U	0.55 U
LEAD	400	170	170	11	8.1	2.5	10	2.4
ZINC	23000	10000	10000	46	11.7	10.3	21.9	16.6
MISCELLANEOUS PARAMETERS								
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	--
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2008 REMEDIAL INVESTIGATION SAMPLES			
					SB-17-103		SB-17-104	
					0 to 1 ft bgs	1 to 4 ft bgs	0 to 1 ft bgs	1 to 4 ft bgs
VOLATILES (µg/kg)								
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--
HERBICIDES (µg/kg)								
MALEIC HYDRAZIDE	31000000	--	31000000	--	21 UJ	23 U	22 U	23 U
MONURON	--	--	--	--	21 UJ	23 U	22 U	23 U
PROPOXUR	240000	--	240000	--	21 U	23 U	22 U	23 U
PESTICIDES (µg/kg)								
4,4'-DDD	2000	4500	2000	21	3.5 UJ	10	3.6 UJ	6.5
4,4'-DDE	1400	3200	1400	21	0.88 J	3.6 J	0.8 J	1.7 J
4,4'-DDT	1700	3800	1700	21	3.5 U	**53**	4.2 U	4 U
ALDRIN	29	64	29	--	1.8 U	1.9 U	1.9 U	1.9 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	1.8 U	1.9 U	1.9 U	1.9 U
BETA-BHC	270	600	270	--	1.8 U	1.9 U	1.9 U	1.9 U
DIELDRIN	30	68	30	--	3.5 U	3.7 U	3.6 U	3.7 U
ENDOSULFAN I[4]	370000	160000	160000	--	1.8 U	1.9 U	1.9 U	1.9 U
ENDRIN	18000	8000	8000	--	3.5 U	3.7 U	3.6 U	3.7 U
GAMMA-BHC (LINDANE)	520	120	120	5	1.8 U	1.9 U	1.9 U	1.9 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	1.8 U	1.9 U	1.9 U	1.9 U
HEPTACHLOR	110	240	110	5.98	1.8 U	1.9 U	1.9 U	1.9 U
HEPTACHLOR EPOXIDE	53	120	53	152	1.8 U	1.9 U	1.9 U	1.9 U
METHOXYCHLOR	310000	130000	130000	--	18 U	19 U	19 U	19 U
PETROLEUM HYDROCARBONS (mg/kg)								
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--
METALS (mg/kg)								
ARSENIC	0.39	0.14	0.14	17	**18.2**	**6.1**	**9.4**	**8.1**
CYANIDE	1600	680	680	0.9	0.55 U	0.55 U	0.55 U	0.55 U
LEAD	400	170	170	11	**11.1**	5.1	11	3.4
ZINC	23000	10000	10000	46	25.8	17.8	26.7	17.9
MISCELLANEOUS PARAMETERS								
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	--
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2008 REMEDIAL INVESTIGATION SAMPLES				
					SB-17-105			SB-17-106	
					0 to 1 ft bgs		1 to 4 ft bgs	0 to 1 ft bgs	1 to 4 ft bgs
					Sample	Duplicate			
VOLATILES (µg/kg)									
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--	--
HERBICIDES (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	22 UJ	23 U	28 U	22 U	21 U
MONURON	--	--	--	--	22 UJ	23 UJ	28 U	22 UJ	21 UJ
PROPOXUR	240000	--	240000	--	22 U	23 UJ	28 U	22 UJ	21 U
PESTICIDES (µg/kg)									
4,4'-DDD	2000	4500	2000	21	3.7 U	3.6 U	3.4 U	10	3.5 U
4,4'-DDE	1400	3200	1400	21	17	14	3.4 U	8.3	3.5 U
4,4'-DDT	1700	3800	1700	21	**28 J**	**28 J**	3.4 UJ	**210**	24 UJ
ALDRIN	29	64	29	--	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U
BETA-BHC	270	600	270	--	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U
DIELDRIN	30	68	30	--	3.7 U	3.6 U	3.4 U	3.6 U	3.5 U
ENDOSULFAN I[4]	370000	160000	160000	--	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U
ENDRIN	18000	8000	8000	--	3.7 U	3.6 U	3.4 U	3.6 U	3.5 U
GAMMA-BHC (LINDANE)	520	120	120	5	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U
HEPTACHLOR	110	240	110	5.98	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U
HEPTACHLOR EPOXIDE	53	120	53	152	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U
METHOXYCHLOR	310000	130000	130000	--	19 U	19 U	18 U	18 U	18 U
PETROLEUM HYDROCARBONS (mg/kg)									
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--	--
METALS (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	**1.4**	**1.6**	**1.5**	**2.4**	**1.7**
CYANIDE	1600	680	680	0.9	0.55 UJ	0.55 UJ	0.5 UJ	0.5 U	0.55 U
LEAD	400	170	170	11	**11.4**	7.8	3	**23.2**	7.5
ZINC	23000	10000	10000	46	13.2	10.9	11.9	21.8	10.6
MISCELLANEOUS PARAMETERS									
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	--	--
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2008 REMEDIAL INVESTIGATION SAMPLES				
					SB-17-107			SB-17-108	
					0 to 1 ft bgs	1 to 4 ft bgs	4 to 8 ft bgs	0 to 1 ft bgs	1 to 4 ft bgs
VOLATILES (µg/kg)									
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--	--
HERBICIDES (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	22 UJ	28 U	26 UJ	27 UJ	24 U
MONURON	--	--	--	--	22 U	28 U	26 U	27 U	24 U
PROPOXUR	240000	--	240000	--	22 U	28 U	26 U	27 U	24 U
PESTICIDES (µg/kg)									
4,4'-DDD	2000	4500	2000	21	4.1 U	4 U	4.2 U	3.8 U	4.3 U
4,4'-DDE	1400	3200	1400	21	4.1 U	4 U	4.2 U	12	4.3 U
4,4'-DDT	1700	3800	1700	21	19 J	5 UJ	4.2 UJ	8.2 J	5 UJ
ALDRIN	29	64	29	--	2.1 U	2 U	2.1 U	2 U	2.2 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	1.1 J	2 U	2.1 U	2 U	2.2 U
BETA-BHC	270	600	270	--	2.1 U	2 U	2.1 U	2 U	2.2 U
DIELDRIN	30	68	30	--	4.1 U	4 U	4.2 U	3.8 U	4.3 U
ENDOSULFAN I[4]	370000	160000	160000	--	2.1 U	2 U	2.1 U	2 U	2.2 U
ENDRIN	18000	8000	8000	--	4.1 U	4 U	4.2 U	3.8 U	4.3 U
GAMMA-BHC (LINDANE)	520	120	120	5	2.1 U	2 U	2.1 U	2 U	2.2 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	1 J	2 U	2.1 U	2 U	2.2 U
HEPTACHLOR	110	240	110	5.98	2.1 U	2 U	2.1 U	2 U	2.2 U
HEPTACHLOR EPOXIDE	53	120	53	152	2.1 U	2 U	2.1 U	2 U	2.2 U
METHOXYCHLOR	310000	130000	130000	--	21 U	20 U	21 U	20 U	22 U
PETROLEUM HYDROCARBONS (mg/kg)									
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--	--
METALS (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	7.8	6.8	1.5	5.2	3.1
CYANIDE	1600	680	680	0.9	0.6 UJ	0.6 UJ	0.6 UJ	0.55 UJ	0.65 UJ
LEAD	400	170	170	11	9	5.6	2.5	6.2	6.2
ZINC	23000	10000	10000	46	25	18.4	11.9	23	19.9
MISCELLANEOUS PARAMETERS									
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	--	--
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2008 REMEDIAL INVESTIGATION SAMPLES			
					SB-17-109		SB-17-110	SB-17-111
					0 to 1 ft bgs	1 to 4 ft bgs	1 to 4 ft bgs	1 to 4 ft bgs
VOLATILES (µg/kg)								
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--
HERBICIDES (µg/kg)								
MALEIC HYDRAZIDE	31000000	--	31000000	--	22 U	21 U	22 U	22 U
MONURON	--	--	--	--	22 UJ	21 UJ	22 UJ	22 U
PROPOXUR	240000	--	240000	--	22 UJ	21 U	22 U	22 U
PESTICIDES (µg/kg)								
4,4'-DDD	2000	4500	2000	21	11	3.4 UJ	**220**	3.6 U
4,4'-DDE	1400	3200	1400	21	9.3 J	3.4 U	**56 J**	12
4,4'-DDT	1700	3800	1700	21	**180**	3.4 UJ	**1000**	**28 J**
ALDRIN	29	64	29	--	1.8 U	1.8 U	18 U	1.9 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	1.8 U	1.8 U	18 U	1.9 U
BETA-BHC	270	600	270	--	1.8 U	1.8 U	18 U	1.9 U
DIELDRIN	30	68	30	--	3.6 U	3.4 U	36 U	3.6 U
ENDOSULFAN I[4]	370000	160000	160000	--	1.8 UJ	1.8 U	18 UJ	1.9 U
ENDRIN	18000	8000	8000	--	3.6 UJ	3.4 U	36 UJ	3.6 U
GAMMA-BHC (LINDANE)	520	120	120	5	1.8 U	1.8 U	18 U	1.9 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	1.8 U	1.8 U	18 U	1.9 U
HEPTACHLOR	110	240	110	5.98	1.8 U	1.8 U	18 U	1.9 U
HEPTACHLOR EPOXIDE	53	120	53	152	1.8 U	1.8 U	18 U	1.9 U
METHOXYCHLOR	310000	130000	130000	--	18 UJ	18 U	180 UJ	19 U
PETROLEUM HYDROCARBONS (mg/kg)								
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	14
METALS (mg/kg)								
ARSENIC	0.39	0.14	0.14	17	**1.8**	**1.4**	**2.2**	**3.4**
CYANIDE	1600	680	680	0.9	0.55 U	0.5 U	0.55 U	0.55 UJ
LEAD	400	170	170	11	**14.2**	2.6	3.7	7.7
ZINC	23000	10000	10000	46	17.6	11.2	11.7	23.7
MISCELLANEOUS PARAMETERS								
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	--
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2008 REMEDIAL INVESTIGATION SAMPLES				
					SB-17-112		SB-17-113		SB-17-114
					0 to 1 ft bgs	1 to 4 ft bgs	0 to 1 ft bgs	1 to 4 ft bgs	0 to 1 ft bgs
VOLATILES (µg/kg)									
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--	--
HERBICIDES (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	24 U	24 U	27 U	23 U	22 U
MONURON	--	--	--	--	24 UJ	24 U	27 U	23 U	110 UJ
PROPOXUR	240000	--	240000	--	24 UJ	24 UJ	27 U	23 U	110 U
PESTICIDES (µg/kg)									
4,4'-DDD	2000	4500	2000	21	**100**	**520**	8.7	**84**	17
4,4'-DDE	1400	3200	1400	21	**46**	**80**	15	**84**	**22**
4,4'-DDT	1700	3800	1700	21	**1200 J**	**7200 J**	**45 J**	**580 J**	**380 J**
ALDRIN	29	64	29	--	2 U	20 U	1.9 U	2.1 U	1.8 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	7	20 U	1.9 U	14 J	1.8 U
BETA-BHC	270	600	270	--	2 U	20 U	1.9 U	2.1 U	1.8 U
DIELDRIN	30	68	30	--	4 U	40 U	3.6 U	4.1 U	3.6 U
ENDOSULFAN I[4]	370000	160000	160000	--	2 U	20 U	1.9 U	2.1 U	1.8 U
ENDRIN	18000	8000	8000	--	4 U	40 U	3.6 U	4.1 U	3.6 U
GAMMA-BHC (LINDANE)	520	120	120	5	2 U	20 U	1.9 U	2.1 U	1.8 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	7.7	20 U	1.9 U	14	1.8 U
HEPTACHLOR	110	240	110	5.98	2 U	20 U	1.9 UJ	2.1 U	1.8 U
HEPTACHLOR EPOXIDE	53	120	53	152	2 U	20 U	1.9 U	2.1 U	1.8 U
METHOXYCHLOR	310000	130000	130000	--	20 U	200 U	19 U	21 U	18 U
PETROLEUM HYDROCARBONS (mg/kg)									
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--	--
METALS (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	**9.4**	**2.2**	**8.3**	**4.1**	**1.8**
CYANIDE	1600	680	680	0.9	0.6 UJ	0.6 UJ	0.55 UJ	0.6 UJ	0.55 U
LEAD	400	170	170	11	4.7	3.6	**12.4**	**32.3**	**17.8**
ZINC	23000	10000	10000	46	24.6	18.9	29	21	17.6
MISCELLANEOUS PARAMETERS									
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	--	--
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2008 REMEDIAL INVESTIGATION SAMPLES				
					SB-17-114	SB-17-115	SB-17-116	SB-17-117	SB-17-118
					1 to 4 ft bgs	7 to 10 ft bgs	4 to 7 ft bgs	1 to 4 ft bgs	0 to 1 ft bgs
VOLATILES (µg/kg)									
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--	--
HERBICIDES (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	21 U	25 U	26 U	24 U	22 U
MONURON	--	--	--	--	21 U	25 UJ	26 UJ	24 UJ	22 U
PROPOXUR	240000	--	240000	--	21 U	25 U	100	24 UJ	22 U
PESTICIDES (µg/kg)									
4,4'-DDD	2000	4500	2000	21	3.5 U	4 U	4.2 UJ	**60**	7.6
4,4'-DDE	1400	3200	1400	21	0.51 J	4 U	19 J	**160**	**52**
4,4'-DDT	1700	3800	1700	21	16 UJ	4 U	**96 J**	**1100 J**	**210 J**
ALDRIN	29	64	29	--	1.8 U	2.1 U	2.2 UJ	10 U	1.8 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	1.8 U	2.1 U	2.2 UJ	67	1.8 U
BETA-BHC	270	600	270	--	1.8 U	2.1 U	2.2 UJ	10 U	1.8 U
DIELDRIN	30	68	30	--	3.5 U	4 U	4.2 UJ	20 U	3.5 U
ENDOSULFAN I[4]	370000	160000	160000	--	1.8 UJ	2.1 U	2.2 UJ	10 UJ	1.8 U
ENDRIN	18000	8000	8000	--	3.5 UJ	4 U	4.2 UJ	20 UJ	3.5 U
GAMMA-BHC (LINDANE)	520	120	120	5	1.8 U	2.1 U	2.2 UJ	10 U	1.8 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	1.8 U	2.1 U	2.2 UJ	70	1.8 U
HEPTACHLOR	110	240	110	5.98	1.8 U	2.1 U	2.2 UJ	10 U	1.8 U
HEPTACHLOR EPOXIDE	53	120	53	152	1.8 U	2.1 U	2.2 UJ	11 J	1.8 U
METHOXYCHLOR	310000	130000	130000	--	18 UJ	21 U	22 UJ	100 UJ	18 U
PETROLEUM HYDROCARBONS (mg/kg)									
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	1.3 J	--	--	--
METALS (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	**1.8**	**1.1**	**1.5**	**3**	**6.8**
CYANIDE	1600	680	680	0.9	0.5 U	0.6 U	0.6 U	0.6 U	0.5 UJ
LEAD	400	170	170	11	3.4	2	4.2	7.4	9.1
ZINC	23000	10000	10000	46	13.4	12.4	17	23.6	25.1
MISCELLANEOUS PARAMETERS									
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	--	--
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	400 J	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2008 REMEDIAL INVESTIGATION SAMPLES				
					SB-17-118	SB-17-119	SB-17-120		SB-17-121
					1 to 4 ft bgs	1 to 4 ft bgs	2 to 5 ft bgs		7 to 10 ft bgs
							Sample	Duplicate	
VOLATILES (µg/kg)									
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--	--
HERBICIDES (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	23 U	23 U	27 U	26 U	27 U
MONURON	--	--	--	--	23 U	23 U	27 UJ	26 UJ	27 UJ
PROPOXUR	240000	--	240000	--	23 U	23 U	370	470	27 U
PESTICIDES (µg/kg)									
4,4'-DDD	2000	4500	2000	21	3.8 U	3.6 U	**25 J**	**54 J**	**32**
4,4'-DDE	1400	3200	1400	21	10	2.7 J	18 J	**33 J**	15
4,4'-DDT	1700	3800	1700	21	**22 J**	9.7 U	**910 J**	**2200 J**	**830**
ALDRIN	29	64	29	--	2 U	1.9 U	2.2 U	2.3 U	2.1 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	1.3 J	1.2 J	19	21	2.1 U
BETA-BHC	270	600	270	--	2 U	1.9 U	2.2 U	2.3 U	2.1 U
DIELDRIN	30	68	30	--	3.8 U	3.6 U	4.3 U	4.5 U	4.1 U
ENDOSULFAN I[4]	370000	160000	160000	--	2 U	1.9 U	2.2 U	2.3 U	2.1 U
ENDRIN	18000	8000	8000	--	3.8 U	3.6 U	4.3 U	4.5 U	4.1 U
GAMMA-BHC (LINDANE)	520	120	120	5	2 U	1.9 U	2.2 U	2.3 U	2.1 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	1.1 J	1.2 J	19	21	2.1 U
HEPTACHLOR	110	240	110	5.98	2 U	1.9 U	1.7 J	2.3 U	2.1 U
HEPTACHLOR EPOXIDE	53	120	53	152	2 U	1.9 U	2.2 U	2.3 U	2.1 U
METHOXYCHLOR	310000	130000	130000	--	20 UJ	19 U	22 U	23 U	21 U
PETROLEUM HYDROCARBONS (mg/kg)									
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--	6.2 U
METALS (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	**3.2**	**1.4**	**2.2**	**1.8**	**1.1**
CYANIDE	1600	680	680	0.9	0.6 UJ	0.55 U	0.65 U	0.65 U	0.6 U
LEAD	400	170	170	11	6.1	2.4	5.7	5.6	2.3
ZINC	23000	10000	10000	46	18	**54.5**	25.8	31.7	14.2
MISCELLANEOUS PARAMETERS									
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	--	--
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	28000 J	24000 J	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2008 REMEDIAL INVESTIGATION SAMPLES				
					SB-17-121	SB-17-122		SB-17-123	
					12 to 15 ft bgs	4 to 7 ft bgs		0 to 1 ft bgs	1 to 4 ft bgs
						Sample	Duplicate		
VOLATILES (µg/kg)									
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--	--
HERBICIDES (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	12 J	36 UJ	27 U	24 U	24 U
MONURON	--	--	--	--	25 UJ	36 UJ	27 UJ	24 U	24 U
PROPOXUR	240000	--	240000	--	25 U	36 UJ	27 UJ	24 U	24 U
PESTICIDES (µg/kg)									
4,4'-DDD	2000	4500	2000	21	15	5.2 U	4.7 U	3.7 U	20
4,4'-DDE	1400	3200	1400	21	4.4	5 U	4.7 U	3.7 U	**49**
4,4'-DDT	1700	3800	1700	21	**230**	**65 J**	4.8 UJ	3.7 U	**530**
ALDRIN	29	64	29	--	2.1 U	2.6 U	2.4 U	1.9 U	9 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	1.2 J	2.6 U	2.4 U	0.8 J	200 J
BETA-BHC	270	600	270	--	2.1 U	2.6 U	2.4 U	1.9 U	9 U
DIELDRIN	30	68	30	--	4.2 U	5 U	4.7 U	3.7 U	17 U
ENDOSULFAN I[4]	370000	160000	160000	--	2.1 U	2.6 U	2.4 U	1.9 U	9 U
ENDRIN	18000	8000	8000	--	4.2 U	5 U	4.7 U	3.7 U	17 U
GAMMA-BHC (LINDANE)	520	120	120	5	2.1 U	2.6 U	2.4 U	1.9 U	9 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	1.1 J	2.6 U	2.4 U	1 J	**280**
HEPTACHLOR	110	240	110	5.98	2.1 U	2.6 U	2.4 U	1.9 U	**11**
HEPTACHLOR EPOXIDE	53	120	53	152	2.1 U	2.6 U	2.4 U	1.9 U	9 U
METHOXYCHLOR	310000	130000	130000	--	21 U	26 U	24 U	19 U	90 U
PETROLEUM HYDROCARBONS (mg/kg)									
DIESEL RANGE ORGANICS[5]	--	--	100	--	13	**200**	**120**	--	--
METALS (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	**5.2**	**1.5**	**1.3**	**9.1 J**	**1.4 J**
CYANIDE	1600	680	680	0.9	0.65 U	0.7 U	0.7 U	0.5 U	0.5 U
LEAD	400	170	170	11	4.9	3	2.9	5.7	1.8
ZINC	23000	10000	10000	46	33.9	15.2	14.5	32.7	10
MISCELLANEOUS PARAMETERS									
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	--	--
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2008 REMEDIAL INVESTIGATION SAMPLES				
					SB-17-124		SB-17-125		
					0 to 1 ft bgs	1 to 4 ft bgs	0 to 1 ft bgs	1 to 4 ft bgs	6 to 8 ft bgs
VOLATILES (µg/kg)									
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--	--
HERBICIDES (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	25 U	23 U	22 U	23 UJ	25 UJ
MONURON	--	--	--	--	25 UJ	23 UJ	22 UJ	23 UJ	25 UJ
PROPOXUR	240000	--	240000	--	25 UJ	23 UJ	22 UJ	23 UJ	25 UJ
PESTICIDES (µg/kg)									
4,4'-DDD	2000	4500	2000	21	3.8 U	3.9 U	**53**	**39 J**	3.7 U
4,4'-DDE	1400	3200	1400	21	3.8 U	8.3	**250**	**67**	3.7 U
4,4'-DDT	1700	3800	1700	21	3.8 U	**72**	**1200**	**390**	**52**
ALDRIN	29	64	29	--	2 U	2 U	9.6 U	2 U	1.9 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	2 U	2 U	100	32 J	1.9 U
BETA-BHC	270	600	270	--	2 U	2 U	9.6 U	2 U	1.9 U
DIELDRIN	30	68	30	--	3.8 U	3.9 U	19 U	4 U	3.7 U
ENDOSULFAN I[4]	370000	160000	160000	--	2 U	2 U	9.6 U	2 U	1.9 U
ENDRIN	18000	8000	8000	--	3.8 U	3.9 U	19 U	4 U	3.7 U
GAMMA-BHC (LINDANE)	520	120	120	5	2 U	**91**	9.6 U	2 U	1.9 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	2 U	2 U	130	2 U	1.9 U
HEPTACHLOR	110	240	110	5.98	2 U	2 U	9.6 U	2 U	1.9 U
HEPTACHLOR EPOXIDE	53	120	53	152	2 U	2 U	9.6 U	2 U	1.9 U
METHOXYCHLOR	310000	130000	130000	--	20 U	20 U	96 U	20 U	19 U
PETROLEUM HYDROCARBONS (mg/kg)									
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--	--
METALS (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	**8.6**	**4.2**	**5.6 J**	**2.7 J**	0.89 UJ
CYANIDE	1600	680	680	0.9	0.55 U	0.55 U	0.34 J	0.55 U	0.5 U
LEAD	400	170	170	11	6	4.4	**23**	7	1.9
ZINC	23000	10000	10000	46	36.4	16.6	40.8	24.2	13.6
MISCELLANEOUS PARAMETERS									
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	--	--
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2008 REMEDIAL INVESTIGATION SAMPLES			
					SB-17-126		SB-17-127	SB-17-128
					0 to 1 ft bgs	1 to 4 ft bgs	3 to 6 ft bgs	5 to 6 ft bgs
VOLATILES (µg/kg)								
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--
HERBICIDES (µg/kg)								
MALEIC HYDRAZIDE	31000000	--	31000000	--	21 U	22 U	24 U	25 UJ
MONURON	--	--	--	--	21 UJ	22 U	24 U	61 J
PROPOXUR	240000	--	240000	--	21 UJ	22 U	24 U	15 J
PESTICIDES (µg/kg)								
4,4'-DDD	2000	4500	2000	21	3.5 UJ	3.6 UJ	3.9 UJ	4.5 UJ
4,4'-DDE	1400	3200	1400	21	19	3.6 U	3.9 U	4.5 U
4,4'-DDT	1700	3800	1700	21	**110**	4.8 U	3.9 U	4.5 U
ALDRIN	29	64	29	--	1.8 U	1.9 U	2 U	2.3 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	13 J	1.9 U	3.5	2.3 U
BETA-BHC	270	600	270	--	1.8 U	1.9 U	2 U	2.3 U
DIELDRIN	30	68	30	--	3.5 U	3.6 U	3.9 U	4.5 U
ENDOSULFAN I[4]	370000	160000	160000	--	1.8 U	1.9 U	2 U	2.3 U
ENDRIN	18000	8000	8000	--	3.5 U	3.6 U	3.9 U	4.5 U
GAMMA-BHC (LINDANE)	520	120	120	5	1.8 U	1.9 U	2 U	2.3 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	17 J	1.9 U	3.8 J	1.1 J
HEPTACHLOR	110	240	110	5.98	1.8 U	1.9 U	2 U	2.3 U
HEPTACHLOR EPOXIDE	53	120	53	152	1.8 U	1.9 U	2 U	2.3 U
METHOXYCHLOR	310000	130000	130000	--	18 U	19 U	20 U	23 U
PETROLEUM HYDROCARBONS (mg/kg)								
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--
METALS (mg/kg)								
ARSENIC	0.39	0.14	0.14	17	**3 J**	**1.6 J**	0.99 UJ	**1.4 J**
CYANIDE	1600	680	680	0.9	0.5 U	0.5 U	0.65 U	0.65 U
LEAD	400	170	170	11	**20.6**	2.5	2.1	3.6
ZINC	23000	10000	10000	46	38	15	10.3	21.6
MISCELLANEOUS PARAMETERS								
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	--
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2008 REMEDIAL INVESTIGATION SAMPLES			
					SB-17-129		SB-17-130	
					3 to 6 ft bgs		0 to 1 ft bgs	1 to 4 ft bgs
					Sample	Duplicate		
VOLATILES (µg/kg)								
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--
HERBICIDES (µg/kg)								
MALEIC HYDRAZIDE	31000000	--	31000000	--	25 UJ	42 UJ	21 U	22 U
MONURON	--	--	--	--	550 J	210 J	21 UJ	22 U
PROPOXUR	240000	--	240000	--	94 J	210 UJ	21 UJ	22 U
PESTICIDES (µg/kg)								
4,4'-DDD	2000	4500	2000	21	5.3 U	5.5 U	3.6 UJ	3.6 U
4,4'-DDE	1400	3200	1400	21	5.3 U	5.5 U	4.6	3.6 U
4,4'-DDT	1700	3800	1700	21	5.3 U	5.5 U	26 U	3.6 U
ALDRIN	29	64	29	--	2.7 U	2.8 U	1.8 U	1.9 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	2.7 U	2.8 U	0.99 J	1.9 U
BETA-BHC	270	600	270	--	2.7 U	2.8 U	1.8 U	1.9 U
DIELDRIN	30	68	30	--	5.3 U	5.5 U	3.6 U	3.6 U
ENDOSULFAN I[4]	370000	160000	160000	--	2.7 U	2.8 U	1.8 U	1.9 U
ENDRIN	18000	8000	8000	--	5.3 U	5.5 U	3.6 U	3.6 U
GAMMA-BHC (LINDANE)	520	120	120	5	2.7 U	2.8 U	1.8 U	1.9 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	2.7 U	2.8 U	1.8 U	1.9 U
HEPTACHLOR	110	240	110	5.98	2.7 U	2.8 U	1.8 U	1.9 U
HEPTACHLOR EPOXIDE	53	120	53	152	2.7 U	2.8 U	1.8 U	1.9 U
METHOXYCHLOR	310000	130000	130000	--	27 U	28 U	18 U	19 U
PETROLEUM HYDROCARBONS (mg/kg)								
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--
METALS (mg/kg)								
ARSENIC	0.39	0.14	0.14	17	**2 J**	**8.7 J**	**5.9 J**	**1.7 J**
CYANIDE	1600	680	680	0.9	0.7 U	0.8 U	0.5 U	0.6
LEAD	400	170	170	11	4.7	4.3	**23.8**	4.4
ZINC	23000	10000	10000	46	17.5	20.2	46	12.6
MISCELLANEOUS PARAMETERS								
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	--
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2008 REMEDIAL INVESTIGATION SAMPLES				
					SB-17-131		SB-17-132		
					0 to 1 ft bgs	1 to 4 ft bgs	0 to 1 ft bgs	1 to 4 ft bgs Sample	1 to 4 ft bgs Duplicate
VOLATILES (µg/kg)									
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--	--
HERBICIDES (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	22 UJ	23 U	22 U	26 UJ	25 UJ
MONURON	--	--	--	--	22 U	23 U	22 UJ	26 UJ	130 U
PROPOXUR	240000	--	240000	--	22 U	23 U	22 UJ	26 UJ	130 U
PESTICIDES (µg/kg)									
4,4'-DDD	2000	4500	2000	21	3.7 U	3.8 U	3.7 U	4.2 U	4.2 U
4,4'-DDE	1400	3200	1400	21	**34**	8.4	3.4 J	12	9.9
4,4'-DDT	1700	3800	1700	21	**77**	**47**	5.4 U	11 U	15 U
ALDRIN	29	64	29	--	1.9 U	2 U	1.9 U	2.2 U	2.2 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	1.9 U	0.78 J	1.9 U	2.2 U	2.2 U
BETA-BHC	270	600	270	--	1.9 U	2 U	1.9 U	2.2 U	2.2 U
DIELDRIN	30	68	30	--	3.7 U	3.8 U	3.7 U	4.2 U	4.2 U
ENDOSULFAN I[4]	370000	160000	160000	--	1.9 U	2 U	1.9 U	2.2 U	2.2 U
ENDRIN	18000	8000	8000	--	3.7 U	3.8 U	3.7 U	4.2 U	4.2 U
GAMMA-BHC (LINDANE)	520	120	120	5	1.9 U	2 U	1.9 U	2.2 U	2.2 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	1.9 U	1 J	1.9 U	2.2 U	2.2 U
HEPTACHLOR	110	240	110	5.98	1 J	2 U	1.9 U	2.2 U	2.2 U
HEPTACHLOR EPOXIDE	53	120	53	152	1.9 U	2 U	1.9 U	2.2 U	2.2 U
METHOXYCHLOR	310000	130000	130000	--	19 U	20 U	19 U	22 U	22 U
PETROLEUM HYDROCARBONS (mg/kg)									
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--	--
METALS (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	**6.8 J**	**6 J**	**6.9 J**	**3.4 J**	**3.6 J**
CYANIDE	1600	680	680	0.9	0.5 U	0.55 U	0.55 U	0.6 U	0.6 U
LEAD	400	170	170	11	**37.5**	6.2	**12.3**	**12.6**	**12.8**
ZINC	23000	10000	10000	46	**47.7**	25.5	34.4	27.8	29.6
MISCELLANEOUS PARAMETERS									
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	--	--
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2008 REMEDIAL INVESTIGATION SAMPLES			
					SB-17-132		SB-17-133	
					4 to 8 ft bgs		0 to 1 ft bgs	1 to 4 ft bgs
					Sample	Duplicate		
VOLATILES (µg/kg)								
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--
HERBICIDES (µg/kg)								
MALEIC HYDRAZIDE	31000000	--	31000000	--	31 U	37 U	24 UJ	27 U
MONURON	--	--	--	--	20 J	140 J	24 U	17 J
PROPOXUR	240000	--	240000	--	31 U	37 U	24 U	27 U
PESTICIDES (µg/kg)								
4,4'-DDD	2000	4500	2000	21	8.4 U	6.8 U	4 U	4.1 U
4,4'-DDE	1400	3200	1400	21	8.4 U	6.8 U	**33 J**	1.8 J
4,4'-DDT	1700	3800	1700	21	8.4 UJ	6.8 UJ	31 U	4.1 U
ALDRIN	29	64	29	--	4.3 U	3.5 U	2.1 U	2.1 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	4.3 U	3.5 U	2.1 U	2.1 U
BETA-BHC	270	600	270	--	4.3 U	3.5 U	2.1 U	2.1 U
DIELDRIN	30	68	30	--	8.4 U	6.8 U	4 U	4.1 U
ENDOSULFAN I[4]	370000	160000	160000	--	4.3 U	3.5 U	2.1 UJ	2.1 UJ
ENDRIN	18000	8000	8000	--	8.4 U	6.8 U	4 UJ	4.1 UJ
GAMMA-BHC (LINDANE)	520	120	120	5	4.3 U	3.5 U	1.5 J	2.1 UJ
GAMMA-CHLORDANE[3]	1600	3600	1600	224	4.3 U	3.5 U	2.1 U	2.1 U
HEPTACHLOR	110	240	110	5.98	4.3 U	3.5 U	2.1 U	2.1 U
HEPTACHLOR EPOXIDE	53	120	53	152	4.3 U	3.5 U	2.1 U	2.1 U
METHOXYCHLOR	310000	130000	130000	--	43 UJ	35 UJ	21 U	21 U
PETROLEUM HYDROCARBONS (mg/kg)								
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--
METALS (mg/kg)								
ARSENIC	0.39	0.14	0.14	17	**4.4**	**3.6**	**7.9 J**	**2 J**
CYANIDE	1600	680	680	0.9	1.3 UJ	1 UJ	0.6 U	0.6 U
LEAD	400	170	170	11	6.3	5.2	**16.6**	4.1
ZINC	23000	10000	10000	46	33.4	25.7	36.1	13.7
MISCELLANEOUS PARAMETERS								
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	--
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2008 REMEDIAL INVESTIGATION SAMPLES				
					SB-17-141	SB-17-142		SB-17-143	SB-17-144
					3 to 7 ft bgs	2 to 3 ft bgs		2 to 3 ft bgs	2 to 3 ft bgs
						Sample	Duplicate		
VOLATILES (µg/kg)									
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--	--
HERBICIDES (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	30 U	--	--	--	--
MONURON	--	--	--	--	100	--	--	--	--
PROPOXUR	240000	--	240000	--	30 U	--	--	--	--
PESTICIDES (µg/kg)									
4,4'-DDD	2000	4500	2000	21	5 U	3.7 UJ	3.6 UJ	3.6 U	3.8 U
4,4'-DDE	1400	3200	1400	21	5 U	3.7 U	3.6 U	3.6 UJ	13 J
4,4'-DDT	1700	3800	1700	21	13 J	3.7 U	3.6 U	3.6 U	**82 J**
ALDRIN	29	64	29	--	2.6 U	1.9 U	1.9 U	1.9 U	1.9 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	2.6 U	1.9 U	1.9 U	1.9 U	14
BETA-BHC	270	600	270	--	2.6 U	1.9 U	1.9 U	1.9 U	1.9 U
DIELDRIN	30	68	30	--	5 U	3.7 U	3.6 U	3.6 U	3.8 U
ENDOSULFAN I[4]	370000	160000	160000	--	2.6 U	1.9 U	1.9 U	1.9 UJ	1.9 UJ
ENDRIN	18000	8000	8000	--	5 U	3.7 U	3.6 U	3.6 UJ	3.8 UJ
GAMMA-BHC (LINDANE)	520	120	120	5	2.6 U	1.9 U	1.9 U	1.9 UJ	1.9 UJ
GAMMA-CHLORDANE[3]	1600	3600	1600	224	2.6 U	1.9 U	1.9 U	1.9 U	17
HEPTACHLOR	110	240	110	5.98	2.6 U	1.9 U	1.9 U	1.9 U	1.9 U
HEPTACHLOR EPOXIDE	53	120	53	152	2.6 U	1.9 U	1.9 U	1.9 U	1.9 U
METHOXYCHLOR	310000	130000	130000	--	26 UJ	19 U	19 U	19 U	19 U
PETROLEUM HYDROCARBONS (mg/kg)									
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--	--
METALS (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	**1.9**	--	--	--	--
CYANIDE	1600	680	680	0.9	0.75 UJ	--	--	--	--
LEAD	400	170	170	11	3	--	--	--	--
ZINC	23000	10000	10000	46	15.6	--	--	--	--
MISCELLANEOUS PARAMETERS									
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	--	--
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2009 SUPPLEMENTAL SAMPLES				
					SB-17-145	SB-17-146	SB-17-147	SB-17-148	SB-17-149
					2 to 3 ft bgs	1 to 4 ft bgs	1 to 4 ft bgs	1 to 4 ft bgs	1 to 4 ft bgs
VOLATILES (µg/kg)									
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--	--
HERBICIDES (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	--	--	--	--	--
MONURON	--	--	--	--	--	--	--	--	--
PROPOXUR	240000	--	240000	--	--	--	--	--	--
PESTICIDES (µg/kg)									
4,4'-DDD	2000	4500	2000	21	3.6 U	5.3	**41**	**84**	**88**
4,4'-DDE	1400	3200	1400	21	8.9 J	**33**	**63**	20	**36**
4,4'-DDT	1700	3800	1700	21	**64**	**34**	**820**	**750**	**120**
ALDRIN	29	64	29	--	1.9 U	2.1 U	2.1 U	2.1 U	2.1 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	11	0.87 J	1.1 J	2.1	5.9
BETA-BHC	270	600	270	--	1.9 U	2.1 U	2.1 U	2.1 U	2.1 U
DIELDRIN	30	68	30	--	3.6 U	1.4 J	9.6	43	25
ENDOSULFAN I[4]	370000	160000	160000	--	1.9 UJ	2.1 U	5.9	4.3	2.1 U
ENDRIN	18000	8000	8000	--	3.6 UJ	4.1 U	4.2 U	4 U	4 U
GAMMA-BHC (LINDANE)	520	120	120	5	1.9 UJ	2.1 U	2.1 U	2.1 U	2.1 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	10	0.81 J	1.1 J	2.2	4.1
HEPTACHLOR	110	240	110	5.98	1.9 U	2.1 U	2.1 U	2.1 U	2.1 U
HEPTACHLOR EPOXIDE	53	120	53	152	1.9 U	2.1 U	2.1 U	2.1 U	2.1 U
METHOXYCHLOR	310000	130000	130000	--	19 U	21 U	21 U	21 U	21 U
PETROLEUM HYDROCARBONS (mg/kg)									
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--	--
METALS (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	--	--	--	--	--
CYANIDE	1600	680	680	0.9	--	--	--	--	--
LEAD	400	170	170	11	--	--	--	--	--
ZINC	23000	10000	10000	46	--	--	--	--	--
MISCELLANEOUS PARAMETERS									
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	--	--
TOTAL SOLIDS (%)	--	--	--	--	--	80	79	82	82
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2009 SUPPLEMENTAL SAMPLES				
					SB-17-150	SB-17-151	SB-17-152	SB-17-154	
					2 to 5 ft bgs	2 to 5 ft bgs	2 to 5 ft bgs	2 to 5 ft bgs	
								Sample	Duplicate
VOLATILES (µg/kg)									
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--	--
HERBICIDES (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	--	--	--	--	--
MONURON	--	--	--	--	--	--	--	--	--
PROPOXUR	240000	--	240000	--	--	--	--	--	--
PESTICIDES (µg/kg)									
4,4'-DDD	2000	4500	2000	21	1.2 J	2.2 J	3.9 U	3.6 J	9.5
4,4'-DDE	1400	3200	1400	21	2.9 J	13	**43**	12	18
4,4'-DDT	1700	3800	1700	21	10	**120**	**330**	**150**	**210**
ALDRIN	29	64	29	--	2 U	2.1 U	2 U	2.3 U	2.3 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	0.81 J	0.96 J	**700**	58	96
BETA-BHC	270	600	270	--	2 U	2.1 U	8.9	2.3 U	2.3 U
DIELDRIN	30	68	30	--	0.75 J	0.68 J	23	0.99 J	2.5 J
ENDOSULFAN I[4]	370000	160000	160000	--	2 U	2.1 U	2 U	2.3 U	2.3 U
ENDRIN	18000	8000	8000	--	3.9 U	4.1 U	3.9 U	4.6 U	4.5 U
GAMMA-BHC (LINDANE)	520	120	120	5	2 U	2.1 U	2 U	2.3 U	1 J
GAMMA-CHLORDANE[3]	1600	3600	1600	224	0.87 J	0.93 J	**760**	62	100
HEPTACHLOR	110	240	110	5.98	2 U	2.1 U	**270**	**7.6**	**12**
HEPTACHLOR EPOXIDE	53	120	53	152	0.61 J	0.62 J	2 U	2.3 U	2.3 U
METHOXYCHLOR	310000	130000	130000	--	20 U	21 U	20 U	23 U	23 U
PETROLEUM HYDROCARBONS (mg/kg)									
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--	--
METALS (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	--	--	--	--	--
CYANIDE	1600	680	680	0.9	--	--	--	--	--
LEAD	400	170	170	11	--	--	--	--	--
ZINC	23000	10000	10000	46	--	--	--	--	--
MISCELLANEOUS PARAMETERS									
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	--	--
TOTAL SOLIDS (%)	--	--	--	--	85	80	84	72	73
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2010 SUPPLEMENTAL SAMPLES				
					SB-17-155	SB-17-202	SB-17-203	SB-17-205	
					2 to 5 ft bgs	2 to 5 ft bgs	2 to 5 ft bgs	2 to 5 ft bgs	
								Sample	Duplicate
VOLATILES (µg/kg)									
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--	--
HERBICIDES (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	--	--	--	--	--
MONURON	--	--	--	--	--	--	--	--	--
PROPOXUR	240000	--	240000	--	--	--	--	--	--
PESTICIDES (µg/kg)									
4,4'-DDD	2000	4500	2000	21	3.5 U	**190 J**	**200 J**	**91**	**110**
4,4'-DDE	1400	3200	1400	21	0.84 J	**280 J**	**1000 J**	**85**	**73 J**
4,4'-DDT	1700	3800	1700	21	1.4 J	**8600 J**	**10000 J**	**4000**	**3400 J**
ALDRIN	29	64	29	--	1.8 U	0.2 UJ	0.18 UJ	0.21 U	0.21 U
ALPHA-CHLORDANE[3]	1600	3600	1600	224	1.8	**520 J**	**2900 J**	160 J	170 J
BETA-BHC	270	600	270	--	1.8 U	0.2 UJ	0.18 UJ	0.21 U	0.21 U
DIELDRIN	30	68	30	--	3.5 U	0.38 UJ	0.35 UJ	0.4 U	0.4 U
ENDOSULFAN I[4]	370000	160000	160000	--	1.8 U	0.2 UJ	0.18 UJ	0.21 U	0.21 U
ENDRIN	18000	8000	8000	--	3.5 U	0.38 UJ	0.35 UJ	0.4 U	0.4 U
GAMMA-BHC (LINDANE)	520	120	120	5	1.8 U	0.2 UJ	0.18 UJ	0.21 U	0.21 U
GAMMA-CHLORDANE[3]	1600	3600	1600	224	1.9	**460 J**	**2600 J**	160	190 J
HEPTACHLOR	110	240	110	5.98	1.8 U	**38 J**	**200 J**	**45 J**	**45 J**
HEPTACHLOR EPOXIDE	53	120	53	152	0.95 J	**100 J**	**580 J**	**180 J**	**250 J**
METHOXYCHLOR	310000	130000	130000	--	18 U	2 UJ	1.8 UJ	2.1 U	2.1 U
PETROLEUM HYDROCARBONS (mg/kg)									
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--	--
METALS (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	--	--	--	--	--
CYANIDE	1600	680	680	0.9	--	--	--	--	--
LEAD	400	170	170	11	--	--	--	--	--
ZINC	23000	10000	10000	46	--	--	--	--	--
MISCELLANEOUS PARAMETERS									
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	--	--
TOTAL SOLIDS (%)	--	--	--	--	94	83	89	78	80
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2010 SUPPLEMENTAL SAMPLES				
					SB-17-206		SB-17-207		SB-17-208
					0 to 1 ft bgs	1 to 3 ft bgs	0 to 1 ft bgs	1 to 3 ft bgs	0 to 1 ft bgs
VOLATILES (µg/kg)									
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--	--
HERBICIDES (µg/kg)									
MALEIC HYDRAZIDE	31000000	--	31000000	--	--	--	--	--	--
MONURON	--	--	--	--	--	--	--	--	--
PROPOXUR	240000	--	240000	--	--	--	--	--	--
PESTICIDES (µg/kg)									
4,4'-DDD	2000	4500	2000	21	**24 J**	**63 J**	**28 J**	21 J	13 J
4,4'-DDE	1400	3200	1400	21	**34 J**	**72 J**	**89 J**	**44 J**	**26 J**
4,4'-DDT	1700	3800	1700	21	**220 J**	**650 J**	**920 J**	**590 J**	**97 J**
ALDRIN	29	64	29	--	0.17 UJ	0.18 UJ	0.19 UJ	0.18 UJ	0.18 UJ
ALPHA-CHLORDANE[3]	1600	3600	1600	224	**840 J**	**3100 J**	**240 J**	170 J	32 J
BETA-BHC	270	600	270	--	0.17 UJ	0.18 UJ	0.19 UJ	0.18 UJ	0.18 UJ
DIELDRIN	30	68	30	--	0.34 UJ	0.35 UJ	0.36 UJ	0.35 UJ	0.34 UJ
ENDOSULFAN I[4]	370000	160000	160000	--	0.17 UJ	0.18 UJ	0.19 UJ	0.18 UJ	0.18 UJ
ENDRIN	18000	8000	8000	--	0.34 UJ	0.35 UJ	0.36 UJ	0.35 UJ	0.34 UJ
GAMMA-BHC (LINDANE)	520	120	120	5	0.17 UJ	0.18 UJ	0.19 UJ	0.18 UJ	0.18 UJ
GAMMA-CHLORDANE[3]	1600	3600	1600	224	**760 J**	**2700 J**	180 J	140 J	19 J
HEPTACHLOR	110	240	110	5.98	**69 J**	**390 J**	**28 J**	**26 J**	0.66 J
HEPTACHLOR EPOXIDE	53	120	53	152	**130 J**	**530 J**	**63 J**	45 J	5.6 J
METHOXYCHLOR	310000	130000	130000	--	1.7 UJ	1.8 UJ	1.9 UJ	1.8 UJ	1.8 UJ
PETROLEUM HYDROCARBONS (mg/kg)									
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--	--
METALS (mg/kg)									
ARSENIC	0.39	0.14	0.14	17	**3.9**	**2.9**	**6.4**	**6**	**7.5**
CYANIDE	1600	680	680	0.9	0.4 U	0.4 U	0.44 U	0.4 U	0.4 U
LEAD	400	170	170	11	**14.4**	**15.9**	6.8	3.8	5.9
ZINC	23000	10000	10000	46	28.9	28.1	24.5	19	24.3
MISCELLANEOUS PARAMETERS									
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	--	--
TOTAL SOLIDS (%)	--	--	--	--	97	94	90	94	94
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

PARAMETER	EPA RESIDENTIAL RSL[1]	MAINE RAGs[2]	MINIMUM SCREENING LEVEL	MINIMUM ESL	2010 SUPPLEMENTAL SAMPLES					
					SB-17-208		SB-17-209		SB-17-210	
					1 to 3 ft bgs		0 to 1 ft bgs	1 to 3 ft bgs	0 to 1 ft bgs	1 to 3 ft bgs
					Sample	Duplicate				
VOLATILES (µg/kg)										
TETRACHLOROETHENE	550	2600	550	--	--	--	--	--	--	--
HERBICIDES (µg/kg)										
MALEIC HYDRAZIDE	31000000	--	31000000	--	--	--	--	--	--	--
MONURON	--	--	--	--	--	--	--	--	--	--
PROPOXUR	240000	--	240000	--	--	--	--	--	--	--
PESTICIDES (µg/kg)										
4,4'-DDD	2000	4500	2000	21	3 J	--	7.7 J	6.7	3.2 J	1.1 J
4,4'-DDE	1400	3200	1400	21	5.4 J	--	**22 J**	16	21 J	5.9 J
4,4'-DDT	1700	3800	1700	21	**36 J**	--	**62 J**	**81 J**	**57 J**	14 J
ALDRIN	29	64	29	--	0.18 UJ	--	0.18 UJ	0.18 U	0.18 UJ	0.18 UJ
ALPHA-CHLORDANE[3]	1600	3600	1600	224	7.6 J	--	13 J	8.2	11 J	2.8 J
BETA-BHC	270	600	270	--	0.18 UJ	--	0.18 UJ	0.18 U	0.18 UJ	0.18 UJ
DIELDRIN	30	68	30	--	0.34 UJ	--	0.35 UJ	0.35 U	0.35 UJ	0.35 UJ
ENDOSULFAN I[4]	370000	160000	160000	--	0.18 UJ	--	0.18 UJ	0.18 U	0.18 UJ	0.18 UJ
ENDRIN	18000	8000	8000	--	0.34 UJ	--	0.35 UJ	0.35 U	0.35 UJ	0.35 UJ
GAMMA-BHC (LINDANE)	520	120	120	5	0.18 UJ	--	0.18 UJ	0.18 U	0.18 UJ	0.18 UJ
GAMMA-CHLORDANE[3]	1600	3600	1600	224	6.3 J	--	7.6 J	6.7	6.7 J	2 J
HEPTACHLOR	110	240	110	5.98	0.21 J	--	0.38 J	0.18 U	0.25 J	0.24 J
HEPTACHLOR EPOXIDE	53	120	53	152	1.7 J	--	1.7 J	0.81 J	1.5 J	0.18 UJ
METHOXYCHLOR	310000	130000	130000	--	1.8 UJ	--	1.8 UJ	1.8 U	1.8 UJ	1.8 UJ
PETROLEUM HYDROCARBONS (mg/kg)										
DIESEL RANGE ORGANICS[5]	--	--	100	--	--	--	--	--	--	--
METALS (mg/kg)										
ARSENIC	0.39	0.14	0.14	17	**5**	**7.4**	**6.3**	**6.2**	**7.1**	**3.6**
CYANIDE	1600	680	680	0.9	0.4 U	0.4 U	0.44 U	0.44 U	0.44 U	0.44 U
LEAD	400	170	170	11	5	6.3	5.6	5.3	8	**11.8**
ZINC	23000	10000	10000	46	17.3	24	20.3	19.3	26.9	21.5
MISCELLANEOUS PARAMETERS										
PERCENT MOISTURE (%)	--	--	--	--	--	--	--	--	--	--
TOTAL SOLIDS (%)	--	--	--	--	94	94	94	93	93	91
TOTAL ORGANIC CARBON (MG/KG)	--	--	--		--	--	--	--	--	--

TABLE 4-3
SUMMARY OF SOIL ANALYTICAL DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

This table includes results for all parameters detected in at least one sample in this media subgroup.

2 Maine Remedial Action Guidelines (RAGs) for Soil Contaminated with Hazardous Substances. (January, 2010). http://www.maine.gov/dep/rwm/publications/guidance/index.htm

3 Chlordane value used as a surrogate.

4 Endosulfan value used as a surrogate.

5 The value listed as the minimum screening criteria for diesel-range organics is the stringent soil remediation goal for oil contaminated soil as presented in the document titled, "Procedural Guidelines for Establishing and Implementing Action Levels and Remediation Goals for the Remediation of Oil Contaminated Soil and Groundwater in Maine" (MEDEP, January 1, 2009).

U - Not detected.

J - Estimated result.

Concentration exceeds RSL/RAG.
Concentration exceeds minimum ESL.
Concentration exceeds RSL/RAG and minimum ESL.

ESL Sources (see Appendix C.2):

Ecological Soil Screening Levels (Eco SSLs) (EPA, 2008).

Canadian Council of Ministers of the Environment (CCME) Recommended Canadian Soil Quality Guidelines (2006).

EPA, Region 5, RCRA Ecological Screening Levels, August 22, 2003.

TABLE 4-4
SUMMARY OF POST-RI/PRE-REMOVAL ACTION GROUNDWATER ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

PARAMETER	EPA MCL[2]	MEDEP MEG[1]	VI[3]	MINIMUM SCREENING CRITERION	MW-17-01	MW-17-03	MW-17-04	MW-NASB-065
PESTICIDES (µg/L)								
4,4'-DDD	NC	1	NC	1	0.05 UJ	0.05 UJ	0.056 UJ	0.056 UJ
4,4'-DDE	NC	1	15	1	0.05 UJ	0.05 UJ	0.056 UJ	0.056 UJ
4,4'-DDT	NC	1	NC	1	0.05 UJ	0.05 UJ	0.042 J	0.056 UJ
HEPTACHLOR EPOXIDE	0.2	0.04	NC	0.04	0.05 UJ	0.05 UJ	**0.17 J**	0.056 UJ
EPH (µg/L)								
2-METHYLNAPHTHALENE	NC	30	NC	30	5 U	5.1 U	5.8 UJ	5 U
C11-C22 AROMATICS	NC	200	NC	200	100 U	100 U	120 UJ	100 U
C19-C36 ALIPHATICS	NC	10000	NC	10000	200 U	338	200 UJ	263
C9-C18 ALIPHATICS	NC	700	NC	700	200 U	100 U	200 UJ	100 U
NAPHTHALENE	NC	10	4	4	5 U	5.1 U	5.8 UJ	5 U
VPH (µg/L)								
METHYL TERT-BUTYL ETHER	NC	35	390	35	1 U	5.6	1 U	1 U

TABLE 4-4
SUMMARY OF POST-RI/PRE-REMOVAL ACTION GROUNDWATER ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

PARAMETER	MINIMUM SCREENING CRITERION	MW-NASB-066	MW-NASB-067	MW-NASB-068	MW-NASB-097			MW-NASB-098
					Sample	Duplicate	Average	
PESTICIDES (µg/L)								
4,4'-DDD	1	0.054 UJ	0.098 J	0.054 UJ	0.069 J	0.06 UJ	0.05	0.056 UJ
4,4'-DDE	1	0.054 UJ	0.057 U	0.054 UJ	0.034 J	0.06 UJ	0.034 J	0.056 UJ
4,4'-DDT	1	0.054 UJ	0.28 J	0.054 UJ	0.1 J	0.066 J	0.083	0.056 UJ
HEPTACHLOR EPOXIDE	0.04	0.054 UJ	0.057 UJ	0.054 UJ	0.061 UJ	0.06 UJ	0.061 U	0.056 UJ
EPH (µg/L)								
2-METHYLNAPHTHALENE	30	5.6 U	5 U	5 U	6.7 U	6 U	6.4 U	5.7 U
C11-C22 AROMATICS	200	110 U	100 U	100 U	**241**	170	**206**	110 U
C19-C36 ALIPHATICS	10000	200 U	200 U	511	875	775	825	200 U
C9-C18 ALIPHATICS	700	200 U	200 U	100 U	130 U	120 U	125 U	200 U
NAPHTHALENE	4	5.6 U	5 U	5 U	6.7 U	6 U	6.4 U	5.7 U
VPH (µg/L)								
METHYL TERT-BUTYL ETHER	35	1.4	1.6	1 U	1 U	1 U	1 U	1 U

This table includes results for all parameters detected during the September 2010 monitoring event in at least one sample in media subgroup.

1 Maine CDC, February 4, 2011. Maximum Exposure Guidelines (MEGs) for Drinking Water.

2 United States Environmental Protection Agency Regions 3, 6, and 9. (November, 2010). Regional Screening Levels for Chemical Contaminants at Superfund Sites. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm

3 Calculated based on methodology in Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils. November 2002 (EPA530-F-02-052)

Bolded cells indicate that detected concentration exceeds the minimum screening criterion.

U - Not detected.

J - Estimated result.

NA - Not analyzed.

TABLE 4-5
SUMMARY OF GROUNDWATER DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

PARAMETER	EPA MCL[2]	MEDEP MEG[1]	VI[3]	MW-17-01	MW-17-02R	MW-17-03	MW-17-04	MW-NASB-065
PESTICIDES (µg/L)								
4,4'-DDD	NC	1	NC	0.018 UJ	**1.2**	0.019 UJ	0.019 UJ	0.018 UJ
4,4'-DDE	NC	1	15	0.015 UJ	0.032 J	0.016 UJ	0.016 UJ	0.015 UJ
4,4'-DDT	NC	1	NC	0.019 UJ	0.30	0.020 UJ	0.020 J	0.019 UJ
VPH (µg/L)								
METHYL TERT-BUTYL ETHER	NC	35	390	1.4	1.0 U	5.6	1.0 U	1.0 U

TABLE 4-5
SUMMARY OF GROUNDWATER DATA FOR CURRENT CONDITIONS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

PARAMETER	EPA MCL[2]	MEDEP MEG[1]	VI[3]	MW-NASB-066	MW-NASB-068	MW-NASB-097			MW-NASB-098
						Sample	Duplicate	Average	
PESTICIDES (µg/L)									
4,4'-DDD	NC	1	NC	0.018 UJ	0.018 UJ	0.018 UJ	0.065	0.04 U	0.020 UJ
4,4'-DDE	NC	1	15	0.014 UJ	0.015 UJ	0.014 UJ	0.015 U	0.015 U	0.016 UJ
4,4'-DDT	NC	1	NC	0.018 UJ	0.019 UJ	**1.3**	**1.6**	**1.45**	0.02 UJ
VPH (µg/L)									
METHYL TERT-BUTYL ETHER	NC	35	390	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

This table includes results for all parameters detected during the April 2011 monitoring event in at least one sample in media subgroup.

1 Maine CDC, February 4, 2011. Maximum Exposure Guidelines (MEGs) for Drinking Water.

2 United States Environmental Protection Agency Regions 3, 6, and 9. (November, 2010). Regional Screening Levels for Chemical Contaminants at Superfund Sites. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm

3 Calculated based on methodology in Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils. November 2002 (EPA530-F-02-052)

Shaded cells indicate that detected concentration exceeds the minimum screening criterion.

U - Not detected.

J - Estimated result.

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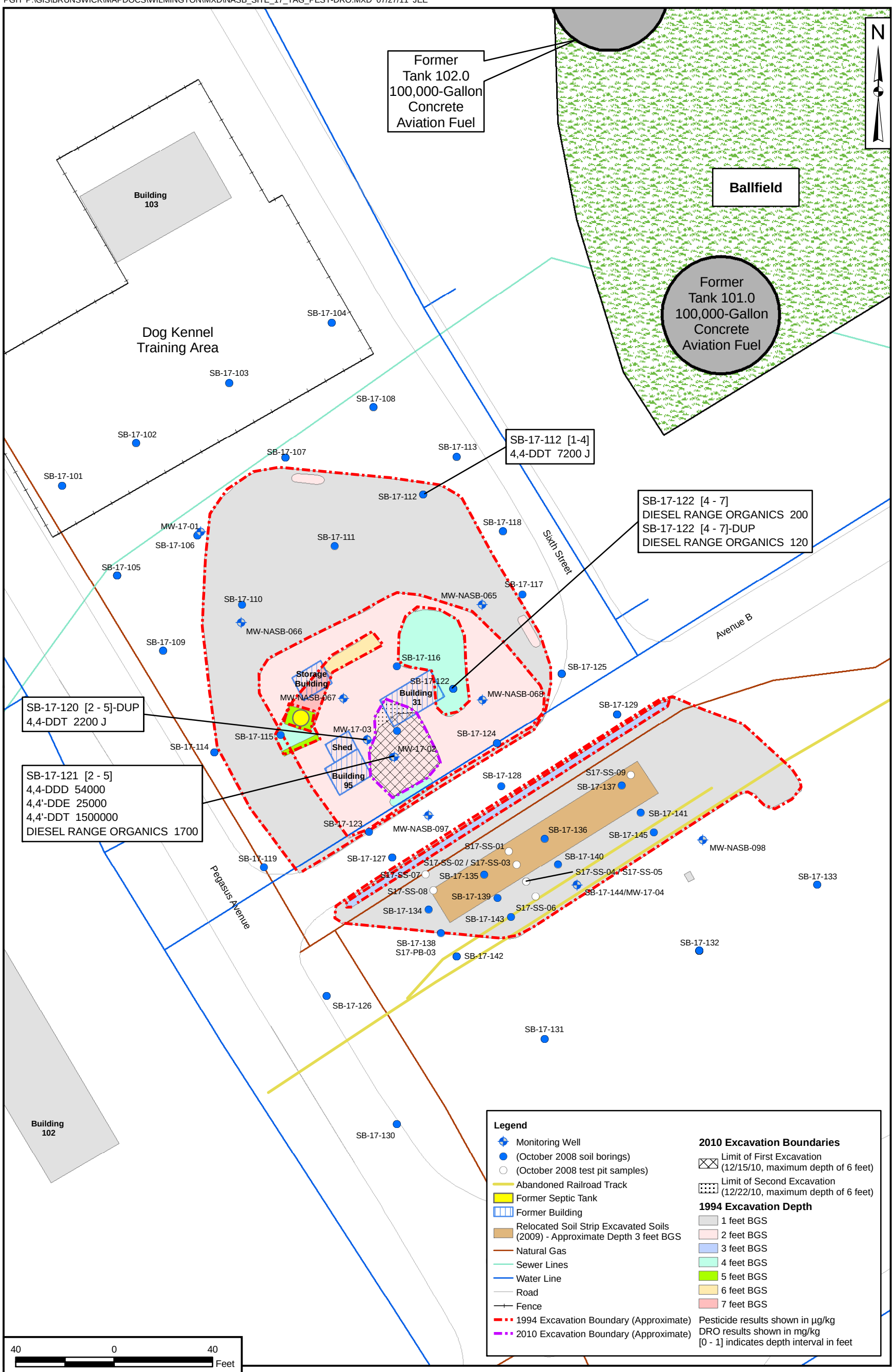

DRAWN BY K. MOORE	DATE 03/17/11	2008 SOIL SAMPLES HUMAN HEALTH EXCEEDANCES - PESTICIDES AND DRO SITE 17 NAVAL AIR STATION BRUNSWICK, MAINE	CONTRACT NUMBER _____ / CTO NUMBER WE 49
CHECKED BY M. KRAUS	DATE 07/22/11		APPROVED BY M. MESSMER / DATE 04/13/11
REVISED BY J. ENGLISH	DATE 07/27/11		APPROVED BY __ / DATE __
SCALE AS NOTED			FIGURE NO. 4 - 1 / REV 0

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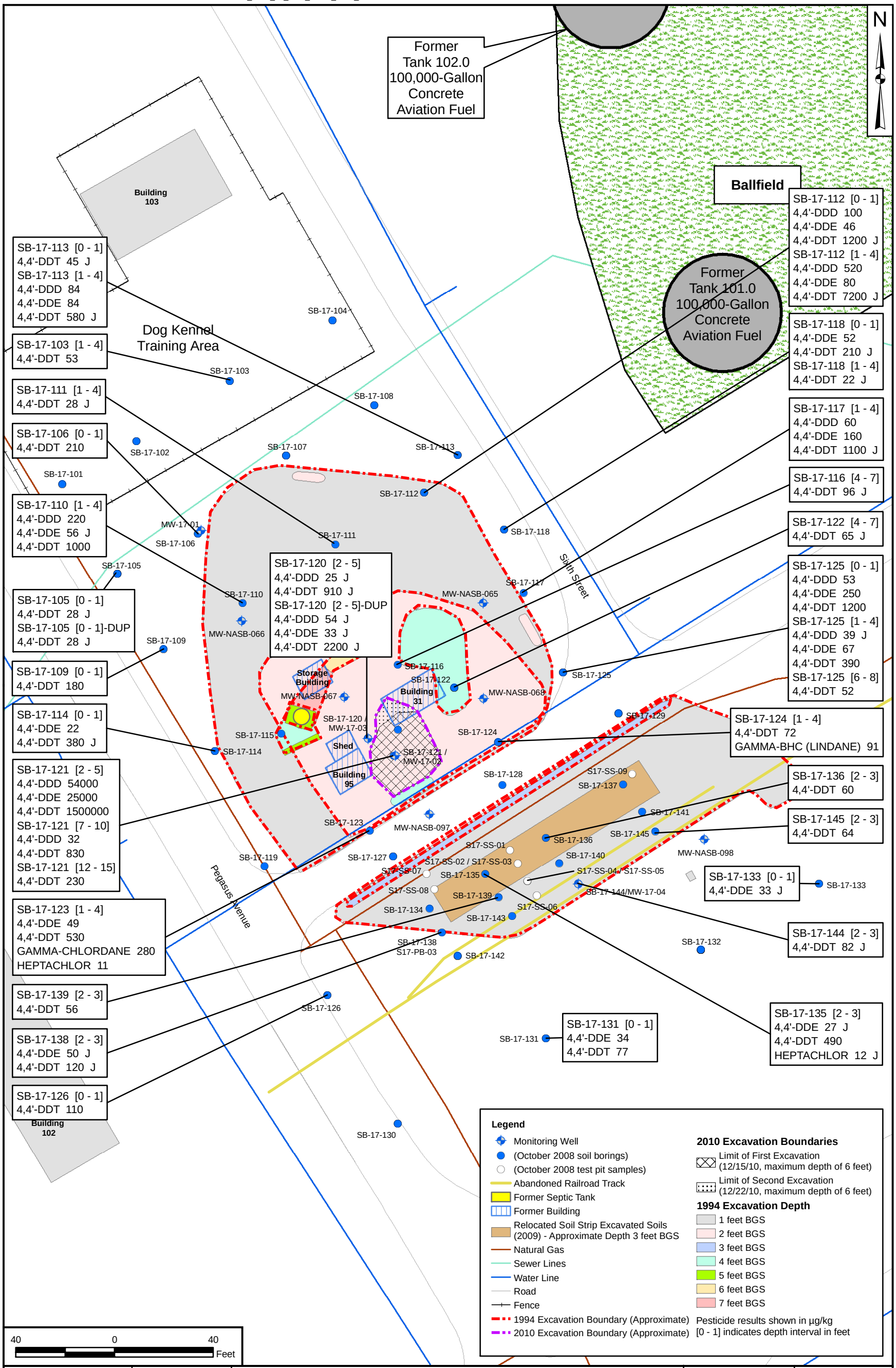
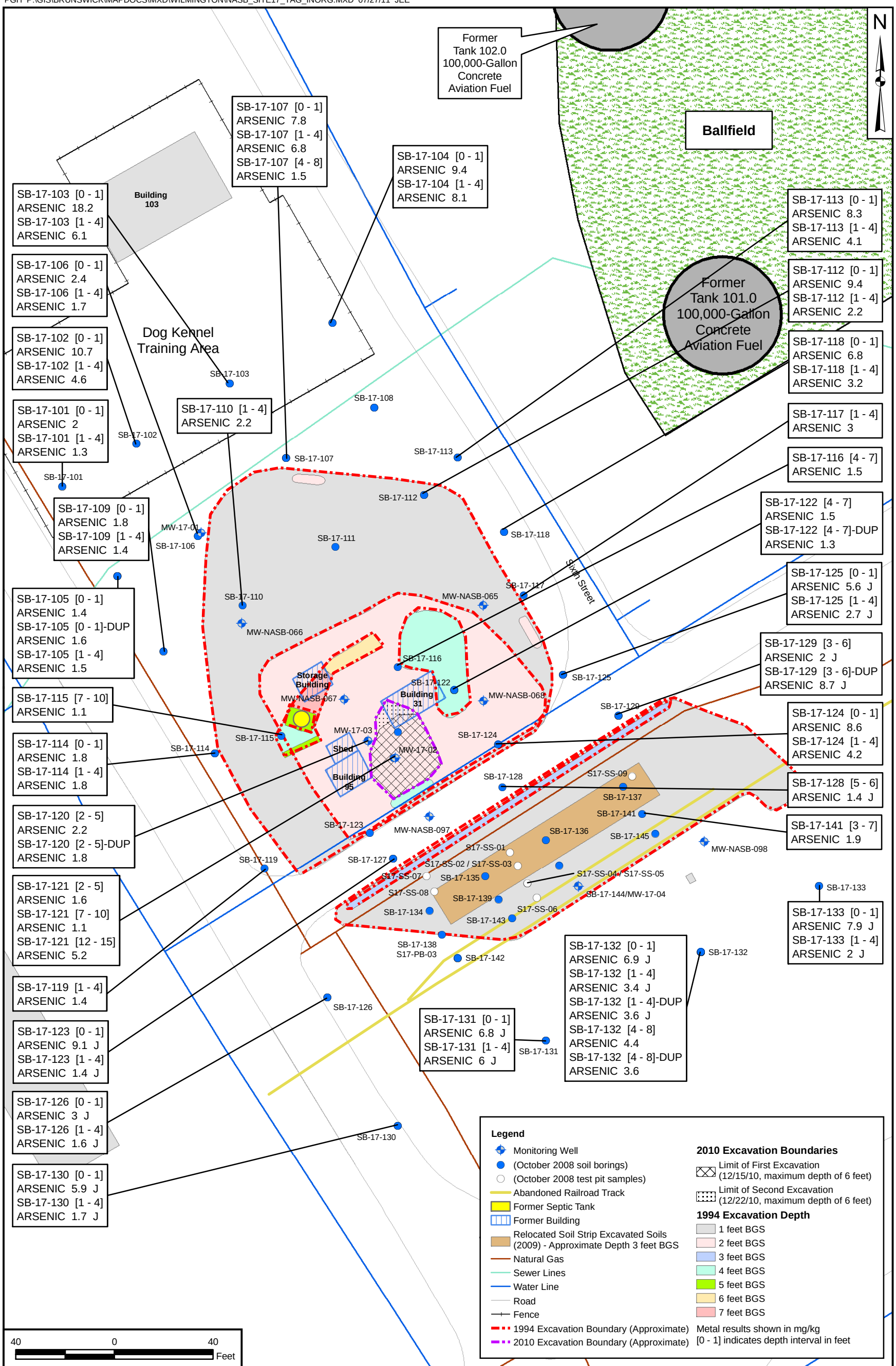


DRAWN BY / DATE	J. ENGLISH 07/25/11
CHECKED BY / DATE	R. MILLER 07/28/11
REVISED BY / DATE	___ ___
SCALE	AS NOTED

2008 SOIL SAMPLES
ECOLOGICAL SCREENING LEVEL EXCEEDANCES - PESTICIDES
SITE 17
NAVAL AIR STATION
BRUNSWICK, MAINE

CONTRACT NUMBER	_____
CTO NUMBER	WE 49
APPROVED BY / DATE	M. MESSMER 04/13/11
APPROVED BY / DATE	___ ___
FIGURE NO.	4 - 2
REV	0

PGH P:\GIS\BRUNSWICK\MAPDOCS\MXD\WILMINGTON\NASB_SITE17_TAG_INORG.MXD 07/27/11 JEE



DRAWN BY	DATE
K. MOORE	03/17/11
CHECKED BY	DATE
M. KRAUS	07/22/11
REVISED BY	DATE
J. ENGLISH	07/27/11
SCALE	
AS NOTED	

2008 SOIL SAMPLES
HUMAN HEALTH EXCEEDANCES - INORGANICS
SITE 17
NAVAL AIR STATION
BRUNSWICK, MAINE

CONTRACT NUMBER	CTO NUMBER
____	WE 49
APPROVED BY	DATE
M. MESSMER	04/13/11
APPROVED BY	DATE
__	__
FIGURE NO.	REV
4 - 3	0

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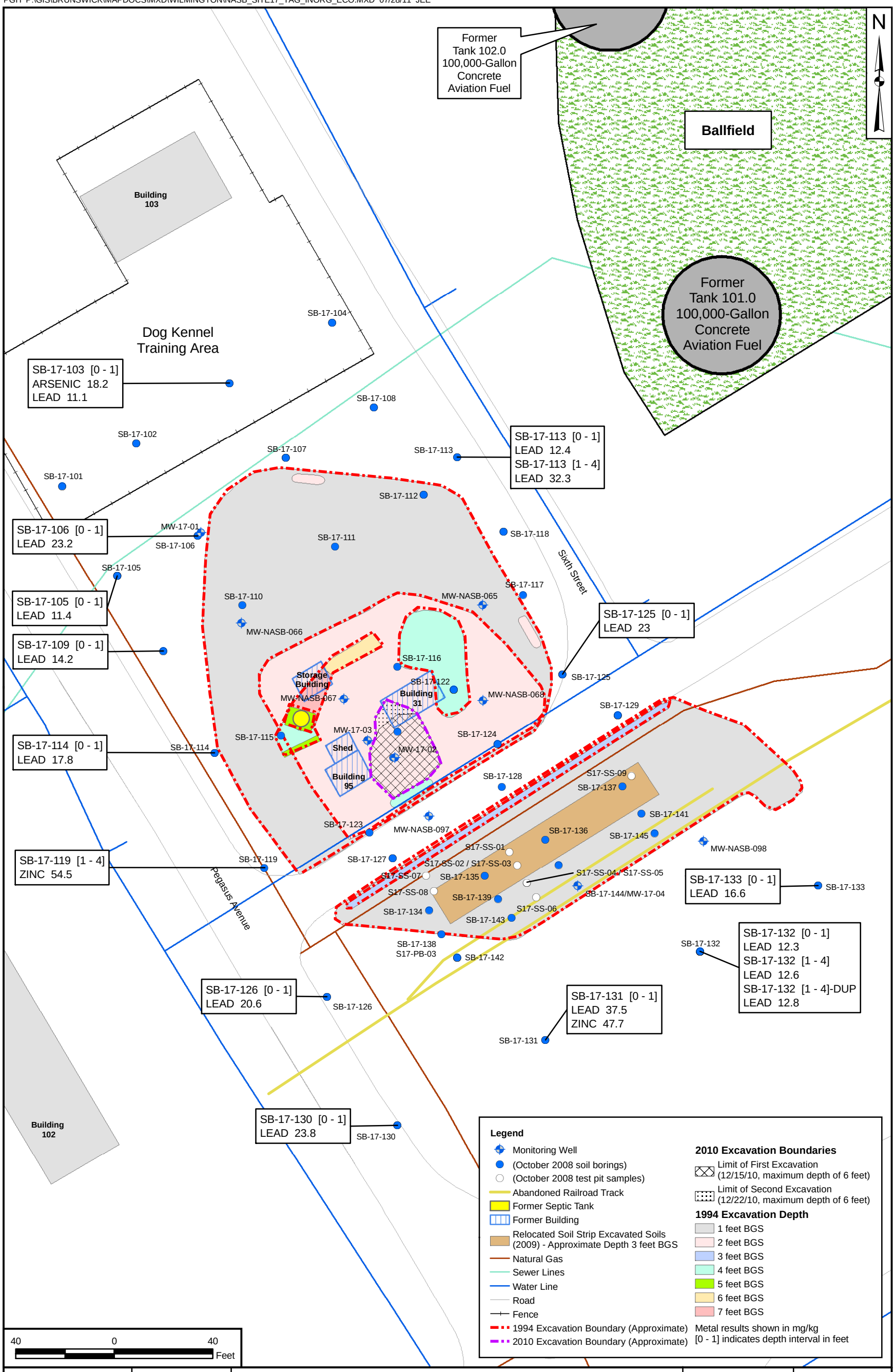

DRAWN BY	J. ENGLISH
DATE	07/25/11
CHECKED BY	R. MILLER
DATE	07/28/11
REVISED BY	
DATE	
SCALE	AS NOTED

NAVFAC

2008 SOIL SAMPLES
ECOLOGICAL SCREENING LEVEL EXCEEDANCES - INORGANICS
SITE 17
NAVAL AIR STATION
BRUNSWICK, MAINE

CONTRACT NUMBER	
CTO NUMBER	WE 49
APPROVED BY	M. MESSMER
DATE	04/13/11
APPROVED BY	
DATE	
FIGURE NO.	4 - 4
REV	0

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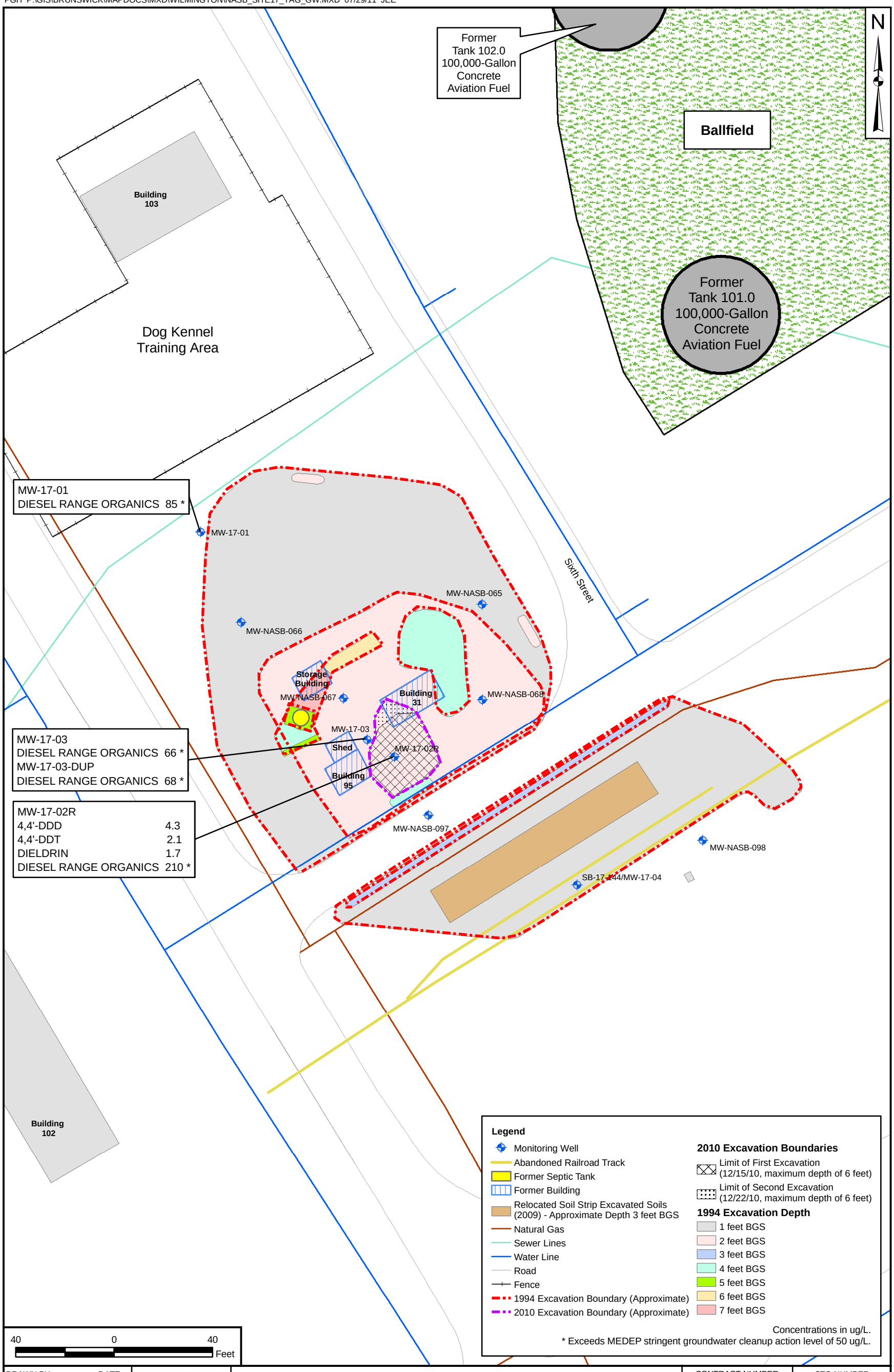

DRAWN BY	J. ENGLISH
DATE	07/27/11
CHECKED BY	R. MILLER
DATE	07/29/11
REVISED BY	
DATE	
SCALE	AS NOTED

NAVFAC

2008 GROUNDWATER EXCEEDANCES
SITE 17
NAVAL AIR STATION
BRUNSWICK, MAINE

CONTRACT NUMBER	
CTO NUMBER	WE 49
APPROVED BY	M. MESSMER
DATE	04/13/11
APPROVED BY	
DATE	
FIGURE NO.	4 - 5
REV	0

PGH P:\GIS\BRUNSWICK\MAPDOCS\MXD\WILMINGTON\NASB_SITE_17_TAG_PEST-PCB.MXD 07/26/11 JEE

Former Tank 102.0 100,000-Gallon Concrete Aviation Fuel

Ballfield

Former Tank 101.0 100,000-Gallon Concrete Aviation Fuel

Building 103

Dog Kennel Training Area

Building 102

Storage Building

Building 31

Shed

Building 95

SB-17-112 [1 - 4]
4,4-DDT 7200 J

SB-17-148 [1 - 4]
DIELDRIN 43

GRID A BOTTOM [2 - 6]
4,4-DDT 9000
GRID A BOTTOM [2 - 6]-DUP
4,4-DDT 7450

GRID B BOTTOM [2 - 6]
4,4-DDT 2940

GRID B EAST B [2 - 6]
4,4-DDT 15200

SB-17-120 [2 - 5]-DUP
4,4-DDT 2200 J

SB-17-202 [2 - 5]
4,4-DDT 8600 J
HEPTACHLOR EPOXIDE 100 J

SB-17-152 [2 - 5]
HEPTACHLOR 270

SB-17-205 [2 - 5]
4,4-DDT 4000
HEPTACHLOR EPOXIDE 180 J
SB-17-205 [2 - 5]-DUP
4,4-DDT 3400 J
HEPTACHLOR EPOXIDE 250 J

SB-17-203 [2 - 5]
4,4-DDT 10,000 J
ALPHA-CHLORDANE 2900 J
GAMMA CHLORDANE 2600 J
HEPTACHLOR 200 J
HEPTACHLOR EPOXIDE 580 J

SB-17-206 [0 - 1]
HEPTACHLOR EPOXIDE 130 J
SB-17-206 [1 - 3]
ALPHA CHLORDANE 3100 J
GAMMA CHLORDANE 2700 J
HEPTACHLOR 390 J
HEPTACHLOR EPOXIDE 530 J

SB-PB-14 [2.75 - 3]-DUP
4,4-DDT 2000

SB-17-207 [0 - 1]
HEPTACHLOR EPOXIDE 63 J

SB-PB-04 [2.75 - 3]
HEPTACHLOR 220
HEPTACHLOR EPOXIDE 130

SB-PB-06 [2.75 - 3]
4,4-DDT 1900

S17-SW-01 [2.75 - 3]
4,4-DDT 4400
HEPTACHLOR 130

SB-17-101 SB-17-102 SB-17-103 SB-17-104 SB-17-105 SB-17-106 MW-17-01 SB-17-107 SB-17-108 SB-17-109 SB-17-110 MW-NASB-066 SB-17-111 SB-17-112 SB-17-113 SB-17-114 SB-17-115 SB-17-116 SB-17-117 SB-17-118 SB-17-119 SB-17-120 SB-17-120/MW-17-03 SB-17-121 SB-17-122 SB-17-123 SB-17-124 SB-17-125 SB-17-126 SB-17-127 SB-17-128 SB-17-129 SB-17-130 SB-17-131 SB-17-132 SB-17-133 SB-17-134 SB-17-135 SB-17-136 SB-17-137 SB-17-138 SB-17-139 SB-17-140 SB-17-141 SB-17-142 SB-17-143 SB-17-144/MW-17-04 SB-17-145 SB-17-146 SB-17-147 SB-17-148 SB-17-149 SB-17-150 SB-17-151 SB-17-152 SB-17-154 SB-17-155 SB-17-202 SB-17-203 SB-17-204 SB-17-205 SB-17-206 SB-17-207 SB-17-208 SB-17-209 SB-17-210

MW-17-01 MW-17-02R MW-NASB-065 MW-NASB-067 MW-NASB-068 MW-NASB-097 MW-NASB-098

S17-PB-01 S17-PB-02 S17-PB-03 S17-PB-04 S17-PB-05 S17-PB-06 S17-PB-08 S17-PB-09 S17-PB-10 S17-PB-11 S17-PB-12 S17-PB-13 S17-PB-14 S17-PB-15 S17-PB-16 S17-PB-17 S17-PB-18 S17-SS-01 S17-SS-02 S17-SS-03 S17-SS-04 S17-SS-05 S17-SS-06 S17-SS-09 S17-SW-01 S17-SW-02 S17-SW-03 S17-SW-04 S17-SW-05 S17-SW-06 S17-00

Grid A West A Grid A West B Grid A Bottom Grid A South
Grid B North #2 Grid B North Grid B East A Grid B Bottom Grid B East B

Sixth Street
Avenue B
Pegasus Avenue

N

Legend

- Monitoring Well
- (April 2009 Supplemental Investigation)
- (July 2009 Confirmatory Sampling)
- (July 2010 soil samples)
- (October 2008 soil borings)
- (October 2008 test pit samples)
- Composite Bottom Soil Sample (December 2010)
- Composite Sidewall Soil Sample (December 2010)
- Abandoned Railroad Track
- Former Septic Tank
- Former Building
- Relocated Soil Strip Excavated Soils (2009) - Approximate Depth 3 feet BGS
- Natural Gas
- Sewer Lines
- Water Line
- Road
- Fence
- 1994 Excavation Boundary (Approximate)
- 2010 Excavation Boundary (Approximate)

2010 Excavation Boundaries

- Limit of First Excavation (12/15/10, maximum depth of 6 feet)
- Limit of Second Excavation (12/22/10, maximum depth of 6 feet)

1994 Excavation Depth

- 1 feet BGS
- 2 feet BGS
- 3 feet BGS
- 4 feet BGS
- 5 feet BGS
- 6 feet BGS
- 7 feet BGS

Results shown in µg/kg
[0 - 1] indicates depth interval in feet

40 0 40 Feet

DRAWN BY / DATE	K. MOORE 03/17/11
CHECKED BY / DATE	M. KRAUS 07/22/11
REVISED BY / DATE	J. ENGLISH 07/26/11
SCALE	AS NOTED

NAVFAC

CURRENT CONDITIONS
HUMAN HEALTH EXCEEDANCES IN SOIL - PESTICIDES
SITE 17
NAVAL AIR STATION
BRUNSWICK, MAINE

CONTRACT NUMBER	CTO NUMBER WE 49
APPROVED BY / DATE	M. MESSMER 04/13/11
APPROVED BY / DATE	__ __
FIGURE NO.	4 - 6
REV	0

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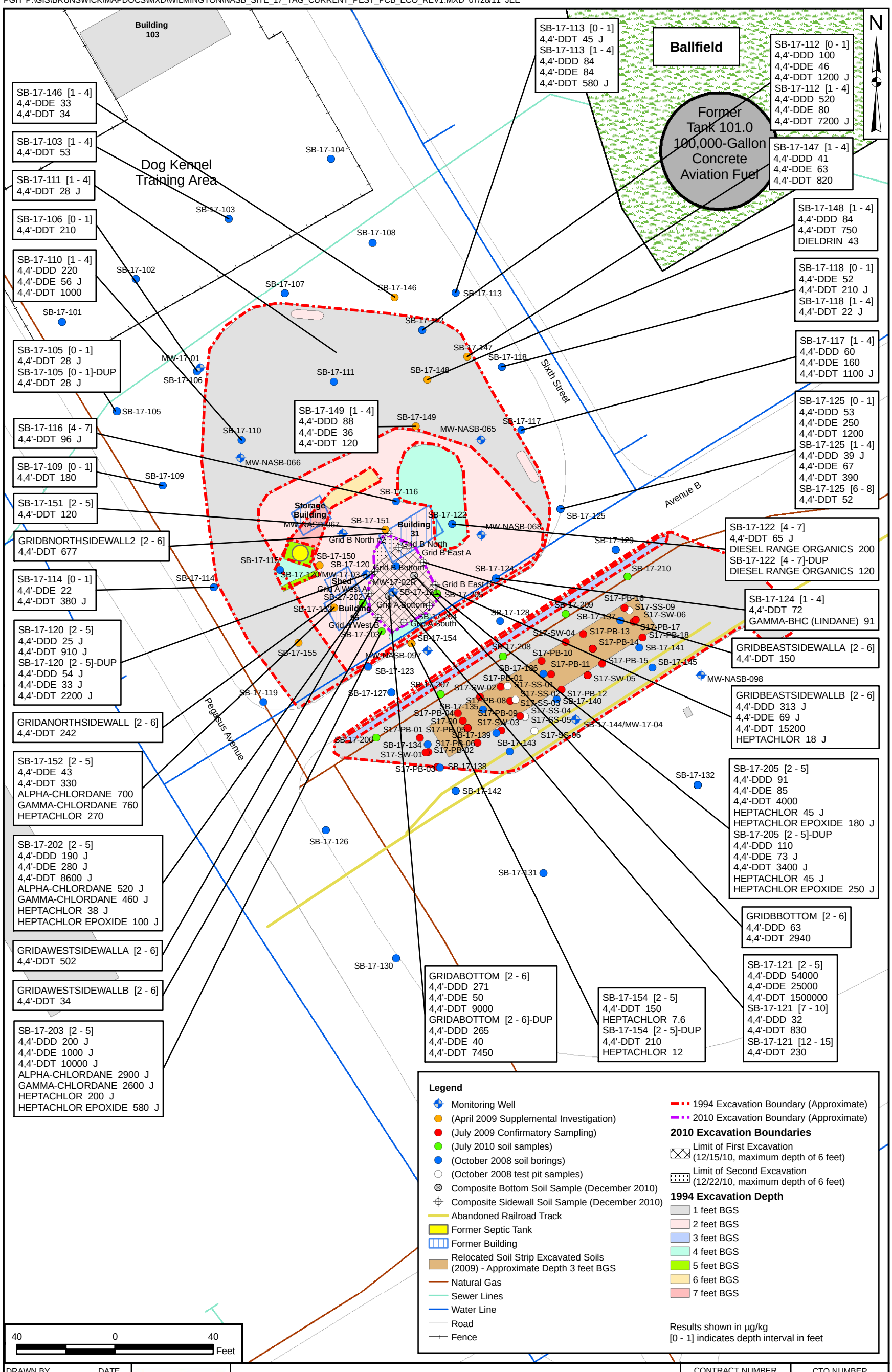

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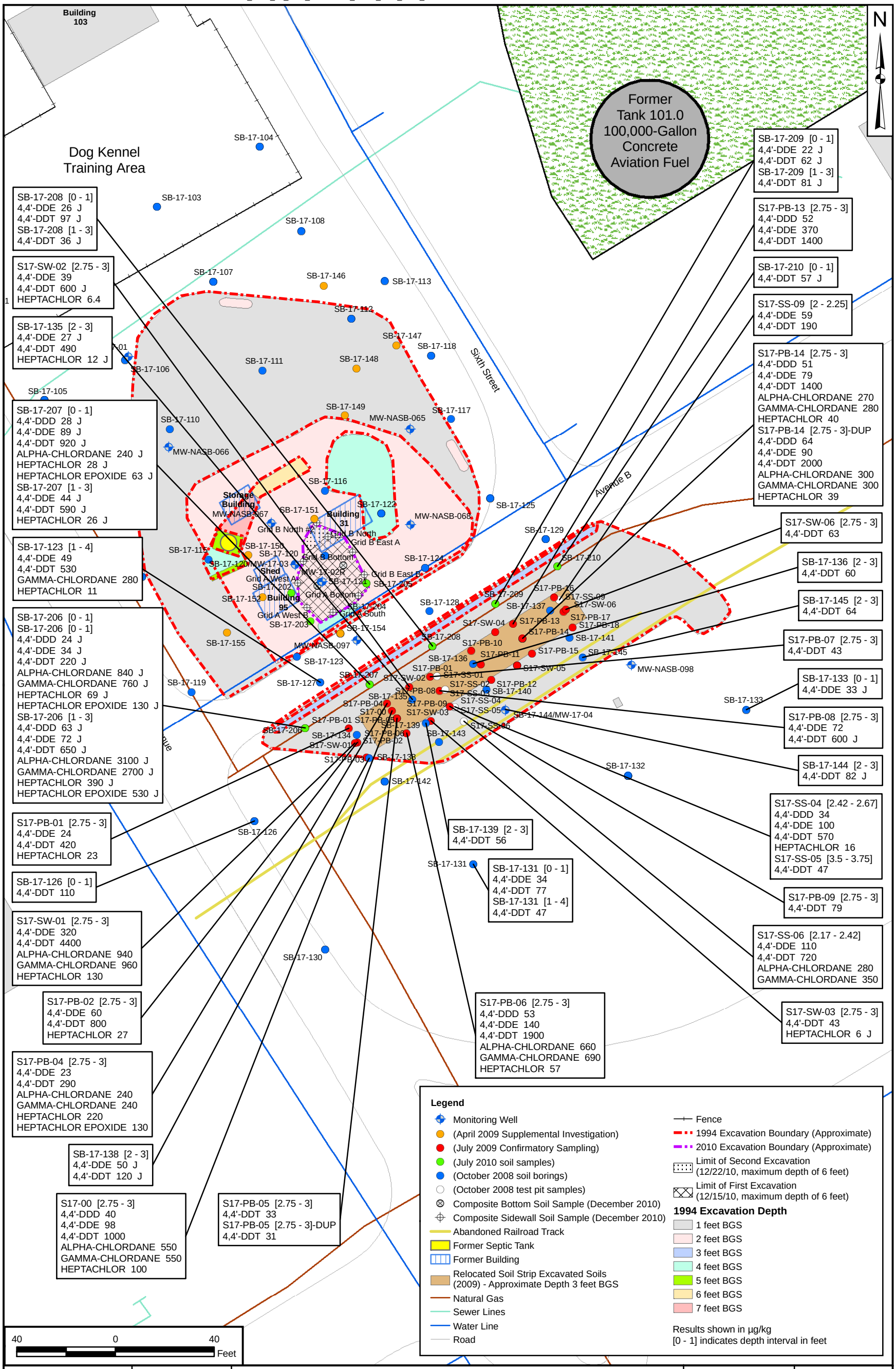
CHECKED BY R. MILLER	DATE 07/28/11	APPROVED BY M. MESSMER	DATE 04/13/11
REVISED BY ___	DATE ___	APPROVED BY ___	DATE ___
SCALE AS NOTED		FIGURE NO. 4 - 7A	REV 0

CURRENT CONDITION SOIL SAMPLES
ECOLOGICAL SCREENING LEVEL EXCEEDANCES - PESTICIDES
(NORTH OF AVENUE B)
SITE 17
NAVAL AIR STATION
BRUNSWICK, MAINE

PGH P:\GIS\BRUNSWICK\MAPDOCS\MXD\WILMINGTON\NASB_SITE_17_TAG_CURRENT_PEST_PCB_ECO_REV2.MXD 07/28/11 JEE



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CHECKED BY: M. KRAUS	DATE: 07/28/11	APPROVED BY: M. MESSMER	DATE: 04/13/11
REVISED BY: ___	DATE: ___	APPROVED BY: ___	DATE: ___
SCALE: AS NOTED		FIGURE NO.: 4 - 7B	REV: 0

CURRENT CONDITION SOIL SAMPLES
ECOLOGICAL SCREENING LEVEL EXCEEDANCES - PESTICIDES
(SOUTH OF AVENUE B)
SITE 17
NAVAL AIR STATION
BRUNSWICK, MAINE

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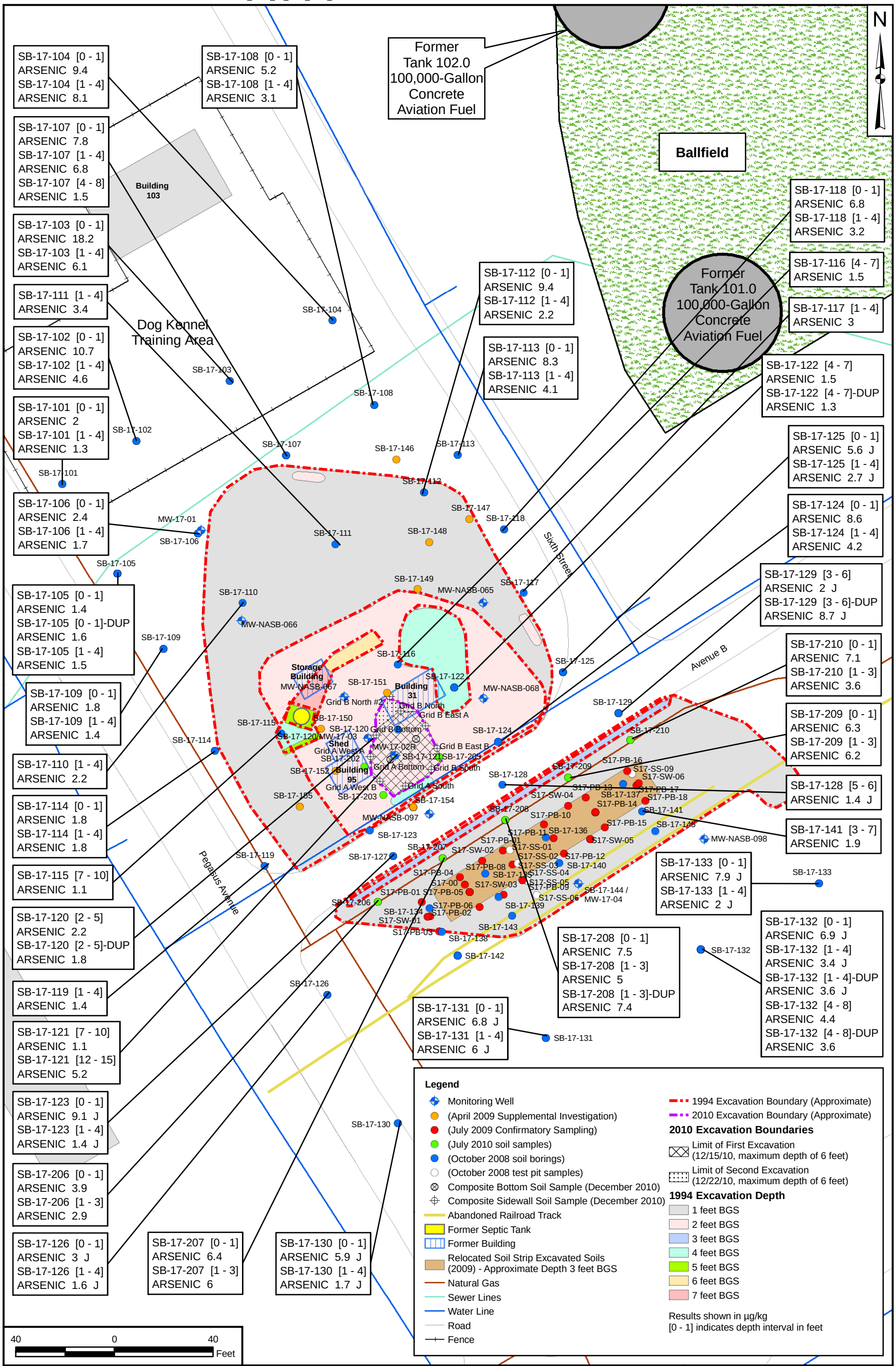

DRAWN BY K. MOORE	DATE 03/17/11	CURRENT CONDITIONS HUMAN HEALTH EXCEEDANCES IN SOIL - INORGANICS SITE 17 NAVAL AIR STATION BRUNSWICK, MAINE	CONTRACT NUMBER ——— / CTO NUMBER WE 49
CHECKED BY M. KRAUS	DATE 07/22/11		APPROVED BY M. MESSMER / DATE 03/29/11
REVISED BY J. ENGLISH	DATE 07/27/11		APPROVED BY — / DATE —
SCALE AS NOTED			FIGURE NO. 4 - 8 / REV 0

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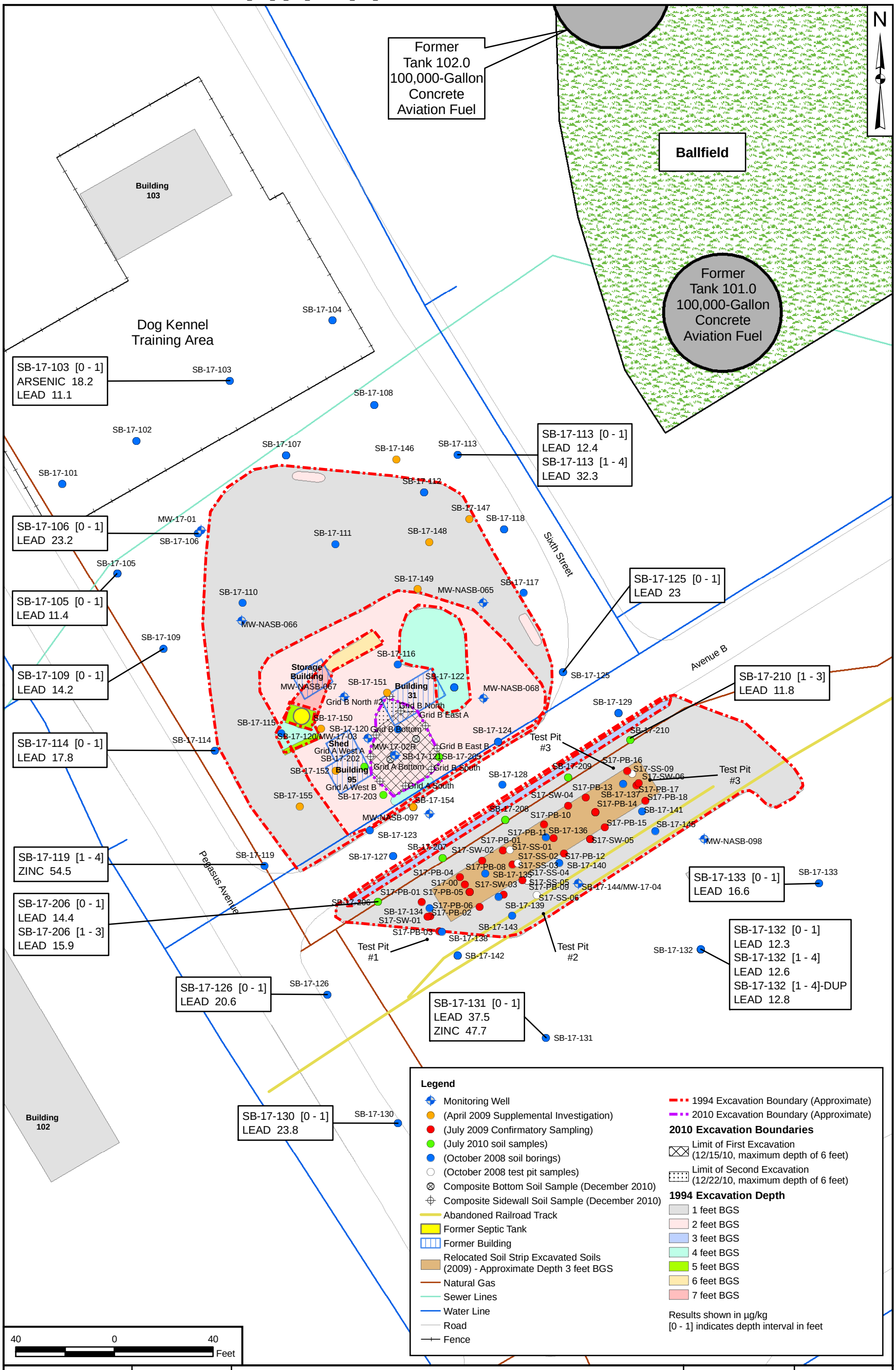

DRAWN BY	DATE
J. ENGLISH	07/25/11
CHECKED BY	DATE
M. KRAUS	07/28/11
REVISED BY	DATE
—	—
SCALE	
AS NOTED	

NAVFAC

CURRENT CONDITION SOIL SAMPLES
ECOLOGICAL SCREENING LEVEL EXCEEDANCES - INORGANICS
SITE 17
NAVAL AIR STATION
BRUNSWICK, MAINE

CONTRACT NUMBER	CTO NUMBER
_____	WE 49
APPROVED BY	DATE
M. MESSMER	03/29/11
APPROVED BY	DATE
—	—
FIGURE NO.	REV
4 - 9	0

PGH P:\GIS\BRUNSWICK\MAPDOCS\MXD\WILMINGTON\NASB_SITE17_TAG_GW_2011.MXD 07/27/11 JEE

Former Tank 102.0 100,000-Gallon Concrete Aviation Fuel

Ballfield

N

Building 103

Dog Kennel Training Area

Former Tank 101.0 100,000-Gallon Concrete Aviation Fuel

MW-17-01

MW-NASB-065

MW-NASB-066

Sixth Street

Storage Building

MW-NASB-067

MW-NASB-068

Building 31

MW-17-03

Shed

MW-17-02

Building 95

MW-17-02
4,4'-DDD 1.2

MW-097
4,4'-DDT 1.3
MW-097-DUP
4,4'-DDT 1.6

MW-NASB-097

MW-NASB-098

SB-17-144/MW-17-04

Building 102

Legend

- Monitoring Well
- Abandoned Railroad Track
- Former Septic Tank
- Former Building
- Relocated Soil Strip Excavated Soils (2009) - Approximate Depth 3 feet BGS
- Natural Gas
- Sewer Lines
- Water Line
- Road
- Fence
- 1994 Excavation Boundary (Approximate)
- 2010 Excavation Boundary (Approximate)

2010 Excavation Boundaries

- Limit of First Excavation (12/15/10, maximum depth of 6 feet)
- Limit of Second Excavation (12/22/10, maximum depth of 6 feet)

1994 Excavation Depth

- 1 feet BGS
- 2 feet BGS
- 3 feet BGS
- 4 feet BGS
- 5 feet BGS
- 6 feet BGS
- 7 feet BGS

Concentrations exceeding screening levels in ug/L.

40 0 40 Feet

DRAWN BY	J. ENGLISH
DATE	07/27/11
CHECKED BY	M. KRAUS
DATE	07/27/11
REVISED BY	
DATE	
SCALE	AS NOTED

NAVFAC

APRIL 2011 GROUNDWATER EXCEEDANCES
SITE 17
NAVAL AIR STATION
BRUNSWICK, MAINE

CONTRACT NUMBER	
CTO NUMBER	WE 49
APPROVED BY	M. MESSMER
DATE	04/13/11
APPROVED BY	
DATE	
FIGURE NO.	4 - 10
REV	0

5.0 CONTAMINANT FATE AND TRANSPORT

The fate and transport of contaminants in environmental media are determined by a variety of factors. The physical and chemical properties of the contaminants and of the environmental media (i.e., soil or groundwater) into which the contaminants are released are all factors that determine the eventual fate of these chemicals. The combination of site-related contaminants and geologic and hydrogeologic conditions influence how contaminants released at Site 17 have migrated in soils and into underlying groundwater,and/or have been transformed as the result of degradation processes. This section presents an evaluation of these processes as they pertain to the contaminants detected at the site.

5.1 GENERAL FATE AND TRANSPORT PROCESSES

The fate and transport processes of concern for the RI are those that govern the migration and fate of contaminants (once released or deposited) in soil and groundwater. This generalized discussion of fate and transport processes is provided so that observed site-specific contamination conditions can be better characterized and understood.

5.1.1 General Fate and Transport Processes of Soil Contaminants

Organic and inorganic chemicals can be released to soils directly through spills or discharges at the surface or beneath the surface (i.e., via subsurface storage tanks, septic tanks or drains) or through deposition of atmospheric or airborne contaminants. After organic and inorganic chemicals are released to soils, a variety of processes may occur that may cause them to become immobilized, degraded, or mobilized to another environmental medium. Some of these processes include the following:

- **Sorption** – Chemicals may be taken up and held on soil particles by adsorption (“sticking” to a particle surface) or absorption (diffusion into the particle). Chemicals may sorb directly to the soil grains or to organic or metal oxyhydroxide coatings on the grains. The degree of sorption of a particular chemical in the environment is controlled by both soil properties (i.e., organic carbon content, metal oxyhydroxide content, clay content, or specific surface area) and by chemical properties (i.e., partition coefficients, solubility, polarity).

- **Volatilization** – Chemicals having high Henry’s Law coefficients or vapor pressures will readily volatilize into ambient air rather than remain adsorbed to soil particles. Once in the atmosphere, the chemicals may undergo further transport through additional processes such as advection, diffusion,

or dispersion. The chemicals may also be transformed through chemical processes such as photolysis or hydrolysis.

- **Leaching** – Chemicals may be transported downward through the soil strata by liquids that infiltrate through the soils or by water from precipitation. Chemicals released to or transported into soils beneath the groundwater surface may be leached from the soils by groundwater and transported downgradient in groundwater. The leaching of chemicals from soils and their subsequent mobilization are controlled by soil properties (i.e., adsorptive capacity, organic carbon content, clay content, or specific surface area) and by chemical properties (i.e., solubility, ability to partition to other phases).

- **Runoff/Erosion** – In situations where chemicals remain sorbed (bound) to soil particles, chemicals may still be mobilized from one contaminated area to another or to other environmental media. Contaminants sorbed to soil particles can be conveyed over land suspended in runoff that occurs during precipitation events or through wind erosion of contaminated soils. Contaminants sorbed to surface particles may also become solubilized in rainwater or snowmelt and be conveyed over land dissolved in the precipitation runoff.

5.1.2 General Fate and Transport Processes of Groundwater Contaminants

Organic and inorganic chemicals may be directly released to groundwater from subsurface tanks (i.e., fuel storage tanks or septic tanks) or drainage structures or may migrate to groundwater from other media. Once in groundwater, a variety of processes may occur that affect the transport and transformation of contaminants. This section describes the physical phases of contaminants in groundwater and the general transport and transformation processes affecting contaminants in groundwater.

Physical Phases of Contaminants in Groundwater

Contaminants occur in groundwater in two principal physical states, dissolved phase (disassociated molecules) and suspended solids (adsorbed to mobile particles). These physical states dictate how contaminants are transported and changed within the aquifer, and the following are the fate and transport processes that govern these physical states:

- **Dissolved Phase** – Dissolved aqueous-phase organic and inorganic contaminants generally migrate in the direction of groundwater flow. Dissolved-phase contaminants are transported via three

processes, advection, mechanical dispersion, and molecular diffusion. These processes are described in more detail below. In addition, dissolved contaminants may interact with both the aquifer matrix and other groundwater constituents during transport. A variety of chemical, physical, and biological interactions can significantly retard or accelerate the rate of dissolved contaminant transport or transform the contaminants into other chemicals or states.

- **Suspended Solids** – Metals and some organic compounds can migrate through aquifers as suspended solids, either in insoluble form or adsorbed to small particles. Research has demonstrated that, depending on the nature of the geologic formation, clay- and silt-sized particles in the colloidal range (0.001 to 1.0 micron) can migrate through an aquifer with groundwater and that certain organic compounds and metals can be retained on colloid surfaces through surface charge attractions. The low-flow sampling methods employed in this RI were designed to obtain samples that include the colloids that would normally be transported with groundwater but to exclude the normally immobile larger particulates that could be entrained by disturbances in the well.

General Transport and Transformation Processes of Contaminants in Groundwater

The major contaminant transport processes in groundwater, advection, dispersion, and molecular diffusion, and important transformation and retardation processes, degradation and sorption, as discussed below.

Advection – Advection, the dominant contaminant transport process in groundwater, is the flow of a fluid in response to a gradient such as pressure or hydraulic head. Contaminant transport results from the entrainment of chemicals in the flow field. Advective transport of contaminants consists of the movement of dissolved or suspended contaminants with the bulk flow of the groundwater. Under conditions where the only contaminant transport mechanism is advection, the rate and direction of advective transport coincide with the rate and direction of groundwater flow. However, the secondary transport and transformation processes described below may slow the rate of transport and spread the contaminants over a wider area than indicated by advective transport alone.

Preferential pathways for groundwater flow may occur because of heterogeneities in subsurface soils or the bedrock matrix or because of the presence of subsurface structures such as pipelines. Geologic materials (e.g., soils or fractured bedrock) that are more permeable than surrounding materials allow the preferential flow of groundwater through those geologic units. Similarly, gaps between a subsurface conduit and surrounding soils or the presence of bedding materials that are more permeable than surrounding soils may create preferred pathways for groundwater flow along the direction of the conduit.

Mechanical Dispersion – Mechanical dispersion is a mixing process that results from velocity variations within bodies of moving fluids. In groundwater environments, velocity variations are caused by irregularities in aquifer media, and these irregularities exist at a variety of scales. For example, velocity variations at the microscopic scale arise from: (1) fluids moving faster through the centers of pores than along the edges; (2) fluids moving faster through large pore spaces than through narrow ones; and (3) some fluid particles following more tortuous flow paths than others as they travel around individual soil particles. At the macroscopic scale, velocity variations result from the presence of layers or lenses of materials having different hydraulic conductivities. Mixing due to dispersion increases as aquifer heterogeneity increases and results in the dilution of a solute body as contaminated water mixes with uncontaminated water along the margins of a plume. Dispersion also results in the spreading of a contaminant plume over a larger area (both parallel and perpendicular to the direction of flow) than would be expected from advection alone.

Molecular Diffusion – Molecular diffusion is movement in response to a concentration gradient. Dissolved contaminants will move from areas of high concentration to areas of low concentration within an aquifer, even if the groundwater is not moving, because the process is driven by the random thermal motion of the contaminant molecules. Diffusive transport is a slow process compared to the more rapid processes of advection and dispersion, and its impact on plume geometry is usually small. Diffusion is typically the dominant transport mechanism only in low-permeability hydrogeologic systems. It is not expected to be important in the relatively permeable geologic materials at Site 17.

Sorption – As described above relative to contaminant transport in soils, chemicals may be taken up and held on soil particles by the processes of adsorption or absorption, known collectively as sorption. Sorption is an important process in contaminant transport in groundwater because most groundwater contaminants react to some extent with the aquifer's solid surfaces. Consequently, their transport is affected not only by the processes of advection, dispersion, and diffusion but also by sorption reactions that retard the rate of contaminant transport. Contaminant sorption to mineral surfaces or the oxyhydroxide or organic coatings on these surfaces cause contaminants to be removed from groundwater, at least temporarily, thereby retarding the rate of contaminant transport. The extent to which the movement of a contaminant is retarded relative to the rate of groundwater flow depends on the solute's propensity to sorb to the aquifer's surfaces. Weakly sorbed contaminants will tend to repeatedly adsorb and desorb, continuing to flow with groundwater at a reduced rate. Strongly sorbed contaminants will tend to remain sorbed to the soil particles and remain out of the groundwater flow field. The propensity to sorb is governed by many factors including the chemical characteristics of the solute, composition of the aquifer’s solid surfaces, and groundwater chemistry.

Biological Degradation – The degradation of organic contaminants in groundwater can occur by biotic (biological) and abiotic (non-biological) means. In biological degradation (biodegradation), microorganisms use available carbon sources to obtain needed energy and nutrients through reduction-oxidation (redox) reactions. This involves the transfer of electrons from the food/energy source to an electron acceptor such as oxygen or nitrate. The energy source (typically the contaminant or a naturally occurring organic compound) is oxidized and the electron receptor is reduced. Biodegradation can occur in groundwater under either aerobic or anaerobic conditions. In both cases, certain conditions are required for the microorganisms to thrive, including geochemical conditions, adequate sources of food (carbon), electron acceptors (such as oxygen or nitrate), and essential nutrients (various minerals).

Under aerobic conditions, carbon (anthropogenic or naturally occurring organic compounds) is oxidized by microorganisms to provide a net energy gain that is necessary for growth and reproduction. DO is used as the primary electron acceptor by the aerobic microorganisms. Low-molecular-weight and highly water-soluble organic compounds are most readily degraded by aerobic microorganisms. The rate of biodegradation generally decreases for higher-molecular-weight compounds and those with lower water solubilities and molecules with more complex chemical structures.

After oxygen in a system is depleted, anaerobic biodegradation becomes the predominant degradation mechanism. Anaerobic microorganisms typically use other available electron acceptors including nitrate, sulfate, ferric iron, and carbon dioxide. The redox reaction results in these electron acceptors being transformed to a reduced state.

Aerobic biodegradation is the primary mechanism for biodegradation of petroleum hydrocarbons. Petroleum hydrocarbons can also be degraded anaerobically, but anaerobic degradation typically occurs at a significantly lower rate than aerobic biodegradation. Pesticides can also biodegrade through anaerobic and aerobic mechanisms; however, the processes are very slow. For example, DDT is a highly chlorinated compound that can be resistant to biodegradation; however, it can degrade to DDD and DDE under anaerobic conditions and to DDE under aerobic conditions. The pesticide biodegradation process is often limited by the presence of appropriate microorganisms, soil temperature, moisture content, and soil organic matter. Through biological degradation processes (and abiotic degradation processes, see below), chemicals that were not originally present at the site may be produced.

Abiotic Degradation – Mechanisms of abiotic degradation include hydrolysis, photolysis, chemical oxidation, and chemical reduction. Subsurface contaminants may be degraded or transformed by these naturally occurring abiotic processes. Hydrolysis is the process where a chemical molecule and a water molecule are both split and recombine to form new chemicals. Chemical oxidation consists of the loss of electrons by an organic compound or a metal ion to break down or transform the chemical. Photolysis is

the chemical process by which molecules are broken down into smaller units through the absorption of light, typically yielding electrons. Chemical reductions are the chemical reactions whereby an organic compound or metal gains electrons. The dominance or effectiveness of these transformation processes is governed by factors such as temperature, pH, conductivity, solubility, and chemical concentration.

5.2 CONTAMINANT FATE AND TRANSPORT AT SITE 17

This section presents profiles of significant contaminant groups detected at Site 17 to provide an understanding of the potential sources of contaminants detected at the site and their behavior in the environment, including potential transport pathways and environmental fate.

5.2.1 Pesticides

As discussed in Section 4.0, eight pesticides were detected in soil samples collected during the RI, including 4,4'-DDD, 4,4'-DDE 4,4'-DDT, alpha- and gamma-chlordane, gamma-BHC, heptachlor, and heptachlor epoxide. Concentrations of 4,4'-DDD, 4,4'-DDE 4,4'-DDT, gamma-chlordane, gamma-BHC, and heptachlor exceeded residential RSLs and/or RAGs. Fourteen pesticides were detected in post-excavation soil samples, including 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, aldrin, alpha-chlordane, beta-BHC, dieldrin, endosulfan I, endrin, gamma-BHC (lindane), gamma-chlordane, heptachlor, heptachlor epoxide, and methoxychlor. Concentrations of six pesticides including 4,4'-DDT, alpha-chlordane, dieldrin, gamma-chlordane, heptachlor, and heptachlor epoxide exceeded EPA residential RSLs and/or RAGs.

Eight pesticides were detected in soil at concentrations exceeding minimum ESLs, including 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, heptachlor, heptachlor epoxide, alpha-chlordane, gamma-chlordane and gamma-BHC (see Table 4-3). Pesticides at concentrations exceeded minimum ESLs were detected within previously excavated (1994 excavation area) and unexcavated areas of the site.

During the RI, 10 pesticides, including 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT, dieldrin, heptachlor, heptachlor epoxide, endosulfan I, alpha-chlordane, gamma-chlordane, and gamma-BHC, were detected in groundwater samples. Concentrations of 4,4'-DDD, 4,4'-DDT, and dieldrin exceeded Maine MEGs at MW-17-02. The pesticides 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and heptachlor epoxide were detected in groundwater samples collected from the site in September 2010. Only one heptachlor epoxide concentration, at MW-17-04, exceeded screening criteria (MEDEP MEG and EPA residential RSL). During the April 2011 post-excavation groundwater monitoring event, 4,4'-DDD, 4,4'-DDE, and/or 4,4'-DDT were detected at three of nine wells sampled. Concentrations of 4,4'-DDD at MW-17-02R and 4,4'-DDT at MW-NASB-097 exceeded Maine MEGs.

As shown in Table 5-1, pesticides have low water solubilities, very low vapor pressures and Henry's law constants, and moderate sorptive capacities. Based on their mobility data, migration potentials are minimal. The importance of biodegradation as a transformation process varies among pesticides. Some pesticides such as dieldrin are generally resistant to biodegradation; others such as heptachlor may biodegrade at a slow rate under anaerobic conditions. 4,4'-DDT will biodegrade to 4,4'-DDD, and 4,4'-DDE, and all three of these compounds will bind to soil particles.

5.2.2 Herbicides

As discussed in Section 4.0, three herbicides were detected in RI soil samples including maleic hydrazide, propoxur, and monuron. Concentrations of maleic hydrazide and propoxur were less than EPA residential soil RSLs. There is no EPA residential soil RSL or Maine RAG for monuron in soil.

The three herbicides detected have moderate to high water solubilities and can have high solubilities, as shown in Table 5-1. They have low vapor pressures and Henry's law constants and range from low leachability (maleic hydrazide) to high leachability (monuron and propoxur). Maleic hydrazide is moderately mobile in typical soils. Propoxur has a low affinity for soil binding and so may be relatively mobile in soils. Because propoxur and monuron are highly soluble in water, moderately persistent, and do not adsorb strongly to soil particles, propoxur and monuron have high groundwater affinities. Monuron and propoxur hydrolyze readily under typical groundwater conditions.

5.2.3 DRO

DRO was detected at four of five RI soil sample locations, as described in Section 4.0. Two RI soil samples had DRO concentrations exceeding the BL-2 cleanup goal for DRO listed in Procedural Guidelines for Establishing and Implementing Action Levels and Remediation Goals for the Remediation of Oil Contaminated Soil and Groundwater in Maine revised on January 1, 2009. Most DRO compounds are relatively heavy long-chain petroleum hydrocarbons (PHCs), have higher sorption coefficients and low water solubilities relative to lighter PHCs, and are therefore less mobile in groundwater than gasoline-range petroleum hydrocarbons such as benzene. DRO constituents are relatively biodegradable under favorable geochemical conditions and in the presence of hydrocarbon-degrading bacteria.

5.2.4 Inorganics

Arsenic, lead, cyanide and zinc were detected in RI soil samples collected from Site 17, as discussed in Section 4.0. Only arsenic was detected at levels exceeding human health screening criteria (EPA residential soil RSL and Maine RAG). A statistical comparison of elevated arsenic detections in fill

material compared to arsenic concentrations in all other site soils found that the population of arsenic concentrations in fill material is distinct and greater than arsenic concentrations in all other site soils (Appendix E.6). Elevated arsenic concentrations are attributed to fill material that appears to have been brought on site from other locations and therefore are not considered to be site related.

The redox state of the subsurface environment will affect the form and valence state of the arsenic present and will influence how much remains bound to soil and rock surfaces and how much remains in solution. In general, under oxidizing conditions, naturally occurring arsenic will remain bound in soil and rock or sorbed to suspended particles. Under reducing conditions, the concentrations of dissolved arsenic in groundwater will tend to increase as the metals at the soil and rock surfaces are reduced to more soluble forms and remain in solution. Based on the low redox (average of 40 millivolts) and slightly low acidic pH values (average of 5.62) measured at the site during 2008 groundwater sampling and the fact that arsenic was not detected in groundwater, it is likely that arsenic at the site remains bound in soil.

5.2.5 Volatiles

During the RI, PCE was detected in soil sample S17-00 at a concentration less than the minimum screening criterion in soil. Sorption of organic compounds to soil has been found to be most reliably predicted when related to the organic carbon content of the soil. Experimentally measured soil sorption coefficients based on organic carbon content for PCE range from 177 to 534. These values are indicative of medium to high mobility in soil. PCE was not detected in any groundwater samples, and it is likely that the PCE remains bound in the soil.

5.2.6 Extractable Petroleum Hydrocarbons

Naphthalene, 2-methylnaphthalene, C_{11}-C_{22} aromatics, C_{19}-C_{36} aliphatics and C_9-C_{18} aliphatics were detected in groundwater samples collected in September 2010, but no EPH parameters were detected the April 2011 (post-removal action) sampling event. Naphthalene and C_{11}-C_{22} aromatics concentrations exceeded the EPA tap water RSL and Maine MEG, respectively, in September 2010 groundwater samples.

Naphthalene in surface water may volatilize to the atmosphere. With a vapor pressure of 0.087 millimeters of mercury at 25 degrees Celsius (°C), solubility in water of 31.7 mg/L at 20°C, and a Henry's law constant of $4.6x10^{-4}$, it is likely that volatilization will be an important route of naphthalene loss from water. Sorption of naphthalene to aquifer materials with low organic carbon content (less than 0.03 percent) may be enhanced by the presence of nonionic low-polarity organics such as PCE. Log octanol/water partition coefficients (K_{ow}s) for naphthalene range from 3.29 to 3.37, and log organic carbon coefficients (K_{oc}s) range from 2.97 to 3.27. The reported experimentally determined log K_{oc} is 3.11.

Based on the magnitude of these values, it is expected that only a small fraction (less than 10 percent) of naphthalene in typical surface water would be associated with particulate matter. Thus, naphthalene discharged to surface waters would remain largely in solution, with smaller quantities being associated with suspended solids and benthic sediments.

The properties of C_{11}-C_{22} aromatics are similar to that of DRO. These aromatics are relatively biodegradable under favorable geochemical conditions and in the presence of hydrocarbon-degrading bacteria.

5.2.7 Volatile Petroleum Hydrocarbons

MTBE was detected at concentrations less than the Maine MEG in 4 of 10 September 2010 groundwater samples and two of nine April 2011 groundwater samples. The K_{oc} for MTBE is approximately 11.2, a low value indicating little tendency to sorb to soil particles and suggesting considerable mobility, especially considering its high water solubility.

TABLE 5-1
SUMMARY OF PESTICIDE AND HERBICIDE MOBILITY INFORMATION
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Common Name	Pesticide Movement Rating[1]	Soil Half-life (days)[1]	Water Solubility (mg/l)[1]	Vapor Pressure (mPa @ 25 C)	Henry's Law Constant ($atm\text{-}m^3/mole$)[2]	Sorption Coefficient (soil K_{oc})
Chlordane	Extremely Low	350	0.06	1.3	0.0000095	20,000
DDD (TDE) (4-4')	Extremely Low	1000	0.02	0.62	0.0000216	100,000
DDE (4-4')	Extremely Low	1000	0.1	2.09	0.00122	50,000
DDT (4-4')	Extremely Low	2000	0.0055	0.025	0.0000129	2,000,000
Dieldrin	Extremely Low	1000	0.2	0.39	0.000058	12,000
Endosulfan	Extremely Low	50	0.32	1200	0.0000112	12,400
Endrin	Extremely Low	4300	0.23	0.026	0.00000752	10,000
Heptachlor	Extremely Low	250	0.056	53	0.00148	24,000
Heptachlor Epoxide	Extremely Low[3]	-	0.2[2]	40[2]	0.000032	21,000[2]
Lindane	Moderate	400	7	5.6	0.00000292	1100
Maleic hydrazide acid	Moderate	30	6000	-	-	250
Maleic hydrazide potassium salt	High	30	400,000	-	-	20
Monuron	Very High	170	230	50	0.00000003	150
Propoxur	High	30	1800	300	4.44E-10	30

1 National Pesticide Information Center, OSU Extension Pesticide Properties Database, P.A. Vogue, E.A. Kerle, and J.J. Jenkins. 7/24/94 (http://npic.orst.edu/ppdmove.htm).
2 Pennsylvania Land Recycling Program Chemical and Physical Properties Database (http://www.dep.state.pa.us/physicalproperties)
3 The National Pestcide Information Center Pesticide Properties Database does not provide information for heptachlor expoxide; however, based on the physical properties listed in the table, movement of heptachlor epoxide would be extremely low in soil.

6.0 RISK ASSESSMENT

A Human Health Risk Assessment (HHRA) and Ecological Risk Assessment (ERA) were performed to assess potential risks posed by chemicals detected in environmental media at Site 17 using data for current site conditions (Tables 4-3 and 4-5). The following sections present the objectives of the risk assessments, a general outline of the basis for the risk assessments, and a summary of the conclusions drawn from the assessments. Detailed information regarding the risk assessments is provided in Appendix C.

6.1 HUMAN HEALTH RISK ASSESSMENT

The objective of this HHRA is to determine whether concentrations of chemicals detected in Site 17 soils and groundwater pose a significant threat to potential human receptors under current and/or future land use scenarios. The potential risks to human health at the site were estimated based on the assumption that no further actions will be taken to address current conditions. Updated post-excavation soil and groundwater data sets were used in the risk assessment. For soil, the data set includes 2009 and 2010 supplemental sampling results and results of samples collected in association with the 2009 and 2010 removal actions and excludes results from samples that were removed as part of these excavations. For groundwater, the updated data set includes results from the nine wells sampled by H&S Environmental, Inc., during the April 2011 long-term monitoring event (first event after the December 2010 removal action).

Detailed text regarding the HHRA is provided in Appendix C-1, and Risk Assessment Guidance for Superfund (RAGS) Part D tables are presented in Attachment C-1.4 of Appendix C-1. The following is a summary of the HHRA.

6.1.1 HHRA Summary

The following current EPA, State of Maine, and Navy risk assessment guidance documents were used to develop the framework for the HHRA:

- Conducting Human Health Risk Assessments Under the Environmental Restoration Program. Chief of Naval Operations (N45) 5090 Ser N453E/1U595168, Fe 12, 2001 (Navy, 2001).

- Navy Human Health Risk Assessment Webpage: http://www-nehc.med.navy.mil/hhra/.

- Risk Assessment Guidance for Superfund: Volume I, Human Health Evaluation Manual (Part A) (EPA, 1989).

- Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors (EPA, 1991).

- Distribution of Preliminary Review Draft: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure (EPA, 1993).

- Guidance for Human Health Risk Assessments for Hazardous Substance Sites in Maine. (MEDEP and Maine CDC, 2009).

- Exposure Factors Handbook. Office of Health and Environmental Assessment (EPA, 1997b).

- Risk Assessment Guidance for Superfund: Volume 1 - Human Health Evaluation Manual (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments) (EPA, 2001).

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

- Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. (EPA, 2002c).

- Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final Guidance (EPA, 2004).

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

This HHRA consists of five components, data evaluation, exposure assessment, toxicity assessment, risk characterization, and uncertainty analysis. Sections 2 through 6 of Appendix C-1 contain detailed discussions of the five components of the HHRA.

Four major aspects of chemical contamination and exposure must be considered to assess potential public health risks: (1) contaminants with toxic characteristics must be found in environmental media; (2) the contaminants must be released by either natural processes or by human action; (3) potential

exposure points must exist; and (4) human receptors must be present at the point of exposure. Risk is a function of both toxicity and exposure; without one of the factors listed above, there is no risk.

As part of the HHRA, a medium-specific list of chemicals of potential concern (COPCs) is developed and used to quantitatively determine potential human health risks. The selection of COPCs is a qualitative screening process that limits the number of chemicals that are quantitatively evaluated in a HHRA to those site-related constituents that dominate overall potential risks. In general, a chemical is selected as a COPC and retained for further risk evaluation if the maximum detected concentration in a sampled medium exceeds the risk-based COPC screening level. An exception to this general COPC selection rule is that if a chemical is determined not to be site related, that chemical is not selected as a COPC. Chemicals are generally determined not to be site related via a background comparison; however, a consensus on an appropriate background data set to use for comparison to Site 17 soils could not be reached by regulators and the Navy (March 23, 2011, conference call); therefore, a background comparison was not conducted in this RI. However, a statistical comparison was completed of elevated arsenic detections in fill material compared to arsenic concentrations in all other site soils, which found that the population of arsenic concentrations in fill material is distinct and greater than arsenic concentrations in all other site soils (Appendix E.6). Based on this comparison and subsequent discussions among the Navy, EPA, and MEDEP, the elevated arsenic concentrations are attributed to fill material and are not considered to be site related. Therefore, risks from arsenic were not quantified in the site-specific risk calculations. Risks from arsenic were quantified in the cumulative risk calculations for informational purposes.

Several types of screening levels were used to identify COPCs for Site 17. Screening concentrations based on November 2010 EPA RSLs were used for selection of soil and groundwater COPCs. For groundwater, if an EPA RSL was not available, the February 2011 Maine MEG was used. The risk-based screening concentrations correspond to a systemic Hazard Quotient (HQ) of 0.1 for non-carcinogens or an incremental lifetime cancer risk (ILCR) of 1×10^{-6} for carcinogens. Chemicals retained as COPCs and associated EPCs are summarized in Table 6-1. RAGS Part D COPC selection tables (Table 2s) are presented in Attachment C-1.4 of Appendix C-1.

An exposure assessment was prepared to identify potentially exposed populations and applicable exposure pathways and to estimate chemical intakes under the identified exposure scenarios. The characterization of exposure factors is necessary to allow the evaluation of potentially complete exposure pathways in the risk assessment. Potential receptors can be exposed to site contaminants in soil and groundwater directly or indirectly. Potential exposure routes for these media include ingestion (swallowing), dermal contact (skin exposure), and/or inhalation (breathing). RAGS Part D exposure assumption tables (Tables 3 and 4) are presented in Attachment C-1.4 of Appendix C-1.

The baseline risk assessment prepared for the site considers receptor exposure under residential and non-residential (e.g., construction worker, industrial, trespasser/recreational user) land use scenarios. Quantitative risk estimates for potential human receptors were developed for those chemicals identified as COPCs. Receptors evaluated in the HHRA included current/future trespassers/recreational users, current/future lifetime trespassers/recreational users, current/future construction workers, future typical industrial workers, and hypothetical future child, adolescent, adult, and lifetime residents. Standard exposure assumptions were used for each receptor type. The methodology used to calculate the risks presented in this section is described in Section 5 of Appendix C-1. Results of the risk assessment are summarized in Tables 6-2 through 6-5. Uncertainties associated with the risk estimates are discussed in Section 6 of Appendix C-1, and RAGS Part D risk result tables (Tables 7 and 9) are presented in Attachment C-1.4 of Appendix C-1.

6.1.2 HHRA Conclusions

The baseline HHRA for Site 17 characterized the potential risks to human receptors under current and potential future land use. Potential receptors evaluated were current and future trespassers/recreational users, hypothetical future lifetime trespassers/recreational users, future construction workers, future typical industrial workers, and hypothetical future child, adolescent, adult, and lifetime residents. In accordance with the June 17, 2010, Risk Assessment Conference Call (Appendix E.4), site-specific and cumulative risks were calculated and are presented in this RI. The difference between site-specific and cumulative risks in this RI is that arsenic is not included in the calculation of site-specific risk but is included in the calculation of cumulative site risks. Sections 6.1.2.1 and 6.1.2.2 and Tables 6-2 and 6-3 present site-specific reasonable maximum exposure (RME) and central tendency exposure (CTE) risks, respectively. Sections 6.1.2.3 and 6.1.2.4 and Tables 6-4 and 6-5 present cumulative RME and CTE exposure risks, respectively. Conclusions of this RI (Section 7) are based on site-specific risks; cumulative risks are presented for risk-management informational purposes only.

The following chemicals were selected as COPCs for the risk evaluation of direct contact exposures to soils:

- Surface soil – arsenic and heptachlor expoxide.

- Subsurface soil – 4,4'-DDT, alpha-chlordane, dieldrin, gamma-chlordane, heptachlor, heptachlor epoxide, monuron, and arsenic.

The following chemicals were selected as COPCs for soil based on the potential for migration of contaminants from soil to groundwater:

- Surface soil – 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-chlordane, gamma-chlordane, heptachlor, heptachlor epoxide, arsenic, and lead.

- Subsurface soil – 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-chlordane, dieldrin, endrin, gamma-chlordane, heptachlor, heptachlor epoxide, monuron, propoxur, PCE, arsenic, and lead.

The chemicals selected as COPCs for groundwater were 4,4'-DDE and 4,4'-DDT. Table 6-1 lists all chemicals retained as COPCs and lists EPCs for direct contact COPCs. Quantitative estimates of cumulative and site-specific non-carcinogenic and carcinogenic risks [Hazard Indices (HIs) and ILCRs, respectively] were developed for potential human receptors, and the results of those estimates are discussed below.

6.1.2.1 Site-Specific Reasonable Maximum Exposure Risks

Site-specific RME risks are summarized in Table 6-2 and discussed below. Target organ-specific HIs for current/future construction workers, current/future trespassers, future industrial workers, and all hypothetical residential receptors were less than or equal to 1; therefore, adverse non-carcinogenic effects are not anticipated for any of the receptors evaluated.

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ILCRs for all receptors were within EPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$ and less than or equal to the MEDEP target risk guidance value of $1x10^{-5}$ on a medium-specific basis; therefore, adverse carcinogenic effects are not anticipated for any of the receptors evaluated on a medium-specific basis. The ILCR for hypothetical lifetime residents ($2x10^{-5}$) exceeded the MEDEP target risk guidance ILCR value of $1x10^{-5}$ when considering the cumulative effects of exposure to both subsurface soil and groundwater. Exposure to 4,4'-DDD and 4,4'-DDT in groundwater via incidental ingestion are the major contributors to hypothetical lifetime resident cancer risk.

6.1.2.2 Site-Specific Central Tendency Exposure Risks

Site-specific CTE risks are summarized on Table 6-3 and discussed below. Target organ-specific HIs for current/future construction workers, current/future trespassers, future industrial workers, and all hypothetical residential receptors were less than or equal to 1; therefore, adverse non-carcinogenic effects are not anticipated for any of the receptors evaluated.

ILCRs for all receptors (maximum $6x10^{-6}$) were within EPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$ and less than the MEDEP target risk guidance value of $1x10^{-5}$; therefore, adverse carcinogenic effects are not anticipated for any of the receptors evaluated.

6.1.2.3 Cumulative Reasonable Maximum Exposure Site Risks

Cumulative RME site risks are summarized on Table 6-4 and discussed below. Target organ-specific HIs for current/future construction workers, current/future trespassers, future industrial workers, and all hypothetical residential receptors were less than or equal to 1; therefore, adverse non-carcinogenic effects are not anticipated for any of the receptors evaluated.

ILCRs for all receptors were within EPA's target risk range of 10^{-6} to 10^{-4}. ILCRs for future child residents ($2x10^{-5}$ for surface soil plus groundwater and subsurface soil plus groundwater), and lifetime residents ($3x10^{-5}$ for surface soil plus groundwater and $2x10^{-5}$ for subsurface soil plus groundwater) exceeded the MEDEP target risk guidance ILCR value of $1x10^{-5}$. Incidental ingestion of arsenic in surface and subsurface soil is the major contributor to cancer risk for those receptors with corresponding risks greater than the MEDEP target risk guidance ILCR value.

6.1.2.4 Cumulative Central Tendency Site Risks

Cumulative CTE site risks are summarized in Table 6-5 and discussed below. Target organ-specific HIs for current/future construction workers, current/future trespassers, future industrial workers, and all hypothetical residential receptors were less than or equal to 1; therefore, adverse non-carcinogenic effects are not anticipated for any of the receptors evaluated.

ILCRs for all receptors were within EPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$ and less than the MEDEP target risk guidance value of $1x10^{-5}$; therefore, adverse carcinogenic effects are not anticipated for any of the receptors evaluated.

6.1.2.5 Chemicals of Concern

Upon completion of the HHRA, no chemicals of concern (COCs) were retained because no unacceptable CERCLA risks (ILCR greater than $1x10^{-4}$ or HI greater than 1) or MEDEP guidance target risk values (ILCR greater than $1x10^{-5}$ or HI greater than 1) were exceeded for any of the individual media (i.e., surface soil, subsurface soil, groundwater) evaluated based on the site-specific risk calculations.

6.1.3 Uncertainty Analysis

Uncertainty in risk characterization results from assumptions made regarding additivity of effects from exposure to multiple COPCs from various exposure routes. High uncertainty exists when summing non-cancer risks for several substances across different exposure pathways. Risks to any individual may also be overestimated by summing multiple assumed exposure pathway risks for any single receptor.

Although every effort was made to develop reasonable scenarios, not all individual receptors may be exposed via all pathways considered.

The risk characterization text in Appendix C-1 did not consider the unlikely scenarios of current/future trespassers or future industrial workers being exposed to subsurface soil. However, as presented in Attachment C-1.4 of Appendix C-1 (RAGS Tables 9.2 to 9.4), HIs are less than unity and ILCRs are within EPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$ and less than the MEDEP guidance target ILCR risk of $1x10^{-5}$ for these receptors.

Hypothetical future residents may be exposed to COPCs through the ingestion of homegrown produce, and infants could potentially be exposed via nursing (i.e., consumption of COPCs in mother's milk). However, these pathways are not routinely evaluated in an HHRA unless the site under investigation is located in a highly agricultural/rural area, and there is a significant potential for subsistence farming. Also, the Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities (EPA, 2005) only recommends evaluating the consumption of mother's milk exposure pathway when dioxin/furans or dioxin-like PCBs are significant site contaminants. Dioxin/furans and dioxin-like PCBs are not COPCs at Site 17; therefore, this risk evaluation did not include a quantitative risk evaluation of an infant's exposure via the ingestion of mother's milk.

Finally, the risk characterization does not consider antagonistic or synergistic effects. Little or no information is available to determine the potential for antagonism or synergism for the COPCs. Because chemical-specific interactions cannot be predicted, the likelihood for risks to be over predicted or under predicted cannot be defined, but the methodology that was used is based on current EPA guidance.

6.2 ECOLOGICAL RISK ASSESSMENT

The goal of the ERA conducted for Site 17 was to evaluate the potential for adverse ecological impacts from site-related contamination and to determine the need for further investigation and/or further remedial action at the site. This ERA contains information to enable scientists and managers to conclude either that risks to ecological populations at the site are most likely negligible or that further information is necessary to evaluate potential ecological risks at the site.

The methodology used for this ERA is in accordance with the following guidance documents:

- Navy Policy for Conducting Ecological Risk Assessment (1999).
- Navy Guidance for Conducting Ecological Risk Assessments (http://web.ead.anl.gov/ecorisk/index.cfm).

- Final Guidelines for Ecological Risk Assessment (EPA, 1998).
- Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (EPA, 1997a).

This Tier I ERA consists of Steps 1, 2, and 3a of the eight-step ERA process conducted in accordance with the above guidance documents. The first two steps are the screening-level ecological risk assessment (SERA). Step 3a is the first step of the baseline ecological risk assessment (BERA) and consists of refining the conservative exposure assumptions to ultimately refine the list of COPCs that are initially selected during Step 2. Steps 3b through 7 consist of additional site-specific investigations/biological studies but are not included in this ERA because no additional site-specific investigations/biological studies were conducted at the site. Finally, Step 8, risk management, is incorporated throughout the ERA process in cooperation with the regulators.

ERA Conclusions

The complete ERA for the site is presented in Appendix C-2, including all tables and supporting information, detailed methodology, and uncertainty analysis. The following text presents a summary of the conclusions of the ERA.

Risks to Terrestrial Plants and Invertebrates

Two pesticides (alpha-chlordane and gamma-chlordane) and arsenic were detected at maximum concentrations exceeding ecological screening levels for plants. Screening levels for plants were not available for two pesticides (heptachlor and heptachlor epoxide). The pesticides alpha-chlordane and gamma-chlordane were detected infrequently at the site at concentrations exceeding screening values based on risk to plants (1 to 2 of 26 samples). The maximum concentrations of heptachlor and heptachlor epoxide were less than an alternate screening benchmark based on risk to plants, and the location of maximum concentrations of heptachlor and heptachlor epoxide is bounded by a road and adjacent samples with lower concentrations. Arsenic concentrations slightly exceeded the conservative screening level for plants. However, the screening level was exceeded at only one location, so risks to plants are not expected. Therefore, no chemicals were retained as COPCs for further evaluation for plants.

Arsenic was detected at a maximum concentration exceeding the screening level for invertebrates. Arsenic concentrations slightly exceeded the conservative screening level, which was a Canadian Soil Quality Guideline based on soil contact using data from toxicity studies on plants and invertebrates. However, the value for arsenic is based on risk to plants. Arsenic concentrations were less than an

alternate benchmark based on risk to invertebrates. Also, as discussed in Section 4.1.3, arsenic was determined not to be site related. Screening levels for invertebrates were not available for five pesticides. Several of the pesticides were detected infrequently at the site. Also, the location of maximum concentrations of the pesticides is bounded by a road and adjacent samples with lower concentrations. Therefore, no chemicals were retained as COPCs for further evaluation for invertebrates.

Risks to Mammals and Birds

During the screening ERA, alpha-chlordane, gamma-chlordane, total DDT, and lead had Ecological Effects Quotient (EEQs) greater than 1.0 based on conservative food-chain models. Further refinement during the Step 3a evaluation determined that risks to wildlife were not great enough for any chemicals to warrant further evaluation at this site. Using the Tier 2, Step 3A inputs food-chain model based on no-observable-adverse-effects levels (NOAELs), only total DDT had an EEQ greater than 1.0. However, as part of the next step in calculating a refined food-chain model, EEQs based on lowest-observed-adverse-effects levels (LOAELs) were less than 1.0. The food-chain model assumes that the receptors obtain their entire diet is from the site. Site 17 is only 0.7 acre and is surrounded by roads, so it is unlikely that the site comprises the entire home range for most if any wildlife receptors. For that reason, risks to wildlife from alpha-chlordane, gamma-chlordane, and total DDT are not expected, so these pesticides were not retained as COPCs for further evaluation for wildlife.

TABLE 6-1
CHEMICALS RETAINED AS COPCs
SITE 17 REMEDIAL INVESTIGATION
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE

Chemical	Surface Soil			Subsurface Soil			Groundwater	
	EPC (mg/kg)	Direct Contact	Soil to Groundwater	EPC (mg/kg)	Direct Contact	Soil to Groundwater	EPC (µg/L)	
Inorganics								
Arsenic	8	R	X	4.4	R	X		
Lead			X			X		
Herbicides								
Monuron				0.05	N	N		
Propoxur						X		
Pesticides/PCBs								
4,4'-DDD			X			X	1.2	G
4,4'-DDE			X			X		
4,4'-DDT			X	2.3	R	X	1.6	G
alpha-Chlordane			X	0.4	R	X		
Dieldrin				0.003	R	X		
Endrin						X		
gamma-Chlordane			X	0.4	R	X		
Heptachlor			X	0.03	R	X		
Heptachlor epoxide	0.02	R	X	0.03	R	X		
Volatiles								
Tetrachloroethene						X		

EPCs were not calculated for those chemicals selected as COPCs based on exceedances of criteria for migration from soil to groundater because the pathway was not quantitatively evaluated in the baseline human health risk assessment.

EPC = Exposure point concentration.
G - Chemical concentration exceeded groundwater screening criterion.
N - No toxicity criterion or surrogate.
R - Chemical concentration exceeded the screening criterion for residential exposure.
X - Chemical concentration exceeded criterion for migration from soil to groundwater.

TABLE 6-2
SUMMARY OF SITE-SPECIFIC CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Construction Worker (Current/Future)	Surface Soil	Incidental Ingestion	5E-09	- -	- -	- -	0.003	- -
		Dermal Contact	2E-09	- -	- -	- -	0.001	- -
		Inhalation	6E-11	- -	- -	- -	- -	- -
		Total	7E-09	- -	- -	- -	0.004	- -
Construction Worker (Current/Future)	Subsurface Soil	Incidental Ingestion	4E-08	- -	- -	- -	0.02	- -
		Dermal Contact	7E-09	- -	- -	- -	0.003	- -
		Inhalation	5E-10	- -	- -	- -	0.0001	- -
		Total	5E-08	- -	- -	- -	0.02	- -
Construction Worker (Current/Future)	Groundwater	Incidental Ingestion	1E-10	- -	- -	- -	0.00004	- -
		Dermal Contact	--	- -	- -	- -	- -	- -
		Inhalation	--			- -	- -	- -
		Total	1E-10	- -	- -	- -	- -	- -
Construction Worker Surface Soil + Groundwater Total			7E-09				0.004	
Construction Worker Subsurface Soil + Groundwater Total			5E-08				0.02	
Typical Industrial Worker (Future)	Surface Soil	Incidental Ingestion	6E-08	- -	- -	- -	0.002	- -
		Dermal Contact	4E-08	- -	- -	- -	0.001	- -
		Inhalation	5E-13	- -	- -	- -	- -	- -
		Total	1E-07	- -	- -	- -	0.002	- -
Typical Industrial Worker (Future)	Subsurface Soil	Incidental Ingestion	5E-07	- -	- -	- -	0.01	- -
		Dermal Contact	2E-07	- -	- -	- -	0.003	- -
		Inhalation	4E-12	- -	- -	- -	- -	- -
		Total	7E-07	- -	- -	- -	0.01	- -
Adolescent Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	4E-09	- -	- -	- -	0.0003	- -
		Dermal Contact	5E-09	- -	- -	- -	0.0003	- -
		Inhalation	9E-15	- -	- -	- -	- -	- -
		Total	9E-09	- -	- -	- -	0.0005	- -
Adolescent Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	4E-08	- -	- -	- -	0.001	- -
		Dermal Contact	2E-08	- -	- -	- -	0.001	- -
		Inhalation	8E-14	- -	- -	- -	- -	- -
		Total	6E-08	- -	- -	- -	0.002	- -

TABLE 6-2
SUMMARY OF SITE-SPECIFIC CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Adult Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	4E-09	- -	- -	- -	0.0002	- -
		Dermal Contact	1E-09	- -	- -	- -	0.0001	- -
		Inhalation	1E-14	- -	- -	- -	- -	- -
		Total	5E-09	- -	- -	- -	0.0002	- -
Adult Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	3E-08	- -	- -	- -	0.001	- -
		Dermal Contact	7E-09	- -	- -	- -	0.0002	- -
		Inhalation	1E-13	- -	- -	- -	- -	- -
		Total	4E-08	- -	- -	- -	0.001	- -
Child Resident (Future)	Surface Soil	Incidental Ingestion	2E-07	- -	- -	- -	0.02	- -
		Dermal Contact	6E-08	- -	- -	- -	0.01	- -
		Inhalation	5E-13	- -	- -	- -	- -	- -
		Total	3E-07	- -	- -	- -	0.03	- -
Child Resident (Future)	Subsurface Soil	Incidental Ingestion	2E-06	- -	- -	- -	0.1	- -
		Dermal Contact	3E-07	- -	- -	- -	0.02	- -
		Inhalation	4E-12	- -	- -	- -	- -	- -
		Total	2E-06	- -	- -	- -	0.1	- -
Child Resident (Future)	Groundwater	Incidental Ingestion	5E-06	- -	- -	- -	0.2	- -
		Dermal Contact	- -	- -	- -	- -	- -	- -
		Inhalation	- -	- -	- -	- -	- -	- -
		Total	5E-06	- -	- -	- -	0.2	- -
Child Resident Surface Soil + Groundwater Total			5E-06				0.2	
Child Resident Subsurface Soil + Groundwater Total			7E-06				0.4	
Adolescent Resident (Future)	Surface Soil	Incidental Ingestion	5E-08	- -	- -	- -	0.003	- -
		Dermal Contact	5E-08	- -	- -	- -	0.003	- -
		Inhalation	8E-13	- -	- -	- -	- -	- -
		Total	1E-07	- -	- -	- -	0.01	- -
Adolescent Resident (Future)	Subsurface Soil	Incidental Ingestion	4E-07	- -	- -	- -	0.02	- -
		Dermal Contact	2E-07	- -	- -	- -	0.01	- -
		Inhalation	6E-12	- -	- -	- -	- -	- -
		Total	6E-07	- -	- -	- -	0.02	- -

TABLE 6-2
SUMMARY OF SITE-SPECIFIC CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Adolescent Resident (Future)	Groundwater	Incidental Ingestion	4E-06	- -	- -	- -	0.1	- -
		Dermal Contact	- -	- -	- -	- -	- -	- -
		Inhalation	- -	- -	- -	- -	- -	- -
		Total	4E-06	- -	- -	- -	0.1	- -
Adolescent Resident Surface Soil + Groundwater Total			4E-06				0.1	
Adolescent Resident Subsurface Soil + Groundwater Total			5E-06				0.1	
Adult Resident (Future)	Surface Soil	Incidental Ingestion	5E-08	- -	- -	- -	0.002	- -
		Dermal Contact	2E-08	- -	- -	- -	0.001	- -
		Inhalation	1E-12	- -	- -	- -	- -	- -
		Total	7E-08	- -	- -	- -	0.003	- -
Adult Resident (Future)	Subsurface Soil	Incidental Ingestion	4E-07	- -	- -	- -	0.01	- -
		Dermal Contact	9E-08	- -	- -	- -	0.002	- -
		Inhalation	9E-12	- -	- -	- -	- -	- -
		Total	5E-07	- -	- -	- -	0.01	- -
Adult Resident (Future)	Groundwater	Incidental Ingestion	5E-06	- -	- -	- -	0.09	- -
		Dermal Contact	- -	- -	- -	- -	- -	- -
		Inhalation	- -	- -	- -	- -	- -	- -
		Total	5E-06	- -	- -	- -	0.09	- -
Adult Resident Surface Soil + Groundwater Total			5E-06				0.09	
Adult Resident Subsurface Soil + Groundwater Total			5E-06				0.1	
Lifelong Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	8E-09	- -	- -	- -	NA	- -
		Dermal Contact	6E-09	- -	- -	- -	NA	- -
		Inhalation	2E-14	- -	- -	- -	NA	- -
		Total	1E-08	- -	- -	- -	NA	- -
Lifelong Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	7E-08	- -	- -	- -	NA	- -
		Dermal Contact	3E-08	- -	- -	- -	NA	- -
		Inhalation	2E-13	- -	- -	- -	NA	- -
		Total	9E-08	- -	- -	- -	NA	- -

TABLE 6-2
SUMMARY OF SITE-SPECIFIC CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Lifelong Resident (Future)	Surface Soil	Incidental Ingestion	3E-07	- -	- -	- -	NA	- -
		Dermal Contact	1E-07	- -	- -	- -	NA	- -
		Inhalation	2E-12	- -	- -	- -	NA	- -
		Total	4E-07	- -	- -	- -	NA	- -
Lifelong Resident (Future)	Subsurface Soil	Incidental Ingestion	3E-06	- -	- -	- -	NA	- -
		Dermal Contact	6E-07	- -	- -	- -	NA	- -
		Inhalation	2E-11	- -	- -	- -	NA	- -
		Total	3E-06	- -	- -	- -	NA	- -
Lifelong Resident (Future)	Groundwater	Incidental Ingestion	1E-05	- -	- -	- -	NA	- -
		Dermal Contact	- -	- -	- -	- -	NA	- -
		Inhalation	- -	- -	- -	- -	NA	
		Total	1E-05	- -	- -	- -	NA	- -
Lifelong Resident Surface Soil + Groundwater Total			1E-05				NA	
Lifelong Resident Subsurface Soil + Groundwater Total			2E-05				NA	

TABLE 6-3
SUMMARY OF SITE-SPECIFIC CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Construction Worker (Current/Future)	Surface Soil	Incidental Ingestion	1E-09	- -	- -	- -	0.001	- -
		Dermal Contact	3E-10	- -	- -	- -	0.0001	- -
		Inhalation	3E-11	- -	- -	- -	- -	- -
		Total	2E-09	- -	- -	- -	0.001	- -
Construction Worker (Current/Future)	Subsurface Soil	Incidental Ingestion	1E-08	- -	- -	- -	0.004	- -
		Dermal Contact	1E-09	- -	- -	- -	0.0004	- -
		Inhalation	3E-10	- -	- -	- -	0.00005	- -
		Total	1E-08	- -	- -	- -	0.005	- -
Construction Worker (Current/Future)	Groundwater	Incidental Ingestion	7E-11	- -	- -	- -	0.00002	- -
		Dermal Contact	- -	- -	- -	- -	- -	- -
		Inhalation	- -	- -	- -	- -	- -	- -
		Total	7E-11	- -	- -	- -	0.00002	- -
Construction Worker Surface Soil + Groundwater Total			2E-09				0.0009	
Construction Worker Subsurface Soil + Groundwater Total			1E-08				0.005	
Typical Industrial Worker (Future)	Surface Soil	Incidental Ingestion	1E-08	- -	- -	- -	0.001	- -
		Dermal Contact	1E-09	- -	- -	- -	0.00009	- -
		Inhalation	1E-13	- -	- -	- -	- -	- -
		Total	1E-08	- -	- -	- -	0.001	- -
Typical Industrial Worker (Future)	Subsurface Soil	Incidental Ingestion	8E-08	- -	- -	- -	0.004	- -
		Dermal Contact	6E-09	- -	- -	- -	0.0003	- -
		Inhalation	1E-12	- -	- -	- -	- -	- -
		Total	9E-08	- -	- -	- -	0.004	- -
Adolescent Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	9E-10	- -	- -	- -	0.0001	- -
		Dermal Contact	4E-10	- -	- -	- -	0.00002	- -
		Inhalation	2E-15	- -	- -	- -	- -	- -
		Total	1E-09	- -	- -	- -	0.0001	- -

TABLE 6-3
SUMMARY OF SITE-SPECIFIC CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Adolescent Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	7E-09	- -	- -	- -	0.0003	- -
		Dermal Contact	2E-09	- -	- -	- -	0.00006	- -
		Inhalation	2E-14	- -	- -	- -	- -	- -
		Total	9E-09	- -	- -	- -	0.0004	- -
Adult Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	9E-10	- -	- -	- -	0.00004	- -
		Dermal Contact	1E-10	- -	- -	- -	0.000004	- -
		Inhalation	3E-15	- -	- -	- -	- -	- -
		Total	1E-09	- -	- -	- -	0.00004	- -
Adult Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	8E-09	- -	- -	- -	0.0002	- -
		Dermal Contact	5E-10	- -	- -	- -	0.00001	- -
		Inhalation	3E-14	- -	- -	- -	- -	- -
		Total	8E-09	- -	- -	- -	0.0002	- -
Child Resident (Future)	Surface Soil	Incidental Ingestion	2E-08	- -	- -	- -	0.01	- -
		Dermal Contact	3E-09	- -	- -	- -	0.0008	- -
		Inhalation	1E-13	- -	- -	- -	- -	- -
		Total	3E-08	- -	- -	- -	0.008	- -
Child Resident (Future)	Subsurface Soil	Incidental Ingestion	2E-07	- -	- -	- -	0.04	- -
		Dermal Contact	1E-08	- -	- -	- -	0.002	- -
		Inhalation	8E-13	- -	- -	- -	- -	- -
		Total	2E-07	- -	- -	- -	0.04	- -
Child Resident (Future)	Groundwater	Incidental Ingestion	7E-07	- -	- -	- -	0.1	- -
		Dermal Contact	- -	- -	- -	- -	- -	- -
		Inhalation	- -	- -	- -	- -	- -	- -
		Total	7E-07	- -	- -	- -	0.1	- -
Child Resident Surface Soil + Groundwater Total			7E-07				0.1	
Child Resident Subsurface Soil + Groundwater Total			9E-07				0.1	
Adolescent Resident (Future)	Surface Soil	Incidental Ingestion	3E-09	- -	- -	- -	0.001	- -
		Dermal Contact	4E-10	- -	- -	- -	0.0001	- -
		Inhalation	1E-13	- -	- -	- -	- -	- -
		Total	4E-09	- -	- -	- -	0.001	- -

TABLE 6-3
SUMMARY OF SITE-SPECIFIC CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Adolescent Resident (Future)	Subsurface Soil	Incidental Ingestion	3E-08	- -	- -	- -	0.01	- -
		Dermal Contact	2E-09	- -	- -	- -	0.0003	- -
		Inhalation	8E-13	- -	- -	- -	- -	- -
		Total	3E-08	- -	- -	- -	0.01	- -
Adolescent Resident (Future)	Groundwater	Incidental Ingestion	3E-07	- -	- -	- -	0.03	- -
		Dermal Contact	- -	- -	- -	- -	- -	- -
		Inhalation	- -	- -	- -	- -	- -	- -
		Total	3E-07	- -	- -	- -	0.03	- -
Adolescent Resident Surface Soil + Groundwater Total			3E-07				0.04	
Adolescent Resident Subsurface Soil + Groundwater Total			3E-07				0.04	
Adult Resident (Future)	Surface Soil	Incidental Ingestion	8E-09	- -	- -	- -	0.001	- -
		Dermal Contact	1E-09	- -	- -	- -	0.00008	- -
		Inhalation	4E-13	- -	- -	- -	- -	- -
		Total	9E-09	- -	- -	- -	0.001	- -
Adult Resident (Future)	Subsurface Soil	Incidental Ingestion	7E-08	- -	- -	- -	0.004	- -
		Dermal Contact	4E-09	- -	- -	- -	0.0002	- -
		Inhalation	3E-12	- -	- -	- -	- -	- -
		Total	7E-08	- -	- -	- -	0.004	- -
Adult Resident (Future)	Groundwater	Incidental Ingestion	1E-06	- -	- -	- -	0.04	- -
		Dermal Contact	- -	- -	- -	- -	- -	- -
		Inhalation	- -	- -	- -	- -	- -	- -
		Total	1E-06	- -	- -	- -	0.04	- -
Adult Resident Surface Soil + Groundwater Total			1E-06				0.04	
Adult Resident Subsurface Soil + Groundwater Total			1E-06				0.05	
Lifelong Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	9E-10	- -	- -	- -	NA	- -
		Dermal Contact	1E-10	- -	- -	- -	NA	- -
		Inhalation	3E-15	- -	- -	- -	NA	- -
		Total	1E-09	- -	- -	- -	NA	- -

TABLE 6-3
SUMMARY OF SITE-SPECIFIC CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Lifelong Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	8E-09	- -	- -	- -	NA	- -
		Dermal Contact	5E-10	- -	- -	- -	NA	- -
		Inhalation	3E-14	- -	- -	- -	NA	- -
		Total	8E-09	- -	- -	- -	NA	- -
Lifelong Resident (Future)	Surface Soil	Incidental Ingestion	4E-08	- -	- -	- -	NA	- -
		Dermal Contact	4E-09	- -	- -	- -	NA	- -
		Inhalation	6E-13	- -	- -	- -	NA	- -
		Total	4E-08	- -	- -	- -	NA	- -
Lifelong Resident (Future)	Subsurface Soil	Incidental Ingestion	2E-06	- -	- -	- -	NA	- -
		Dermal Contact	6E-08	- -	- -	- -	NA	- -
		Inhalation	2E-10	- -	- -	- -	NA	- -
		Total	2E-06	- -	- -	- -	NA	- -
Lifelong Resident (Future)	Groundwater	Incidental Ingestion	2E-06	- -	- -	- -	NA	- -
		Dermal Contact	- -	- -	- -	- -	NA	- -
		Inhalation	- -	- -	- -	- -	NA	
		Total	2E-06	- -	- -	- -	NA	- -
Lifelong Resident Surface Soil + Groundwater Total			2E-06				NA	
Lifelong Resident Subsurface Soil + Groundwater Total			4E-06				NA	

TABLE 6-4
SUMMARY OF CUMULATIVE CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Construction Worker (Current/Future)	Surface Soil	Incidental Ingestion	3E-07	- -	- -	- -	0.05	- -
		Dermal Contact	3E-08	- -	- -	- -	0.006	- -
		Inhalation	4E-08	- -	- -	- -	0.05	- -
		Total	4E-07	- -	- -	- -	0.1	- -
Construction Worker (Current/Future)	Subsurface Soil	Incidental Ingestion	2E-07	- -	- -	- -	0.05	- -
		Dermal Contact	2E-08	- -	- -	- -	0.01	- -
		Inhalation	2E-08	- -	- -	- -	0.02	- -
		Total	3E-07	- -	- -	- -	0.1	- -
Construction Worker (Current/Future)	Groundwater	Incidental Ingestion	1E-10	- -	- -	- -	0.00004	- -
		Dermal Contact	- -	- -	- -	- -	- -	- -
		Inhalation	- -	- -	- -	- -	- -	- -
		Total	1E-10	- -	- -	- -	0.00004	- -
Construction Worker Surface Soil + Groundwater Total			4E-07				0.1	
Construction Worker Subsurface Soil + Groundwater Total			3E-07				0.1	
Typical Industrial Worker (Future)	Surface Soil	Incidental Ingestion	4E-06	- -	- -	Arsenic	0.03	- -
		Dermal Contact	9E-07	- -	- -	- -	0.006	- -
		Inhalation	3E-10	- -	- -	- -	0.00001	- -
		Total	5E-06	- -	- -	Arsenic	0.03	- -
Typical Industrial Worker (Future)	Subsurface Soil	Incidental Ingestion	3E-06	- -	- -	Arsenic	0.02	- -
		Dermal Contact	6E-07	- -	- -	- -	0.01	- -
		Inhalation	2E-10	- -	- -	- -	0.000007	- -
		Total	3E-06	- -	- -	Arsenic	0.03	- -
Adolescent Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	3E-07	- -	- -	- -	0.005	- -
		Dermal Contact	1E-07	- -	- -	- -	0.002	- -
		Inhalation	6E-12	- -	- -	- -	0.0000007	- -
		Total	4E-07	- -	- -	- -	0.006	- -
Adolescent Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	2E-07	- -	- -	- -	0.004	- -
		Dermal Contact	7E-08	- -	- -	- -	0.002	- -
		Inhalation	4E-12	- -	- -	- -	0.0000004	- -
		Total	3E-07	- -	- -	- -	0.006	- -

TABLE 6-4
SUMMARY OF CUMULATIVE CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Adult Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	2E-07	- -	- -	- -	0.003	- -
		Dermal Contact	3E-08	- -	- -	- -	0.0004	- -
		Inhalation	9E-12	- -	- -	- -	0.0000007	- -
		Total	3E-07	- -	- -	- -	0.003	- -
Adult Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	2E-07	- -	- -	- -	0.002	- -
		Dermal Contact	2E-08	- -	- -	- -	0.0004	- -
		Inhalation	5E-12	- -	- -	- -	0.0000004	- -
		Total	2E-07	- -	- -	- -	0.003	- -
Child Resident (Future)	Surface Soil	Incidental Ingestion	1E-05	- -	Arsenic	- -	0.4	- -
		Dermal Contact	1E-06	- -	- -	Arsenic	0.04	- -
		Inhalation	3E-10	- -	- -	- -	0.00005	- -
		Total	2E-05	- -	Arsenic	- -	0.4	- -
Child Resident (Future)	Subsurface Soil	Incidental Ingestion	1E-05	- -	- -	Arsenic	0.3	- -
		Dermal Contact	9E-07	- -	- -	- -	0.03	- -
		Inhalation	2E-10	- -	- -	- -	0.00003	- -
		Total	1E-05	- -	- -	Arsenic	0.4	- -
Child Resident (Future)	Groundwater	Incidental Ingestion	5E-06	- -	- -	- -	0.2	- -
		Dermal Contact	- -	- -	- -	- -	- -	- -
		Inhalation	- -	- -	- -	- -	- -	- -
		Total	5E-06	- -	- -	- -	0.2	- -
Child Resident Surface Soil + Groundwater Total			2E-05				0.6	
Child Resident Subsurface Soil + Groundwater Total			2E-05				0.6	
Adolescent Resident (Future)	Surface Soil	Incidental Ingestion	3E-06	- -	- -	Arsenic	0.05	- -
		Dermal Contact	1E-06	- -	- -	Arsenic	0.02	- -
		Inhalation	5E-10	- -	- -	- -	0.00005	- -
		Total	4E-06	- -	- -	Arsenic	0.07	- -
Adolescent Resident (Future)	Subsurface Soil	Incidental Ingestion	2E-06	- -	- -	Arsenic	0.04	- -
		Dermal Contact	8E-07	- -	- -	- -	0.02	- -
		Inhalation	3E-10	- -	- -	- -	0.00003	- -
		Total	3E-06	- -	- -	Arsenic	0.1	- -

TABLE 6-4
SUMMARY OF CUMULATIVE CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Adolescent Resident (Future)	Groundwater	Incidental Ingestion	4E-06	- -	- -	4,4'-DDD, 4,4'-DDT	0.1	- -
		Dermal Contact	- -	- -	- -	- -	- -	- -
		Inhalation	- -	- -	- -	- -	- -	- -
		Total	4E-06	- -	- -	4,4'-DDD, 4,4'-DDT	0.1	- -
Adolescent Resident Surface Soil + Groundwater Total			9E-06				0.2	
Adolescent Resident Subsurface Soil + Groundwater Total			7E-06				0.2	
Adult Resident (Future)	Surface Soil	Incidental Ingestion	3E-06	- -	- -	Arsenic	0.04	- -
		Dermal Contact	4E-07	- -	- -	- -	0.005	- -
		Inhalation	7E-10	- -	- -	- -	0.00005	- -
		Total	4E-06	- -	- -	Arsenic	0.04	- -
Adult Resident (Future)	Subsurface Soil	Incidental Ingestion	2E-06	- -	- -	Arsenic	0.03	- -
		Dermal Contact	3E-07	- -	- -	- -	0.005	- -
		Inhalation	4E-10	- -	- -	- -	0.00003	- -
		Total	3E-06	- -	- -	Arsenic	0.04	- -
Adult Resident (Future)	Groundwater	Incidental Ingestion	5E-06	- -	- -	4,4'-DDD, 4,4'-DDT	0.09	- -
		Dermal Contact	- -	- -	- -	- -	- -	- -
		Inhalation	- -	- -	- -	- -	- -	- -
		Total	5E-06	- -	- -	4,4'-DDD, 4,4'-DDT	0.09	- -
Adult Resident Surface Soil + Groundwater Total			8E-06				0.1	
Adult Resident Subsurface Soil + Groundwater Total			7E-06				0.1	
Lifelong Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	5E-07	- -	- -	- -	NA	- -
		Dermal Contact	1E-07	- -	- -	- -	NA	- -
		Inhalation	1E-11	- -	- -	- -	NA	- -
		Total	7E-07	- -	- -	- -	NA	- -
Lifelong Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	4E-07	- -	- -	- -	NA	- -
		Dermal Contact	9E-08	- -	- -	- -	NA	- -
		Inhalation	8E-12	- -	- -	- -	NA	- -
		Total	5E-07	- -	- -	- -	NA	- -

TABLE 6-4
SUMMARY OF CUMULATIVE CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $> 10^{-4}$	Chemicals with Cancer Risks $> 10^{-5}$ and $\leq 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-5}$	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Lifelong Resident (Future)	Surface Soil	Incidental Ingestion	2E-05	- -	Arsenic	- -	NA	- -
		Dermal Contact	3E-06	- -	- -	- -	NA	- -
		Inhalation	2E-09	- -	- -	- -	NA	- -
		Total	2E-05	- -	Arsenic	- -	NA	- -
Lifelong Resident (Future)	Subsurface Soil	Incidental Ingestion	1E-05	- -	- -	Arsenic, 4,4'-DDT	NA	- -
		Dermal Contact	2E-06	- -	- -	- -	NA	- -
		Inhalation	8E-10	- -	- -	- -	NA	- -
		Total	2E-05	- -	- -	Arsenic, 4,4'-DDT	NA	- -
Lifelong Resident (Future)	Groundwater	Incidental Ingestion	6E-06	- -	- -	- -	NA	- -
		Dermal Contact	- -	- -	- -	- -	NA	- -
		Inhalation	- -	- -	- -	- -	NA	
		Total	6E-06	- -	- -	- -	NA	- -
Lifelong Resident Surface Soil + Groundwater Total			3E-05				NA	
Lifelong Resident Subsurface Soil + Groundwater Total			2E-05				NA	

TABLE 6-5
SUMMARY OF CUMULATIVE CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Construction Worker (Current/Future)	Surface Soil	Incidental Ingestion	8E-08	- -	- -	- -	0.01	- -
		Dermal Contact	5E-09	- -	- -	- -	0.001	- -
		Inhalation	2E-08	- -	- -	- -	0.02	- -
		Total	1E-07	- -	- -	- -	0.04	- -
Construction Worker (Current/Future)	Subsurface Soil	Incidental Ingestion	6E-08	- -	- -	- -	0.01	- -
		Dermal Contact	4E-09	- -	- -	- -	0.0009	- -
		Inhalation	1E-08	- -	- -	- -	0.01	- -
		Total	7E-08	- -	- -	- -	0.02	- -
Construction Worker (Current/Future)	Groundwater	Incidental Ingestion	7E-11	- -	- -	- -	0.00002	- -
		Dermal Contact	- -	- -	- -	- -	- -	- -
		Inhalation	- -	- -	- -	- -	- -	- -
		Total	7E-11	- -	- -	- -	0.00002	- -
Construction Worker Surface Soil + Groundwater Total			1E-07				0.04	
Construction Worker Subsurface Soil + Groundwater Total			7E-08				0.02	
Typical Industrial Worker (Future)	Surface Soil	Incidental Ingestion	7E-07	- -	- -	- -	0.01	- -
		Dermal Contact	3E-08	- -	- -	- -	0.001	- -
		Inhalation	9E-11	- -	- -	- -	0.00001	- -
		Total	7E-07	- -	- -	- -	0.01	- -
Typical Industrial Worker (Future)	Subsurface Soil	Incidental Ingestion	4E-07	- -	- -	- -	0.01	- -
		Dermal Contact	2E-08	- -	- -	- -	0.0005	- -
		Inhalation	5E-11	- -	- -	- -	0.000006	- -
		Total	5E-07	- -	- -	- -	0.01	- -
Adolescent Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	6E-08	- -	- -	- -	0.001	- -
		Dermal Contact	8E-09	- -	- -	- -	0.0001	- -
		Inhalation	2E-12	- -	- -	- -	0.0000002	- -
		Total	7E-08	- -	- -	- -	0.001	- -
Adolescent Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	4E-08	- -	- -	- -	0.001	- -
		Dermal Contact	6E-09	- -	- -	- -	0.0001	- -
		Inhalation	9E-13	- -	- -	- -	0.0000001	- -
		Total	5E-08	- -	- -	- -	0.001	- -

TABLE 6-5
SUMMARY OF CUMULATIVE CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Adult Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	6E-08	- -	- -	- -	0.001	- -
		Dermal Contact	2E-09	- -	- -	- -	0.00003	- -
		Inhalation	2E-12	- -	- -	- -	0.0000002	- -
		Total	6E-08	- -	- -	- -	0.001	- -
Adult Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	4E-08	- -	- -	- -	0.001	- -
		Dermal Contact	2E-09	- -	- -	- -	0.00003	- -
		Inhalation	1E-12	- -	- -	- -	0.0000001	- -
		Total	4E-08	- -	- -	- -	0.001	- -
Child Resident (Future)	Surface Soil	Incidental Ingestion	2E-06	- -	- -	Arsenic	0.1	- -
		Dermal Contact	6E-08	- -	- -	- -	0.00	- -
		Inhalation	7E-11	- -	- -	- -	0.00004	- -
		Total	2E-06	- -	- -	Arsenic	0.1	- -
Child Resident (Future)	Subsurface Soil	Incidental Ingestion	1E-06	- -	- -	- -	0.1	- -
		Dermal Contact	4E-08	- -	- -	- -	0.00	- -
		Inhalation	4E-11	- -	- -	- -	0.00002	- -
		Total	1E-06	- -	- -	- -	0.1	- -
Child Resident (Future)	Groundwater	Incidental Ingestion	7E-07	- -	- -	- -	0.1	- -
		Dermal Contact	- -	- -	- -	- -	- -	- -
		Inhalation	- -	- -	- -	- -	- -	- -
		Total	7E-07	- -	- -	- -	0.1	- -
Child Resident Surface Soil + Groundwater Total			2E-06				0.2	
Child Resident Subsurface Soil + Groundwater Total			2E-06				0.2	
Adolescent Resident (Future)	Surface Soil	Incidental Ingestion	2E-07	- -	- -	- -	0.02	- -
		Dermal Contact	8E-09	- -	- -	- -	0.0007	- -
		Inhalation	7E-11	- -	- -	- -	0.00004	- -
		Total	2E-07	- -	- -	- -	0.02	- -
Adolescent Resident (Future)	Subsurface Soil	Incidental Ingestion	1E-07	- -	- -	- -	0.01	- -
		Dermal Contact	6E-09	- -	- -	- -	0.0006	- -
		Inhalation	4E-11	- -	- -	- -	0.00002	- -
		Total	1E-07	- -	- -	- -	0.02	- -

TABLE 6-5
SUMMARY OF CUMULATIVE CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Adolescent Resident (Future)	Groundwater	Incidental Ingestion	3E-07	- -	- -	- -	0.03	- -
		Dermal Contact	- -	- -	- -	- -	- -	- -
		Inhalation	- -	- -	- -	- -	- -	- -
		Total	3E-07	- -	- -	- -	0.03	- -
Adolescent Resident Surface Soil + Groundwater Total			5E-07				0.05	
Adolescent Resident Subsurface Soil + Groundwater Total			4E-07				0.05	
Adult Resident (Future)	Surface Soil	Incidental Ingestion	6E-07	- -	- -	- -	0.01	- -
		Dermal Contact	2E-08	- -	- -	- -	0.0005	- -
		Inhalation	2E-10	- -	- -	- -	0.00004	- -
		Total	6E-07	- -	- -	- -	0.01	- -
Adult Resident (Future)	Subsurface Soil	Incidental Ingestion	4E-07	- -	- -	- -	0.01	- -
		Dermal Contact	1E-08	- -	- -	- -	0.0005	- -
		Inhalation	1E-10	- -	- -	- -	0.00002	- -
		Total	4E-07	- -	- -	- -	0.01	- -
Adult Resident (Future)	Groundwater	Incidental Ingestion	1E-06	- -	- -	- -	0.04	- -
		Dermal Contact	- -	- -	- -	- -	- -	- -
		Inhalation	- -	- -	- -	- -	- -	- -
		Total	1E-06	- -	- -	- -	0.04	- -
Adult Resident Surface Soil + Groundwater Total			2E-06				0.05	
Adult Resident Subsurface Soil + Groundwater Total			1E-06				0.05	
Lifelong Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	6E-08	- -	- -	- -	NA	- -
		Dermal Contact	2E-09	- -	- -	- -	NA	- -
		Inhalation	2E-12	- -	- -	- -	NA	- -
		Total	6E-08	- -	- -	- -	NA	- -
Lifelong Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	4E-08	- -	- -	- -	NA	- -
		Dermal Contact	2E-09	- -	- -	- -	NA	- -
		Inhalation	1E-12	- -	- -	- -	NA	- -
		Total	4E-08	- -	- -	- -	NA	- -

TABLE 6-5
SUMMARY OF CUMULATIVE CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $> 10^{-4}$	Chemicals with Cancer Risks $> 10^{-5}$ and $\leq 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-5}$	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Lifelong Resident (Future)	Surface Soil	Incidental Ingestion	2E-06	- -	- -	Arsenic	NA	- -
		Dermal Contact	8E-08	- -	- -	- -	NA	- -
		Inhalation	4E-10	- -	- -	- -	NA	- -
		Total	2E-06	- -	- -	Arsenic	NA	- -
Lifelong Resident (Future)	Subsurface Soil	Incidental Ingestion	2E-06	- -	- -	- -	NA	- -
		Dermal Contact	6E-08	- -	- -	- -	NA	- -
		Inhalation	2E-10	- -	- -	- -	NA	- -
		Total	2E-06	- -	- -	- -	NA	- -
Lifelong Resident (Future)	Groundwater	Incidental Ingestion	2E-06	- -	- -	- -	NA	- -
		Dermal Contact	- -	- -	- -	- -	NA	- -
		Inhalation	- -	- -	- -	- -	NA	
		Total	2E-06	- -	- -	- -	NA	- -
Lifelong Resident Surface Soil + Groundwater Total			4E-06				NA	
Lifelong Resident Subsurface Soil + Groundwater Total			3E-06				NA	

7.0 CONCLUSIONS AND RECOMMENDATIONS

Groundwater Assessment

Depths to groundwater ranged from approximately 0.5 to 5 feet bgs across the site. Groundwater movement occurs preferentially through the Upper Sand Unit and fine sand interbeds within the underlying Transition Unit in a south/southeasterly direction. Concentrations of 4,4'-DDD and 4,4'-DDT exceeded MEGs in one well each during the April 2011 event. There are no MCLs for these pesticides. EPH/VPH constituents were detected during post-RI/pre-excavation groundwater sampling; however, no EPH/VPH concentrations exceeded MCLs/MEGs during the April 2011 post-excavation monitoring event, and only MTBE was detected. Based on the information currently available, it is not clear whether petroleum-related constituents in the groundwater are related to historical site activities, potential off-site sources, or both. The Navy plans to further investigate petroleum hydrocarbons in the general area during the upcoming Old Navy Fuel Farm Site Assessment.

Soil Assessment

Fill (primarily fine to medium sand) was encountered throughout the site, typically up to 2 feet thick and ranged up to approximately 7 feet thick (SB-17-115) in at least one area of the site. Low-level exceedances of arsenic screening levels were widespread in soils. A correlation exists between the maximum arsenic detections and the presence of fill material, indicating that arsenic is not site related (Appendix E.6).

Risk Assessment

The following summarizes the results of the HHRA and ERA conducted using current (post-excavation) data:

- For site-specific human health risks under the RME scenario, HIs for all receptors were less than 1.0 and ILCRs for all receptors were within EPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$ and equal to or less than the MEDEP target risk guidance value of $1x10^{-5}$; therefore, no adverse non-carcinogenic or carcinogenic risks are anticipated on a medium-specific basis for any of the receptors evaluated based on exposure to soil or groundwater at Site 17.

- Upon completion of the HHRA, no chemicals were retained as COCs for Site 17.

- No chemicals were retained as ecological COPCs for further evaluation of plants, invertebrates, or wildlife as a result of the ERA.

The Navy began environmental assessment of the 0.7-acre Site 17 as part of the 1983 IAS. Soil sampling initiated in 1990 led to identification of pesticide-contaminated soil and a decision by the Navy to accomplish soil removal activities. Three soil removal actions in 1994 removed approximately 1,350 cubic yards of contaminated soil from areas of the site north and south of Avenue B. Groundwater sampling began in 1993, and a long-term monitoring program was initiated in 1995 and continued for 12 years until 2007. During the last 3 years of monitoring (six semi-annual events), no analytes were detected at concentrations greater than MEGs or MCLs. The Navy recommended discontinuing the monitoring program but monitoring was instead suspended until a comprehensive RI could be completed. Because potentially unacceptable human health risks were estimated based on preliminary RI data, supplemental soil and groundwater sampling and additional focused soil removal actions were conducted at the site. In December 2010, an additional 287 tons of soil were removed from the site to achieve risk-based cleanup levels. As a result of all excavation activities to date, the majority of the site was excavated to a depth of 1 to 2 feet bgs (in 1994), the relocated soil strip south of Avenue B was excavated to an approximate depth of 3 feet bgs (2009), and an area north of Avenue B within the 1994 excavation area was excavated to an approximate depth of 6 feet bgs (2010). Based on the actions completed by the Navy over more than 20 years, including numerous actions to mitigate risks such as contaminated soil excavation and off-base disposal as well as a 12-year groundwater monitoring program at this 0.7 acre site, and based on the results of the RI indicating that current risks to human health and the environment from residual site-related contaminants in soil and groundwater are acceptable, it is recommended that Site 17 soils proceed to a No Further Action Record of Decision (ROD). For groundwater, although risks estimated based on one round of post-excavation samples were acceptable, it is recommended that three additional rounds of groundwater monitoring be conducted to confirm representative post-excavation groundwater concentrations.

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APPENDIX A
FIELD DOCUMENTATION

A.1 BORING LOGS

A.2 MONITORING WELL CONSTRUCTION LOGS

A.3 WELL DEVELOPMENT DATA SHEETS

A.4 SLUG TEST CALCULATIONS

A.5 LOW-FLOW GROUNDWATER SAMPLING LOGS

A.6 MISCELLANEOUS

A.1 BORING LOGS

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-101
PROJECT NO:	112G00646		START DATE: 10/17/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: L. Homoleski	COMPLETION DATE: 10/17/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: NA
GRD. SURFACE ELEVATION:	75.95' MSL	ELEVATION FROM: NAVD 1988	CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0										
		1.0 / 1.0	1205 SB-17-101-0001	TOPSOIL	Loose	Brown/ Brown/Orange	0.0'-0.8' Topsoil - SAND (fine some medium), trace silt - 0.8'-1.0' - SAND (fine to medium)	SP	Dry	PID = ND FID = ND
2				FILL	Loose	Light Brown	0.0'-3.0' - SAND (fine to medium)	SP	Dry	PID = ND FID = ND
		3.0 / 3.0	1210 SB-17-101-0104		↓	↓	↓	↓		
4										
		/		End of Boring at 4'						
		/								
		/								
		/								
		/								
		/								

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-102
PROJECT NO:	112G00646		START DATE: 10/17/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: L. Homoleski	COMPLETION DATE: 10/17/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: NA
GRD. SURFACE ELEVATION:	75.12' MSL	ELEVATION FROM: NAVD 1988	CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0		1.0 / 1.0	1225 SB-17-102-0001	TOPSOIL	Loose	Brown / Light Brown	0.0'-0.5'- Topsoil - SAND (fine) and silt, organic fibrous material 0.5'-1.0' - SAND (fine to medium)	SM/SP	Dry	PID = ND FID = ND Headspace FI D = 30.3
2				FILL	Loose	Light Brown	0.0'-3.0' SAND (fine to medium)	SP	Dry	PID = ND FID = 0.3
		3.0 / 3.0	1230 SB-17-102-0104		↓	↓	↓	↓		Headspace FID = 0.3
4				End of Boring at 4'						

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-103
PROJECT NO:	112G00646		START DATE: 10/17/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: L. Homoleski	COMPLETION DATE: 10/17/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: NA
GRD. SURFACE ELEVATION:	74.24' MSL	ELEVATION FROM: NAVD 1988	CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, PID, (PPM)]
0										
		1.0 / 1.0	1245 SB-17-103-0001	TOPSOIL	Loose	Brown/ Light Brown	0.0'-0.3' -Topsoil - SAND (fine) and silt, organic fibrous materials	SM/SP	Dry	PID = ND FID = ND Head Space FID = 5.1
				FILL			0.3'-1.0' - SAND (fine to medium)			
2		3.0 / 3.0	1250 SB-17-103-0104		Loose	Light Brown	0.0'-2.8' - SAND (fine to medium)	SP	Dry	PID = ND FID = 19.1
					↓	↓	↓	↓		Head Space FID = 6.0
4					Hard	Black	2.8'-3.0' -Asphalt (broken)			
		/		End of Boring at 4'						
		/								
		/								
		/								
		/								
		/								

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NASB

PROJECT NO: 112G00646

LOGGED BY: C. Fellows-Swenson, J. Traut

DRILLED BY (Company/Driller): S. Brown (MAI)

GRD. SURFACE ELEVATION: 73.39' MSL

TRANSCRIBED BY: L. Homoleski

ELEVATION FROM: NAVD 1988

BORING NO.: SB-17-104

START DATE: 10/17/2008

COMPLETION DATE: 10/17/2008

MON. WELL NO.: NA

CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, PID, (PPM)]
0		1.0 / 1.0	1300 SB-17-104-0001	TOPSOIL	Slightly Dense/	Brown/ Light Brown	0.0'-0.4' - Topsoil - SAND (fine) and silt, organics fibrous material	SM/SP	Dry	PID = ND FID = ND
				FILL	Loose		0.4'-1.0' - SAND (fine to medium)			Head Space FID = 3.1
2		3.0 / 3.0	1305 SB-17-104-0104		Slightly Dense	Brown/ Slightly Black	0.0'-1.0' - SAND (fine to medium)	SP	Dry	PID = ND FID = 16.4 (top 1')
					↓	Light Brown	1.0-3.0' - SAND (fine to medium)	↓		Head Space FID = 51.1
4					↓	↓	↓	↓		
		/		End of Boring at 4'						
		/								
		/								
		/								
		/								
		/								

TYPE OF DRILLING RIG: Geoprobe DPT 6620

METHOD OF ADVANCING BORING: Macrocore

METHOD OF SOIL SAMPLING: Acetate Liners

METHOD OF ROCK CORING: NA

GROUNDWATER LEVELS:

OTHER OBSERVATIONS::

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-105
PROJECT NO:	112G00646		START DATE: 10/20/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: L. Homoleski	COMPLETION DATE: 10/20/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: NA
GRD. SURFACE ELEVATION:	76.91' MSL	ELEVATION FROM: NAVD 1988	CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, (PPM)]
0		1.3 / 1.3	0915 SB-17-105-0001 (DUP07)	TOPSOIL	Loose	Brown Black Orange tan	0.0'-0.4' - SAND (fine to medium) 0.4'-0.7' - SAND (fine) some trace silt 0.7'-1.3'- SAND (fine to medium)	SP	Dry	FID = ND
2		2.6 / 3.0	0920 SB-17-105-0104	UPPER SAND UNIT	Slightly Dense	Tan	0.0'-2.6' -SAND (fine to medium)		Dry	FID = ND Headspace FID = ND
4				End of Boring at 4'						

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-106
PROJECT NO:	112G00646		START DATE: 10/17/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: L. Homoleski	COMPLETION DATE: 10/17/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: MW-17-01
GRD. SURFACE ELEVATION:	76.59' MSL	ELEVATION FROM:NAVD 1988	CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, PID, (PPM)]
0										
		1.0 / 1.0	0845 SB-17-106-0001	TOPSOIL UPPER SAND UNIT	Loose	Brown Black	0.0'-0.8' - topsoil - SAND (fine to medium), son organics, 0.8'-1.0' SAND (fine to medium)	SP	Dry	PID = ND FID = ND
2						Light Brown	0.0'-3.0'- SAND (fine to medium)			PID = ND FID = ND
		3.0 / 3.0	0850 SB-17-106-0104						Dry	
4										
							0.0'-3.1' - SAND (fine to medium)		Moist	PID = ND FID = ND
6		3.1 / 5.0								
8										
			0855							
10					Slightly Dense		0.0'-5.0' - SAND (fine to medium)		Wet	PID = ND FID = ND
12		5.0 / 5.0								
14			0900							
		5.0 / 5.0					0.0'-4.3' - SAND (fine to medium)		Wet	PID = ND FID = ND
16			0910							

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NASB
PROJECT NO: 112G00646
LOGGED BY: C. Fellows-Swenson, J. Traut
DRILLED BY (Company/Driller): S. Brown (MAI)
GRD. SURFACE ELEVATION: 76.59' MSL

TRANSCRIBED BY: L. Homoleski
ELEVATION FROM: NAVD 1988

BORING NO.: SB-17-106
START DATE: 10/17/2008
COMPLETION DATE: 10/17/2008
MON. WELL NO.: MW-17-01
CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, PID, (PPM)]
16				UPPER SAND UNIT	Slightly Dense	Light Brown	0.0'-4.3' - SAND (fine to medium)	SP		
18				TRANSITION UNIT		Gray	4.3'-5.0' - SAND (fine) and silt	SM	Wet	PID = ND FID = ND
20							0.0'-0.8' - SAND (fine) and silt 0.8'-5.0' - SAND (fine) and silt, trace clay			
					Soft					PID = ND FID = ND
22		5.0 / 5.0								
24			0920							
				Presumpscot Formation			0.0'-2.0' - CLAY	CL	Wet	PID = ND FID = ND
26										
		5.0 / 5.0					2.0'-3.6' - SAND (fine) and silt, trace clay	SM		
28							3.6'-5.0' -CLAY	CL		
29			0925							
				End of Boring at 29'						

TYPE OF DRILLING RIG: Geoprobe DPT 6620
METHOD OF ADVANCING BORING: Macrocore
METHOD OF SOIL SAMPLING: Acetate Liners
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS:
OTHER OBSERVATIONS::

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-107
PROJECT NO:	112G00646		START DATE: 10/20/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: L. Homoleski	COMPLETION DATE: 10/20/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: NA
GRD. SURFACE ELEVATION:	72.74' MSL	ELEVATION FROM: NAVD 1988	CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, PID, (PPM)]
0										
		0.9 / 1.0	0855 SB-17-107-0001	TOPSOIL	Loose	Dark Brown	0.0'-0.2' - SAND (fine) some silt	SM	Dry	FID = ND
				UPPER SAND UNIT		Tan	0.2'-0.9' - SAND (fine to medium) trace silt	SP		Headspace FID = ND
2					Slightly Dense		0.0'-1.8' - SAND (fine to medium), trace fine and coarse gravel.			FID = 508.7 PID = ND
		1.9 / 3.0	0900 SB-17-107-0104						Moist	Headspace FID = 4,56
4						Black	1.8'-1.9' - black SILT, trace fine sand, some organics.	OM	FID Readings from 1.0'-1.7'	
							0.0'-0.3' - Similar to above	SD	Wet	FID = 820
						Brown	0.3'-1.3' - SAND (fine to medium) trace silt			
6		2.9 / 4.0	0910 SB-17-107-0408			Tan	1.3'-2.9' - SAND (fine to medium)		FID Readings from 1.3'-2.9'	PID = 0.1
										Headspace FID = 7,24
8										
				End of Boring at 8'						

TYPE OF DRILLING RIG:	Geoprobe DPT 6620		Tetra Tech NUS, Inc.
METHOD OF ADVANCING BORING:	Macrocore		
METHOD OF SOIL SAMPLING:	Acetate Liners		
METHOD OF ROCK CORING:	NA		
GROUNDWATER LEVELS:			
OTHER OBSERVATIONS::	Next to sewer line	BORING NO.: SB-17-107	PAGE: 1 OF 1

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-108
PROJECT NO:	112G00646		START DATE: 10/20/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: L. Homoleski	COMPLETION DATE: 10/20/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: NA
GRD. SURFACE ELEVATION:	72.67' MSL	ELEVATION FROM: NAVD 1988	CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, PID, (PPM)]
0										
		1.1 / 1.1	0825 SB-17-108-0001	TOPSOIL UPPER SAND UNIT	Slightly Dense	Brown Tan	0.0'-0.5' - SAND (fine) some silt 0.5'-1.1' - SAND (fine to medium) trace silt	SM SP	Dry	FID = ND Headspace FID = ND
2		2.6 / 3.0	0830 SB-17-108-0104		↓	↓	0.0'-2.6' - SAND (fine to medium)	↓		
					Dense				Moist	FID = ND Headspace FID = ND
4					↓	↓		↓		
		/		End of Boring at 4'						
		/								
		/								
		/								
		/								
		/								
		/								

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-109
PROJECT NO:	112G00646		START DATE: 10/16/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: L. Homoleski	COMPLETION DATE: 10/16/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: NA
GRD. SURFACE ELEVATION:	76.54' MSL	ELEVATION FROM: NAVD 1988	CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, PID , (PPM)]
0		1.0 / 1.0	1030 SB-17-109-0001	TOPSOIL	Loose	Brown	0.0'-0.2' - SAND (fine) organic material, roots	OM	Dry	PID = ND
				UPPER SAND UNIT		Dk brown/black orange tan	0.2'-1.0' - SAND (fine to medium)	SP		FID = ND
2		2.4 / 3.0	1035 SB-17-109-0104		Medium Dense	Tan	0.0'-2.4' - SAND (fine to medium)		PID reading from 0.3' Dry	PID = 0.2
4				End of Boring at 4'						

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-110
PROJECT NO:	112G00646		START DATE: 10/16/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: L. Homoleski	COMPLETION DATE: 10/16/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: NA
GRD. SURFACE ELEVATION:	76.34' MSL	ELEVATION FROM: NAVD 1988	CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, PID , (PPM)]
0										
		1.0 / 1.0	0940	TOPSOIL	Loose	Tan	0.0'-0.2' - SILTY SAND, organic material	OM/SP	Dry	PID = ND
				FILL			0.2'-1.0' - SAND (fine to medium)			FID = ND
					Loose	Tan	0.0'-2.4' - SAND (fine to medium)			
					Medium Dense	Black	0.7'-0.9' - layer of black SAND some silt			PID = ND
2				UPPER SAND		Tan/Orange			Dry	FID = ND
		2.4 / 3.0	0945 SB-17-110-0104	UNIT						
4						Tan				
							0.0'-3.8' - SAND (fine to medium) trace silt	SP	Dry	PID = ND
							2.8'-3.8' - iron staining throughout			
6		3.8 / 5.0							Moist	
					Dense				Damp	
8										
			1000							
10							0.0'-5.0' SAND (fine to medium), trace silt		Wet	PID = ND
		5.0 / 5.0								
12										
14			1005							
		/		End of Boring at 14'						

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-111
PROJECT NO:	112G00646		START DATE: 10/20/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: L. Homoleski	COMPLETION DATE: 10/20/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: NA
GRD. SURFACE ELEVATION:	74.42' MSL	ELEVATION FROM: NAVD 1988	CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, PID, (PPM)]
0										
		1.0 / 1.0	1000	TOPSOIL Fill	Slightly Dense	Tan	0.0'-0.5' - SILTY SAND (fine), organic materia 0.5'-1.0' - SAND (fine to medium)	SM SP	Dry	FID = ND Headspace FID = ND
2		1.6 / 3.0	1005 SB-17-111-0104	UPPER SAND UNIT			0.0'-1.6' - SAND (fine to medium)		Dry	FID = ND Headspace FID = ND
4				End of Boring at 4'		Brown	Pushed rock at bottom			

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NASB
PROJECT NO: 112G00646
LOGGED BY: C. Fellows-Swenson, J. Traut
DRILLED BY (Company/Driller): S. Brown (MAI)
GRD. SURFACE ELEVATION: 72.47' MSL

TRANSCRIBED BY: L. Homoleski
ELEVATION FROM: NAVD 1988

BORING NO.: SB-17-112
START DATE: 10/20/2008
COMPLETION DATE: 10/20/2008
MON. WELL NO.: NA
CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, PID, (PPM)]
0		1.0 / 1.0	0935 SB-17-112-0104	FILL	Slightly Dense	Tan	0.0'-0.4' - SILTY SAND (fine sand) 0.4'-1.0' - SAND (fine to medium)	SM SP	Dry	FID = ND Headspace FID = ND
2		2.8 / 3.0	940 SB-17-112-0104 Lab QC	UPPER SAND UNIT			0.0'-2.4' - Similar to above			
4						Gray/Black	2.4-2.5 - layer of SILTY CLAY 2.5-2.8 - SILT, trace fine sand, organics, wood chunk	CL OH	Moist	PID = ND FID = 25.1 Headspace FID = 2,589
6		2.9 / 4.0			Dense	Tan	0.0'-0.9' - Similar to above 0.9'-2.9' - SAND (fine to medium)	SP	Wet	FID = ND
8			0950							
		/		End of Boring at 8'						
		/								
		/								
		/								

TYPE OF DRILLING RIG: Geoprobe DPT 6620
METHOD OF ADVANCING BORING: Macrocore
METHOD OF SOIL SAMPLING: Acetate Liners
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS:
OTHER OBSERVATIONS::

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NASB
PROJECT NO: 112G00646
LOGGED BY: C. Fellows-Swenson, J. Traut
DRILLED BY (Company/Driller): S. Brown (MAI)
GRD. SURFACE ELEVATION: 72.29' MSL

TRANSCRIBED BY: L. Homoleski
ELEVATION FROM: NAVD 1988

BORING NO.: SB-17-113
START DATE: 10/20/2008
COMPLETION DATE: 10/20/2008
MON. WELL NO.: NA
CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, PID, (PPM)]
0		0.75 / 1.0	1020 SB-17-113-0001	TOPSOIL	Slightly Dense	Brown	0.0'-0.4' - SAND (fine to medium) organic materi	SP	Dry	FID = ND
				UPPER SAND UNIT		orange brown	0.4'-0.75' - SAND (fine to medium), trace silt, trace coarse sand			Headspace FID = ND
2		2.0 / 3.0	1025 SB-17-113-0104			Tan	0.0'-2.0' - SAND (fine to medium), some silt, trace fine and coarse gravel	SM		
						Brown	layer of coarse sand at 1.4'		Wet	PID = ND
4										Headspace FID = 2,811
				End of Boring at 4'						

TYPE OF DRILLING RIG: Geoprobe DPT 6620
METHOD OF ADVANCING BORING: Macrocore
METHOD OF SOIL SAMPLING: Acetate Liners
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS:
OTHER OBSERVATIONS::

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NASB

PROJECT NO: 112G00646

LOGGED BY: C. Fellows-Swenson, J. Traut

TRANSCRIBED BY: L. Homoleski

DRILLED BY (Company/Driller): S. Brown (MAI)

GRD. SURFACE ELEVATION: 75.74' MSL

ELEVATION FROM: NAVD 1988

BORING NO.: SB-17-114

START DATE: 10/15/2008

COMPLETION DATE: 10/15/2008

MON. WELL NO.: NA

CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, PID, (PPM)]
0		1.0 / 1.0	1020 SB-17-114-0001	TOPSOIL	Loose	Brown/tan/ dark brown orange tan	0.0'-0.5' - SAND (fine) trace silt, wood/roots	SP	Dry	PID = ND FID = ND
				UPPER SAND UNIT			0.5'-1.0' - SAND (mostly fine) trace silt			
2		2.7 / 3.0	1025 SB-17-114-0104		↓	Orange tan	0.0'-2.7' - SAND (fine to medium)	↓		
					Medium Dense	Tan	↓		Dry	PID = ND
4					↓	↓	↓	↓		
		/		End of Boring at 4'						
		/								
		/								
		/								
		/								
		/								

TYPE OF DRILLING RIG: Geoprobe DPT 6620

METHOD OF ADVANCING BORING: Macrocore

METHOD OF SOIL SAMPLING: Acetate Liners

METHOD OF ROCK CORING: NA

GROUNDWATER LEVELS:

OTHER OBSERVATIONS::

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-115
PROJECT NO:	112G00646		START DATE: 10/16/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: L. Homoleski	COMPLETION DATE: 10/16/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: NA
GRD. SURFACE ELEVATION:	76.49' MSL	ELEVATION FROM: NAVD 1988	CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, PID, (PPM)]
0				TOPSOIL	Slightly Dense	Brown	0.0'-0.6' - Topsoil - SAND (fine) and silt, organic grass	SM	Dry	PID = 1.0
2		2.6 / 3.0		FILL	Loose	Light Brown	0.6'-2.6' - SAND (fine to medium)	SP		PID = 0.6
			0900		↓	↓	↓	↓		PID = ND
4					Very Loose		0.0'-3.6' - SAND (fine to medium)		Dry	PID = ND
		3.6 / 4.0			↓		↓		Moist	
6					Loose		↓			
			0905		↓		↓			
8		2.8 / 3.0	0910 SB-17-115-0710	UPPER SAND UNIT	Slightly Loose	↓	0.0'-2.8' - SAND (fine to medium)	↓	Moist	PID = ND
					↓		↓			
10					↓		↓			
		/		End of Boring at 10'						
		/								
		/								
		/								

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NASB
PROJECT NO: 112G00646
LOGGED BY: C. Fellows-Swenson, J. Traut
DRILLED BY (Company/Driller): S. Brown (MAI)
GRD. SURFACE ELEVATION: 71.99' MSL

TRANSCRIBED BY: L. Homoleski
ELEVATION FROM: NAVD 1988

BORING NO.: SB-17-116
START DATE: 10/16/2008
COMPLETION DATE: 10/16/2008
MON. WELL NO.: NA
CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, PID, (PPM)]
0				TOPSOIL	Medium Dense	Tan	0.0'-0.7' - SILTY SAND (fine) sand, organic material - grass roots, etc. 0.0'-0.2'	OM / SM	Dry	PID = ND FID = ND
2		3.0 / 1.0		FILL	↓	↓	0.7'-3.0' - SAND (fine to medium) trace silt, trace coarse gravel	SP	Moist	
					Dense	Tan/Brown	↓	↓	↓	
4			1435		↓	↓	↓	↓		
		3.0 / 3.0	1440 SB-17-116-0407	UPPER SAND UNIT			0.0'-1.4' - SAND (fine to medium) trace silt	SP	Wet Saturated	PID = ND FID = ND
6						Black Light Tan	1.0'-1.4' - SILT some organic material 1.4'-3.0' - SAND (fine to medium)	SM SP	Wet	
7					↓	↓	↓	↓		
				End of Boring at 7'						
		/								
		/								
		/								
		/								

TYPE OF DRILLING RIG: Geoprobe DPT 6620
METHOD OF ADVANCING BORING: Macrocore
METHOD OF SOIL SAMPLING: Acetate Liners
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS:
OTHER OBSERVATIONS::

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-117
PROJECT NO:	112G00646		START DATE: 10/17/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: L. Homoleski	COMPLETION DATE: 10/17/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: NA
GRD. SURFACE ELEVATION:	71.97' MSL	ELEVATION FROM: NAVD 1988	CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, PID, (PPM)]
0										
		1.0 / 1.0	1110	TOPSOIL	Slightly Dense	Brown	0.0'-1.0' - Topsoil - SAND (fine) and silt, organic fibrous materials	SM	Dry	PID = ND FID = ND
2				UPPER SAND UNIT	Loose	Light Brown	0.0'-2.5' - SAND (fine to medium)	SP	Dry	PID = ND FID = ND
		2.5 / 3.0	1115 SB-17-117-0104		↓	↓	↓	↓		
4					↓	↓	↓	↓		
		2.4 / 3.0			Slightly Dense	Black	0.0'-1.0' - SILT, organics	OH	Moist	PID = 0.3 FID = 3.2
6					↓	Brown	1.0'-2.4'- SAND (fine to medium)	SP		Headspace FID = 15.3
7			1120		↓	↓	↓	↓		
				End of Boring at 7'						
		/								
		/								
		/								
		/								
		/								

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NASB
PROJECT NO: 112G00646
LOGGED BY: C. Fellows-Swenson, J. Traut
DRILLED BY (Company/Driller): S. Brown (MAI)
GRD. SURFACE ELEVATION: 72.4' MSL

TRANSCRIBED BY: L. Homoleski
ELEVATION FROM: NAVD 1988

BORING NO.: SB-17-118
START DATE: 10/20/2008
COMPLETION DATE: 10/20/2008
MON. WELL NO.: NA
CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, PID, (PPM)]
0										
		1.0 / 1.0	1030 SB-17-118-0001	TOPSOIL	Slightly Dense	Brown Orange/tan	0.0'-1.0' -SAND (fine to medium), some fine gravel	SM	Dry	FID = ND Headspace FID = ND
2				UPPER SAND UNIT		Brown/tan	0.0'-0.9' - Similar to above black layer at 0.7'			
		2.2 / 3.0	1035 SB-17-118-0104				0.9'-2.2' - SAND (fine to medium)		Moist	FID = ND Headspace FID = 104.1
4					Dense					
						Black	0.0'-0.6' - SILT (black) some organics	OH	Wet	FID = ND Headspace FID = 1,753
6		3.3 / 4.0				Brown Tan	0.6'-3.3' - SAND (fine to medium)	SP		
8			1045							
		/		End of Boring at 8'						
		/								
		/								

TYPE OF DRILLING RIG: Geoprobe DPT 6620
METHOD OF ADVANCING BORING: Macrocore
METHOD OF SOIL SAMPLING: Acetate Liners
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS:
OTHER OBSERVATIONS::

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-119
PROJECT NO:	112G00646		START DATE: 10/16/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: L. Homoleski	COMPLETION DATE: 10/16/2008
DRILLED BY (Company/Driller):	S. Brown (MA)		MON. WELL NO.: NA
GRD. SURFACE ELEVATION:	74.28' MSL	ELEVATION FROM: NAVD 1988	CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, PID, (PPM)]
0		1.0 / 1.0	0830	TOPSOIL / UPPER SAND UNIT	Very Loose	Brown/ Light Brown	0.0'-0.5' - Topsoil - SAND (fine to medium) organ fibrous material, 0.5'-1.0' - SAND (fine-medium)	SP SP	Dry	PID = ND
2		2.0 / 3.0	0835 SB-17-119-0104			Light Brown	0.0'-2.9' - SAND (fine to medium)		Dry	PID = ND
4									Moist	
				End of Boring at 4'						

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-120
PROJECT NO:	112G00646		START DATE: 10/16/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: L. Homoleski	COMPLETION DATE: 10/16/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: MW-17-03
GRD. SURFACE ELEVATION:	72.51' MSL	ELEVATION FROM: NAVD 1988	CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, PID, (PPM)]
0										
		1.9 / 2.0	1320	FILL	Slightly Dense	Brown	0.0'-0.8' - Topsoil - SAND (fine) and silt, organic fibrous material	SM	Dry	PID = ND FID = ND
2					Loose	Light Brown	0.8'-2.0' - SAND (fine to medium) trace silt	SP		
		2.7 / 3.0	1325 SB-17-120-0205 DUP05 at 1330	UPPER SAND UNIT	↓	Orange/ Brown	0.0'-0.8' - SAND (fine to medium)	↓	Moist	PID = ND FID = ND
4				PEAT	Slightly Dense	Black	0.8'-1.4' -SILT and sand, organics, fibrous material	OM/SM		
					↓	Light Brown	1.4'-2.7' - SAND (fine to medium)	SP		
6				UPPER SAND UNIT	Soft	Brown	0.0'-1.0' - SILT and sand (fine)	SM	Wet	PID = ND FID = ND
					Loose	Light Brown	1.0'-5.0' - SAND fine to medium	SP		
8		5.0 / 5.0			↓	↓	↓	↓		
					↓	↓	↓	↓		
10			1330		↓	↓	↓	↓		
					Slightly Dense	↓	0.0'-4.8' - SAND (fine to medium)	↓	Wet	PID = ND FID = ND
12					Soft	↓	↓	↓		
		5.0 / 5.0			↓	↓	↓	↓		
14					↓	↓	↓	↓		
			1335	TRANSITION UNIT	↓	Gray	4.8'-5.0' - SAND (fine) and silt, trace clay	SM		
16					↓					

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-120
PROJECT NO:	112G00646		START DATE: 10/16/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: L. Homoleski	COMPLETION DATE: 10/16/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: MW-17-02
GRD. SURFACE ELEVATION:	72.51	ELEVATION FROM: NAVD 1988	CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, PID, (PPM)]
16										
					Soft	Gray	0..0'-2.6' - SAND (fine to medium)	SP	WET	PID = ND
18		4.4 / ~.0		PRESUMPSCOT FORMATION			2.6'-4.4' - CLAY			
								CL		
20			1345		Soft Very Dense					PID = ND
							0.0'-5.0' - CLAY			
22		5.0 / 5.0								
24										
25			1350							
				End of Boring at 25'						

TYPE OF DRILLING RIG:	Geoprobe DPT 6620		Tetra Tech NUS, Inc.
METHOD OF ADVANCING BORING:	Macrocore		
METHOD OF SOIL SAMPLING:	Acetate Liners		
METHOD OF ROCK CORING:	NA		
GROUNDWATER LEVELS:			
OTHER OBSERVATIONS::		BORING NO.: SB-17-120	PAGE: 2 OF 2

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-121
PROJECT NO:	112G00646		START DATE: 10/16/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: L. Homoleski	COMPLETION DATE: 10/16/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: MW-17-02
GRD. SURFACE ELEVATION:	72.61' MSL	ELEVATION FROM: NAVD 1988	CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors: geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, PID, (PPM)]
0							Grass/Forest			
		1.8 / 2.0		TOPSOIL	Medium Dense	Brown	0.0'-0.6' - SILTY SAND (fine sand) 0.0'-0.2' - grass roots	SM SP	Dry	PID = ND
2			1505	FILL	↓	Tan	0.6-1.8 - SAND (fine to medium) trace silt	↓	Damp	FID = ND
		2.7 / 3.0	1510 SB-17-121-0205 Lab QC	UPPER SAND UNIT	↓	Brown	0.0'-1.5' - Similar to above	↓	Odor -1.5'-2.3'	PID = 0.3
4				PEAT	Dense	Black	1.5'-2.3' - SILT some organics	SM		FID = ND
				UPPER SAND UNIT	Medium Dense	Brown/Tan	2.3'-2.7' - SAND, trace silt (fine to medium sand)	SP	Damp/Wet	
6		1.8 / 2.0			Dense	Tan	0.0'-1.8' - SAND (fine to medium)	↓	Wet	PID = 0.6
7			1515		↓	↓	↓	↓		FID = ND
8		3.0 / 3.0	1520 SB-17-121-0710		↓	↓	0.0'-3.0' - SAND (fine to medium)	↓	Wet	
					↓	↓	↓	↓		PID = ND
10					↓	Orange Tan	Iron staining	↓		FID = ND
		0.0 / 2.0			Very Loose		NO RECOVERY			
12					↓	↓	↓	↓		
		2.2 / 3.0	1540 SB-17-121-1215		Dense	Tan	0.0'-1.0' -SAND (fine to medium)	SP	Wet	PID = ND
14				TRANSITION UNIT	↓	Gray	1.0'-2.2' -SAND (fine) some silt	SM		FID = ND
15					↓	↓	↓	↓		
				End of Boring at 15'						

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB			BORING NO.:	SB-17-122
PROJECT NO:	112G00646			START DATE:	10/17/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: L. Homoleski		COMPLETION DATE:	10/17/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)			MON. WELL NO.:	NA
GRD. SURFACE ELEVATION:	71.81' MSL	ELEVATION FROM: NAVD 1988		CHECKED BY:	B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, PID, (PPM)]
0				TOPSOIL	Slightly Dense	Brown	0.0'-0.4' - Topsoil - SAND (fine) and silt, organic fibrous materials	SM	Dry	PID = ND FID = ND
2		3.2 / 4.0		FILL	Loose	Light Brown	0.4'-3.2' - SAND (fine to medium)	SP		
4			1055							
6		2.5 / 3.0	SB-17-122-0407 1100 SB-17-DUP06 1105	UPPER SAND UNIT	Slightly Dense	Black Light Brown/Gray	0.0'-0.2' - SAND (fine to medium) 0.2'-1.0' -SILT, organics 1.0'-2.5' - SAND (fine to medium)	OH	Moist	PID = ND FID = 45.9 at black layer Head Space FID = 163
7					Loose			SP		
				End of Boring at 7'						

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NASB
PROJECT NO: 112G00646
LOGGED BY: C. Fellows-Swenson, J. Traut
TRANSCRIBED BY: L. Homoleski
DRILLED BY (Company/Driller): Seth (MAI)
GRD. SURFACE ELEVATION: 73.64' MSL
ELEVATION FROM: NAVD 1988

BORING NO.: SB-17-123
START DATE: 10/15/2008
COMPLETION DATE: 10/15/2008
MON. WELL NO.: NA
CHECKED BY: B. Geringer

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, (PPM)]
0		1.1 / 1.1	1500 SB-17-123-0001	FILL	Dense / Medium Dense	Tan	0.0'-0.6' SILTY SAND (fine sand) 0.6'-1.1' - SAND (fine to medium)	SM / SP	Dry	PID = ND FID = ND
2		2.6 / 3.0	1510 SB-17-123-0104	UPPER SAND UNIT			0.0'-2.6' - SAND (fine to medium)		Dry Moist	PID = ND FID = ND
4				End of Boring at 4'						

TYPE OF DRILLING RIG: Geoprobe DPT 6620
METHOD OF ADVANCING BORING: Macrocore
METHOD OF SOIL SAMPLING: Acetate Sleeve
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS:
OTHER OBSERVATIONS::

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NASB
PROJECT NO: 112G00646
LOGGED BY: C. Fellows-Swenson, J. Traut
DRILLED BY (Company/Driller): S. Brown (MAI)
GRD. SURFACE ELEVATION: 72.15' MSL

TRANSCRIBED BY: B. Geringer
ELEVATION FROM: NAVD 1988

BORING NO.: SB-17-124
START DATE: 10/16/2008
COMPLETION DATE: 10/16/2008
MON. WELL NO.: NA
CHECKED BY: J. Traut

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0		1.0 / 1.0	0800 SB-17-124-0001	TOPSOIL	Slightly Dense	Brown	0'-0.6' - Top Soil - SAND (fine) and silt, organics, fibrous materials 0.6'-1.0' - SAND (fine to medium) trace silt	SM	Dry	PID = ND
2		2.4 / 3.0	805 SB-17-124-0104	FILL	Loose	Light Brown	0.0'-2.4' - SAND (fine to medium), trace course gravel	SP	Dry	
4				UPPER SAND UNIT	Slightly Dense				Moist	PID = ND
6		2.8 / 4.0	0815			Black	0.0'-1.0' - SILT, trace clay, organic fibrous material (possible p	OM/SM	Moist	PID = 0.4
8						Gray	1.0'-2.8' - SAND (fine to medium)	SP		PID = ND
		/		End of Boring at 8'						
		/								
		/								
		/								

TYPE OF DRILLING RIG: Geoprobe DPT 6620
METHOD OF ADVANCING BORING: Macrocore
METHOD OF SOIL SAMPLING: Acetate Liners
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS:
OTHER OBSERVATIONS::

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB			BORING NO.:	SB-17-125
PROJECT NO:	112G00646			START DATE:	10/15/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: B. Geringer		COMPLETION DATE	10/15/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)			MON. WELL NO.:	NA
GRD. SURFACE ELEVATION:	71.88' MSL	ELEVATION FROM: NAVD 1988		CHECKED BY:	J. Traut

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0										
		1.2 / 1.2	1415 SB-17-125-0001	TOPSOIL	Medium Dense	Brown Tan	0'-0.5' - Silty SAND, grass/organic material 0.5'-1.2' - SAND (fine to medium) trace silt	SP	Dry	PID = ND FID = ND
2				UPPER SAND UNIT			0.0'-2.3' - SAND (fine to medium), trace silt and gravel (fine and coarse gravel) 0.8' - Asphalt	SP	Moist	
		2.3 / 3.0	1420 SB-17-125-0104 (LAB QC)							PID = ND FID = 0.4
4							2.0'-2.2' - Layer of fine black SAND		Wet	
				PEAT		Black	0.0'-0.7' - SILT, trace fine sand, roots	SM		
6		2.5 / 4.0	1430 SB-17-125-0608			Tan/Gray	0.7'-2.5' - SAND (fine to medium)	SP		
8										
		/		End of Boring at 8.2'						
		/								
		/								
		/								
		/								

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NASB
PROJECT NO: 112G00646
LOGGED BY: C. Fellows-Swenson, J. Traut
DRILLED BY (Company/Driller): S. Brown (MAI)
GRD. SURFACE ELEVATION: 72.81' MSL

TRANSCRIBED BY: B. Geringer
ELEVATION FROM: NAVD 1988

BORING NO.: SB-17-126
START DATE: 10/15/2008
COMPLETION DATE: 10/15/2008
MON. WELL NO.: NA
CHECKED BY: J. Traut

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0										
		1.0 / 1.0	1320 SB-17-126-0001	TOPSOIL	Loose	Brown	0'-0.1' - Topsoil, SAND (fine to medium), organic material 0.1'-1.0' - SAND (fine to medium) trace gravel (fine and	SP	Dry	PID = ND
2				UPPER SAND UNIT		Light Brown	0.0'-2.9' - SAND (fine to medium)			
		2.9 / 3.0	1322 SB-17-126-0104						Moist	PID = ND
4										
		/		End of Boring at 4'						
		/								
		/								
		/								
		/								
		/								
		/								

TYPE OF DRILLING RIG: Geoprobe DPT 6620
METHOD OF ADVANCING BORING: Macrocore
METHOD OF SOIL SAMPLING: Acetate Liners
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS:
OTHER OBSERVATIONS::

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NASB
PROJECT NO: 112G00646
LOGGED BY: C. Fellows-Swenson, J. Traut
DRILLED BY (Company/Driller): S. Brown (MAI)
GRD. SURFACE ELEVATION: 73.36' MSL

TRANSCRIBED BY: B. Geringer
ELEVATION FROM: NAVD 1988

BORING NO.: SB-17-127
START DATE: 10/15/2008
COMPLETION DATE: 10/15/2008
MON. WELL NO.: NA
CHECKED BY: J. Traut

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0				ASPHALT BASE	Medium Dense	Tan	0'-0.3' - Road Asphalt		Dry	PID = ND
							0.3'-0.4' - SAND (fine to coarse)	SP		FID = ND
2		2.5 / 3.0	1335				0.4'-0.8' - Rock 0.8'-2.5' SAND (fine to medium)			PID = ND
				UPPER SAND UNIT						FID = ND
4							0.0'-2.1' - SAND (fine to medium)		Dry	
		2.1 / 3.0	1322 SB-17-127-0306						Moist	PID = ND
6						Gray				
		/		End of Boring at 6'						
		/								
		/								
		/								
		/								
		/								

TYPE OF DRILLING RIG: Geoprobe DPT 6620
METHOD OF ADVANCING BORING: Macrocore
METHOD OF SOIL SAMPLING: Acetate Liners
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS:
OTHER OBSERVATIONS::

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NASB
PROJECT NO: 112G00646
LOGGED BY: C. Fellows-Swenson, J. Traut
DRILLED BY (Company/Driller): S. Brown (MAI)
GRD. SURFACE ELEVATION: 72.55' MSL

TRANSCRIBED BY: B. Geringer
ELEVATION FROM: NAVD 1988

BORING NO.: SB-17-128
START DATE: 10/15/2008
COMPLETION DATE: 10/15/2008
MON. WELL NO.: NA
CHECKED BY: J. Traut

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0				ASPHALT BASE	Loose	Black/Brown	0'-0.6' - Asphalt 0.6'-0.9' - SAND (fine), with silt, trace gravel (fine and	SP	Dry	
2		2.5 / 3.0	1350			Light Brown	0.9'-1.4' - SAND (fine to coarse), some rock fragments 1.4'-2.5' SAND (fine to medium)			PID = ND FID = ND
				UPPER SAND UNIT					Moist	
4		3.0 / 3.0	1355 SB-17-128-0306		Slightly Dense		0.0'-2.0' - SAND (fine to medium)			
										PID = ND FID = ND
6				PEAT		Black	2.0'-2.6' - SAND (fine) and SILT, fibrous, organic	SM		
						Gray	2.6'-3.0' - SAND (fine to medium), trace silt	SP		
		/		End of Boring at 6'						
		/								
		/								
		/								
		/								
		/								
		/								
		/								

TYPE OF DRILLING RIG: Geoprobe DPT 6620
METHOD OF ADVANCING BORING: Macrocore
METHOD OF SOIL SAMPLING: Acetate Liners
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS:
OTHER OBSERVATIONS::

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NASB
PROJECT NO: 112G00646
LOGGED BY: C. Fellows-Swenson, J. Traut
DRILLED BY (Company/Driller): S. Brown (MAI)
GRD. SURFACE ELEVATION: 72.20' MSL

TRANSCRIBED BY: B. Geringer
ELEVATION FROM: NAVD 1988

BORING NO.: SB-17-129
START DATE: 10/15/2008
COMPLETION DATE: 10/15/2008
MON. WELL NO.: NA
CHECKED BY: J. Traut

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0				ASPHALT BASE	Medium Dense	Black	0'-0.4' - Asphalt		Dry	
						Tan/Black	0.4'-0.6' - SAND (fine to medium), trace gravel (fine)	SP		PID = ND
2		0.6 / 3.0	1440	UPPER SAND UNIT						
4		2.2 / 3.0	1445 SB-17-129-0306 1450 SB-17-129-DUP04			Tan	0.0'-1.0' - SAND (fine to medium)		Wet	
				PEAT	Dense	Black	1.0'-2.1' - SILT, trace fine sand-wood/roots at 2.1'	SM		PID = ND
6						Tan	2.1'-2.2' - sand (fine to medium)	SP		
				End of Boring at 6'						

TYPE OF DRILLING RIG: Geoprobe DPT 6620
METHOD OF ADVANCING BORING: Macrocore
METHOD OF SOIL SAMPLING: Acetate Liners
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS:
OTHER OBSERVATIONS::

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NASB
PROJECT NO: 112G00646
LOGGED BY: C. Fellows-Swenson, J. Traut
DRILLED BY (Company/Driller): S. Brown (MAI)
GRD. SURFACE ELEVATION: 73.51' MSL

TRANSCRIBED BY: B. Geringer
ELEVATION FROM: NAVD 1988

BORING NO.: SB-17-130
START DATE: 10/15/2008
COMPLETION DATE: 10/15/2008
MON. WELL NO.: NA
CHECKED BY: J. Traut

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0		1.0 / 1.0	1310 SB-17-130-0001	TOPSOIL	Slightly Dense	Brown	0'-0.5' - Topsoil, SAND (fine) and silt, some fine gravel, fibrous 0.5'-1.0' - SAND (fine to medium) trace gravel (coarse)	SM	Dry	PID = ND FID = ND
2		3.0 / 3.0	1315 SB-17-130-0104	UPPER SAND UNIT	Loose	Orange/Brown	0.0'-0.5 - SAND (fine), trace gravel (coarse) 0.5'-3.0' - SAND (fine to medium)	SP	Dry	PID = ND FID = ND
4				End of Boring at 4'						

TYPE OF DRILLING RIG: Geoprobe DPT 6620
METHOD OF ADVANCING BORING: Macrocore
METHOD OF SOIL SAMPLING: Acetate Liners
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS:
OTHER OBSERVATIONS::

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-131
PROJECT NO:	112G00646		START DATE: 10/14/2008
LOGGED BY:	T. Rojahn, J. Traut	TRANSCRIBED BY: B. Geringer	COMPLETION DATE 10/14/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: NA
GRD. SURFACE ELEVATION:	72.75' MSL	ELEVATION FROM: NAVD 1988	CHECKED BY: J. Traut

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0										
		1.1 / 1.1	1455 SB-17-131-0001	TOPSOIL	Loose	Brown	0'-1.1' - SAND (fine to medium), trace silt - organic material (0.0'-0.2") 0.7'-0.9' - SAND (fine to medium), some silt	SM SP	Dry	PID = ND
2				UPPER SAND UNIT	Loose	Brown	0.0'-2.3' - SAND (fine to medium), trace silt 0.8'-1.0' - Layer of coarse SAND	SP	Dry	PID = ND
		2.3 / 3.0	1500 SB-17-131-0104		Medium Dense	Tan	1.3'-1.7' - Layer of SILTY SAND	SM SP		
4				End of Boring at 4.1'						

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NASB
PROJECT NO: 112G00646
LOGGED BY: T. Rojahn, J. Traut
DRILLED BY (Company/Driller): S. Brown (MAI)
GRD. SURFACE ELEVATION: 73.06' MSL

TRANSCRIBED BY: B. Geringer
ELEVATION FROM: NAVD 1988

BORING NO.: SB-17-132
START DATE: 10/14/2008
COMPLETION DATE: 10/20/2008
MON. WELL NO.: NA
CHECKED BY: J. Traut

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0		1.2 / 1.2	1515 SB-17-132-0001	FILL		Brown Tan Brown	0'-0.4' - SAND (fine to medium), trace silt 0.4'-0.8' - SAND (fine to medium) 0.8'-1.2' - SAND (fine to medium), trace silt	SP	Dry	PID = ND FID = ND
2		1.0 / 3.0	1520 SB-17-132-0104 1525 SB-17-132-DUP01				0.0'-1.0' - SILTY SAND (fine sand) (pushed rock)	SM	Moist	PID = ND FID = ND
4										
6		2.9 / 4.0	1145 SB-17-132-0408 1150 SB-17-132-DUP08	UPPER SAND PEAT	Slightly Dense Dense Slightly Dense	Orange/Tan Gray Black Gray	0.0'-0.4' - SAND (fine to medium) 0.4'-1.2' - SAND (fine to medium), some silt 1.2'-2.3' - SILT, organic with wood, fibrous material (peaty) 2.3'-2.9' - SAND (fine to medium)	SP SM OH SP	Saturated Wet	PID = ND FID = 170 FID Headspace = 3695
8				End of Boring at 8.2'						

TYPE OF DRILLING RIG: Geoprobe DPT 6620
METHOD OF ADVANCING BORING: Macrocore
METHOD OF SOIL SAMPLING: Acetate Liners
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:: Returned on 10/20/2008, Drilled 4' to 8'

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-133
PROJECT NO:	112G00646		START DATE: 10/14/2008
LOGGED BY:	T. Rojahan, J. Traut	TRANSCRIBED BY: B. Geringer	COMPLETION DATE 10/14/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: NA
GRD. SURFACE ELEVATION:	71.28' MSL	ELEVATION FROM: NAVD 1988	CHECKED BY: J. Traut

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0		1.0 / 1.0	1540	TOPSOIL	Loose	Brown	0'-0.5' - SILTY SAND	SM	Dry	PID = 7.9
							0.5'-0.8' - Wood/rock			
			SB-17-133-0001	FILL	Medium Dense	Dark Brown	0.8'-1.0' - SAND (fine to medium)	SP	Moist	
2						▼ Tan	0.0'-0.5' - Similar to above		Moist	PID = 1.5
		2.8 / 3.0	1545 SB-17-133-0104				0.5'-2.6' SAND some silt (fine to medium sand)		Wet	PID = ND
4							2.6'-2.8' - SILTY SAND	SM		
				End of Boring at 4'						

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-134
PROJECT NO:	112G00646		START DATE: 10/15/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: B. Geringer	COMPLETION DATE 10/15/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: NA
GRD. SURFACE ELEVATION:	73.39' MSL	ELEVATION FROM: NAVD 1988	CHECKED BY: J. Traut

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0										
		2.0 / 2.0	1540	TOPSOIL FILL	Slightly Dense	Brown	0'-0.5' - Topsoil - SAND (fine), and silt, organic, some fibrous material 0.5'-2.0' - SAND (fine to medium), trace fine gravel	SM	Dry	PID = ND FID = ND
2					Loose	Light Brown	↓	SP	↓	
3		1.0 / 1.0	1235 SB-17-134-0203 1240 SB-17-134-DUP03	UPPER SAND UNIT	↓	↓	0.0'-1.0' - SAND (fine to medium)	↓	Dry	PID = ND FID = ND
		/		End of Boring at 3'						
		/								
		/								
		/								
		/								
		/								
		/								
		/								

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NASB
PROJECT NO: 112G00646
LOGGED BY: C. Fellows-Swenson, J. Traut
DRILLED BY (Company/Driller): S. Brown (MAI)
GRD. SURFACE ELEVATION: 73.14' MSL

TRANSCRIBED BY: B. Geringer
ELEVATION FROM: NAVD 1988

BORING NO.: SB-17-135
START DATE: 10/15/2008
COMPLETION DATE: 10/15/2008
MON. WELL NO.: NA
CHECKED BY: J. Traut

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0										
		2.0 / 2.0	1145	TOPSOIL	Slightly Dense	Brown	0'-0.4' - Topsoil - SAND (fine), and silt, organic, some fibrous	SM	Dry	PID = ND
							0.4'-2.0' - SAND (fine to medium), trace gravel (fine and	SP		FID = ND
2				FILL	Loose	Light Brown	shreds of black geotextile approximately 1.8'			
3		1.0 / 1.0	1148 (LAB QC) SB-17-135-0203	UPPER SAND U PEAT	↓	↓ Black	0.0'-0.9' - SAND (fine to medium) 0.9'-1.0' - SAND (fine) and silt, some fibrous material	↓	Dry Moist	
		/		End of Boring at 3'						
		/								
		/								
		/								
		/								
		/								
		/								

TYPE OF DRILLING RIG: Geoprobe DPT 6620
METHOD OF ADVANCING BORING: Macrocore
METHOD OF SOIL SAMPLING: Acetate Liners
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS:
OTHER OBSERVATIONS::

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NASB
PROJECT NO: 112G00646
LOGGED BY: C. Fellows-Swenson, J. Traut
DRILLED BY (Company/Driller): S. Brown (MAI)
GRD. SURFACE ELEVATION: 73.03' MSL

TRANSCRIBED BY: B. Geringer
ELEVATION FROM: NAVD 1988

BORING NO.: SB-17-136
START DATE: 10/15/2008
COMPLETION DATE: 10/15/2008
MON. WELL NO.: NA
CHECKED BY: J. Traut

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0										
		2.0 / 2.0	1115	TOPSOIL	Slightly Dense	Brown	0'-0.3' - Topsoil - SAND (fine), some silt, some fibrous material, organics 0.3'-2.0' - SAND (fine to medium), rock fragment at 1.0'	SM SP	Dry	PID = ND
2				FILL	Loose	Light Brown	1.9'-2.0' - Fragments of black asphalt, shreds of geotextile liner			
3		1.0 / 1.0	1120 SB-17-136-0203	UPPER SAND UNIT			0.0'-1.0' - SAND (fine to medium), trace silt		Dry	PID = ND FID = ND
				End of Boring at 3'						

TYPE OF DRILLING RIG: Geoprobe DPT 6620
METHOD OF ADVANCING BORING: Macrocore
METHOD OF SOIL SAMPLING: Acetate Liners
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS:
OTHER OBSERVATIONS::

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NASB
PROJECT NO: 112G00646
LOGGED BY: C. Fellows-Swenson, J. Traut
DRILLED BY (Company/Driller): S. Brown (MAI)
GRD. SURFACE ELEVATION: 72.94' MSL

TRANSCRIBED BY: B. Geringer
ELEVATION FROM: NAVD 1988

BORING NO.: SB-17-137
START DATE: 10/15/2008
COMPLETION DATE: 10/15/2008
MON. WELL NO.: NA
CHECKED BY: J. Traut

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0										
		2.0 / 2.0	0800	TOPSOIL	Slightly Dense/Loos	Brown	0'-0.2' - Topsoil - SAND (fine), some silt, some fibrous material 0.2'-2.0' - SAND (fine to medium),	SM SP	Dry	PID = ND FID = ND
2				FILL	Loose	Light Brown	rock fragments at 0.7' and 1.4'			
3		1.0 / 1.0	805 SB-17-137-0203	UPPER SAND UNIT			0.0'-1.0' - SAND (fine to medium), trace silt		Moist	PID = ND FID = ND
				End of Boring at 3'						

TYPE OF DRILLING RIG: Geoprobe DPT 6620
METHOD OF ADVANCING BORING: Macrocore
METHOD OF SOIL SAMPLING: Acetate Liners
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS:
OTHER OBSERVATIONS::

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-138
PROJECT NO:	112G00646		START DATE: 10/15/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: B. Geringer	COMPLETION DATE 10/20/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: NA
GRD. SURFACE ELEVATION:	73.46' MSL	ELEVATION FROM: NAVD 1988	CHECKED BY: J. Traut

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0										
		2.0 / 2.0	1220	TOPSOIL	Slightly Dense	Brown	0'-0.6' - Topsoil - SAND (fine) and silt, organics, fibrous material 0.6'-2.0' - SAND (fine to medium), trace fine gravel	SM	Dry	PID = ND FID = ND
2				FILL	Loose	Light Brown		SP		
		1.0 / 1.0	1225 SB-17-138-0203				0.0'-1.0' - SAND (fine to medium)		Dry	PID = ND
4		2.8 / 4.0	1130	UPPER SAND UNIT	Slightly Dense	Tan	0.0'-2.8' - SAND (fine to medium)			FID = ND Headspace FID = ND
							1.5' - Iron Staining			
6					Dense				Dry/Moist	
7						Gray/Tan				
				End of Boring at 7'						

TYPE OF DRILLING RIG:	Geoprobe DPT 6620		Tetra Tech NUS, Inc.
METHOD OF ADVANCING BORING:	Macrocore		
METHOD OF SOIL SAMPLING:	Acetate Liners		
METHOD OF ROCK CORING:	NA		
GROUNDWATER LEVELS:			
OTHER OBSERVATIONS::	Returned on 10/20/2008, to drill 3' to 7'	BORING NO.: SB-17-138	PAGE: 1 OF 1

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-139
PROJECT NO:	112G00646		START DATE: 10/15/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: B. Geringer	COMPLETION DATE: 10/15/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: NA
GRD. SURFACE ELEVATION:	73.33' MSL	ELEVATION FROM: NAVD 1988	CHECKED BY: J. Traut

DEPTH (FEET)	BLOWS PER 6"	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0										
		2.0 / 2.0	1138	TOPSOIL	Slightly Dense/Loose	Brown	0'-0.5' - Topsoil - SAND (fine) and silt, fibrous material, some organics	SM	Dry	PID = ND
							0.5'-2.0' - SAND (fine to medium), trace coarse gravel	SP		FID = ND
2				FILL	Loose	Light Brown				
3		1.0 / 1.0	1140 SB-17-139-0203	UPPER SAND UNIT			0.0'-1.0' - SAND (fine to medium), trace coarse gravel		Dry	PID = ND FID = ND
				End of Boring at 3'						

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NASB
PROJECT NO: 112G00646
LOGGED BY: C. Fellows-Swenson, J. Traut
DRILLED BY (Company/Driller): S. Brown (MAI)
GRD. SURFACE ELEVATION: 73.20' MSL

TRANSCRIBED BY: B. Geringer
ELEVATION FROM: NAVD 1988

BORING NO.: SB-17-140
START DATE: 10/15/2008
COMPLETION DA: 10/15/2008
MON. WELL NO.: NA
CHECKED BY: J. Traut

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/C ONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0										
		2.1 / 2.1	1055	TOPSOIL / FILL	Loose	Tan	0'-0.5' - Topsoil - SAND (fine) some silt, organic material 0.5'-2.0' - SAND (fine to medium), trace silt, trace fine gravel (rounded)	OM / SP	Dry	PID = ND FID = ND
2										
3		0.5 / 1.0	1105 SB-17-140-0203	UPPER SAND UNIT			0.0'-0.5' - SAND (fine to medium), trace silt		Moist	PID = ND
				End of Boring at 3.1'						

TYPE OF DRILLING RIG: Geoprobe DPT 6620
METHOD OF ADVANCING BORING: Macrocore
METHOD OF SOIL SAMPLING: Acetate Liners
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS:
OTHER OBSERVATIONS::

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NASB
PROJECT NO: 112G00646
LOGGED BY: C. Fellows-Swenson, J. Traut
DRILLED BY (Company/Driller): S. Brown (MAI)
GRD. SURFACE ELEVATION: 73.25' MSL

TRANSCRIBED BY: B. Geringer
ELEVATION FROM: NAVD 1988

BORING NO.: SB-17-141
START DATE: 10/15/2008
COMPLETION DATE: 10/20/2008
MON. WELL NO.: NA
CHECKED BY: J. Traut

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0										
		2.0 / 2.0	0810	TOPSOIL	Loose/ Slightly Dense	Brown	0'-0.3' - Topsoil - SAND (fine) some silt, fibrous material 0.3'-2.0' - SAND (fine to medium), band of sand (medium)	SM	Dry	PID = ND FID = ND
2				FILL	Loose	Light Brown	rock fragments at 1.0'	SP		
		1.0 / 1.0	815 SB-17-141-0203	UPPER SAND UNIT	↓	↓	0.0'-1.0' - SAND (fine to medium), trace silt	↓	Moist	PID = ND FID = ND
4		2.9 / 4.0	1120 SB-17-141-0307		↓	↓	0.0'-1.5' - Similar to above	↓	Damp	FID = 549 Headspace FID = 2,532
				PEAT	Slightly Dense	Gray Black	1.5'-2.5' - SILT, trace fine sand, organic material	OH		
6					Dense	↓	↓	↓		
7					↓	Tan	2.5'-2.9' - SAND (fine to medium)	SP		
				End of Boring at 7'						
		/								
		/								
		/								

TYPE OF DRILLING RIG: Geoprobe DPT 6620
METHOD OF ADVANCING BORING: Macrocore
METHOD OF SOIL SAMPLING: Acetate Liners
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:: Returned on 10/20/2008, Drilled 3' to 7'

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-142
PROJECT NO:	112G00646		START DATE: 10/15/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: B. Geringer	COMPLETION DATE 10/15/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: NA
GRD. SURFACE ELEVATION:	73.15' MSL	ELEVATION FROM: NAVD 1988	CHECKED BY: J. Traut

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/C ONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0										
		2.0 / 2.0	1200	TOPSOIL	Slightly Dense	Brown	0'-0.4' - Topsoil - SAND (fine) and silt, organic and fibrous 0.4'-1.5' - SAND (fine to medium) some gravel (fine to coarse)	SM SP	Dry	PID = ND FID = ND
2				UPPER SAND UNIT	Loose	Light Brown	1.5'-2.0' - SAND (fine to medium)			
3		1.0 / 1.0	1205 SB-17-142-0203				0.0'-1.0' - SAND (fine to medium)		Dry	PID = ND
		/	1210 SB-17-DUP02	End of Boring at 3'						
		/								
		/								
		/								
		/								
		/								
		/								
		/								

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB			BORING NO.:	SB-17-143
PROJECT NO:	112G00646			START DATE:	10/15/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: B. Geringer		COMPLETION DATE	10/15/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)			MON. WELL NO.:	NA
GRD. SURFACE ELEVATION:	73.34' MSL	ELEVATION FROM: NAVD 1988		CHECKED BY:	J. Traut

DEPTH (FEET)	BLOWS PER 6"	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/C ONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0										
	NA	2.0 / 2.0	1130	TOPSOIL	Slightly Dense	Brown	0'-0.4' - Topsoil - SAND (fine) and silt, fibrous material, some organics 0.4'-2.0' - SAND (fine to medium)	SM	Dry	PID = ND
2				FILL	Loose	Light Brown		SP		
3		1.0 / 1.0	1135 SB-17-143-0203	UPPER SAND UNIT			0.0'-1.0' - SAND (fine to medium)		Dry	PID = ND
				End of Boring at 3'						

TYPE OF DRILLING RIG:	Geoprobe DPT 6620		Tetra Tech NUS, Inc.
METHOD OF ADVANCING BORING:	Macrocore		
METHOD OF SOIL SAMPLING:	Acetate Liners		
METHOD OF ROCK CORING:	NA		
GROUNDWATER LEVELS:			
OTHER OBSERVATIONS::		BORING NO.: SB-17-143	PAGE: 1 OF 1

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-144
PROJECT NO:	112G00646		START DATE: 10/15/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: B. Geringer	COMPLETION DATE: 10/16/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: MW-17-04
GRD. SURFACE ELEVATION:	73.25' MSL	ELEVATION FROM: NAVD 1988	CHECKED BY: J. Traut

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, PID (PPM)]
0										
2		2.0 / 2.0	0845	TOPSOIL FILL	Loose/ Medium Dense	Tan	0.0'-0.4' - SILTY SAND (fine), 0.0'-0.2' - organic material 0.4'-2.0' - SAND (fine to medium), trace silt	SM SP	Dry	PID = ND FID = ND
		1.0 / 1.0	0850 SB-17-144-0203		Medium Dense		0.0'-1.0' - SAND (fine to medium), dark staining at 0.5'		Moist	PID = ND FID = ND
4		1.8 / 2.0	0855	UPPER SAND UNIT			0.0'-1.8' - SAND (fine to medium), dark staining 1.0'-1.4'		Moist/Damp	PID = ND
6				PEAT	Slightly Dense	Light Brown Black	0.0'-0.7' - SAND (fine to medium) 0.7'-1.2' - SAND (fine) and silt, some organics		Wet	PID = ND FID = 68
8		4.2 / 5.0	0910			Light Brown	1.2'-1.8' - SAND (fine), trace silt 1.8'-4.2' - SAND (fine to medium)	SM SP		
10										
12		4.2 / 5.0	0930				0.0'-2.6' - SAND (fine to medium)		Wet	PID = ND FID = ND
14						Orange Light Brown/Gray	2.6'-2.8' - SAND (medium), with mica 2.8'-4.2' - SAND (fine to medium), trace silt	SW SP		
16						Gray	0.0'-3.0' - SAND (fine to medium), trace silt		Wet	

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB		
PROJECT NO:	112G00646	BORING NO.:	SB-17-144
LOGGED BY:	C. Fellows-Swenson, J. Traut	START DATE:	10/15/2008
TRANSCRIBED BY:	B. Geringer	COMPLETION DATE:	10/16/2008
DRILLED BY (Company/Driller):	Seth (MAI)	MON. WELL NO.:	MW-17-04
GRD. SURFACE ELEVATION:	73.25' MSL	CHECKED BY:	J. Traut
ELEVATION FROM:	NAVD 1988		

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/ CONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, (PPM)]
16										
18		3.0 / 5.0	1010	UPPER SAND UNIT	Slightly Dense / Dense	Gray	0.0'-3.0' - SAND (fine to medium), trace silt	SP	Wet	PID = ND FID = ND
20										
22		4.0 / 4.0	1015	TRANSITION UNIT	Soft		0.0'-4.0' - SAND (fine) and silt, black band at 0.8'	SM	Wet	PID = ND FID = ND
24										
26		2.5 / 4.0	1120				0.0'-2.5' - SAND (fine) and silt		Very Wet	PID = ND FID = ND
28										
30		5.0 / 5.0	1125	Presumpscot Formation			0.0'-5.0' - Clay	CL	Wet	PID = ND FID = ND
32										
33				End of Boring at 33'						

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17, NASB		BORING NO.: SB-17-145
PROJECT NO:	112G00646		START DATE: 10/15/2008
LOGGED BY:	C. Fellows-Swenson, J. Traut	TRANSCRIBED BY: B. Geringer	COMPLETION DA 10/15/2008
DRILLED BY (Company/Driller):	S. Brown (MAI)		MON. WELL NO.: NA
GRD. SURFACE ELEVATION:	73.26' MSL	ELEVATION FROM: NAVD 1988	CHECKED BY: J. Traut

DEPTH (FEET)	BLOWS PER 6" NA	SAMP REC./ SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG/WELL PROF'L	SOIL DENSITY/C ONSIS. OR ROCK HARD	CLR	MATERIAL CLASSIFICATION	USCS OR ROCK BRKN	REMARKS (moisture condition;odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [PID, FID, (PPM)]
0										
		2.0 / 2.0	0825	TOPSOIL	Slightly Dense	Brown	0'-0.4' - Topsoil - SAND (fine) with silt, fibrous material, grass	SM	Dry	PID = ND
				FILL			0.4'-2.0' - SAND (fine to medium), rock fragments at 1.5'	SP	↓	FID = ND
2					Loose	Light Brown	↓	↓		
3		1.0 / 1.0	830 SB-17-145-0203	UPPER SAND UNIT	↓	↓	0.0'-1.0' - SAND (fine to medium), trace silt	↓	Moist	PID = ND FID = ND
		/		End of Boring at 3'						
		/								
		/								
		/								
		/								
		/								
		/								
		/								
		/								

TYPE OF DRILLING RIG:	Geoprobe DPT 6620
METHOD OF ADVANCING BORING:	Macrocore
METHOD OF SOIL SAMPLING:	Acetate Liners
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS::	

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NAS Brunswick
PROJECT NO.: 112G02063-0620
LOGGED BY: J. Traut
DRILLED BY (Company/Driller): MAI/ S. Brown
GRD. SURFACE ELEVATION:

TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: SB-17-146
START DATE: 4/23/09
COMPLETION: DATE: 4/23/09
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	HEADSPACE SCREENING DATA *METHOD* = [FID, (PPM)]
0							Grass			
		0.8 / 1.0	1355		Medium Dense	Tan	0.0'-0.8' SILTY SAND (fine to medium)	SM	Moist – Wet	PID 0.0 FID 0.0
2						Black	0.0'-2.0' SAND (fine to medium) Cobble at 2.4'-2.5'	SP		PID 0.0 FID 0.0
		2.0 / 3.0	SB-17-SB17146-0104			Brown Tan			Moist - Wet	
4			1400			Black Tan				
				E.O.B.						

TYPE OF DRILLING RIG: Geoprobe 6620 DT
METHOD OF ADVANCING BORING: DPT
METHOD OF SOIL SAMPLING: Macro-Core with Acetate Liner
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:

Tetra Tech NUS, Inc.

BORING LOG FOR:	Site 17; NAS Brunswick		
PROJECT NO.:	112G02063-0620	BORING NO.:	SB-17-147
LOGGED BY:	J. Traut	START DATE:	4/23/09
DRILLED BY (Company/Driller):	MAI/ S. Brown	COMPLETION: DATE:	4/23/09
GRD. SURFACE ELEVATION:		MON. WELL NO.:	N/A
TRANSCRIBED BY:		CHECKED BY:	
ELEVATION FROM:			

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	HEADSPACE SCREENING DATA *METHOD* = [FID, (PPM)]
0		0.7 / 1.0	1320		Loose	Tan	0.0'-0.3' SILTY SAND (fine to medium) - saturated 0.3'-0.7' SAND (fine to medium)	SP	Moist	PID 0.0 FID 0.0
2					Medium Dense	↓	0.0'-1.6' SAND (fine to medium)	↓	Wet	PID 0.0 FID 0.0
		2.4 / 3.0	SB-17-SB17147-0104 Lab QC 1325		↓	Dk Brown Tan	1.6'-2.4' SAND (fine to medium) some fine gravel	↓	Wet	
4					↓	↓	↓	↓	↓	
				E.O.B.						

TYPE OF DRILLING RIG:	Geoprobe 6620 DT
METHOD OF ADVANCING BORING:	DPT
METHOD OF SOIL SAMPLING:	Macro-Core with Acetate Liner
METHOD OF ROCK CORING:	N/A
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS:	Standing water around boring areas – heavy rains 4/21/09

BORING NO.: SB-17-147

Tetra Tech NUS, Inc.

TtNUS Form 0018

BORING LOG FOR: Site 17, NAS Brunswick
PROJECT NO.: 112G02063-0620
LOGGED BY: J. Traut
TRANSCRIBED BY:
DRILLED BY (Company/Driller): MAI/ S. Brown
GRD. SURFACE ELEVATION:
ELEVATION FROM:

BORING NO.: SB-17-148
START DATE: 4/23/09
COMPLETION: DATE: 4/23/09
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	HEADSPACE SCREENING DATA *METHOD* = [FID, (PPM)]
0		0.6 / 1.0	1345		Loose	Tan	0.0'-0.3' SILTY SAND (fine to medium) 0.3'-0.6' SAND (fine to medium)	SP	Wet	PID 5.9 FID 0.6
2					Medium Dense	↓	0.0'-0.6' SAND (fine to medium) some coarse sand 0.6'-1.4'- SAND (fine to medium)	↓	Moist	PID 2.3 FID 33.9
		2.6 / 3.0	SB-17-SB17148-0104		↓	Black Grey/tan	1.4'-1.5' SILTY organic material (peat?) 1.5'-2.0' SAND (fine)	SM SP	Moist	
4			1350		Dense	↓	2.0'-2.6' SAND (fine to medium)	↓		
				E.O.B.						

TYPE OF DRILLING RIG: Geoprobe 6620 DT
METHOD OF ADVANCING BORING: DPT
METHOD OF SOIL SAMPLING: Macro-Core with Acetate Liner
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS: Standing water surrounding borings – heavy rains on 4/21/09

BORING NO.: SB-17-148

Tetra Tech NUS, Inc.

TtNUS Form 0018

BORING LOG FOR:	Site 17, NAS Brunswick		
PROJECT NO.:	112G02063-0620	BORING NO.:	SB-17-149
LOGGED BY:	J. Traut	START DATE:	4/23/09
DRILLED BY (Company/Driller):	MAI/ S. Brown	COMPLETION: DATE:	4/23/09
GRD. SURFACE ELEVATION:		MON. WELL NO.:	N/A
TRANSCRIBED BY:		CHECKED BY:	
ELEVATION FROM:			

DEPTH (FEET) 0	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF' L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	HEADSPACE SCREENING DATA *METHOD* = [FID, (PPM)]
		1.2 / 1.2	1405		Slightly Dense	Tan	0.0'-1.0' SILTY SAND (fine to medium) 1.0'-1.2' SAND (fine to medium)	SM	Moist –Wet Geotextile liner noted ~ 2 ft bgs	PID 44.1 FID 17.8
2		2.4 / 3.0	SB-17—SB17149-0104		Dense		0.0'-2.4' SAND (fine to medium) 0.5'-0.7' and 0.9'-1.1' layers of silty fine sand	SP		PID 0.0 FID 25.0
4			1410	E.O.B.					Moist	

TYPE OF DRILLING RIG:	Geoprobe 6620 DT		Tetra Tech NUS, Inc.
METHOD OF ADVANCING BORING:	DPT		
METHOD OF SOIL SAMPLING:	Macro-Core with Acetate Liner		
METHOD OF ROCK CORING:	N/A		
GROUNDWATER LEVELS:			
OTHER OBSERVATIONS:	Standing water surrounding borings – heavy rains on 4/21/09	BORING NO.: SB-17-149	PAGE: 1 OF 1

TtNUS Form 0018

BORING LOG FOR: Site 17, NAS Brunswick
PROJECT NO.: 112G02063-0620
LOGGED BY: J. Traut
TRANSCRIBED BY:
DRILLED BY (Company/Driller): MAI/ S. Brown
GRD. SURFACE ELEVATION:
ELEVATION FROM:

BORING NO.: SB-17-150
START DATE: 4/23/09
COMPLETION: DATE: 4/23/09
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	HEADSPACE SCREENING DATA *METHOD* = [FID, (PPM)]
0										
		1.6 / 2.0			Dense	Tan	0.0'-0.6' SILTY SAND (fine) 0.6'-1.6' SAND (fine to medium)	SM SP	Moist	PID 0.0 FID 0.0
2			1520		Loose	↓	↓	↓		PID 0.0 FID 0.0
					Dense	Brown/ Tan	0.0'-3.0' SAND (fine to medium) Trace coarse sand 0.0'-1.0'	↓	Moist	
4		3.0 / 3.0	SB-17-SB17-150-0205		↓	Orange/ Tan	↓	↓	↓	
5			1525		↓	Tan	↓	↓		
				E.O.B.						

TYPE OF DRILLING RIG: Geoprobe 6620 DT
METHOD OF ADVANCING BORING: DPT
METHOD OF SOIL SAMPLING: Macro-Core with Acetate Liner
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NAS Brunswick
PROJECT NO.: 112G02063-0620
LOGGED BY: J. Traut
TRANSCRIBED BY: _____
DRILLED BY (Company/Driller): MAI/ S. Brown
GRD. SURFACE ELEVATION: _____
ELEVATION FROM: _____

BORING NO.: SB-17-151
START DATE: 4/23/09
COMPLETION: DATE: 4/23/09
MON. WELL NO.: N/A
CHECKED BY: _____

DEPTH (FEET) 0	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	HEADSPACE SCREENING DATA *METHOD* = [FID, (PPM)]
		1.5 / 2.0			Dense	Tan	0.0'-0.6' SILT some sand (fine)	SM	Moist - damp	PID 0.0
					Loose	↓	0.6'-1.5' SAND (fine to medium)	SP		FID 0.0
2			1430		↓	↓	↓	↓		PID 0.0 FID 0.0
		3.0 / 3.0	SB-17-SB17151-0205		Medium Dense	Brown	0.0'-0.5' SAND (fine to coarse) 0.5'-2.5' SAND (fine to medium)		Wet	
4					↓	↓				
5			1435		↓	Black	2.5'-3.0' SAND (fine to medium) some silt	↓		
				E.O.B.						

TYPE OF DRILLING RIG: Geoprobe 6620 DT
METHOD OF ADVANCING BORING: DPT
METHOD OF SOIL SAMPLING: Macro-Core with Acetate Liner
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS: _____
OTHER OBSERVATIONS: _____

BORING NO.: SB-17-151

Tetra Tech NUS, Inc.

TtNUS Form 0018

BORING LOG FOR: Site 17, NAS Brunswick
PROJECT NO.: 112G02063-0620
LOGGED BY: J. Traut
DRILLED BY (Company/Driller): MAI/ S. Brown
GRD. SURFACE ELEVATION:

TRANSCRIBED BY:

ELEVATION FROM:

BORING NO.: SB-17-152
START DATE: 4/23/09
COMPLETION: DATE: 4/23/09
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	HEADSPACE SCREENING DATA *METHOD* = [FID, (PPM)]
0										
		1.9 / 2.0			Dense	Brown	0.0'-0.8' SILTY SAND (fine)	SM	Moist	PID 0.0 FID 0.0
2			1500		Slightly Dense	Tan	0.8'-1.9' SAND (fine to medium)	SP	Geotextile liner ~ 2 ft bgs	PID 0.4 FID 0.0
		2.9 / 3.0	SB-17-SB17152-0205		Dense	Orange/ Tan	0.0'-2.9' SAND (fine to medium)		Moist	
4										
5			1510							
				E.O.B.						

TYPE OF DRILLING RIG: Geoprobe 6620 DT
METHOD OF ADVANCING BORING: DPT
METHOD OF SOIL SAMPLING: Macro-Core with Acetate Liner
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NAS Brunswick
PROJECT NO.: 112G02063-0620
LOGGED BY: J. Traut
TRANSCRIBED BY: _____
DRILLED BY (Company/Driller): MAI/ S. Brown
GRD. SURFACE ELEVATION: _____
ELEVATION FROM: _____

BORING NO.: SB-17-153
START DATE: 4/23/09
COMPLETION: DATE: 4/23/09
MON. WELL NO.: N/A
CHECKED BY: _____

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	HEADSPACE SCREENING DATA *METHOD* = [FID, (PPM)]
0										
		1.4 / 2.0			Loose	Tan	0.0'-0.6' SILTY SAND (fine)	SM	Moist- damp	PID 0.0
					↓	↓	0.6'-1.4' SAND (fine to medium)	SP		FID 0.0
2			1420		↓	↓	↓	↓		PID 0.0 FID 0.0
					Dense	Tan/ Brown	0.0'-0.5' SAND (fine to medium) some coarse		Wet	
		2.6 / 3.0	SB-17-SB17153-0205		↓	↓	0.5' 1.8' SAND (fine to medium) trace fine gravel			
4					↓					
5			1425		↓	Dk. Brown	1.8'-2.6' SAND (fine to medium)	↓		
				E.O.B.						

TYPE OF DRILLING RIG: Geoprobe 6620 DT
METHOD OF ADVANCING BORING: DPT
METHOD OF SOIL SAMPLING: Macro-Core with Acetate Liner
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS: _____
OTHER OBSERVATIONS: _____

BORING NO.: SB-17-153

Tetra Tech NUS, Inc.

TtNUS Form 0018

BORING LOG FOR:	Site 17, NAS Brunswick		
PROJECT NO.:	112G02063-0620	BORING NO.:	SB-17-154
LOGGED BY:	J. Traut	START DATE:	4/23/09
DRILLED BY (Company/Driller):	MAI/ S. Brown	COMPLETION: DATE:	4/23/09
GRD. SURFACE ELEVATION:		MON. WELL NO.:	N/A
TRANSCRIBED BY:		CHECKED BY:	
ELEVATION FROM:			

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	HEADSPACE SCREENING DATA *METHOD* = [FID, (PPM)]
0										
		1.7 / 2.0			Loose	Tan	0.0'-0.4' SILTY SAND (fine to medium) 0.4'-1.7' SAND (fine to medium)	SM SP	Moist- Damp	PID 0.8 FID 0.0
2			1515		↓	↓	↓			PID 0.0 FID 0.0
					Dense	Or. Tan Gray	0.0'-1.7' SAND (fine to medium)		Wet	
4		3.0 / 3.0	SB-17-SB17154-0205 DUP01 @ 1525		↓	Or. Tan Black	1.7'-2.2' SAND (fine to medium) some silt 2.2'-2.5' SAND (fine to medium)	↓	↓	
5			1520		↓	Tan	2.5'-2.7' SILTY SAND 2.7'-3.0' SAND (fine to medium)			
				E.O.B.						

TYPE OF DRILLING RIG:	Geoprobe 6620 DT
METHOD OF ADVANCING BORING:	DPT
METHOD OF SOIL SAMPLING:	Macro-Core with Acetate Liner
METHOD OF ROCK CORING:	N/A
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS:	

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NAS Brunswick
PROJECT NO.: 112G02063-0620
LOGGED BY: J. Traut
TRANSCRIBED BY:
DRILLED BY (Company/Driller): MAI/ S. Brown
GRD. SURFACE ELEVATION:
ELEVATION FROM:

BORING NO.: SB-17-155
START DATE: 4/23/09
COMPLETION: DATE: 4/23/09
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	HEADSPACE SCREENING DATA *METHOD* = [FID, (PPM)]
0										
		1.9 / 2.0			Sl. Dense/ Loose	Tan/ Brown	0.0'-0.6' SILTY SAND (fine) 0.6'-1.9' SAND (fine to medium)	SM SP	Moist Geotextile liner at ~ 1.2 ft bgs	PID 0.0 FID 0.0
2			1450			Orange Tan				PID 0.0 FID 0.0
		2.6 / 3.0	SB-17-SB17155-0205				0.0'-2.6' SAND (fine to medium)		Moist	
4										
5			1455		Medium Dense					
				E.O.B.						

TYPE OF DRILLING RIG: Geoprobe 6620 DT
METHOD OF ADVANCING BORING: DPT
METHOD OF SOIL SAMPLING: Macro-Core with Acetate Liner
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:

Tetra Tech NUS, Inc.

BORING NO.: SB-17-155

TtNUS Form 0018

BORING LOG FOR: NASB Site 17-Additional Soil Investigation
PROJECT NO.: CTO WE09 - 112G02063 / 0000.0620
LOGGED BY: C. Fellows
DRILLED BY (Company/Driller): N/A
GRD. SURFACE ELEVATION:

TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: SB-17- 201
START DATE: 7/8/10
COMPLETION: DATE: 7/8/10
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA *METHOD* = [FID. (PPM)]
0										
		/			loose	Brown	0.0-2.0 - sand (f-m). small fibers of geotextile membrane (black) observed at 2.0.	SP	Dry	PID = 0.0
1										FID = 0.0
		/					↓			PID = 0.1
2							↓			FID = 0.6
		/	SB-17-201-0205 1150		loose	Brown	2.0-4.0 - sand (f-m)	SP	Dry	PID = 0.1
3							↓			FID = 0.0
		/					↓		moist at 3'	PID = 0.1
4							↓			FID = 0.0
		/			loose	orange/ Brown	4.0-5.0 - sand (f-m) some silt	SM		PID = 0.0
5							↓		wet at 4.5'	FID = 0.0
		/		EOB @ 5'						
		/								
		/								

TYPE OF DRILLING RIG: N/A
METHOD OF ADVANCING BORING: Hand Auger
METHOD OF SOIL SAMPLING: Hand Trowel / Spatula
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:

Tetra Tech NUS, Inc.

BORING NO.: SB-17- 201

TINUS Form 0018

BORING LOG FOR: NASB Site 17-Additional Soil Investigation
PROJECT NO.: CTO WE09 - 112G02063 / 0000.0620
LOGGED BY: C. Fellows
DRILLED BY (Company/Driller): N/A
GRD. SURFACE ELEVATION:

TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: SB-17- 202
START DATE: 7/8/10
COMPLETION: DATE: 7/8/10
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA *METHOD* = [FID, (PPM)]
0					loose	tan	0.0-2.0 - Sand (f) some sand(m)	SP	Dry	PID= 0.0
1		/					↓			FID=0.0
										PID= 0.0
2		/					↓			FID= 0.0
			SB-17-202-0205 1215		loose	Brown	2.0-5.0 Sand (f-m).	SP	Dry	PID= 0.0
3		/					Black geotextile membrane observed at 2.2'		Moist at 2.5'	FID= 0.0
										PID= 0.0
4		/					↓			FID= 0.0
										PID= 0.0
5		/					↓		Wet at 4.5'	FID= 0.0
				EOB @ 5'						
		/								
		/								
		/								

TYPE OF DRILLING RIG: N/A
METHOD OF ADVANCING BORING: Hand Auger
METHOD OF SOIL SAMPLING: Hand Trowel / Spatula
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:

Tetra Tech NUS, Inc.

BORING NO.: SB-17- 202

TtNUS Form 0018

BORING LOG FOR: NASB Site 17-Additional Soil Investigation
PROJECT NO.: CTO WE09 - 112G02063 / 0000.0620
LOGGED BY: C. Fellows
DRILLED BY (Company/Driller): N/A
GRD. SURFACE ELEVATION:
TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: SB-17- 203
START DATE: 7/8/10
COMPLETION: DATE: 7/8/10
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA *METHOD* = [FID, (PPM)]
0										
					loose	tan	0.0-2.0 - Sand (f) some sand(m)	SP	Dry	PID = 0.0
1		/					↓			FID = 0.0
							↓			PID = 0.0
2		/					↓			FID = 0.0
			SB-17-203-0205 1230		loose	Brown	2.0-4.5 - Sand (f-m) Trace of peat at 2.0	SP	Dry	PID = 0.0
3		/					↓			FID = 0.0
							↓			PID = 0.0
4		/					↓			FID = 0.0
							↓		Moist at 4'	PID = 0.0
5		/			loose	orange/ Brown	4.5-5.0 - Sand (f-m)	SP		FID = 0.0
				EOB @ 5'						
		/								
		/								
		/								

TYPE OF DRILLING RIG: N/A
METHOD OF ADVANCING BORING: Hand Auger
METHOD OF SOIL SAMPLING: Hand Trowel / Spatula
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:

Tetra Tech NUS, Inc.

BORING NO.: SB-17- 203

TINUS Form 0018

BORING LOG FOR: NASB Site 17-Additional Soil Investigation
PROJECT NO.: CTO WE09 - 112G02063 / 0000.0620
LOGGED BY: C. Fellows
DRILLED BY (Company/Driller): N/A
GRD. SURFACE ELEVATION:
TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: SB-17- 204
START DATE: 7/8/10
COMPLETION: DATE: 7/8/10
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA *METHOD* = [FID, (PPM)]
0										
					loose	Brown	0.0-2.0 - Sand (f-m), some iron staining from 1.0-2.0.	SP	Dry	PID = 0.1
1		/								FID = 0.0
							↓			PID = 0.1
2		/					↓			FID = 0.0
			SB-17-204-0205 1120		loose	Brown	2.0-3.5 - Sand (f-m)	SP	Dry	PID = 0.1
3		/	SB-17-DUP01-070810 (Pesticides Only)				↓			FID = 0.0
							↓			PID = 0.1
4		/			sl. Dense	Black	3.5-3.9 - Peat	PT	Moist at 3.5'	FID = 0.0
					loose	Dark Brown	3.9-4.5 - Sand (f-m) and silt	SM		PID = 0.1
5		/			soft	Brown	4.5-5.0 - Sand (f-m) and silt	SM	Wet at 4.5'	FID = 0.0
				EOB @ 5'						
		/								
		/								
		/								

TYPE OF DRILLING RIG: N/A
METHOD OF ADVANCING BORING: Hand Auger
METHOD OF SOIL SAMPLING: Hand Trowel / Spatula
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:

Tetra Tech NUS, Inc.

BORING NO.: SB-17- 204

TINUS Form 0018

BORING LOG FOR: NASB Site 17-Additional Soil Investigation
PROJECT NO.: CTO WE09 - 112G02063 / 0000.0620
LOGGED BY: C. Fellows
DRILLED BY (Company/Driller): N/A
GRD. SURFACE ELEVATION:

TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: SB-17- 205
START DATE: 7/8/10
COMPLETION: DATE: 7/8/10
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA *METHOD* = [FID, (PPM)]
0					loose	tan/ Brown	0.0 - 2.0 - Sand (f-m)	SP	Dry	PID= 0.0
1		/								FID= 0.0
										PID= 0.0
2		/								FID= 0.0
			SB-17-205-0205 1315		loose	Brown	2.0-3.0 - Sand (f-m), Geotextile membrane observed at 2.1	SP	Dry	PID= 0.0
3		/	SB-17-DUP02-070810							FID= 0.0
			(Pesticides only)		loose	gray	3.0-3.1 - Sand (f-m)	SP		PID= 0.0
4		/			loose	Brown	3.1-4.3 - Sand (f-m)	SP		FID= 0.0
					sl. Dense	Black	4.3-4.8 - Peat	PT	Moist at 4.3'	PID= 0.0
5		/			soft	Brown	4.8-5.0 Sand (f-m) and silt	SM	Wet at 4.8'	FID= 0.0
				EOB @ 5'						
		/								
		/								
		/								

TYPE OF DRILLING RIG: N/A
METHOD OF ADVANCING BORING: Hand Auger
METHOD OF SOIL SAMPLING: Hand Trowel / Spatula
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:

Tetra Tech NUS, Inc.

BORING NO.: SB-17- 205

TtNUS Form 0018

BORING LOG FOR: NASB Site 17-Additional Soil Investigation
PROJECT NO.: CTO WE09 - 112G02063 / 0000.0620
LOGGED BY: C. Fellows
DRILLED BY (Company/Driller): N/A
GRD. SURFACE ELEVATION:

TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: SB-17- 206
START DATE: 7/8/10
COMPLETION: DATE: 7/8/10
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA *METHOD* = [FID, (PPM)]
0			SB-17-206-0001 1100		loose	tan/ Brown	0.0-1.0 - sand (f) some sand(m)	SP	Dry	PID= 0.0
1		/								FID= 0.0
			SB-17-206-0103 1105		loose	Brown	1.0-3.0 - sand (f-m) trace gravel (sub-rounded), trace slag	SP	Dry	PID= 0.0
2		/					↓			FID= 0.0
										PID= 0.0
3		/								FID= 0.0
				EOB @ 3'						
		/								
		/								
		/								
		/								
		/								

TYPE OF DRILLING RIG: N/A
METHOD OF ADVANCING BORING: Hand Auger
METHOD OF SOIL SAMPLING: Hand Trowel / Spatula
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:

Tetra Tech NUS, Inc.

BORING NO.: SB-17- 206

TtNUS Form 0018

BORING LOG FOR: NASB Site 17-Additional Soil Investigation
PROJECT NO.: CTO WE09 - 112G02063 / 0000.0620
LOGGED BY: C. Fellows
DRILLED BY (Company/Driller): N/A
GRD. SURFACE ELEVATION:
TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: SB-17- 207
START DATE: 7/8/10
COMPLETION: DATE: 7/8/10
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA *METHOD* = [FID, (PPM)]
0										
		/	SB-17-207-0001 1040		loose	tan/ Brown	0.0-1.0 - sand (f-m)	SP	Dry	PID = 0.0
1										FID = 0.0
		/	SB-17-207-0103 1045 (Lab QC)		loose	Brown	1.0-3.0 - Sand (f-m) same iron staining at 1.5'	SP	Dry	PID = 0.0
2							Pieces of black geotextile membrane observed at 1.8, 2.5 and 2.8.			FID = 0.0
		/					↓			PID = 0.0
3										FID = 0.0
		/		EOB @ 3'						
		/								
		/								
		/								
		/								

TYPE OF DRILLING RIG: N/A
METHOD OF ADVANCING BORING: Hand Auger
METHOD OF SOIL SAMPLING: Hand Trowel / Spatula
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:

Tetra Tech NUS, Inc.

BORING NO.: SB-17- 207

TtNUS Form 0018

BORING LOG FOR: NASB Site 17-Additional Soil Investigation
PROJECT NO.: CTO WE09 - 112G02063 / 0000.0620
LOGGED BY: C. Fellows
DRILLED BY (Company/Driller): N/A
GRD. SURFACE ELEVATION:

TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: SB-17- 208
START DATE: 7/8/10
COMPLETION: DATE: 7/8/10
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA *METHOD* = [FID, (PPM)]
0			SB-17-208-0001 1030		loose	Brown	0.0-1.0 - Sand (f-m) trace gravel (sub-rounded)	SP	Dry	PID= 0.0
1		/								FID= 0.0
			SB-17-208-0103 1035		loose	Brown	1.0-3.0- Sand (f-m)	SP	Dry	PID= 0.0
2		/	SB-17-DUP03-070810 (Metals only)				↓			FID= 0.0
										PID= 0.0
3		/					↓			FID= 0.0
				EOB @ 3'						
		/								
		/								
		/								
		/								
		/								
		/								

TYPE OF DRILLING RIG: N/A
METHOD OF ADVANCING BORING: Hand Auger
METHOD OF SOIL SAMPLING: Hand Trowel / Spatula
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:

Tetra Tech NUS, Inc.

BORING NO.: SB-17- 208

TtNUS Form 0018

BORING LOG FOR: NASB Site 17-Additional Soil Investigation
PROJECT NO.: CTO WE09 - 112G02063 / 0000.0620
LOGGED BY: C. Fellows
DRILLED BY (Company/Driller): N/A
GRD. SURFACE ELEVATION:

TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: SB-17- 209
START DATE: 7/8/10
COMPLETION: DATE: 7/8/10
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA *METHOD* = (FID, (PPM))
0										
		/	SB-17-209-0001 1005		loose	tan/ Brown	0.0-1.0- sand (f-m) trace gravel (sub-rounded)	SP	Dry	PID= 0.0
1										FID=0.0
		/	SB-17-209-0103 1010		loose	Brown	1.0-3.0- sand (f-m) trace gravel (sub-rounded)	SP	Dry	PID = 0.0
2							↓			FID= 0.0
		/								PID= 0.0
3							↓			FID= 0.0
		/		EOB @ 3'						
		/								
		/								
		/								
		/								

TYPE OF DRILLING RIG: N/A
METHOD OF ADVANCING BORING: Hand Auger
METHOD OF SOIL SAMPLING: Hand Trowel / Spatula
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:

Tetra Tech NUS, Inc.

BORING NO.: SB-17- 209

TtNUS Form 0018

BORING LOG FOR: NASB Site 17-Additional Soil Investigation
PROJECT NO.: CTO WE09 - 112G02063 / 0000.0620
LOGGED BY: C. Fellows
DRILLED BY (Company/Driller): N/A
GRD. SURFACE ELEVATION:
TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: SB-17- 210
START DATE: 7/8/10
COMPLETION: DATE: 7/8/10
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA *METHOD* = [FID, (PPM)]
0										
		/	SB-17-210-0001 0945		loose	Tan	0.0-1.0- sand (f-m) trace gravel (subrounded)	SP	Dry	PID = 0.0
1										FID = 0.0
		/	SB-17-210-0103 0950		loose	orange/ Brown	1.0-3.0- sand (f-m) trace gravel (subrounded) same iron staining at 2.0-2.5	SP	Dry	PID = 0.0
2										FID = 0.0
		/					↓			PID = 0.0
3										FID = 0.0
		/		EOB @ 3'						
		/								
		/								
		/								
		/								

TYPE OF DRILLING RIG: N/A
METHOD OF ADVANCING BORING: Hand Auger
METHOD OF SOIL SAMPLING: Hand Trowel / Spatula
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:

Tetra Tech NUS, Inc.

BORING NO.: SB-17- 210

TINUS Form 0018

BORING LOG FOR: NASB- MW-17-02R
PROJECT NO.: CTO 432 / ~~112G02390~~ 112G-00958
LOGGED BY: C. Fellows / K. Callahan
DRILLED BY (Company/Driller): MAI / S. Brown, P. Prescott
GRD. SURFACE ELEVATION: 72.59
TRANSCRIBED BY:
ELEVATION FROM: NAVD88
BORING NO.: SB02R
START DATE: 2/11/11
COMPLETION: DATE: 2/11/11
MON. WELL NO.: MW-17-02R
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA *METHOD* = [FID, (PPM)]
0										
		2.9 / 5.0		Fill	loose	Brown	0.0-2.9 - Sand (f-m) - (Potential Fill)	SP		
2							↓		moist at 1.5'	
		/					↓			
4							↓		wet at 3.5'	
		3.4 / 5.0					↓			
6					loose	Brown	0.0-1.0 - Sand (f-m) (Potential Fill)	SP		
		/		organics	loose	DK Brown/ Brown	1.0-1.5 - Sand(f) and silt - organics	PT/SM		
8				Upper Sand	loose	Brown/ orange	1.5-3.4 - Sand (f-m), some iron staining from 2.7-3.1	SP		
		/					↓			
10							↓			
		/		EOB @ 10'						
		/								
		/								

TYPE OF DRILLING RIG: Geoprobe
METHOD OF ADVANCING BORING: DPT
METHOD OF SOIL SAMPLING: Dual Tube
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:

Tetra Tech NUS, Inc.

BORING NO.: SB02R

PAGE: 1 OF 1

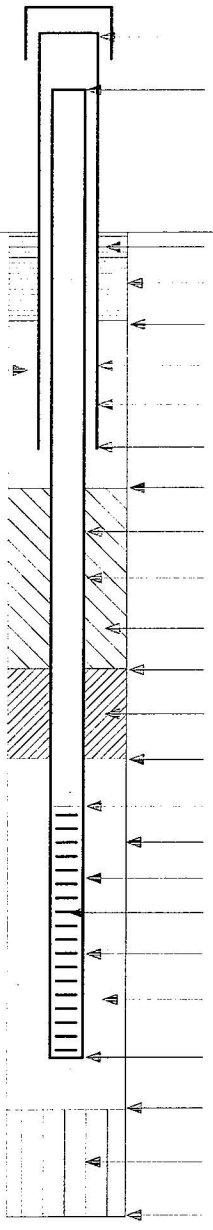
TINUS Form 0018

A.2 MONITORING WELL CONSTRUCTION LOGS

OVERBURDEN MONITORING WELL CONSTRUCTION LOG — TETRA TECH NUS, INC.

PROJECT NAME: Site 17, NASB — PROJECT NO: 112G00646
PROJECT LOCATION: Brunswick, Maine — WELL NO: MW-17-01
CLIENT: Navy — BORING NO: SB-17-106
CONTRACTOR: MAI — DRILLER: S. Brown — BORING LOCATION:
LOGGED BY: J. Traut — DATE: 10/17/08
CHECKED BY: — DATE:
PAGE: 1 OF 1

ELEVATION TOP OF PROTECTIVE CASING: 78.16'
ELEVATION TOP OF RISER PIPE: 77.94'
GROUND ELEVATION: 76.28'



LENGTH OF PROTECTIVE CASING ABOVE GROUND SURFACE (Ft.)	1.88'
LENGTH OF RISER PIPE ABOVE GROUND SURFACE (Ft.)	1.66'
TYPE OF SURFACE SEAL	Cement
DIA. SURFACE SEAL BGS (In.)	2'
DEPTH TO BOTTOM OF SURFACE SEAL (Ft.)	2'
I.D. OF PROTECTIVE CASING (In.)	4.5'
TYPE OF PROTECTIVE CASING	Steel Casing
DEPTH BOTTOM OF PROTECTIVE CASING (Ft.)	3'
DEPTH BOTTOM OF DRAIN LAYER (Ft.)	3.5'
RISER PIPE (In.) I.D.: 1" O.D.: 1.25"	
TYPE OF RISER PIPE	PVC
TYPE OF BACKFILL AROUND RISER PIPE	Sand No. 1
DEPTH TOP OF SEAL (Ft.)	9'
TYPE OF SEAL	Bentonite chips
DEPTH BOTTOM OF SEAL (Ft.)	11'
DEPTH TOP OF PERVIOUS SECTION (Ft.)	13'
DIAMETER OF BOREHOLE (In.)	3.25"
TYPE OF PERVIOUS SECTION	PVC
TYPE OF OPENINGS	0.010 Slots
PERVIOUS SECTION (In.) I.D.: 1" O.D.: 2.5"	
TYPE OF FILTER PACK AROUND PERVIOUS SECTION	Prepack Screen
DEPTH BOTTOM OF PERVIOUS SECTION (Ft.)	23'
DEPTH BOTTOM OF FILTER PACK (Ft.)	23'
TYPE OF BACKFILL BELOW FILTER PACK	SAND
END OF BORING (Ft.)	24'

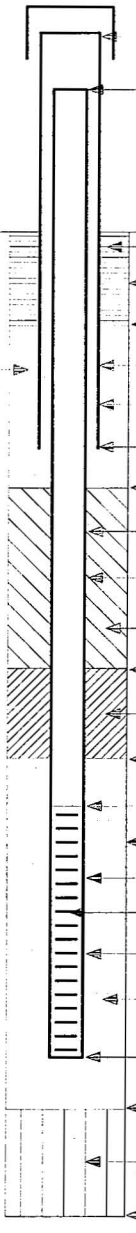
GENERAL NOTE:

1. Entry of 0.00 for Ground Elevation, Elev. Top of Riser Pipe & Elev. Top of Protective Casing Indicates that Surveyed Ground Elevation Not Available.

OVERBURDEN MONITORING WELL CONSTRUCTION LOG — TETRA TECH NUS, INC.

PROJECT NAME: Site 17, NASB
PROJECT NO: 112G00646
PROJECT LOCATION: Brunswick, Maine
WELL NO: MW-17-02
CLIENT: Navy
BORING NO: SB-17-121
CONTRACTOR: MAI
DRILLER: S. Brown
BORING LOCATION: SB-17-121
LOGGED BY: C. Fellows
DATE: 10/17/08
CHECKED BY:
DATE:
PAGE: 1 OF 1

ELEVATION TOP OF PROTECTIVE CASING 75.38'
ELEVATION TOP OF RISER PIPE 75.31'
GROUND ELEVATION 72.51'



LENGTH OF PROTECTIVE CASING ABOVE GROUND SURFACE (Ft.)	2.87'
LENGTH OF RISER PIPE ABOVE GROUND SURFACE (Ft.)	2.8'
TYPE OF SURFACE SEAL	Cement
DIA. SURFACE SEAL BGS (In.)	2'
DEPTH TO BOTTOM OF SURFACE SEAL (Ft.)	2.0'
I.D. OF PROTECTIVE CASING (In.)	4.5'
TYPE OF PROTECTIVE CASING	Steel Casing
DEPTH BOTTOM OF PROTECTIVE CASING (Ft.)	2.4'
DEPTH BOTTOM OF DRAIN LAYER (Ft.)	3.0'
RISER PIPE (In.) I.D.: 1" O.D.: 1.25"	
TYPE OF RISER PIPE	PVC
TYPE OF BACKFILL AROUND RISER PIPE	Sand
DEPTH TOP OF SEAL (Ft.)	3.0'
TYPE OF SEAL	Bentonite chips
DEPTH BOTTOM OF SEAL (Ft.)	3.5'
DEPTH TOP OF PERVIOUS SECTION (Ft.)	3.8'
DIAMETER OF BOREHOLE (In.)	3.25'
TYPE OF PERVIOUS SECTION	PVC
TYPE OF OPENINGS	0.010 Slots
PERVIOUS SECTION (In.) I.D.: 1" O.D.: 2.5'	
TYPE OF FILTER PACK AROUND PERVIOUS SECTION	Prepack Screen
DEPTH BOTTOM OF PERVIOUS SECTION (Ft.)	8.8'
DEPTH BOTTOM OF FILTER PACK (Ft.)	8.8'
TYPE OF BACKFILL BELOW FILTER PACK	Sand
END OF BORING (Ft.)	9.0'

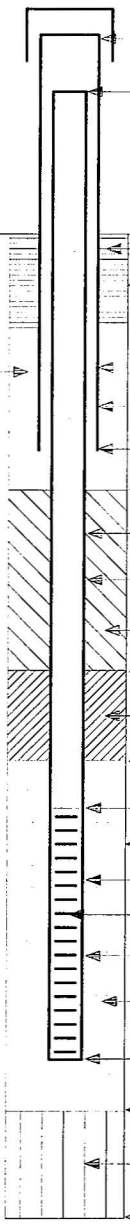
GENERAL NOTE:

1. Entry of 0.00 for Ground Elevation, Elev. Top of Riser Pipe & Elev. Top of Protective Casing Indicates that Surveyed Ground Elevation Not Available.

OVERBURDEN MONITORING WELL CONSTRUCTION LOG — TETRA TECH NUS, INC.

PROJECT NAME: Site 17, NASB
PROJECT NO: 112G00646
PROJECT LOCATION: Brunswick, Maine
WELL NO: MW-17-03
CLIENT: Navy
BORING NO: SB-17-120
CONTRACTOR: MAI
DRILLER: S. Brown
BORING LOCATION:
LOGGED BY: J. Traut
DATE: 10/16/08
CHECKED BY:
DATE: 10/16/08
PAGE: 1 OF 1

ELEVATION TOP OF PROTECTIVE CASING 75.16'
ELEVATION TOP OF RISER PIPE 74.93'
GROUND ELEVATION 72.61'



LENGTH OF PROTECTIVE CASING ABOVE GROUND SURFACE (Ft.)	2.55'
LENGTH OF RISER PIPE ABOVE GROUND SURFACE (Ft.)	2.32'
TYPE OF SURFACE SEAL	Cement
DIA. SURFACE SEAL BGS (In.)	2'
DEPTH TO BOTTOM OF SURFACE SEAL (Ft.)	2'
I.D. OF PROTECTIVE CASING (In.)	4.5'
TYPE OF PROTECTIVE CASING	Steel Casing
DEPTH BOTTOM OF PROTECTIVE CASING (Ft.)	3'
DEPTH BOTTOM OF DRAIN LAYER (Ft.)	3.5'
RISER PIPE (In.) I.D.: 1" O.D.: 1.25"	
TYPE OF RISER PIPE	PVC
TYPE OF BACKFILL AROUND RISER PIPE	Sand No. 1
DEPTH TOP OF SEAL (Ft.)	4'
TYPE OF SEAL	Bentonite
DEPTH BOTTOM OF SEAL (Ft.)	5'
DEPTH TOP OF PERVIOUS SECTION (Ft.)	6'
DIAMETER OF BOREHOLE (In.)	3.25"
TYPE OF PERVIOUS SECTION	PVC
TYPE OF OPENINGS	0.010 Slots
PERVIOUS SECTION (In.) I.D.: 1" O.D.: 2.5"	
TYPE OF FILTER PACK AROUND PERVIOUS SECTION	Prepack Screen
DEPTH BOTTOM OF PERVIOUS SECTION (Ft.)	16'
DEPTH BOTTOM OF FILTER PACK (Ft.)	16'
TYPE OF BACKFILL BELOW FILTER PACK	NA
END OF BORING (Ft.)	16'

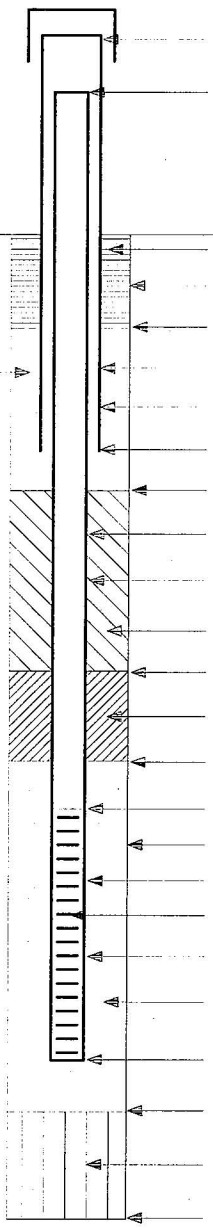
GENERAL NOTE:

1. Entry of 0.00 for Ground Elevation, Elev. Top of Riser Pipe & Elev. Top of Protective Casing
   Indicates that Surveyed Ground Elevation Not Available.

OVERBURDEN MONITORING WELL CONSTRUCTION LOG — TETRA TECH NUS, INC.

PROJECT NAME: Site 17, NASB
PROJECT NO: 112G00646
PROJECT LOCATION: Brunswick, Maine
WELL NO: MW-17-04
CLIENT: Navy
BORING NO: SB-17-144
CONTRACTOR: MAI
DRILLER: S. Brown
BORING LOCATION: NW of transform
LOGGED BY: J. Traut
DATE: 10/16/08
CHECKED BY:
DATE: 10/16/08
PAGE: 1 OF 1

ELEVATION TOP OF PROTECTIVE CASING: 75.44'
ELEVATION TOP OF RISER PIPE: 75.18
GROUND ELEVATION: 73.25



LENGTH OF PROTECTIVE CASING ABOVE GROUND SURFACE (Ft.)	2.19
LENGTH OF RISER PIPE ABOVE GROUND SURFACE (Ft.)	1.93
TYPE OF SURFACE SEAL	Cement
DIA. SURFACE SEAL BGS (In.)	2'
DEPTH TO BOTTOM OF SURFACE SEAL (Ft.)	2.0'
I.D. OF PROTECTIVE CASING (In.)	4.5'
TYPE OF PROTECTIVE CASING	Steel Casing
DEPTH BOTTOM OF PROTECTIVE CASING (Ft.)	3'
DEPTH BOTTOM OF DRAIN LAYER (Ft.)	3.4'
RISER PIPE (In.) I.D.: 1" O.D.: 1.25"	
TYPE OF RISER PIPE	PVC
TYPE OF BACKFILL AROUND RISER PIPE	No. 1 Sand
DEPTH TOP OF SEAL (Ft.)	3.4'
TYPE OF SEAL	Bentonite chips
DEPTH BOTTOM OF SEAL (Ft.)	4'
DEPTH TOP OF PERVIOUS SECTION (Ft.)	5.2'
DIAMETER OF BOREHOLE (In.)	3.25"
TYPE OF PERVIOUS SECTION	PVC
TYPE OF OPENINGS	0.010 Slots
PERVIOUS SECTION (In.) I.D.: 1" O.D.: 2.5"	
TYPE OF FILTER PACK AROUND PERVIOUS SECTION	Prepack Screen
DEPTH BOTTOM OF PERVIOUS SECTION (Ft.)	15.2'
DEPTH BOTTOM OF FILTER PACK (Ft.)	15.2'
TYPE OF BACKFILL BELOW FILTER PACK	Natural material
END OF BORING (Ft.)	22'

GENERAL NOTE:

1. Entry of 0.00 for Ground Elevation, Elev. Top of Riser Pipe & Elev. Top of Protective Casing Indicates that Surveyed Ground Elevation Not Available.

OVERBURDEN MONITORING WELL CONSTRUCTION LOG — TETRA TECH NUS, INC.

PROJECT NAME: NASB – Site 17 — PROJECT NO: 112G00958/CTO 432

PROJECT LOCATION: NAS Brunswick, Maine — WELL NO: MW-17-02R

CLIENT: U.S. Navy — BORING NO: SB02R

CONTRACTOR: Tetra Tech NUS — DRILLER: MAI Environmental — BORING LOCATION: Replacement monitoring well for Site 17 MW-17-02

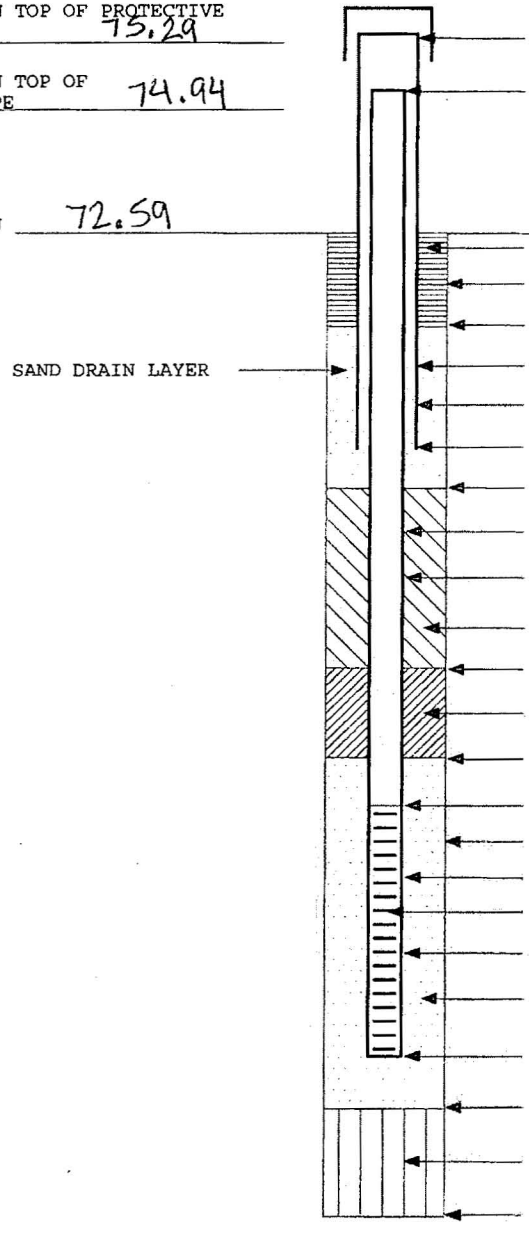
LOGGED BY: C. Fellows-Stanley — DATE: 2/11/2010

CHECKED BY: _____ — DATE: _____

ELEVATION TOP OF PROTECTIVE CASING: 75.29

ELEVATION TOP OF RISER PIPE: 74.94

GROUND ELEVATION: 72.59



LENGTH OF PROTECTIVE CASING ABOVE GROUND SURFACE (Ft.)	2.7
LENGTH OF RISER PIPE ABOVE GROUND SURFACE (Ft.)	2.35
TYPE OF SURFACE SEAL	Silica sand (20-40)
DIA. SURFACE SEAL BGS (In.)	3
DEPTH TO BOTTOM OF SURFACE SEAL (Ft.)	0.5
I.D. OF PROTECTIVE CASING (In.)	4
TYPE OF PROTECTIVE CASING	Steel Guard Pipe
DEPTH BOTTOM OF PROTECTIVE CASING (Ft.)	2.3
DEPTH BOTTOM OF DRAIN LAYER (Ft.)	2.8
RISER PIPE (In.) I.D.: 1 O.D.: 1.25	
TYPE OF RISER PIPE	Schedule 40 PVC
TYPE OF BACKFILL AROUND RISER PIPE	Bentonite Chips-Med
DEPTH TOP OF SEAL (Ft.)	2.8
TYPE OF SEAL	Bentonite Chips-Med
DEPTH BOTTOM OF SEAL (Ft.)	3.3
DEPTH TOP OF PERVIOUS SECTION (Ft.)	3.8
DIAMETER OF BOREHOLE (In.)	3.25
TYPE OF PERVIOUS SECTION	Schedule 40 PVC
TYPE OF OPENINGS	0.010 slot openings
PERVIOUS SECTION (In.) I.D.: 1 O.D.: 2.25	
TYPE OF FILTER PACK AROUND PERVIOUS SECTION	Silica sand (20-40)*
DEPTH BOTTOM OF PERVIOUS SECTION (Ft.)	8.8
DEPTH BOTTOM OF FILTER PACK (Ft.)	8.8
TYPE OF BACKFILL BELOW FILTER PACK	Natural Collapse
END OF BORING (Ft.)	10

GENERAL NOTE: * Extra sand placed around pre-pack screen.

1. Entry of 0.00 for Ground Elevation, Elev. Top of Riser Pipe & Elev. Top of Protective Casing Indicates that Surveyed Ground Elevation Not Available.

Soil Boring Logs and/or Well Construction Data

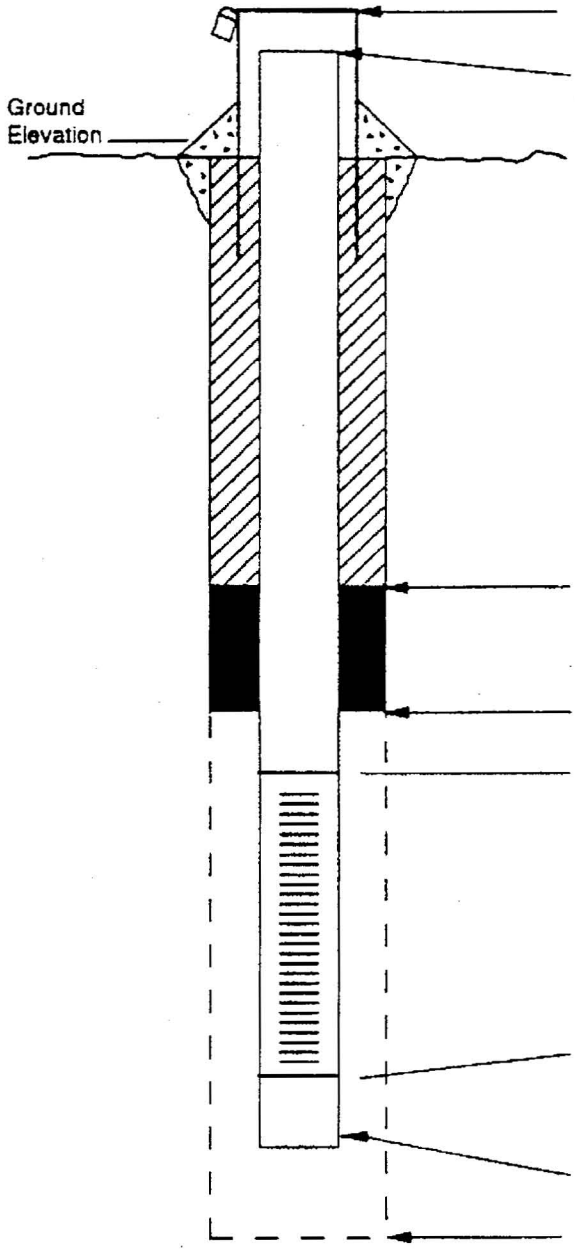
Sample Location: MW-NASB-065
Previous Designation: MW-95-01
File Name: MW-NASB-065.pdf

MONITORING WELL CONSTRUCTION DIAGRAM

Project NASB Site MW-95-01/95 Driller N4B

Project No. 7127-05 Boring No. MW-95-01 Drilling Method HSA

Elevation _____ Date Installed 1-15-93 Development Method MONO PUMP



Elevation of Top of Surface Casing: NA

Stick-up of Casing Above Ground Surface: NA

Elevation of Top of Riser Pipe: _____

Type of Surface Seal: BENTONITE CHIPS - PURE GOLD

Type of Surface Casing: NA

ID of Surface Casing: NA

Diameter of Borehole: DRILLED W/ 4.25" HSA

Riser Pipe ID: 2"

Type of Riser Pipe: PVC

Type of Backfill: COARSE POOL FILTER SAND

Elevation of Top of Seal: _____

Depth of Top of Seal: 2'

Type of Seal: PURE GOLD BENT. CHIPS

Elevation of Top of Sand: _____

Depth of Top of Sand: 2'

Elevation of Top of Screen: _____

Depth of Top of Screen: 3'

Type of Screen: PVC

Slot Size x Length: 0.010 X 10'

ID of Screen: 2"

Type of Sandpack: COARSE POOL FILTER SAND

Elevation of Bottom of Screen: _____

Depth of Bottom of Screen: 13'

Depth of Sediment Sump with Plug: NA

Sediment Sump with Plug - NA

Elevation of Bottom of Borehole: _____

Depth of Bottom of Borehole: 17'

NO PROTECTIVE CASING - 2' STICK-UP

9301020D

Soil Boring Logs and/or Well Construction Data

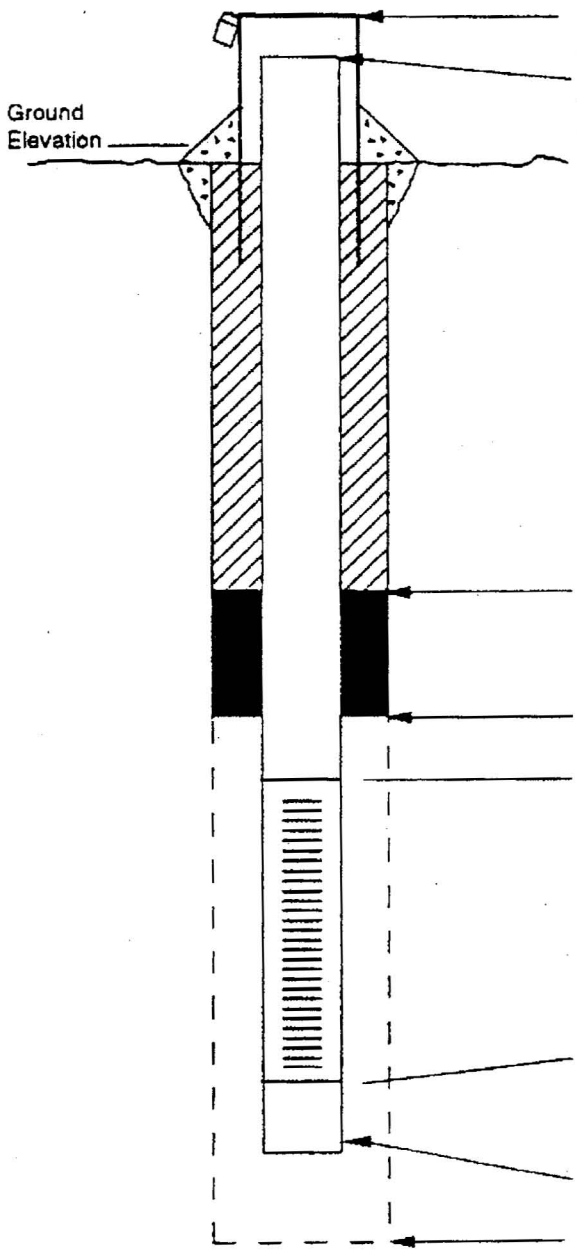
Sample Location: MW-NASB-066
Previous Designation: MW-95-02
File Name: MW-NASB-066.pdf

MONITORING WELL CONSTRUCTION DIAGRAM

Project NASB Site Site 95 Driller NHB

Project No. 7127-05 Boring No. MW-95-02 Drilling Method HSA

Elevation _____ Date Installed 1-16-93 Development Method Mono Pump



Elevation of Top of Surface Casing: N/A

Stick-up of Casing Above Ground Surface: N/A

Elevation of Top of Riser Pipe: _____

Type of Surface Seal: Bent. Chips

Type of Surface Casing: N/A

ID of Surface Casing: N/A

Diameter of Borehole: Drilled w/ 4.25" HSA

Riser Pipe ID: 2"

Type of Riser Pipe: PVC

Type of Backfill: Cuttings

Elevation of Top of Seal: _____

Depth of Top of Seal: 3'

Type of Seal: Pure Gold Bent. Chips

Elevation of Top of Sand: _____

Depth of Top of Sand: 5'

Elevation of Top of Screen: _____

Depth of Top of Screen: 8'

Type of Screen: PVC

Slot Size x Length: 0.010 x 10'

ID of Screen: 2"

Type of Sandpack: Coarse Pool Filter Sand

Elevation of Bottom of Screen: _____

Depth of Bottom of Screen: 18'

Depth of Sediment Sump with Plug: N/A

Sediment Sump with Plug N/A

Elevation of Bottom of Borehole: _____

Depth of Bottom of Borehole: 20'

No Protective Casing - 3' Stick-up

93010200

ABB Environmental Services, Inc.

Soil Boring Logs and/or Well Construction Data

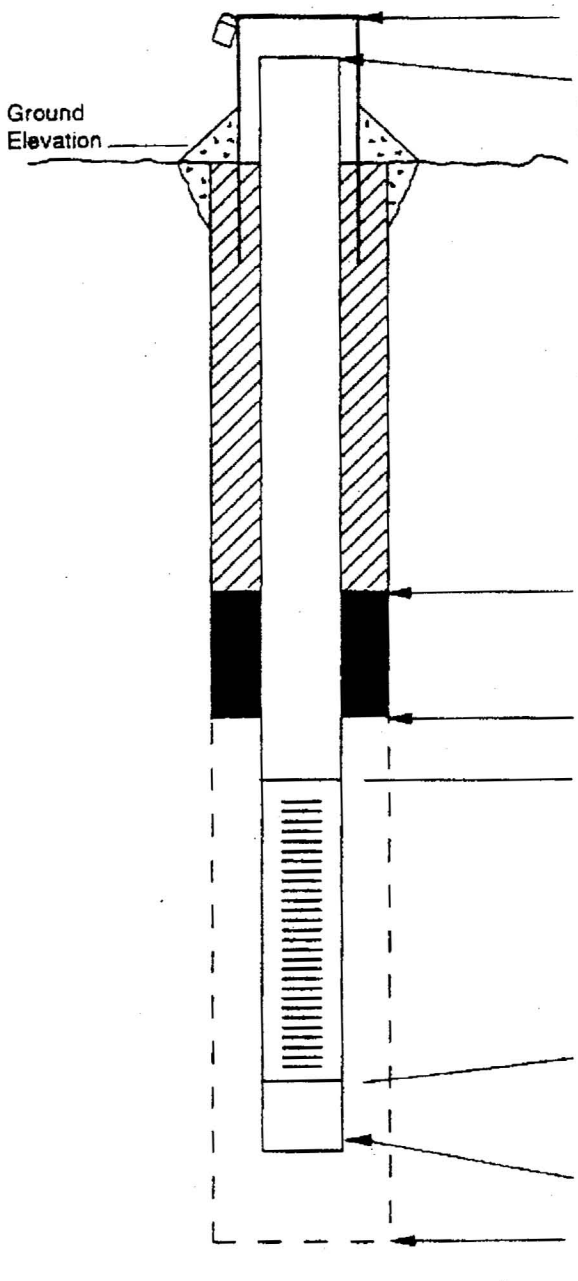
Sample Location: MW-NASB-068
Previous Designation: MW-95-04
File Name: MW-NASB-068.pdf

MONITORING WELL CONSTRUCTION DIAGRAM

Project NASB Site Bldg. 95 Driller NHB

Project No. 7127-05 Boring No. MW-95-04 Drilling Method HSA

Elevation _____ Date Installed 1-18-93 Development Method Mono Pump



Elevation of Top of Surface Casing: N/A
Stick-up of Casing Above Ground Surface: N/A
Elevation of Top of Riser Pipe: _____
Type of Surface Seal: Bent. Chips
Type of Surface Casing: N/A

ID of Surface Casing: N/A

Diameter of Borehole: Drilled w/ 4.25" HSA

Riser Pipe ID: 2"
Type of Riser Pipe: PVC

Type of Backfill: Pure Gold Bent. Chips

Elevation of Top of Seal: _____
Depth of Top of Seal: 0'
Type of Seal: Pure Gold Bent. Chips

Elevation of Top of Sand: _____
Depth of Top of Sand: 2'
Elevation of Top of Screen: _____
Depth of Top of Screen: 3.2'

Type of Screen: PVC
Slot Size x Length: 0.010 x 10'
ID of Screen: 2"

Type of Sandpack: Coarse Pool Filter Sand

Elevation of Bottom of Screen: _____
Depth of Bottom of Screen: 13.2'
Depth of Sediment Sump with Plug: N/A

Sediment Sump with Plug N/A

Elevation of Bottom of Borehole: _____
Depth of Bottom of Borehole: 17'

NO SURFACE CASING — 2' STICK-UP

93010200

ABB Environmental Services, Inc.

Soil Boring Logs and/or Well Construction Data

Sample Location: MW-98
Previous Designation: None
File Name: mw-nasb-98.pdf

FIELD RECORD OF MONITORING WELL CONSTRUCTION

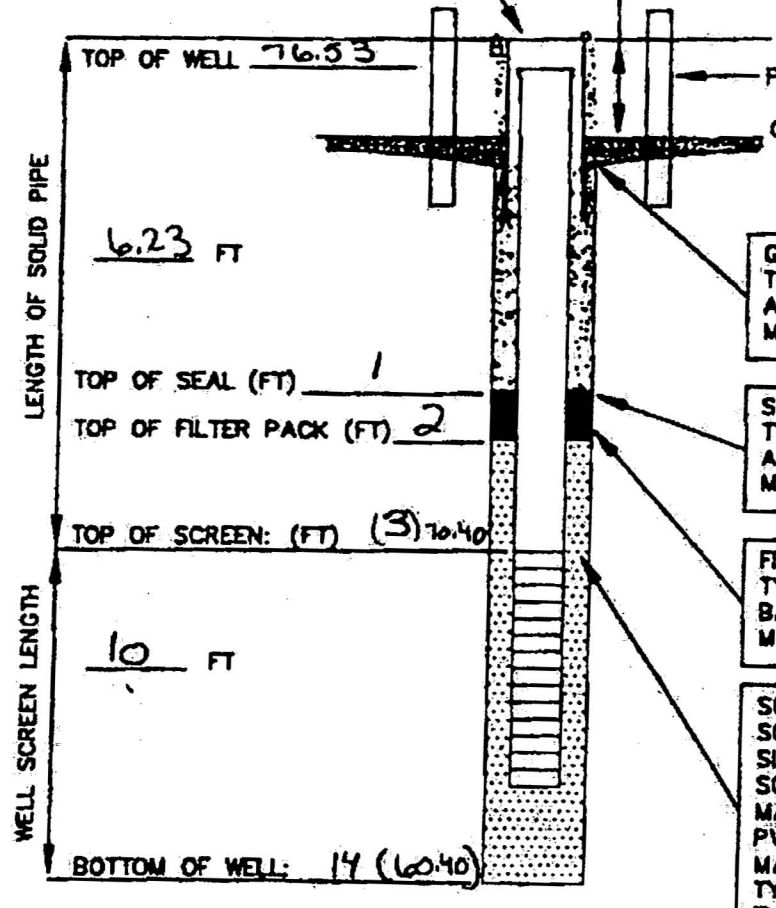
(ALL MEASURMENTS FROM GROUND SURFACE)

SIT NAME/LOCATION:	PROJECT: 29600477895
DATE INSTALLED: STARTED: 3/20/00 COMPLETED: 3/20/00	LOCATION: (COORDINATES OR STATION) 38 8 18.30 563125.25
ELEVATION TOP OF BORING: 73.40	SIGNATURE OF INSPECTOR: Suzanne Chan
ELEVATION TOP OF CASING: 76.53	HOLE No. (AS SHOWN ON DRAWING TITLE AND FILE No.) MW-NASB-23J 98
DEPTH TO WATER: 5.73	DATE/TIME: 3/27/00 905
DRILLING METHOD: dun wash	

PROTECTIVE CASING 76.63

TYPE OF PROTECTIVE CASING 4" Steel casing

STICK UP: 3.13 Ft



PROTECTIVE POST: none

GROUND SURFACE: 73.40

GROUT INFORMATION:
TYPE: NA
AMOUNT: NA
MANUFACTURER: NA

SEAL INFORMATION:
TYPE: bentonite
AMOUNT: BFT
MANUFACTURER: —

FILTER PACK MATERIAL:
TYPE: Sand
BACKFILL METHOD: pouring
MANUFACTURER: NA

SCREEN INFORMATION:
SCREEN SIZE: 2" x 10Ft
SLOT SIZE: 0.010
SCHEDULE: 40
MATERIAL:
PVC ☒ S.S. ☐ OTHER:
MANUFACTURER: NA
TYPE OF PIPE JOINTS: NA
TYPE OF BLANK CASING: PVC

EA ENGINEERING, SCIENCE, AND TECHNOLOGY

A.3 WELL DEVELOPMENT DATA SHEETS

Tetra Tech NUS, Inc.

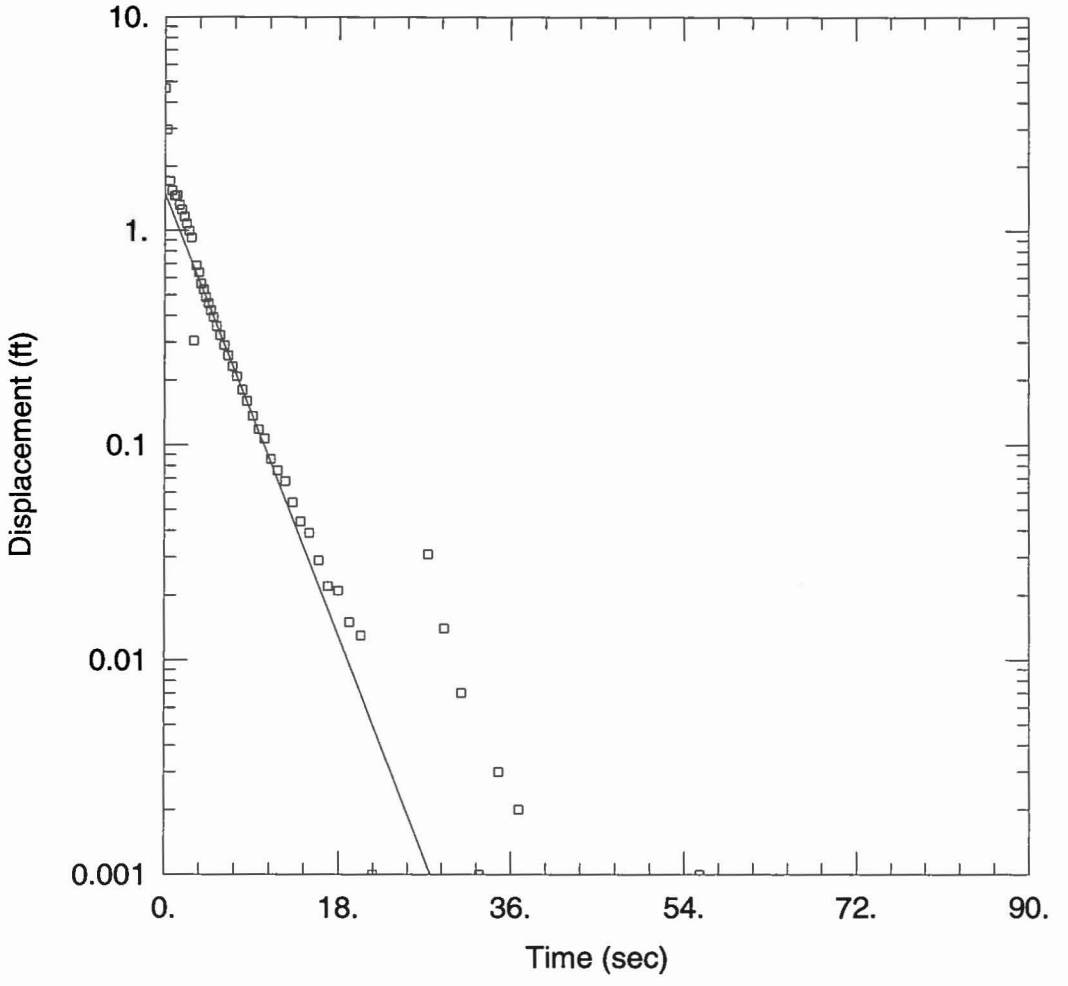
MONITORING WELL DEVELOPMENT RECORD

Site: NAS BRUNSWICK
Well: MW1702R
Date Installed: 2.11.11
Date Developed: 2.16.11
Dev. Method: PERISTALTIC PUMP
Pump Type: GEO
Depth to Bottom (ft.): 11.25
Static Water Level Before (ft.): 6.37
Static Water Level After (ft.): _____
Screen Length (ft.): 5'
Specific Capacity: _____
Casing ID (in.): 1" PVC STICK-UP
Project Name: NASB
Project Number: CTO 432
Site Geologist: R. SIMPSON
Drilling Co.: _____

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ~~US~~/CM	Turbidity (NTU)	Remarks (odor, color, etc.)
1420	0	0	6.37					LT BRN, NO ODOR
1430	0	2	7.40	4.6	7.18	88	1363	
1440	↓	4	↓	4.5	6.02	85	31	CLEARING
1450	↓	6	↓	4.4	6.04	83	15	
1500	↓	8	↓	4.4	5.99	79	10.0	
1510	↓	10	7.12	4.3	5.95	77	2.9	PUMP RATE .15 GPM
1520	↓	11.5	6.90	4.4	5.92	79	3.1	

START PUMP RATE = 0.2 GPM

A.4 SLUG TEST CALCULATIONS



WELL TEST ANALYSIS

Data Set: O:\...\MW-17-01.aqt
Date: 03/11/09 Time: 11:09:35

AQUIFER DATA

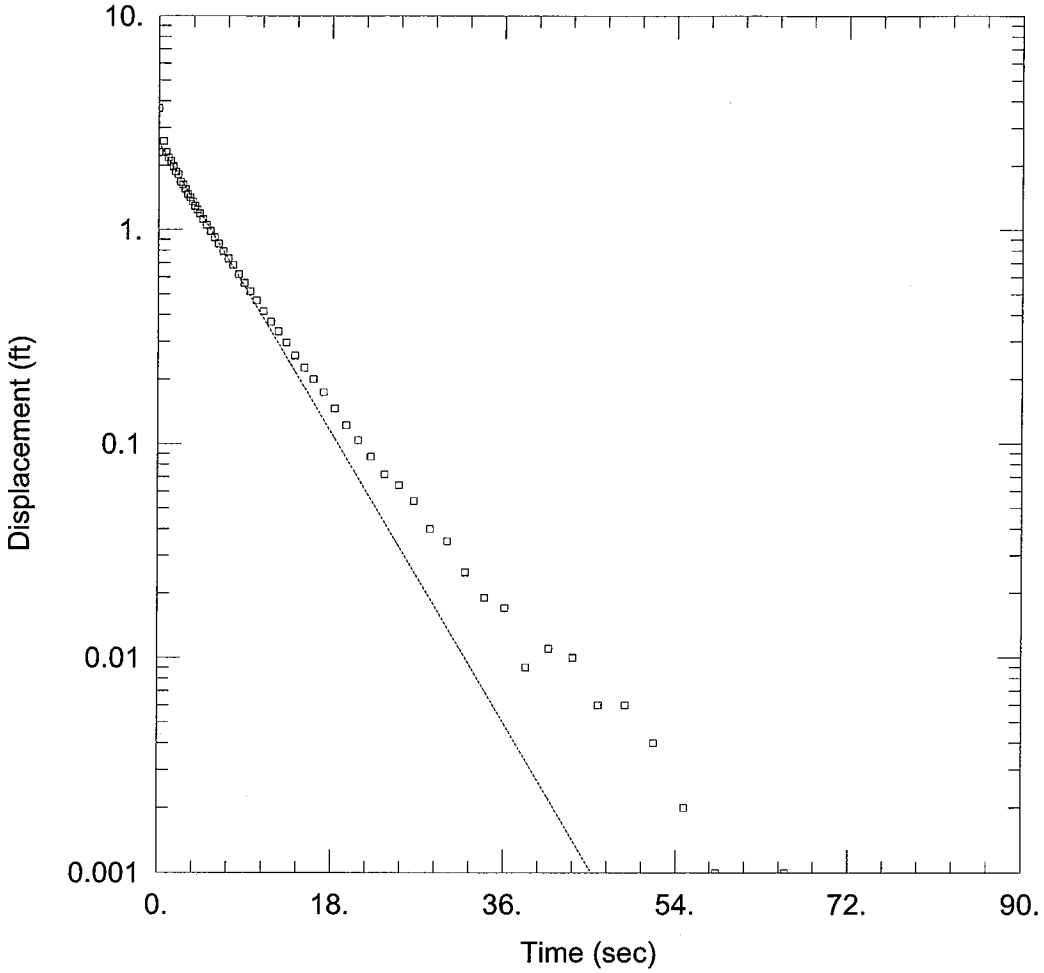
Saturated Thickness: 19.07 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-17-01)

Initial Displacement: 4.649 ft
Total Well Penetration Depth: 18.07 ft
Casing Radius: 0.042 ft
Static Water Column Height: 18.07 ft
Screen Length: 10. ft
Well Radius: 0.14 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.003108 cm/sec
y0 = 1.486 ft



WELL TEST ANALYSIS

Data Set: C:\Tetratech Folders\Site 17\March 2011 Revisions\Rev 1\original files\MW-17-02.aqt
Date: 07/22/11 Time: 14:31:24

AQUIFER DATA

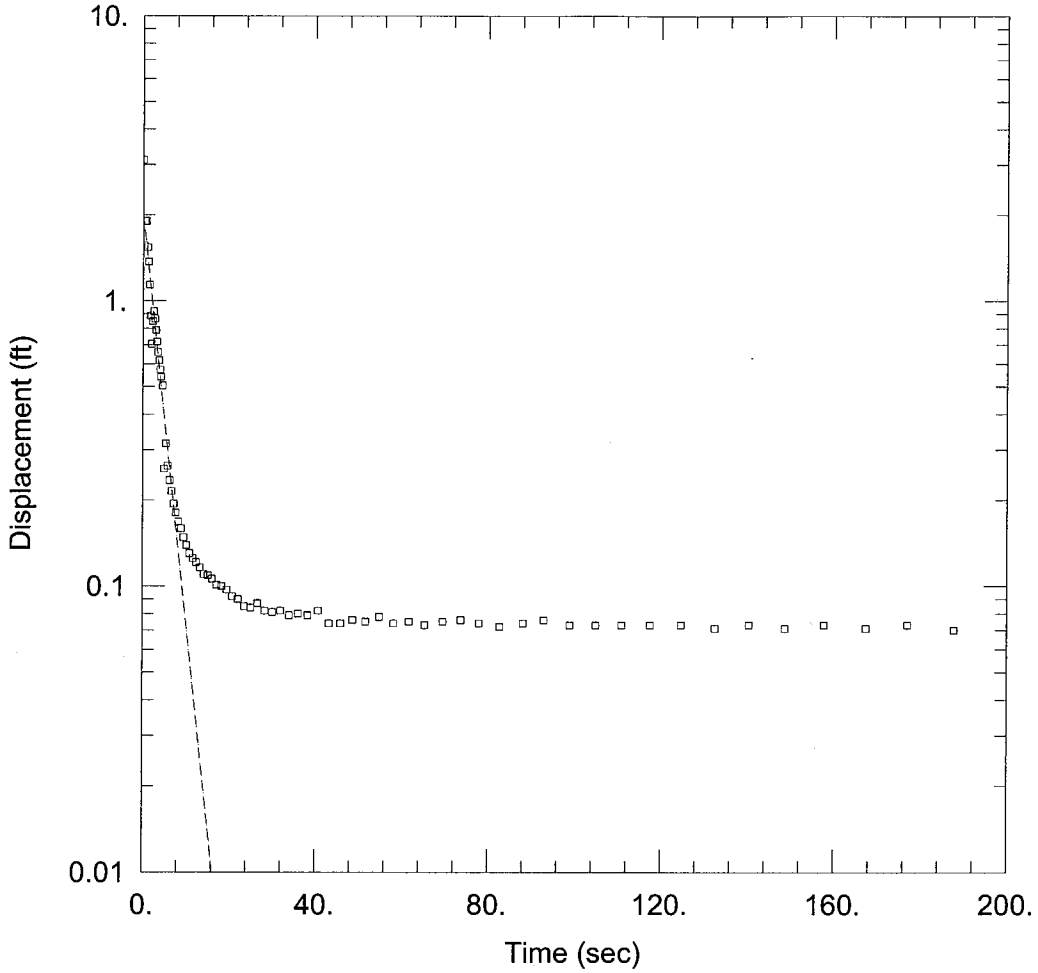
Saturated Thickness: 7.15 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-17-02)

Initial Displacement: 3.701 ft
Total Well Penetration Depth: 6.95 ft
Casing Radius: 0.042 ft
Static Water Column Height: 6.95 ft
Screen Length: 5. ft
Well Radius: 0.14 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.003459 cm/sec
y0 = 2.556 ft



WELL TEST ANALYSIS

Data Set: C:\Tetratech Folders\Site 17\March 2011 Revisions\Rev 1\original files\MW-17-03.aqt
Date: 07/22/11 Time: 14:43:40

AQUIFER DATA

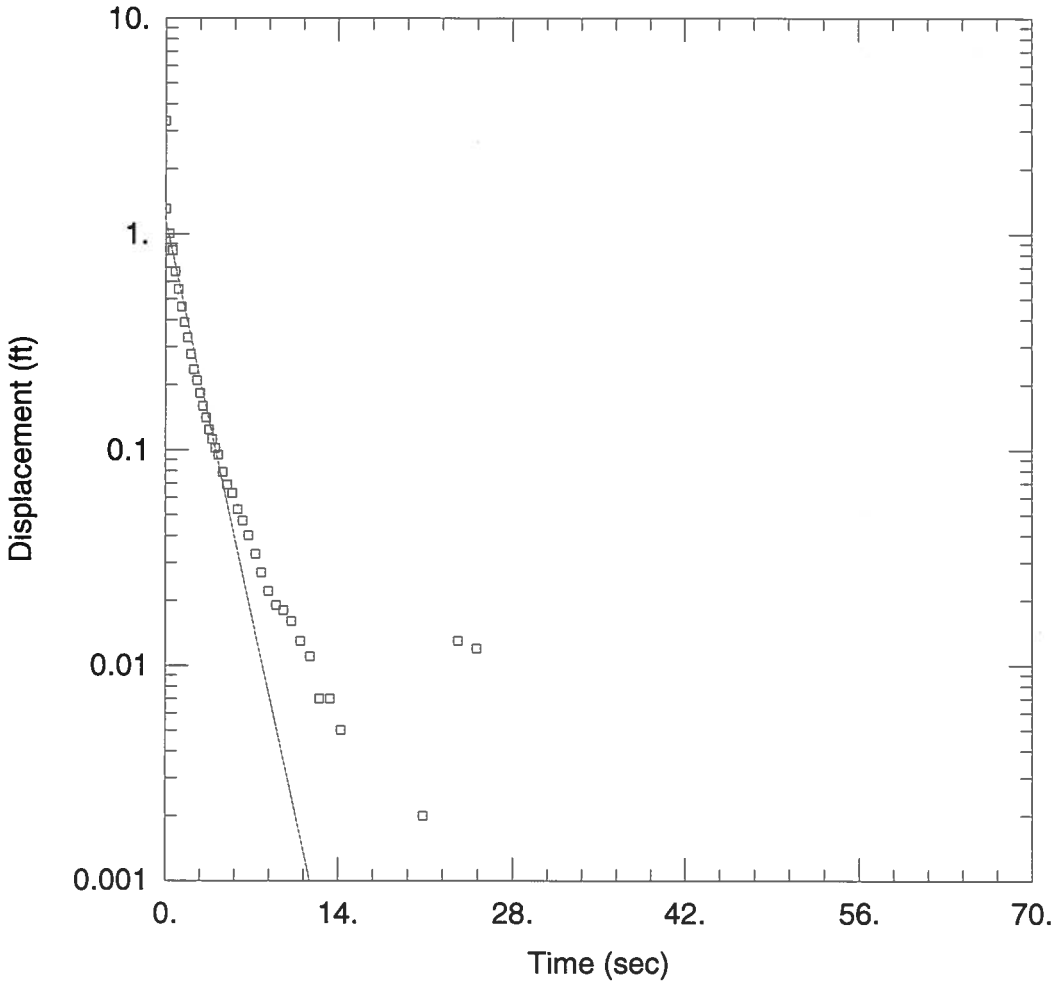
Saturated Thickness: 14.12 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-17-03)

Initial Displacement: 3.115 ft
Total Well Penetration Depth: 14.12 ft
Casing Radius: 0.042 ft
Static Water Column Height: 14.12 ft
Screen Length: 10. ft
Well Radius: 0.14 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.003916 cm/sec
y0 = 1.985 ft



WELL TEST ANALYSIS

Data Set: O:\...\MW-17-04.aqt
Date: 07/29/11 Time: 11:38:59

AQUIFER DATA

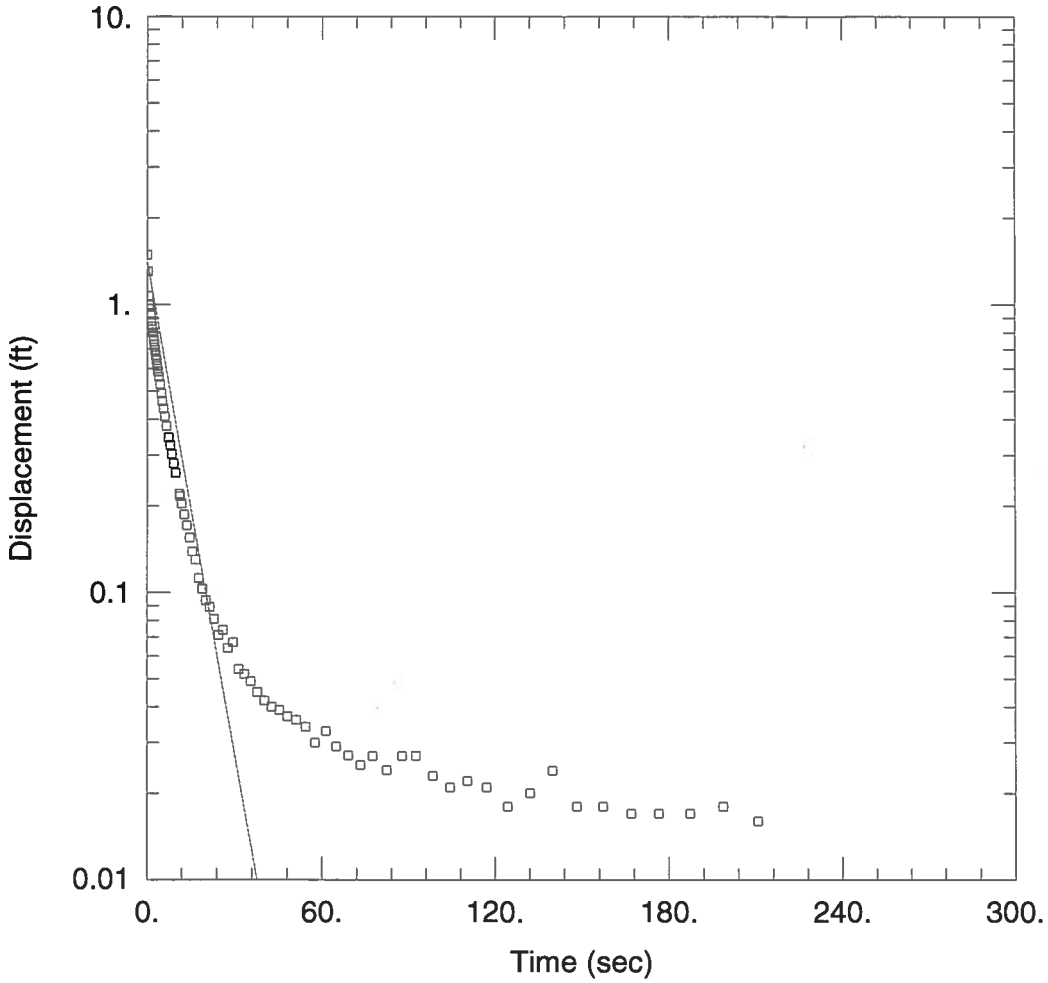
Saturated Thickness: 18.83 ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-17-04)

Initial Displacement: 3.338 ft
Total Well Penetration Depth: 12.03 ft
Casing Radius: 0.042 ft
Static Water Column Height: 12.03 ft
Screen Length: 10. ft
Well Radius: 0.14 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0064 cm/sec
y0 = 1.156 ft



WELL TEST ANALYSIS

Data Set: O:\...\MW-NASB-065.aqt
Date: 07/29/11 Time: 11:41:01

AQUIFER DATA

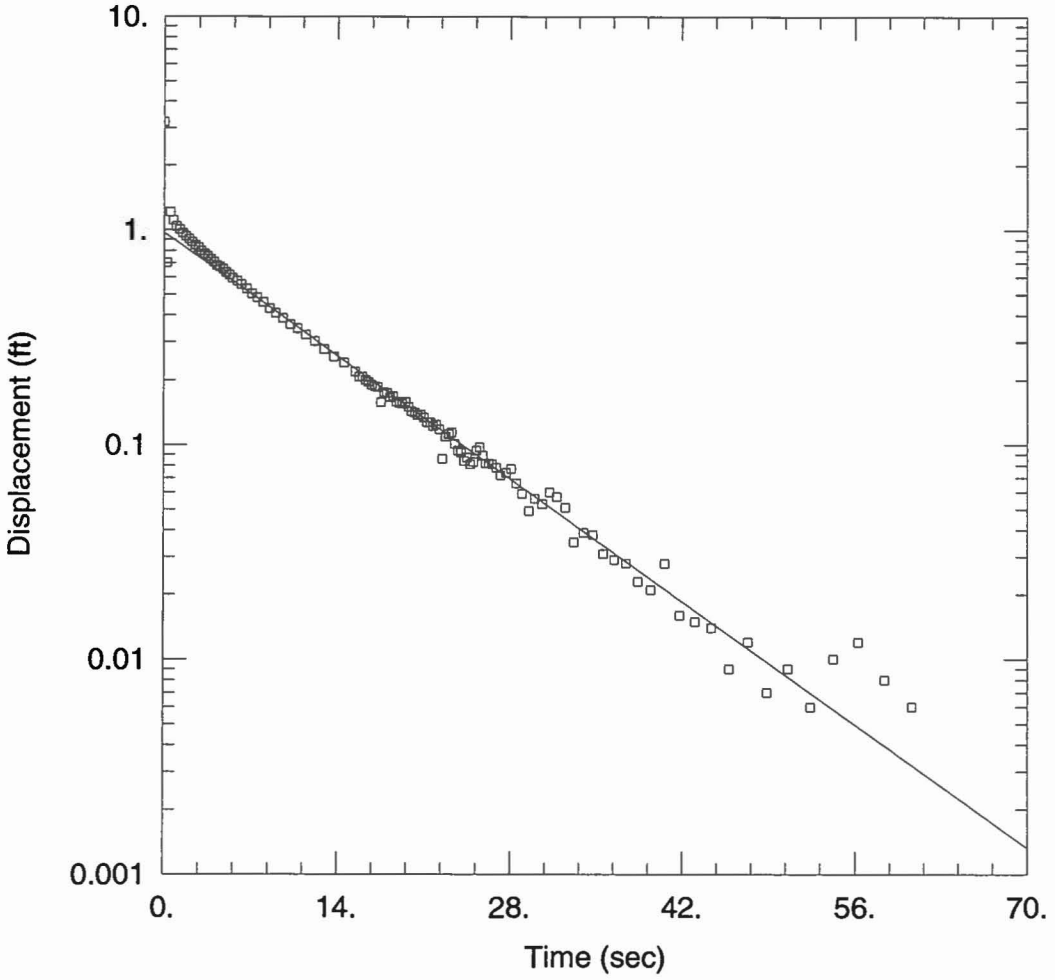
Saturated Thickness: 16.44 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW_NASB-065)

Initial Displacement: 1.488 ft
Static Water Column Height: 12.44 ft
Total Well Penetration Depth: 12.44 ft
Screen Length: 10. ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.004557 cm/sec
y0 = 1.423 ft



WELL TEST ANALYSIS

Data Set: O:\...\MW-NASB-066.aqt
Date: 03/11/09 Time: 11:09:46

AQUIFER DATA

Saturated Thickness: 15.1 ft Anisotropy Ratio (Kz/Kr): 0.1

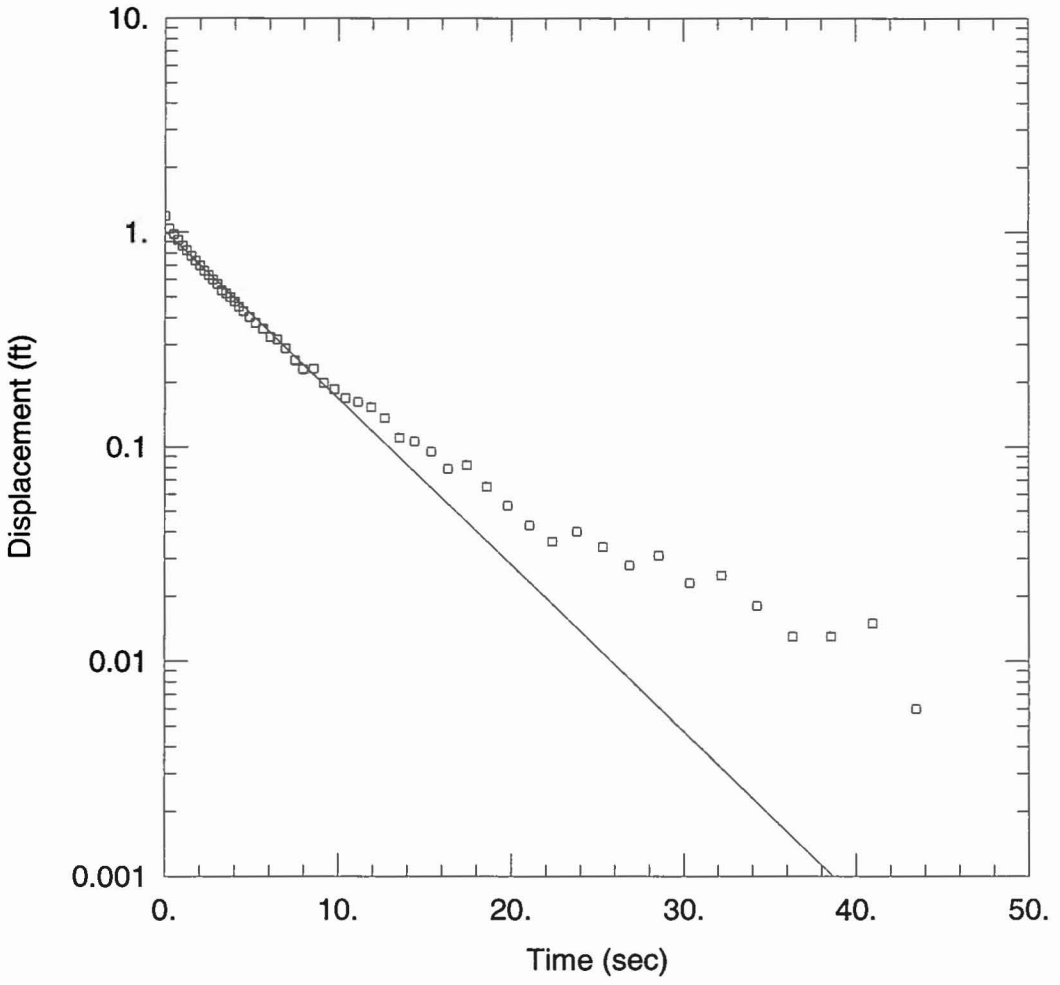
WELL DATA (MW-NASB-066)

Initial Displacement: 3.207 ft
Static Water Column Height: 13.1 ft
Total Well Penetration Depth: 13.1 ft
Screen Length: 10. ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.003362 cm/sec
y0 = 0.969 ft



WELL TEST ANALYSIS

Data Set: O:\...\MW-NASB-068.aqt
Date: 03/11/09 Time: 11:09:48

AQUIFER DATA

Saturated Thickness: 15.61 ft Anisotropy Ratio (Kz/Kr): 0.1

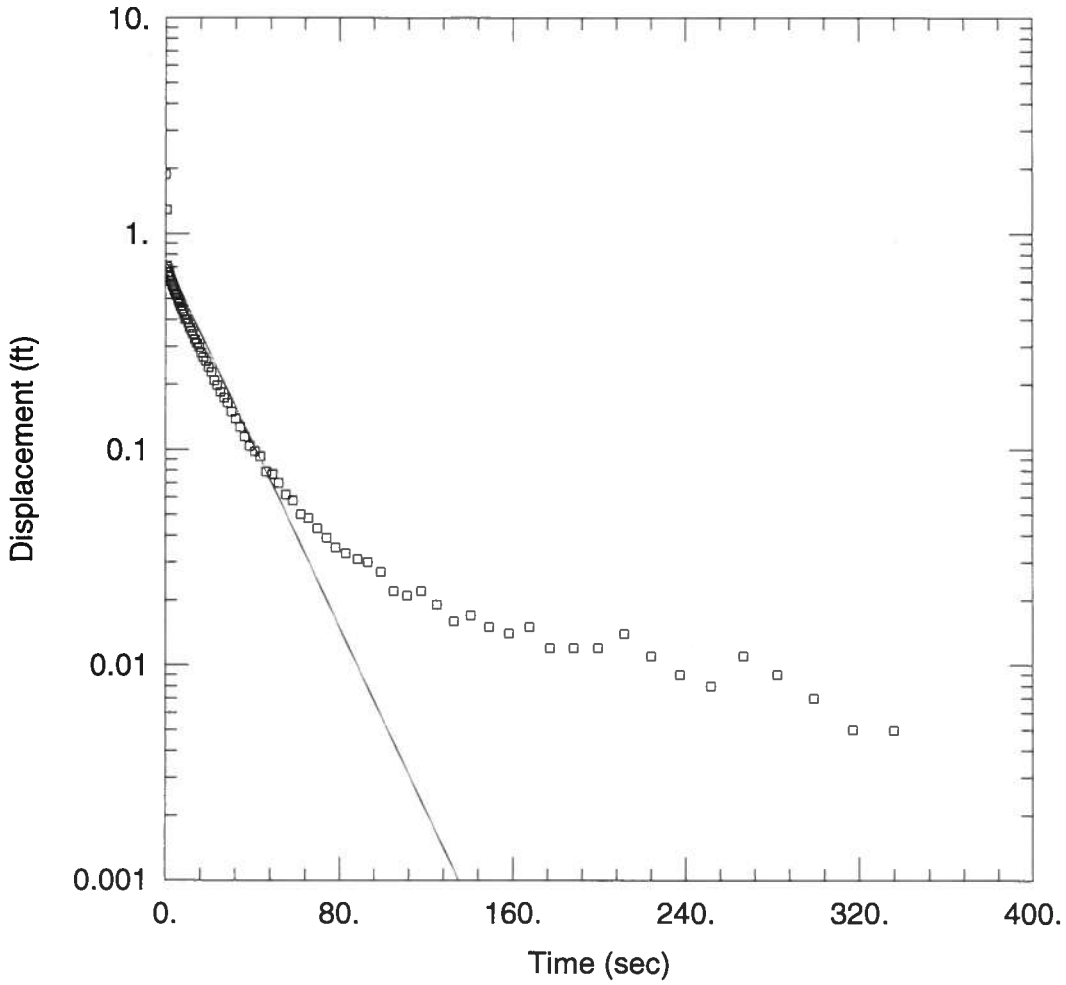
WELL DATA (MW-NASB-068)

Initial Displacement: 1.188 ft Static Water Column Height: 11.81 ft
Total Well Penetration Depth: 11.81 ft Screen Length: 10. ft
Casing Radius: 0.083 ft Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.006178 cm/sec y0 = 1.006 ft



WELL TEST ANALYSIS

Data Set: O:\...\MW-NASB-098.aqt
Date: 07/29/11 Time: 11:40:39

AQUIFER DATA

Saturated Thickness: 11.39 ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-NASB-098)

Initial Displacement: 1.882 ft
Total Well Penetration Depth: 10.39 ft
Casing Radius: 0.083 ft
Static Water Column Height: 10.39 ft
Screen Length: 10. ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.001713 cm/sec
y0 = 0.7621 ft

A.5 LOW FLOW GROUNDWATER SAMPLING LOGS

TETRA TECH NUS, INC.

PURGE DATA SHEET - "LOW FLOW" GROUNDWATER

Site Name: NASB-Site 17 Brunswick, ME
Sample ID: NASB- SI7-GW-MW17O2B

Tetra Tech NUS Charge No. 112G00958 / CTO 432 Page 1 of 2
QC: SI7-GW-DUP-031511 (If applicable)

Sample Method: Low Stress (flow) with ~~Bladder~~ Peristaltic Pump
Depth Sampled: 9.25 (TOR) Screen Int. Depth 3.8-8.8 ft bgs
Sample Date & Time: 3/15/2011 1315 hours Yes (Dup Time)
Sampler(s): C. Fellows B. Geringer
Data Recorded By: C. Fellows Signature:
Notes: Water Depth MP = top of riser (TOR); NAPL signal at start (Yes/(No)); if yes, report depths/describe thickness
Visual Evidence of Sheen (Yes/(No))
Olfactory Evidence of Odor (Yes/(No))
TD= 11.25 (TOR); Well S/U = 2.45 Casing S/U = 2.8
Weather: Sunny, 40's

H&S Survey Meter ——— PPM Field Instrument Group A / B / (N/A)
Initial WL 2.93 ft btor (Dedicated tubing)

(Also see separate sample logsheet for gw)

Clock Time 24hr	Water Depth below MP ft	Pump Dial 1	Purge Rate ml/min	Cum. Volume Purged Gals.	Temp °C	Spec. Cond. 2 ~~uS/cm~~ mS/cm	pH (S.U.)	ORP/Eh3 mv	DO mg/L	Turbidity NTU	Comments
1225	Begin purging, measuring drawdown, and filling flow cell.										
1230	3.16	3 o'clock	280		5.18	0.089	5.47	-56.6	2.20	5.10	Clear/colorless
1235	3.13	"	250		4.78	0.090	5.33	-75.5	1.86	4.47	"
1240	3.13	"	250	1	5.02	0.087	5.33	-109.3	1.79	4.64	"
1245	3.14	"	"		4.97	0.095	5.36	-107.9	1.52	2.78	"
1250	3.09	"	"		5.26	0.089	5.34	-122.9	1.42	3.59	"
1255	3.09	"	"	2	5.01	0.089	5.31	-124.7	1.51	3.01	"
1300	3.10	"	"		5.30	0.088	5.30	-126.2	1.32	3.29	"
1305	3.05	"	"		5.38	0.087	5.33	-125.9	1.34	3.04	"
1310	3.05	"	"	3	5.22	0.086	5.28	-126.3	1.33	2.50	"
1315	End purge. Begin sampling.										
Acceptance Criteria: <0.3 ft (drawdown)					3%	3%	+/- 1.0 S.U.	+/- 10mV	10%	10%	

Modified TtNUS Form 0009

Saturated screen or well volume (gallons) 0.34 (1.5" screen = 0.092 gals/ft of depth; 2" screen = 0.163 gals/ft of depth)
(1" screen = 0.041 gals / ft of depth)

1. Pump dial setting (for example: hertz, cycle/min, etc.)
2. Siemens per cm (same as umhos/cm) at 25 °C.
3. Oxidation reduction potential (stand in for Eh).

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NASB- Site 17 Brunswick, ME
Project No.: 112G00958 / CTO432

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No. S17-GW-MW1702R
Sample Location: MW-17-02R
Sampled By: CFS
C.O.C. No.:
Type of Sample:
[X] Low / Moderate Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	Temp (°C)	S.C. ~~(µS/cm)~~ mS/cm	DO (mg/L)	pH (S.U.)	ORP (mv)	Turbidity (NTU)	Other
Date: 3/15/11								
Time: 1315								
Method: Low Flow	Clear/colorless	5.22	0.086	1.33	5.28	-126.3	2.50	

PURGE DATA:

	Volume	Temp	S.C.	DO	pH	ORP	Turbidity	Other
Date: 3/15/11								
Method: Low Flow								
Monitor Reading (ppm): —								
Well Casing Diameter & Material	See separate low-flow purge data sheet							
Type: 1.5 or 2 inch / PVC 1"								
Total Well Depth (TD): 11.25								
Static Water Level (WL): 2.93								
Well or Sat. Scrn. Vol. (gal): 0.34								
Start Purge (hrs): 1225								
End Purge (hrs): 1315								
Total Purge Time (min): 50								
Total Vol. Purged (gal/L): 3 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Pesticides	4° C	3 x liter glass amber	(Yes) / No
			Yes / No
			Yes / No
			Yes / No
			Yes / No

OBSERVATIONS / NOTES:

Visual evidence of contamination - yes or (no) If yes, describe:

Olfactory evidence of contamination - yes or (no) If yes, describe:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	S17-GW-DUP-031511

Signature(s):

A.6 MISCELLANEOUS

POST-RI/PRE-REMEDIAL ACTION WATER LEVEL AND GROUNDWATER ELEVATION DATA
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Well Identification	Year Installed	Aquifer Screened	Diameter (in)	TPVC Elevation (ft above msl)	Ground Elevation (ft above msl)	Screened Interval (ft bgs)	September 7, 2010		March 15, 2011	
							Depth to Water (ft from TPVC)	Groundwater Elevation (ft above msl)	Depth to Water (ft from TPVC)	Groundwater Elevation (ft above msl)
MW-NASB-065	1993	Upper Sand	2	73.64	72.32	3 to 13	4.51	69.13	NM	--
MW-NASB-066	1993	Upper Sand/ Transition Unit	2	78.14	76.93	8 to 18	8.83	69.31	NM	--
MW-NASB-067	1993	Upper Sand/ Transition Unit	2	74.21	Unknown	4 to 14	4.82	69.39	NM	--
MW-NASB-068	1993	Upper Sand	2	75.88	72.81	3.2 to 13.2	5.57	70.31	NM	--
MW-NASB-097	2000	Upper Sand	2	73.53	73.58	2.2 to 13.2	4.20	69.33	NM	--
MW-NASB-098	2000	Upper Sand	2	75.88	73.40	3 to 13	7.60	68.28	NM	--
MW-17-01	2008	Upper Sand/	1	77.94	76.28	13 to 23	8.53	69.41	NM	--
MW-17-02	2008	Upper Sand/ Transition Unit	1	75.31	72.51	3.8 to 8.8	6.76	68.55	NM	--
MW-17-02R	2010	Fill/ Upper Sand	1	74.94	72.59	3.8 to 8.8	NI	--	2.93	72.01
MW-17-03	2008	Upper Sand	1	74.93	72.61	6 to 16	6.30	68.63	NM	--
MW-17-04	2008	Upper Sand	1	75.18	73.25	5.2 to 15.2	6.91	68.27	NM	--

1 Elevations are based on feet mean sea level (NAVD 1988).
msl - Mean sea level.
bgs - Below ground surface.
NAVD - North American Vertical Datum.
TPVC - Top of polyvinyl chloride riser.
NM - Not measured.

GROUNDWATER SAMPLE FINAL FIELD PARAMETER DATA - SEPTEMBER 2010 AND MARCH 2011
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Well ID	Sample Date	Depth Sampled (ft bgs)	Pump Type Bladder/Perisaltic	Initial Clock Time	Final Clock Time	Time of Reading	Water Depth Below MP (ft)	Purge Rate (mL/min)	Cum. Volume Purged (approx. gal)	Temp (^{o}C)	Spec. Cond. (µS/cm)	pH	ORP (mV)	DO (mg/L)	Turbidity (NTU)
MW-17-011	9/21/2010	NR	Peristaltic	1340	1530	1340	9.15	360	0.95	12.33	154	4.81	33.4	13.76	107
						1530	9.11	360	11.41	12.29	154	5.29	3.7	7.76	1.88
MW-17-02	9/20/2010	NR	Peristaltic	1230	1330	1240	7.33	250	0.33	14.91	61	4.16	141.3	0.70	7.82
						1330	7.33	250	1.65	14.46	71	4.67	128.0	0.49	0.95
MW-17-02R	3/15/2011	6.9	Peristaltic	1225	1315	1240	3.16	250	1	5.02	87	5.33	-109.3	1.79	4.64
						1315	3.05	250	3	5.22	86	5.28	-126.3	1.33	2.5
MW-17-03	9/20/2010	NR	Peristaltic	1410	1520	1410	6.81	250	0.66	12.21	193	5.21	-45.4	0.92	20.9
						1520	6.8	250	4.95	12.16	181	5.27	-49.5	0.32	1.93
MW-17-04	9/21/2010	NR	Peristaltic	1125	1230	1125	7.45	350	0.92	14.76	85	4.99	81.5	9.07	17.4
						1230	7.43	350	6.93	14.64	80	4.95	76.0	10.80	2.33
MW-NASB-065	9/20/2010	NR	Peristaltic	1338	1453	1338	5.41	440	1.16	12.84	142	5.64	13.5	2.86	14.4
						1453	5.38	440	9.88	13.22	137	5.63	-5.8	0.21	1.36
MW-NASB-066	9/21/2010	NR	Peristaltic	1025	1215	1025	9.38	500	1.32	13.39	127	5.51	44.5	0.32	37.9
						1215	9.37	500	15.85	15.53	124	5.37	49.6	0.43	8.57
MW-NASB-067	9/21/2010	NR	Peristaltic	900	1000	900	5.32	380	1	13.22	197	5.86	-18.2	2.50	18.6
						1000	5.32	380	7.03	14.55	159	5.62	-11.3	0.65	2.7
MW-NASB-068	9/20/2010	NR	Peristaltic	1240	1315	1240	6.11	480	1.27	14.41	119	5.74	26.1	7.38	19.9
						1315	6.10	480	5.71	15.23	113	5.66	22.6	5.37	3.24
MW-NASB-097	9/20/2010	NR	Peristaltic	1520	1615	1520	5.50	220	0.58	18.71	78	5.63	43.3	1.14	427
						1615	5.56	220	3.78	17.45	69	5.61	70.3	0.23	10.2
MW-NASB-098	9/21/2010	NR	Peristaltic	905	1055	905	8.42	250	0.66	14.59	168	5.56	-26.3	22.56	5.76
						1055	8.47	250	7.93	15.20	94	5.74	-29.5	9.10	1.99

1 Well did not stabilize.
^{o}C - Degrees Celsius.
µS/cm - MicroSiemens per centimeter.
DO - Dissolved oxygen.
ft bgs - Feet below ground surface.
gal - Gallons.
mg/L - Milligrams per liter.
mL/min - Milliliters per minute.
MP - Measuring point.
mV - Millivolts.
NTU - Nephelometric turbidity units.
ORP - Oxidation-reduction potential.
NR - Not recorded.

APPENDIX B

CURRENT CONDITION ANALYTICAL RESULTS

B.1 CURRENT CONDITION SURFACE SOIL ANALYTICAL RESULTS

B.2 CURRENT CONDITION SUBSURFACE SOIL ANALYTICAL RESULTS

B.3 CURRENT CONDITION GROUNDWATER ANALYTICAL RESULTS

B.1 CURRENT CONDITION SURFACE SOIL ANALYTICAL RESULTS

TABLE B-1
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-101	SB-17-102	SB-17-103	SB-17-104	SB-17-105	SB-17-105	SB-17-105	SB-17-106	SB-17-107	SB-17-108	SB-17-109
SAMPLE ID	SB-17-101-0001	SB-17-102-0001	SB-17-103-0001	SB-17-104-0001	SB-17-105-0001	SB-17-105-0001-AVG	SB-17-105-0001-D	SB-17-106-0001	SB-17-107-0001	SB-17-108-0001	SB-17-109-0001
SAMPLE DATE	10/17/2008	10/17/2008	10/17/2008	10/17/2008	10/20/2008	10/20/2008	10/20/2008	10/17/2008	10/20/2008	10/20/2008	10/16/2008
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	0	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	1	1	1	1	1	1	1	1	1	1	1
EXPOSURE UNIT	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH
HERBICIDES (UG/KG)											
2,4,5-T	38 U	35 U	35 U	36 U	37 U	36.5 U	36 U	36 U	41 U	38 U	36 U
2,4-D	38 U	35 U	35 U	36 U	37 U	36.5 U	36 U	36 U	41 U	38 U	36 U
CARBARYL	22 U	21 U	21 U	22 U	22 U	22.5 UJ	23 UJ	22 UJ	22 U	27 U	22 UJ
DIURON	22 U	21 U	21 UJ	22 U	22 UJ	22.5 UJ	23 UJ	22 UJ	22 U	27 U	22 UJ
MALEIC HYDRAZIDE	22 UJ	21 U	21 UJ	22 U	22 UJ	22.5 UJ	23 U	22 U	22 UJ	27 UJ	22 U
MONURON	22 U	21 U	21 UJ	22 U	22 UJ	22.5 UJ	23 UJ	22 UJ	22 U	27 U	22 UJ
PROPOXUR	22 U	21 U	21 U	22 U	22 U	22.5 UJ	23 UJ	22 UJ	22 U	27 U	22 UJ
ROTENONE	22 U	21 U	21 U	22 U	22 U	22.5 UJ	23 UJ	22 UJ	22 U	27 U	22 UJ
METALS (MG/KG)											
ARSENIC	2	10.7	18.2	9.4	1.4	1.5	1.6	2.4	7.8	5.2	1.8
CYANIDE	0.55 U	0.5 U	0.55 U	0.55 U	0.55 UJ	0.55 UJ	0.55 UJ	0.5 U	0.6 UJ	0.55 UJ	0.55 U
LEAD	8.1	10	11.1	11	11.4	9.6	7.8	23.2	9	6.2	14.2
ZINC	11.7	21.9	25.8	26.7	13.2	12.05	10.9	21.8	25	23	17.6
MISCELLANEOUS PARAMETERS											
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--	--	--	--
CYANIDE (MG/KG)	--	--	--	--	--	--	--	--	--	--	--
ORGANOPHOSPHOROUS PESTICIDES (UG/KG)											
4-AMINOPYRIDINE	56 U	53 U	53 U	54 U	56 U	56.5 U	57 U	55 U	55 U	68 U	55 U
DIAZINON	56 U	53 U	53 U	54 U	56 U	56.5 U	57 U	55 U	55 U	68 U	55 U
MALATHION	56 U	53 U	53 U	54 U	56 U	56.5 U	57 U	55 U	55 U	68 U	55 U
PYRETHRINS	900 U	850 U	850 U	870 U	890 U	905 U	920 U	880 U	880 U	1100 U	880 U
RESMETHRIN	450 U	420 U	420 U	430 U	440 U	450 U	460 U	440 U	440 U	540 U	440 U
SIMAZINE	56 UJ	53 UJ	53 UJ	54 UJ	56 UJ	56.5 UJ	57 UJ	55 UJ	55 UJ	68 UJ	55 UJ
PESTICIDES/PCBS (UG/KG)											
4,4'-DDD	3.8 UJ	3.5 UJ	3.5 UJ	3.6 UJ	3.7 U	3.65 U	3.6 U	10	4.1 U	3.8 U	11
4,4'-DDE	13	0.7 J	0.88 J	0.8 J	17	15.5	14	8.3	4.1 U	12	9.3 J
4,4'-DDT	12 U	3.5 U	3.5 U	4.2 U	28 J	28 J	28 J	210	19 J	8.2 J	180
ALDRIN	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.8 U	2.1 U	2 U	1.8 U
ALPHA-BHC	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.8 U	2.1 U	2 U	1.8 U
ALPHA-CHLORDANE	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.8 U	1.1 J	2 U	1.8 U
BETA-BHC	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.8 U	2.1 U	2 U	1.8 U
DELTA-BHC	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.8 U	2.1 U	2 U	1.8 U
DIELDRIN	3.8 U	3.5 U	3.5 U	3.6 U	3.7 U	3.65 U	3.6 U	3.6 U	4.1 U	3.8 U	3.6 U
ENDOSULFAN I	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.8 U	2.1 U	2 U	1.8 UJ
ENDOSULFAN II	3.8 U	3.5 U	3.5 U	3.6 U	3.7 U	3.65 U	3.6 U	3.6 U	4.1 U	3.8 U	3.6 U

TABLE B-1
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	**SB-17-101**	**SB-17-102**	**SB-17-103**	**SB-17-104**	**SB-17-105**	**SB-17-105**	**SB-17-105**	**SB-17-106**	**SB-17-107**	**SB-17-108**	**SB-17-109**
SAMPLE ID	**SB-17-101-0001**	**SB-17-102-0001**	**SB-17-103-0001**	**SB-17-104-0001**	**SB-17-105-0001**	**SB-17-105-0001-AVG**	**SB-17-105-0001-D**	**SB-17-106-0001**	**SB-17-107-0001**	**SB-17-108-0001**	**SB-17-109-0001**
SAMPLE DATE	**10/17/2008**	**10/17/2008**	**10/17/2008**	**10/17/2008**	**10/20/2008**	**10/20/2008**	**10/20/2008**	**10/17/2008**	**10/20/2008**	**10/20/2008**	**10/16/2008**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**ORIG**	**AVG**	**DUP**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
TOP DEPTH	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
BOTTOM DEPTH	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
EXPOSURE UNIT	**NORTH**	**NORTH**	**NORTH**	**NORTH**	**NORTH**	**NORTH**	**NORTH**	**NORTH**	**NORTH**	**NORTH**	**NORTH**
ENDOSULFAN SULFATE	3.8 U	3.5 U	3.5 U	3.6 U	3.7 U	3.65 U	3.6 U	3.6 U	4.1 U	3.8 U	3.6 U
ENDRIN	3.8 U	3.5 U	3.5 U	3.6 U	3.7 U	3.65 U	3.6 U	3.6 U	4.1 U	3.8 U	3.6 UJ
ENDRIN ALDEHYDE	3.8 U	3.5 U	3.5 U	3.6 U	3.7 U	3.65 U	3.6 U	3.6 U	4.1 U	3.8 U	3.6 U
ENDRIN KETONE	3.8 U	3.5 U	3.5 U	3.6 U	3.7 U	3.65 U	3.6 U	3.6 U	4.1 U	3.8 U	3.6 U
GAMMA-BHC (LINDANE)	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.8 U	2.1 U	2 U	1.8 U
GAMMA-CHLORDANE	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.8 U	1 J	2 U	1.8 U
HEPTACHLOR	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.8 U	2.1 U	2 U	1.8 U
HEPTACHLOR EPOXIDE	1.9 U	1.8 U	1.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.8 U	2.1 U	2 U	1.8 U
METHOXYCHLOR	19 U	18 U	18 U	19 U	19 U	19 U	19 U	18 U	21 U	20 U	18 UJ
TOTAL DDT HALFND	20.9	4.2	4.38	4.7	46.85	45.325	43.8	228.3	23.1	22.1	200.3
TOTAL DDT POS	13	0.7	0.88	0.8	45	43.5	42	228.3	19	20.2	200.3
TOXAPHENE	38 U	35 U	35 U	36 U	37 U	36.5 U	36 U	36 U	41 U	38 U	36 U

-- = The chemical was not analyzed or no value was available.

Data Qualifiers:

Blank (i.e., no qualifier) = the chemical was detected.

> = The chemical was detected.

J = The chemical was detected but the concentration reported is an estimated value.

U = The chemical was not detected.

< = The chemical was not detected.

R = The chemical was rejected.

TABLE B-1
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-112	SB-17-113	SB-17-114	SB-17-118	SB-17-123	SB-17-124	SB-17-125	SB-17-126	SB-17-130	SB-17-131	SB-17-132
SAMPLE ID	SB-17-112-0001	SB-17-113-0001	SB-17-114-0001	SB-17-118-0001	SB-17-123-0001	SB-17-124-0001	SB-17-125-0001	SB-17-126-0001	SB-17-130-0001	SB-17-131-0001	SB-17-132-0001
SAMPLE DATE	10/20/2008	10/20/2008	10/16/2008	10/20/2008	10/15/2008	10/16/2008	10/15/2008	10/15/2008	10/15/2008	10/14/2008	10/14/2008
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	0	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	1	1	1	1	1	1	1	1	1	1	1
EXPOSURE UNIT	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	SOUTH	SOUTH	SOUTH	SOUTH
HERBICIDES (UG/KG)											
2,4,5-T	40 U	36 U	36 U	35 U	37 U	38 U	37 U	35 U	36 U	37 U	37 U
2,4-D	40 U	36 U	36 U	35 U	37 U	38 U	37 U	35 U	36 U	37 U	37 U
CARBARYL	24 UJ	27 U	110 U	22 U	24 U	25 UJ	22 UJ	21 UJ	21 UJ	22 U	22 UJ
DIURON	24 UJ	27 U	110 UJ	22 U	24 U	25 UJ	22 UJ	21 UJ	21 UJ	22 U	22 UJ
MALEIC HYDRAZIDE	24 U	27 U	22 U	22 U	24 U	25 U	22 U	21 U	21 U	22 UJ	22 U
MONURON	24 UJ	27 U	110 UJ	22 U	24 U	25 UJ	22 UJ	21 UJ	21 UJ	22 U	22 UJ
PROPOXUR	24 UJ	27 U	110 U	22 U	24 U	25 UJ	22 UJ	21 UJ	21 UJ	22 U	22 UJ
ROTENONE	24 UJ	27 U	110 UJ	22 U	24 UJ	25 UJ	22 UJ	21 UJ	21 UJ	22 UJ	22 UJ
METALS (MG/KG)											
ARSENIC	9.4	8.3	1.8	6.8	9.1 J	8.6	5.6 J	3 J	5.9 J	6.8 J	6.9 J
CYANIDE	0.6 UJ	0.55 UJ	0.55 U	0.5 UJ	0.5 U	0.55 U	0.34 J	0.5 U	0.5 U	0.5 U	0.55 U
LEAD	4.7	12.4	17.8	9.1	5.7	6	23	20.6	23.8	37.5	12.3
ZINC	24.6	29	17.6	25.1	32.7	36.4	40.8	38	46	47.7	34.4
MISCELLANEOUS PARAMETERS											
TOTAL SOLIDS (%)	--	--	--	--	--	--	--	--	--	--	--
CYANIDE (MG/KG)	--	--	--	--	--	--	--	--	--	--	--
ORGANOPHOSPHOROUS PESTICIDES (UG/KG)											
4-AMINOPYRIDINE	61 U	68 U	55 U	54 U	60 U	62 U	56 U	53 U	53 U	56 U	55 UJ
DIAZINON	61 U	68 U	55 U	54 U	60 U	62 U	56 U	53 U	53 U	56 U	55 UJ
MALATHION	61 U	68 U	55 U	54 U	60 U	62 U	56 U	53 U	53 U	56 U	55 UJ
PYRETHRINS	970 U	1100 U	880 U	870 U	960 U	1000 U	890 U	850 U	850 U	900 U	880 U
RESMETHRIN	490 U	540 U	440 U	430 U	480 U	500 U	440 U	420 U	430 U	450 U	440 U
SIMAZINE	61 UJ	68 UJ	55 UJ	54 UJ	60 UJ	62 UJ	56 UJ	53 UJ	53 UJ	56 UJ	55 UJ
PESTICIDES/PCBS (UG/KG)											
4,4'-DDD	100	8.7	17	7.6	3.7 U	3.8 U	53	3.5 UJ	3.6 UJ	3.7 U	3.7 U
4,4'-DDE	46	15	22	52	3.7 U	3.8 U	250	19	4.6	34	3.4 J
4,4'-DDT	1200 J	45 J	380 J	210 J	3.7 U	3.8 U	1200	110	26 U	77	5.4 U
ALDRIN	2 U	1.9 U	1.8 U	1.8 U	1.9 U	2 U	9.6 U	1.8 U	1.8 U	1.9 U	1.9 U
ALPHA-BHC	2 U	1.9 U	1.8 U	1.8 U	1.9 U	2 U	9.6 U	1.8 U	1.8 U	1.9 U	1.9 U
ALPHA-CHLORDANE	7	1.9 U	1.8 U	1.8 U	0.8 J	2 U	100	13 J	0.99 J	1.9 U	1.9 U
BETA-BHC	2 U	1.9 U	1.8 U	1.8 U	1.9 U	2 U	9.6 U	1.8 U	1.8 U	1.9 U	1.9 U
DELTA-BHC	2 U	1.9 U	1.8 U	1.8 U	1.9 U	2 U	9.6 U	1.8 U	1.8 U	1.9 U	1.9 U
DIELDRIN	4 U	3.6 U	3.6 U	3.5 U	3.7 U	3.8 U	19 U	3.5 U	3.6 U	3.7 U	3.7 U
ENDOSULFAN I	2 U	1.9 U	1.8 U	1.8 U	1.9 U	2 U	9.6 U	1.8 U	1.8 U	1.9 U	1.9 U
ENDOSULFAN II	4 U	3.6 U	3.6 U	3.5 U	3.7 U	3.8 U	19 U	3.5 U	3.6 U	3.7 U	3.7 U

TABLE B-1
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-112	SB-17-113	SB-17-114	SB-17-118	SB-17-123	SB-17-124	SB-17-125	SB-17-126	SB-17-130	SB-17-131	SB-17-132
SAMPLE ID	SB-17-112-0001	SB-17-113-0001	SB-17-114-0001	SB-17-118-0001	SB-17-123-0001	SB-17-124-0001	SB-17-125-0001	SB-17-126-0001	SB-17-130-0001	SB-17-131-0001	SB-17-132-0001
SAMPLE DATE	10/20/2008	10/20/2008	10/16/2008	10/20/2008	10/15/2008	10/16/2008	10/15/2008	10/15/2008	10/15/2008	10/14/2008	10/14/2008
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	0	0	0	0	0	0	0	0	0	0	0
BOTTOM DEPTH	1	1	1	1	1	1	1	1	1	1	1
EXPOSURE UNIT	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	SOUTH	SOUTH	SOUTH	SOUTH
ENDOSULFAN SULFATE	4 U	3.6 U	3.6 U	3.5 U	3.7 U	3.8 U	19 U	3.5 U	3.6 U	3.7 U	3.7 U
ENDRIN	4 U	3.6 U	3.6 U	3.5 U	3.7 U	3.8 U	19 U	3.5 U	3.6 U	3.7 U	3.7 U
ENDRIN ALDEHYDE	4 U	3.6 U	3.6 U	3.5 U	3.7 U	3.8 U	19 U	3.5 U	3.6 U	3.7 U	3.7 U
ENDRIN KETONE	4 U	3.6 U	3.6 U	3.5 U	3.7 U	3.8 U	19 U	3.5 U	3.6 U	3.7 U	3.7 U
GAMMA-BHC (LINDANE)	2 U	1.9 U	1.8 U	1.8 U	1.9 U	2 U	9.6 U	1.8 U	1.8 U	1.9 U	1.9 U
GAMMA-CHLORDANE	7.7	1.9 U	1.8 U	1.8 U	1 J	2 U	130	17 J	1.8 U	1.9 U	1.9 U
HEPTACHLOR	2 U	1.9 UJ	1.8 U	1.8 U	1.9 U	2 U	9.6 U	1.8 U	1.8 U	1 J	1.9 U
HEPTACHLOR EPOXIDE	2 U	1.9 U	1.8 U	1.8 U	1.9 U	2 U	9.6 U	1.8 U	1.8 U	1.9 U	1.9 U
METHOXYCHLOR	20 U	19 U	18 U	18 U	19 U	20 U	96 U	18 U	18 U	19 U	19 U
TOTAL DDT HALFND	1346	68.7	419	269.6	5.55	5.7	1503	130.75	19.4	112.85	7.95
TOTAL DDT POS	1346	68.7	419	269.6	0 U	0 U	1503	129	4.6	111	3.4
TOXAPHENE	40 U	36 U	36 U	35 U	37 U	38 U	190 U	35 U	36 U	37 U	37 U

-- = The chemical was not analyzed or no value was available.

Data Qualifiers:

Blank (i.e., no qualifier) = the chemical was detected.

> = The chemical was detected.

J = The chemical was detected but the concentration reported is an estimated value.

U = The chemical was not detected.

< = The chemical was not detected.

R = The chemical was rejected.

TABLE B-1
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-133	SB-17-206	SB-17-207	SB-17-208	SB-17-209	SB-17-210
SAMPLE ID	SB-17-133-0001	SB-17-206-0001	SB-17-207-0001	SB-17-208-0001	SB-17-209-0001	SB-17-210-0001
SAMPLE DATE	10/14/2008	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	0	0	0	0	0	0
BOTTOM DEPTH	1	1	1	1	1	1
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
HERBICIDES (UG/KG)						
2,4,5-T	40 U	--	--	--	--	--
2,4-D	40 U	--	--	--	--	--
CARBARYL	24 U	--	--	--	--	--
DIURON	24 U	--	--	--	--	--
MALEIC HYDRAZIDE	24 UJ	--	--	--	--	--
MONURON	24 U	--	--	--	--	--
PROPOXUR	24 U	--	--	--	--	--
ROTENONE	24 UJ	--	--	--	--	--
METALS (MG/KG)						
ARSENIC	7.9 J	3.9	6.4	7.5	6.3	7.1
CYANIDE	0.6 U	--	--	--	--	--
LEAD	16.6	14.4	6.8	5.9	5.6	8
ZINC	36.1	28.9	24.5	24.3	20.3	26.9
MISCELLANEOUS PARAMETERS						
TOTAL SOLIDS (%)	--	97	90	94	94	93
CYANIDE (MG/KG)	--	0.4 U	0.44 U	0.4 U	0.44 U	0.44 U
ORGANOPHOSPHOROUS PESTICIDES (UG/KG)						
4-AMINOPYRIDINE	61 UJ	--	--	--	--	--
DIAZINON	61 UJ	--	--	--	--	--
MALATHION	61 UJ	--	--	--	--	--
PYRETHRINS	980 U	--	--	--	--	--
RESMETHRIN	490 U	--	--	--	--	--
SIMAZINE	61 UJ	--	--	--	--	--
PESTICIDES/PCBS (UG/KG)						
4,4'-DDD	4 U	24 J	28 J	13 J	7.7 J	3.2 J
4,4'-DDE	33 J	34 J	89 J	26 J	22 J	21 J
4,4'-DDT	31 U	220 J	920 J	97 J	62 J	57 J
ALDRIN	2.1 U	0.17 UJ	0.19 UJ	0.18 UJ	0.18 UJ	0.18 UJ
ALPHA-BHC	2.1 U	0.17 UJ	0.19 UJ	0.18 UJ	0.18 UJ	0.18 UJ
ALPHA-CHLORDANE	2.1 U	840 J	240 J	32 J	13 J	11 J
BETA-BHC	2.1 U	0.17 UJ	0.19 UJ	0.18 UJ	0.18 UJ	0.18 UJ
DELTA-BHC	2.1 U	0.17 UJ	0.19 UJ	0.18 UJ	0.18 UJ	0.18 UJ
DIELDRIN	4 U	0.34 UJ	0.36 UJ	0.34 UJ	0.35 UJ	0.35 UJ
ENDOSULFAN I	2.1 UJ	0.17 UJ	0.19 UJ	0.18 UJ	0.18 UJ	0.18 UJ
ENDOSULFAN II	4 UJ	0.34 UJ	0.36 UJ	0.34 UJ	0.35 UJ	0.35 UJ

TABLE B-1
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	**SB-17-133**	**SB-17-206**	**SB-17-207**	**SB-17-208**	**SB-17-209**	**SB-17-210**
SAMPLE ID	**SB-17-133-0001**	**SB-17-206-0001**	**SB-17-207-0001**	**SB-17-208-0001**	**SB-17-209-0001**	**SB-17-210-0001**
SAMPLE DATE	**10/14/2008**	**7/8/2010**	**7/8/2010**	**7/8/2010**	**7/8/2010**	**7/8/2010**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
TOP DEPTH	**0**	**0**	**0**	**0**	**0**	**0**
BOTTOM DEPTH	**1**	**1**	**1**	**1**	**1**	**1**
EXPOSURE UNIT	**SOUTH**	**SOUTH**	**SOUTH**	**SOUTH**	**SOUTH**	**SOUTH**
ENDOSULFAN SULFATE	4 U	0.34 UJ	0.36 UJ	0.34 UJ	0.35 UJ	0.35 UJ
ENDRIN	4 UJ	0.34 UJ	0.36 UJ	0.34 UJ	0.35 UJ	0.35 UJ
ENDRIN ALDEHYDE	4 U	0.34 UJ	0.36 UJ	0.34 UJ	0.35 UJ	0.35 UJ
ENDRIN KETONE	4 U	0.34 UJ	0.36 UJ	0.34 UJ	0.35 UJ	0.35 UJ
GAMMA-BHC (LINDANE)	1.5 J	0.17 UJ	0.19 UJ	0.18 UJ	0.18 UJ	0.18 UJ
GAMMA-CHLORDANE	2.1 U	760 J	180 J	19 J	7.6 J	6.7 J
HEPTACHLOR	2.1 U	69 J	28 J	0.66 J	0.38 J	0.25 J
HEPTACHLOR EPOXIDE	2.1 U	130 J	63 J	5.6 J	1.7 J	1.5 J
METHOXYCHLOR	21 U	1.7 UJ	1.9 UJ	1.8 UJ	1.8 UJ	1.8 UJ
TOTAL DDT HALFND	50.5	--	--	--	--	--
TOTAL DDT POS	33	--	--	--	--	--
TOXAPHENE	40 U	3.3 UJ	3.5 U	3.4 UJ	3.4 UJ	3.4 UJ

-- = The chemical was not analyzed or no value was available.

Data Qualifiers:

Blank (i.e., no qualifier) = the chemical was detected.

> = The chemical was detected.

J = The chemical was detected but the concentration reported is an estimated value.

U = The chemical was not detected.

< = The chemical was not detected.

R = The chemical was rejected.

B.2 CURRENT CONDITION SUBSURFACE SOIL ANALYTICAL RESULTS

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	S17-SS-04	S17-SS-05	S17-SS-06	S17-SS-09	SB-17-101	SB-17-102	SB-17-103	SB-17-104	SB-17-105	SB-17-106	SB-17-107
SAMPLE ID	S17-SS-04	S17-SS-05	S17-SS-06	S17-SS-09	SB-17-101-0104	SB-17-102-0104	SB-17-103-0104	SB-17-104-0104	SB-17-105-0104	SB-17-106-0104	SB-17-107-0104
SAMPLE DATE	10/14/2008	10/14/2008	10/14/2008	10/14/2008	10/17/2008	10/17/2008	10/17/2008	10/17/2008	10/20/2008	10/17/2008	10/20/2008
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	2.42	3.5	2.17	2	1	1	1	1	1	1	1
BOTTOM DEPTH	2.67	3.75	2.42	2.25	4	4	4	4	4	4	4
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH
HERBICIDES (UG/KG)											
2,4,5-T	--	--	--	--	35 U	36 U	37 U	37 U	34 U	35 U	40 U
2,4-D	--	--	--	--	35 U	36 U	37 U	37 U	34 U	35 U	40 U
CARBARYL	--	--	--	--	21 U	22 U	23 U	23 U	28 U	21 U	28 U
DIURON	--	--	--	--	21 U	22 U	23 U	23 U	28 U	21 UJ	28 U
MALEIC HYDRAZIDE	--	--	--	--	21 U	22 U	23 U	23 U	28 U	21 U	28 U
MONURON	--	--	--	--	21 U	22 U	23 U	23 U	28 U	21 UJ	28 U
PROPOXUR	--	--	--	--	21 U	22 U	23 U	23 U	28 U	21 U	28 U
ROTENONE	--	--	--	--	21 U	22 U	23 U	23 U	28 U	21 UJ	28 U
METALS (MG/KG)											
ARSENIC	--	--	--	--	1.3	4.6	6.1	8.1	1.5	1.7	6.8
CYANIDE	--	--	--	--	0.5 U	0.55 U	0.55 U	0.55 U	0.5 UJ	0.55 U	0.6 UJ
LEAD	--	--	--	--	2.5	2.4	5.1	3.4	3	7.5	5.6
ZINC	--	--	--	--	10.3	16.6	17.8	17.9	11.9	10.6	18.4
MISCELLANEOUS PARAMETERS											
CYANIDE (MG/KG)	--	--	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--	--	--	--	--	--	--	--	--
ORGANOPHOSPHOROUS PESTICIDES (UG/KG)											
4-AMINOPYRIDINE	--	--	--	--	53 U	56 U	56 U	57 U	69 U	53 U	69 U
DIAZINON	--	--	--	--	53 U	56 U	56 U	57 U	69 U	53 U	69 U
MALATHION	--	--	--	--	53 U	56 U	56 U	57 U	69 U	53 U	69 U
PYRETHRINS	--	--	--	--	840 U	890 U	900 U	910 U	1100 U	850 U	1100 U
RESMETHRIN	--	--	--	--	420 U	450 U	450 U	460 U	550 U	420 U	550 U
SIMAZINE	--	--	--	--	53 UJ	56 UJ	56 UJ	57 UJ	69 UJ	53 UJ	69 UJ
SEMIVOLATILES (UG/KG)											
1,2,4-TRICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROTOLUENE	--	--	--	--	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	--	--	--	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--
2-CHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2-METHYLNAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--
2-METHYLPHENOL	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	S17-SS-04	S17-SS-05	S17-SS-06	S17-SS-09	SB-17-101	SB-17-102	SB-17-103	SB-17-104	SB-17-105	SB-17-106	SB-17-107
SAMPLE ID	S17-SS-04	S17-SS-05	S17-SS-06	S17-SS-09	SB-17-101-0104	SB-17-102-0104	SB-17-103-0104	SB-17-104-0104	SB-17-105-0104	SB-17-106-0104	SB-17-107-0104
SAMPLE DATE	10/14/2008	10/14/2008	10/14/2008	10/14/2008	10/17/2008	10/17/2008	10/17/2008	10/17/2008	10/20/2008	10/17/2008	10/20/2008
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	2.42	3.5	2.17	2	1	1	1	1	1	1	1
BOTTOM DEPTH	2.67	3.75	2.42	2.25	4	4	4	4	4	4	4
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH
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	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROANILINE	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROPHENYL PHENYL ETHER	--	--	--	--	--	--	--	--	--	--	--
4-NITROANILINE	--	--	--	--	--	--	--	--	--	--	--
4-NITROPHENOL	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHENE	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHYLENE	--	--	--	--	--	--	--	--	--	--	--
ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)PYRENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(B)FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(G,H,I)PERYLENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(K)FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	--	--	--	--	--	--	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
CARBAZOLE	--	--	--	--	--	--	--	--	--	--	--
CHRYSENE	--	--	--	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
DIBENZOFURAN	--	--	--	--	--	--	--	--	--	--	--
DIETHYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
FLUORENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBUTADIENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	--	--	--	--	--	--	--	--	--	--	--
ISOPHORONE	--	--	--	--	--	--	--	--	--	--	--
NAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	S17-SS-04	S17-SS-05	S17-SS-06	S17-SS-09	SB-17-101	SB-17-102	SB-17-103	SB-17-104	SB-17-105	SB-17-106	SB-17-107
SAMPLE ID	S17-SS-04	S17-SS-05	S17-SS-06	S17-SS-09	SB-17-101-0104	SB-17-102-0104	SB-17-103-0104	SB-17-104-0104	SB-17-105-0104	SB-17-106-0104	SB-17-107-0104
SAMPLE DATE	10/14/2008	10/14/2008	10/14/2008	10/14/2008	10/17/2008	10/17/2008	10/17/2008	10/17/2008	10/20/2008	10/17/2008	10/20/2008
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	2.42	3.5	2.17	2	1	1	1	1	1	1	1
BOTTOM DEPTH	2.67	3.75	2.42	2.25	4	4	4	4	4	4	4
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH
NITROBENZENE	--	--	--	--	--	--	--	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
PHENANTHRENE	--	--	--	--	--	--	--	--	--	--	--
PHENOL	--	--	--	--	--	--	--	--	--	--	--
PYRENE	--	--	--	--	--	--	--	--	--	--	--
VOLATILES (UG/KG)											
1,1,1-TRICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--	--	--	--	--
METHYL TERT-BUTYL ETHER	--	--	--	--	--	--	--	--	--	--	--
METHYLENE CHLORIDE	--	--	--	--	--	--	--	--	--	--	--
STYRENE	--	--	--	--	--	--	--	--	--	--	--
TETRACHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TOLUENE	--	--	--	--	--	--	--	--	--	--	--
TOTAL 1,2-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	S17-SS-04	S17-SS-05	S17-SS-06	S17-SS-09	SB-17-101	SB-17-102	SB-17-103	SB-17-104	SB-17-105	SB-17-106	SB-17-107
SAMPLE ID	S17-SS-04	S17-SS-05	S17-SS-06	S17-SS-09	SB-17-101-0104	SB-17-102-0104	SB-17-103-0104	SB-17-104-0104	SB-17-105-0104	SB-17-106-0104	SB-17-107-0104
SAMPLE DATE	10/14/2008	10/14/2008	10/14/2008	10/14/2008	10/17/2008	10/17/2008	10/17/2008	10/17/2008	10/20/2008	10/17/2008	10/20/2008
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	2.42	3.5	2.17	2	1	1	1	1	1	1	1
BOTTOM DEPTH	2.67	3.75	2.42	2.25	4	4	4	4	4	4	4
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH
TOTAL XYLENES	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROFLUOROMETHANE	--	--	--	--	--	--	--	--	--	--	--
VINYL CHLORIDE	--	--	--	--	--	--	--	--	--	--	--
PESTICIDES/PCBS (UG/KG)											
4,4'-DDD	34	6.4 U	30 U	30 U	3.5 U	3.6 U	10	6.5	3.4 U	3.5 U	4 U
4,4'-DDE	100	5.5 J	110	59	1.3 J	3.6 U	3.6 J	1.7 J	3.4 U	3.5 U	4 U
4,4'-DDT	570	47	720	190	13 U	3.6 U	53	4 U	3.4 UJ	24 UJ	5 UJ
ALDRIN	5.8 U	6.4 U	30 U	30 U	1.8 U	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	2 U
ALPHA-BHC	5.8 U	6.4 U	30 U	30 U	1.8 U	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	2 U
ALPHA-CHLORDANE	110	9.6	280	30 U	1.8 U	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	2 U
BETA-BHC	5.8 U	6.4 U	30 U	30 U	1.8 U	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	2 U
DELTA-BHC	5.8 U	6.4 U	30 U	30 U	1.8 U	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	2 U
DIELDRIN	5.8 U	6.4 U	30 U	30 U	3.5 U	3.6 U	3.7 U	3.7 U	3.4 U	3.5 U	4 U
ENDOSULFAN I	66	6.4 U	190	30 U	1.8 U	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	2 U
ENDOSULFAN II	5.8 U	6.4 U	30 U	30 U	3.5 U	3.6 U	3.7 U	3.7 U	3.4 U	3.5 U	4 U
ENDOSULFAN SULFATE	5.8 U	6.4 U	30 U	30 U	3.5 U	3.6 U	3.7 U	3.7 U	3.4 U	3.5 U	4 U
ENDRIN	150	13	220	37	3.5 U	3.6 U	3.7 U	3.7 U	3.4 U	3.5 U	4 U
ENDRIN ALDEHYDE	5.8 U	6.4 U	30 U	30 U	3.5 U	3.6 U	3.7 U	3.7 U	3.4 U	3.5 U	4 U
ENDRIN KETONE	5.8 U	6.4 U	30 U	30 U	3.5 U	3.6 U	3.7 U	3.7 U	3.4 U	3.5 U	4 U
GAMMA-BHC (LINDANE)	5.8 U	6.4 U	30 U	30 U	1.8 U	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	2 U
GAMMA-CHLORDANE	140	12	350	30 U	1.8 U	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	2 U
HEPTACHLOR	16	6.4 U	30 U	30 U	1.8 U	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	2 U
HEPTACHLOR EPOXIDE	34	6.4 U	30 U	30 U	1.8 U	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	2 U
METHOXYCHLOR	8.5	6.4 U	30 U	30 U	18 U	19 U	19 U	19 U	18 U	18 U	20 U
PYRETHRIN I	230 U	250 U	1200 U	1200 U	--	--	--	--	--	--	--
PYRETHRIN II	230 U	250 U	1200 U	1200 U	--	--	--	--	--	--	--
PYRETHRINS	470 U	510 U	2400 U	2400 U	--	--	--	--	--	--	--
TOXAPHENE	120 U	130 U	600 U	590 U	35 U	36 U	37 U	37 U	34 U	35 U	40 U
PETROLEUM HYDROCARBONS (MG/KG)											
DIESEL RANGE ORGANICS	--	--	--	--	--	--	--	--	--	--	--

-- = The chemical was not analyzed or no value was available.

Data Qualifiers:

Blank (i.e., no qualifier) = the chemical was detected.

J = The chemical was detected but the concentration reported is an estimated value.

U = The chemical was not detected.

R = The chemical was rejected.

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-107	SB-17-108	SB-17-109	SB-17-110	SB-17-111	SB-17-112	SB-17-113	SB-17-114	SB-17-115	SB-17-116	SB-17-117
SAMPLE ID	SB-17-107-0408	SB-17-108-0104	SB-17-109-0104	SB-17-110-0104	SB-17-111-0104	SB-17-112-0104	SB-17-113-0104	SB-17-114-0104	SB-17-115-0710	SB-17-116-0407	SB-17-117-0104
SAMPLE DATE	10/20/2008	10/20/2008	10/16/2008	10/16/2008	10/20/2008	10/20/2008	10/20/2008	10/16/2008	10/16/2008	10/16/2008	10/17/2008
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	4	1	1	1	1	1	1	1	7	4	1
BOTTOM DEPTH	8	4	4	4	4	4	4	4	10	7	4
EXPOSURE UNIT	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH
HERBICIDES (UG/KG)											
2,4,5-T	42 U	43 U	34 U	36 U	36 U	40 U	41 U	35 U	40 U	42 U	40 U
2,4-D	42 U	43 U	34 U	36 U	36 U	40 U	41 U	35 U	40 U	42 U	40 U
CARBARYL	26 U	24 U	21 U	22 U	22 U	24 U	23 U	21 U	25 U	26 U	24 UJ
DIURON	26 U	24 U	21 UJ	22 UJ	22 U	24 U	23 U	21 U	25 UJ	26 UJ	24 UJ
MALEIC HYDRAZIDE	26 UJ	24 U	21 U	22 U	22 U	24 U	23 U	21 U	25 U	26 U	24 U
MONURON	26 U	24 U	21 UJ	22 UJ	22 U	24 U	23 U	21 U	25 UJ	26 UJ	24 UJ
PROPOXUR	26 U	24 U	21 U	22 U	22 U	24 UJ	23 U	21 U	25 U	100	24 UJ
ROTENONE	26 U	24 U	21 UJ	22 UJ	22 U	24 U	23 U	21 UJ	25 UJ	26 UJ	24 UJ
METALS (MG/KG)											
ARSENIC	1.5	3.1	1.4	2.2	3.4	2.2	4.1	1.8	1.1	1.5	3
CYANIDE	0.6 UJ	0.65 UJ	0.5 U	0.55 U	0.55 UJ	0.6 UJ	0.6 UJ	0.5 U	0.6 U	0.6 U	0.6 U
LEAD	2.5	6.2	2.6	3.7	7.7	3.6	32.3	3.4	2	4.2	7.4
ZINC	11.9	19.9	11.2	11.7	23.7	18.9	21	13.4	12.4	17	23.6
MISCELLANEOUS PARAMETERS											
CYANIDE (MG/KG)	--	--	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--	--	--	--	--	--	400 J	--	--
ORGANOPHOSPHOROUS PESTICIDES (UG/KG)											
4-AMINOPYRIDINE	64 U	60 U	53 U	54 U	55 U	60 U	58 U	53 U	61 U	65 U	61 U
DIAZINON	64 U	60 U	53 U	54 U	55 U	60 U	58 U	53 U	61 U	65 U	61 U
MALATHION	64 U	60 U	53 U	54 U	55 U	60 U	58 U	53 U	61 U	65 U	61 U
PYRETHRINS	1000 U	960 U	840 U	860 U	880 U	960 U	930 U	840 U	980 U	1000 U	980 U
RESMETHRIN	510 U	480 U	420 U	430 U	440 U	480 U	460 U	420 U	490 U	520 U	490 U
SIMAZINE	64 UJ	60 UJ	53 UJ	54 UJ	55 UJ	60 UJ	58 UJ	53 UJ	61 UJ	65 UJ	61 UJ
SEMIVOLATILES (UG/KG)											
1,2,4-TRICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROTOLUENE	--	--	--	--	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	--	--	--	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--
2-CHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2-METHYLNAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--
2-METHYLPHENOL	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-107	SB-17-108	SB-17-109	SB-17-110	SB-17-111	SB-17-112	SB-17-113	SB-17-114	SB-17-115	SB-17-116	SB-17-117
SAMPLE ID	SB-17-107-0408	SB-17-108-0104	SB-17-109-0104	SB-17-110-0104	SB-17-111-0104	SB-17-112-0104	SB-17-113-0104	SB-17-114-0104	SB-17-115-0710	SB-17-116-0407	SB-17-117-0104
SAMPLE DATE	10/20/2008	10/20/2008	10/16/2008	10/16/2008	10/20/2008	10/20/2008	10/20/2008	10/16/2008	10/16/2008	10/16/2008	10/17/2008
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	4	1	1	1	1	1	1	1	7	4	1
BOTTOM DEPTH	8	4	4	4	4	4	4	4	10	7	4
EXPOSURE UNIT	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH
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	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROANILINE	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROPHENYL PHENYL ETHER	--	--	--	--	--	--	--	--	--	--	--
4-NITROANILINE	--	--	--	--	--	--	--	--	--	--	--
4-NITROPHENOL	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHENE	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHYLENE	--	--	--	--	--	--	--	--	--	--	--
ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)PYRENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(B)FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(G,H,I)PERYLENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(K)FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	--	--	--	--	--	--	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
CARBAZOLE	--	--	--	--	--	--	--	--	--	--	--
CHRYSENE	--	--	--	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
DIBENZOFURAN	--	--	--	--	--	--	--	--	--	--	--
DIETHYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
FLUORENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBUTADIENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	--	--	--	--	--	--	--	--	--	--	--
ISOPHORONE	--	--	--	--	--	--	--	--	--	--	--
NAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-107	SB-17-108	SB-17-109	SB-17-110	SB-17-111	SB-17-112	SB-17-113	SB-17-114	SB-17-115	SB-17-116	SB-17-117
SAMPLE ID	SB-17-107-0408	SB-17-108-0104	SB-17-109-0104	SB-17-110-0104	SB-17-111-0104	SB-17-112-0104	SB-17-113-0104	SB-17-114-0104	SB-17-115-0710	SB-17-116-0407	SB-17-117-0104
SAMPLE DATE	10/20/2008	10/20/2008	10/16/2008	10/16/2008	10/20/2008	10/20/2008	10/20/2008	10/16/2008	10/16/2008	10/16/2008	10/17/2008
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	4	1	1	1	1	1	1	1	7	4	1
BOTTOM DEPTH	8	4	4	4	4	4	4	4	10	7	4
EXPOSURE UNIT	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH
NITROBENZENE	--	--	--	--	--	--	--	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
PHENANTHRENE	--	--	--	--	--	--	--	--	--	--	--
PHENOL	--	--	--	--	--	--	--	--	--	--	--
PYRENE	--	--	--	--	--	--	--	--	--	--	--
VOLATILES (UG/KG)											
1,1,1-TRICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--	--	--	--	--
METHYL TERT-BUTYL ETHER	--	--	--	--	--	--	--	--	--	--	--
METHYLENE CHLORIDE	--	--	--	--	--	--	--	--	--	--	--
STYRENE	--	--	--	--	--	--	--	--	--	--	--
TETRACHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TOLUENE	--	--	--	--	--	--	--	--	--	--	--
TOTAL 1,2-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-107	SB-17-108	SB-17-109	SB-17-110	SB-17-111	SB-17-112	SB-17-113	SB-17-114	SB-17-115	SB-17-116	SB-17-117
SAMPLE ID	SB-17-107-0408	SB-17-108-0104	SB-17-109-0104	SB-17-110-0104	SB-17-111-0104	SB-17-112-0104	SB-17-113-0104	SB-17-114-0104	SB-17-115-0710	SB-17-116-0407	SB-17-117-0104
SAMPLE DATE	10/20/2008	10/20/2008	10/16/2008	10/16/2008	10/20/2008	10/20/2008	10/20/2008	10/16/2008	10/16/2008	10/16/2008	10/17/2008
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	4	1	1	1	1	1	1	1	7	4	1
BOTTOM DEPTH	8	4	4	4	4	4	4	4	10	7	4
EXPOSURE UNIT	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH
TOTAL XYLENES	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROFLUOROMETHANE	--	--	--	--	--	--	--	--	--	--	--
VINYL CHLORIDE	--	--	--	--	--	--	--	--	--	--	--
PESTICIDES/PCBS (UG/KG)											
4,4'-DDD	4.2 U	4.3 U	3.4 UJ	220	3.6 U	520	84	3.5 U	4 U	4.2 UJ	60
4,4'-DDE	4.2 U	4.3 U	3.4 U	56 J	12	80	84	0.51 J	4 U	19 J	160
4,4'-DDT	4.2 UJ	5 UJ	3.4 UJ	1000	28 J	7200 J	580 J	16 UJ	4 U	96 J	1100 J
ALDRIN	2.1 U	2.2 U	1.8 U	18 U	1.9 U	20 U	2.1 U	1.8 U	2.1 U	2.2 UJ	10 U
ALPHA-BHC	2.1 U	2.2 U	1.8 U	18 U	1.9 U	20 U	2.1 U	1.8 U	2.1 U	2.2 UJ	10 U
ALPHA-CHLORDANE	2.1 U	2.2 U	1.8 U	18 U	1.9 U	20 U	14 J	1.8 U	2.1 U	2.2 UJ	67
BETA-BHC	2.1 U	2.2 U	1.8 U	18 U	1.9 U	20 U	2.1 U	1.8 U	2.1 U	2.2 UJ	10 U
DELTA-BHC	2.1 U	2.2 U	1.8 U	18 U	1.9 U	20 U	2.1 U	1.8 U	2.1 U	2.2 UJ	10 U
DIELDRIN	4.2 U	4.3 U	3.4 U	36 U	3.6 U	40 U	4.1 U	3.5 U	4 U	4.2 UJ	20 U
ENDOSULFAN I	2.1 U	2.2 U	1.8 U	18 UJ	1.9 U	20 U	2.1 U	1.8 UJ	2.1 U	2.2 UJ	10 UJ
ENDOSULFAN II	4.2 U	4.3 U	3.4 U	36 U	3.6 U	40 U	4.1 U	3.5 U	4 U	4.2 UJ	20 U
ENDOSULFAN SULFATE	4.2 U	4.3 U	3.4 U	36 U	3.6 U	40 U	4.1 U	3.5 U	4 U	4.2 UJ	20 U
ENDRIN	4.2 U	4.3 U	3.4 U	36 UJ	3.6 U	40 U	4.1 U	3.5 UJ	4 U	4.2 UJ	20 UJ
ENDRIN ALDEHYDE	4.2 U	4.3 U	3.4 U	36 U	3.6 U	40 U	4.1 U	3.5 U	4 U	4.2 UJ	20 U
ENDRIN KETONE	4.2 U	4.3 U	3.4 U	36 U	3.6 U	40 U	4.1 U	3.5 U	4 U	4.2 UJ	20 U
GAMMA-BHC (LINDANE)	2.1 U	2.2 U	1.8 U	18 U	1.9 U	20 U	2.1 U	1.8 U	2.1 U	2.2 UJ	10 U
GAMMA-CHLORDANE	2.1 U	2.2 U	1.8 U	18 U	1.9 U	20 U	14	1.8 U	2.1 U	2.2 UJ	70
HEPTACHLOR	2.1 U	2.2 U	1.8 U	18 U	1.9 U	20 U	2.1 U	1.8 U	2.1 U	2.2 UJ	10 U
HEPTACHLOR EPOXIDE	2.1 U	2.2 U	1.8 U	18 U	1.9 U	20 U	2.1 U	1.8 U	2.1 U	2.2 UJ	11 J
METHOXYCHLOR	21 U	22 U	18 U	180 UJ	19 U	200 U	21 U	18 UJ	21 U	22 UJ	100 UJ
PYRETHRIN I	--	--	--	--	--	--	--	--	--	--	--
PYRETHRIN II	--	--	--	--	--	--	--	--	--	--	--
PYRETHRINS	--	--	--	--	--	--	--	--	--	--	--
TOXAPHENE	42 U	43 U	34 U	360 U	36 U	400 U	41 U	35 U	40 U	42 UJ	200 U
PETROLEUM HYDROCARBONS (MG/KG)											
DIESEL RANGE ORGANICS	--	--	--	--	14	--	--	--	1.3 J	--	--

-- = The chemical was not analyzed or no value was available.

Data Qualifiers:

Blank (i.e., no qualifier) = the chemical was detected.

J = The chemical was detected but the concentration reported is an estimated value.

U = The chemical was not detected.

R = The chemical was rejected.

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-118	SB-17-119	SB-17-120	SB-17-120	SB-17-120	SB-17-121	SB-17-121	SB-17-122	SB-17-122	SB-17-122	SB-17-123
SAMPLE ID	SB-17-118-0104	SB-17-119-0104	SB-17-120-0205	SB-17-120-0205-AVG	SB-17-120-0205-D	SB-17-121-0710	SB-17-121-1215	SB-17-122-0407	SB-17-122-0407-AVG	SB-17-122-0407-D	SB-17-123-0104
SAMPLE DATE	10/20/2008	10/16/2008	10/16/2008	10/16/2008	10/16/2008	10/16/2008	10/16/2008	10/17/2008	10/17/2008	10/17/2008	10/15/2008
SAMPLE CODE	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL
TOP DEPTH	1	1	2	2	2	7	12	4	4	4	1
BOTTOM DEPTH	4	4	5	5	5	10	15	7	7	7	4
EXPOSURE UNIT	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH
HERBICIDES (UG/KG)											
2,4,5-T	38 U	36 U	43 U	44 U	45 U	41 U	42 U	50 U	48.5 U	47 U	35 U
2,4-D	38 U	36 U	43 U	44 U	45 U	41 U	42 U	50 U	48.5 U	47 U	35 U
CARBARYL	23 U	23 U	27 UJ	26.5 UJ	26 UJ	27 U	25 U	36 UJ	31.5 UJ	27 UJ	24 U
DIURON	23 U	23 U	27 UJ	26.5 UJ	26 UJ	27 UJ	25 UJ	36 UJ	31.5 UJ	27 UJ	24 U
MALEIC HYDRAZIDE	23 U	23 U	27 U	26.5 U	26 U	27 U	12 J	36 UJ	31.5 UJ	27 U	24 U
MONURON	23 U	23 U	27 UJ	26.5 UJ	26 UJ	27 UJ	25 UJ	36 UJ	31.5 UJ	27 UJ	24 U
PROPOXUR	23 U	23 U	370	420	470	27 U	25 U	36 UJ	31.5 UJ	27 UJ	24 U
ROTENONE	23 U	23 UJ	27 UJ	26.5 UJ	26 UJ	27 UJ	25 UJ	36 UJ	31.5 UJ	27 UJ	24 UJ
METALS (MG/KG)											
ARSENIC	3.2	1.4	2.2	2	1.8	1.1	5.2	1.5	1.4	1.3	1.4 J
CYANIDE	0.6 UJ	0.55 U	0.65 U	0.65 U	0.65 U	0.6 U	0.65 U	0.7 U	0.70 U	0.7 U	0.5 U
LEAD	6.1	2.4	5.7	5.65	5.6	2.3	4.9	3	2.95	2.9	1.8
ZINC	18	54.5	25.8	28.75	31.7	14.2	33.9	15.2	14.85	14.5	10
MISCELLANEOUS PARAMETERS											
CYANIDE (MG/KG)	--	--	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	28000 J	26000 J	24000 J	--	--	--	--	--	--
ORGANOPHOSPHOROUS PESTICIDES (UG/KG)											
4-AMINOPYRIDINE	58 U	57 U	66 U	66 U	66 U	66 U	62 U	91 U	79.5 U	68 U	59 U
DIAZINON	58 U	57 U	66 U	66 U	66 U	66 U	62 U	91 U	79.5 U	68 U	59 U
MALATHION	58 U	57 U	66 U	66 U	66 U	66 U	62 U	91 U	79.5 U	68 U	59 U
PYRETHRINS	930 U	920 U	1100 U	1100 U	1100 U	1100 U	1000 U	1500 U	1300 U	1100 U	950 U
RESMETHRIN	470 U	460 U	530 U	530 U	530 U	530 U	500 U	730 U	635 U	540 U	470 U
SIMAZINE	58 UJ	57 UJ	66 UJ	66 UJ	66 UJ	66 UJ	62 UJ	91 UJ	79.5 UJ	68 UJ	59 UJ
SEMIVOLATILES (UG/KG)											
1,2,4-TRICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROTOLUENE	--	--	--	--	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	--	--	--	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--
2-CHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2-METHYLNAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--
2-METHYLPHENOL	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-118	SB-17-119	SB-17-120	SB-17-120	SB-17-120	SB-17-121	SB-17-121	SB-17-122	SB-17-122	SB-17-122	SB-17-123
SAMPLE ID	SB-17-118-0104	SB-17-119-0104	SB-17-120-0205	SB-17-120-0205-AVG	SB-17-120-0205-D	SB-17-121-0710	SB-17-121-1215	SB-17-122-0407	SB-17-122-0407-AVG	SB-17-122-0407-D	SB-17-123-0104
SAMPLE DATE	10/20/2008	10/16/2008	10/16/2008	10/16/2008	10/16/2008	10/16/2008	10/16/2008	10/17/2008	10/17/2008	10/17/2008	10/15/2008
SAMPLE CODE	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL
TOP DEPTH	1	1	2	2	2	7	12	4	4	4	1
BOTTOM DEPTH	4	4	5	5	5	10	15	7	7	7	4
EXPOSURE UNIT	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH
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	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROANILINE	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROPHENYL PHENYL ETHER	--	--	--	--	--	--	--	--	--	--	--
4-NITROANILINE	--	--	--	--	--	--	--	--	--	--	--
4-NITROPHENOL	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHENE	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHYLENE	--	--	--	--	--	--	--	--	--	--	--
ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)PYRENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(B)FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(G,H,I)PERYLENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(K)FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	--	--	--	--	--	--	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
CARBAZOLE	--	--	--	--	--	--	--	--	--	--	--
CHRYSENE	--	--	--	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
DIBENZOFURAN	--	--	--	--	--	--	--	--	--	--	--
DIETHYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
FLUORENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBUTADIENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	--	--	--	--	--	--	--	--	--	--	--
ISOPHORONE	--	--	--	--	--	--	--	--	--	--	--
NAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-118	SB-17-119	SB-17-120	SB-17-120	SB-17-120	SB-17-121	SB-17-121	SB-17-122	SB-17-122	SB-17-122	SB-17-123
SAMPLE ID	SB-17-118-0104	SB-17-119-0104	SB-17-120-0205	SB-17-120-0205-AVG	SB-17-120-0205-D	SB-17-121-0710	SB-17-121-1215	SB-17-122-0407	SB-17-122-0407-AVG	SB-17-122-0407-D	SB-17-123-0104
SAMPLE DATE	10/20/2008	10/16/2008	10/16/2008	10/16/2008	10/16/2008	10/16/2008	10/16/2008	10/17/2008	10/17/2008	10/17/2008	10/15/2008
SAMPLE CODE	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL
TOP DEPTH	1	1	2	2	2	7	12	4	4	4	1
BOTTOM DEPTH	4	4	5	5	5	10	15	7	7	7	4
EXPOSURE UNIT	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH
NITROBENZENE	--	--	--	--	--	--	--	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
PHENANTHRENE	--	--	--	--	--	--	--	--	--	--	--
PHENOL	--	--	--	--	--	--	--	--	--	--	--
PYRENE	--	--	--	--	--	--	--	--	--	--	--
VOLATILES (UG/KG)											
1,1,1-TRICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--	--	--	--	--
METHYL TERT-BUTYL ETHER	--	--	--	--	--	--	--	--	--	--	--
METHYLENE CHLORIDE	--	--	--	--	--	--	--	--	--	--	--
STYRENE	--	--	--	--	--	--	--	--	--	--	--
TETRACHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TOLUENE	--	--	--	--	--	--	--	--	--	--	--
TOTAL 1,2-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-118	SB-17-119	SB-17-120	SB-17-120	SB-17-120	SB-17-121	SB-17-121	SB-17-122	SB-17-122	SB-17-122	SB-17-123
SAMPLE ID	SB-17-118-0104	SB-17-119-0104	SB-17-120-0205	SB-17-120-0205-AVG	SB-17-120-0205-D	SB-17-121-0710	SB-17-121-1215	SB-17-122-0407	SB-17-122-0407-AVG	SB-17-122-0407-D	SB-17-123-0104
SAMPLE DATE	10/20/2008	10/16/2008	10/16/2008	10/16/2008	10/16/2008	10/16/2008	10/16/2008	10/17/2008	10/17/2008	10/17/2008	10/15/2008
SAMPLE CODE	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL
TOP DEPTH	1	1	2	2	2	7	12	4	4	4	1
BOTTOM DEPTH	4	4	5	5	5	10	15	7	7	7	4
EXPOSURE UNIT	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH
TOTAL XYLENES	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROFLUOROMETHANE	--	--	--	--	--	--	--	--	--	--	--
VINYL CHLORIDE	--	--	--	--	--	--	--	--	--	--	--
PESTICIDES/PCBS (UG/KG)											
4,4'-DDD	3.8 U	3.6 U	25 J	39.5 J	54 J	32	15	5.2 U	4.95 U	4.7 U	20
4,4'-DDE	10	2.7 J	18 J	25.5 J	33 J	15	4.4	5 U	4.85 U	4.7 U	49
4,4'-DDT	22 J	9.7 U	910 J	1555 J	2200 J	830	230	65 J	33.7 J	4.8 UJ	530
ALDRIN	2 U	1.9 U	2.2 U	2.25 U	2.3 U	2.1 U	2.1 U	2.6 U	2.5 U	2.4 U	9 U
ALPHA-BHC	2 U	1.9 U	2.2 U	2.25 U	2.3 U	2.1 U	2.1 U	2.6 U	2.5 U	2.4 U	9 U
ALPHA-CHLORDANE	1.3 J	1.2 J	19	20	21	2.1 U	1.2 J	2.6 U	2.5 U	2.4 U	200 J
BETA-BHC	2 U	1.9 U	2.2 U	2.25 U	2.3 U	2.1 U	2.1 U	2.6 U	2.5 U	2.4 U	9 U
DELTA-BHC	2 U	1.9 U	2.2 U	2.25 U	2.3 U	2.1 U	2.1 U	2.6 U	2.5 U	2.4 U	9 U
DIELDRIN	3.8 U	3.6 U	4.3 U	4.4 U	4.5 U	4.1 U	4.2 U	5 U	4.85 U	4.7 U	17 U
ENDOSULFAN I	2 U	1.9 U	2.2 U	2.25 U	2.3 U	2.1 U	2.1 U	2.6 U	2.5 U	2.4 U	9 U
ENDOSULFAN II	3.8 U	3.6 U	4.3 U	4.4 U	4.5 U	4.1 U	4.2 U	5 U	4.85 U	4.7 U	17 U
ENDOSULFAN SULFATE	3.8 U	3.6 U	4.3 U	4.4 U	4.5 U	4.1 U	4.2 U	5 U	4.85 U	4.7 U	17 U
ENDRIN	3.8 U	3.6 U	4.3 U	4.4 U	4.5 U	4.1 U	4.2 U	5 U	4.85 U	4.7 U	17 U
ENDRIN ALDEHYDE	3.8 U	3.6 U	4.3 U	4.4 U	4.5 U	4.1 U	4.2 U	5 U	4.85 U	4.7 U	17 U
ENDRIN KETONE	3.8 U	3.6 U	4.3 U	4.4 U	4.5 U	4.1 U	4.2 U	5 U	4.85 U	4.7 U	17 U
GAMMA-BHC (LINDANE)	2 U	1.9 U	2.2 U	2.25 U	2.3 U	2.1 U	2.1 U	2.6 U	2.5 U	2.4 U	9 U
GAMMA-CHLORDANE	1.1 J	1.2 J	19	20	21	2.1 U	1.1 J	2.6 U	2.5 U	2.4 U	280
HEPTACHLOR	2 U	1.9 U	1.7 J	1.7 J	2.3 U	2.1 U	2.1 U	2.6 U	2.5 U	2.4 U	11
HEPTACHLOR EPOXIDE	2 U	1.9 U	2.2 U	2.25 U	2.3 U	2.1 U	2.1 U	2.6 U	2.5 U	2.4 U	9 U
METHOXYCHLOR	20 UJ	19 U	22 U	22.5 U	23 U	21 U	21 U	26 U	25 U	24 U	90 U
PYRETHRIN I	--	--	--	--	--	--	--	--	--	--	--
PYRETHRIN II	--	--	--	--	--	--	--	--	--	--	--
PYRETHRINS	--	--	--	--	--	--	--	--	--	--	--
TOXAPHENE	38 U	36 U	43 U	44 U	45 U	41 U	42 U	50 U	48.5 U	47 U	170 U
PETROLEUM HYDROCARBONS (MG/KG)											
DIESEL RANGE ORGANICS	--	--	--	--	--	6.2 U	13	200	160	120	--

-- = The chemical was not analyzed or no value was available.

Data Qualifiers:

Blank (i.e., no qualifier) = the chemical was detected.

J = The chemical was detected but the concentration reported is an estimated value.

U = The chemical was not detected.

R = The chemical was rejected.

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-124	SB-17-125	SB-17-125	SB-17-126	SB-17-127	SB-17-128	SB-17-129	SB-17-129	SB-17-129	SB-17-130	SB-17-131
SAMPLE ID	SB-17-124-0104	SB-17-125-0104	SB-17-125-0608	SB-17-126-0104	SB-17-127-0306	SB-17-128-0506	SB-17-129-0306	SB-17-129-0306-AVG	SB-17-129-0306-D	SB-17-130-0104	SB-17-131-0104
SAMPLE DATE	10/16/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/14/2008
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL
TOP DEPTH	1	1	6	1	3	5	3	3	3	1	1
BOTTOM DEPTH	4	4	8	4	6	6	6	6	6	4	4
EXPOSURE UNIT	NORTH	NORTH	NORTH	SOUTH	SOUTH	NORTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
HERBICIDES (UG/KG)											
2,4,5-T	39 U	40 U	37 U	36 U	39 U	45 U	53 U	54 U	55 U	36 U	38 U
2,4-D	39 U	40 U	37 U	36 U	39 U	45 U	53 U	54 U	55 U	36 U	38 U
CARBARYL	23 UJ	23 UJ	25 UJ	22 U	24 U	25 UJ	130 U	170 U	210 U	22 U	23 U
DIURON	23 UJ	23 UJ	25 UJ	22 U	24 U	25 UJ	130 U	170 U	210 U	22 U	23 U
MALEIC HYDRAZIDE	23 U	23 UJ	25 UJ	22 U	24 U	25 UJ	25 UJ	33.5 UJ	42 UJ	22 U	23 U
MONURON	23 UJ	23 UJ	25 UJ	22 U	24 U	61 J	550 J	380 J	210 J	22 U	23 U
PROPOXUR	23 UJ	23 UJ	25 UJ	22 U	24 U	15 J	94 J	94 J	210 UJ	22 U	23 U
ROTENONE	23 UJ	23 UJ	25 UJ	22 UJ	24 UJ	25 UJ	130 UJ	170 UJ	210 UJ	22 UJ	23 UJ
METALS (MG/KG)											
ARSENIC	4.2	2.7 J	0.89 UJ	1.6 J	0.99 UJ	1.4 J	2 J	5.35 J	8.7 J	1.7 J	6 J
CYANIDE	0.55 U	0.55 U	0.5 U	0.5 U	0.65 U	0.65 U	0.7 U	0.75 U	0.8 U	0.6	0.55 U
LEAD	4.4	7	1.9	2.5	2.1	3.6	4.7	4.5	4.3	4.4	6.2
ZINC	16.6	24.2	13.6	15	10.3	21.6	17.5	18.85	20.2	12.6	25.5
MISCELLANEOUS PARAMETERS											
CYANIDE (MG/KG)	--	--	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--	--	--	--	--	--	--	--	--
ORGANOPHOSPHOROUS PESTICIDES (UG/KG)											
4-AMINOPYRIDINE	58 U	58 U	61 UJ	55 U	59 U	63 U	63 U	86.5 UJ	110 UJ	55 U	58 UJ
DIAZINON	58 U	58 U	61 UJ	55 U	59 U	63 U	63 U	86.5 UJ	110 UJ	55 U	58 UJ
MALATHION	58 U	58 U	61 UJ	55 U	59 U	63 U	63 U	86.5 UJ	110 UJ	55 U	58 UJ
PYRETHRINS	930 U	920 U	980 U	880 U	950 U	1000 U	1000 U	1350 U	1700 U	880 U	930 U
RESMETHRIN	470 U	460 U	490 U	440 U	480 U	510 U	510 U	680 U	850 U	440 U	470 U
SIMAZINE	58 UJ	58 UJ	61 UJ	55 UJ	59 UJ	63 UJ	63 UJ	86.5 UJ	110 UJ	55 UJ	58 UJ
SEMIVOLATILES (UG/KG)											
1,2,4-TRICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROTOLUENE	--	--	--	--	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	--	--	--	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--
2-CHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2-METHYLNAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--
2-METHYLPHENOL	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-124	SB-17-125	SB-17-125	SB-17-126	SB-17-127	SB-17-128	SB-17-129	SB-17-129	SB-17-129	SB-17-130	SB-17-131
SAMPLE ID	SB-17-124-0104	SB-17-125-0104	SB-17-125-0608	SB-17-126-0104	SB-17-127-0306	SB-17-128-0506	SB-17-129-0306	SB-17-129-0306-AVG	SB-17-129-0306-D	SB-17-130-0104	SB-17-131-0104
SAMPLE DATE	10/16/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/14/2008
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL
TOP DEPTH	1	1	6	1	3	5	3	3	3	1	1
BOTTOM DEPTH	4	4	8	4	6	6	6	6	6	4	4
EXPOSURE UNIT	NORTH	NORTH	NORTH	SOUTH	SOUTH	NORTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
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	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROANILINE	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROPHENYL PHENYL ETHER	--	--	--	--	--	--	--	--	--	--	--
4-NITROANILINE	--	--	--	--	--	--	--	--	--	--	--
4-NITROPHENOL	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHENE	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHYLENE	--	--	--	--	--	--	--	--	--	--	--
ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)PYRENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(B)FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(G,H,I)PERYLENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(K)FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	--	--	--	--	--	--	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
CARBAZOLE	--	--	--	--	--	--	--	--	--	--	--
CHRYSENE	--	--	--	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
DIBENZOFURAN	--	--	--	--	--	--	--	--	--	--	--
DIETHYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
FLUORENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBUTADIENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	--	--	--	--	--	--	--	--	--	--	--
ISOPHORONE	--	--	--	--	--	--	--	--	--	--	--
NAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-124	SB-17-125	SB-17-125	SB-17-126	SB-17-127	SB-17-128	SB-17-129	SB-17-129	SB-17-129	SB-17-130	SB-17-131
SAMPLE ID	SB-17-124-0104	SB-17-125-0104	SB-17-125-0608	SB-17-126-0104	SB-17-127-0306	SB-17-128-0506	SB-17-129-0306	SB-17-129-0306-AVG	SB-17-129-0306-D	SB-17-130-0104	SB-17-131-0104
SAMPLE DATE	10/16/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/14/2008
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL
TOP DEPTH	1	1	6	1	3	5	3	3	3	1	1
BOTTOM DEPTH	4	4	8	4	6	6	6	6	6	4	4
EXPOSURE UNIT	NORTH	NORTH	NORTH	SOUTH	SOUTH	NORTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
NITROBENZENE	--	--	--	--	--	--	--	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
PHENANTHRENE	--	--	--	--	--	--	--	--	--	--	--
PHENOL	--	--	--	--	--	--	--	--	--	--	--
PYRENE	--	--	--	--	--	--	--	--	--	--	--
VOLATILES (UG/KG)											
1,1,1-TRICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--	--	--	--	--
METHYL TERT-BUTYL ETHER	--	--	--	--	--	--	--	--	--	--	--
METHYLENE CHLORIDE	--	--	--	--	--	--	--	--	--	--	--
STYRENE	--	--	--	--	--	--	--	--	--	--	--
TETRACHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TOLUENE	--	--	--	--	--	--	--	--	--	--	--
TOTAL 1,2-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-124	SB-17-125	SB-17-125	SB-17-126	SB-17-127	SB-17-128	SB-17-129	SB-17-129	SB-17-129	SB-17-130	SB-17-131
SAMPLE ID	SB-17-124-0104	SB-17-125-0104	SB-17-125-0608	SB-17-126-0104	SB-17-127-0306	SB-17-128-0506	SB-17-129-0306	SB-17-129-0306-AVG	SB-17-129-0306-D	SB-17-130-0104	SB-17-131-0104
SAMPLE DATE	10/16/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/15/2008	10/14/2008
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL
TOP DEPTH	1	1	6	1	3	5	3	3	3	1	1
BOTTOM DEPTH	4	4	8	4	6	6	6	6	6	4	4
EXPOSURE UNIT	NORTH	NORTH	NORTH	SOUTH	SOUTH	NORTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
TOTAL XYLENES	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROFLUOROMETHANE	--	--	--	--	--	--	--	--	--	--	--
VINYL CHLORIDE	--	--	--	--	--	--	--	--	--	--	--
PESTICIDES/PCBS (UG/KG)											
4,4'-DDD	3.9 U	39 J	3.7 U	3.6 UJ	3.9 UJ	4.5 UJ	5.3 U	5.4 U	5.5 U	3.6 U	3.8 U
4,4'-DDE	8.3	67	3.7 U	3.6 U	3.9 U	4.5 U	5.3 U	5.4 U	5.5 U	3.6 U	8.4
4,4'-DDT	72	390	52	4.8 U	3.9 U	4.5 U	5.3 U	5.4 U	5.5 U	3.6 U	47
ALDRIN	2 U	2 U	1.9 U	1.9 U	2 U	2.3 U	2.7 U	2.75 U	2.8 U	1.9 U	2 U
ALPHA-BHC	2 U	2 U	1.9 U	1.9 U	2 U	2.3 U	2.7 U	2.75 U	2.8 U	1.9 U	2 U
ALPHA-CHLORDANE	2 U	32 J	1.9 U	1.9 U	3.5	2.3 U	2.7 U	2.75 U	2.8 U	1.9 U	0.78 J
BETA-BHC	2 U	2 U	1.9 U	1.9 U	2 U	2.3 U	2.7 U	2.75 U	2.8 U	1.9 U	2 U
DELTA-BHC	2 U	2 U	1.9 U	1.9 U	2 U	2.3 U	2.7 U	2.75 U	2.8 U	1.9 U	2 U
DIELDRIN	3.9 U	4 U	3.7 U	3.6 U	3.9 U	4.5 U	5.3 U	5.4 U	5.5 U	3.6 U	3.8 U
ENDOSULFAN I	2 U	2 U	1.9 U	1.9 U	2 U	2.3 U	2.7 U	2.75 U	2.8 U	1.9 U	2 U
ENDOSULFAN II	3.9 U	4 U	3.7 U	3.6 U	3.9 U	4.5 U	5.3 U	5.4 U	5.5 U	3.6 U	3.8 U
ENDOSULFAN SULFATE	3.9 U	4 U	3.7 U	3.6 U	3.9 U	4.5 U	5.3 U	5.4 U	5.5 U	3.6 U	3.8 U
ENDRIN	3.9 U	4 U	3.7 U	3.6 U	3.9 U	4.5 U	5.3 U	5.4 U	5.5 U	3.6 U	3.8 U
ENDRIN ALDEHYDE	3.9 U	4 U	3.7 U	3.6 U	3.9 U	4.5 U	5.3 U	5.4 U	5.5 U	3.6 U	3.8 U
ENDRIN KETONE	3.9 U	4 U	3.7 U	3.6 U	3.9 U	4.5 U	5.3 U	5.4 U	5.5 U	3.6 U	3.8 U
GAMMA-BHC (LINDANE)	91	2 U	1.9 U	1.9 U	2 U	2.3 U	2.7 U	2.75 U	2.8 U	1.9 U	2 U
GAMMA-CHLORDANE	2 U	2 U	1.9 U	1.9 U	3.8 J	1.1 J	2.7 U	2.75 U	2.8 U	1.9 U	1 J
HEPTACHLOR	2 U	2 U	1.9 U	1.9 U	2 U	2.3 U	2.7 U	2.75 U	2.8 U	1.9 U	2 U
HEPTACHLOR EPOXIDE	2 U	2 U	1.9 U	1.9 U	2 U	2.3 U	2.7 U	2.75 U	2.8 U	1.9 U	2 U
METHOXYCHLOR	20 U	20 U	19 U	19 U	20 U	23 U	27 U	27.5 U	28 U	19 U	20 U
PYRETHRIN I	--	--	--	--	--	--	--	--	--	--	--
PYRETHRIN II	--	--	--	--	--	--	--	--	--	--	--
PYRETHRINS	--	--	--	--	--	--	--	--	--	--	--
TOXAPHENE	39 U	40 U	37 U	36 U	39 U	45 U	53 U	54 U	55 U	36 U	38 U
PETROLEUM HYDROCARBONS (MG/KG)											
DIESEL RANGE ORGANICS	--	--	--	--	--	--	--	--	--	--	--

-- = The chemical was not analyzed or no value was available.

Data Qualifiers:

Blank (i.e., no qualifier) = the chemical was detected.

J = The chemical was detected but the concentration reported is an estimated value.

U = The chemical was not detected.

R = The chemical was rejected.

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-132	SB-17-132	SB-17-132	SB-17-132	SB-17-132	SB-17-132	SB-17-133	SB-17-141	SB-17-142	SB-17-142	SB-17-142
SAMPLE ID	SB-17-132-0104	SB-17-132-0104-AVG	SB-17-132-0104-D	SB-17-132-0408	SB-17-132-0408-AVG	SB-17-132-0408-D	SB-17-133-0104	SB-17-141-0307	SB-17-142-0203-D	SB-17-142-0203	SB-17-142-0203-AVG
SAMPLE DATE	10/14/2008	10/14/2008	10/14/2008	10/20/2008	10/20/2008	10/20/2008	10/14/2008	10/20/2008	10/15/2008	10/15/2008	10/15/2008
SAMPLE CODE	ORIG	AVG	DUP	ORIG	AVG	DUP	NORMAL	NORMAL	DUP	ORIG	AVG
TOP DEPTH	1	1	1	4	4	4	1	3	2	2	2
BOTTOM DEPTH	4	4	4	8	8	8	4	7	3	3	3
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
HERBICIDES (UG/KG)											
2,4,5-T	42 U	42 U	42 U	84 U	76 U	68 U	41 U	50 U	--	--	--
2,4-D	42 U	42 U	42 U	84 U	76 U	68 U	41 U	50 U	--	--	--
CARBARYL	26 UJ	78 UJ	130 U	31 U	34 U	37 U	27 U	30 U	--	--	--
DIURON	26 UJ	78 UJ	130 U	31 U	34 U	37 U	27 U	30 U	--	--	--
MALEIC HYDRAZIDE	26 UJ	25.5 UJ	25 UJ	31 U	34 U	37 U	27 U	30 U	--	--	--
MONURON	26 UJ	78 UJ	130 U	20 J	80 J	140 J	17 J	100	--	--	--
PROPOXUR	26 UJ	78 UJ	130 U	31 U	34 U	37 U	27 U	30 U	--	--	--
ROTENONE	26 UJ	78 UJ	130 UJ	31 U	34 U	37 U	27 UJ	30 U	--	--	--
METALS (MG/KG)											
ARSENIC	3.4 J	3.5 J	3.6 J	4.4	4	3.6	2 J	1.9	--	--	--
CYANIDE	0.6 U	0.60 U	0.6 U	1.3 UJ	1.15 UJ	1 UJ	0.6 U	0.75 UJ	--	--	--
LEAD	12.6	12.7	12.8	6.3	5.75	5.2	4.1	3	--	--	--
ZINC	27.8	28.7	29.6	33.4	29.55	25.7	13.7	15.6	--	--	--
MISCELLANEOUS PARAMETERS											
CYANIDE (MG/KG)	--	--	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--	--	--	--	--	--	--	--	--
ORGANOPHOSPHOROUS PESTICIDES (UG/KG)											
4-AMINOPYRIDINE	64 UR	63 UJ	63 UJ	78 U	85 U	92 U	67 UJ	76 U	--	--	--
DIAZINON	64 UR	63 UJ	63 UJ	78 U	85 U	92 U	67 UJ	76 U	--	--	--
MALATHION	64 UR	63 UJ	63 UJ	78 U	85 U	92 U	67 UJ	76 U	--	--	--
PYRETHRINS	1000 U	1000 U	1000 U	1300 U	1400 U	1500 U	1100 U	1200 U	870 U	880 U	875 U
RESMETHRIN	510 U	510 U	510 U	630 U	685 U	740 U	530 U	610 U	440 U	440 U	440 U
SIMAZINE	64 UR	63 UJ	63 UJ	78 UJ	85 UJ	92 UJ	67 UJ	76 UJ	--	--	--
SEMIVOLATILES (UG/KG)											
1,2,4-TRICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROTOLUENE	--	--	--	--	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	--	--	--	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--
2-CHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2-METHYLNAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--
2-METHYLPHENOL	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-132	SB-17-132	SB-17-132	SB-17-132	SB-17-132	SB-17-132	SB-17-133	SB-17-141	SB-17-142	SB-17-142	SB-17-142
SAMPLE ID	SB-17-132-0104	SB-17-132-0104-AVG	SB-17-132-0104-D	SB-17-132-0408	SB-17-132-0408-AVG	SB-17-132-0408-D	SB-17-133-0104	SB-17-141-0307	SB-17-142-0203-D	SB-17-142-0203	SB-17-142-0203-AVG
SAMPLE DATE	10/14/2008	10/14/2008	10/14/2008	10/20/2008	10/20/2008	10/20/2008	10/14/2008	10/20/2008	10/15/2008	10/15/2008	10/15/2008
SAMPLE CODE	ORIG	AVG	DUP	ORIG	AVG	DUP	NORMAL	NORMAL	DUP	ORIG	AVG
TOP DEPTH	1	1	1	4	4	4	1	3	2	2	2
BOTTOM DEPTH	4	4	4	8	8	8	4	7	3	3	3
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
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	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROANILINE	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROPHENYL PHENYL ETHER	--	--	--	--	--	--	--	--	--	--	--
4-NITROANILINE	--	--	--	--	--	--	--	--	--	--	--
4-NITROPHENOL	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHENE	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHYLENE	--	--	--	--	--	--	--	--	--	--	--
ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)PYRENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(B)FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(G,H,I)PERYLENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(K)FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	--	--	--	--	--	--	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
CARBAZOLE	--	--	--	--	--	--	--	--	--	--	--
CHRYSENE	--	--	--	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
DIBENZOFURAN	--	--	--	--	--	--	--	--	--	--	--
DIETHYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
FLUORENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBUTADIENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	--	--	--	--	--	--	--	--	--	--	--
ISOPHORONE	--	--	--	--	--	--	--	--	--	--	--
NAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-132	SB-17-132	SB-17-132	SB-17-132	SB-17-132	SB-17-132	SB-17-133	SB-17-141	SB-17-142	SB-17-142	SB-17-142
SAMPLE ID	SB-17-132-0104	SB-17-132-0104-AVG	SB-17-132-0104-D	SB-17-132-0408	SB-17-132-0408-AVG	SB-17-132-0408-D	SB-17-133-0104	SB-17-141-0307	SB-17-142-0203-D	SB-17-142-0203	SB-17-142-0203-AVG
SAMPLE DATE	10/14/2008	10/14/2008	10/14/2008	10/20/2008	10/20/2008	10/20/2008	10/14/2008	10/20/2008	10/15/2008	10/15/2008	10/15/2008
SAMPLE CODE	ORIG	AVG	DUP	ORIG	AVG	DUP	NORMAL	NORMAL	DUP	ORIG	AVG
TOP DEPTH	1	1	1	4	4	4	1	3	2	2	2
BOTTOM DEPTH	4	4	4	8	8	8	4	7	3	3	3
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
NITROBENZENE	--	--	--	--	--	--	--	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
PHENANTHRENE	--	--	--	--	--	--	--	--	--	--	--
PHENOL	--	--	--	--	--	--	--	--	--	--	--
PYRENE	--	--	--	--	--	--	--	--	--	--	--
VOLATILES (UG/KG)											
1,1,1-TRICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--	--	--	--	--
METHYL TERT-BUTYL ETHER	--	--	--	--	--	--	--	--	--	--	--
METHYLENE CHLORIDE	--	--	--	--	--	--	--	--	--	--	--
STYRENE	--	--	--	--	--	--	--	--	--	--	--
TETRACHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TOLUENE	--	--	--	--	--	--	--	--	--	--	--
TOTAL 1,2-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-132	SB-17-132	SB-17-132	SB-17-132	SB-17-132	SB-17-132	SB-17-133	SB-17-141	SB-17-142	SB-17-142	SB-17-142
SAMPLE ID	SB-17-132-0104	SB-17-132-0104-AVG	SB-17-132-0104-D	SB-17-132-0408	SB-17-132-0408-AVG	SB-17-132-0408-D	SB-17-133-0104	SB-17-141-0307	SB-17-142-0203-D	SB-17-142-0203	SB-17-142-0203-AVG
SAMPLE DATE	10/14/2008	10/14/2008	10/14/2008	10/20/2008	10/20/2008	10/20/2008	10/14/2008	10/20/2008	10/15/2008	10/15/2008	10/15/2008
SAMPLE CODE	ORIG	AVG	DUP	ORIG	AVG	DUP	NORMAL	NORMAL	DUP	ORIG	AVG
TOP DEPTH	1	1	1	4	4	4	1	3	2	2	2
BOTTOM DEPTH	4	4	4	8	8	8	4	7	3	3	3
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
TOTAL XYLENES	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROFLUOROMETHANE	--	--	--	--	--	--	--	--	--	--	--
VINYL CHLORIDE	--	--	--	--	--	--	--	--	--	--	--
PESTICIDES/PCBS (UG/KG)											
4,4'-DDD	4.2 U	4.2 U	4.2 U	8.4 U	7.6 U	6.8 U	4.1 U	5 U	3.6 UJ	3.7 UJ	3.65 UJ
4,4'-DDE	12	10.95	9.9	8.4 U	7.6 U	6.8 U	1.8 J	5 U	3.6 U	3.7 U	3.65 U
4,4'-DDT	11 U	13 U	15 U	8.4 UJ	7.6 UJ	6.8 UJ	4.1 U	13 J	3.6 U	3.7 U	3.65 U
ALDRIN	2.2 U	2.2 U	2.2 U	4.3 U	3.9 U	3.5 U	2.1 U	2.6 U	1.9 U	1.9 U	1.9 U
ALPHA-BHC	2.2 U	2.2 U	2.2 U	4.3 U	3.9 U	3.5 U	2.1 U	2.6 U	1.9 U	1.9 U	1.9 U
ALPHA-CHLORDANE	2.2 U	2.2 U	2.2 U	4.3 U	3.9 U	3.5 U	2.1 U	2.6 U	1.9 U	1.9 U	1.9 U
BETA-BHC	2.2 U	2.2 U	2.2 U	4.3 U	3.9 U	3.5 U	2.1 U	2.6 U	1.9 U	1.9 U	1.9 U
DELTA-BHC	2.2 U	2.2 U	2.2 U	4.3 U	3.9 U	3.5 U	2.1 U	2.6 U	1.9 U	1.9 U	1.9 U
DIELDRIN	4.2 U	4.2 U	4.2 U	8.4 U	7.6 U	6.8 U	4.1 U	5 U	3.6 U	3.7 U	3.65 U
ENDOSULFAN I	2.2 U	2.2 U	2.2 U	4.3 U	3.9 U	3.5 U	2.1 UJ	2.6 U	1.9 U	1.9 U	1.9 U
ENDOSULFAN II	4.2 U	4.2 U	4.2 U	8.4 U	7.6 U	6.8 U	4.1 UJ	5 U	3.6 U	3.7 U	3.65 U
ENDOSULFAN SULFATE	4.2 U	4.2 U	4.2 U	8.4 U	7.6 U	6.8 U	4.1 U	5 U	3.6 U	3.7 U	3.65 U
ENDRIN	4.2 U	4.2 U	4.2 U	8.4 U	7.6 U	6.8 U	4.1 UJ	5 U	3.6 U	3.7 U	3.65 U
ENDRIN ALDEHYDE	4.2 U	4.2 U	4.2 U	8.4 U	7.6 U	6.8 U	4.1 U	5 U	3.6 U	3.7 U	3.65 U
ENDRIN KETONE	4.2 U	4.2 U	4.2 U	8.4 U	7.6 U	6.8 U	4.1 U	5 U	3.6 U	3.7 U	3.65 U
GAMMA-BHC (LINDANE)	2.2 U	2.2 U	2.2 U	4.3 U	3.9 U	3.5 U	2.1 UJ	2.6 U	1.9 U	1.9 U	1.9 U
GAMMA-CHLORDANE	2.2 U	2.2 U	2.2 U	4.3 U	3.9 U	3.5 U	2.1 U	2.6 U	1.9 U	1.9 U	1.9 U
HEPTACHLOR	2.2 U	2.2 U	2.2 U	4.3 U	3.9 U	3.5 U	2.1 U	2.6 U	1.9 U	1.9 U	1.9 U
HEPTACHLOR EPOXIDE	2.2 U	2.2 U	2.2 U	4.3 U	3.9 U	3.5 U	2.1 U	2.6 U	1.9 U	1.9 U	1.9 U
METHOXYCHLOR	22 U	22 U	22 U	43 UJ	39 UJ	35 UJ	21 U	26 UJ	19 U	19 U	19 U
PYRETHRIN I	--	--	--	--	--	--	--	--	--	--	--
PYRETHRIN II	--	--	--	--	--	--	--	--	--	--	--
PYRETHRINS	--	--	--	--	--	--	--	--	--	--	--
TOXAPHENE	42 U	42 U	42 U	84 U	76 U	68 U	41 U	50 U	36 U	37 U	36.5 U
PETROLEUM HYDROCARBONS (MG/KG)											
DIESEL RANGE ORGANICS	--	--	--	--	--	--	--	--	--	--	--

-- = The chemical was not analyzed or no value was available.

Data Qualifiers:

Blank (i.e., no qualifier) = the chemical was detected.

J = The chemical was detected but the concentration reported is an estimated value.

U = The chemical was not detected.

R = The chemical was rejected.

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-143	SB-17-144	SB-17-145	SB-17-146	SB-17-147	SB-17-148	SB-17-149	SB-17-150	SB-17-151	SB-17-152	SB-17-154
SAMPLE ID	SB-17-143-0203	SB-17-144-0203	SB-17-145-0203	SB-17-146-0104	SB-17-147-0104	SB-17-148-0104	SB-17-149-0104	SB-17-150-0205	SB-17-151-0205	SB-17-152-0205	SB-17-154-0205
SAMPLE DATE	10/15/2008	10/15/2008	10/15/2008	4/23/2009	4/23/2009	4/23/2009	4/23/2009	4/23/2009	4/23/2009	4/23/2009	4/23/2009
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
TOP DEPTH	2	2	2	1	1	1	1	2	2	2	2
BOTTOM DEPTH	3	3	3	4	4	4	4	5	5	5	5
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	SOUTH
HERBICIDES (UG/KG)											
2,4,5-T	--	--	--	--	--	--	--	--	--	--	--
2,4-D	--	--	--	--	--	--	--	--	--	--	--
CARBARYL	--	--	--	--	--	--	--	--	--	--	--
DIURON	--	--	--	--	--	--	--	--	--	--	--
MALEIC HYDRAZIDE	--	--	--	--	--	--	--	--	--	--	--
MONURON	--	--	--	--	--	--	--	--	--	--	--
PROPOXUR	--	--	--	--	--	--	--	--	--	--	--
ROTENONE	--	--	--	--	--	--	--	--	--	--	--
METALS (MG/KG)											
ARSENIC	--	--	--	--	--	--	--	--	--	--	--
CYANIDE	--	--	--	--	--	--	--	--	--	--	--
LEAD	--	--	--	--	--	--	--	--	--	--	--
ZINC	--	--	--	--	--	--	--	--	--	--	--
MISCELLANEOUS PARAMETERS											
CYANIDE (MG/KG)	--	--	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--	--	--	--	--	--	--	--	--
ORGANOPHOSPHOROUS PESTICIDES (UG/KG)											
4-AMINOPYRIDINE	--	--	--	--	--	--	--	--	--	--	--
DIAZINON	--	--	--	--	--	--	--	--	--	--	--
MALATHION	--	--	--	--	--	--	--	--	--	--	--
PYRETHRINS	890 U	900 U	890 U	--	--	--	--	--	--	--	--
RESMETHRIN	450 U	450 U	450 U	--	--	--	--	--	--	--	--
SIMAZINE	--	--	--	--	--	--	--	--	--	--	--
SEMIVOLATILES (UG/KG)											
1,2,4-TRICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROTOLUENE	--	--	--	--	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	--	--	--	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--
2-CHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2-METHYLNAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--
2-METHYLPHENOL	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-143	SB-17-144	SB-17-145	SB-17-146	SB-17-147	SB-17-148	SB-17-149	SB-17-150	SB-17-151	SB-17-152	SB-17-154
SAMPLE ID	SB-17-143-0203	SB-17-144-0203	SB-17-145-0203	SB-17-146-0104	SB-17-147-0104	SB-17-148-0104	SB-17-149-0104	SB-17-150-0205	SB-17-151-0205	SB-17-152-0205	SB-17-154-0205
SAMPLE DATE	10/15/2008	10/15/2008	10/15/2008	4/23/2009	4/23/2009	4/23/2009	4/23/2009	4/23/2009	4/23/2009	4/23/2009	4/23/2009
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
TOP DEPTH	2	2	2	1	1	1	1	2	2	2	2
BOTTOM DEPTH	3	3	3	4	4	4	4	5	5	5	5
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	SOUTH
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	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROANILINE	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROPHENYL PHENYL ETHER	--	--	--	--	--	--	--	--	--	--	--
4-NITROANILINE	--	--	--	--	--	--	--	--	--	--	--
4-NITROPHENOL	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHENE	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHYLENE	--	--	--	--	--	--	--	--	--	--	--
ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)PYRENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(B)FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(G,H,I)PERYLENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(K)FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	--	--	--	--	--	--	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
CARBAZOLE	--	--	--	--	--	--	--	--	--	--	--
CHRYSENE	--	--	--	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
DIBENZOFURAN	--	--	--	--	--	--	--	--	--	--	--
DIETHYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
FLUORENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBUTADIENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	--	--	--	--	--	--	--	--	--	--	--
ISOPHORONE	--	--	--	--	--	--	--	--	--	--	--
NAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-143	SB-17-144	SB-17-145	SB-17-146	SB-17-147	SB-17-148	SB-17-149	SB-17-150	SB-17-151	SB-17-152	SB-17-154
SAMPLE ID	SB-17-143-0203	SB-17-144-0203	SB-17-145-0203	SB-17-146-0104	SB-17-147-0104	SB-17-148-0104	SB-17-149-0104	SB-17-150-0205	SB-17-151-0205	SB-17-152-0205	SB-17-154-0205
SAMPLE DATE	10/15/2008	10/15/2008	10/15/2008	4/23/2009	4/23/2009	4/23/2009	4/23/2009	4/23/2009	4/23/2009	4/23/2009	4/23/2009
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
TOP DEPTH	2	2	2	1	1	1	1	2	2	2	2
BOTTOM DEPTH	3	3	3	4	4	4	4	5	5	5	5
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	SOUTH
NITROBENZENE	--	--	--	--	--	--	--	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
PHENANTHRENE	--	--	--	--	--	--	--	--	--	--	--
PHENOL	--	--	--	--	--	--	--	--	--	--	--
PYRENE	--	--	--	--	--	--	--	--	--	--	--
VOLATILES (UG/KG)											
1,1,1-TRICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--	--	--	--	--
METHYL TERT-BUTYL ETHER	--	--	--	--	--	--	--	--	--	--	--
METHYLENE CHLORIDE	--	--	--	--	--	--	--	--	--	--	--
STYRENE	--	--	--	--	--	--	--	--	--	--	--
TETRACHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TOLUENE	--	--	--	--	--	--	--	--	--	--	--
TOTAL 1,2-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-143	SB-17-144	SB-17-145	SB-17-146	SB-17-147	SB-17-148	SB-17-149	SB-17-150	SB-17-151	SB-17-152	SB-17-154
SAMPLE ID	SB-17-143-0203	SB-17-144-0203	SB-17-145-0203	SB-17-146-0104	SB-17-147-0104	SB-17-148-0104	SB-17-149-0104	SB-17-150-0205	SB-17-151-0205	SB-17-152-0205	SB-17-154-0205
SAMPLE DATE	10/15/2008	10/15/2008	10/15/2008	4/23/2009	4/23/2009	4/23/2009	4/23/2009	4/23/2009	4/23/2009	4/23/2009	4/23/2009
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
TOP DEPTH	2	2	2	1	1	1	1	2	2	2	2
BOTTOM DEPTH	3	3	3	4	4	4	4	5	5	5	5
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	SOUTH
TOTAL XYLENES	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROFLUOROMETHANE	--	--	--	--	--	--	--	--	--	--	--
VINYL CHLORIDE	--	--	--	--	--	--	--	--	--	--	--
PESTICIDES/PCBS (UG/KG)											
4,4'-DDD	3.6 U	3.8 U	3.6 U	5.3	41	84	88	1.2 J	2.2 J	3.9 U	3.6 J
4,4'-DDE	3.6 UJ	13 J	8.9 J	33	63	20	36	2.9 J	13	43	12
4,4'-DDT	3.6 U	82 J	64	34	820	750	120	10	120	330	150
ALDRIN	1.9 U	1.9 U	1.9 U	2.1 U	2.1 U	2.1 U	2.1 U	2 U	2.1 U	2 U	2.3 U
ALPHA-BHC	1.9 U	1.9 U	1.9 U	2.1 U	2.1 U	2.1 U	2.1 U	2 U	2.1 U	2 U	2.3 U
ALPHA-CHLORDANE	1.9 U	14	11	0.87 J	1.1 J	2.1	5.9	0.81 J	0.96 J	700	58
BETA-BHC	1.9 U	1.9 U	1.9 U	2.1 U	2.1 U	2.1 U	2.1 U	2 U	2.1 U	8.9	2.3 U
DELTA-BHC	1.9 U	1.9 U	1.9 U	2.1 U	2.1 U	2.1 U	2.1 U	2 U	2.1 U	2 U	2.3 U
DIELDRIN	3.6 U	3.8 U	3.6 U	1.4 J	9.6	43	25	0.75 J	0.68 J	23	0.99 J
ENDOSULFAN I	1.9 UJ	1.9 UJ	1.9 UJ	2.1 U	5.9	4.3	2.1 U	2 U	2.1 U	2 U	2.3 U
ENDOSULFAN II	3.6 UJ	3.8 UJ	3.6 UJ	4.1 U	4.2 U	4 U	4 U	3.9 U	4.1 U	3.9 U	4.6 U
ENDOSULFAN SULFATE	3.6 U	3.8 U	3.6 U	4.1 U	4.2 U	4 U	4 U	3.9 U	4.1 U	3.9 U	4.6 U
ENDRIN	3.6 UJ	3.8 UJ	3.6 UJ	4.1 U	4.2 U	4 U	4 U	3.9 U	4.1 U	3.9 U	4.6 U
ENDRIN ALDEHYDE	3.6 U	3.8 U	3.6 U	4.1 U	4.2 U	4 U	4 U	3.9 U	4.1 U	3.9 U	4.6 U
ENDRIN KETONE	3.6 U	3.8 U	3.6 U	4.1 U	4.2 U	4 U	4 U	3.9 U	4.1 U	3.9 U	4.6 U
GAMMA-BHC (LINDANE)	1.9 UJ	1.9 UJ	1.9 UJ	2.1 U	2.1 U	2.1 U	2.1 U	2 U	2.1 U	2 U	2.3 U
GAMMA-CHLORDANE	1.9 U	17	10	0.81 J	1.1 J	2.2	4.1	0.87 J	0.93 J	760	62
HEPTACHLOR	1.9 U	1.9 U	1.9 U	2.1 U	2.1 U	2.1 U	2.1 U	2 U	2.1 U	270	7.6
HEPTACHLOR EPOXIDE	1.9 U	1.9 U	1.9 U	2.1 U	2.1 U	2.1 U	2.1 U	0.61 J	0.62 J	2 U	2.3 U
METHOXYCHLOR	19 U	19 U	19 U	21 U	21 U	21 U	21 U	20 U	21 U	20 U	23 U
PYRETHRIN I	--	--	--	--	--	--	--	--	--	--	--
PYRETHRIN II	--	--	--	--	--	--	--	--	--	--	--
PYRETHRINS	--	--	--	--	--	--	--	--	--	--	--
TOXAPHENE	36 U	38 U	36 U	41 U	42 U	40 U	40 U	39 U	41 U	39 U	46 U
PETROLEUM HYDROCARBONS (MG/KG)											
DIESEL RANGE ORGANICS	--	--	--	--	--	--	--	--	--	--	--

-- = The chemical was not analyzed or no value was available.

Data Qualifiers:

Blank (i.e., no qualifier) = the chemical was detected.

J = The chemical was detected but the concentration reported is an estimated value.

U = The chemical was not detected.

R = The chemical was rejected.

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-154	SB-17-154	SB-17-155	S17-00	S17-PB-01	S17-PB-02	S17-PB-03	S17-PB-04	S17-PB-05	S17-PB-05	S17-PB-05
SAMPLE ID	SB-17-154-0205-AVG	SB-17-154-0205-D	SB-17-155-0205	S17-00	S17-PB-01	S17-PB-02	S17-PB-03	S17-PB-04	S17-PB-05	S17-PB-05-AVG	S17-PB-05-D
SAMPLE DATE	4/23/2009	4/23/2009	4/23/2009	7/8/2009	7/30/2009	7/30/2009	7/30/2009	7/8/2009	7/8/2009	7/8/2009	7/8/2009
SAMPLE CODE	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP
TOP DEPTH	2	2	2	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
BOTTOM DEPTH	5	5	5	3	3	3	3	3	3	3	3
EXPOSURE UNIT	SOUTH	SOUTH	NORTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
HERBICIDES (UG/KG)											
2,4,5-T	--	--	--	--	--	--	--	--	--	--	--
2,4-D	--	--	--	--	--	--	--	--	--	--	--
CARBARYL	--	--	--	--	--	--	--	--	--	--	--
DIURON	--	--	--	--	--	--	--	--	--	--	--
MALEIC HYDRAZIDE	--	--	--	--	--	--	--	--	--	--	--
MONURON	--	--	--	--	--	--	--	--	--	--	--
PROPOXUR	--	--	--	--	--	--	--	--	--	--	--
ROTENONE	--	--	--	--	--	--	--	--	--	--	--
METALS (MG/KG)											
ARSENIC	--	--	--	--	--	--	--	--	--	--	--
CYANIDE	--	--	--	--	--	--	--	--	--	--	--
LEAD	--	--	--	--	--	--	--	--	--	--	--
ZINC	--	--	--	--	--	--	--	--	--	--	--
MISCELLANEOUS PARAMETERS											
CYANIDE (MG/KG)	--	--	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--	--	--	--	--	--	--	--	--
ORGANOPHOSPHOROUS PESTICIDES (UG/KG)											
4-AMINOPYRIDINE	--	--	--	--	--	--	--	--	--	--	--
DIAZINON	--	--	--	--	--	--	--	--	--	--	--
MALATHION	--	--	--	--	--	--	--	--	--	--	--
PYRETHRINS	--	--	--	--	--	--	--	--	--	--	--
RESMETHRIN	--	--	--	--	--	--	--	--	--	--	--
SIMAZINE	--	--	--	--	--	--	--	--	--	--	--
SEMIVOLATILES (UG/KG)											
1,2,4-TRICHLOROBENZENE	--	--	--	340 U	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	--	--	--	340 U	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	--	--	--	340 U	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	--	--	--	340 U	--	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	--	--	--	340 U	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	--	--	--	680 U	--	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	--	--	--	680 U	--	--	--	--	--	--	--
2,4-DICHLOROPHENOL	--	--	--	680 U	--	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	--	--	--	680 U	--	--	--	--	--	--	--
2,4-DINITROPHENOL	--	--	--	1400 U	--	--	--	--	--	--	--
2,4-DINITROTOLUENE	--	--	--	680 U	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	--	--	--	680 U	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	--	--	--	340 U	--	--	--	--	--	--	--
2-CHLOROPHENOL	--	--	--	340 U	--	--	--	--	--	--	--
2-METHYLNAPHTHALENE	--	--	--	340 U	--	--	--	--	--	--	--
2-METHYLPHENOL	--	--	--	680 U	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-154	SB-17-154	SB-17-155	S17-00	S17-PB-01	S17-PB-02	S17-PB-03	S17-PB-04	S17-PB-05	S17-PB-05	S17-PB-05
SAMPLE ID	SB-17-154-0205-AVG	SB-17-154-0205-D	SB-17-155-0205	S17-00	S17-PB-01	S17-PB-02	S17-PB-03	S17-PB-04	S17-PB-05	S17-PB-05-AVG	S17-PB-05-D
SAMPLE DATE	4/23/2009	4/23/2009	4/23/2009	7/8/2009	7/30/2009	7/30/2009	7/30/2009	7/8/2009	7/8/2009	7/8/2009	7/8/2009
SAMPLE CODE	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP
TOP DEPTH	2	2	2	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
BOTTOM DEPTH	5	5	5	3	3	3	3	3	3	3	3
EXPOSURE UNIT	SOUTH	SOUTH	NORTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
2-NITROANILINE	--	--	--	680 U	--	--	--	--	--	--	--
2-NITROPHENOL	--	--	--	680 U	--	--	--	--	--	--	--
3&4-METHYLPHENOL	--	--	--	680 U	--	--	--	--	--	--	--
3,3'-DICHLOROBENZIDINE	--	--	--	340 UJ	--	--	--	--	--	--	--
3-NITROANILINE	--	--	--	680 U	--	--	--	--	--	--	--
4,6-DINITRO-2-METHYLPHENOL	--	--	--	680 U	--	--	--	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	--	--	--	340 U	--	--	--	--	--	--	--
4-CHLORO-3-METHYLPHENOL	--	--	--	680 U	--	--	--	--	--	--	--
4-CHLOROANILINE	--	--	--	680 UJ	--	--	--	--	--	--	--
4-CHLOROPHENYL PHENYL ETHER	--	--	--	340 U	--	--	--	--	--	--	--
4-NITROANILINE	--	--	--	680 U	--	--	--	--	--	--	--
4-NITROPHENOL	--	--	--	1400 U	--	--	--	--	--	--	--
ACENAPHTHENE	--	--	--	340 U	--	--	--	--	--	--	--
ACENAPHTHYLENE	--	--	--	340 U	--	--	--	--	--	--	--
ANTHRACENE	--	--	--	340 U	--	--	--	--	--	--	--
BENZO(A)ANTHRACENE	--	--	--	340 U	--	--	--	--	--	--	--
BENZO(A)PYRENE	--	--	--	340 U	--	--	--	--	--	--	--
BENZO(B)FLUORANTHENE	--	--	--	340 U	--	--	--	--	--	--	--
BENZO(G,H,I)PERYLENE	--	--	--	340 U	--	--	--	--	--	--	--
BENZO(K)FLUORANTHENE	--	--	--	340 U	--	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	--	--	--	340 U	--	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	--	--	--	340 U	--	--	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	340 U	--	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--	340 U	--	--	--	--	--	--	--
CARBAZOLE	--	--	--	340 U	--	--	--	--	--	--	--
CHRYSENE	--	--	--	340 U	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	--	--	--	340 U	--	--	--	--	--	--	--
DIBENZOFURAN	--	--	--	340 U	--	--	--	--	--	--	--
DIETHYL PHTHALATE	--	--	--	340 U	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	--	--	--	340 U	--	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	--	--	--	340 U	--	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--	340 U	--	--	--	--	--	--	--
FLUORANTHENE	--	--	--	340 U	--	--	--	--	--	--	--
FLUORENE	--	--	--	340 U	--	--	--	--	--	--	--
HEXACHLOROBENZENE	--	--	--	340 U	--	--	--	--	--	--	--
HEXACHLOROBUTADIENE	--	--	--	340 U	--	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	--	--	--	680 UJ	--	--	--	--	--	--	--
HEXACHLOROETHANE	--	--	--	340 U	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	--	--	--	340 U	--	--	--	--	--	--	--
ISOPHORONE	--	--	--	340 U	--	--	--	--	--	--	--
NAPHTHALENE	--	--	--	340 U	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-154	SB-17-154	SB-17-155	S17-00	S17-PB-01	S17-PB-02	S17-PB-03	S17-PB-04	S17-PB-05	S17-PB-05	S17-PB-05
SAMPLE ID	SB-17-154-0205-AVG	SB-17-154-0205-D	SB-17-155-0205	S17-00	S17-PB-01	S17-PB-02	S17-PB-03	S17-PB-04	S17-PB-05	S17-PB-05-AVG	S17-PB-05-D
SAMPLE DATE	4/23/2009	4/23/2009	4/23/2009	7/8/2009	7/30/2009	7/30/2009	7/30/2009	7/8/2009	7/8/2009	7/8/2009	7/8/2009
SAMPLE CODE	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP
TOP DEPTH	2	2	2	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
BOTTOM DEPTH	5	5	5	3	3	3	3	3	3	3	3
EXPOSURE UNIT	SOUTH	SOUTH	NORTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
NITROBENZENE	--	--	--	340 U	--	--	--	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	--	--	--	340 U	--	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	--	--	--	340 U	--	--	--	--	--	--	--
PENTACHLOROPHENOL	--	--	--	680 U	--	--	--	--	--	--	--
PHENANTHRENE	--	--	--	340 U	--	--	--	--	--	--	--
PHENOL	--	--	--	340 U	--	--	--	--	--	--	--
PYRENE	--	--	--	340 U	--	--	--	--	--	--	--
VOLATILES (UG/KG)											
1,1,1-TRICHLOROETHANE	--	--	--	280 U	--	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	--	--	--	280 U	--	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	--	--	--	280 U	--	--	--	--	--	--	--
1,1-DICHLOROETHANE	--	--	--	280 U	--	--	--	--	--	--	--
1,1-DICHLOROETHENE	--	--	--	280 U	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	--	--	--	280 U	--	--	--	--	--	--	--
1,2-DICHLOROETHANE	--	--	--	280 U	--	--	--	--	--	--	--
1,2-DICHLOROPROPANE	--	--	--	280 U	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	--	--	--	280 U	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	--	--	--	280 U	--	--	--	--	--	--	--
2-BUTANONE	--	--	--	710 U	--	--	--	--	--	--	--
2-HEXANONE	--	--	--	710 UJ	--	--	--	--	--	--	--
4-METHYL-2-PENTANONE	--	--	--	710 U	--	--	--	--	--	--	--
ACETONE	--	--	--	710 U	--	--	--	--	--	--	--
BENZENE	--	--	--	71 U	--	--	--	--	--	--	--
BROMODICHLOROMETHANE	--	--	--	280 U	--	--	--	--	--	--	--
BROMOFORM	--	--	--	280 U	--	--	--	--	--	--	--
BROMOMETHANE	--	--	--	280 U	--	--	--	--	--	--	--
CARBON DISULFIDE	--	--	--	710 U	--	--	--	--	--	--	--
CARBON TETRACHLORIDE	--	--	--	280 UJ	--	--	--	--	--	--	--
CHLOROBENZENE	--	--	--	280 U	--	--	--	--	--	--	--
CHLORODIBROMOMETHANE	--	--	--	280 U	--	--	--	--	--	--	--
CHLOROETHANE	--	--	--	710 U	--	--	--	--	--	--	--
CHLOROFORM	--	--	--	280 U	--	--	--	--	--	--	--
CHLOROMETHANE	--	--	--	710 U	--	--	--	--	--	--	--
CIS-1,2-DICHLOROETHENE	--	--	--	280 U	--	--	--	--	--	--	--
CIS-1,3-DICHLOROPROPENE	--	--	--	280 U	--	--	--	--	--	--	--
ETHYLBENZENE	--	--	--	280 U	--	--	--	--	--	--	--
METHYL TERT-BUTYL ETHER	--	--	--	280 U	--	--	--	--	--	--	--
METHYLENE CHLORIDE	--	--	--	280 U	--	--	--	--	--	--	--
STYRENE	--	--	--	710 U	--	--	--	--	--	--	--
TETRACHLOROETHENE	--	--	--	170 J	--	--	--	--	--	--	--
TOLUENE	--	--	--	710 U	--	--	--	--	--	--	--
TOTAL 1,2-DICHLOROETHENE	--	--	--	280 U	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-154	SB-17-154	SB-17-155	S17-00	S17-PB-01	S17-PB-02	S17-PB-03	S17-PB-04	S17-PB-05	S17-PB-05	S17-PB-05
SAMPLE ID	SB-17-154-0205-AVG	SB-17-154-0205-D	SB-17-155-0205	S17-00	S17-PB-01	S17-PB-02	S17-PB-03	S17-PB-04	S17-PB-05	S17-PB-05-AVG	S17-PB-05-D
SAMPLE DATE	4/23/2009	4/23/2009	4/23/2009	7/8/2009	7/30/2009	7/30/2009	7/30/2009	7/8/2009	7/8/2009	7/8/2009	7/8/2009
SAMPLE CODE	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP
TOP DEPTH	2	2	2	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
BOTTOM DEPTH	5	5	5	3	3	3	3	3	3	3	3
EXPOSURE UNIT	SOUTH	SOUTH	NORTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
TOTAL XYLENES	--	--	--	280 U	--	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	--	--	--	280 U	--	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	--	--	--	280 U	--	--	--	--	--	--	--
TRICHLOROETHENE	--	--	--	280 U	--	--	--	--	--	--	--
TRICHLOROFLUOROMETHANE	--	--	--	280 U	--	--	--	--	--	--	--
VINYL CHLORIDE	--	--	--	280 U	--	--	--	--	--	--	--
PESTICIDES/PCBS (UG/KG)											
4,4'-DDD	6.55 J	9.5	3.5 U	40	5.6 U	6.1 U	6.2 U	18	6.9 U	6.7 U	6.5 U
4,4'-DDE	15	18	0.84 J	98	24	60	6.2 U	23	6.9 U	6.7 U	6.5 U
4,4'-DDT	180	210	1.4 J	1000	420	800	6.2 U	290	33	32	31
ALDRIN	2.3 U	2.3 U	1.8 U	18	5.6 U	6.1 U	6.2 U	6.4 U	6.9 U	6.7 U	6.5 U
ALPHA-BHC	2.3 U	2.3 U	1.8 U	6.7 U	5.6 U	6.1 U	6.2 U	6.4 U	6.9 U	6.7 U	6.5 U
ALPHA-CHLORDANE	77	96	1.8	550	140	180	6.2 U	240	12	11.5	11
BETA-BHC	2.3 U	2.3 U	1.8 U	6.7 U	5.6 U	6.1 U	6.2 U	6.4 U	6.9 U	6.7 U	6.5 U
DELTA-BHC	2.3 U	2.3 U	1.8 U	6.7 U	5.6 U	6.1 U	6.2 U	6.4 U	6.9 U	6.7 U	6.5 U
DIELDRIN	1.745 J	2.5 J	3.5 U	6.7 U	5.6 U	6.1 U	6.2 U	6.4 U	6.9 U	6.7 U	6.5 U
ENDOSULFAN I	2.3 U	2.3 U	1.8 U	6.7 U	5.6 U	6.1 U	6.2 U	50	6.9 U	6.7 U	6.5 U
ENDOSULFAN II	4.55 U	4.5 U	3.5 U	6.7 U	5.6 U	6.1 U	6.2 U	6.4 U	6.9 U	6.7 U	6.5 U
ENDOSULFAN SULFATE	4.55 U	4.5 U	3.5 U	6.7 U	5.6 U	6.1 U	6.2 U	6.4 U	6.9 U	6.7 U	6.5 U
ENDRIN	4.55 U	4.5 U	3.5 U	200	120	150	6.2 U	58	6.1 J	6.45 J	6.8
ENDRIN ALDEHYDE	4.55 U	4.5 U	3.5 U	6.7 U	5.6 U	6.1 U	6.2 U	6.4 UJ	6.9 UJ	6.7 UJ	6.5 UJ
ENDRIN KETONE	4.55 U	4.5 U	3.5 U	6.7 U	5.6 U	6.1 U	6.2 U	6.4 U	6.9 U	6.7 U	6.5 U
GAMMA-BHC (LINDANE)	1 J	1 J	1.8 U	6.7 U	5.6 U	6.1 U	6.2 U	6.4 U	6.9 U	6.7 U	6.5 U
GAMMA-CHLORDANE	81	100	1.9	550	160	190	6.2 U	240	12	11.5	11
HEPTACHLOR	9.8	12	1.8 U	100	23	27	6.2 U	220	6.9 U	6.7 U	6.5 U
HEPTACHLOR EPOXIDE	2.3 U	2.3 U	0.95 J	6.7 U	50	6.1 U	6.2 U	130	6.9 U	6.7 U	6.5 U
METHOXYCHLOR	23 U	23 U	18 U	6.7 U	5.6 U	6.1 U	6.2 U	6.4 U	6.9 U	6.7 U	6.5 U
PYRETHRIN I	--	--	--	270 U	220 U	240 U	250 U	260 U	280 U	270 U	260 U
PYRETHRIN II	--	--	--	270 U	220 U	240 U	250 U	260 U	280 U	270 U	260 U
PYRETHRINS	--	--	--	530 U	450 U	490 U	500 U	510 U	560 U	540 U	520 U
TOXAPHENE	45.5 U	45 U	35 U	670 U	560 U	610 U	620 U	640 U	690 U	670 U	650 U
PETROLEUM HYDROCARBONS (MG/KG)											
DIESEL RANGE ORGANICS	--	--	--	--	--	--	--	--	--	--	--

-- = The chemical was not analyzed or no value was available.

Data Qualifiers:

Blank (i.e., no qualifier) = the chemical was detected.

J = The chemical was detected but the concentration reported is an estimated value.

U = The chemical was not detected.

R = The chemical was rejected.

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	S17-PB-06	S17-PB-07	S17-PB-08	S17-PB-09	S17-PB-10	S17-PB-11	S17-PB-12	S17-PB-13	S17-PB-14	S17-PB-14	S17-PB-14
SAMPLE ID	S17-PB-06	S17-PB-07	S17-PB-08	S17-PB-09	S17-PB-10	S17-PB-11	S17-PB-12	S17-PB-13	S17-PB-14	S17-PB-14-AVG	S17-PB-14-D
SAMPLE DATE	7/8/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP
TOP DEPTH	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
BOTTOM DEPTH	3	3	3	3	3	3	3	3	3	3	3
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
HERBICIDES (UG/KG)											
2,4,5-T	--	--	--	--	--	--	--	--	--	--	--
2,4-D	--	--	--	--	--	--	--	--	--	--	--
CARBARYL	--	--	--	--	--	--	--	--	--	--	--
DIURON	--	--	--	--	--	--	--	--	--	--	--
MALEIC HYDRAZIDE	--	--	--	--	--	--	--	--	--	--	--
MONURON	--	--	--	--	--	--	--	--	--	--	--
PROPOXUR	--	--	--	--	--	--	--	--	--	--	--
ROTENONE	--	--	--	--	--	--	--	--	--	--	--
METALS (MG/KG)											
ARSENIC	--	--	--	--	--	--	--	--	--	--	--
CYANIDE	--	--	--	--	--	--	--	--	--	--	--
LEAD	--	--	--	--	--	--	--	--	--	--	--
ZINC	--	--	--	--	--	--	--	--	--	--	--
MISCELLANEOUS PARAMETERS											
CYANIDE (MG/KG)	--	--	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--	--	--	--	--	--	--	--	--
ORGANOPHOSPHOROUS PESTICIDES (UG/KG)											
4-AMINOPYRIDINE	--	--	--	--	--	--	--	--	--	--	--
DIAZINON	--	--	--	--	--	--	--	--	--	--	--
MALATHION	--	--	--	--	--	--	--	--	--	--	--
PYRETHRINS	--	--	--	--	--	--	--	--	--	--	--
RESMETHRIN	--	--	--	--	--	--	--	--	--	--	--
SIMAZINE	--	--	--	--	--	--	--	--	--	--	--
SEMIVOLATILES (UG/KG)											
1,2,4-TRICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROTOLUENE	--	--	--	--	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	--	--	--	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--
2-CHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2-METHYLNAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--
2-METHYLPHENOL	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	S17-PB-06	S17-PB-07	S17-PB-08	S17-PB-09	S17-PB-10	S17-PB-11	S17-PB-12	S17-PB-13	S17-PB-14	S17-PB-14	S17-PB-14
SAMPLE ID	S17-PB-06	S17-PB-07	S17-PB-08	S17-PB-09	S17-PB-10	S17-PB-11	S17-PB-12	S17-PB-13	S17-PB-14	S17-PB-14-AVG	S17-PB-14-D
SAMPLE DATE	7/8/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP
TOP DEPTH	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
BOTTOM DEPTH	3	3	3	3	3	3	3	3	3	3	3
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
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	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROANILINE	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROPHENYL PHENYL ETHER	--	--	--	--	--	--	--	--	--	--	--
4-NITROANILINE	--	--	--	--	--	--	--	--	--	--	--
4-NITROPHENOL	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHENE	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHYLENE	--	--	--	--	--	--	--	--	--	--	--
ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)PYRENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(B)FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(G,H,I)PERYLENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(K)FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	--	--	--	--	--	--	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
CARBAZOLE	--	--	--	--	--	--	--	--	--	--	--
CHRYSENE	--	--	--	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
DIBENZOFURAN	--	--	--	--	--	--	--	--	--	--	--
DIETHYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
FLUORENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBUTADIENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	--	--	--	--	--	--	--	--	--	--	--
ISOPHORONE	--	--	--	--	--	--	--	--	--	--	--
NAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	S17-PB-06	S17-PB-07	S17-PB-08	S17-PB-09	S17-PB-10	S17-PB-11	S17-PB-12	S17-PB-13	S17-PB-14	S17-PB-14	S17-PB-14
SAMPLE ID	S17-PB-06	S17-PB-07	S17-PB-08	S17-PB-09	S17-PB-10	S17-PB-11	S17-PB-12	S17-PB-13	S17-PB-14	S17-PB-14-AVG	S17-PB-14-D
SAMPLE DATE	7/8/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP
TOP DEPTH	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
BOTTOM DEPTH	3	3	3	3	3	3	3	3	3	3	3
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
NITROBENZENE	--	--	--	--	--	--	--	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
PHENANTHRENE	--	--	--	--	--	--	--	--	--	--	--
PHENOL	--	--	--	--	--	--	--	--	--	--	--
PYRENE	--	--	--	--	--	--	--	--	--	--	--
VOLATILES (UG/KG)											
1,1,1-TRICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--	--	--	--	--
METHYL TERT-BUTYL ETHER	--	--	--	--	--	--	--	--	--	--	--
METHYLENE CHLORIDE	--	--	--	--	--	--	--	--	--	--	--
STYRENE	--	--	--	--	--	--	--	--	--	--	--
TETRACHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TOLUENE	--	--	--	--	--	--	--	--	--	--	--
TOTAL 1,2-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	S17-PB-06	S17-PB-07	S17-PB-08	S17-PB-09	S17-PB-10	S17-PB-11	S17-PB-12	S17-PB-13	S17-PB-14	S17-PB-14	S17-PB-14
SAMPLE ID	S17-PB-06	S17-PB-07	S17-PB-08	S17-PB-09	S17-PB-10	S17-PB-11	S17-PB-12	S17-PB-13	S17-PB-14	S17-PB-14-AVG	S17-PB-14-D
SAMPLE DATE	7/8/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP
TOP DEPTH	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
BOTTOM DEPTH	3	3	3	3	3	3	3	3	3	3	3
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
TOTAL XYLENES	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROFLUOROMETHANE	--	--	--	--	--	--	--	--	--	--	--
VINYL CHLORIDE	--	--	--	--	--	--	--	--	--	--	--
PESTICIDES/PCBS (UG/KG)											
4,4'-DDD	53	6.1 U	14	2.3 J	6.1 U	6.3 U	6.4 U	52	51	57.5	64
4,4'-DDE	140	6.1	72	19	6.1 U	6.3 U	6.4 U	370	79	84.5	90
4,4'-DDT	1900	43	600 J	79	4.4 J	6.3 U	2.9 J	1400	1400	1700	2000
ALDRIN	31 U	6.1 U	6.4 U	5.9 U	6.1 U	6.3 U	6.4 U	29 U	30 U	30.5 U	31 U
ALPHA-BHC	31 U	6.1 U	6.4 U	5.9 U	6.1 U	6.3 U	6.4 U	29 U	30 U	30.5 U	31 U
ALPHA-CHLORDANE	660	8.4	22	9.2	6.1 U	6.3 U	5.2 J	83	270	285	300
BETA-BHC	31 U	6.1 U	6.4 U	5.9 U	6.1 U	6.3 U	6.4 U	29 U	30 U	30.5 U	31 U
DELTA-BHC	31 U	6.1 U	6.4 U	5.9 U	6.1 U	6.3 U	6.4 U	29 U	30 U	30.5 U	31 U
DIELDRIN	31 U	6.1 U	6.4 U	5.9 U	6.1 U	6.3 U	6.4 U	29 U	30 U	30.5 U	31 U
ENDOSULFAN I	31 U	6.1 U	6.4 U	5.9 U	6.1 U	6.3 U	6.4 U	29 U	30 U	30.5 U	31 U
ENDOSULFAN II	31 U	6.1 U	6.4 U	5.9 U	6.1 U	6.3 U	6.4 U	29 U	30 U	30.5 U	31 U
ENDOSULFAN SULFATE	31 U	6.1 U	6.4 U	5.9 U	6.1 U	6.3 U	6.4 U	29 U	30 U	30.5 U	31 U
ENDRIN	410	8.9	95	21	6.1 U	6.3 U	6.4 U	200	290	320	350
ENDRIN ALDEHYDE	31 UJ	6.1 UJ	6.4 UJ	5.9 UJ	6.1 UJ	6.3 UJ	6.4 UJ	29 UJ	30 UJ	30.5 UJ	31 UJ
ENDRIN KETONE	31 U	6.1 U	6.4 U	5.9 U	6.1 U	6.3 U	6.4 U	29 U	30 U	30.5 U	31 U
GAMMA-BHC (LINDANE)	31 U	6.1 U	6.4 U	5.9 U	6.1 U	6.3 U	6.4 U	29 U	30 U	30.5 U	31 U
GAMMA-CHLORDANE	690	9	23	10	6.1 U	6.3 U	2.8 J	85	280	290	300
HEPTACHLOR	57	6.1 U	2.6 J	2.5 J	6.1 U	6.3 U	6.4 U	29 U	40	39.5	39
HEPTACHLOR EPOXIDE	31 U	6.1 U	6.4 U	5.9 U	6.1 U	6.3 U	6.4 U	29 U	30 U	30.5 U	31 U
METHOXYCHLOR	31 U	6.1 U	6.4 U	5.9 U	6.1 U	6.3 U	6.4 U	29 U	30 U	30.5 U	31 U
PYRETHRIN I	1200 U	250 U	260 U	230 U	240 U	250 U	260 U	1100 U	1200 U	1250 U	1300 U
PYRETHRIN II	1200 U	250 U	260 U	230 U	240 U	250 U	260 U	1100 U	1200 U	1250 U	1300 U
PYRETHRINS	2500 U	490 U	510 U	470 U	490 U	510 U	520 U	2300 U	2400 U	2450 U	2500 U
TOXAPHENE	3100 U	610 U	640 U	590 U	610 U	630 U	640 U	2900 U	3000 U	3050 U	3100 U
PETROLEUM HYDROCARBONS (MG/KG)											
DIESEL RANGE ORGANICS	--	--	--	--	--	--	--	--	--	--	--

-- = The chemical was not analyzed or no value was available.

Data Qualifiers:

Blank (i.e., no qualifier) = the chemical was detected.

J = The chemical was detected but the concentration reported is an estimated value.

U = The chemical was not detected.

R = The chemical was rejected.

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	S17-PB-15	S17-PB-16	S17-PB-17	S17-PB-18	S17-SW-01	S17-SW-02	S17-SW-03	S17-SW-04	S17-SW-05	S17-SW-05	S17-SW-05
SAMPLE ID	S17-PB-15	S17-PB-16	S17-PB-17	S17-PB-18	S17-SW-01	S17-SW-02	S17-SW-03	S17-SW-04	S17-SW-05	S17-SW-05-AVG	S17-SW-05-D
SAMPLE DATE	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/30/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP
TOP DEPTH	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
BOTTOM DEPTH	3	3	3	3	3	3	3	3	3	3	3
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
HERBICIDES (UG/KG)											
2,4,5-T	--	--	--	--	--	--	--	--	--	--	--
2,4-D	--	--	--	--	--	--	--	--	--	--	--
CARBARYL	--	--	--	--	--	--	--	--	--	--	--
DIURON	--	--	--	--	--	--	--	--	--	--	--
MALEIC HYDRAZIDE	--	--	--	--	--	--	--	--	--	--	--
MONURON	--	--	--	--	--	--	--	--	--	--	--
PROPOXUR	--	--	--	--	--	--	--	--	--	--	--
ROTENONE	--	--	--	--	--	--	--	--	--	--	--
METALS (MG/KG)											
ARSENIC	--	--	--	--	--	--	--	--	--	--	--
CYANIDE	--	--	--	--	--	--	--	--	--	--	--
LEAD	--	--	--	--	--	--	--	--	--	--	--
ZINC	--	--	--	--	--	--	--	--	--	--	--
MISCELLANEOUS PARAMETERS											
CYANIDE (MG/KG)	--	--	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--	--	--	--	--	--	--	--	--
ORGANOPHOSPHOROUS PESTICIDES (UG/KG)											
4-AMINOPYRIDINE	--	--	--	--	--	--	--	--	--	--	--
DIAZINON	--	--	--	--	--	--	--	--	--	--	--
MALATHION	--	--	--	--	--	--	--	--	--	--	--
PYRETHRINS	--	--	--	--	--	--	--	--	--	--	--
RESMETHRIN	--	--	--	--	--	--	--	--	--	--	--
SIMAZINE	--	--	--	--	--	--	--	--	--	--	--
SEMIVOLATILES (UG/KG)											
1,2,4-TRICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROTOLUENE	--	--	--	--	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	--	--	--	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--
2-CHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2-METHYLNAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--
2-METHYLPHENOL	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	S17-PB-15	S17-PB-16	S17-PB-17	S17-PB-18	S17-SW-01	S17-SW-02	S17-SW-03	S17-SW-04	S17-SW-05	S17-SW-05	S17-SW-05
SAMPLE ID	S17-PB-15	S17-PB-16	S17-PB-17	S17-PB-18	S17-SW-01	S17-SW-02	S17-SW-03	S17-SW-04	S17-SW-05	S17-SW-05-AVG	S17-SW-05-D
SAMPLE DATE	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/30/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP
TOP DEPTH	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
BOTTOM DEPTH	3	3	3	3	3	3	3	3	3	3	3
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
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	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROANILINE	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROPHENYL PHENYL ETHER	--	--	--	--	--	--	--	--	--	--	--
4-NITROANILINE	--	--	--	--	--	--	--	--	--	--	--
4-NITROPHENOL	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHENE	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHYLENE	--	--	--	--	--	--	--	--	--	--	--
ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)PYRENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(B)FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(G,H,I)PERYLENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(K)FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	--	--	--	--	--	--	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
CARBAZOLE	--	--	--	--	--	--	--	--	--	--	--
CHRYSENE	--	--	--	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
DIBENZOFURAN	--	--	--	--	--	--	--	--	--	--	--
DIETHYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
FLUORENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBUTADIENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	--	--	--	--	--	--	--	--	--	--	--
ISOPHORONE	--	--	--	--	--	--	--	--	--	--	--
NAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	S17-PB-15	S17-PB-16	S17-PB-17	S17-PB-18	S17-SW-01	S17-SW-02	S17-SW-03	S17-SW-04	S17-SW-05	S17-SW-05	S17-SW-05
SAMPLE ID	S17-PB-15	S17-PB-16	S17-PB-17	S17-PB-18	S17-SW-01	S17-SW-02	S17-SW-03	S17-SW-04	S17-SW-05	S17-SW-05-AVG	S17-SW-05-D
SAMPLE DATE	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/30/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP
TOP DEPTH	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
BOTTOM DEPTH	3	3	3	3	3	3	3	3	3	3	3
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
NITROBENZENE	--	--	--	--	--	--	--	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
PHENANTHRENE	--	--	--	--	--	--	--	--	--	--	--
PHENOL	--	--	--	--	--	--	--	--	--	--	--
PYRENE	--	--	--	--	--	--	--	--	--	--	--
VOLATILES (UG/KG)											
1,1,1-TRICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--	--	--	--	--
METHYL TERT-BUTYL ETHER	--	--	--	--	--	--	--	--	--	--	--
METHYLENE CHLORIDE	--	--	--	--	--	--	--	--	--	--	--
STYRENE	--	--	--	--	--	--	--	--	--	--	--
TETRACHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TOLUENE	--	--	--	--	--	--	--	--	--	--	--
TOTAL 1,2-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	S17-PB-15	S17-PB-16	S17-PB-17	S17-PB-18	S17-SW-01	S17-SW-02	S17-SW-03	S17-SW-04	S17-SW-05	S17-SW-05	S17-SW-05
SAMPLE ID	S17-PB-15	S17-PB-16	S17-PB-17	S17-PB-18	S17-SW-01	S17-SW-02	S17-SW-03	S17-SW-04	S17-SW-05	S17-SW-05-AVG	S17-SW-05-D
SAMPLE DATE	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/30/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009	7/7/2009
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP
TOP DEPTH	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
BOTTOM DEPTH	3	3	3	3	3	3	3	3	3	3	3
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
TOTAL XYLENES	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROFLUOROMETHANE	--	--	--	--	--	--	--	--	--	--	--
VINYL CHLORIDE	--	--	--	--	--	--	--	--	--	--	--
PESTICIDES/PCBS (UG/KG)											
4,4'-DDD	6.4 U	6.1 U	6.1 U	6.8 U	28 U	12	6.4 U	6.2 U	6.4 U	6.4 U	6.4 U
4,4'-DDE	6.4 U	6.1 U	6.1 U	6.8 U	320	39	14	6.2 U	6.4 U	6.4 U	6.4 U
4,4'-DDT	3.4 J	6.1 U	6.1 U	6.8 U	4400	600 J	43	3.1 J	6.4 U	6.4 U	6.4 U
ALDRIN	6.4 U	6.1 U	6.1 U	6.8 U	28 U	5.9 U	6.4 U	6.2 U	6.4 U	6.4 U	6.4 U
ALPHA-BHC	6.4 U	6.1 U	6.1 U	6.8 U	28 U	5.9 U	6.4 U	6.2 U	6.4 U	6.4 U	6.4 U
ALPHA-CHLORDANE	6.4 U	6.1 U	6.1 U	6.8 U	940	44	16	6.2 U	6.4 U	6.4 U	6.4 U
BETA-BHC	6.4 U	6.1 U	6.1 U	6.8 U	28 U	5.9 U	6.4 U	6.2 U	6.4 U	6.4 U	6.4 U
DELTA-BHC	6.4 U	6.1 U	6.1 U	6.8 U	28 U	5.9 U	6.4 U	6.2 U	6.4 U	6.4 U	6.4 U
DIELDRIN	6.4 U	6.1 U	6.1 U	6.8 U	28 U	5.9 U	6.4 U	6.2 U	6.4 U	6.4 U	6.4 U
ENDOSULFAN I	6.4 U	6.1 U	6.1 U	6.8 U	28 U	5.9 U	6.4	6.2 U	6.4 U	6.4 U	6.4 U
ENDOSULFAN II	6.4 U	6.1 U	6.1 U	6.8 U	28 U	5.9 U	6.4 U	6.2 U	6.4 U	6.4 U	6.4 U
ENDOSULFAN SULFATE	6.4 U	6.1 U	6.1 U	6.8 U	28 U	5.9 U	6.4 U	6.2 U	6.4 U	6.4 U	6.4 U
ENDRIN	6.4 U	6.1 U	6.1 U	6.8 U	840	32	9	6.2 U	6.4 U	6.4 U	6.4 U
ENDRIN ALDEHYDE	6.4 UJ	6.1 UJ	6.1 UJ	6.8 UJ	28 U	5.9 UJ	6.4 UJ	6.2 UJ	6.4 UJ	6.4 UJ	6.4 UJ
ENDRIN KETONE	6.4 U	6.1 U	6.1 U	6.8 U	28 U	5.9 U	6.4 U	6.2 U	6.4 U	6.4 U	6.4 U
GAMMA-BHC (LINDANE)	6.4 U	6.1 U	6.1 U	6.8 U	28 U	5.9 U	6.4 U	6.2 U	6.4 U	6.4 U	6.4 U
GAMMA-CHLORDANE	6.4 U	6.1 U	6.1 U	6.8 U	960	42	17	6.2 U	6.4 U	6.4 U	6.4 U
HEPTACHLOR	6.4 U	6.1 U	6.1 U	6.8 U	130	6.4	6 J	6.2 U	6.4 U	6.4 U	6.4 U
HEPTACHLOR EPOXIDE	6.4 U	6.1 U	6.1 U	6.8 U	28 U	5.9 U	12	6.2 U	6.4 U	6.4 U	6.4 U
METHOXYCHLOR	6.4 U	6.1 U	6.1 U	6.8 U	28 U	5.9 U	6.4 U	6.2 U	6.4 U	6.4 U	6.4 U
PYRETHRIN I	260 U	240 U	240 U	270 U	1100 U	240 U	250 U	250 U	260 U	260 U	260 U
PYRETHRIN II	260 U	240 U	240 U	270 U	1100 U	240 U	250 U	250 U	260 U	260 U	260 U
PYRETHRINS	510 U	490 U	480 U	550 U	2200 U	470 U	510 U	490 U	510 U	515 U	520 U
TOXAPHENE	640 U	610 U	610 U	680 U	2800 U	590 U	640 U	620 U	640 U	640 U	640 U
PETROLEUM HYDROCARBONS (MG/KG)											
DIESEL RANGE ORGANICS	--	--	--	--	--	--	--	--	--	--	--

-- = The chemical was not analyzed or no value was available.

Data Qualifiers:

Blank (i.e., no qualifier) = the chemical was detected.

J = The chemical was detected but the concentration reported is an estimated value.

U = The chemical was not detected.

R = The chemical was rejected.

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	S17-SW-06	SB-17-202	SB-17-203	SB-17-205	SB-17-205	SB-17-205	SB-17-206	SB-17-207	SB-17-208	SB-17-208	SB-17-208
SAMPLE ID	S17-SW-06	SB-17-202-0205	SB-17-203-0205	SB-17-205-0205	SB-17-205-0205-AVG	SB-17-205-0205-D	SB-17-206-0103	SB-17-207-0103	SB-17-208-0103	SB-17-208-0103-AVG	SB-17-208-0103-D
SAMPLE DATE	7/7/2009	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	ORIG	AVG	DUP
TOP DEPTH	2.75	2	2	2	2	2	1	1	1	1	1
BOTTOM DEPTH	3	5	5	5	5	5	3	3	3	3	3
EXPOSURE UNIT	SOUTH	NORTH	NORTH	NORTH	NORTH	NORTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
HERBICIDES (UG/KG)											
2,4,5-T	--	--	--	--	--	--	--	--	--	--	--
2,4-D	--	--	--	--	--	--	--	--	--	--	--
CARBARYL	--	--	--	--	--	--	--	--	--	--	--
DIURON	--	--	--	--	--	--	--	--	--	--	--
MALEIC HYDRAZIDE	--	--	--	--	--	--	--	--	--	--	--
MONURON	--	--	--	--	--	--	--	--	--	--	--
PROPOXUR	--	--	--	--	--	--	--	--	--	--	--
ROTENONE	--	--	--	--	--	--	--	--	--	--	--
METALS (MG/KG)											
ARSENIC	--	--	--	--	--	--	2.9	6	5	6.2	7.4
CYANIDE	--	--	--	--	--	--	--	--	--	--	--
LEAD	--	--	--	--	--	--	15.9	3.8	5	5.65	6.3
ZINC	--	--	--	--	--	--	28.1	19	17.3	20.65	24
MISCELLANEOUS PARAMETERS											
CYANIDE (MG/KG)	--	--	--	--	--	--	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
TOTAL ORGANIC CARBON (MG/KG)	--	--	--	--	--	--	--	--	--	--	--
ORGANOPHOSPHOROUS PESTICIDES (UG/KG)											
4-AMINOPYRIDINE	--	--	--	--	--	--	--	--	--	--	--
DIAZINON	--	--	--	--	--	--	--	--	--	--	--
MALATHION	--	--	--	--	--	--	--	--	--	--	--
PYRETHRINS	--	--	--	--	--	--	--	--	--	--	--
RESMETHRIN	--	--	--	--	--	--	--	--	--	--	--
SIMAZINE	--	--	--	--	--	--	--	--	--	--	--
SEMIVOLATILES (UG/KG)											
1,2,4-TRICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DICHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROTOLUENE	--	--	--	--	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	--	--	--	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--
2-CHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
2-METHYLNAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--
2-METHYLPHENOL	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	S17-SW-06	SB-17-202	SB-17-203	SB-17-205	SB-17-205	SB-17-205	SB-17-206	SB-17-207	SB-17-208	SB-17-208	SB-17-208
SAMPLE ID	S17-SW-06	SB-17-202-0205	SB-17-203-0205	SB-17-205-0205	SB-17-205-0205-AVG	SB-17-205-0205-D	SB-17-206-0103	SB-17-207-0103	SB-17-208-0103	SB-17-208-0103-AVG	SB-17-208-0103-D
SAMPLE DATE	7/7/2009	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	ORIG	AVG	DUP
TOP DEPTH	2.75	2	2	2	2	2	1	1	1	1	1
BOTTOM DEPTH	3	5	5	5	5	5	3	3	3	3	3
EXPOSURE UNIT	SOUTH	NORTH	NORTH	NORTH	NORTH	NORTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
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	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROANILINE	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROPHENYL PHENYL ETHER	--	--	--	--	--	--	--	--	--	--	--
4-NITROANILINE	--	--	--	--	--	--	--	--	--	--	--
4-NITROPHENOL	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHENE	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHYLENE	--	--	--	--	--	--	--	--	--	--	--
ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)PYRENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(B)FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(G,H,I)PERYLENE	--	--	--	--	--	--	--	--	--	--	--
BENZO(K)FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	--	--	--	--	--	--	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
CARBAZOLE	--	--	--	--	--	--	--	--	--	--	--
CHRYSENE	--	--	--	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	--	--	--	--	--	--	--	--	--	--	--
DIBENZOFURAN	--	--	--	--	--	--	--	--	--	--	--
DIETHYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--	--	--	--	--	--	--	--	--
FLUORANTHENE	--	--	--	--	--	--	--	--	--	--	--
FLUORENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBUTADIENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	--	--	--	--	--	--	--	--	--	--	--
ISOPHORONE	--	--	--	--	--	--	--	--	--	--	--
NAPHTHALENE	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	S17-SW-06	SB-17-202	SB-17-203	SB-17-205	SB-17-205	SB-17-205	SB-17-206	SB-17-207	SB-17-208	SB-17-208	SB-17-208
SAMPLE ID	S17-SW-06	SB-17-202-0205	SB-17-203-0205	SB-17-205-0205	SB-17-205-0205-AVG	SB-17-205-0205-D	SB-17-206-0103	SB-17-207-0103	SB-17-208-0103	SB-17-208-0103-AVG	SB-17-208-0103-D
SAMPLE DATE	7/7/2009	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	ORIG	AVG	DUP
TOP DEPTH	2.75	2	2	2	2	2	1	1	1	1	1
BOTTOM DEPTH	3	5	5	5	5	5	3	3	3	3	3
EXPOSURE UNIT	SOUTH	NORTH	NORTH	NORTH	NORTH	NORTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
NITROBENZENE	--	--	--	--	--	--	--	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROPHENOL	--	--	--	--	--	--	--	--	--	--	--
PHENANTHRENE	--	--	--	--	--	--	--	--	--	--	--
PHENOL	--	--	--	--	--	--	--	--	--	--	--
PYRENE	--	--	--	--	--	--	--	--	--	--	--
VOLATILES (UG/KG)											
1,1,1-TRICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--	--	--	--	--
METHYL TERT-BUTYL ETHER	--	--	--	--	--	--	--	--	--	--	--
METHYLENE CHLORIDE	--	--	--	--	--	--	--	--	--	--	--
STYRENE	--	--	--	--	--	--	--	--	--	--	--
TETRACHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TOLUENE	--	--	--	--	--	--	--	--	--	--	--
TOTAL 1,2-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	S17-SW-06	SB-17-202	SB-17-203	SB-17-205	SB-17-205	SB-17-205	SB-17-206	SB-17-207	SB-17-208	SB-17-208	SB-17-208
SAMPLE ID	S17-SW-06	SB-17-202-0205	SB-17-203-0205	SB-17-205-0205	SB-17-205-0205-AVG	SB-17-205-0205-D	SB-17-206-0103	SB-17-207-0103	SB-17-208-0103	SB-17-208-0103-AVG	SB-17-208-0103-D
SAMPLE DATE	7/7/2009	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010	7/8/2010
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	ORIG	AVG	DUP
TOP DEPTH	2.75	2	2	2	2	2	1	1	1	1	1
BOTTOM DEPTH	3	5	5	5	5	5	3	3	3	3	3
EXPOSURE UNIT	SOUTH	NORTH	NORTH	NORTH	NORTH	NORTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
TOTAL XYLENES	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROFLUOROMETHANE	--	--	--	--	--	--	--	--	--	--	--
VINYL CHLORIDE	--	--	--	--	--	--	--	--	--	--	--
PESTICIDES/PCBS (UG/KG)											
4,4'-DDD	6.1 U	190 J	200 J	91	100.5	110	63 J	21 J	3 J	3 J	--
4,4'-DDE	11	280 J	1000 J	85	79	73 J	72 J	44 J	5.4 J	5.4 J	--
4,4'-DDT	63	8600 J	10000 J	4000	3700	3400 J	650 J	590 J	36 J	36 J	--
ALDRIN	6.1 U	0.2 UJ	0.18 UJ	0.21 U	0.21 U	0.21 U	0.18 UJ	0.18 UJ	0.18 UJ	0.18 UJ	--
ALPHA-BHC	6.1 U	0.2 UJ	0.18 UJ	0.21 U	0.21 U	0.21 U	0.18 UJ	0.18 UJ	0.18 UJ	0.18 UJ	--
ALPHA-CHLORDANE	4.5 J	520 J	2900 J	160 J	330 J	170 J	3100 J	170 J	7.6 J	7.6 J	--
BETA-BHC	6.1 U	0.2 UJ	0.18 UJ	0.21 U	0.21 U	0.21 U	0.18 UJ	0.18 UJ	0.18 UJ	0.18 UJ	--
DELTA-BHC	6.1 U	0.2 UJ	0.18 UJ	0.21 U	0.21 U	0.21 U	0.18 UJ	0.18 UJ	0.18 UJ	0.18 UJ	--
DIELDRIN	6.1 U	0.38 UJ	0.35 UJ	0.4 U	0.4 U	0.4 U	0.35 UJ	0.35 UJ	0.34 UJ	0.34 UJ	--
ENDOSULFAN I	6.1 U	0.2 UJ	0.18 UJ	0.21 U	0.21 U	0.21 U	0.18 UJ	0.18 UJ	0.18 UJ	0.18 UJ	--
ENDOSULFAN II	6.1 U	0.38 UJ	0.35 UJ	0.4 U	0.4 U	0.4 U	0.35 UJ	0.35 UJ	0.34 UJ	0.34 UJ	--
ENDOSULFAN SULFATE	6.1 U	0.38 UJ	0.35 UJ	0.4 UJ	0.4 UJ	0.4 UJ	0.35 UJ	0.35 UJ	0.34 UJ	0.34 UJ	--
ENDRIN	11	0.38 UJ	0.35 UJ	0.4 U	0.4 U	0.4 U	0.35 UJ	0.35 UJ	0.34 UJ	0.34 UJ	--
ENDRIN ALDEHYDE	6.1 UJ	0.38 UJ	0.35 UJ	0.4 U	0.4 U	0.4 U	0.35 UJ	0.35 UJ	0.34 UJ	0.34 UJ	--
ENDRIN KETONE	6.1 U	0.38 UJ	0.35 UJ	0.4 U	0.4 U	0.4 U	0.35 UJ	0.35 UJ	0.34 UJ	0.34 UJ	--
GAMMA-BHC (LINDANE)	6.1 U	0.2 UJ	0.18 UJ	0.21 U	0.21 U	0.21 U	0.18 UJ	0.18 UJ	0.18 UJ	0.18 UJ	--
GAMMA-CHLORDANE	5 J	460 J	2600 J	160	175	190 J	2700 J	140 J	6.3 J	6.3 J	--
HEPTACHLOR	6.1 U	38 J	200 J	45 J	45 J	45 J	390 J	26 J	0.21 J	0.21 J	--
HEPTACHLOR EPOXIDE	6.1 U	100 J	580 J	180 J	215 J	250 J	530 J	45 J	1.7 J	1.7 J	--
METHOXYCHLOR	6.1 U	2 UJ	1.8 UJ	2.1 U	2.1 U	2.1 U	1.8 UJ	1.8 UJ	1.8 UJ	1.8 UJ	--
PYRETHRIN I	240 U	--	--	--	--	--	--	--	--	--	--
PYRETHRIN II	240 U	--	--	--	--	--	--	--	--	--	--
PYRETHRINS	490 U	--	--	--	--	--	--	--	--	--	--
TOXAPHENE	610 U	3.7 UJ	3.4 UJ	3.9 U	3.9 U	3.9 U	3.4 UJ	3.4 UJ	3.3 UJ	3.3 UJ	--
PETROLEUM HYDROCARBONS (MG/KG)											
DIESEL RANGE ORGANICS	--	--	--	--	--	--	--	--	--	--	--

-- = The chemical was not analyzed or no value was available.

Data Qualifiers:

Blank (i.e., no qualifier) = the chemical was detected.

J = The chemical was detected but the concentration reported is an estimated value.

U = The chemical was not detected.

R = The chemical was rejected.

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-209	SB-17-210	GRID A BOTTOM	GRID A BOTTOM	GRID A BOTTOM	GRID A SOUTH SIDEWALL	GRID A WEST SIDEWALL A	GRID A WEST SIDEWALL B	GRID B BOTTOM
SAMPLE ID	SB-17-209-0103	SB-17-210-0103	GRID A BOTTOM	GRID A BOTTOM-AVG	GRID A BOTTOM-D	GRID A SOUTH SIDEWALL	GRID A WEST SIDEWALL A	GRID A WEST SIDEWALL B	GRID B BOTTOM
SAMPLE DATE	7/8/2010	7/8/2010	12/15/2010	12/15'2010	12/15/2010	12/15/2010	12/15/2010	12/15/2010	12/15/2010
SAMPLE CODE	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	1	1	2	2	2	2	2	2	2
BOTTOM DEPTH	3	3	6	6	6	6	6	6	6
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
HERBICIDES (UG/KG)									
2,4,5-T	--	--	--	--	--	--	--	--	--
2,4-D	--	--	--	--	--	--	--	--	--
CARBARYL	--	--	--	--	--	--	--	--	--
DIURON	--	--	--	--	--	--	--	--	--
MALEIC HYDRAZIDE	--	--	--	--	--	--	--	--	--
MONURON	--	--	--	--	--	--	--	--	--
PROPOXUR	--	--	--	--	--	--	--	--	--
ROTENONE	--	--	--	--	--	--	--	--	--
METALS (MG/KG)									
ARSENIC	6.2	3.6	--	--	--	--	--	--	--
CYANIDE	--	--	--	--	--	--	--	--	--
LEAD	5.3	11.8	--	--	--	--	--	--	--
ZINC	19.3	21.5	--	--	--	--	--	--	--
MISCELLANEOUS PARAMETERS									
CYANIDE (MG/KG)	0.44 U	0.44 U	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--	--	--	--	--	--	--
ORGANOPHOSPHOROUS PESTICIDES (UG/KG)									
4-AMINOPYRIDINE	--	--	--	--	--	--	--	--	--
DIAZINON	--	--	--	--	--	--	--	--	--
MALATHION	--	--	--	--	--	--	--	--	--
PYRETHRINS	--	--	--	--	--	--	--	--	--
RESMETHRIN	--	--	--	--	--	--	--	--	--
SIMAZINE	--	--	--	--	--	--	--	--	--
SEMIVOLATILES (UG/KG)									
1,2,4-TRICHLOROBENZENE	--	--	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	--	--	--	--	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	--	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	--	--	--	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	--	--	--	--	--	--	--	--	--
2,4-DICHLOROPHENOL	--	--	--	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	--	--	--	--	--	--	--	--	--
2,4-DINITROPHENOL	--	--	--	--	--	--	--	--	--
2,4-DINITROTOLUENE	--	--	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	--	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	--	--	--	--	--	--	--	--	--
2-CHLOROPHENOL	--	--	--	--	--	--	--	--	--
2-METHYLNAPHTHALENE	--	--	--	--	--	--	--	--	--
2-METHYLPHENOL	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-209	SB-17-210	GRID A BOTTOM	GRID A BOTTOM	GRID A BOTTOM	GRID A SOUTH SIDEWALL	GRID A WEST SIDEWALL A	GRID A WEST SIDEWALL B	GRID B BOTTOM
SAMPLE ID	SB-17-209-0103	SB-17-210-0103	GRID A BOTTOM	GRID A BOTTOM-AVG	GRID A BOTTOM-D	GRID A SOUTH SIDEWALL	GRID A WEST SIDEWALL A	GRID A WEST SIDEWALL B	GRID B BOTTOM
SAMPLE DATE	7/8/2010	7/8/2010	12/15/2010	12/15'2010	12/15/2010	12/15/2010	12/15/2010	12/15/2010	12/15/2010
SAMPLE CODE	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	1	1	2	2	2	2	2	2	2
BOTTOM DEPTH	3	3	6	6	6	6	6	6	6
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
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	--	--	--	--	--	--	--	--	--
4-CHLOROANILINE	--	--	--	--	--	--	--	--	--
4-CHLOROPHENYL PHENYL ETHER	--	--	--	--	--	--	--	--	--
4-NITROANILINE	--	--	--	--	--	--	--	--	--
4-NITROPHENOL	--	--	--	--	--	--	--	--	--
ACENAPHTHENE	--	--	--	--	--	--	--	--	--
ACENAPHTHYLENE	--	--	--	--	--	--	--	--	--
ANTHRACENE	--	--	--	--	--	--	--	--	--
BENZO(A)ANTHRACENE	--	--	--	--	--	--	--	--	--
BENZO(A)PYRENE	--	--	--	--	--	--	--	--	--
BENZO(B)FLUORANTHENE	--	--	--	--	--	--	--	--	--
BENZO(G,H,I)PERYLENE	--	--	--	--	--	--	--	--	--
BENZO(K)FLUORANTHENE	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	--	--	--	--	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--	--	--	--	--	--	--
CARBAZOLE	--	--	--	--	--	--	--	--	--
CHRYSENE	--	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	--	--	--	--	--	--	--	--	--
DIBENZOFURAN	--	--	--	--	--	--	--	--	--
DIETHYL PHTHALATE	--	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	--	--	--	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	--	--	--	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--	--	--	--	--	--	--
FLUORANTHENE	--	--	--	--	--	--	--	--	--
FLUORENE	--	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	--	--	--	--	--	--	--	--	--
HEXACHLOROBUTADIENE	--	--	--	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	--	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	--	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	--	--	--	--	--	--	--	--	--
ISOPHORONE	--	--	--	--	--	--	--	--	--
NAPHTHALENE	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-209	SB-17-210	GRID A BOTTOM	GRID A BOTTOM	GRID A BOTTOM	GRID A SOUTH SIDEWALL	GRID A WEST SIDEWALL A	GRID A WEST SIDEWALL B	GRID B BOTTOM
SAMPLE ID	SB-17-209-0103	SB-17-210-0103	GRID A BOTTOM	GRID A BOTTOM-AVG	GRID A BOTTOM-D	GRID A SOUTH SIDEWALL	GRID A WEST SIDEWALL A	GRID A WEST SIDEWALL B	GRID B BOTTOM
SAMPLE DATE	7/8/2010	7/8/2010	12/15/2010	12/15'2010	12/15/2010	12/15/2010	12/15/2010	12/15/2010	12/15/2010
SAMPLE CODE	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	1	1	2	2	2	2	2	2	2
BOTTOM DEPTH	3	3	6	6	6	6	6	6	6
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
NITROBENZENE	--	--	--	--	--	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	--	--	--	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	--	--	--	--	--	--	--	--	--
PENTACHLOROPHENOL	--	--	--	--	--	--	--	--	--
PHENANTHRENE	--	--	--	--	--	--	--	--	--
PHENOL	--	--	--	--	--	--	--	--	--
PYRENE	--	--	--	--	--	--	--	--	--
VOLATILES (UG/KG)									
1,1,1-TRICHLOROETHANE	--	--	--	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	--	--	--	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHANE	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHENE	--	--	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--	--	--
METHYL TERT-BUTYL ETHER	--	--	--	--	--	--	--	--	--
METHYLENE CHLORIDE	--	--	--	--	--	--	--	--	--
STYRENE	--	--	--	--	--	--	--	--	--
TETRACHLOROETHENE	--	--	--	--	--	--	--	--	--
TOLUENE	--	--	--	--	--	--	--	--	--
TOTAL 1,2-DICHLOROETHENE	--	--	--	--	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	SB-17-209	SB-17-210	GRID A BOTTOM	GRID A BOTTOM	GRID A BOTTOM	GRID A SOUTH SIDEWALL	GRID A WEST SIDEWALL A	GRID A WEST SIDEWALL B	GRID B BOTTOM
SAMPLE ID	SB-17-209-0103	SB-17-210-0103	GRID A BOTTOM	GRID A BOTTOM-AVG	GRID A BOTTOM-D	GRID A SOUTH SIDEWALL	GRID A WEST SIDEWALL A	GRID A WEST SIDEWALL B	GRID B BOTTOM
SAMPLE DATE	7/8/2010	7/8/2010	12/15/2010	12/15'2010	12/15/2010	12/15/2010	12/15/2010	12/15/2010	12/15/2010
SAMPLE CODE	NORMAL	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	1	1	2	2	2	2	2	2	2
BOTTOM DEPTH	3	3	6	6	6	6	6	6	6
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
TOTAL XYLENES	--	--	--	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	--	--	--	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	--	--	--	--	--	--	--	--	--
TRICHLOROETHENE	--	--	--	--	--	--	--	--	--
TRICHLOROFLUOROMETHANE	--	--	--	--	--	--	--	--	--
VINYL CHLORIDE	--	--	--	--	--	--	--	--	--
PESTICIDES/PCBS (UG/KG)									
4,4'-DDD	6.7	1.1 J	271	268	265	1.1 J	16	1.7 J	63
4,4'-DDE	16	5.9 J	50	45	40	1.2 J	1 U	1.9 J	11 J
4,4'-DDT	81 J	14 J	9000	8225	7450	12	502	34	2940
ALDRIN	0.18 U	0.18 UJ	2.4 U	2.3 U	2.2 U	0.26 U	0.26 U	0.24 U	2.4 U
ALPHA-BHC	0.18 U	0.18 UJ	2.4 U	2.3 U	2.2 U	0.26 U	0.26 U	0.24 U	2.4 U
ALPHA-CHLORDANE	8.2	2.8 J	35	28.5	22	7.5	0.13 U	11	1.2 U
BETA-BHC	0.18 U	0.18 UJ	3.6 U	3.45 U	3.3 U	0.39 U	0.39 U	0.36 U	3.6 U
DELTA-BHC	0.18 U	0.18 UJ	2.4 U	2.3 U	2.2 U	0.26 U	0.26 U	0.24 U	2.4 U
DIELDRIN	0.35 U	0.35 UJ	1.2 U	1.05 U	1.1 U	0.13 U	0.13 U	0.12 U	1.2 U
ENDOSULFAN I	0.18 U	0.18 UJ	3.6 U	3.45 U	3.3 U	0.39 U	0.39 U	0.36 U	3.6 U
ENDOSULFAN II	0.35 U	0.35 UJ	1.2 U	1.05 U	1.1 U	0.13 U	0.13 U	0.12 U	1.2 U
ENDOSULFAN SULFATE	0.35 UJ	0.35 UJ	3.6 U	3.45 U	3.3 U	0.39 U	0.39 U	0.36 U	3.6 U
ENDRIN	0.35 U	0.35 UJ	1.2 U	1.05 U	1.1 U	0.13 U	0.13 U	0.12 U	1.2 U
ENDRIN ALDEHYDE	0.35 U	0.35 UJ	3.6 U	3.45 U	3.3 U	0.39 U	0.39 U	0.36 U	3.6 U
ENDRIN KETONE	0.35 U	0.35 UJ	12 U	11.5 U	11 U	1.3 U	1.3 U	1.2 U	12 U
GAMMA-BHC (LINDANE)	0.18 U	0.18 UJ	0.96 U	0.92 U	0.88 U	0.10 U	0.1 U	0.10 U	0.96 U
GAMMA-CHLORDANE	6.7	2 J	21	20.5	20	5.1	0.78 U	6.7	7.2 U
HEPTACHLOR	0.18 U	0.24 J	3.0 J	2.05	2.2 U	0.26 U	0.4 J	0.30 J	2.4 U
HEPTACHLOR EPOXIDE	0.81 J	0.18 UJ	1.2 U	1.05 U	1.1 U	0.13 U	0.13 U	3.0	1.2 U
METHOXYCHLOR	1.8 U	1.8 UJ	29 U	27.5 U	26 U	3.1 U	3.1 U	2.9 U	29 U
PYRETHRIN I	--	--	--	--	--	--	--	--	--
PYRETHRIN II	--	--	--	--	--	--	--	--	--
PYRETHRINS	--	--	--	--	--	--	--	--	--
TOXAPHENE	3.4 U	3.4 UJ	89 U		81 U	9.6 U	9.6 U	8.9 U	89 U
PETROLEUM HYDROCARBONS (MG/KG)									
DIESEL RANGE ORGANICS	--	--							

-- = The chemical was not analyzed or no value was available.

Data Qualifiers:

Blank (i.e., no qualifier) = the chemical was detected.

J = The chemical was detected but the concentration reported is an estimated value.

U = The chemical was not detected.

R = The chemical was rejected.

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	GRID B EAST SIDEWALL A	GRID B EAST SIDEWALL B	GRID A NORTH SIDEWALL	GRID B SOUTH SIDEWALL	GRID B NORTH SIDEWALL #2
SAMPLE ID	GRID B EAST SIDEWALL A	GRID B EAST SIDEWALL B	GRID A NORTH SIDEWALL	GRID B SOUTH SIDEWALL	GRID B NORTH SIDEWALL #2
SAMPLE DATE	12/15/2010	12/15/2010	12/15/2010	12/15/2010	12/22/2010
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	2	2	2	2	2
BOTTOM DEPTH	6	6	6	6	6
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
HERBICIDES (UG/KG)					
2,4,5-T	--	--	--	--	--
2,4-D	--	--	--	--	--
CARBARYL	--	--	--	--	--
DIURON	--	--	--	--	--
MALEIC HYDRAZIDE	--	--	--	--	--
MONURON	--	--	--	--	--
PROPOXUR	--	--	--	--	--
ROTENONE	--	--	--	--	--
METALS (MG/KG)					
ARSENIC	--	--	--	--	--
CYANIDE	--	--	--	--	--
LEAD	--	--	--	--	--
ZINC	--	--	--	--	--
MISCELLANEOUS PARAMETERS					
CYANIDE (MG/KG)	--	--	--	--	--
TOTAL ORGANIC CARBON (MG/KG)	--	--	--	--	--
ORGANOPHOSPHOROUS PESTICIDES (UG/KG)					
4-AMINOPYRIDINE	--	--	--	--	--
DIAZINON	--	--	--	--	--
MALATHION	--	--	--	--	--
PYRETHRINS	--	--	--	--	--
RESMETHRIN	--	--	--	--	--
SIMAZINE	--	--	--	--	--
SEMIVOLATILES (UG/KG)					
1,2,4-TRICHLOROBENZENE	--	--	--	--	--
1,2-DICHLOROBENZENE	--	--	--	--	--
1,3-DICHLOROBENZENE	--	--	--	--	--
1,4-DICHLOROBENZENE	--	--	--	--	--
2,2'-OXYBIS(1-CHLOROPROPANE)	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	--	--	--	--	--
2,4-DICHLOROPHENOL	--	--	--	--	--
2,4-DIMETHYLPHENOL	--	--	--	--	--
2,4-DINITROPHENOL	--	--	--	--	--
2,4-DINITROTOLUENE	--	--	--	--	--
2,6-DINITROTOLUENE	--	--	--	--	--
2-CHLORONAPHTHALENE	--	--	--	--	--
2-CHLOROPHENOL	--	--	--	--	--
2-METHYLNAPHTHALENE	--	--	--	--	--
2-METHYLPHENOL	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	GRID B EAST SIDEWALL A	GRID B EAST SIDEWALL B	GRID A NORTH SIDEWALL	GRID B SOUTH SIDEWALL	GRID B NORTH SIDEWALL #2
SAMPLE ID	GRID B EAST SIDEWALL A	GRID B EAST SIDEWALL B	GRID A NORTH SIDEWALL	GRID B SOUTH SIDEWALL	GRID B NORTH SIDEWALL #2
SAMPLE DATE	12/15/2010	12/15/2010	12/15/2010	12/15/2010	12/22/2010
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	2	2	2	2	2
BOTTOM DEPTH	6	6	6	6	6
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
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	--	--	--	--	--
4-CHLOROANILINE	--	--	--	--	--
4-CHLOROPHENYL PHENYL ETHER	--	--	--	--	--
4-NITROANILINE	--	--	--	--	--
4-NITROPHENOL	--	--	--	--	--
ACENAPHTHENE	--	--	--	--	--
ACENAPHTHYLENE	--	--	--	--	--
ANTHRACENE	--	--	--	--	--
BENZO(A)ANTHRACENE	--	--	--	--	--
BENZO(A)PYRENE	--	--	--	--	--
BENZO(B)FLUORANTHENE	--	--	--	--	--
BENZO(G,H,I)PERYLENE	--	--	--	--	--
BENZO(K)FLUORANTHENE	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--	--	--
CARBAZOLE	--	--	--	--	--
CHRYSENE	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	--	--	--	--	--
DIBENZOFURAN	--	--	--	--	--
DIETHYL PHTHALATE	--	--	--	--	--
DIMETHYL PHTHALATE	--	--	--	--	--
DI-N-BUTYL PHTHALATE	--	--	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--	--	--
FLUORANTHENE	--	--	--	--	--
FLUORENE	--	--	--	--	--
HEXACHLOROBENZENE	--	--	--	--	--
HEXACHLOROBUTADIENE	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	--	--	--	--	--
HEXACHLOROETHANE	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	--	--	--	--	--
ISOPHORONE	--	--	--	--	--
NAPHTHALENE	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	GRID B EAST SIDEWALL A	GRID B EAST SIDEWALL B	GRID A NORTH SIDEWALL	GRID B SOUTH SIDEWALL	GRID B NORTH SIDEWALL #2
SAMPLE ID	GRID B EAST SIDEWALL A	GRID B EAST SIDEWALL B	GRID A NORTH SIDEWALL	GRID B SOUTH SIDEWALL	GRID B NORTH SIDEWALL #2
SAMPLE DATE	12/15/2010	12/15/2010	12/15/2010	12/15/2010	12/22/2010
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	2	2	2	2	2
BOTTOM DEPTH	6	6	6	6	6
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
NITROBENZENE	--	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	--	--	--	--	--
N-NITROSODIPHENYLAMINE	--	--	--	--	--
PENTACHLOROPHENOL	--	--	--	--	--
PHENANTHRENE	--	--	--	--	--
PHENOL	--	--	--	--	--
PYRENE	--	--	--	--	--
VOLATILES (UG/KG)					
1,1,1-TRICHLOROETHANE	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	--	--	--	--	--
1,1,2-TRICHLOROETHANE	--	--	--	--	--
1,1-DICHLOROETHANE	--	--	--	--	--
1,1-DICHLOROETHENE	--	--	--	--	--
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	--	--	--	--	--
METHYL TERT-BUTYL ETHER	--	--	--	--	--
METHYLENE CHLORIDE	--	--	--	--	--
STYRENE	--	--	--	--	--
TETRACHLOROETHENE	--	--	--	--	--
TOLUENE	--	--	--	--	--
TOTAL 1,2-DICHLOROETHENE	--	--	--	--	--

TABLE B-2
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION SUBSURFACE SOIL SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	GRID B EAST SIDEWALL A	GRID B EAST SIDEWALL B	GRID A NORTH SIDEWALL	GRID B SOUTH SIDEWALL	GRID B NORTH SIDEWALL #2
SAMPLE ID	GRID B EAST SIDEWALL A	GRID B EAST SIDEWALL B	GRID A NORTH SIDEWALL	GRID B SOUTH SIDEWALL	GRID B NORTH SIDEWALL #2
SAMPLE DATE	12/15/2010	12/15/2010	12/15/2010	12/15/2010	12/22/2010
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	2	2	2	2	2
BOTTOM DEPTH	6	6	6	6	6
EXPOSURE UNIT	SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
TOTAL XYLENES	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	--	--	--	--	--
TRICHLOROETHENE	--	--	--	--	--
TRICHLOROFLUOROMETHANE	--	--	--	--	--
VINYL CHLORIDE	--	--	--	--	--
PESTICIDES/PCBS (UG/KG)					
4,4'-DDD	5.5	313 J	3.3 J	0.36 U	8.6
4,4'-DDE	17	69 J	0.96 U	0.96 U	4.1
4,4'-DDT	150	15200	242	8.8	677
ALDRIN	0.24 U	2.6 UJ	0.24 U	0.24 U	0.24 U
ALPHA-BHC	0.24 U	2.6 UJ	0.24 U	0.24 U	0.24 U
ALPHA-CHLORDANE	0.12 U	74 J	0.12 U	0.12 U	0.12 U
BETA-BHC	0.36 U	3.9 UJ	0.36 U	0.36 U	0.36 U
DELTA-BHC	0.24 U	2.6 UJ	0.24 U	0.24 U	0.24 U
DIELDRIN	0.12 U	1.3 UJ	0.12 U	0.12 U	0.12 U
ENDOSULFAN I	0.36 U	3.9 UJ	0.36 U	0.36 U	0.36 U
ENDOSULFAN II	0.12 U	1.3 UJ	0.12 U	0.12 U	0.12 U
ENDOSULFAN SULFATE	0.36 U	3.9 UJ	0.36 U	0.36 U	0.36 U
ENDRIN	0.12 U	1.3 UJ	0.12 U	0.12 U	0.12 U
ENDRIN ALDEHYDE	0.36 U	3.9 UJ	0.36 U	0.36 U	0.36 U
ENDRIN KETONE	1.2 U	13 UJ	1.3 U	1.2 U	1.2 U
GAMMA-BHC (LINDANE)	0.10 U	1 UJ	0.1 U	0.10 U	0.10 U
GAMMA-CHLORDANE	0.72 U	68 J	0.72 U	0.72 U	0.72 U
HEPTACHLOR	0.24 U	18 J	0.24 U	0.24 U	0.24 U
HEPTACHLOR EPOXIDE	0.12 U	1.3 UJ	0.12 U	0.12 U	0.12 U
METHOXYCHLOR	2.9 U	31 UJ	3.1 U	2.9 U	2.9 U
PYRETHRIN I	--	--	--	--	--
PYRETHRIN II	--	--	--	--	--
PYRETHRINS	--	--	--	--	--
TOXAPHENE	8.9 U	96 UJ	9.6 U	8.9 U	8.9 U
PETROLEUM HYDROCARBONS (MG/KG)					
DIESEL RANGE ORGANICS					

-- = The chemical was not analyzed or no value was available.

Data Qualifiers:

Blank (i.e., no qualifier) = the chemical was detected.

J = The chemical was detected but the concentration reported is an estimated value.

U = The chemical was not detected.

R = The chemical was rejected.

B.3 CURRENT CONDITION GROUNDWATER ANALYTICAL RESULTS

TABLE B-3
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION GROUNDWATER SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	MW-17-01	MW-17-02	MW-17-03	MW-17-04	MW-NASB-065	MW-NASB-066	MW-NASB-067
SAMPLE ID	MW-17-01-L-20100921	MW-17-02-L-20100920	MW-17-03-L-20100920	MW-17-04-L-20100921	MW-NASB-065-L-20100920	MW-NASB-066-L-20100921	MW-NASB-067-L-20100921
SAMPLE DATE	9/21/2010	9/20/2010	9/20/2010	9/21/2010	9/20/2010	9/21/2010	9/21/2010
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
EPH MADEP (UG/L)							
2-METHYLNAPHTHALENE	5 U	3 J	5.1 U	5.8 UJ	5 U	5.6 U	5 U
ACENAPHTHENE	5 U	5.6 U	5.1 U	5.8 UJ	5 U	5.6 U	5 U
ACENAPHTHYLENE	5 U	5.6 U	5.1 U	5.8 UJ	5 U	5.6 U	5 U
ANTHRACENE	5 U	5.6 U	5.1 U	5.8 UJ	5 U	5.6 U	5 U
BENZO(A)ANTHRACENE	5 U	5.6 U	5.1 U	5.8 UJ	5 U	5.6 U	5 U
BENZO(A)PYRENE	5 U	5.6 U	5.1 U	5.8 UJ	5 U	5.6 U	5 U
BENZO(B)FLUORANTHENE	5 U	5.6 U	5.1 U	5.8 UJ	5 U	5.6 U	5 U
BENZO(G,H,I)PERYLENE	5 U	5.6 U	5.1 U	5.8 UJ	5 U	5.6 U	5 U
BENZO(K)FLUORANTHENE	5 U	5.6 U	5.1 U	5.8 UJ	5 U	5.6 U	5 U
C11-C22 AROMATICS	100 U	140	100 U	120 UJ	100 U	110 U	100 U
C11-C22 AROMATICS-UNADJ	100 U	146	100 U	120 UJ	100 U	110 U	100 U
C19-C36 ALIPHATICS	200 U	382	338	200 UJ	263	200 U	200 U
C9-C18 ALIPHATICS	200 U	139	100 U	200 UJ	100 U	200 U	200 U
CHRYSENE	5 U	5.6 U	5.1 U	5.8 UJ	5 U	5.6 U	5 U
DIBENZO(A,H)ANTHRACENE	5 U	5.6 U	5.1 U	5.8 UJ	5 U	5.6 U	5 U
FLUORANTHENE	5 U	5.6 U	5.1 U	5.8 UJ	5 U	5.6 U	5 U
FLUORENE	5 U	5.6 U	5.1 U	5.8 UJ	5 U	5.6 U	5 U
INDENO(1,2,3-CD)PYRENE	5 U	5.6 U	5.1 U	5.8 UJ	5 U	5.6 U	5 U
NAPHTHALENE	5 U	3.3 J	5.1 U	5.8 UJ	5 U	5.6 U	5 U
PHENANTHRENE	5 U	5.6 U	5.1 U	5.8 UJ	5 U	5.6 U	5 U
PYRENE	5 U	5.6 U	5.1 U	5.8 UJ	5 U	5.6 U	5 U
FIELD (C)							
TEMPERATURE	12.29	14.46	12.16	14.64	13.22	15.53	14.55
FIELD (MG/L)							
DISSOLVED OXYGEN	7.76	0.49	0.32	10.8	0.21	0.43	0.65
FIELD (MV)							
OXIDATION REDUCTION POTENTIAL	3.7	128	-49.5	76	-5.8	49.6	-11.3
FIELD (NTU)							
TURBIDITY	1.88	0.95	1.93	2.33	1.36	8.57	2.7
FIELD (S.U.)							
PH	5.29	4.67	5.27	4.95	5.63	5.32	5.62
FIELD (US/CM)							
SPECIFIC CONDUCTANCE	154	71	181	80	137	124	159
HERBICIDES (UG/L)							
2,4,5-T	NA	NA	NA	NA	NA	NA	NA
2,4-D	NA	NA	NA	NA	NA	NA	NA
CARBARYL	NA	NA	NA	NA	NA	NA	NA

TABLE B-3
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION GROUNDWATER SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	MW-17-01	MW-17-02	MW-17-03	MW-17-04	MW-NASB-065	MW-NASB-066	MW-NASB-067
SAMPLE ID	MW-17-01-L-20100921	MW-17-02-L-20100920	MW-17-03-L-20100920	MW-17-04-L-20100921	MW-NASB-065-L-20100920	MW-NASB-066-L-20100921	MW-NASB-067-L-20100921
SAMPLE DATE	9/21/2010	9/20/2010	9/20/2010	9/21/2010	9/20/2010	9/21/2010	9/21/2010
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DIURON	NA	NA	NA	NA	NA	NA	NA
MALEIC HYDRAZIDE	NA	NA	NA	NA	NA	NA	NA
MONURON	NA	NA	NA	NA	NA	NA	NA
PROPOXUR	NA	NA	NA	NA	NA	NA	NA
ROTENONE	NA	NA	NA	NA	NA	NA	NA
METALS (UG/L)							
ARSENIC	NA	NA	NA	NA	NA	NA	NA
CYANIDE	NA	NA	NA	NA	NA	NA	NA
LEAD	NA	NA	NA	NA	NA	NA	NA
ZINC	NA	NA	NA	NA	NA	NA	NA
ORGANOPHOSPHOROUS PESTICIDES (UG/L)							
4-AMINOPYRIDINE	NA	NA	NA	NA	NA	NA	NA
DIAZINON	NA	NA	NA	NA	NA	NA	NA
MALATHION	NA	NA	NA	NA	NA	NA	NA
PYRETHRINS	NA	NA	NA	NA	NA	NA	NA
RESMETHRIN	NA	NA	NA	NA	NA	NA	NA
SIMAZINE	NA	NA	NA	NA	NA	NA	NA
PESTICIDES/PCBS (UG/L)							
4,4'-DDD	0.05 UJ	9.1	0.05 UJ	0.056 UJ	0.056 UJ	0.054 UJ	0.098 J
4,4'-DDE	0.05 UJ	0.13 J	0.05 UJ	0.056 UJ	0.056 UJ	0.054 UJ	0.057 U
4,4'-DDT	0.05 UJ	3.9 J	0.05 UJ	0.042 J	0.056 UJ	0.054 UJ	0.28 J
ALDRIN	0.05 UJ	0.054 UJ	0.05 UJ	0.056 UJ	0.056 UJ	0.054 UJ	0.057 UJ
ALPHA-BHC	0.05 U	0.054 UJ	0.05 UJ	0.056 U	0.056 U	0.054 U	0.057 U
ALPHA-CHLORDANE	0.05 UJ	0.054 UJ	0.05 UJ	0.056 UJ	0.056 UJ	0.054 UJ	0.057 UJ
BETA-BHC	0.05 U	0.054 UJ	0.05 UJ	0.056 U	0.056 U	0.054 U	0.057 U
DELTA-BHC	0.05 UJ	0.054 UJ	0.05 UJ	0.056 UJ	0.056 UJ	0.054 UJ	0.057 UJ
DIELDRIN	0.05 UJ	0.054 UJ	0.05 UJ	0.056 UJ	0.056 UJ	0.054 UJ	0.057 UJ
ENDOSULFAN I	0.05 UJ	0.054 UJ	0.05 UJ	0.056 UJ	0.056 UJ	0.054 UJ	0.057 UJ
ENDOSULFAN II	0.05 UJ	0.054 UJ	0.05 UJ	0.056 UJ	0.056 UJ	0.054 UJ	0.057 UJ
ENDOSULFAN SULFATE	0.05 UJ	0.054 UJ	0.05 UJ	0.056 UJ	0.056 UJ	0.054 UJ	0.057 UJ
ENDRIN	0.05 UJ	0.054 UJ	0.05 UJ	0.056 UJ	0.056 UJ	0.054 UJ	0.057 UJ
ENDRIN ALDEHYDE	0.05 UJ	0.054 UJ	0.05 UJ	0.056 UJ	0.056 UJ	0.054 UJ	0.057 UJ
ENDRIN KETONE	0.05 UJ	0.054 UJ	0.05 UJ	0.056 UJ	0.056 UJ	0.054 UJ	0.057 UJ
GAMMA-BHC (LINDANE)	0.05 UJ	0.054 UJ	0.05 UJ	0.056 UJ	0.056 UJ	0.054 UJ	0.057 UJ
GAMMA-CHLORDANE	0.05 UJ	0.054 UJ	0.05 UJ	0.056 UJ	0.056 UJ	0.054 UJ	0.057 UJ
HEPTACHLOR	0.05 UJ	0.054 UJ	0.05 UJ	0.056 UJ	0.056 UJ	0.054 UJ	0.057 UJ
HEPTACHLOR EPOXIDE	0.05 UJ	0.054 UJ	0.05 UJ	0.17 J	0.056 UJ	0.054 UJ	0.057 UJ
METHOXYCHLOR	0.05 UJ	0.054 UJ	0.05 UJ	0.056 UJ	0.056 UJ	0.054 UJ	0.057 UJ

TABLE B-3
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION GROUNDWATER SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	MW-17-01	MW-17-02	MW-17-03	MW-17-04	MW-NASB-065	MW-NASB-066	MW-NASB-067
SAMPLE ID	MW-17-01-L-20100921	MW-17-02-L-20100920	MW-17-03-L-20100920	MW-17-04-L-20100921	MW-NASB-065-L-20100920	MW-NASB-066-L-20100921	MW-NASB-067-L-20100921
SAMPLE DATE	9/21/2010	9/20/2010	9/20/2010	9/21/2010	9/20/2010	9/21/2010	9/21/2010
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOTAL DDT HALFND	NA	NA	NA	NA	NA	NA	NA
TOTAL DDT POS	NA	NA	NA	NA	NA	NA	NA
TOXAPHENE	2.5 U	2.7 U	2.5 U	2.8 U	2.8 U	2.7 U	2.8 U
PETROLEUM HYDROCARBONS (UG/L)							
DIESEL RANGE ORGANICS	NA	NA	NA	NA	NA	NA	NA
VPH MADEP (UG/L)							
BENZENE	2 U	2 U	2 U	2 U	2 U	2 U	2 U
C5-C8 ALIPHATICS	50 U	50 U	50 U	50 U	50 U	50 U	50 U
C5-C8 ALIPHATICS-UNADJ	50 U	50 U	50 U	50 U	50 U	50 U	50 U
C9-C10 AROMATICS-UNADJ	50 U	50 U	50 U	50 U	50 U	50 U	50 U
C9-C12 ALIPHATICS	50 U	50 U	50 U	50 U	50 U	50 U	50 U
C9-C12 ALIPHATICS-UNADJ	50 U	50 U	50 U	50 U	50 U	50 U	50 U
ETHYLBENZENE	2 U	2 U	2 U	2 U	2 U	2 U	2 U
M+P-XYLENES	2 U	2 U	2 U	2 U	2 U	2 U	2 U
METHYL TERT-BUTYL ETHER	1 U	1.8	5.6	1 U	1 U	1.4	1.6
NAPHTHALENE	3 U	3 U	3 U	3 U	3 U	3 U	3 U
O-XYLENE	2 U	2 U	2 U	2 U	2 U	2 U	2 U
TOLUENE	2 U	2 U	2 U	2 U	2 U	2 U	2 U

NA Not analyzed.

Data Qualifiers:

Blank (i.e., no qualifier) = the chemical was detected.

J = The chemical was detected but the concentration reported is an estimated value.

U = The chemical was not detected.

R = The chemical was rejected.

TABLE B-3
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION GROUNDWATER SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	MW-NASB-068	MW-NASB-097	MW-NASB-097		MW-NASB-098
SAMPLE ID	MW-NASB-068-L-20100920	MW-NASB-097-L-20100920	MW-NASB-097-L-20100920-AVG	MW-NASB-097-L-20100920-D	MW-NASB-098-L-20100921
SAMPLE DATE	9/20/2010	9/20/2010	9/20/2010	9/20/2010	9/21/2010
SAMPLE CODE	NORMAL	ORIG	AVG	DUP	NORMAL
EPH MADEP (UG/L)					
2-METHYLNAPHTHALENE	5 U	6.7 U	6.35 U	6 U	5.7 U
ACENAPHTHENE	5 U	6.7 U	6.35 U	6 U	5.7 U
ACENAPHTHYLENE	5 U	6.7 U	6.35 U	6 U	5.7 U
ANTHRACENE	5 U	6.7 U	6.35 U	6 U	5.7 U
BENZO(A)ANTHRACENE	5 U	6.7 U	6.35 U	6 U	5.7 U
BENZO(A)PYRENE	5 U	6.7 U	6.35 U	6 U	5.7 U
BENZO(B)FLUORANTHENE	5 U	6.7 U	6.35 U	6 U	5.7 U
BENZO(G,H,I)PERYLENE	5 U	6.7 U	6.35 U	6 U	5.7 U
BENZO(K)FLUORANTHENE	5 U	6.7 U	6.35 U	6 U	5.7 U
C11-C22 AROMATICS	100 U	241	205.5	170	110 U
C11-C22 AROMATICS-UNADJ	100 U	241	205.5	170	110 U
C19-C36 ALIPHATICS	511	875	825	775	200 U
C9-C18 ALIPHATICS	100 U	130 U	125 U	120 U	200 U
CHRYSENE	5 U	6.7 U	6.35 U	6 U	5.7 U
DIBENZO(A,H)ANTHRACENE	5 U	6.7 U	6.35 U	6 U	5.7 U
FLUORANTHENE	5 U	6.7 U	6.35 U	6 U	5.7 U
FLUORENE	5 U	6.7 U	6.35 U	6 U	5.7 U
INDENO(1,2,3-CD)PYRENE	5 U	6.7 U	6.35 U	6 U	5.7 U
NAPHTHALENE	5 U	6.7 U	6.35 U	6 U	5.7 U
PHENANTHRENE	5 U	6.7 U	6.35 U	6 U	5.7 U
PYRENE	5 U	6.7 U	6.35 U	6 U	5.7 U
FIELD (C)					
TEMPERATURE	15.23	17.45	17.45	NA	15.2
FIELD (MG/L)					
DISSOLVED OXYGEN	5.37	0.23	0.23	NA	9.1
FIELD (MV)					
OXIDATION REDUCTION POTENTIAL	22.6	70.3	70.3	NA	-29.5
FIELD (NTU)					
TURBIDITY	3.24	10.2	10.2	NA	1.99
FIELD (S.U.)					
PH	5.66	5.61	5.61	NA	5.74
FIELD (US/CM)					
SPECIFIC CONDUCTANCE	113	69	69	NA	94
HERBICIDES (UG/L)					
2,4,5-T	NA	NA	NA	NA	NA
2,4-D	NA	NA	NA	NA	NA
CARBARYL	NA	NA	NA	NA	NA

TABLE B-3
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION GROUNDWATER SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	MW-NASB-068	MW-NASB-097	MW-NASB-097		MW-NASB-098
SAMPLE ID	MW-NASB-068-L-20100920	MW-NASB-097-L-20100920	MW-NASB-097-L-20100920-AVG	MW-NASB-097-L-20100920-D	MW-NASB-098-L-20100921
SAMPLE DATE	9/20/2010	9/20/2010	9/20/2010	9/20/2010	9/21/2010
SAMPLE CODE	NORMAL	ORIG	AVG	DUP	NORMAL
DIURON	NA	NA	NA	NA	NA
MALEIC HYDRAZIDE	NA	NA	NA	NA	NA
MONURON	NA	NA	NA	NA	NA
PROPOXUR	NA	NA	NA	NA	NA
ROTENONE	NA	NA	NA	NA	NA
METALS (UG/L)					
ARSENIC	NA	NA	NA	NA	NA
CYANIDE	NA	NA	NA	NA	NA
LEAD	NA	NA	NA	NA	NA
ZINC	NA	NA	NA	NA	NA
ORGANOPHOSPHOROUS PESTICID					
4-AMINOPYRIDINE	NA	NA	NA	NA	NA
DIAZINON	NA	NA	NA	NA	NA
MALATHION	NA	NA	NA	NA	NA
PYRETHRINS	NA	NA	NA	NA	NA
RESMETHRIN	NA	NA	NA	NA	NA
SIMAZINE	NA	NA	NA	NA	NA
PESTICIDES/PCBS (UG/L)					
4,4'-DDD	0.054 UJ	0.069 J	0.0495	0.06 UJ	0.056 UJ
4,4'-DDE	0.054 UJ	0.034 J	0.034 J	0.06 UJ	0.056 UJ
4,4'-DDT	0.054 UJ	0.1 J	0.083	0.066 J	0.056 UJ
ALDRIN	0.054 UJ	0.061 UJ	0.0605 U	0.06 UJ	0.056 UJ
ALPHA-BHC	0.054 U	0.061 UJ	0.0605 U	0.06 UJ	0.056 UJ
ALPHA-CHLORDANE	0.054 UJ	0.061 UJ	0.0605 U	0.06 UJ	0.056 UJ
BETA-BHC	0.054 U	0.061 UJ	0.0605 U	0.06 UJ	0.056 UJ
DELTA-BHC	0.054 UJ	0.061 UJ	0.0605 U	0.06 UJ	0.056 UJ
DIELDRIN	0.054 UJ	0.061 UJ	0.0605 U	0.06 UJ	0.056 UJ
ENDOSULFAN I	0.054 UJ	0.061 UJ	0.0605 U	0.06 UJ	0.056 UJ
ENDOSULFAN II	0.054 UJ	0.061 UJ	0.0605 U	0.06 UJ	0.056 UJ
ENDOSULFAN SULFATE	0.054 UJ	0.061 UJ	0.0605 U	0.06 UJ	0.056 UJ
ENDRIN	0.054 UJ	0.061 UJ	0.0605 U	0.06 UJ	0.056 UJ
ENDRIN ALDEHYDE	0.054 UJ	0.061 UJ	0.0605 U	0.06 UJ	0.056 UJ
ENDRIN KETONE	0.054 UJ	0.061 UJ	0.0605 U	0.06 UJ	0.056 UJ
GAMMA-BHC (LINDANE)	0.054 UJ	0.061 UJ	0.0605 U	0.06 UJ	0.056 UJ
GAMMA-CHLORDANE	0.054 UJ	0.061 UJ	0.0605 U	0.06 UJ	0.056 UJ
HEPTACHLOR	0.054 UJ	0.061 UJ	0.0605 U	0.06 UJ	0.056 UJ
HEPTACHLOR EPOXIDE	0.054 UJ	0.061 UJ	0.0605 U	0.06 UJ	0.056 UJ
METHOXYCHLOR	0.054 UJ	0.061 UJ	0.0605 U	0.06 UJ	0.056 UJ

TABLE B-3
SITE 17 REMEDIAL INVESTIGATION
CURRENT CONDITION GROUNDWATER SAMPLE RESULTS
NAS BRUNSWICK, BRUNSWICK, MAINE

LOCATION	MW-NASB-068	MW-NASB-097	MW-NASB-097		MW-NASB-098
SAMPLE ID	MW-NASB-068-L-20100920	MW-NASB-097-L-20100920	MW-NASB-097-L-20100920-A	MW-NASB-097-L-20100920-D	MW-NASB-098-L-20100921
SAMPLE DATE	9/20/2010	9/20/2010	9/20/2010	9/20/2010	9/21/2010
SAMPLE CODE	NORMAL	ORIG	AVG	DUP	NORMAL
TOTAL DDT HALFND	NA	NA	NA	NA	NA
TOTAL DDT POS	NA	NA	NA	NA	NA
TOXAPHENE	2.7 U	3 U	3 U	3 U	2.8 U
PETROLEUM HYDROCARBONS (UG					
DIESEL RANGE ORGANICS	NA	NA	NA	NA	NA
VPH MADEP (UG/L)					
BENZENE	2 U	2 U	2 U	2 U	2 U
C5-C8 ALIPHATICS	50 U	50 U	50 U	50 U	50 U
C5-C8 ALIPHATICS-UNADJ	50 U	50 U	50 U	50 U	50 U
C9-C10 AROMATICS-UNADJ	50 U	50 U	50 U	50 U	50 U
C9-C12 ALIPHATICS	50 U	50 U	50 U	50 U	50 U
C9-C12 ALIPHATICS-UNADJ	50 U	50 U	50 U	50 U	50 U
ETHYLBENZENE	2 U	2 U	2 U	2 U	2 U
M+P-XYLENES	2 U	2 U	2 U	2 U	2 U
METHYL TERT-BUTYL ETHER	1 U	1 U	1 U	1 U	1 U
NAPHTHALENE	3 U	3 U	3 U	3 U	3 U
O-XYLENE	2 U	2 U	2 U	2 U	2 U
TOLUENE	2 U	2 U	2 U	2 U	2 U

NA Not analyzed.

Data Qualifiers:

Blank (i.e., no qualifier) = the chemical was detected.

J = The chemical was detected but the concentration rep

U = The chemical was not detected.

R = The chemical was rejected.

APPENDIX C
RISK ASSESSMENT APPENDICES

C.1 HUMAN HEALTH RISK ASSESSMENT

C.2 ECOLOGICAL RISK ASSESSMENT

C.1 HUMAN HEALTH RISK ASSESSMENT

APPENDIX C-1 HUMAN HEALTH RISK ASSESSMENT

The objective of this human health risk assessment (HHRA) is to determine whether concentrations of chemicals detected in Site 17 soils and groundwater pose a significant threat to potential human receptors under current or future land use scenarios. The potential risks to human health at the site are estimated based on the assumption that no actions will be taken to address current conditions.

C.1 INTRODUCTION

The following current USEPA risk assessment guidance documents were used to develop the framework for the HHRA:

- Conducting Human Health Risk Assessments Under the Environmental Restoration Program. Chief of Naval Operations (N45) 5090 Ser N453E/1U595168, Fe 12, 2001 (U.S. Navy, 2001).

- Navy Human Health Risk Assessment Webpage: http://www-nehc.med.navy.mil/hhra/.

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

- Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors (USEPA, 1991).

- Distribution of Preliminary Review Draft: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure (USEPA, 1993).

- Guidance for Human Health Risk Assessments for Hazardous Substance Sites in Maine. State of Maine Department of Environmental Protection and Center for Disease Control (July 2009).

- Exposure Factors Handbook. Office of Health and Environmental Assessment (USEPA, 1997).

- Risk Assessment Guidance for Superfund: Volume 1 - Human Health Evaluation Manual (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments) (USEPA, 2001).

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

- Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. (US, EPA 2002).

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

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

This HHRA consists of five components: data evaluation, exposure assessment, toxicity assessment, risk characterization, and uncertainty analysis. Sections C.2 through C.6 contain detailed discussions of the five components of the HHRA.

To assess potential public health risks, four major aspects of chemical contamination and exposure must be considered: (1) contaminants with toxic characteristics must be found in environmental media; (2) the contaminants must be released by either natural processes or by human action; (3) potential exposure points must exist; and (4) human receptors must be present at the point of exposure. Risk is a function of both toxicity and exposure; without one of the factors listed above, there is no risk.

C.2 DATA EVALUATION

The main objective of data evaluation is to develop a medium-specific list of chemicals of potential concern (COPCs) that is used to quantitatively determine potential human health risks.

The selection of COPCs is a qualitative screening process limiting the number of chemicals that are quantitatively evaluated in a HHRA to those site-related constituents that dominate overall potential risks. In general, a chemical was selected as a COPC and retained for further risk evaluation if the

maximum detected concentration in a sampled medium exceeded the risk-based COPC screening level.

C.2.1 COPC Screening Level Development

Screening Levels for Soil

Soil screening concentrations were based on USEPA residential Regional Screening Levels (RSLs) (USEPA, November 2010). The risk-based screening concentrations used for COPC selection correspond to a systemic Hazard Quotient (HQ) of 0.1 (for noncarcinogens) or a lifetime cancer risk of 1×10^{-6} (for carcinogens).

Soil screening levels (SSLs) for migration from soil to groundwater (USEPA, November 2010) were also used for screening chemicals detected in site soil. SSLs are based on a dilution attenuation factor (DAF) of 1. Chemicals in soil with concentrations greater than SSLs could potentially migrate to groundwater, impacting water quality. COPCs for the migration to groundwater pathway are not evaluated quantitatively but rather are discussed qualitatively as part of the Uncertainty Analysis.

Lead as a COPC

RSLs are not calculated for lead because USEPA has not derived toxicity values for this constituent. However, guidance from both the Office of Prevention, Pesticides, and Toxic Substances (OPPTS) and OSWER recommends 400 mg/kg as the lowest screening level for lead-contaminated soil in a residential setting where children are frequently present (USEPA, 1994a and 1994b). Based on this recommendation, a value of 400 mg/kg for lead was used as the screening level for COPC selection for soil.

Screening Levels for Groundwater

COPC screening levels for groundwater were based on the following criteria:

- USEPA RSLs for tap water (November 2010)
- MEDEP Maximum Exposure Guidelines (MEGs) (February 4, 2011)

Groundwater COPCs were selected based on a comparison of the maximum concentration detected to screening levels based on the USEPA RSLs (November 2010). If an USEPA RSL does not exist for a compound detected in the groundwater samples but a State of Maine MEG does exist, the COPC selection criterion is the State of Maine MEG.

Essential Nutrients and Chemicals without Toxicity Criteria

Because of the lack of toxicity criteria, risk-based COPC screening levels are not available for some compounds (e.g., alpha- and gamma-chlordane). Surrogates were selected for some of these chemicals based on similar chemical structures. In the COPC screening, chlordane was selected as a surrogate for alpha- and gamma-chlordane, and endosulfan was used as a surrogate for endosulfan I. No toxicity criterion or surrogate value was available for monuron, which was detected in subsurface soil.

Decision Rules for Establishing COPCs

The following decision rules were used to select COPCs:

- A chemical was selected as a COPC if any detected chemical concentration exceeded the screening levels defined above.

- A chemical was selected as a COPC if no toxicity criteria and no acceptable surrogate existed for that chemical.

C.2.2 Selection of Chemicals of Potential Concern

COPCs at Site 17 were selected for surface soil, subsurface soil, and groundwater using the risk-based COPC screening levels described in Section C.2.1. A discussion of the chemicals identified as COPCs and the rationale for COPC selection are provided in the following subsections. Chemicals retained as COPCs are summarized in Table C.1-1.

Surface Soil

The current condition surface soil data set (Appendix B; Table B-1) was used for the Site 17 HHRA. Eight pesticides and four inorganics were detected in the surface soil samples. A comparison of the maximum detected surface soil concentrations to screening levels based on RSL residential exposures are presented in Table 2.1 in Attachment C.1-4. The following chemicals were detected in surface soil and were retained as COPCs for surface soil at Site 17 (based on screening criteria assuming residential exposure) as per the COPCs decision rules presented in Section C.2.1:

- Pesticides [heptachlor epoxide].

- Inorganics [arsenic].

A comparison of maximum detected surface soil concentrations to screening levels based on USEPA RSL SSLs for chemical migration from soil to groundwater is presented in Table 2.2 in C.1-4. The following chemicals were detected in surface soil and were retained as COPCs for surface soil (based on soil to groundwater migration screening criteria) as per the COPCs decision rules presented in Section C.2.1:

- Pesticides [4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-chlordane, gamma-chlordane, heptachlor, and heptachlor epoxide].

- Inorganics [arsenic and lead].

Subsurface Soil

The current condition subsurface soil dataset (Appendix B; Table B-2) was used for the Site 17 HHRA. One volatile organic compound (VOC), fourteen pesticides, diesel range organics, three herbicides, and four inorganics were detected in subsurface soil samples. A comparison of maximum detected subsurface soil concentrations to screening levels based on USEPA RSLs for residential exposures is presented in Table 2.3 in Attachment C.1-4. The following chemicals were detected in subsurface soil and were retained as COPCs for subsurface soil at Site 17 (based on screening criteria assuming residential exposure) as per the COPCs decision rules presented in Section C.2.1:

- Pesticides [4,4'-DDT, alpha-chlordane, dieldrin, gamma-chlordane, heptachlor, and heptachlor epoxide].

- Herbicides [monuron].

- Inorganics [arsenic].

A comparison of maximum detected subsurface soil concentrations to screening levels based on USEPA RSLs for chemical migration from soil to groundwater is presented in Table 2.4 in Attachment C.1-4. The following chemicals were detected at maximum concentrations in subsurface soil and were retained as COPCs for subsurface soil at Site 17 (based on soil to groundwater migration screening criteria) as per the COPCs decision rules presented in Section C.2.1:

- Volatiles [tetrachloroethene].

- Pesticides [4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-chlordane, dieldrin, endrin, gamma-chlordane, heptachlor, and heptachlor epoxide].

- Herbicides [monuron and propoxur].

- Inorganics [arsenic and lead].

Groundwater

The current condition groundwater analytical results (Appendix B; Table B-3) collected in April of 2011 were used for the Site 17 HHRA. Three pesticides and one volatile petroleum hydrocarbon (VPH) parameter were detected in groundwater samples. A comparison of maximum detected groundwater concentrations to screening levels based on USEPA RSLs for residential exposures is presented in Table 2.5 in Attachment C.1-4. The following chemicals were detected in groundwater and were retained as COPCs for groundwater at Site 17 as per the COPCs decision rules presented in C.2.1:

- Pesticides [4,4'-DDT and 4,4'-DDD].

C.3 EXPOSURE ASSESSMENT

The exposure assessment is designed to depict the physical setting of the site, identify potentially exposed populations and applicable exposure pathways, calculate concentrations of COPCs to which receptors might be exposed, and estimate chemical intakes under the identified exposure scenarios.

Actual or potential exposures evaluated for Site 17 are based on the most likely pathways of contaminant release and transport, as well as human activity patterns. A complete exposure pathway has three components: a source of chemicals that can be released to the environment, a route of contaminant transport through an environmental medium, and an exposure or contact point for a human receptor. This compilation of likely exposure pathways and receptors is referred to as the Conceptual Site Model (CSM).

C.3.1 Conceptual Site Model

The CSM (Tetra Tech, September 2008) graphically integrates information regarding the physical characteristics of the site, exposed populations, sources of contamination, and contaminant mobility (fate and transport) to identify potential exposure routes and receptors evaluated in the risk assessment. A well-defined CSM allows for a better understanding of the risks at a site and aids risk managers in the identification of the potential need for remediation. Figure C-1.6 illustrates the CSM for Site 17. Sections 4.0 and 5.0 of this report discuss the Nature and Extent of Contamination and Contaminant Fate and Transport, respectively.

C.3.1.1 Potential Exposure Pathways/Receptors

Site 17 is located in the north-central area of the base, one block north of Fitch Avenue at the corner of Pegasus Avenue and Avenue B. The site is bounded to the northwest by a dog kennel, to the northeast by the former Old Navy Fuel Farm, to the southeast by Avenue B, and to the southwest to northwest by Pegasus Avenue. Abandoned railroad tracks south of and running parallel to Avenue B were removed in 1994.

Three former buildings (Buildings 31, 95, and a storage shed) were located at Site 17. Building 31 was approximately 12 feet x 25 feet and used by workers conducting asbestos abatement for changing and showering. Building 95 was constructed in the late 1940s and was approximately 15 feet x 20 feet. This building had a pesticide drum storage rack along the eastern side of the building and was used for pesticide storage during winter months. The storage shed was used to house asbestos abatement equipment only. All three buildings were removed from the site between January and February 1994.

Site 17 housed pest control operations that included storage, mixing, and disposal of pesticides and herbicides from the late 1940s until 1985. Those pest control operations are the source of pesticide contamination at Site 17. Prior to 1976, any materials left over after pest service calls were reportedly dumped behind Building 95. Dumping of unused materials stopped in 1976. Empty containers were rinsed, crushed, and placed in the trash for disposal.

The course that a chemical takes from the source to the exposed individual is defined as the exposure pathway. The characterization of exposure factors is necessary to allow the evaluation of

potentially complete exposure pathways in the risk assessment.

Potential receptors can be exposed to site contaminants in soil and groundwater, directly or indirectly. Potential exposure routes for these media include ingestion (swallowing), dermal contact (skin exposure), and/or inhalation (breathing).

The baseline risk assessment prepared for the site considers receptor exposure under residential and non-residential (e.g., construction worker, industrial, trespasser) land use scenarios. Table C.1-2 provides a site-specific summary of the potential receptors and exposure routes addressed quantitatively in the HHRA. Based on current and potential future land use, the following potential receptors may be exposed to contaminated environmental media at Site 17:

- **Trespassers/Recreational Users** – A plausible receptor (adolescent age 6-16 years old or an adult) under current and future land use. A trespasser/recreational user may be exposed to potentially contaminated surface soil (0 to 2 feet bgs) (incidental ingestion; dermal contact; inhalation of volatiles/fugitive dust). Direct contact with groundwater or subsurface soils is not anticipated for this receptor. (Please note that receptor exposure to subsurface soil would only occur if subsurface soils were excavated and deposited on existing surface soils. Although this is an unlikely scenario, it will be included in Section C.6 for purposes of completeness and to aid the risk managers regarding the need for deed restrictions.)

- **Construction Workers** – A plausible on-site receptor under current or future land use. Construction workers could be exposed to surface and subsurface soils (incidental ingestion; dermal contact; inhalation of volatiles/fugitive dust) and groundwater (ingestion; dermal contact; inhalation of volatiles).

- **Typical Industrial Worker** – An on-site receptor under future land use, at present there are no industrial workers at the site. This receptor will be evaluated using USEPA's standard default exposure assumptions as presented in USEPA's Supplement Guidance for Soil Screening Levels for Superfund Sites, (USEPA, 2002). The standard default assumptions assume a worst case scenario where an industrial worker is outdoors all of the time and has frequent contact with soil. This receptor could be exposed to surface and subsurface soil (incidental ingestion; dermal contact; inhalation of volatiles/fugitive dust). It is anticipated that this receptor would not be routinely exposed to groundwater. This receptor is expected to be exposed to soils on a more frequent basis (but less intensely) than the construction worker. (Please note that receptor exposure to subsurface soil would only occur if

subsurface soils were excavated and deposited on existing surface soils. Although this is an unlikely scenario, it will be included in Section C.6 for purposes of completeness and to aid the risk managers regarding the need for deed restrictions.)

- **Future Residents** - A future residential scenario, assuming the site ultimately is used for residential development, is typically evaluated in a risk assessment for decision-making purposes. For example, the need for deed restrictions at a site may be eliminated prior to site closure if minimal risks are estimated for residential receptors. It is assumed that a hypothetical resident may be exposed to surface and subsurface soils (incidental ingestion; dermal contract), groundwater (ingestion; dermal contact), and air (inhalation of volatiles/fugitive dust). (Please note that receptor exposure to subsurface soil would only occur if subsurface soils were excavated and deposited on existing surface soils. This scenario will be included in the HHRA.)

RAGS Part D Table 1 in Attachment C.1-4 provides a site-specific listing of all exposure pathways considered and the basis for inclusion or exclusion of each exposure pathway for each receptor. A summary of the exposure routes that will be addressed quantitatively for each human receptor is provided in Table C.1-2.

C.3.2 Central Tendency Exposure versus Reasonable Maximum Exposure

Traditionally, exposures evaluated in the HHRA were based on the concept of a Reasonable Maximum Exposure (RME) only, which is defined as “the maximum exposure that is reasonably expected to occur at a site" (USEPA, 1989). However, more recent risk assessment guidance (USEPA, 1992a) recommends addressing an average case or Central Tendency Exposure (CTE). Therefore, an evaluation of the CTE scenario is also performed for Site 17. The same equations are used to estimate intakes for the RME and CTE scenarios; however, exposure input parameters are modified for the CTE scenario to reflect average case exposures. It should be noted that the available guidance (USEPA, 1993) concerning the evaluation of the CTE is limited and at times vague. Therefore, professional judgment is exercised when defining CTE conditions for a particular receptor at the site.

C.3.3 Exposure Point Concentrations

The exposure point concentration (EPC), which is calculated for COPCs only, is a reasonable maximum estimate of the chemical concentration that is likely to be contacted over time and is used to calculate estimated exposure intakes. The 95 percent upper confidence limit (UCL), which is based on the distribution of a data set, is considered to be the best estimate of the exposure concentration for data sets with 10 or more samples (USEPA, 1992b). The 95 percent UCL is used as the exposure concentration to assess RME and CTE risks (USEPA, 1993a). Surface and subsurface soil EPCs were calculated following USEPA's Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites (USEPA, 2002a) and using USEPA's ProUCL software (Version 4.1.00, USEPA, May 2010). Groundwater EPCs were based on the maximum concentration of a contaminant detected across all wells monitored at Site 17 using the most recent groundwater data available. The maximum groundwater concentration was used as the EPC at Site 17 because only one round of groundwater since the most recent excavation was available. The current condition groundwater analytical results (Appendix B; Table B-3) were used to determine EPCs.

An exposure unit is defined as the area typically encountered/traversed by a receptor under a particular land use scenario. The entire site is approximately 0.7 acres; however, a road (Avenue B) divides the site into northern and southern areas. During a Site 17 Risk Assessment Conference call on June 17, 2010 (Appendix E-4) risk assessors from the Navy, State of Maine, and USEPA agreed that data north and south of Avenue B would be segregated and evaluated to determine whether chemical concentrations are comparable for those data sets. If the evaluation concludes that the data sets are comparable then risk for the entire site will be evaluated as one exposure unit; if not comparable, then risk will be evaluated for two exposure units (Avenue B area and north; and the area south of Avenue B). In accordance with this decision, the final surface soil and subsurface soil data sets for the areas north and south of Avenue B (representative of current site conditions) were statistically compared for each chemical that was detected at least once in the areas north and south of Avenue B. The majority of chemicals evaluated were determined to be similar (Appendix E-5); therefore, the entire site was evaluated as one exposure unit. For those chemicals determined not to be statistically similar north and south of Avenue B an evaluation was conducted to determine if the overall risk conclusions made evaluating the site as a single exposure unit would change if the site was evaluated as two separate exposure units. That evaluation, which is summarized on Table C-1.7, was conducted as follows:

1. Select all chemicals determined to have statistically different concentration populations in the areas north and south of Avenue B.

2. Calculate EPCs for those chemicals selected in step 1 for the areas north and south of Avenue B.

3. Compare the EPC north and south of Avenue B to the entire site EPC.

4. If north or south EPC is less than entire site EPC than risks north or south of avenue B would be less than risks associated with the entire site EPC so no further action is required.

5. For those chemicals with EPCs in the north or south greater than the corresponding entire site EPC, determine whether any changes in risk conclusions for the most sensitive receptor would occur (i.e. determine if estimated risks to the lifetime residential receptor would exceed $1x10^{-5}$) if risks were evaluated for the north and south exposure units instead of for the entire site (see Table C-1.7).

The overall conclusion as presented on Table C-1.7 is there would be no change to the overall risk conclusions if the site was evaluated as one exposure unit or two. The uncertainty associated with using the entire site as the exposure unit for receptors is discussed in Section C.6.2.

EPCs for COPCs in surface soil, subsurface soil and groundwater are presented in Tables 3.1, 3.2, and 3.3 in Attachment C.1-4. Attachment C.1-5 contains ProUCL output files.

C.3.4 Chemical Intake Estimation

Exposure intakes for the identified potential receptor groups were calculated using current USEPA risk assessment guidance (e.g., USEPA, 1991, 1997, 2004, and 2009b). The methodologies and techniques used to estimate exposure intakes are presented in Attachment C.1-2.

C.4 TOXICITY ASSESSMENT

The objective of the toxicity assessment is to identify quantitative toxicity values which will be integrated with outputs of the exposure assessment to characterize the potential for the occurrence of adverse health effects for each receptor group. The toxicity assessment was conducted following

current USEPA risk assessment guidance (e.g., USEPA, 1989, 2003). The toxicity assessment is presented in Attachment C.1-3.

C.5 RISK CHARACTERIZATION

Potential risks (noncarcinogenic and carcinogenic) for human receptors resulting from exposures to contaminated media are quantitatively determined during the risk characterization component of the HHRA.

A summary and interpretive discussion of the quantitative risk estimates are provided in the text of the risk assessment. COPCs that contribute significantly to elevated risks are identified as "risk drivers" in this section. The chemical-specific numeric estimates of risk are contained in the risk assessment spreadsheets provided in Attachment C.1-4.

C.5.1 Quantitative Analysis of Chemicals Other Than Lead

Quantitative estimates of risk for chemicals other than lead were calculated according to risk assessment methods outlined in USEPA guidance (USEPA, 1989). Lifetime cancer risks are expressed in the form of dimensionless probabilities, referred to as incremental lifetime cancer risks (ILCRs), based on cancer slope factors (CSFs) and inhalation unit risks (IURs). Noncarcinogenic risk estimates are presented in the form of HQs that are determined through a comparison of intakes with published reference doses (RfDs) and reference concentrations (RfCs).

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

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

If the above equation results in an ILCR greater than 0.01, the following equation is used:

$$ILCR = 1-[\exp(-\text{Estimated Exposure Intake})(CSF)]$$

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

$$ILCR = (IUR)(Exposure\ Concentration)(1000\ \mu g/mg)$$

An ILCR of 1×10^{-6} indicates that the exposed receptor has a one in-one million chance of developing cancer under the defined exposure scenario. Alternatively, such a risk may be interpreted as representing one additional case of cancer in an exposed population of one million persons.

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

$$HQ = (Estimated\ Exposure\ Intake)/(RfD)$$

For inhalation exposures, HQ is calculated as follows:

$$HQ = (Exposure\ Concentration)/(RfC)$$

An HI was generated by summing the individual HQs for all COPCs. The HI is not a mathematical prediction of the severity of toxic effects and therefore is not a true "risk"; it is simply a numerical indicator of the possibility of the occurrence of noncarcinogenic (threshold) effects.

C.5.2 Comparison of Quantitative Risk Estimates to Benchmarks

To interpret the quantitative risks and to aid risk managers in determining the need for remediation at a site, quantitative risk estimates are compared to typical benchmarks. USEPA has defined 1×10^{-4} to 1×10^{-6} as the ILCR "target range" for carcinogens for most hazardous waste facilities addressed under CERCLA. Cumulative ILCRs greater than 1×10^{-4} generally indicate that some degree of remedial response is required, whereas ILCRs less than 1×10^{-6} normally will not result in remedial efforts. Whenever ILCRs fall between 1×10^{-4} and 1×10^{-6}, decisions for remediation are made on a case-specific basis. The State of Maine's cumulative cancer risk management criterion is 1×10^{-5}, and individual chemicals contributing significantly to risks exceeding the Maine cumulative target level of 1×10^{-5} per receptor are considered to be chemicals of concern (COCs) per Maine Risk Assessment Guidance (MEDEP, 2009).

An HI exceeding unity (1.0) indicates that there may be potential noncarcinogenic health risks associated with exposure. If an HI exceeds unity, target organ effects from individual COPCs contributing to the risk are considered. Only those chemicals that impact the same target organ(s) or exhibit similar critical effect(s) will be regarded as truly additive. Thus, only COPCs contributing significantly to an HI greater than 1.0 on the basis of a single target organ/effect are considered to be COCs.

C.5.3 Results of the Risk Characterization

This section contains a summary of the results of the risk characterization for Site 17. Quantitative risk estimates for potential human receptors were developed for those chemicals identified as COPCs. Uncertainties associated with the risk estimates are discussed in Section C.6. The methodology used to calculate the risks presented in this section was described in Sections C.3 and C.4. Receptors evaluated in the HHRA included current/future trespassers, current/future construction workers, future typical industrial workers, and future hypothetical child residents, future hypothetical adolescent residents, and future hypothetical adult residents. Results of the risk assessment are summarized in Tables C.1-3 and C.1-4 for the RME and CTE scenarios, respectively. RAGS Part D Table 7s, 9s, and 10s are included in Attachment C.1-4. Sample calculations are included in Attachment C.1-6.

Risks in this section are presented two different ways: cumulative risks and site-specific risks. Cumulative risks include all COPCs in the quantitative risk analyses. Site-specific risks present risks only for the COPCs that are associated with site activities. Site-specific risks do not include risk due to arsenic in soil because arsenic concentrations in fill used at the site were determined to be statistically different from arsenic concentrations in the other site soils (i.e., non-fill) (see Appendix E-6). This presentation approach is consistent with the verbal agreement made between the Navy, MEDEP, and USEPA on the March 23, 2011 NAS Brunswick conference call. The results of both the cumulative and site-specific analyses are presented in Attachment C.1-4 and discussed in this section.

C.5.3.1 Cumulative Noncarcinogenic Risks – RME

As indicated on Table C.1-3, the total HIs for future construction workers, residents (child, adolescent, and adult), future typical industrial workers, and current/future adolescent and adult trespassers exposed to COPCs in surface soil/groundwater and subsurface soil/groundwater are

less than 1. An HI equal to or less than 1 indicates that no adverse health effects are anticipated for the aforementioned receptors under the defined exposure conditions.

C.5.3.2 Cumulative Carcinogenic Risks – RME

The ILCRs for future construction workers exposed to surface soil/groundwater and subsurface soil/groundwater, as well as future industrial workers and future adolescent/adult/lifelong trespassers exposed to surface soil, were within USEPA's target risk range of 1×10^{-4} to 1×10^{-6} and were less than Maine's cumulative cancer risk management criterion of 1×10^{-5}. The ILCRs for hypothetical future adolescent and adult residents exposed to COPCs in surface soil/groundwater and subsurface soil/groundwater are also within USEPA's target risk range and are less than Maine's cumulative cancer risk management criterion.

The ILCRs for hypothetical child residents (ILCR = 2×10^{-5}) and hypothetical lifelong residents (ILCR = 3×10^{-5}) potentially exposed to COPCs in surface soil/groundwater exceeded Maine's cancer risk management criterion but were within USEPA's target risk range. Arsenic in surface soil was the primary risk driver for both the child and lifelong residents.

The ILCR for hypothetical child residents (ILCR = 2×10^{-5}) and hypothetical lifelong residents (ILCR = 2×10^{-5}) exposed to COPCs in subsurface soil/groundwater were both greater than Maine's cumulative cancer risk management criterion (1×10^{-5}). Arsenic in subsurface soil was the primary risk driver for those receptors.

C.5.3.3 Cumulative Noncarcinogenic Risks – CTE

As indicated on Table C.1-4, total HIs for all receptors and exposure scenarios evaluated were less than or equal to unity, indicating that no adverse health effects are anticipated for any receptor except the hypothetical child resident under the defined exposure conditions.

C.5.3.4 Cumulative Carcinogenic Risks – CTE

As indicated on Table C.1-4, the CTE ILCRs for all receptors and exposure scenarios evaluated were less than or within USEPA's target risk range of 1×10^{-4} to 1×10^{-6} and were less than Maine's cancer risk management criterion of 1×10^{-5} for exposures to all media evaluated.

C.5.3.5 Site-Specific Noncarcinogenic Risks – RME

As indicated on Table C.1-5, the total HIs for all receptors and media are less than 1. An HI equal to or less than 1 indicates that no adverse health effects are anticipated for the aforementioned receptors under the defined exposure conditions.

C.5.3.6 Site-Specific Carcinogenic Risks – RME

The ILCRs for all receptors and media evaluated were less than or within USEPA's target risk range of 1×10^{-4} to 1×10^{-6} and were less than or equal to Maine's cumulative cancer risk management criterion of 1×10^{-5} when evaluated on a media-specific basis (i.e. surface soil, subsurface soil, groundwater. However, the cumulative ILCR for the hypothetical lifelong resident exposed to subsurface soil and groundwater was 2×10^{-5} which slightly exceeds Maine's ILCR target. No primary carcinogenic risk drivers were selected for the individual media evaluated..

C.5.3.7 Site-Specific Noncarcinogenic Risks – CTE

As indicated on Table C.1-6, total HIs for all receptors and exposure scenarios evaluated were less than or equal to unity, indicating that no adverse health effects are anticipated for any receptor under the defined exposure conditions.

C.5.3.8 Site-Specific Carcinogenic Risks – CTE

As indicated on Table C.1-6, the CTE ILCRs for all receptors and exposure scenarios evaluated were less than or within USEPA's target risk range of 1×10^{-4} to 1×10^{-6} and were less than Maine's cancer risk management criterion of 1×10^{-5} for exposures to all media evaluated.

C.6 UNCERTAINTY ANALYSIS

There is uncertainty associated with all aspects of the baseline HHRA. A summary of the uncertainties, including a discussion of how they may affect the final risk numbers, is provided in this section.

Uncertainty in the selection of COPCs is related to the current status of the predictive databases, the grouping of samples, the numbers, types and distributions of samples, and the procedures used to include or exclude constituents as COPCs. Uncertainty associated with the exposure assessment includes the values used as input variables for a given intake route or scenario, the assumptions made to determine EPCs, and the predictions regarding future land use and population characteristics. Uncertainty in the toxicity assessment includes the quality of the existing toxicity data needed to support dose response relationships and the weight of evidence used to determine the carcinogenicity of COPCs. Uncertainty in risk characterization includes that associated with exposure to multiple chemicals and the cumulative uncertainty from combining conservative assumptions made in earlier steps of the risk assessment process.

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

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

After the risk assessment is complete, the results are reviewed and evaluated to identify the type and magnitude of uncertainty involved. Reliance on results from a risk assessment without consideration of uncertainties, limitations, and assumptions inherent in the process can be misleading. For example, to account for uncertainties in the development of exposure assumptions, conservative estimates must be made to ensure that the particular assumptions made are protective of sensitive subpopulations or maximum exposed individuals. If a number of conservative assumptions are combined in an exposure model, the resulting calculations can propagate the uncertainties associated with those assumptions, thereby producing a much larger uncertainty for the final results. This uncertainty is biased toward over predicting both carcinogenic and noncarcinogenic risks. Thus, both the results of the risk assessment and the uncertainties associated with those results must be considered when making risk management decisions.

This interpretation is especially relevant when the risks exceed the point of departure for defining "acceptable" risk. For example, when risks calculated using a high degree of uncertainty are less than an acceptable risk level (i.e., 1×10^{-6}), the interpretation of no significant risk is typically straightforward. However, when risks calculated using a high degree of uncertainty exceed an acceptable risk level (i.e., 1×10^{-4}), a conclusion can be difficult unless uncertainty is considered.

C.6.1 Data Evaluation

The most significant issues related to uncertainty in COPC selection are the screening levels used and the absence of screening levels for a few chemicals detected in the site media, and the use of available background data in COPC selection for the site. A brief discussion of each of these issues is provided in the remainder of this section.

COPC Screening Levels

The use of risk-based screening values based on conservative land use scenarios (i.e., residential land use), corresponding to an ILCR of 1×10^{-6} and HI of 0.1, should ensure that all the significant contributors to risk from a site are evaluated. The elimination of chemicals present at concentrations that correspond to an ILCR less than 1×10^{-6} and an HI less than 0.1 should not affect the final conclusions of the risk assessment because these chemicals are not expected to cause a potential health concern at the detected concentrations.

For this risk assessment, diesel range organic (DRO) compounds detected in subsurface soil exceeded the MEDEP stringent clean-up goal (200 mg/kg) but were within one order of magnitude of this clean-up goal (See RAGS Table 2.3 in Attachment C.1-4); however, DRO compounds were not retained as COPCs for quantitative risk assessment in accordance with the Site 17 HHRA Work plan. The maximum concentration of DRO detected in subsurface soil was in sample SB-17-122-0407. No other subsurface soil samples, including the duplicate sample collected from the same location as sample SB-17-122-0407 had concentration exceeding the screening criterion. The exclusion of DRO compounds from the quantitative risk assessment may potentially biased risk values low.

Chemicals Without Established Screening Levels Direct Contact Criteria

Risk-based screening levels are currently not available for some constituents [e.g., alpha- and gamma-chlordane]. Therefore, surrogates were selected for these chemicals based on similar

chemical structures. In the COPC screening, chlordane was selected as a surrogate for alpha- and gamma-chlordane, and endosulfan was selected as a surrogate for endosulfan I. Applying toxicity values of one compound to another increases the uncertainty in the risk assessment both in regard to the selection of COPCs and with the subsequently-calculated risks.

Monuron

Monuron was retained as a COPC in subsurface soil for direct contact and migration; however, this chemical compound was not carried through the quantitative risk assessment because no toxicity criteria or acceptable surrogates were identified for this compound. Limited toxicity data found for this compound indicates that it is not classifiable as a carcinogen for humans (http://www.inchem.org/documents/iarc/vol53/14-monuron.htm), and that it may be a blood, liver, and respiratory toxicant (http://www.scorecard.com). Monuron was detected in 5 of 38 subsurface soil samples yielding a maximum concentration of 550 µg/kg. The detections occurred at locations SB-17-128, SB-17-129, SB-17-132, SB-17-133, and SB-17-141.

Arsenic

Risks in the risk characterization section were evaluated both with and without arsenic (i.e., the cumulative and site-specific risks, respectively). Arsenic was not considered to be a site-specific COPC because concentrations of arsenic in fill samples were statistically different than concentrations associated with other site samples (i.e., non-fill samples) (See Appendix E-6). There is a general correlation between the presence of fill and high (i.e., 8 mg/kg or greater) concentrations of arsenic. Therefore, the concentrations of arsenic in soil are not considered to be related to site activities.

Migration to Groundwater

Maximum concentrations in soil (surface soil and subsurface soil) were compared to USEPA SSLs for protection of groundwater developed using a DAF of 1. These comparisons are summarized in tables presented in Attachment C-1.4.

The following chemicals were detected in surface soil at maximum concentrations exceeding SSLs for contaminant migration from soil-to-groundwater:

- Pesticides – 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-chlordane, gamma-chlordane, heptachlor, and heptachlor epoxide.
- Inorganics – arsenic and lead.

The following chemicals were detected in subsurface soil at maximum concentrations exceeding SSLs for contaminant migration from soil-to-groundwater:

- Volatiles – tetrachloroethene.
- Pesticides – 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-chlordane, dieldrin, endrin, gamma-chlordane, heptachlor, and heptachlor epoxide.
- Herbicides: monuron and propoxur.
- Inorganics – arsenic and lead.

Exceedances of the SSLs may indicate the potential for chemicals in soil to leach to groundwater and impact water quality. Chemicals in surface soil that exceeded soil-to-groundwater SSLs and also exceeded groundwater screening criteria included the chemicals 4,4'-DDT and 4,4'-DDD, indicating that those chemicals are potentially leaching from surface soil to the groundwater. The maximum concentrations detected for arsenic and lead in surface soil exceeded the migration-to-groundwater SSL; however, arsenic and lead concentrations in 2008 site groundwater did not exceed corresponding groundwater screening criteria indicating that arsenic and lead migration to groundwater currently does not pose unacceptable risks human health. The 2008 groundwater data were used to evaluate arsenic and lead because the 2011 groundwater samples, included in Table 2.5, were not analyzed for inorganics. The inorganics were not analyzed in the 2011 groundwater samples because previous sampling had determined that parameters associated with this fraction were not posing unacceptable risks in groundwater. Therefore, concentrations of these chemicals in soil are not expected to negatively impact site groundwater quality.

Chemicals in subsurface soil that exceeded soil-to-groundwater SSLs and also exceeded groundwater screening criteria are 4,4'-DDT and 4,4'-DDD, indicating that these chemicals are potentially leaching from subsurface soil to the groundwater. Tetrachloroethene, 4,4'-DDE, alpha-chlordane, dieldrin, endrin, gamma-chlordane, heptachlor, heptachlor epoxide, monuron, propoxur, arsenic, and lead maximum concentrations in subsurface soil exceeded corresponding soil-to-groundwater SSLs; however, these chemicals did not exceed corresponding groundwater screening criteria indicating that migration of those chemicals from subsurface soil to groundwater does not currently pose unacceptable risks to human health. The 2008 groundwater data were used to evaluate arsenic and lead because the 2011 groundwater samples, included in Table 2.5, were not analyzed for inorganics. Likewise, the 2011 groundwater samples were not analyzed for herbicides. Concentrations of propoxur in 2008 groundwater did not exceed the tap water RSL. No toxicity criterion is available for monuron. The 2011 groundwater samples were not analyzed for herbicides or inorganics because previous sampling had determined that parameters associated with these

fractions were not posing unacceptable risks in groundwater. Therefore, concentrations of these chemicals in soil are not expected to negatively impact site groundwater quality.

The soil migration to groundwater SSLs, which are based on a DAF of 1, are very conservative because a DAF of 1 assumes that no dilution or attenuation occurs as a chemical migrates from soil to groundwater. The USEPA recommends that a DAF of 20 be used as the default DAF (USEPA, 1996b). If SSLs for a DAF of 20 were used in the comparisons, only the maximum concentrations of alpha-chlordane, gamma-chlordane, heptachlor, heptachlor epoxide, and arsenic in surface soil would still exceed criteria; however, none of these pesticides were detected in groundwater; therefore, these pesticides are not retained as soil-to-groundwater COPCs. As detailed in the preceding paragraphs, arsenic concentrations in 2008 groundwater samples did not exceed groundwater screening criteria; therefore, arsenic is not retained as a soil-to-groundwater COPC.

If a DAF of 20 were used in the subsurface soil COPC comparisons, the following subsurface soil COPCs would still exceed criteria: tetrachloroethene, 4,4'-DDE, 4,4'-DDT, alpha-chlordane, dieldrin, gamma-chlordane, heptachlor, heptachlor expoxide, and arsenic. Of those pesticide subsurface soil migration to groundwater COPCs, 4,4'-DDE, alpha-chlordane, dieldrin, endrin, gamma-chlordane, and heptachlor, and heptachlor epoxide did not exceed groundwater screening criteria indicating that migration of those chemicals from subsurface soil to groundwater does not currently pose unacceptable risks to human health. As noted previously, arsenic in 2008 groundwater samples does not exceed screening criteria; therefore, arsenic is not retained as a migration to groundwater COPC.

The following table displays further information about those compounds that exceeded corresponding subsurface soil SSLs and groundwater screening criteria.

Compounds that exceed SSLs and GW Screening Criteria	Frequency of Detection	Number of Positive Detections Exceeding DAF = 20	Number of Nondetected Detection Limits Exceeding DAF = 20	Sample Location with Greatest Detected Concentration	Sample Location with Greatest Nondected Detection Limit Exceeding DAF = 20
4,4'-DDT	70/100	17	0	GRID B EAST SIDEWALL B	NA
4,4'-DDD[(1)]	45/100	0[(1)]	0	SB-17-112-0104	NA

DAF = Dilution Attenuation Factor; GW = Groundwater; NA = Not Applicable; SSLs = Soil Screening Levels
1 – 4,4'-DDD concentrations do not exceed the migration to groundwater SSL at a DAF of 20.

Based on the preceding discussion, the soil and groundwater data suggest that for most chemicals analyzed that soils are not a significant residual contaminant source for groundwater contamination at the Site. However, the data indicate that 4,4'-DDT is potentially leaching to groundwater.

C.6.2 Exposure Assessment

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

There is also uncertainty associated with using the entire site as the exposure unit for calculating EPCs. An exposure unit is defined as the area typically encountered/traversed by a receptor under a particular land use scenario. Residential lot sizes are typically in the range of ¼ acre to 2 acres consequently a smaller exposure unit may be appropriate if the site was developed for residential usage in the future. Site 17 is approximately 0.7 acres. If a receptor's exposure was limited to only a portion of the site then the resulting EPCs may be smaller or larger than those calculated using the entire site as the exposure unit depending on the distribution of contamination across the site.

Land Use

The current land use patterns at Site 17 are well established, thereby limiting the uncertainty associated with land use assumptions. Land use at the site is currently limited and is expected to be limited in the future. Therefore, the elevated risks presented for future residents are not likely to occur. This exposure scenario is primarily evaluated for information purposes.

Exposure Point Concentrations

Uncertainty is associated with the use of the 95 percent UCL on the mean concentration as the EPC for soil. As a result of using the 95 percent UCL, the estimations of potential risk for the RME scenario are most likely overstated because this is a representation of the upper limit that potential receptors would be exposed to over the entire exposure period. For groundwater, the maximum concentration of each COPC was used as the EPC. This was done because only one round of groundwater data prior to the most recent excavation was available. This likely overstates groundwater risks to receptors across the EU.

Exposure Routes and Receptor Identification

An attempt was made to simplify the various receptor groups and exposure routes of potential concern in this report. The uncertainty associated with this approach is minimal because exposure routes and potential receptors are considered to be well defined based on the limited land use observed at the site. In addition, exposure routes eliminated from further evaluation were excluded only after a qualitative evaluation of potential exposure.

Exposure Parameters

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

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

Many of the exposure parameters used to calculate exposures and risks in this report are selected from a distribution of possible values, including USEPA guidance (1991, 1993a, 1997a, 2001). For the RME scenario, the value representing the 95th percentile is generally selected for each parameter to ensure that the assessment bounds the actual risks from a postulated exposure. This risk number is used in risk management decisions but does not indicate what a more average or typical exposure might be or what risk range might be expected for individuals in the exposed population.

C.6.3 Toxicity Assessment

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

Derivation of Toxicity Criteria

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

Uncertainty in hazard assessment arises from the nature and quality of animal and human data. Uncertainty is reduced when similar effects are observed across species, strain, sex, and exposure route; when the magnitude of the response is clearly dose related; when pharmacokinetic data indicate a similar fate in humans and animals; when postulated mechanisms of toxicity are similar for humans and animals; and when the COC is structurally similar to other chemicals for which the toxicity is more completely characterized.

Uncertainty in the dose response evaluation includes the determination of a CSF for the carcinogenic assessment and derivation of an RfD for the noncarcinogenic assessment. Uncertainty is introduced from interspecies (animal to human) extrapolation, which, in the absence of quantitative pharmacokinetic or mechanistic data, is usually based on consideration of interspecies differences in basal metabolic rate. Uncertainty also results from intraspecies variation. Most toxicity experiments are performed with animals that are very similar in age and genotype, so intragroup biological variation is minimal, but the human population of concern may reflect a great deal of heterogeneity, including unusual sensitivity or tolerance to the COPC. Even toxicity data from human occupational exposure reflect a bias because only those individuals sufficiently healthy to attend work regularly (the "healthy worker effect") and those not unusually sensitive to the chemical are likely to be occupationally exposed. Finally, uncertainty arises from the quality of the key study from which the quantitative estimate is derived and the quality/representativeness of the database. For cancer effects, the uncertainty associated with dose response factors is mitigated by assuming the 95 percent upper bound for the slope factor. Another source of uncertainty in carcinogenic assessment is the method by which data from high doses in animal studies are extrapolated to the dose range expected for environmentally exposed humans. The linearized multistage model, which is used in nearly all quantitative estimations of human risk from animal data, is based on a nonthreshold assumption of carcinogenesis. Evidence suggests however, that

epigenetic carcinogens, as well as many genotoxic carcinogens, have a threshold below which they are noncarcinogenic. Therefore, the use of the linearized multistage model is conservative for chemicals that exhibit a threshold for carcinogenicity.

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

The derivation of dermal RfDs and CSFs from oral values may cause uncertainty. This is particularly the case when no gastrointestinal absorption rates are available in the literature or when only qualitative statements regarding absorption are available.

Use of Chronic Toxicity Values for Construction Workers

Under the guidelines established by the Superfund program, exposures to construction workers of one year or less are classified as subchronic exposures. Risks for noncarcinogenic effects associated with subchronic exposures should incorporate toxicity values for subchronic and not chronic effects. Subchronic toxicity values are not as widely available as chronic values. Chronic toxicity values were used when subchronic toxicity values were not available. Using chronic toxicity criteria to evaluate subchronic exposures for construction workers tends to overestimate potential noncarcinogenic risks. However, noncarcinogenic HIs for construction workers did not exceed acceptable levels. Therefore, uncertainty due to the use of chronic toxicity values for construction workers does not affect overall risk assessment conclusions.

Uncertainty Associated with Evaluation of the Dermal Exposure Pathway

According to RAGS Part E (USEPA, 2004), risks for dermal absorption of chemicals in soil are to be quantitatively evaluated for arsenic, cadmium, chlordane, 2,4 dichlorophenoxyacetic acid, DDT, TCDD (and other dioxins), PAHs, PCBs, pentachlorophenol, and SVOCs if any of the aforementioned are selected as COPCs. Other chemicals selected as COPCs are not quantitatively

evaluated for dermal absorption because of limited guidance available to evaluate dermal exposure to those other constituents; therefore, providing a source of uncertainty.

For the calculation of DA(event) in groundwater, the chemicals DDD, DDE, and DDT have permeability coefficients that are outside of the effective predictive domain of the model used according to RAGS Part E (USEPA, 2004). Therefore, dermal risks were not calculated for the COPCs DDT and DDD in groundwater (DDE was not selected as a groundwater COPC). Permeability coefficients used in DA(event) calculations for other compounds are provided in Table 4-19 of Attachment C.1-4.

C.6.4 Risk Characterization

Uncertainty in risk characterization results from assumptions made regarding additivity of effects from exposure to multiple COPCs from various exposure routes. High uncertainty exists when summing noncancer risks for several substances across different exposure pathways. This assumes that each substance has a similar effect and/or mode of action. Even when compounds affect the same target organs, they may have different mechanisms of action or differ in their fate in the body, so additivity may not be an appropriate assumption. However, the assumption of additivity is considered because in most cases it represents a conservative estimate of risk. Risks to any individual may also be overestimated by summing multiple assumed exposure pathway risks for any single receptor. Although every effort was made to develop reasonable scenarios, not all individual receptors may be exposed via all pathways considered.

The risk characterization did not consider the unlikely scenarios of current/future trespassers, or future industrial workers being exposed to subsurface soil. Industrial worker and trespasser exposure to subsurface soil was not discussed in the Risk Characterization because it is very unlikely that these receptors will be exposed to contaminants in soil located greater than 2 feet bgs. However, these receptors were evaluated for exposure to subsurface soil for completeness sake. Estimates for cancer risks and hazard indices are presented in the following paragraphs and in Tables 9.2, 9.3 and 9.4 RME and CTE in Appendix C.1-4.

For cumulative risks under the RME scenario, noncancer hazards were less than unity for the industrial worker as well as the adolescent and adult trespassers exposed to subsurface soil, indicating that adverse noncarcinogenic effects are not anticipated for these receptors under the defined exposure assumptions. For cancer risks, the estimated subsurface soil ILCRs for industrial

workers and adolescent, adult, and lifelong trespassers were less than the USEPA target cancer risk range and less than Maine's cancer risk management criterion.

For cumulative risks under the CTE scenario, subsurface soil noncancer HIs are less than unity for industrial workers and adolescent and adult trespassers, indicating that adverse noncarcinogenic effects are not anticipated under the defined exposure assumptions. Subsurface soil cancer risk estimates are less than the USEPA target cancer risk range and less than Maine's cancer risk management criterion for industrial workers and adolescent, adult, and lifelong trespassers.

For site-specific risks under the RME scenario, noncancer hazards were less than unity for the industrial worker as well as the adolescent and adult trespassers exposed to subsurface soil, indicating that adverse noncarcinogenic effects are not anticipated for these receptors under the defined exposure assumptions. For cancer risks, the estimated subsurface soil ILCRs for industrial workers and adolescent, adult, and lifelong trespassers were less than the USEPA target cancer risk range and less than Maine's cancer risk management criterion.

For site-specific risks under the CTE scenario, subsurface soil noncancer HIs are less than unity for industrial workers and adolescent and adult trespassers, indicating that adverse noncarcinogenic effects are not anticipated under the defined exposure assumptions. Subsurface soil cancer risk estimates are less than the USEPA target cancer risk range and less than Maine's cancer risk management criterion for industrial workers and adolescent, adult, and lifelong trespassers.

Hypothetical future residents may be exposed to COPCs through the ingestion of homegrown produce and infants could potentially be exposed via nursing (i.e., consumption of COPCs in mother's milk). However, these pathways are not routinely evaluated in HHRAs unless the site under investigation is located in a highly agricultural/rural area and there is a significant potential for subsistence farming. Also, the Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities (USEPA, 2005b) only recommends evaluating the consumption of mother's milk exposure pathway when dioxin/furans or dioxin-like PCBs are significant site contaminants. Dioxin/furans and dioxin-like PCBs are not COPCs at Site 17; therefore, this risk evaluation did not include a quantitative risk evaluation of an infant exposure via the ingestion of mother's milk.

Finally, the risk characterization does not consider antagonistic or synergistic effects. Little or no information is available to determine the potential for antagonism or synergism for the COPCs. Because chemical-specific interactions cannot be predicted, the likelihood for risks to be over

predicted or under predicted cannot be defined, but the methodology that was used is based on current USEPA guidance.

C.6.5 Deviations from the Work Plan

Most of the deviations from the original HHRA methodology presented in the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine (Tetra Tech, September 2008) occurred due to updates to risk assessment methodology or screening criteria. In accordance with updated USEPA ProUCL guidance (May 2010), the quantitation limit is used as an input to ProUCL for non-detected results instead of using ½ the quantitation limit for non-detected results as the work plan stated. USEPA criteria (November 2010) were used for soil COPC selection instead of the Region IX Preliminary Remediation Goals (PRGs), in accordance with USEPA guidance. Additionally, the Work Plan stated that MEDEP Remedial Action Guidelines (RAGs) would be used for soil COPC selection; however the final RAGs published in 2010 were not used for soil COPC selection because those values are intended to be used for cleanup purposes not for COPC selection in a full risk assessment (MEDEP, January 13, 2010). Finally, the calculated SSLs for migration from soil-to-air were not included in the risk assessment even though the Work Plan stated that chemicals in soil would be screened against these criteria (though COPCs should not be selected on this basis). The soil-to-air criteria were unnecessary because the USEPA soil screening values used to select COPCs account for the inhalation pathway.

The work plan stated that the 95% UCL on the mean would be used as an EPC for groundwater concentrations if data for 10 or more wells exists. However, an average concentration was used as the EPC to provide a more representative concentration of site groundwater.

The work plan stated that exceedances of migration from soil-to-air and soil-to-groundwater SSLs would be discussed qualitatively. Soil-to-air SSL exceedances have not been discussed because SSLs were not used for screening as noted above. Migration to groundwater exceedances are presented on RAGS Part D Tables 2.2 and 2.4 and discussed in Section C.6.1.

C.7 SUMMARY

The baseline HHRA for Site 17 was performed to characterize the potential risks to human receptors under current and potential future land use. Potential receptors retained for quantitative evaluation were current and future adolescent, adult, and lifelong trespassers/recreational users, current/future

construction workers, future typical industrial workers, and hypothetical future child, adolescent, adult, and lifelong residents.

The following chemicals were selected as COPCs for the risk evaluation of direct contact exposures to soils:

- Surface Soil – arsenic and heptachlor epoxide.

- Subsurface soil – 4,4'-DDT, alpha-chlordane, dieldrin, gamma-chlordane, heptachlor, heptachlor epoxide, arsenic, and monuron.

The following chemicals were selected as COPCs for soil based on the potential for migration of contaminants from soil to groundwater:

- Surface Soil – 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-chlordane, gamma-chlordane, heptachlor, heptachlor epoxide, arsenic, and lead.

- Subsurface soil - tetrachloroethene, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-chlordane, dieldrin, endrin, gamma-chlordane, heptachlor, heptachlor epoxide, monuron, propoxur, arsenic, and lead.

The following chemicals were selected as COPCs for groundwater:

- 4,4'-DDD, and 4,4'-DDT.

Quantitative estimates of noncarcinogenic and carcinogenic risks (HIs and ILCRs, respectively) were developed for potential human receptors. Target organ-specific HIs for all receptors were less than or equal to unity (1). ILCRs for current/future construction workers, current/future trespassers, future industrial workers, and hypothetical future adolescent and adult residents were within USEPA's target risk range of 1×10^{-4} to 1×10^{-6} for both the cumulative and site-specific risk evaluations. ILCRs for these receptors were also less than Maine's cancer risk management criterion of 1×10^{-5} for these receptors exposed to all media evaluated in the Risk Characterization. The estimated ILCR for industrial workers exposed to subsurface soil (discussed in the Uncertainty Analysis only) slightly exceeded Maine's cancer risk management criterion.

ILCRs for the cumulative COPC evaluation for hypothetical child residents and hypothetical lifelong residents exposed to COPCs in surface soil/groundwater and for hypothetical child residents and hypothetical lifelong residents exposed to COPCs in subsurface soil/groundwater exceeded MEDEPs target risk range. Arsenic was the major risk contributor to those exceedances of the MEDEP target risk range. 4,4'-DDT in subsurface soil was a lesser risk contributor for the lifelong resident in the cumulative risk evaluation.

Site-specific risk estimates calculated for all receptors were less than or within USEPA's target risk range and were less than or equal to Maine's cancer management criterion based on evaluations of individual media. However, the cumulative ILCR for the hypothetical lifelong resident exposed to subsurface soil and groundwater was 2×10^{-5} which slightly exceeds Maine's ILCR target. No primary carcinogenic risk drivers were selected for the individual media evaluated.

Upon completion of the HHRA, no chemicals were retained as COCs because site-specific risks did not exceed USEPA or Maine target levels on a media specific basis. Arsenic, the primary risk driver in soil for the cumulative risk evaluation, was not retained as a COC because elevated arsenic concentrations were determined to be correlated with the presence of fill. Risks calculated without arsenic (i.e., site-specific risks) did not exceed USEPA's target risk range of 1×10^{-4} to 1×10^{-6} or Maine's cancer risk management criterion of 1×10^{-5}.

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ATTACHMENT C-1.1

TABLES

TABLE C-1.1

CHEMICALS RETAINED AS COPCs
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

Chemical	Surface Soil		Subsurface Soil		Groundwater
	Direct Contact	Soil to Groundwater	Direct Contact	Soil to Groundwater	
Inorganics					
Arsenic	R	X	R	X	
Lead		X		X	
Herbicides					
Monuron			N	N	
Propoxur				X	
Pesticides/PCBs					
4,4'-DDD		X		X	R
4,4'-DDE		X		X	
4,4'-DDT		X	R	X	R
alpha-chlordane		X	R	X	
Dieldrin			R	X	
Endrin				X	
gamma-chlordane		X	R	X	
Heptachlor		X	R	X	
Heptachlor epoxide	R	X	R	X	
Volatiles					
Tetrachloroethylene				X	

Notes
G - Chemical concentration exceeded groundwater screening criteria.
N - No toxicity criteria or surrogate.
R - Chemical concentration exceeded the screening criterion for residential exposure.
X - Chemical concentration exceeded criterion for migration from soil to groundwater.

TABLE C-1.2

RECEPTORS AND EXPOSURE ROUTES FOR QUANTITATIVE EVALUATION
SITE 17 REMEDIAL INVESTIGATION
BRUNSWICK, MAINE

Receptors	Exposure Routes
Trespassers (current/future land use)	• Soil dermal contact (surface and subsurface[(1)]) • Soil ingestion (surface and subsurface[(1)]) • Inhalation of air/dust/emissions from soil (surface and subsurface[(1)])
Construction Workers (current/future land use)	• Soil dermal contact (surface and subsurface) • Soil ingestion (surface and subsurface) • Inhalation of air/dust/emissions from soil (surface and subsurface) • Groundwater dermal contact • Groundwater ingestion • Inhalation of volatiles in groundwater
Industrial Worker (future land use)	• Soil dermal contact (surface and subsurface[(1)]) • Soil ingestion (surface and subsurface[(1)]) • Inhalation of air/dust/emissions from soil (surface and subsurface[(1)])
Residents (future land use)	• Soil dermal contact (surface and subsurface) • Soil ingestion (surface and subsurface) • Inhalation of air/dust/emissions from soil (surface and subsurface) • Groundwater dermal contact • Groundwater ingestion • Inhalation of volatiles in groundwater

1 – It is unlikely that trespassers or industrial workers would be exposed to chemicals in subsurface soil. However, exposure of trespassers and industrial workers to chemicals in subsurface soil was evaluated quantitatively and discussed in the Uncertainty Analysis.

TABLE C-1.3

SUMMARY OF CUMULATIVE CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Construction Worker (Current/Future)	Surface Soil	Incidental Ingestion	3E-07	- -	- -	- -	0.05	- -
		Dermal Contact	3E-08	- -	- -	- -	0.006	- -
		Inhalation	4E-08	- -	- -	- -	0.05	- -
		Total	4E-07	- -	- -	- -	0.1	- -
Construction Worker (Current/Future)	Subsurface Soil	Incidental Ingestion	2E-07	- -	- -	- -	0.05	- -
		Dermal Contact	2E-08	- -	- -	- -	0.01	- -
		Inhalation	2E-08	- -	- -	- -	0.02	- -
		Total	3E-07	- -	- -	- -	0.1	- -
Construction Worker (Current/Future)	Groundwater	Incidental Ingestion	1E-10	- -	- -	- -	0.00004	- -
		Dermal Contact	--	- -	- -	- -	--	- -
		Inhalation	--			- -	--	- -
		Total	1E-10	- -	- -	- -	0.00004	- -
Construction Worker Surface Soil + Groundwater Total			4E-07				0.1	
Construction Worker Subsurface Soil + Groundwater Total			3E-07				0.1	
Typical Industrial Worker (Future)	Surface Soil	Incidental Ingestion	4E-06	- -	- -	Arsenic	0.03	- -
		Dermal Contact	9E-07	- -	- -	- -	0.006	- -
		Inhalation	3E-10	- -	- -	- -	0.00001	- -
		Total	5E-06	- -	- -	Arsenic	0.03	- -
Typical Industrial Worker (Future)	Subsurface Soil	Incidental Ingestion	3E-06	- -	- -	Arsenic	0.02	- -
		Dermal Contact	6E-07	- -	- -	- -	0.01	- -
		Inhalation	2E-10	- -	- -	- -	0.000007	- -
		Total	3E-06	- -	- -	Arsenic	0.03	- -
Adolescent Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	3E-07	- -	- -	- -	0.005	- -
		Dermal Contact	1E-07	- -	- -	- -	0.002	- -
		Inhalation	6E-12	- -	- -	- -	0.0000007	- -
		Total	4E-07	- -	- -	- -	0.006	- -
Adolescent Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	2E-07	- -	- -	- -	0.004	- -
		Dermal Contact	7E-08	- -	- -	- -	0.002	- -
		Inhalation	4E-12	- -	- -	- -	0.0000004	- -
		Total	3E-07	- -	- -	- -	0.006	- -
Adult Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	2E-07	- -	- -	- -	0.003	- -
		Dermal Contact	3E-08	- -	- -	- -	0.0004	- -
		Inhalation	9E-12	- -	- -	- -	0.0000007	- -
		Total	3E-07	- -	- -	- -	0.003	- -
Adult Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	2E-07	- -	- -	- -	0.002	- -
		Dermal Contact	2E-08	- -	- -	- -	0.0004	- -
		Inhalation	5E-12	- -	- -	- -	0.0000004	- -
		Total	2E-07	- -	- -	- -	0.003	- -

TABLE C-1.3

SUMMARY OF CUMULATIVE CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Child Resident (Future)	Surface Soil	Incidental Ingestion	1E-05	- -	Arsenic	- -	0.4	- -
		Dermal Contact	1E-06	- -	- -	Arsenic	0.04	- -
		Inhalation	3E-10	- -	- -	- -	0.00005	- -
		Total	2E-05	- -	Arsenic	- -	0.4	- -
Child Resident (Future)	Subsurface Soil	Incidental Ingestion	1E-05	- -	- -	Arsenic	0.3	- -
		Dermal Contact	9E-07	- -	- -	- -	0.03	- -
		Inhalation	2E-10	- -	- -	- -	0.00003	- -
		Total	1E-05	- -	- -	Arsenic	0.4	- -
Child Resident (Future)	Groundwater	Incidental Ingestion	5E-06	- -	- -	- -	0.2	- -
		Dermal Contact	--	- -	- -	- -	--	- -
		Inhalation	--	- -	- -	- -	--	- -
		Total	5E-06	- -	- -	- -	0.2	- -
Child Resident Surface Soil + Groundwater Total			2E-05				0.6	
Child Resident Subsurface Soil + Groundwater Total			2E-05				0.6	
Adolescent Resident (Future)	Surface Soil	Incidental Ingestion	3E-06	- -	- -	Arsenic	0.05	- -
		Dermal Contact	1E-06	- -	- -	Arsenic	0.02	- -
		Inhalation	5E-10	- -	- -	- -	0.00005	- -
		Total	4E-06	- -	- -	Arsenic	0.07	- -
Adolescent Resident (Future)	Subsurface Soil	Incidental Ingestion	2E-06	- -	- -	Arsenic	0.04	- -
		Dermal Contact	8E-07	- -	- -	- -	0.02	- -
		Inhalation	3E-10	- -	- -	- -	0.00003	- -
		Total	3E-06	- -	- -	Arsenic	0.1	- -
Adolescent Resident (Future)	Groundwater	Incidental Ingestion	4E-06	- -	- -	- -	0.1	- -
		Dermal Contact	--	- -	- -	- -	--	- -
		Inhalation	--	- -	- -	- -	--	- -
		Total	4E-06	- -	- -	- -	0.1	- -
Adolescent Resident Surface Soil + Groundwater Total			9E-06				0.2	
Adolescent Resident Subsurface Soil + Groundwater Total			7E-06				0.2	
Adult Resident (Future)	Surface Soil	Incidental Ingestion	3E-06	- -	- -	Arsenic	0.04	- -
		Dermal Contact	4E-07	- -	- -	- -	0.005	- -
		Inhalation	7E-10	- -	- -	- -	0.00005	- -
		Total	4E-06	- -	- -	Arsenic	0.04	- -
Adult Resident (Future)	Subsurface Soil	Incidental Ingestion	2E-06	- -	- -	Arsenic	0.03	- -
		Dermal Contact	3E-07	- -	- -	- -	0.005	- -
		Inhalation	4E-10	- -	- -	- -	0.00003	- -
		Total	3E-06	- -	- -	Arsenic	0.04	- -

TABLE C-1.3

SUMMARY OF CUMULATIVE CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Adult Resident	Groundwater	Incidental Ingestion	5E-06	- -	- -	- -	0.09	- -
(Future)		Dermal Contact	--	- -	- -	- -	--	- -
		Inhalation	--	- -	- -	- -	--	- -
		Total	5E-06	- -	- -	- -	0.09	- -
Adult Resident Surface Soil + Groundwater Total			8E-06				0.1	
Adult Resident Subsurface Soil + Groundwater Total			7E-06				0.1	
Lifelong Trespasser	Surface Soil	Incidental Ingestion	5E-07	- -	- -	- -	NA	- -
(Current/Future)		Dermal Contact	1E-07	- -	- -	- -	NA	- -
		Inhalation	1E-11	- -	- -	- -	NA	- -
		Total	7E-07	- -	- -	- -	NA	- -
Lifelong Trespasser	Subsurface Soil	Incidental Ingestion	4E-07	- -	- -	- -	NA	- -
(Current/Future)		Dermal Contact	9E-08	- -	- -	- -	NA	- -
		Inhalation	8E-12	- -	- -	- -	NA	- -
		Total	5E-07	- -	- -	- -	NA	- -
Lifelong Resident	Surface Soil	Incidental Ingestion	2E-05	- -	- -	Arsenic	NA	- -
(Future)		Dermal Contact	3E-06	- -	- -	- -	NA	- -
		Inhalation	2E-09	- -	- -	- -	NA	- -
		Total	2E-05	- -	- -	Arsenic	NA	- -
Lifelong Resident	Subsurface Soil	Incidental Ingestion	1E-05	- -	- -	Arsenic	NA	- -
(Future)		Dermal Contact	2E-06	- -	- -	- -	NA	- -
		Inhalation	8E-10	- -	- -	- -	NA	- -
		Total	2E-05	- -	- -	Arsenic	NA	- -
Lifelong Resident	Groundwater	Incidental Ingestion	6E-06	- -	- -	4,4'-DDT, 4,4'-DDD	NA	- -
(Future)		Dermal Contact	--	- -	- -	- -	NA	- -
		Inhalation	--	- -	- -	- -	NA	
		Total	6E-06	- -	- -	4,4'-DDT, 4,4'-DDD	NA	- -
Lifelong Resident Surface Soil + Groundwater Total			3E-05				NA	
Lifelong Resident Subsurface Soil + Groundwater Total			2E-05				NA	

TABLE C-1.4

SUMMARY OF CUMULATIVE CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Construction Worker (Current/Future)	Surface Soil	Incidental Ingestion	8E-08	- -	- -	- -	0.01	- -
		Dermal Contact	5E-09	- -	- -	- -	0.001	- -
		Inhalation	2E-08	- -	- -	- -	0.02	- -
		Total	1E-07	- -	- -	- -	0.04	- -
Construction Worker (Current/Future)	Subsurface Soil	Incidental Ingestion	6E-08	- -	- -	- -	0.01	- -
		Dermal Contact	4E-09	- -	- -	- -	0.0009	- -
		Inhalation	1E-08	- -	- -	- -	0.01	- -
		Total	7E-08	- -	- -	- -	0.02	- -
Construction Worker (Current/Future)	Groundwater	Incidental Ingestion	7E-11	- -	- -	- -	0.00002	- -
		Dermal Contact	--	- -	- -	- -	--	- -
		Inhalation	--			- -	--	- -
		Total	7E-11	- -	- -	- -	0.00002	- -
Construction Worker Surface Soil + Groundwater Total			1E-07				0.04	
Construction Worker Subsurface Soil + Groundwater Total			7E-08				0.02	
Typical Industrial Worker (Future)	Surface Soil	Incidental Ingestion	7E-07	- -	- -	- -	0.01	- -
		Dermal Contact	3E-08	- -	- -	- -	0.001	- -
		Inhalation	9E-11	- -	- -	- -	0.00001	- -
		Total	7E-07	- -	- -	- -	0.01	- -
Typical Industrial Worker (Future)	Subsurface Soil	Incidental Ingestion	4E-07	- -	- -	- -	0.01	- -
		Dermal Contact	2E-08	- -	- -	- -	0.0005	- -
		Inhalation	5E-11	- -	- -	- -	0.000006	- -
		Total	5E-07	- -	- -	- -	0.01	- -
Adolescent Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	6E-08	- -	- -	- -	0.001	- -
		Dermal Contact	8E-09	- -	- -	- -	0.0001	- -
		Inhalation	2E-12	- -	- -	- -	0.0000002	- -
		Total	7E-08	- -	- -	- -	0.001	- -
Adolescent Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	4E-08	- -	- -	- -	0.001	- -
		Dermal Contact	6E-09	- -	- -	- -	0.0001	- -
		Inhalation	9E-13	- -	- -	- -	0.0000001	- -
		Total	5E-08	- -	- -	- -	0.001	- -
Adult Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	6E-08	- -	- -	- -	0.001	- -
		Dermal Contact	2E-09	- -	- -	- -	0.00003	- -
		Inhalation	2E-12	- -	- -	- -	0.0000002	- -
		Total	6E-08	- -	- -	- -	0.001	- -
Adult Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	4E-08	- -	- -	- -	0.001	- -
		Dermal Contact	2E-09	- -	- -	- -	0.00003	- -
		Inhalation	1E-12	- -	- -	- -	0.0000001	- -
		Total	4E-08	- -	- -	- -	0.001	- -

TABLE C-1.4

SUMMARY OF CUMULATIVE CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Child Resident (Future)	Surface Soil	Incidental Ingestion	2E-06	- -	- -	Arsenic	0.1	- -
		Dermal Contact	6E-08	- -	- -	- -	0.00	- -
		Inhalation	7E-11	- -	- -	- -	0.00004	- -
		Total	2E-06	- -	- -	Arsenic	0.1	- -
Child Resident (Future)	Subsurface Soil	Incidental Ingestion	1E-06	- -	- -	- -	0.1	- -
		Dermal Contact	4E-08	- -	- -	- -	0.00	- -
		Inhalation	4E-11	- -	- -	- -	0.00002	- -
		Total	1E-06	- -	- -	- -	0.1	- -
Child Resident (Future)	Groundwater	Incidental Ingestion	7E-07	- -	- -	- -	0.1	- -
		Dermal Contact	--	- -	- -	- -	--	- -
		Inhalation	--	- -	- -	- -	--	- -
		Total	7E-07	- -	- -	- -	0.1	- -
Child Resident Surface Soil + Groundwater Total			2E-06				0.2	
Child Resident Subsurface Soil + Groundwater Total			2E-06				0.2	
Adolescent Resident (Future)	Surface Soil	Incidental Ingestion	2E-07	- -	- -	- -	0.02	- -
		Dermal Contact	8E-09	- -	- -	- -	0.0007	- -
		Inhalation	7E-11	- -	- -	- -	0.00004	- -
		Total	2E-07	- -	- -	- -	0.02	- -
Adolescent Resident (Future)	Subsurface Soil	Incidental Ingestion	1E-07	- -	- -	- -	0.01	- -
		Dermal Contact	6E-09	- -	- -	- -	0.0006	- -
		Inhalation	4E-11	- -	- -	- -	0.00002	- -
		Total	1E-07	- -	- -	- -	0.02	- -
Adolescent Resident (Future)	Groundwater	Incidental Ingestion	3E-07	- -	- -	- -	0.03	- -
		Dermal Contact	--	- -	- -	- -	--	- -
		Inhalation	--	- -	- -	- -	--	- -
		Total	3E-07	- -	- -	- -	0.03	- -
Adolescent Resident Surface Soil + Groundwater Total			5E-07				0.05	
Adolescent Resident Subsurface Soil + Groundwater Total			4E-07				0.05	
Adult Resident (Future)	Surface Soil	Incidental Ingestion	6E-07	- -	- -	- -	0.01	- -
		Dermal Contact	2E-08	- -	- -	- -	0.0005	- -
		Inhalation	2E-10	- -	- -	- -	0.00004	- -
		Total	6E-07	- -	- -	- -	0.01	- -
Adult Resident (Future)	Subsurface Soil	Incidental Ingestion	4E-07	- -	- -	- -	0.01	- -
		Dermal Contact	1E-08	- -	- -	- -	0.0005	- -
		Inhalation	1E-10	- -	- -	- -	0.00002	- -
		Total	4E-07	- -	- -	- -	0.01	- -
Adult Resident	Groundwater	Incidental Ingestion	1E-06	- -	- -	- -	0.04	- -

TABLE C-1.4

SUMMARY OF CUMULATIVE CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
(Future)		Dermal Contact	--	- -	- -	- -	--	- -
		Inhalation	--	- -	- -	- -	--	- -
		Total	1E-06	- -	- -	- -	0.04	- -
Adult Resident Surface Soil + Groundwater Total			2E-06				0.05	
Adult Resident Subsurface Soil + Groundwater Total			1E-06				0.05	
Lifelong Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	6E-08	- -	- -	- -	NA	- -
		Dermal Contact	2E-09	- -	- -	- -	NA	- -
		Inhalation	2E-12	- -	- -	- -	NA	- -
		Total	6E-08	- -	- -	- -	NA	- -
Lifelong Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	4E-08	- -	- -	- -	NA	- -
		Dermal Contact	2E-09	- -	- -	- -	NA	- -
		Inhalation	1E-12	- -	- -	- -	NA	- -
		Total	4E-08	- -	- -	- -	NA	- -
Lifelong Resident (Future)	Surface Soil	Incidental Ingestion	2E-06	- -	- -	- -	NA	- -
		Dermal Contact	8E-08	- -	- -	- -	NA	- -
		Inhalation	4E-10	- -	- -	- -	NA	- -
		Total	2E-06	- -	- -	- -	NA	- -
Lifelong Resident (Future)	Subsurface Soil	Incidental Ingestion	2E-06	- -	- -	- -	NA	- -
		Dermal Contact	6E-08	- -	- -	- -	NA	- -
		Inhalation	2E-10	- -	- -	- -	NA	- -
		Total	2E-06	- -	- -	- -	NA	- -
Lifelong Resident (Future)	Groundwater	Incidental Ingestion	2E-06	- -	- -	- -	NA	- -
		Dermal Contact	--	- -	- -	- -	NA	- -
		Inhalation	--	- -	- -	- -	NA	- -
		Total	2E-06	- -	- -	- -	NA	- -
Lifelong Resident Surface Soil + Groundwater Total			4E-06				NA	
Lifelong Resident Subsurface Soil + Groundwater Total			3E-06				NA	

TABLE C-1.5

SUMMARY OF SITE SPECIFIC CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Construction Worker (Current/Future)	Surface Soil	Incidental Ingestion	5E-09	- -	- -	- -	0.003	- -
		Dermal Contact	2E-09	- -	- -	- -	0.001	- -
		Inhalation	6E-11	- -	- -	- -	- -	- -
		Total	7E-09	- -	- -	- -	0.004	- -
Construction Worker (Current/Future)	Subsurface Soil	Incidental Ingestion	4E-08	- -	- -	- -	0.02	- -
		Dermal Contact	7E-09	- -	- -	- -	0.003	- -
		Inhalation	5E-10	- -	- -	- -	0.0001	- -
		Total	5E-08	- -	- -	- -	0.02	- -
Construction Worker (Current/Future)	Groundwater	Incidental Ingestion	1E-10	- -	- -	- -	0.00004	- -
		Dermal Contact	--	- -	- -	- -	--	- -
		Inhalation	--			- -	--	- -
		Total	1E-10	- -	- -	- -	0.00004	- -
Construction Worker Surface Soil + Groundwater Total			7E-09				0.004	
Construction Worker Subsurface Soil + Groundwater Total			5E-08				0.02	
Typical Industrial Worker (Future)	Surface Soil	Incidental Ingestion	6E-08	- -	- -	- -	0.002	- -
		Dermal Contact	4E-08	- -	- -	- -	0.001	- -
		Inhalation	5E-13	- -	- -	- -	- -	- -
		Total	1E-07	- -	- -	- -	0.002	- -
Typical Industrial Worker (Future)	Subsurface Soil	Incidental Ingestion	5E-07	- -	- -	- -	0.01	- -
		Dermal Contact	2E-07	- -	- -	- -	0.003	- -
		Inhalation	4E-12	- -	- -	- -	- -	- -
		Total	7E-07	- -	- -	- -	0.01	- -
Adolescent Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	4E-09	- -	- -	- -	0.0003	- -
		Dermal Contact	5E-09	- -	- -	- -	0.0003	- -
		Inhalation	9E-15	- -	- -	- -	- -	- -
		Total	9E-09	- -	- -	- -	0.0005	- -
Adolescent Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	4E-08	- -	- -	- -	0.001	- -
		Dermal Contact	2E-08	- -	- -	- -	0.001	- -
		Inhalation	8E-14	- -	- -	- -	- -	- -
		Total	6E-08	- -	- -	- -	0.002	- -
Adult Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	4E-09	- -	- -	- -	0.0002	- -
		Dermal Contact	1E-09	- -	- -	- -	0.0001	- -
		Inhalation	1E-14	- -	- -	- -	- -	- -
		Total	5E-09	- -	- -	- -	0.0002	- -
Adult Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	3E-08	- -	- -	- -	0.001	- -
		Dermal Contact	7E-09	- -	- -	- -	0.0002	- -
		Inhalation	1E-13	- -	- -	- -	- -	- -
		Total	4E-08	- -	- -	- -	0.001	- -

TABLE C-1.5

SUMMARY OF SITE SPECIFIC CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Child Resident (Future)	Surface Soil	Incidental Ingestion	2E-07	- -	- -	- -	0.02	- -
		Dermal Contact	6E-08	- -	- -	- -	0.01	- -
		Inhalation	5E-13	- -	- -	- -	- -	- -
		Total	3E-07	- -	- -	- -	0.03	- -
Child Resident (Future)	Subsurface Soil	Incidental Ingestion	2E-06	- -	- -	- -	0.1	- -
		Dermal Contact	3E-07	- -	- -	- -	0.02	- -
		Inhalation	4E-12	- -	- -	- -	- -	- -
		Total	2E-06	- -	- -	- -	0.1	- -
Child Resident (Future)	Groundwater	Incidental Ingestion	5E-06	- -	- -	- -	0.2	- -
		Dermal Contact	--	- -	- -	- -	--	- -
		Inhalation	--	- -	- -	- -	--	- -
		Total	5E-06	- -	- -	- -	0.2	- -
Child Resident Surface Soil + Groundwater Total			5E-06				0.2	
Child Resident Subsurface Soil + Groundwater Total			7E-06				0.4	
Adolescent Resident (Future)	Surface Soil	Incidental Ingestion	5E-08	- -	- -	- -	0.003	- -
		Dermal Contact	5E-08	- -	- -	- -	0.003	- -
		Inhalation	8E-13	- -	- -	- -	- -	- -
		Total	1E-07	- -	- -	- -	0.01	- -
Adolescent Resident (Future)	Subsurface Soil	Incidental Ingestion	4E-07	- -	- -	- -	0.02	- -
		Dermal Contact	2E-07	- -	- -	- -	0.01	- -
		Inhalation	6E-12	- -	- -	- -	- -	- -
		Total	6E-07	- -	- -	- -	0.02	- -
Adolescent Resident (Future)	Groundwater	Incidental Ingestion	4E-06	- -	- -	--	0.1	- -
		Dermal Contact	--	- -	- -	--	--	- -
		Inhalation	--	- -	- -	--	--	- -
		Total	4E-06	- -	- -	--	0.1	- -
Adolescent Resident Surface Soil + Groundwater Total			4E-06				0.1	
Adolescent Resident Subsurface Soil + Groundwater Total			5E-06				0.1	
Adult Resident (Future)	Surface Soil	Incidental Ingestion	5E-08	- -	- -	- -	0.002	- -
		Dermal Contact	2E-08	- -	- -	- -	0.001	- -
		Inhalation	1E-12	- -	- -	- -	- -	- -
		Total	7E-08	- -	- -	- -	0.003	- -
Adult Resident (Future)	Subsurface Soil	Incidental Ingestion	4E-07	- -	- -	- -	0.01	- -
		Dermal Contact	9E-08	- -	- -	- -	0.002	- -
		Inhalation	9E-12	- -	- -	- -	- -	- -
		Total	5E-07	- -	- -	- -	0.01	- -
Adult Resident	Groundwater	Incidental Ingestion	5E-06	- -	- -	--	0.09	- -

TABLE C-1.5

SUMMARY OF SITE SPECIFIC CANCER RISKS AND HAZARD INDICES
REASONABLE MAXIMUM EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
(Future)		Dermal Contact	--	- -	- -	--	--	- -
		Inhalation	--	- -	- -	--	--	- -
		Total	5E-06	- -	- -	--	0.09	- -
Adult Resident Surface Soil + Groundwater Total			5E-06				0.09	
Adult Resident Subsurface Soil + Groundwater Total			5E-06				0.1	
Lifelong Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	8E-09	- -	- -	- -	NA	- -
		Dermal Contact	6E-09	- -	- -	- -	NA	- -
		Inhalation	2E-14	- -	- -	- -	NA	- -
		Total	1E-08	- -	- -	- -	NA	- -
Lifelong Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	7E-08	- -	- -	- -	NA	- -
		Dermal Contact	3E-08	- -	- -	- -	NA	- -
		Inhalation	2E-13	- -	- -	- -	NA	- -
		Total	9E-08	- -	- -	- -	NA	- -
Lifelong Resident (Future)	Surface Soil	Incidental Ingestion	5E-08	- -	- -	- -	NA	- -
		Dermal Contact	2E-08	- -	- -	- -	NA	- -
		Inhalation	1E-12	- -	- -	- -	NA	- -
		Total	7E-08	- -	- -	- -	NA	- -
Lifelong Resident (Future)	Subsurface Soil	Incidental Ingestion	3E-06	- -	- -	- -	NA	- -
		Dermal Contact	6E-07	- -	- -	- -	NA	- -
		Inhalation	2E-11	- -	- -	- -	NA	- -
		Total	3E-06	- -	- -	- -	NA	- -
Lifelong Resident (Future)	Groundwater	Incidental Ingestion	1E-05	- -	- -	- -	NA	- -
		Dermal Contact	--	- -	- -	- -	NA	- -
		Inhalation	--	- -	- -	- -	NA	
		Total	1E-05	- -	- -	- -	NA	- -
Lifelong Resident Surface Soil + Groundwater Total			1E-05				NA	
Lifelong Resident Subsurface Soil + Groundwater Total			2E-05				NA	

TABLE C-1.6

SUMMARY OF SITE SPECIFIC CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Construction Worker (Current/Future)	Surface Soil	Incidental Ingestion	1E-09	- -	- -	- -	0.001	- -
		Dermal Contact	3E-10	- -	- -	- -	0.0001	- -
		Inhalation	3E-11	- -	- -	- -	- -	- -
		Total	2E-09	- -	- -	- -	0.001	- -
Construction Worker (Current/Future)	Subsurface Soil	Incidental Ingestion	1E-08	- -	- -	- -	0.004	- -
		Dermal Contact	1E-09	- -	- -	- -	0.0004	- -
		Inhalation	3E-10	- -	- -	- -	0.00005	- -
		Total	1E-08	- -	- -	- -	0.005	- -
Construction Worker (Current/Future)	Groundwater	Incidental Ingestion	7E-11	- -	- -	- -	0.00002	- -
		Dermal Contact	--	- -	- -	- -	--	- -
		Inhalation	--			- -	--	- -
		Total	7E-11	- -	- -	- -	0.00002	- -
Construction Worker Surface Soil + Groundwater Total			2E-09				0.0009	
Construction Worker Subsurface Soil + Groundwater Total			1E-08				0.005	
Typical Industrial Worker (Future)	Surface Soil	Incidental Ingestion	1E-08	- -	- -	- -	0.001	- -
		Dermal Contact	1E-09	- -	- -	- -	0.00009	- -
		Inhalation	1E-13	- -	- -	- -	- -	- -
		Total	1E-08	- -	- -	- -	0.001	- -
Typical Industrial Worker (Future)	Subsurface Soil	Incidental Ingestion	8E-08	- -	- -	- -	0.004	- -
		Dermal Contact	6E-09	- -	- -	- -	0.0003	- -
		Inhalation	1E-12	- -	- -	- -	- -	- -
		Total	9E-08	- -	- -	- -	0.004	- -
Adolescent Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	9E-10	- -	- -	- -	0.0001	- -
		Dermal Contact	4E-10	- -	- -	- -	0.00002	- -
		Inhalation	2E-15	- -	- -	- -	- -	- -
		Total	1E-09	- -	- -	- -	0.0001	- -
Adolescent Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	7E-09	- -	- -	- -	0.0003	- -
		Dermal Contact	2E-09	- -	- -	- -	0.00006	- -
		Inhalation	2E-14	- -	- -	- -	- -	- -
		Total	9E-09	- -	- -	- -	0.0004	- -
Adult Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	9E-10	- -	- -	- -	0.00004	- -
		Dermal Contact	1E-10	- -	- -	- -	0.000004	- -
		Inhalation	3E-15	- -	- -	- -	- -	- -
		Total	1E-09	- -	- -	- -	0.00004	- -
Adult Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	8E-09	- -	- -	- -	0.0002	- -
		Dermal Contact	5E-10	- -	- -	- -	0.00001	- -
		Inhalation	3E-14	- -	- -	- -	- -	- -
		Total	8E-09	- -	- -	- -	0.0002	- -

TABLE C-1.6

SUMMARY OF SITE SPECIFIC CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
Child Resident (Future)	Surface Soil	Incidental Ingestion	2E-08	- -	- -	- -	0.01	- -
		Dermal Contact	3E-09	- -	- -	- -	0.0008	- -
		Inhalation	1E-13	- -	- -	- -	- -	- -
		Total	3E-08	- -	- -	- -	0.008	- -
Child Resident (Future)	Subsurface Soil	Incidental Ingestion	2E-07	- -	- -	- -	0.04	- -
		Dermal Contact	1E-08	- -	- -	- -	0.002	- -
		Inhalation	8E-13	- -	- -	- -	- -	- -
		Total	2E-07	- -	- -	- -	0.04	- -
Child Resident (Future)	Groundwater	Incidental Ingestion	7E-07	- -	- -	- -	0.1	- -
		Dermal Contact	--	- -	- -	- -	--	- -
		Inhalation	--	- -	- -	- -	--	- -
		Total	7E-07	- -	- -	- -	0.1	- -
Child Resident Surface Soil + Groundwater Total			7E-07				0.1	
Child Resident Subsurface Soil + Groundwater Total			9E-07				0.1	
Adolescent Resident (Future)	Surface Soil	Incidental Ingestion	3E-09	- -	- -	- -	0.001	- -
		Dermal Contact	4E-10	- -	- -	- -	0.0001	- -
		Inhalation	1E-13	- -	- -	- -	- -	- -
		Total	4E-09	- -	- -	- -	0.001	- -
Adolescent Resident (Future)	Subsurface Soil	Incidental Ingestion	3E-08	- -	- -	- -	0.01	- -
		Dermal Contact	2E-09	- -	- -	- -	0.0003	- -
		Inhalation	8E-13	- -	- -	- -	- -	- -
		Total	3E-08	- -	- -	- -	0.01	- -
Adolescent Resident (Future)	Groundwater	Incidental Ingestion	3E-07	- -	- -	- -	0.03	- -
		Dermal Contact	--	- -	- -	- -	--	- -
		Inhalation	--	- -	- -	- -	--	- -
		Total	3E-07	- -	- -	- -	0.03	- -
Adolescent Resident Surface Soil + Groundwater Total			3E-07				0.04	
Adolescent Resident Subsurface Soil + Groundwater Total			3E-07				0.04	
Adult Resident (Future)	Surface Soil	Incidental Ingestion	8E-09	- -	- -	- -	0.001	- -
		Dermal Contact	1E-09	- -	- -	- -	0.00008	- -
		Inhalation	4E-13	- -	- -	- -	- -	- -
		Total	9E-09	- -	- -	- -	0.001	- -
Adult Resident (Future)	Subsurface Soil	Incidental Ingestion	7E-08	- -	- -	- -	0.004	- -
		Dermal Contact	4E-09	- -	- -	- -	0.0002	- -
		Inhalation	3E-12	- -	- -	- -	- -	- -
		Total	7E-08	- -	- -	- -	0.004	- -
Adult Resident	Groundwater	Incidental Ingestion	1E-06	- -	- -	- -	0.04	- -

TABLE C-1.6

SUMMARY OF SITE SPECIFIC CANCER RISKS AND HAZARD INDICES
CENTRAL TENDENCY EXPOSURES
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK
BRUNSWICK, MAINE

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index (HI)	Chemicals Contributing to an HI > 1[(1)]
(Future)		Dermal Contact	--	- -	- -	- -	--	- -
		Inhalation	--	- -	- -	- -	--	- -
		Total	1E-06	- -	- -	- -	0.04	- -
Adult Resident Surface Soil + Groundwater Total			1E-06				0.04	
Adult Resident Subsurface Soil + Groundwater Total			1E-06				0.05	
Lifelong Trespasser (Current/Future)	Surface Soil	Incidental Ingestion	9E-10	- -	- -	- -	NA	- -
		Dermal Contact	1E-10	- -	- -	- -	NA	- -
		Inhalation	3E-15	- -	- -	- -	NA	- -
		Total	1E-09	- -	- -	- -	NA	- -
Lifelong Trespasser (Current/Future)	Subsurface Soil	Incidental Ingestion	8E-09	- -	- -	- -	NA	- -
		Dermal Contact	5E-10	- -	- -	- -	NA	- -
		Inhalation	3E-14	- -	- -	- -	NA	- -
		Total	8E-09	- -	- -	- -	NA	- -
Lifelong Resident (Future)	Surface Soil	Incidental Ingestion	8E-09	- -	- -	- -	NA	- -
		Dermal Contact	1E-09	- -	- -	- -	NA	- -
		Inhalation	4E-13	- -	- -	- -	NA	- -
		Total	9E-09	- -	- -	- -	NA	- -
Lifelong Resident (Future)	Subsurface Soil	Incidental Ingestion	2E-06	- -	- -	- -	NA	- -
		Dermal Contact	6E-08	- -	- -	- -	NA	- -
		Inhalation	2E-10	- -	- -	- -	NA	- -
		Total	2E-06	- -	- -	- -	NA	- -
Lifelong Resident (Future)	Groundwater	Incidental Ingestion	2E-06	- -	- -	- -	NA	- -
		Dermal Contact	--	- -	- -	- -	NA	- -
		Inhalation	--	- -	- -	- -	NA	
		Total	2E-06	- -	- -	- -	NA	- -
Lifelong Resident Surface Soil + Groundwater Total			2E-06				NA	
Lifelong Resident Subsurface Soil + Groundwater Total			4E-06				NA	

TABLE C-1.7
EVALUATION OF POTENTIAL RISKS USING EXPOSURE UNITS NORTH AND SOUTH OF AVENUE B
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK MAINE

Chemical	Entire Site EPC (µg/kg)	Entire Site Calculated Risk for Lifelong Resident	North of Avenue B EPC (µg/kg)	Effect on risks North of Avenue B Compared to Entire Site	South of Avenue B EPC (µg/kg)	Effect on risks South of Avenue B Compared to Entire Site	Change in Overall Risk Conclusions[2]
Surface Soil							
Alpha-Chlordane[3]	107	NA	22	--	450	--	No
Gamma-Chlordane[3]	96.7	NA	28	--	230	--	No
Heptachlor Epoxide	24	4.E-07	NA[1]	Less	43	Greater	No
Subsurface Soil							
4,4'-DDD[3]	NA	NA	75.8	--	14.8	--	No
4,4'-DDT	2300	2.E-06	5700	Greater	550	Less	No
Alpha-Chlordane	410	3.E-07	700	Greater	830	Greater	No
Gamma-Chlordane	370	3.E-07	630	Greater	760	Greater	No
Heptachlor Epoxide	32	7.E-07	41	Greater	38	Greater	No

1 All heptachlor epoxide concentrations for soil samples north of Avenue B were reported as non-detected.

2 A change in the overall risk conclusion would be flagged as occuring if one of the EPCs showed caused a change in the risk conclusion for the life long receptor (most-sensitive receptor). For example if one of the EPCs labeled as "greater" caused the cumulative risk for a receptor to be greater than an ILCR of 1E-5 when the risk was previously less than 1E-5 then a "Yes" would placed in the Change in Overall Risk Conclusions column.

3 Chemical was not selected as a COPC because the maximum concentration detected was not greater than the corresponding screening level; therefore, risks were not calculated.

Chemical	Entire Site Calculated Risk for Lifelong Resident	North and South EPC Estimated Risk for Lifelong Resident [1]
Subsurface Soil		
4,4'-DDT	2.E-06	5.E-06
Alpha-Chlordane	3.E-07	8.E-07
Gamma-Chlordane	3.E-07	8.E-07
Heptachlor Epoxide	7.E-07	2.E-06

1 EPCs calculated for the chemicals in the first table flagged as greater than Entire Site EPCs were greater by a maximum factor of approximately 2.5. To **conservatively** estimate whether risk conclusions may change based on the north and south EPCs all entire site risks were multiplied by a factor of 2.5 in the table directly above to estimate if any changes would occur to risk conclusions for the most sensitive receptor evaluated.

Entire Site Risks from Table 9.9 RME Site Specific

Lifelong Resident Total = 5.E-06

North and South EPC Conservative Risk Esimates based on North and South EPCs presented above and 9.9 RME Site Specific

Lifelong Resident Cumulative (SB + GW) Total = 1.E-05

ATTACHMENT C-1.2

EXPOSURE ASSESSMENT

C-1.2 CHEMICAL INTAKE ESTIMATION

The methodologies and techniques used to estimate exposure intakes are presented in this Appendix. Intakes for the identified potential receptor groups were calculated using current USEPA risk assessment guidance (e.g., USEPA, 1991, 1997, and 2004) and presented in the risk assessment spreadsheets. All quantitative risk assessment results are presented in RAGS Part D-format tables (Attachment C-1.4).

Noncarcinogenic intakes are estimated using the concept of an average annual exposure. Carcinogenic intakes are calculated as an incremental lifetime exposure, which assumes a life expectancy of 70 years. Equations used to calculate estimated intakes are provided below. Assumptions regarding exposure for all receptors and exposure pathways are presented in the RAGS Part D Table 4s which are provided in Attachment C1.4.

C-1.2.1 Incidental Ingestion of Soil

Direct physical contact with soil may result in the incidental ingestion of chemicals. Chemical intake for incidental ingestion of soil is estimated in the following manner (USEPA, 1989):

$$Intake_{si} = \frac{(C_{si})(IR_s)(FI)(EF)(ED)(CF)}{(BW)(AT)}$$

where:			
	Intakes	=	intake of contaminant "i" from soil (mg/kg/day)
	C_{si}	=	concentration of contaminant "i" in soil (mg/kg)
	IR_s	=	incidental ingestion rate (mg/day)
	FI	=	fraction ingested from contaminated source (dimensionless)
	EF	=	exposure frequency (days/yr)
	ED	=	exposure duration (yr)
	CF	=	conversion factor (1×10^{-6} kg/mg)
	BW	=	body weight (kg)
	AT	=	averaging time (days); for noncarcinogens, AT = ED x 365 days/yr; for carcinogens, AT = 70 yr x 365 days/yr

For the RME scenario, the incidental ingestion rate is set at 330 mg/day for the construction workers; 100 mg/day for industrial workers, trespassers, adolescent residents, and adult residents; and 200 mg/day for child residents (USEPA, 2002). For the CTE scenario, the incidental ingestion rate is set at 165 mg/day for the construction workers; 50 mg/day for industrial workers, trespassers, adolescent

residents, and adult residents; and 100 mg/day for child residents (USEPA, 1993). Exposure frequencies of 150 days/year for construction workers, 250 days/year for industrial workers, 26 days/year for trespassers, and 350 days/year for child, adolescent, and adult residents are used for the RME scenarios. Exposure frequencies of 75 days/year for construction workers, 219 days/year for industrial workers, 13 days/year for trespassers, and 234 days/year for child, adolescent, and adult residents are used for the CTE scenarios. Exposure durations are set at 1 year for the construction worker, 25 years for the industrial worker, 10 years for the adolescent trespasser, 14 years for the adult trespasser, 6 years for child residents, 10 years for the adolescent resident, and 14 years for adult residents under the RME scenario. For the CTE scenario, the exposure duration is set at 1 year for the construction worker; 9 years for the industrial worker, 10 years for the adolescent trespasser, 14 years for the adult trespasser, 2 years for child and adolescent residents, and 7 years for adult residents.

C-1.2.2 Dermal Contact with Soil

Direct physical contact with soil may result in the dermal absorption of chemicals. Exposure associated with dermal contact with soil is estimated in the following manner (USEPA, 1989):

$$Intake_{si} = \frac{(C_{si})(SA)(AF)(ABS)(CF)(EF)(ED)}{(BW)(AT)}$$

where:

$Intake_{si}$	=	amount of chemical "i" absorbed during contact with soil (mg/kg/day)
C_{si}	=	concentration of chemical "i" in soil (mg/kg)
SA	=	skin surface area available for contact (cm2/day)
AF	=	skin adherence factor (mg/cm2)
ABS	=	absorption factor (dimensionless)
CF	=	conversion factor ($1x\ 10^{-6}$ kg/mg)
EF	=	exposure frequency (days/yr)
ED	=	exposure duration (yr)
BW	=	body weight (kg)
AT	=	averaging time (days); for noncarcinogens, AT = ED x 365 days/yr; for carcinogens, AT = 70 yr x 365 days/yr

The same exposure frequencies and durations used in the estimation of incidental ingestion intakes of soil are used to estimate exposure via dermal contact. Exposed surface areas of the body available for dermal contact are determined on a receptor specific basis because they correspond with assumed

human activities and clothing worn during exposure events. Current guidance (USEPA, 1997, 2004) was used to develop the following assumptions concerning the amount of skin surface area available for contact for a receptor:

- For construction workers and industrial workers the USEPA currently recommends that an area of 3,300 cm^2 be assumed available for dermal contact (USEPA, 2004). This assumes that the worker wears a short sleeved shirt, long pants, and shoes. Therefore, the exposed skin surface area is limited to the head, hands, and forearms.

- For adolescent trespassers and hypothetical adolescent residents, the head, hands, forearms, lower legs, and feet (5,300 cm^2) are assumed to be available for soil contact (USEPA, 2004).

- For adult trespassers and hypothetical adult residents, the head, hands, forearms, lower legs, and feet (5,700 cm^2) are assumed to be available for soil contact (USEPA, 2004).

- For hypothetical child residents, the hands, forearms, lower legs, feet, and face (2,800 cm^2) are assumed to be available for soil contact (USEPA, 2004).

Current USEPA Guidance (USEPA, 2004) is used to determine soil adherence factors and chemical specific absorption factors. The following soil adherence factors were used for the RME and CTE exposure scenarios:

- Construction workers – 0.3 mg/cm^2 for the RME and 0.1 mg/cm^2 for the CTE (Exhibit 3.3, USEPA, 2004).

- Industrial workers – 0.2 mg/cm^2 for the RME and 0.02 mg/cm^2 for the CTE (Exhibit 3.3, USEPA, 2004).

- Adolescent trespassers - 0.2 mg/cm^2 for the RME and 0.04 mg/cm^2 for the CTE (same as hypothetical child and adolescent residents)

- Adult trespassers - 0.07 mg/cm^2 for the RME and 0.01 mg/cm^2 for the CTE (same as hypothetical adult residents)

- Hypothetical child residents – 0.2 mg/cm^2 for the RME and 0.04 mg/cm^2 for the CTE (Exhibit 3.5, USEPA, 2004).

- Hypothetical adolescent residents – 0.2 mg/cm^2 for the RME and 0.04 mg/cm^2 for the CTE (Exhibit 3.5, USEPA, 2004).

- Hypothetical adult residents – 0.07 mg/cm^2 for the RME and 0.01 mg/cm^2 for the CTE (Exhibit 3.5, USEPA, 2004).

For the constituents identified as COPCs in soil, the following absorption factors were used (USEPA, 2009, unless otherwise noted):

- Chlordane – 0.04
- DDD – 0.03
- DDE – 0.03
- DDT – 0.03
- Gamma-chlordane (lindane) – 0.04
- Other pesticides – 0.1

C-1.2.3 Inhalation of Air and Fugitive Dust/Volatile Emissions from Soils

Intakes of both particulates and vapors/gases are calculated using the same equation, as follows (USEPA, 2009):

$$EC = \frac{(C_{air})(ET)(EF)(ED)}{AT}$$

where:

EC	=	exposure concentration (mg/m^3)
C_{air}	=	concentration of chemical in air (mg/m^3)
ET	=	exposure time (hours/day)
EF	=	exposure frequency (days/yr)
ED	=	exposure duration (yr)
AT	=	averaging time (hours);
	=	for noncarcinogens, AT = ED x 365 days/yr x 24 hours/day;
	=	for carcinogens, AT = 70 yr x 365 days/yr x 24 hours/day

Some of the exposure assumptions that will be used to estimate chemical intakes from inhalation of fugitive dusts/volatile emissions from surface and subsurface soils are based on default assumptions described in the standard USEPA guidance. The same exposure frequencies and durations used to

estimate incidental ingestion of soil intakes are used to estimate exposure via inhalation of fugitive dust/volatile emissions for surface and subsurface soils.

The concentrations of chemicals in air resulting from emissions from soil are developed following procedures presented in USEPA Soil Screening Guidance (USEPA, 2002). The chemical concentration in air is calculated from:

$$C_{air} = C_{soil} \times [(1/PEF) + (1/VF)]$$

where:

C_{air}	=	chemical concentration in air, mg/m^3
C_s	=	chemical concentration in soil, mg/kg
PEF	=	Particulate emission factor, m^3/kg
VF	=	volatilization factor, m^3/kg

The particulate emissions factor, PEF, relates the concentration of the chemical in soil with the concentration of dust particles in air. A PEF value of 9.37 x 10^{+9} m^3/kg was obtained from USEPA's Soil Screening Internet site located at http://rais.USEPA.gov/epa/ssl1.shtml. This is the default value for Portland, Maine which is the closest city to Site 17 listed on the Internet site. Because air emissions resulting from fugitive dust emissions settings will be different than dust emissions generated during construction activities, a separate PEF was used for construction activities. The PEF for construction workers (1.62 x 10^6 m^3/kg) was calculated using the equations presented in the supplemental SSL guidance document (USEPA, 2002). Sample calculations showing how the PEFs were calculated are presented in Attachment C-1.4

Ambient air concentrations resulting from the volatilization of COPCs from soil are chemical dependent and were calculated using the following equation from USEPA's Soil Screening Guidance:

$$VF = \frac{Q/C \times (3.14 \times D_a \times T)^{0.5} \times 10^{-4} \ (m^2 / cm^2)}{(2 \times \rho_b \times D_a)}$$

and

$$D_a = \frac{[(\theta_a^{10/3} \times D_i \times H' + \theta_w^{10/3} \times D_w)/n^2]}{\rho_b \times K_d + \theta_w + \theta_a \times H'}$$

where:

VF	=	volatilization factor (m^3-air/kg-soil)
Q/C	=	inverse of the mean concentration at the center of source (gm/m^2-sec per kg/m^3)
D_a	=	apparent diffusivity, chemical specific, (cm^2/sec)

T = exposure interval, exposure specific, (sec)

ρ_b = dry bulk soil particle density (g/cm^3)

θ_a = air-filled soil porosity (L_{air}/L_{soil})

D_i = diffusivity in air, chemical specific, (cm^2/sec)

n = total soil porosity (L_{pore}/L_{soil})

θ_w = water-filled soil porosity (L_{air}/L_{soil})

D_w = diffusivity in water, chemical specific, (cm^2/sec)

K_d = soil-water partition coefficient, chemical specific

H' = dimensionless Henry's law constant, chemical specific

Chemical properties were obtained from the Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (USEPA, 2002).

C-1.2.4 Summary of Exposure Parameters

In general, standard default parameters (USEPA, 1993), which combine mid-range and upper-end exposure factors, are used to assess RME. CTE is assessed primarily by the use of mid-range exposure factors presented in current risk assessment guidance (USEPA, 1989 and 1993). Age-adjusted factors are used to assess RME and CTE risks for residential receptors. Exposure input parameters for the identified potential receptor groups at Site 17 are presented in the RAGS Part D Table 4s which are provided in Attachment C-1.4.

REFERENCES

(USEPA), 2009. Regional Screening Levels for Chemical Contaminants at Superfund Sites. http://epa-prgs.USEPA.gov/chemicals/index.shtml. December.

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

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

USEPA, 1993. Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure. Office of Solid Waste and Emergency Response, Washington, DC., May.

USEPA, 1997. Exposure Factors Handbook. EPA/600/P-95/002Ba, National Center for Environmental Assessment, Washington, D.C., August.

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

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

ATTACHMENT C-1.3

TOXICITY ASSESSMENT

C-1.3 TOXICITY ASSESSMENT

The objective of the toxicity assessment is to identify the potential adverse health effects in exposed populations. Quantitative estimates of the relationship between the magnitude and type of exposures and the severity or probability of human health effects are defined for the identified constituents of concern. Quantitative toxicity values determined during this component of the risk assessment are integrated with outputs of the exposure assessment to characterize the potential for the occurrence of adverse health effects for each receptor group.

The toxicity value used to evaluate noncarcinogenic health effects for ingestion and dermal exposures is the reference dose (RfD). The reference concentration (RfC) is used to evaluate noncarcinogenic health effects for inhalation exposures. The RfD and RfC is an estimate of the daily exposure level for the human population that is likely to be without appreciable risk during a portion or all of a lifetime. It is based on a review of available animal and/or human toxicity data, with adjustments for various uncertainties associated with the data. Carcinogenic effects are quantified using the cancer slope factor (CSF) for ingestion and dermal exposures and inhalation unit risks (IUR) for inhalation exposure, which is a plausible upper-bound estimate of the probability of development of cancer per unit intake of chemical over a lifetime. These are typically based on available dose-response data from human and/or animal studies.

C-1.3.1 Toxicity Criteria for Oral and Inhalation Exposures

Oral RfDs and CSFs and inhalation RfCs and IURs used in the Site 17 risk assessment were obtained from the following primary USEPA literature sources (USEPA, December 2009):

- Integrated Risk Information System (IRIS).

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

- Other Toxicity Values – These sources include but are not limited to California Environmental Protection Agency (Cal EPA) toxicity values, the Agency for Toxic Substances and Disease Registry (ATSDR), and the Annual Health Effects Assessment Summary Tables (HEAST) (USEPA, July 1997).

Although toxicity criteria can be found in several toxicological sources, USEPA's IRIS online database is the preferred source of toxicity values. This database is continuously updated, and the presented values have been verified by USEPA. The USEPA RSL table may also be used as a source of toxicity criteria. This table is updated several times a year and reflects recent changes in IRIS. The toxicity criteria for compounds analyzed are presented in RAGS Part D Tables 6.1 and 6.2 in Appendix C-1.4.

C-1.3.2 Toxicity Criteria for Dermal Exposure

RfDs and CSFs found in literature are typically expressed as administered (not absorbed) doses. Therefore, these values are considered to be inappropriate for estimating the risks associated with dermal routes of exposure. Oral dose response parameters based on administered doses must be adjusted to absorbed doses before the comparison to estimated dermal exposure intakes is made. Because information on administered dermal doses is not always readily available, all oral dose response parameters are adjusted to provide values for dermal contact.

The adjustment to an absorbed dose is made using chemical specific gastrointestinal absorption efficiencies published in available guidance (i.e., USEPA dermal guidance [USEPA, 2004] and the following equations:

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

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

where: ABS_{GI} = absorption efficiency in the gastrointestinal tract.

Absorption efficiencies used in the risk assessment reflects USEPA's current dermal assessment guidance (USEPA, 2004).

REFERENCES

USEPA, 2009. Regional Screening Levels for Chemical Contaminants at Superfund Sites. http://epa-prgs.ornl.gov/chemicals/index.shtml. December.

USEPA, 1997. Health Effects Assessment Summary Tables FY 1997. Office of Solid Waste and Emergency Response, Washington, D.C., July.

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

ATTACHMENT C-1.4

RAGS PART D TABLES

RAGS PART D TABLE 1

Selection of Exposure Pathways

TABLE 1
SELECTION OF EXPOSURE PATHWAYS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK MAINE
PAGE 1 OF 2

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface Soil	Surface Soil	Site 17	Construction Workers	Adult	Ingestion Dermal	Quant Quant	Construction workers may have contact with surface soil during excavation activities.
				Trespassers	Adolescent	Ingestion Dermal	Quant Quant	Adolescent trespassers may contact surface soil while at the site.
					Adult	Ingestion Dermal	Quant Quant	Adult trespassers may contact surface soil while at the site.
		Air	Site 17	Construction Workers	Adult	Inhalation	Quant	Construction workers may be exposed to fugitive dust and volatile emissions during construction activities.
				Trespassers	Adolescents	Inhalation	Quant	Adolescent trespassers may be exposed to fugitive dust and volatile emissions while at the site.
					Adult	Inhalation	Quant	Adult trespassers may be exposed to fugitive dust and volatile emissions while at the site.
	Subsurface Soil	Subsurface Soil	Site 17	Construction Workers	Adult	Ingestion Dermal	Quant Quant	Construction workers may have contact with subsurface soil during excavation activities.
				Trespassers	Adolescent	Ingestion Dermal	Quant Quant	Adolescent trespassers are unlikely to contact subsurface soil while at the site. However, this pathway is discussed in the Uncertainty Analysis.
					Adult	Ingestion Dermal	Quant Quant	Adult trespassers are unlikely to contact subsurface soil while at the site. However, this pathway is discussed in the Uncertainty Analysis.
		Air	Site 17	Construction Workers	Adult	Inhalation	Quant	Construction workers may be exposed to fugitive dust and volatile emissions during construction activities.
				Trespassers	Adolescents	Inhalation	Quant	Adolescent trespassers are unlikely to be exposed to fugitive dust/ volatile emissions while at the site. However, this pathway is evaluated in the Uncertainty Analysis.
					Adult	Inhalation	Quant	Adolescent trespassers are unlikely to be exposed to fugitive dust/ volatile emissions while at the site. However, this pathway is evaluated in the Uncertainty Analysis.
	Groundwater	Groundwater	Site 17	Construction Workers	Adult	Ingestion Dermal	Quant Quant	Construction workers may ingest or have dermal contact with ground water during excavation activities.
Future	Surface Soil	Surface Soil	Site 17	Industrial Worker	Adult	Ingestion Dermal	Quant Quant	Although future industrial and residential scenarios are considered unlikely at the site these scenarios are included to aid in future risk management decisions.
				Residents	Young Child	Ingestion Dermal	Quant Quant	
					Adolescents	Ingestion Dermal	Quant Quant	
					Adult	Ingestion Dermal	Quant Quant	
		Air	Site 17	Industrial Worker	Adult	Inhalation	Quant	
				Residents	Young Child	Inhalation	Quant	
					Adolescents	Inhalation	Quant	
					Adult	Inhalation	Quant	
	Subsurface Soil	Subsurface Soil	Site 17	Industrial Worker[(1)]	Adult	Ingestion Dermal	Quant Quant	
				Residents	Young Child	Ingestion Dermal	Quant Quant	
					Adolescents	Ingestion Dermal	Quant Quant	
					Adult	Ingestion	Quant	

TABLE 1
SELECTION OF EXPOSURE PATHWAYS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK MAINE

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Subsurface Soil	Subsurface Soil	Site 17	Residents	Adult	Dermal	Quant	Although future industrial and residential scenarios are considered unlikely at the site these scenarios are included to aid in future risk management decisions.
		Air	Site 17	Industrial Worker(1)	Adult	Inhalation	Quant	
	Subsurface Soil	Air	Site 17	Residents	Young Child	Inhalation	Quant	
					Adolescents	Inhalation	Quant	
					Adult	Inhalation	Quant	
	Groundwater	Groundwater	Site 17	Residents	Adult	Ingestion Dermal Inhalation	Quant Quant Quant	
					Young Child	Ingestion Dermal Inhalation	Quant Quant Quant	
					Adolescents	Ingestion Dermal Inhalation	Quant Quant Quant	

Notes:
Quant - Quantitative.
1 - It is unlikely that industrial workers would contact subsurface soil at the site. However, this pathway is evaluated in the Uncertainty Analysis.

RAGS PART D TABLE 2

Occurrence, Distribution, and Selection of Chemicals of Potential Concern

LIST OF TABLES
RAGS PART D TABLE 2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Table No.

2.1 Surface Soil
2.2 Surface Soil - Migration
2.3 Subsurface Soil
2.4 Subsurface Soil - Migration
2.5 Groundwater

TABLE 2.1
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE SOIL
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection[1]	Range of Nondetects[2]	Concentration Used for Screening[3]	Screening Toxicity Value[4]	COPC Flag	Rationale
Site 17	**INORGANICS**											
	7440-38-2	**Arsenic**	1.4	18.2	MG/KG	SB-17-103-0001	26/26	-	18.2	**0.39 c**	**Yes**	ASL
	57-12-5	Cyanide	0.34 J	0.34 J	MG/KG	SB-17-125-0001	1/21	0.5 - 0.6	0.34	160 n	No	BSL
	7439-92-1	Lead	4.7	37.5	MG/KG	SB-17-131-0001	26/26	-	37.5	400 n	No	BSL
	7440-66-6	Zinc	10.9	47.7	MG/KG	SB-17-131-0001	26/26	-	47.7	2300 n	No	BSL
	PESTICIDES											
	72-54-8	4,4'-DDD	3.2 J	100	UG/KG	SB-17-112-0001	12/26	3.5 - 4.1	100	2000 c	No	BSL
	72-55-9	4,4'-DDE	0.7 J	250	UG/KG	SB-17-125-0001	23/26	3.7 - 4.1	250	1400 c	No	BSL
	50-29-3	4,4'-DDT	8.2 J	1200 J	UG/KG	SB-17-112-0001, SB-17-125-0001	17/26	3.5 - 31	1200	1700 c	No	BSL
	5103-71-9	alpha-Chlordane	0.8 J	840 J	UG/KG	SB-17-206-0001	11/26	1.8 - 2.1	840	1600 c[5]	No	BSL
	58-89-9	gamma-BHC (Lindane)	1.5 J	1.5 J	UG/KG	SB-17-133-0001	1/26	0.17 - 9.6	1.5	520 c	No	BSL
	5103-74-2	gamma-Chlordane	1 J	760 J	UG/KG	SB-17-206-0001	10/26	1.8 - 2.1	760	1600 c[5]	No	BSL
	76-44-8	Heptachlor	0.25 J	69 J	UG/KG	SB-17-206-0001	6/26	1.8 - 9.6	69	110 c	No	BSL
	1024-57-3	**Heptachlor Epoxide**	1.5 J	130 J	UG/KG	SB-17-206-0001	5/26	1.8 - 9.6	130	**53 c**	**Yes**	ASL

Shaded criterion indicates that the maximum detected concentration exceeds one or more screening criteria. Shaded chemical name indicates that the chemical was retained as a COPC.

Footnotes:
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations and as one sample when determining frequency of detection.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - United States Environmental Protection Agency Regions 3, 6, and 9. (November, 2010). Regional Screening Levels for Chemical Contaminants at Superfund Sites. Residential screening value. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm. Noncarcinogenic values were divided by 10.
5 - Chlordane value used as a surrogate for alpha- and gamma-chlordane.

Associated Samples

SB-17-101-0001	SB-17-118-0001	SB-17-210-0001
SB-17-102-0001	SB-17-123-0001	
SB-17-103-0001	SB-17-124-0001	
SB-17-104-0001	SB-17-125-0001	
SB-17-105-0001	SB-17-126-0001	
SB-17-105-0001-D	SB-17-130-0001	
SB-17-106-0001	SB-17-131-0001	
SB-17-107-0001	SB-17-132-0001	
SB-17-108-0001	SB-17-133-0001	
SB-17-109-0001	SB-17-206-0001	
SB-17-112-0001	SB-17-207-0001	
SB-17-113-0001	SB-17-208-0001	
SB-17-114-0001	SB-17-209-0001	

Definitions:
c = carcinogen
CAS = Chemical Abstracts Service
COPC = Chemical of Potential Concern
J = Estimated value
MG/KG = milligram per kilogram
n = noncarcinogen
UG/KG = microgram per kilogram

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BSL = Below Screening Level

TABLE 2.2
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE SOIL - MIGRATION
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK MAINE

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Frequency of Detection[1]	Range of Nondetects[2]	Sample of Maximum Concentration	Concentration Used for Screening [3]	Human Health Risk Screening			
										Human Health Screening Criteria			
										USEPA RSL SSL[4]		COPC Flag	Rationale
Site 17	**INORGANICS**												
	7440-38-8	**Arsenic**	1.4	18.2	MG/KG	26/26	-	SB-17-103-0001	18.2	**0.0013**	RBV	**Yes**	ASL
	57-12-5	Cyanide	0.34 J	0.34 J	MG/KG	1/21	0.5 - 0.6	SB-17-125-0001	0.34	7.4	RBV	No	BSL
	7439-92-1	**Lead**	4.7	37.5	MG/KG	26/26	-	SB-17-131-0001	37.5	**14**	MCL[5]	**Yes**	ASL
	7440-66-6	Zinc	10.9	47.7	MG/KG	26/26	-	SB-17-131-0001	47.7	680	RBV	No	BSL
	PESTICIDES												
	72-54-8	**4,4'-DDD**	3.2 J	100	UG/KG	12/26	3.5 - 4.1	SB-17-112-0001	100	**66**	RBV	**Yes**	ASL
	72-55-9	**4,4'-DDE**	0.7 J	250	UG/KG	23/26	3.7 - 4.1	SB-17-125-0001	250	**47**	RBV	**Yes**	ASL
	50-29-3	**4,4'-DDT**	8.2 J	1200 J	UG/KG	17/26	3.5 - 31	SB-17-112-0001, SB-17-125-0001	1200	**67**	RBV	**Yes**	ASL
	5103-71-9	**alpha-Chlordane**	0.8 J	840 J	UG/KG	11/26	1.8 - 2.1	SB-17-206-0001	840	**13**	RBV[6]	**Yes**	ASL
	58-89-9	gamma-BHC (Lindane)	1.5 J	1.5 J	UG/KG	1/26	0.17 - 9.6	SB-17-133-0001	1.5	**0.36**	RBV	No	FOD
	5103-74-2	**gamma-Chlordane**	1 J	760 J	UG/KG	10/26	1.8 - 2.1	SB-17-206-0001	760	**13**	RBV[6]	**Yes**	ASL
	76-44-8	**Heptachlor**	0.25 J	69 J	UG/KG	6/26	1.8 - 9.6	SB-17-206-0001	69	**1.2**	RBV	**Yes**	ASL
	1024-57-3	**Heptachlor Epoxide**	1.5 J	130 J	UG/KG	5/26	1.8 - 9.6	SB-17-206-0001	130	**0.15**	RBV	**Yes**	ASL

Shaded criterion indicates that the maximum detected concentration exceeds one or more screening criteria. Shaded chemical name indicates that the chemical was retained as a COPC.

Footnotes:
1 - Sample and duplicate are counted as two separate samples when determining the minimum and maximum detected concentrations and as one sample when determining frequency of detection.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - United States Environmental Protection Agency Regions 3, 6, and 9. (November, 2010). Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Protection of Groundwater Soil Screening Level risk-based criteria. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
5 - MCL based soil screening level.
6 - The value for chlordane was used as a surrogate for alpha- and gamma-chlordane.

Associated Samples:
SB-17-101-0001
SB-17-102-0001
SB-17-103-0001
SB-17-104-0001
SB-17-105-0001
SB-17-105-0001-D
SB-17-106-0001
SB-17-107-0001
SB-17-108-0001
SB-17-109-0001
SB-17-112-0001
SB-17-113-0001
SB-17-114-0001
SB-17-118-0001
SB-17-123-0001
SB-17-124-0001
SB-17-125-0001
SB-17-126-0001
SB-17-130-0001
SB-17-131-0001
SB-17-132-0001
SB-17-133-0001

Definitions:
c = carcinogen
CAS = Chemical Abstracts Service
COPC = Chemical of Potential Concern
J = Estimated value
MCL = Maximum Contaminant Level
MG/KG = milligram per kilogram
n = noncarcinogen
RBV = Risk-based Value
RSL = Regional Screening Level
SSL = Soil Screening Level
USEPA = United States Environmental Protection Agency
UG/KG = microgram per kilogram

Rationale Codes:

For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:

BSL = Below Screening Level
FOD = Frequency of Detection

TABLE 2.3
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SUBSURFACE SOIL
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection[1]	Range of Nondetects[2]	Concentration Used for Screening[3]	Screening Toxicity Value[4]	COPC Flag	Rationale
Site 17	**INORGANICS**											
	7440-38-2	**Arsenic**	1.1	8.7 J	MG/KG	SB-17-129-0306-D	41/43	0.89 - 0.99	8.7	**0.39 c**	**Yes**	ASL
	57-12-5	Cyanide	0.6	0.6	MG/KG	SB-17-130-0104	1/38	0.5 - 1.3	0.6	160 n	No	BSL
	7439-92-1	Lead	1.8	32.3	MG/KG	SB-17-113-0104	43/43	-	32.3	400 n	No	BSL
	7440-66-6	Zinc	10	54.5	MG/KG	SB-17-119-0104	43/43	-	54.5	2300 n	No	BSL
	HERBICIDES											
	123-33-1	Maleic Hydrazide	12 J	12 J	UG/KG	SB-17-121-1215	1/38	21 - 42	12	3100000 n	No	BSL
	150-68-5	**Monuron**	17 J	550 J	UG/KG	SB-17-129-0306	5/38	21 - 130	550	--	**Yes**	NTX
	114-26-1	Propoxur	15 J	470	UG/KG	SB-17-120-0205-D	4/38	21 - 210	470	24000 n	No	BSL
	PESTICIDES/PCBS											
	72-54-8	4,4'-DDD	0.36 J	520	UG/KG	SB-17-112-0104	43/98	0.36 - 30	520	2000 c	No	BSL
	72-55-9	4,4'-DDE	0.51 J	1000 J	UG/KG	SB-17-203-0205	65/98	0.96 - 10	1000	1400 c	No	BSL
	50-29-3	**4,4'-DDT**	1.3 J	15200 J	UG/KG	GRID B EAST SIDEWALL B	70/98	1.2 - 24	10000	**1700 c**	**Yes**	ASL
	309-00-2	Aldrin	0.18 J	18	UG/KG	S17-00	1/98	0.18 - 31	18	29 c	No	BSL
	5103-71-9	**alpha-Chlordane**	0.12 J	3100 J	UG/KG	SB-17-206-0103	52/98	0.12 - 30	3100	**1600 c[5]**	**Yes**	ASL
	319-85-7	beta-BHC	8.9	8.9	UG/KG	SB-17-152-0205	1/98	0.18 - 31	8.9	270 c	No	BSL
	60-57-1	**Dieldrin**	0.68 J	43	UG/KG	SB-17-148-0104	8/98	0.12 - 40	43	**30 c**	**Yes**	ASL
	959-98-8	Endosulfan I	4.3	190	UG/KG	S17-SS-06	6/98	0.18 - 31	190	37000 n[6]	No	BSL
	72-20-8	Endrin	6.1 J	840	UG/KG	S17-SW-01	19/98	0.12 - 40	840	1800 n	No	BSL
	58-89-9	gamma-BHC (Lindane)	0.42 J	91	UG/KG	SB-17-124-0104	2/98	0.1 - 31	91	520 c	No	BSL
	5103-74-2	**gamma-Chlordane**	0.72 J	2700 J	UG/KG	SB-17-206-0103	52/98	0.72 - 30	2700	**1600 c[5]**	**Yes**	ASL
	76-44-8	**Heptachlor**	0.21 J	390 J	UG/KG	SB-17-206-0103	27/98	0.18 - 30	390	**110 c**	**Yes**	ASL
	1024-57-3	**Heptachlor Epoxide**	0.12 J	580 J	UG/KG	SB-17-203-0205	16/98	0.12 - 31	580	**53 c**	**Yes**	ASL
	72-43-5	Methoxychlor	8.5	8.5	UG/KG	S17-SS-04	1/98	1.8 - 200	8.5	31000 n	No	BSL
	VOLATILES											
	127-18-4	Tetrachloroethene	170 J	170 J	UG/KG	S17-00	1/1	-	170	550 c	No	BSL
	PETROLEUM HYDROCARBONS											
	--	Diesel Range Organics	1.3 J	200	MG/KG	SB-17-122-0407	4/5	6.2 - 6.2	200	**100** [7]	No	WP

Shaded criterion indicates that the maximum detected concentration exceeds one or more screening criteria. Shaded chemical name indicates that the chemical was retained as a COPC.

Footnotes:
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations and as one sample when determining frequency of detection.
2 - Values presented are sample-specific quantitation limits.

Definitions:
c = carcinogen
CAS = Chemical Abstract Service

TABLE 2.3
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SUBSURFACE SOIL
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

Footnotes:
3 - The maximum detected concentration is used for screening purposes.
4 - United States Environmental Protection Agency Regions 3, 6, and 9. (November, 2010). Regional Screening Levels for Chemical Contaminants at Superfund Sites. Residential screening value. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm. Noncarcinogenic values were divided by 10.
5 - Chlordane value used as a surrogate for alpha- and gamma-chlordane.
6 - Endosulfan value used as a surrogate for Endosulfan I.
7 - The value listed as the minimum screening criteria for Diesel Range Organics is the Baseline-2 soil remediation goal for oil contaminated soil as presented in the document titled, "Procedural Guidelines for Establishing and Implementing Action Levels and Remediation Goals for the Remediation of Oil Contaminated Soil and Groundwater in Maine" (MEDEP, January 1, 2009). Diesel Range Organics are not retained as a COPC in accordance with page 2-12 of the Site 17 Remedial Investigation Work Plan.

Definitions:
COPC = Chemical of Potential Concern

J = Estimated value

MEDEP = Maine Department of Environmental Protection
MG/KG = millgram per kilogram

n = noncarcinogen

UG/KG = microgram per kilogram

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level
NTX = No Toxicity Criteria

For elimination as a COPC:
BSL = Below Screening Level
WP = Work Plan

Associated Samples

S17-SS-04	SB-17-129-0306	S17-PB-11
S17-SS-05	SB-17-129-0306-D	S17-PB-12
S17-SS-06	SB-17-130-0104	S17-PB-13
S17-SS-09	SB-17-131-0104	S17-PB-14
SB-17-101-0104	SB-17-132-0104	S17-PB-14-D
SB-17-102-0104	SB-17-132-0104-D	S17-PB-15
SB-17-103-0104	SB-17-132-0408	S17-PB-16
SB-17-104-0104	SB-17-132-0408-D	S17-PB-17
SB-17-105-0104	SB-17-133-0104	S17-PB-18
SB-17-106-0104	SB-17-141-0307	S17-SW-01
SB-17-107-0104	SB-17-142-0203-D	S17-SW-02
SB-17-107-0408	SB-17-142-0203	S17-SW-03
SB-17-108-0104	SB-17-143-0203	S17-SW-04
SB-17-109-0104	SB-17-144-0203	S17-SW-05
SB-17-110-0104	SB-17-145-0203	S17-SW-05-D
SB-17-111-0104	SB-17-146-0104	S17-SW-06
SB-17-112-0104	SB-17-147-0104	SB-17-202-0205
SB-17-113-0104	SB-17-148-0104	SB-17-203-0205
SB-17-114-0104	SB-17-149-0104	SB-17-205-0205
SB-17-115-0710	SB-17-150-0205	SB-17-205-0205-D
SB-17-116-0407	SB-17-151-0205	SB-17-206-0103
SB-17-117-0104	SB-17-152-0205	SB-17-207-0103
SB-17-118-0104	SB-17-154-0205	SB-17-208-0103
SB-17-119-0104	SB-17-154-0205-D	SB-17-208-0103-D
SB-17-120-0205	SB-17-155-0205	SB-17-209-0103
SB-17-120-0205-D	S17-00	SB-17-210-0103
SB-17-121-0710	S17-PB-01	GRID A BOTTOM
SB-17-121-1215	S17-PB-02	GRID A BOTTOM-D
SB-17-122-0407	S17-PB-03	GRID A SOUTH SIDEWALL
SB-17-122-0407-D	S17-PB-04	GRID A WEST SIDEWALL A
SB-17-123-0104	S17-PB-05	GRID A WEST SIDEWALL B
SB-17-124-0104	S17-PB-05-D	GRID B BOTTOM
SB-17-125-0104	S17-PB-06	GRID B EAST SIDEWALL A
SB-17-125-0608	S17-PB-07	GRID B EAST SIDEWALL B
SB-17-126-0104	S17-PB-08	GRID A NORTH SIDEWALL
SB-17-127-0306	S17-PB-09	GRID B SOUTH SIDEWALL
SB-17-128-0506	S17-PB-10	GRID B NORTH SIDEWALL #2

TABLE 2.4
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SUBSURFACE SOIL - MIGRATION
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS NUMBER	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Frequency of Detection[1]	Range of Nondetects[2]	Sample of Maximum Concentration	Concentration Used for Screening [3]	Human Health Risk Screening			
										Human Health Screening Criteria		COPC Flag	Rationale
										USEPA RSL SSL[4]			
Site 17	**INORGANICS**												
	7440-38-2	**Arsenic**	1.1	8.7 J	MG/KG	41/43	0.89 - 0.99	SB-17-129-0306-D	8.7	**0.0013**	RBV	**Yes**	ASL
	57-12-5	Cyanide	0.6	0.6	MG/KG	1/38	0.5 - 1.3	SB-17-130-0104	0.6	7.4	RBV	No	BSL
	7439-92-1	**Lead**	1.8	32.3	MG/KG	43/43	-	SB-17-113-0104	32.3	**14**	MCL[5]	**Yes**	ASL
	7440-66-6	Zinc	10	54.5	MG/KG	43/43	-	SB-17-119-0104	54.5	680	RBV	No	BSL
	HERBICIDES												
	123-33-1	Maleic Hydrazide	12 J	12 J	UG/KG	1/38	21 - 42	SB-17-121-1215	12	3800	RBV	No	BSL
	150-68-5	**Monuron**	17 J	550 J	UG/KG	5/38	21 - 130	SB-17-129-0306	550	--	--	**Yes**	NTX
	114-26-1	**Propoxur**	15 J	470	UG/KG	4/38	21 - 210	SB-17-120-0205-D	470	**47**	RBV	**Yes**	ASL
	PESTICIDES												
	72-54-8	**4,4'-DDD**	0.36 J	520	UG/KG	45/100	0.36 - 30	SB-17-112-0104	520	**66**	RBV	**Yes**	ASL
	72-55-9	**4,4'-DDE**	0.51 J	1000 J	UG/KG	67/100	0.96 - 10	SB-17-203-0205	1000	**47**	RBV	**Yes**	ASL
	50-29-3	**4,4'-DDT**	1.3 J	15200 J	UG/KG	70/100	1.2 - 24	GRID B EAST SIDEWALL B	15200	**67**	RBV	**Yes**	ASL
	309-00-2	Aldrin	0.18 J	18	UG/KG	3/100	0.18 - 31	S17-00	18	**0.65**	RBV	No	FOD
	5103-71-9	**alpha-Chlordane**	0.12 J	3100 J	UG/KG	55/100	0.12 - 30	SB-17-206-0103	3100	**13**	RBV[6]	**Yes**	ASL
	319-85-7	beta-BHC	8.9	8.9	UG/KG	1/100	0.18 - 31	SB-17-152-0205	8.9	**0.22**	RBV	No	FOD
	60-57-1	**Dieldrin**	0.68 J	43	UG/KG	9/100	0.12 - 40	SB-17-148-0104	43	**0.17**	RBV	**Yes**	ASL
	959-98-8	Endosulfan I	4.3	190	UG/KG	6/100	0.18 - 31	S17-SS-06	190	3000	RBV[7]	No	BSL
	72-20-8	**Endrin**	6.1 J	840	UG/KG	19/100	0.12 - 40	S17-SW-01	840	**440**	RBV	**Yes**	ASL
	58-89-9	gamma-BHC (Lindane)	0.42 J	91	UG/KG	3/100	0.1 - 31	SB-17-124-0104	91	**0.36**	RBV	No	FOD
	5103-74-2	**gamma-Chlordane**	0.72 J	2700 J	UG/KG	54/100	0.72 - 30	SB-17-206-0103	2700	**13**	RBV[6]	**Yes**	ASL
	76-44-8	**Heptachlor**	0.21 J	390 J	UG/KG	27/100	0.18 - 30	SB-17-206-0103	390	**1.2**	RBV	**Yes**	ASL
	1024-57-3	**Heptachlor Epoxide**	0.12 J	580 J	UG/KG	17/100	0.12 - 31	SB-17-203-0205	580	**0.15**	RBV	**Yes**	ASL
	72-43-5	Methoxychlor	8.5	8.5	UG/KG	1/100	1.8 - 200	S17-SS-04	8.5	2200	MCL[5]	No	BSL
	VOLATILES												
	127-18-4	**Tetrachloroethene**	170 J	170 J	UG/KG	S17-00	1/1	-	170	**0.000049 c**		**Yes**	ASL
	PETROLEUM HYDROCARBONS												
	--	Diesel Range Organics	1.3 J	200	MG/KG	4/5	6.2 - 6.2	SB-17-122-0407	200	--	--	No	WP

Shaded criterion indicates that the maximum detected concentration exceeds one or more screening criteria. Shaded chemical name indicates that the chemical was retained as a COPC.

Footnotes:
1 Sample and duplicate are counted as two separate samples when determining the minimum and maximum detected concentrations and as one sample when determining frequency of detection.
2 Values presented are sample-specific quantitation limits.
3 The maximum detected concentration is used for screening purposes.
4 - United States Environmental Protection Agency Regions 3, 6, and 9. (November, 2010). Regional Screening Levels for Chemical Contaminants at Superfund Sites. Protection of Groundwater Soil Screening Level risk-based criteria. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
5 The value is the MCL-based SSL.
6 The value for chlordane was used as a surrogate for alpha- and gamma-chlordane.
7 Endosulfan was used as a surrogate for Endosulfan I.

Associated Samples:

S17-SS-04	SB-17-129-0306	S17-PB-10	GRID A NORTH SIDEWALL
S17-SS-05	SB-17-129-0306-D	S17-PB-11	GRID B SOUTH SIDEWALL
S17-SS-06	SB-17-130-0104	S17-PB-12	GRID B NORTH SIDEWALL #2
S17-SS-09	SB-17-131-0104	S17-PB-13	
SB-17-101-0104	SB-17-132-0104	S17-PB-14	
SB-17-102-0104	SB-17-132-0104-D	S17-PB-14-D	
SB-17-103-0104	SB-17-132-0408	S17-PB-15	
SB-17-104-0104	SB-17-132-0408-D	S17-PB-16	

Definitions:
CAS = Chemical Abstracts Service
COPC = Chemical of Potential Concern
J = Estimated value
MCL = Maximum Contaminant Level
MG/KG = milligram per kilogram
RBV = Risk-based Value
RSL = Regional Screening Level
SSL = Soil Screening Level

Rationale Codes:

For selection as a COPC:
ASL = Above Screening Level and site background.
NTX = No toxicity criteria

For elimination as a COPC:
BSL = Below COPC Screening Level

TABLE 2.4
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SUBSURFACE SOIL - MIGRATION
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

Associated Samples:

SB-17-105-0104	SB-17-133-0104	S17-PB-17
SB-17-106-0104	SB-17-141-0307	S17-PB-18
SB-17-107-0104	SB-17-142-0203-D	S17-SW-01
SB-17-107-0408	SB-17-142-0203	S17-SW-02
SB-17-108-0104	SB-17-143-0203	S17-SW-03
SB-17-109-0104	SB-17-144-0203	S17-SW-04
SB-17-110-0104	SB-17-145-0203	S17-SW-05
SB-17-111-0104	SB-17-146-0104	S17-SW-05-D
SB-17-112-0104	SB-17-147-0104	S17-SW-06
SB-17-113-0104	SB-17-148-0104	SB-17-202-0205
SB-17-114-0104	SB-17-149-0104	SB-17-203-0205
SB-17-115-0710	SB-17-150-0205	SB-17-204-0205
SB-17-116-0407	SB-17-151-0205	SB-17-204-0205-D
SB-17-117-0104	SB-17-152-0205	SB-17-205-0205
SB-17-118-0104	SB-17-153-0205	SB-17-205-0205-D
SB-17-119-0104	SB-17-154-0205	SB-17-206-0103
SB-17-120-0205	SB-17-154-0205-D	SB-17-207-0103
SB-17-120-0205-D	SB-17-155-0205	SB-17-208-0103
SB-17-121-0710	S17-00	SB-17-208-0103-D
SB-17-121-1215	S17-PB-01	SB-17-209-0103
SB-17-122-0407	S17-PB-02	SB-17-210-0103
SB-17-122-0407-D	S17-PB-03	GRID A BOTTOM
SB-17-123-0104	S17-PB-04	GRID A BOTTOM-D
SB-17-124-0104	S17-PB-05	GRID A SOUTH SIDEWALL
SB-17-125-0104	S17-PB-05-D	GRID A WEST SIDEWALL A
SB-17-125-0608	S17-PB-06	GRID A WEST SIDEWALL B
SB-17-126-0104	S17-PB-07	GRID B BOTTOM
SB-17-127-0306	S17-PB-08	GRID B EAST SIDEWALL A
SB-17-128-0506	S17-PB-09	GRID B EAST SIDEWALL B

Definitions:
USEPA = United States Environmental Protection Agency
UG/KG = microgram per kilogram

Rationale Codes:
FOD = Frequency of Detection
WP = Work Plan

TABLE 2.5
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection[1]	Range of Nondetects[2]	Concentration Used for Screening[3]	Screening Value[4]	COPC Flag	Rationale
Site 17	**PESTICIDES**											
	72-54-8	**4,4'-DDD**	0.065	1.2	UG/L	MW-17-02R	2/10	0.018 - 0.020	1.2	**0.28 c**	**Yes**	ASL
	72-55-9	4,4'-DDE	0.032	0.032	UG/L	MW17-02R	1/10	0.014 - 0.016	0.032	0.2	No	BSL
	50-29-3	**4,4'-DDT**	0.3	1.6	UG/L	MW-17-NASB-XD1	3/10	0.018 - 0.020	1.6	**0.2 c**	**Yes**	ASL
	VPH MADEP											
	1634-04-4	Methyl Tert-Butyl Ether	1.4	5.6	UG/L	MW-17-03	2/10	1.0 - 1.0	5.6	12 c	No	BSL

Shaded criterion indicates that the maximum detected concentration exceeds one or more screening criteria. Shaded chemical name indicates that the chemical was retained as a COPC.

Footnotes:
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - United States Environmental Protection Agency Regions 3, 6, and 9. (November, 2010). Regional Screening Levels for Chemical Contaminants at Superfund Sites. Tapwater screening value. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm. Noncarcinogenic values were divided by 10.
5 - February 2011 Maine Maximum Exposure Guidelines were used for screening purposes.

Definitions:

c = carcinogen
CAS = Chemical Abstracts Service
COPC = Chemical Of Potential Concern
J = Estimated value
n = noncarcinogen

Associated Samples:
MW-17-01
MW-17-02R
MW-17-03
MW-17-04
MS-NASB-065
MW-NASB-066
MW-NASB-068
MW-NASB-097
MW-17-NASB-XD1
MW-NASB-098

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BSL = Below COPC Screening Level
NUT = Essential nutrient
NTX = No toxicity criteria

RAGS PART D TABLE 3

Medium-Specific Exposure Point Concentration Summary

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RAGS PART D TABLE 3
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Reasonable Maximum/Central Tendency Exposures

Table No.	
3.1.RME	Surface Soil
3.2.RME	Subsurface Soil
3.3.RME	Groundwater

TABLE 3.1.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration[1]			
						Value	Units	Statistic	Rationale
Site 17	ARSENIC	mg/kg	6.55	8.03 (G)	18.2	8	mg/kg	95% Approximate Gamma UCL	ProUCL Version 4.1
	HEPTACHLOR EPOXIDE	mg/kg	0.0087	0.024 (NP)	0.13 (J)	0.02	mg/kg	95% KM (Percentile Bootstrap) UCL	ProUCL Version 4.1

For non-detects, the sample quantitation limit was used as an input for the 95% UCL calculation; one-half the detection limit was used as the proxy concentration for non-detects in the arithmetic mean calculation.

For duplicate sample results, the average value was used in the calculation.

1. Exposure point concentration is the value recommended by USEPA's ProUCL. The maximum detected concentration is selected as the exposure point concentration if the recommended calculated UCL is greater than the maximum or if the dataset contains less than 10 samples.

G = Gamma
J = Estimated value
NP = Non-parametric
UCL = Upper Confidence Limit

TABLE 3.2.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
NAS BRUNSWICK
BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration[1]			
						Value	Units	Statistic	Rationale
Site 17	ARSENIC	mg/kg	3.08	4.36 (NP)	8.7 (J)	4.4	mg/kg	95% KM (Chebyshev) UCL	ProUCL Version 4.1
	MONURON	mg/kg	0.032	0.05 (NP)	0.55 (J)	0.05	mg/kg	95% KM (t) UCL	ProUCL Version 4.1
	4,4'-DDT	mg/kg	0.85	2.3 (NP)	15.2 (J)	2.3	mg/kg	97.5% KM (Chebyshev) UCL	ProUCL Version 4.1
	ALPHA-CHLORDANE	mg/kg	0.12	0.41 (NP)	3.1 (J)	0.4	mg/kg	97.5% KM (Chebyshev) UCL	ProUCL Version 4.1
	DIELDRIN	mg/kg	0.002	0.003 (NP)	0.043	0.003	mg/kg	95% KM (t) UCL	ProUCL Version 4.1
	GAMMA-CHLORDANE	mg/kg	0.12	0.37 (NP)	2.7	0.4	mg/kg	97.5% KM (Chebyshev) UCL	ProUCL Version 4.1
	HEPTACHLOR	mg/kg	0.02	0.03 (NP)	0.39 (J)	0.03	mg/kg	95% KM (t) UCL	ProUCL Version 4.1
	HEPTACHLOR EPOXIDE	mg/kg	0.02	0.03 (NP)	0.58 J	0.03	mg/kg	95% KM (t) UCL	ProUCL Version 4.1

For non-detects, the sample quantitation limit was used as an input for the 95% UCL calculation; one-half the detection limit was used as the proxy concentration for non-detects in the arithmetic mean calculation.

For duplicate sample results, the average value was used in the calculation.

1. Exposure point concentration is the value recommended by USEPA's ProUCL. The maximum detected concentration is selected as the exposure point concentration if the recommended calculated UCL is greater than the maximum or if the dataset contains less than 10 samples.

J = Estimated value
N = Normal
NP = Non-parametric
UCL = Upper Confidence Limit

TABLE 3.3.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
NAS BRUNSWICK
BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL* (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration[(1)]			
						Value	Units	Statistic	Rationale
Site 17	4,4'-DDD	ug/L	0.13	NA	1.2	1.2	ug/L	Maximum Concentration	(1)
	4,4'-DDT	ug/L	0.33	NA	1.6	1.6	ug/L	Maximum Concentration	(1)

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.

1. One round of groundwater data is available since the most recent removal action; therefore, the maximum concentration was selected as the EPC.

NA = Not Applicable

RAGS PART D TABLE 4

Values Used for Daily Intake Calculations

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VALUES USED FOR DAILY INTAKE CALCULATIONS

Table No.	
	Resonable Maximum Exposure
4.1 RME	Construction Workers Exposed to Surface/Subsurface Soil
4.2 RME	Construction Workers Exposed to Air Emissions from Surface/Subsurface Soil
4.3 RME	Construction Workers Exposed to Groundwater
4.4 RME	Construction Workers Exposed to Air Emissions from Groundwater
4.5 RME	Industrial Workers Exposed to Surface/Subsurface Soil
4.6 RME	Industrial Workers Exposed to Air Emissions from Surface/Subsurface Soil
4.7 RME	Adolescent Trespassers Exposed to Surface/Subsurface Soil
4.8 RME	Adolescent Trespassers Exposed to Air Emissions from Surface/Subsurface Soil
4.9 RME	Adult Trespassers Exposed to Surface/Subsurface Soil
4.10 RME	Adult Trespassers Exposed to Air Emissions from Surface/Subsurface Soil
4.11 RME	Young Child Residents Exposed to Surface/Subsurface Soil
4.12 RME	Young Child Residents Exposed to Air Emissions from Surface/Subsurface Soil
4.13 RME	Young Child Residents Exposed to Groundwater
4.14 RME	Young Child Resident Exposed to Air Emissions from Groundwater
4.15 RME	Young Child Resident Exposed to Air Emissions from Groundwater
4.16 RME	Adolescent Residents Exposed to Air Emissions from Surface/Subsurface Soil
4.17 RME	Adolescent Residents Exposed to Groundwater
4.18 RME	Adolescent Resident Exposed to Air Emissions from Groundwater
4.19 RME	Adult Residents Exposed to Surface/Subsurface Soil
4.20 RME	Adult Residents Exposed to Air Emissions from Surface/Subsurface Soil
4.21 RME	Adult Residents Exposed to Groundwater
4.22 RME	Adult Resident Exposed to Air Emissions from Groundwater
	Central Tendency Exposure
4.1 CTE	Construction Workers Exposed to Surface/Subsurface Soil
4.2 CTE	Construction Workers Exposed to Air Emissions from Surface/Subsurface Soil
4.3 CTE	Construction Workers Exposed to Groundwater
4.4 CTE	Construction Workers Exposed to Air Emissions from Groundwater
4.5 CTE	Industrial Workers Exposed to Surface/Subsurface Soil
4.6 CTE	Industrial Workers Exposed to Air Emissions from Surface/Subsurface Soil
4.7 CTE	Adolescent Trespassers Exposed to Surface/Subsurface Soil
4.8 CTE	Adolescent Trespassers Exposed to Air Emissions from Surface/Subsurface Soil
4.9 CTE	Adult Trespassers Exposed to Surface/Subsurface Soil
4.10 CTE	Adult Trespassers Exposed to Air Emissions from Surface/Subsurface Soil
4.11 CTE	Young Child Residents Exposed to Surface/Subsurface Soil
4.12 CTE	Young Child Residents Exposed to Air Emissions from Surface/Subsurface Soil
4.13 CTE	Young Child Residents Exposed to Groundwater
4.14 CTE	Young Child Resident Exposed to Air Emissions from Groundwater
4.15 CTE	Adolescent Residents Exposed to Surface/Subsurface Soil
4.16 CTE	Adolescent Residents Exposed to Air Emissions from Surface/Subsurface Soil
4.17 CTE	Adolescent Residents Exposed to Groundwater
4.18 CTE	Adolescent Resident Exposed to Air Emissions from Groundwater
4.19 CTE	Adult Residents Exposed to Surface/Subsurface Soil
4.20 CTE	Adult Residents Exposed to Air Emissions from Surface/Subsurface Soil
4.21 CTE	Adult Residents Exposed to Groundwater
4.22 CTE	Adult Resident Exposed to Air Emissions from Groundwater
	Intermediate Variables for Calculating DA(Event)
4.23	Intermediate Variables for Calculating DA(Event)

TABLE 4.1 RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - CONSTRUCTION WORKERS- SOILS

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Construction Workers	Adult	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002a	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	330	mg/day	USEPA, 2002b	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	USEPA, 2002b	BW x AT
				EF	Exposure Frequency	150	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 1989	
Dermal	Construction Workers	Adult	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002a	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	3300	cm2	USEPA, 2004	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.3	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	150	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 1989	

Notes:

1 - Professional judgment.

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

USEPA, 2002a:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 2.77E-08 Cancer Dermal Intake = 8.30E-08

Noncancer Ingestion Intake = 1.94E-06 Noncancer Dermal Intake = 5.81E-06

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.2 RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - CONSTRUCTION WORKERS - SOILS TO AIR

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Construction Workers	Adult	Site 17	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	8	hours/day	(1)	$\frac{CA \times ET \times EF \times ED}{AT \times 24\ hours/day}$
				CF	Conversion Factor	24	hours/day	--	
				EF	Exposure Frequency	150	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 1989	
				PEF	Particulate Emission Factor	1.62E+06	m3/kg	USEPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	

Notes:

1 - Professional judgment.

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Cancer Unit Exposure Concentration = 1.96E-03 Noncancer Unit Exposure Concentration = 1.37E-01

Cancer risk from ingestion = Air concentration x Exposure Concentration x Inhalation Unit Risk

Hazard Index from ingestion = Air concentration x Exposure Concentration / Inhalation Reference Concentration

TABLE 4.3 RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - CONSTRUCTION WORKERS - GROUNDWATER

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Construction Workers	Adult	Site 17	CGW	Chemical Concentration in Groundwater	Average	ug/L	(1)	Chronic Daily Intake (CDI) (mg/kg/day) =
				CF	Conversion Factor	0.001	mg/ug	- -	
				IR-GW	Ingestion Rate of Groundwater	0.01	L/day	(1)	CGW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	30	days/year	(1)	BW x AT
				ED	Exposure Duration	1	years	(1)	
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 1989	
Dermal	Construction Workers	Adult	Site 17	Daevent	Dermally Absorbed Dose per Event	Calculated	mg/cm2-event	USEPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				Cw	Chemical Concentration in Groundwater	Average	ug/L	(1)	
				FA	Fraction Absorbed	Chemical Specific	unitless	USEPA, 2004	DAevent x EV x EF x ED x SA
				CF	Conversion factor	0.001	L/cm^3	- -	BW x AT
				Kp	Permeability coefficient	Chemical Specific	cm/hr	USEPA, 2004	
				τ	Lag time	Chemical Specific	hr/event	USEPA, 2004	For inorganics
				t*	Time it takes to reach steady state	Chemical Specific	hr/event	USEPA, 2004	DAevent = Kp x CW x CF x tevent
				tevent	Duration of event	4	hr/event	(1)	
				B	Bunge model constant	Chemical Specific	unitless	USEPA, 2004	For organics if tevent <= t*
				SA	Skin Surface Available for Contact	3300	cm2	USEPA, 2004	DAevent= 2 x FA x Kp x Cw x CF x sqrt[(6 x τ x tevent)/pi]
				EV	Event Frequency	1	events/day	(1)	
				EF	Exposure Frequency	30	days/year	(1)	For organics if tevent > t*
				ED	Exposure Duration	1	years	(1)	DAevent =FA x Kp x Cw x CF x [tevent/(1+B) +
				BW	Body Weight	70	kg	USEPA, 1989	2 x τ +(1 + 3B + $3B^2$)/(1+B^2)
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 1989	

Notes

1 - Professional judgment.

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 2002:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (IR-GW x EF x ED) / (BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 1.6774E-07 Noncancer Ingestion Intake = 1.17E-05

Cancer Dermal Intake = 5.54E-02 Noncancer Dermal Intake = 3.87E+00

Cancer risk from dermal contact = Groundwater concentration x Cancer Dermal Intake x DAevent x Dermal Cancer Slope Factor

Hazard Index from dermal contact = Groundwater concentration x Noncancer Dermal Intake x DAevent / Dermal Reference Dose

TABLE 4.4.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURES - CONSTRUCTION WORKERS - GROUNDWATER TO AIR

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: 0
Medium: Groundwater
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	0	0	Site 17	CA	Chemical concentration in air	Calculated	mg/m3	VDEQ, 2004	Exposure Concentration (mg/m3) =
				CW	Chemical concentration in water.	Average	ug/L	--	
				CF	Conversion Factor	0.001	mg/ug	--	CA x ET x EF x ED
				ET	Exposure Time	4	hours/day	(1)	AT x 24 hours/day
				EF	Exposure Frequency	30	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	CA = CW x CF x VF
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 1989	
				VF	Volatilization Factor	Calculated	(mg/m3)/(mg/L)	VDEQ, 2004	

Notes:

1 - Professional judgment.

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

VDEQ, 2004: Virginia Department of Environmental Quality (VDEQ, online- http://www.deq.state.va.us/vrprisk/homepage.html).

Unit Intake Calculations

Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Carcinogenic Chemicals	Noncarcinogenic Chemicals
Cancer Inhalation Intake = 1.96E-04	Noncancer Inhalation Intake = 1.37E-02

Cancer risk from ingestion = Air concentration x Cancer Inhalation Intake x Inhalation Cancer Slope Factor

Hazard Index from ingestion = Air concentration x Noncancer Inhalation Intake / Inhalation Reference Dose

TABLE 4.5 RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - INDUSTRIAL WORKERS - SOIL

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Industrial Worker	Adult	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002a	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	USEPA, 2002b	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	USEPA, 2002b	BW x AT
				EF	Exposure Frequency	250	days/year	USEPA, 2002b	
				ED	Exposure Duration	25	years	USEPA, 2002b	
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9125	days	USEPA, 1989	
Dermal	Industrial Worker	Adult	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002a	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	3300	cm2	USEPA, 2004	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	250	days/year	USEPA, 2002b	
				ED	Exposure Duration	25	years	USEPA, 1989	
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9125	days	USEPA, 1989	

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

USEPA, 2002a:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 3.49E-07 Cancer Dermal Intake = 2.31E-06

Noncancer Ingestion Intake = 9.78E-07 Noncancer Dermal Intake = 6.46E-06

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.6 RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - INDUSTRIAL WORKERS - SOIL TO AIR

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Industrial Worker	Adult	Site 17	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	8	hours/day	(1)	$\frac{CA \times ET \times EF \times ED}{AT \times 24\ hours/day}$
				CF	Conversion Factor	24	hours/day	--	
				EF	Exposure Frequency	250	days/year	USEPA, 2002a	
				ED	Exposure Duration	25	years	USEPA, 2002a	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	9125	days	USEPA, 1989	
				PEF	Particulate Emission Factor	9.37E+09	m3/kg	USEPA 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	74.32	g/m2-s per kg/m3	USEPA, 2008	
				Ut	Equivalent threshold of wind velocity at 7m.	11.32	m/sec	USEPA, 2008	
				Um	Mean annual wind speed	3.89	m/sec	USEPA, 2008	
				V	Fraction of vegetative cover	0.5	unitless	USEPA, 2008	
				F(x)	Function dependent of Um/Ut	0.0391	unitless	USEPA, 2008	

Notes:

1 - Length of typical work day.

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. USEPA/540/1-86/060.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2008: Soil Screening Guidance calculation Internet site at http://risk.ornl.gov/cgi-bin/epa/ssl1.cgi. Site-specific values for Portland, Maine.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Cancer Unit Exposure Concentration = 8.15E-02 Noncancer Unit Exposure Concentration = 2.28E-01

Cancer risk from ingestion = Air concentration x Exposure Concentration x Inhalation Unit Risk

Hazard Index from ingestion = Air concentration x Exposure Concentration / Inhalation Reference Concentration

TABLE 4.7 RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADOLESCENT TRESPASSERS - SOILS

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Trespasser	Adolescent	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	USEPA, 1997	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	USEPA, 1997	BW x AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration (6-16 years)	10	years	(2)	
				BW	Body Weight	52	kg	USEPA, 1997	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3650	days	USEPA, 1989	
Dermal	Trespasser	Adolescent	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	5300	cm2	(3)	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration (6-16 years)	10	years	(2)	
				BW	Body Weight	52	kg	USEPA, 1997	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3650	days	USEPA, 1989	

Notes:

For chemicals that act via the mutagenic mode of action the intake will be multiplied by the appropriate age-dependent adjustment factor in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

1 - Assume one day a week in warm weather months for RME and one day every other week for CTE.

2 - Older children were evaluated as one age group (6-16) years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

3 - Assumes head, hands, forearms, lower legs, and feet are exposed (USEPA, 2004).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1997: Exposure Factors Handbook. USEPA/600/8-95/002FA.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 1.96E-08 Cancer Dermal Intake = 2.07E-07

Noncancer Ingestion Intake = 1.37E-07 Noncancer Dermal Intake = 1.45E-06

TABLE 4.7 RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADOLESCENT TRESPASSERS - SOILS

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.8 RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADOLESCENT TRESPASSERS - SOILS TO AIR

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Trespasser	Adolescent	Site 17	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	4	hours/day	(1)	$\frac{CA \times ET \times EF \times ED}{AT \times 24\ hours/day}$
				CF	Conversion Factor	24	hours/day	--	
				EF	Exposure Frequency	26	days/year	(2)	
				ED	Exposure Duration (6-16 years)	10	years	(3)	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	3,650	days	USEPA, 1989	
				PEF	Particulate Emission Factor	9.37E+09	m3/kg	USEPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	74.32	g/m2-s per kg/m3	USEPA, 2008	
				F_D	dispersion correction factor	1	unitless	USEPA, 2002a	
				Ut	Equivalent threshold of wind velocity at 7m.	11.32	m/sec	USEPA, 2008	
				Um	Mean annual wind speed	3.89	m/sec	USEPA, 2008	
				V	Fraction of vegetative cover	0.5	unitless	USEPA, 2008	
				F(x)	Function dependent of Um/Ut	0.0391	unitless	USEPA, 2008	

Notes:

For chemicals that act via the mutagenic mode of action the intake will be multiplied by the appropriate age-dependent adjustment factor in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

1 - Professional judgment.

2 - Assume one day a week in warm weather months for RME and one day every other week for CTE.

3 - Older children were evaluated as one age group (6-16) years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. USEPA/540/1-86/060.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2008: Soil Screening Guidance calculation Internet site at http://risk.ornl.gov/cgi-bin/epa/ssl1.cgi. Site-specific values for Portland, Maine.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Cancer Unit Exposure Concentration = 1.70E-03 Noncancer Unit Exposure Concentration = 1.19E-02

Cancer risk from ingestion = Air concentration x Exposure Concentration x Inhalation Unit Risk

Hazard Index from ingestion = Air concentration x Exposure Concentration / Inhalation Reference Concentration

TABLE 4.9 RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADULT TRESPASSERS - SOILS

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Trespasser	Adult	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	USEPA, 1997	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	USEPA, 1997	BW x AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration (16 - 30 years)	14	years	(2)	
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	5110	days	USEPA, 1989	
Dermal	Trespasser	Adult	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	5700	cm2	(3)	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration (16 - 30 years)	14	years	(2)	
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	5110	days	USEPA, 1989	

Notes:

For chemicals that act via the mutagenic mode of action the intake will be multiplied by the appropriate age-dependent adjustment factor in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

1 - Assume one day a week in warm weather months for RME and one day every other week for CTE.

2 - Adults were evaluated from ages 16 - 30 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

3 - Assumes head, hands, forearms, lower legs, and feet are exposed (USEPA, 2004).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1997: Exposure Factors Handbook. USEPA/600/8-95/002FA.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 2.04E-08 Cancer Dermal Intake = 8.12E-08

Noncancer Ingestion Intake = 1.02E-07 Noncancer Dermal Intake = 4.06E-07

TABLE 4.9 RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADULT TRESPASSERS - SOILS

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.10 RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADULT TRESPASSERS - SOILS TO AIR

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Trespasser	Adult	Site 17	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	4	hours/day	(1)	$\frac{CA \times ET \times EF \times ED}{AT \times 24\ hours/day}$
				CF	Conversion Factor	24	hours/day	--	
				EF	Exposure Frequency	26	days/year	(2)	
				ED	Exposure Duration	14	years	(3)	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	5,110	days	USEPA, 1989	
				PEF	Particulate Emission Factor	9.37E+09	m3/kg	USEPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	74.32	g/m2-s per kg/m3	USEPA, 2008	
				F_D	dispersion correction factor	1	unitless	USEPA, 2002	
				Ut	Equivalent threshold of wind velocity at 7m.	11.32	m/sec	USEPA, 2008	
				Um	Mean annual wind speed	3.89	m/sec	USEPA, 2008	
				V	Fraction of vegetative cover	0.5	unitless	USEPA, 2008	
				F(x)	Function dependent of Um/Ut	0.0391	unitless	USEPA, 2008	

Notes:

For chemicals that act via the mutagenic mode of action the intake will be multiplied by the appropriate age-dependent adjustment factor in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

1 - Professional judgment.

2 - Assume one day a week in warm weather months for RME and one day every other week for CTE.

3 - Adults were evaluated from ages 16 - 30 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. USEPA/540/1-86/060.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2008: Soil Screening Guidance calculation Internet site at http://risk.ornl.gov/cgi-bin/epa/ssl1.cgi. Site-specific values for Portland, Maine.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Cancer Unit Exposure Concentration = 2.37E-03 Noncancer Unit Exposure Concentration = 1.19E-02

Cancer risk from ingestion = Air concentration x Exposure Concentration x Inhalation Unit Risk

Hazard Index from ingestion = Air concentration x Exposure Concentration / Inhalation Reference Concentration

TABLE 4.11 RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - YOUNG CHILD RESIDENTS - SOILS

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Future
Medium: Surface/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Young Child	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	200	mg/day	USEPA, 1997	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	USEPA, 1997	BW x AT
				EF	Exposure Frequency	350	days/year	USEPA, 1997	
				ED1	Exposure Duration (Age 0 - 2)	2	years	USEPA, 1989	
				ED2	Exposure Duration (Age 2 - 6)	4	years	USEPA, 1989	
				BW	Body Weight	14	kg	USEPA, 1997	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 1989	
Dermal	Resident	Young Child	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	2,800	cm2	USEPA, 2004	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	350	days/year	USEPA, 1997	
				ED1	Exposure Duration (Age 0 - 2)	2	years	USEPA, 1989	
				ED2	Exposure Duration (Age 2 - 6)	4	years	USEPA, 1997	
				BW	Body Weight	14	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 1989	

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1997: Exposure Factors Handbook. USEPA/600/8-95/002FA.

USEPA, 2002:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake (Age 0 - 6) = 1.17E-06 Cancer Dermal Intake (Age 0 - 6) = 3.29E-06

Noncancer Ingestion Intake = 1.37E-05 Noncancer Dermal Intake = 3.84E-05

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.12 RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - YOUNG CHILD RESIDENTS SOILS TO AIR

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Young Child	Site 17	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	24	hours/day	USEPA, 1997	$\frac{CA \times ET \times EF \times ED}{AT \times 24 \text{ hours/day}}$
				CF	Conversion Factor	24	hours/day	--	
				EF	Exposure Frequency	350	days/year	USEPA, 1997	
				ED1	Exposure Duration (Age 0 - 2)	2	years	USEPA, 1989	
				ED2	Exposure Duration (Age 2 - 6)	4	years	USEPA, 1989	CA = (1/PEF + 1/VF) x Cs
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2190	days	USEPA, 1989	
				PEF	Particulate Emission Factor	9.37E+09	m3/kg	USEPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	74.32	g/m2-s per kg/m3	USEPA, 2008	
				Ut	Equivalent threshold of wind velocity at 7m.	11.32	m/sec	USEPA, 2008	
				Um	Mean annual wind speed	3.89	m/sec	USEPA, 2008	
				V	Fraction of vegetative cover	0.5	unitless	USEPA, 2008	
				F(x)	Function dependent of Um/Ut	0.0391	unitless	USEPA, 2008	

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. USEPA/540/1-86/060.

USEPA, 1997: Exposure Factors Handbook. USEPA/600/8-95/002FA.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2008: Soil Screening Guidance calculation Internet site at http://risk.ornl.gov/cgi-bin/epa/ssl1.cgi. Site-specific values for Portland, Maine.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Cancer Unit Exposure Concentration (Age 0 - 6) = 8.22E-02 Noncancer Unit Exposure Concentration = 9.59E-01

Cancer risk from ingestion = Air concentration x Exposure Concentration x Inhalation Unit Risk

Hazard Index from ingestion = Air concentration x Exposure Concentration / Inhalation Reference Concentration

TABLE 4.13 RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - YOUNG CHILD RESIDENTS - GROUNDWATER

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Young Child	Site 17	CGW	Chemical Concentration in Groundwater	Average	ug/L	(1)	Chronic Daily Intake (CDI) (mg/kg/day) =
				CF	Conversion Factor	0.001	mg/ug	--	
				IR-GW	Ingestion Rate of Groundwater	1	L/day	USEPA, 1997	CGW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	350	days/year	USEPA, 1997	BW x AT
				ED1	Exposure Duration (Age 0 - 2)	2	years	USEPA, 1989	
				ED2	Exposure Duration (Age 2 - 6)	4	years	USEPA, 1989	
				BW	Body Weight	14	kg	USEPA, 1997	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 1989	
Dermal	Residents	Young Child	Site 17	Daevent	Dermally Absorbed Dose per Event	Calculated	mg/cm2-event	USEPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				Cw	Chemical Concentration in Groundwater	Average	ug/L	(1)	
				FA	Fraction Absorbed	Chemical Specific	unitless	USEPA, 2004	DAevent x EV x EF x ED x SA
				CF	Conversion factor	0.001	L/cm^3	- -	BW x AT
				Kp	Permeability coefficient	Chemical Specific	cm/hr	USEPA, 2004	
				τ	Lag time	Chemical Specific	hr/event	USEPA, 2004	For inorganics
				t*	Time it takes to reach steady state	Chemical Specific	hr/event	USEPA, 2004	DAevent = Kp x CW x CF x tevent
				tevent	Duration of event	1	hr/event	USEPA, 2004	
				B	Bunge model constant	Chemical Specific	unitless	USEPA, 2004	For organics if tevent <= t*
				SA	Skin Surface Available for Contact	6,600	cm2	USEPA, 2004	DAevent= 2 x FA x Kp x Cw x CF x sqrt[(6 x τ x tevent)/pi]
				EV	Event Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	350	days/year	USEPA, 1994	DAevent =FA x Kp x Cw x CF x [tevent/(1+B) +
				ED1	Exposure Duration (Age 0 - 2)	2	years	USEPA, 1989	2 x τ +(1 + 3B + $3B^2$)/(1+B^2)
				ED2	Exposure Duration (Age 2 - 6)	4	years	USEPA, 1989	
				BW	Body Weight	14	kg	USEPA, 1997	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 1989	

1 - Professional judgement

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1997: Exposure Factors Handbook. USEPA/600/8-95/002FA.

USEPA, 2002:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (IR-GW x EF x ED x CF)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake (Age 0 - 6) = 5.87E-06 Cancer Dermal Intake Time (Age 0 - 6) = 3.87E+01

Noncancer Ingestion Intake = 6.85E-05 Noncancer Dermal Intake = 4.52E+02

Cancer risk from ingestion = Groundwater concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Groundwater concentration x Cancer Dermal Intake x DAevent x Dermal Cancer Slope Factor

TABLE 4.13 RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - YOUNG CHILD RESIDENTS - GROUNDWATER

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Hazard Index from ingestion = Groundwater concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Groundwater concentration x Noncancer Dermal Intake x DAevent / Dermal Reference Dose

TABLE 4.14.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURES - YOUNG CHILD RESIDENT - GROUNDWATER TO AIR

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: 0
Medium: Groundwater
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Residents	Young Child	Site 17	CA	Chemical concentration in air	Calculated	mg/m3	Adelman Method, USEPA, 1991	Exposure Concentration (mg/m3) =
				CW	Chemical concentration in water.	Average	ug/L	--	
				CF	Conversion Factor	0.001	mg/ug	--	CA x ET x EF x ED
				ET	Exposure Time	24	hours/day	(1)	AT x 24 hours/day
				EF	Exposure Frequency	350	days/year	(1)	
				ED	Exposure Duration	6	years	(1)	CA = CW x CF x VF
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2190	days	USEPA, 1989	
				VF	Volatilization Factor	0.5	(mg/m3)/(mg/L)	USEPA, 1991	

Notes:

1 - Professional judgment.

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1991: Risk Assessment Guidance for Superfund. Vo1 Human Health Evaluation Manual, Part B. EPA/540/R-92/003.

Unit Intake Calculations

Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Carcinogenic Chemicals	Noncarcinogenic Chemicals
Cancer Inhalation Intake = 8.22E-02	Noncancer Inhalation Intake = 9.59E-01

Cancer risk from ingestion = Air concentration x Cancer Inhalation Intake x Inhalation Cancer Slope Factor

Hazard Index from ingestion = Air concentration x Noncancer Inhalation Intake / Inhalation Reference Dose

TABLE 4.15 RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADOLESCENT RESIDENTS - SOILS

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Future
Medium: Surface/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adolescent	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	USEPA, 1997	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	USEPA, 1997	BW x AT
				EF	Exposure Frequency	350	days/year	USEPA, 1997	
				ED1	Exposure Duration (Age 6 - 16)	10	years	(1), USEPA, 1989	
				BW	Body Weight	52	kg	USEA, 1997	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,650	days	USEPA, 1989	
Dermal	Resident	Adolescent	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	5,300	cm2	USEPA, 2004	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	350	days/year	USEPA, 1997	
				ED1	Exposure Duration (Age 6 - 16)	10	years	(1), USEPA, 1989, 2005	
				BW	Body Weight	52	kg	USEPA, 1997	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,650	days	USEPA, 1989	

Notes:

1 - Older children were evaluated from 6-16 years of age.

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1997: Exposure Factors Handbook. USEPA/600/8-95/002FA.

USEPA, 2002:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 2.63E-07 Cancer Dermal Intake = 2.79E-06

Noncancer Ingestion Intake = 1.84E-06 Noncancer Dermal Intake = 1.95E-05

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.16 RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADOLESCENT RESIDENTS SOILS TO AIR

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Adolescent	Site 17	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	24	hours/day	USEPA, 1997	CA x ET x EF x ED
				CF	Conversion Factor	24	hours/day	--	AT x 24 hours/day
				EF	Exposure Frequency	350	days/year	USEPA, 1997	
				ED1	Exposure Duration (Age 6 - 16)	10	years	(1), USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3650	days	USEPA, 1989	
				PEF	Particulate Emission Factor	9.37E+09	m3/kg	USEPA 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	74.32	g/m2-s per kg/m3	USEPA, 2008	
				Ut	Equivalent threshold of wind velocity at 7m.	11.32	m/sec	USEPA, 2008	
				Um	Mean annual wind speed	3.89	m/sec	USEPA, 2008	
				V	Fraction of vegetative cover	0.5	unitless	USEPA, 2008	
				F(x)	Function dependent of Um/Ut	0.0391	unitless	USEPA, 2008	

Notes:

1 - Older children were evaluated from 6-16 years of age.

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. USEPA/540/1-86/060.

USEPA, 1997: Exposure Factors Handbook. USEPA/600/8-95/002FA.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2008: Soil Screening Guidance calculation Internet site at http://risk.ornl.gov/cgi-bin/epa/ssl1.cgi. Site-specific values for Portland, Maine.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Cancer Unit Exposure Concentration = 1.37E-01 Noncancer Unit Exposure Concentration = 9.59E-01

Cancer risk from ingestion = Air concentration x Exposure Concentration x Inhalation Unit Risk

Hazard Index from ingestion = Air concentration x Exposure Concentration / Inhalation Reference Concentration

TABLE 4.17 RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADOLESCENT RESIDENTS - GROUNDWATER

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Adolescent	Site 17	CGW	Chemical Concentration in Groundwater	Average	ug/L	(2)	Chronic Daily Intake (CDI) (mg/kg/day) =
				CF	Conversion Factor	0.001	mg/ug	--	
				IR-GW	Ingestion Rate of Groundwater	2	L/day	USEPA, 1997	CGW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	350	days/year	USEPA, 1997	BW x AT
				ED1	Exposure Duration (Age 6 - 16)	10	years	(1), USEPA, 1989	
				BW	Body Weight	52	kg	USEPA, 1997	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,650	days	USEPA, 1989	
Dermal	Residents	Adolescent	Site 17	Daevent	Dermally Absorbed Dose per Event	Calculated	mg/cm2-event	USEPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				Cw	Chemical Concentration in Groundwater	Average	ug/L	(2)	
				FA	Fraction Absorbed	Chemical Specific	unitless	USEPA, 2004	DAevent x EV x EF x ED x SA
				CF	Conversion factor	0.001	L/cm^3	- -	BW x AT
				Kp	Permeability coefficient	Chemical Specific	cm/hr	USEPA, 2004	
				τ	Lag time	Chemical Specific	hr/event	USEPA, 2004	For inorganics
				t*	Time it takes to reach steady state	Chemical Specific	hr/event	USEPA, 2004	DAevent = Kp x CW x CF x tevent
				tevent	Duration of event	0.58	hr/event	USEPA, 2004	
				B	Bunge model constant	Chemical Specific	unitless	USEPA, 2004	For organics if tevent <= t*
				SA	Skin Surface Available for Contact	13,100	cm2	USEPA, 2004	DAevent= 2 x FA x Kp x Cw x CF x sqrt[(6 x τ x tevent)/pi]
				EV	Event Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	350	days/year	USEPA, 1994	
				ED1	Exposure Duration (Age 6 -16)	10	years	(1), USEPA, 1989	For organics if tevent > t*
				BW	Body Weight	52	kg	USEPA, 1997	DAevent =FA x Kp x Cw x CF x [tevent/(1+B) +
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	2 x τ +(1 + 3B + $3B^2$)/(1+B^2)
				AT-N	Averaging Time (Non-Cancer)	3,650	days	USEPA, 1989	

Notes:

1 - Older children were evaluated from 6-16 years of age.

2 - Professional judgement.

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa

USEPA, 2002:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (IR-GW x EF x ED x CF)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 5.27E-06 Cancer Dermal Intake Time = 3.45E+01

Noncancer Ingestion Intake = 3.69E-05 Noncancer Dermal Intake = 2.42E+02

TABLE 4.17 RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADOLESCENT RESIDENTS - GROUNDWATER

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Cancer risk from ingestion = Groundwater concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Groundwater concentration x Cancer Dermal Intake x DAevent x Dermal Cancer Slope Factor

Hazard Index from ingestion = Groundwater concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Groundwater concentration x Noncancer Dermal Intake x DAevent / Dermal Reference Dose

TABLE 4.18.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURES - ADOLESCENT RESIDENT - GROUNDWATER TO AIR

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: 0
Medium: Groundwater
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Residents	Adolescent	Site 17	CA	Chemical concentration in air	Calculated	mg/m3	Adelman Method, USEPA, 1991	Exposure Concentration (mg/m3) =
				CW	Chemical concentration in water.	Average	ug/L	--	
				CF	Conversion Factor	0.001	mg/ug	--	CA x ET x EF x ED
				ET	Exposure Time	0.58	hours/day	(1)	AT x 24 hours/day
				EF	Exposure Frequency	350	days/year	(1)	
				ED	Exposure Duration	10	years	(1)	CA = CW x CF x VF
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3650	days	USEPA, 1989	
				VF	Volatilization Factor	0.5	(mg/m3)/(mg/L)	USEPA, 1991	

Notes:

1 - Professional judgment.

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1991: Risk Assessment Guidance for Superfund. Vo1 Human Health Evaluation Manual, Part B. EPA/540/R-92/003.

Unit Intake Calculations

Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Carcinogenic Chemicals	Noncarcinogenic Chemicals
Cancer Inhalation Intake = 3.31E-03	Noncancer Inhalation Intake = 2.32E-02

Cancer risk from ingestion = Air concentration x Cancer Inhalation Intake x Inhalation Cancer Slope Factor

Hazard Index from ingestion = Air concentration x Noncancer Inhalation Intake / Inhalation Reference Dose

TABLE 4.19 RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADULT RESIDENTS - SOILS

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Future
Medium: Surface/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	USEPA, 1997	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	USEPA, 1997	BW x AT
				EF	Exposure Frequency	350	days/year	USEPA, 1997	
				ED1	Exposure Duration (Age 16 - 30)	14	years	(1), USEPA, 1989	
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	5,110	days	USEPA, 1989	
Dermal	Resident	Adult	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	5,700	cm2	USEPA, 2004	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	350	days/year	USEPA, 1997	
				ED1	Exposure Duration (Age 16 - 30)	14	years	(1), USEPA, 1989	
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	5,110	days	USEPA, 1989	

Notes:

1 - Residential adults were evaluated as 16 - 30 years.

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

USEPA, 1997: Exposure Factors Handbook. USEPA/600/8-95/002FA.

USEPA, 2002:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 2.74E-07 Cancer Dermal Intake = 1.09E-06

Noncancer Ingestion Intake = 1.37E-06 Noncancer Dermal Intake = 5.47E-06

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.20 RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADULT RESIDENTS - SOILS TO AIR

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Adult	Site 17	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	24	hours/day	USEPA, 1997	$\frac{CA \times ET \times EF \times ED}{AT \times 24\ hours/day}$
				CF	Conversion Factor	24	hours/day	--	
				EF	Exposure Frequency	350	days/year	USEPA, 1997	
				ED1	Exposure Duration (Age 16 - 30)	14	years	(1), USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	5110	days	USEPA, 1989	
				PEF	Particulate Emission Factor	9.37E+09	m3/kg	USEPA 2002a	$PEF = \frac{Q / C \times 3600}{0.036 \times (1 - V) \times (U_m / U_t)^3 \times F(x)}$
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	74.32	g/m2-s per kg/m3	USEPA, 2008	$F(x) = 0.18 * (8x^3 + 12x) * \exp(-x^2)$
				Ut	Equivalent threshold of wind velocity at 7m.	11.32	m/sec	USEPA, 2008	
				Um	Mean annual wind speed	3.89	m/sec	USEPA, 2008	$x = 0.886 * Ut / Um$
				V	Fraction of vegetative cover	0.5	unitless	USEPA, 2008	
				F(x)	Function dependent of Um/Ut	0.0391	unitless	USEPA, 2008	

Notes:

1 - Residential adults were evaluated as 16 - 30 years.

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. USEPA/540/1-86/060.

USEPA, 1997: Exposure Factors Handbook. USEPA/600/8-95/002FA.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

USEPA, 2008: Soil Screening Guidance calculation Internet site at http://risk.ornl.gov/cgi-bin/epa/ssl1.cgi. Site-specific values for Portland, Maine.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Cancer Unit Exposure Concentration (Age 6 - 30) = 1.92E-01 Noncancer Unit Exposure Concentration = 9.59E-01

Cancer risk from ingestion = Air concentration x Exposure Concentration x Inhalation Unit Risk

Hazard Index from ingestion = Air concentration x Exposure Concentration / Inhalation Reference Concentration

TABLE 4.21 RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADULT RESIDENTS - GROUNDWATER

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Adult	Site 17	CGW	Chemical Concentration in Groundwater	Average	ug/L	(2)	Chronic Daily Intake (CDI) (mg/kg/day) =
				CF	Conversion Factor	0.001	mg/ug	--	
				IR-GW	Ingestion Rate of Groundwater	2	L/day	USEPA, 1997	CGW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	350	days/year	USEPA, 1997	BW x AT
				ED	Exposure Duration (Age 16 - 30)	14	years	(1), USEPA, 1989	
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	5,110	days	USEPA, 1989	
Dermal	Residents	Adult	Site 17	Daevent	Dermally Absorbed Dose per Event	Calculated	mg/cm2-event	USEPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				Cw	Chemical Concentration in Groundwater	Average	ug/L	(2)	DAevent x EV x EF x ED x SA
				FA	Fraction Absorbed	Chemical Specific	unitless	USEPA, 2004	BW x AT
				CF	Conversion factor	0.001	L/cm^3	- -	
				Kp	Permeability coefficient	Chemical Specific	cm/hr	USEPA, 2004	For inorganics
				τ	Lag time	Chemical Specific	hr/event	USEPA, 2004	DAevent = Kp x CW x CF x tevent
				t*	Time it takes to reach steady state	Chemical Specific	hr/event	USEPA, 2004	
				tevent	Duration of event	0.58	hr/event	USEPA, 2004	For organics if tevent <= t*
				B	Bunge model constant	Chemical Specific	unitless	USEPA, 2004	DAevent= 2 x FA x Kp x Cw x CF x sqrt[(6 x τ x tevent)/pi]
				SA	Skin Surface Available for Contact	18,000	cm2	USEPA, 2004	
				EV	Event Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	350	days/year	USEPA, 1994	DAevent =FA x Kp x Cw x CF x [tevent/(1+B) +
				ED1	Exposure Duration (Age 16 - 30)	14	years	(1), USEPA, 1989	2 x τ +(1 + 3B + $3B^2$)/(1+B^2)
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	5,110	days	USEPA, 1989	

Notes:

1 - Residential adults were evaluated as 16 - 30 years.

2 - Professional Judgement

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1997: Exposure Factors Handbook. USEPA/600/8-95/002FA.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (IR-GW x EF x ED x CF)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 5.48E-06 Cancer Dermal Intake = 4.93E+01

Noncancer Ingestion Intake = 2.74E-05 Noncancer Dermal Intake = 2.47E+02

Cancer risk from ingestion = Groundwater concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Groundwater concentration x Cancer Dermal Intake x DAevent x Dermal Cancer Slope Factor

Hazard Index from ingestion = Groundwater concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Groundwater concentration x Noncancer Dermal Intake x DAevent / Dermal Reference Dose

TABLE 4.22.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURES - ADULT RESIDENT - GROUNDWATER TO AIR

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: 0
Medium: Groundwater
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Residents	Adult	Site 17	CA	Chemical concentration in air	Calculated	mg/m3	Adelman Method, USEPA, 1991	Exposure Concentration (mg/m3) =
				CW	Chemical concentration in water.	Average	ug/L	--	
				CF	Conversion Factor	0.001	mg/ug	--	CA x ET x EF x ED
				ET	Exposure Time	24	hours/day	(1)	AT x 24 hours/day
				EF	Exposure Frequency	350	days/year	(1)	
				ED	Exposure Duration	14	years	(1)	CA = CW x CF x VF
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	5110	days	USEPA, 1989	
				VF	Volatilization Factor	0.5	(mg/m3)/(mg/L)	USEPA, 1991	

Notes:

1 - Professional judgment.

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1991: Risk Assessment Guidance for Superfund. Vo1 Human Health Evaluation Manual, Part B. EPA/540/R-92/003.

Unit Intake Calculations

Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Carcinogenic Chemicals	Noncarcinogenic Chemicals
Cancer Inhalation Intake = 1.92E-01	Noncancer Inhalation Intake = 9.59E-01

Cancer risk from ingestion = Air concentration x Cancer Inhalation Intake x Inhalation Cancer Slope Factor

Hazard Index from ingestion = Air concentration x Noncancer Inhalation Intake / Inhalation Reference Dose

TABLE 4.1 CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - CONSTRUCTION WORKERS - SOILS

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Construction Workers	Adult	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002a	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	165	mg/day	(1)	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	USEPA, 2002b	BW x AT
				EF	Exposure Frequency	75	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 1989	
Dermal	Construction Workers	Adult	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002a	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	3300	cm2	USEPA, 2002b	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.1	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	75	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 1989	

Notes:

1 - Professional judgment. For some factors, CTE is assumed to be 50 percent of RME.

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

USEPA, 2002a:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 6.92E-09 Cancer Dermal Intake = 1.38E-08

Noncancer Ingestion Intake = 4.84E-07 Noncancer Dermal Intake = 9.69E-07

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.2 CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - CONSTRUCTION WORKERS - SOILS TO AIR

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Construction Workers	Adult	Site 17	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	8	hours/day	(1)	$\frac{CA \times ET \times EF \times ED}{AT \times 24\ hours/day}$
				CF	Conversion Factor	24	hours/day	--	
				EF	Exposure Frequency	75	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 1989	
				PEF	Particulate Emission Factor	1.62E+06	m3/kg	USEPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	

Notes:

1 - Professional judgment. For some factors, CTE is assumed to be 50 percent of RME.

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Cancer Unit Exposure Concentration = 9.78E-04 Noncancer Unit Exposure Concentration = 6.85E-02

Cancer risk from ingestion = Air concentration x Exposure Concentration x Inhalation Unit Risk

Hazard Index from ingestion = Air concentration x Exposure Concentration / Inhalation Reference Concentration

TABLE 4.3 CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - CONSTRUCTION WORKERS - GROUNDWATER

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Construction Workers	Adult	Site 17	CGW	Chemical Concentration in Groundwater	Average	ug/L	(1)	Chronic Daily Intake (CDI) (mg/kg/day) =
				CF	Conversion Factor	0.001	mg/ug	--	
				IR-GW	Ingestion Rate of Groundwater	0.01	L/day	(1)	$\frac{CGW \times CF \times IR\text{-}GW \times EF \times ED}{BW \times AT}$
				EF	Exposure Frequency	15	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 1989	
Dermal	Construction Workers	Adult	Site 17	Daevent	Dermally Absorbed Dose per Event	Calculated	mg/cm2-event	USEPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				Cw	Chemical Concentration in Groundwater	Average	ug/L	(1)	
				FA	Fraction Absorbed	Chemical Specific	unitless	USEPA, 2004	$\frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
				CF	Conversion factor	0.001	L/cm^3	- -	
				Kp	Permeability coefficient	Chemical Specific	cm/hr	USEPA, 2004	
				τ	Lag time	Chemical Specific	hr/event	USEPA, 2004	For inorganics
				t*	Time it takes to reach steady state	Chemical Specific	hr/event	USEPA, 2004	DAevent = Kp x CW x CF x tevent
				tevent	Duration of event	2	hr/event	(1)	
				B	Bunge model constant	Chemical Specific	unitless	USEPA, 2004	For organics if tevent <= t*
				SA	Skin Surface Available for Contact	3300	cm2	USEPA, 2004	DAevent= 2 x FA x Kp x Cw x CF x sqrt[(6 x τ x tevent)/pi]
				EV	Event Frequency	1	events/day	(1)	
				EF	Exposure Frequency	15	days/year	(1)	DAevent =FA x Kp x Cw x CF x [tevent/(1+B) +
				ED	Exposure Duration	1	years	(1)	2 x τ +(1 + 3B + $3B^2$)/(1+B^2)
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 1989	

Notes

1 - Professional judgment. For some factors, CTE is assumed to be 50 percent of RME.

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Dermal Intake = 2.77E-02 Noncancer Dermal Intake = 1.94E+00

Cancer risk from dermal contact = Groundwater concentration x Cancer Dermal Intake x DAevent x Dermal Cancer Slope Factor

Hazard Index from dermal contact = Groundwater concentration x Noncancer Dermal Intake x DAevent / Dermal Reference Dose

TABLE 4.4.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS - CONSTRUCTION WORKERS - GROUNDWATER TO AIR

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: 0
Medium: Groundwater
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	0	0	Site 17	CA	Chemical concentration in air	Calculated	mg/m3	VDEQ, 2004	Exposure Concentration (mg/m3) =
				CW	Chemical concentration in water.	Average	ug/L	--	
				CF	Conversion Factor	0.001	mg/ug	--	CA x ET x EF x ED
				ET	Exposure Time	2	hours/day	(1)	AT x 24 hours/day
				EF	Exposure Frequency	15	days/year	(1)	
				ED	Exposure Duration	1	years	(1)	CA = CW x CF x VF
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA, 1989	
				VF	Volatilization Factor	Calculated	(mg/m3)/(mg/L)	VDEQ, 2004	

Notes:

1 - Professional judgment. For some factors, CTE is assumed to be 50 percent of RME.

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

VDEQ, 2004: Virginia Department of Environmental Quality (VDEQ, online- http://www.deq.state.va.us/vrprisk/homepage.html).

Unit Intake Calculations

Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Carcinogenic Chemicals	Noncarcinogenic Chemicals
Cancer Inhalation Intake = 4.89E-05	Noncancer Inhalation Intake = 3.42E-03

Cancer risk from ingestion = Air concentration x Cancer Inhalation Intake x Inhalation Cancer Slope Factor

Hazard Index from ingestion = Air concentration x Noncancer Inhalation Intake / Inhalation Reference Dose

TABLE 4.5 CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - INDUSTRIAL WORKERS - SOIL

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Industrial Worker	Adult	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	50	mg/day	USEPA, 1993	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	USEPA, 1993	BW x AT
				EF	Exposure Frequency	219	days/year	USEPA, 1993	
				ED	Exposure Duration	9	years	USEPA, 1993	
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3285	days	USEPA, 1989	
Dermal	Industrial Worker	Adult	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	3300	cm2	USEPA, 2004	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.02	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	219	days/year	USEPA, 1993	
				ED	Exposure Duration	9	years	USEPA, 1993	
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3285	days	USEPA, 1989	

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

USEPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 5.51E-08 Cancer Dermal Intake = 7.27E-08

Noncancer Ingestion Intake = 4.29E-07 Noncancer Dermal Intake = 5.66E-07

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.6 CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - INDUSTRIAL WORKERS - SOIL TO AIR

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Industrial Worker	Adult	Site 17	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	8	hours/day	(1)	$\frac{CA \times ET \times EF \times ED}{AT \times 24\ hours/day}$
				CF	Conversion Factor	24	hours/day	--	
				EF	Exposure Frequency	219	days/year	USEPA, 2002a	
				ED	Exposure Duration	9	years	USEPA, 1993	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	3285	days	USEPA, 1989	
				PEF	Particulate Emission Factor	9.37E+09	m3/kg	USEPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	74.32	g/m2-s per kg/m3	USEPA, 2008	
				Ut	Equivalent threshold of wind velocity at 7m.	11.32	m/sec	USEPA, 2008	
				Um	Mean annual wind speed	3.89	m/sec	USEPA, 2008	
				V	Fraction of vegetative cover	0.5	unitless	USEPA, 2008	
				F(x)	Function dependent of Um/Ut	0.0391	unitless	USEPA, 2008	

Notes:

1 - Length of typical work day.

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. USEPA/540/1-86/060.

USEPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2008: Soil Screening Guidance calculation Internet site at http://risk.lsd.ornl.gov/calc_start.htm. Site-specific values for Hartford, Connecticut.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Cancer Unit Exposure Concentration = 2.57E-02 Noncancer Unit Exposure Concentration = 2.00E-01

Cancer risk from ingestion = Air concentration x Exposure Concentration x Inhalation Unit Risk

Hazard Index from ingestion = Air concentration x Exposure Concentration / Inhalation Reference Concentration

TABLE 4.7 CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - ADOLESCENT TRESPASSERS - SOILS

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Trespasser	Adolescent	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	50	mg/day	USEPA, 1993	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CSs x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	USEPA, 1993	BW x AT
				EF	Exposure Frequency	13	days/year	(1)	
				ED	Exposure Duration	10	years	(2)	
				BW	Body Weight	52	kg	USEPA, 1997	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3650	days	USEPA, 1989	
Dermal	Trespasser	Adolescent	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	5300	cm2	(3)	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	13	days/year	(1)	
				ED	Exposure Duration	10	years	(2)	
				BW	Body Weight	52	kg	USEPA, 1997	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3650	days	USEPA, 1989	

Notes:

1 - Assume one day a week in warm weather months for RME and one day every other week for CTE.

2 - Older children were evaluated as one age group (6-16) years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

3 - Assumes head, hands, forearms, lower legs, and feet are exposed (USEPA, 2004).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 4.89E-09 Cancer Dermal Intake = 2.07E-08

Noncancer Ingestion Intake = 3.42E-08 Noncancer Dermal Intake = 1.45E-07

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.8 CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - ADOLESCENT TRESPASSERS - SOILS TO AIR

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Trespasser	Adolescent	Site 17	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	2	hours/day	(1)	$\frac{CA \times ET \times EF \times ED}{AT \times 24\ hours/day}$
				CF	Conversion Factor	24	hours/day	--	
				EF	Exposure Frequency	13	days/year	(2)	
				ED	Exposure Duration	10	years	(3)	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	3,650	days	USEPA, 1989	
				PEF	Particulate Emission Factor	9.37E+09	m3/kg	USEPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	74.32	g/m2-s per kg/m3	USEPA, 2008	
				Ut	Equivalent threshold of wind velocity at 7m.	11.32	m/sec	USEPA, 2008	
				Um	Mean annual wind speed	3.89	m/sec	USEPA, 2008	
				V	Fraction of vegetative cover	0.5	unitless	USEPA, 2008	
				F(x)	Function dependent of Um/Ut	0.0391	unitless	USEPA, 2008	

Notes:

1 - Professional judgment.

2 - Assume one day a week in warm weather months for RME and one day every other week for CTE.

3 - Older children were evaluated as one age group (6-16) years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. USEPA/540/1-86/060.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2008: Soil Screening Guidance calculation Internet site at http://risk.lsd.ornl.gov/calc_start.htm. Site-specific values for Hartford, Connecticut.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Cancer Unit Exposure Concentration = 4.24E-04 Noncancer Unit Exposure Concentration = 2.97E-03

Cancer risk from ingestion = Air concentration x Exposure Concentration x Inhalation Unit Risk

Hazard Index from ingestion = Air concentration x Exposure Concentration / Inhalation Reference Concentration

TABLE 4.9 CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - ADULT TRESPASSERS - SOILS

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Trespasser	Adult	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	50	mg/day	USEPA, 1993	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	CSs x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	USEPA, 1993	BW x AT
				EF	Exposure Frequency	13	days/year	(1)	
				ED	Exposure Duration	14	years	(2)	
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	5110	days	USEPA, 1989	
Dermal	Trespasser	Adult	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	5700	cm2	(3)	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.01	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	13	days/year	(1)	
				ED	Exposure Duration	14	years	(2)	
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	5110	days	USEPA, 1989	

Notes:

1 - Assume one day a week in warm weather months for RME and one day every other week for CTE.

2 - Adults were evaluated from ages 16 - 30 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

3 - Assumes head, hands, forearms, lower legs, and feet are exposed (USEPA, 2004).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 5.09E-09 Cancer Dermal Intake = 5.80E-09

Noncancer Ingestion Intake = 2.54E-08 Noncancer Dermal Intake = 2.90E-08

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.10 CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - ADULT TRESPASSERS - SOILS TO AIR

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Trespasser	Adult	Site 17	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	2	hours/day	(1)	$\frac{CA \times ET \times EF \times ED}{AT \times 24\ hours/day}$
				CF	Conversion Factor	24	hours/day	--	
				EF	Exposure Frequency	13	days/year	(2)	
				ED	Exposure Duration	14	years	(3)	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	5,110	days	USEPA, 1989	
				PEF	Particulate Emission Factor	9.37E+09	m3/kg	USEPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	74.32	g/m2-s per kg/m3	USEPA, 2008	
				Ut	Equivalent threshold of wind velocity at 7m.	11.32	m/sec	USEPA, 2008	
				Um	Mean annual wind speed	3.89	m/sec	USEPA, 2008	
				V	Fraction of vegetative cover	0.5	unitless	USEPA, 2008	
				F(x)	Function dependent of Um/Ut	0.0391	unitless	USEPA, 2008	

Notes:

1 - Professional judgment.

2 - Assume one day a week in warm weather months for RME and one day every other week for CTE.

3 - Adults were evaluated from ages 16 - 30 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. USEPA/540/1-86/060.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2008: Soil Screening Guidance calculation Internet site at http://risk.lsd.ornl.gov/calc_start.htm. Site-specific values for Hartford, Connecticut.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Cancer Unit Exposure Concentration = 5.94E-04 Noncancer Unit Exposure Concentration = 2.97E-03

Cancer risk from ingestion = Air concentration x Exposure Concentration x Inhalation Unit Risk

Hazard Index from ingestion = Air concentration x Exposure Concentration / Inhalation Reference Concentration

TABLE 4.11 CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - YOUNG CHILD RESIDENTS - SOILS

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Future
Medium: Surface/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Young Child	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	USEPA, 1993	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	USEPA, 1993	BW x AT
				EF	Exposure Frequency	234	days/year	USEPA, 1994	
				ED	Exposure Duration	2	years	USEPA, 1993	
				BW	Body Weight	14	kg	USEPA, 1997	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 1989	
Dermal	Resident	Young Child	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	2,800	cm2	USEPA, 2004	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	234	days/year	USEPA, 1994	
				ED	Exposure Duration	2	years	USEPA, 1993	
				BW	Body Weight	14	kg	USEPA, 1997	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 1989	

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 1.31E-07 Cancer Dermal Intake = 1.47E-07

Noncancer Ingestion Intake = 4.58E-06 Noncancer Dermal Intake = 5.13E-06

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.12 CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - YOUNG CHILD RESIDENTS - SOILS TO AIR

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Young Child	Site 17	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	24	hours/day	USEPA, 1993	$\frac{CA \times ET \times EF \times ED}{AT \times 24\ hours/day}$
				CF	Conversion Factor	24	hours/day	--	
				EF	Exposure Frequency	234	days/year	USEPA, 1994	
				ED	Exposure Duration	2	years	USEPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 1989	
				PEF	Particulate Emission Factor	9.37E+09	m3/kg	USEPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	74.32	g/m2-s per kg/m3	USEPA, 2008	
				Ut	Equivalent threshold of wind velocity at 7m.	11.32	m/sec	USEPA, 2008	
				Um	Mean annual wind speed	3.89	m/sec	USEPA, 2008	
				V	Fraction of vegetative cover	0.5	unitless	USEPA, 2008	
				F(x)	Function dependent of Um/Ut	0.0391	unitless	USEPA, 2008	

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. USEPA/540/1-86/060.

USEPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 1994: USEPA Region I Risk Updates, August 1994.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2008: Soil Screening Guidance calculation Internet site at http://risk.lsd.ornl.gov/calc_start.htm. Site-specific values for Hartford, Connecticut.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Cancer Unit Exposure Concentration = 1.83E-02 Noncancer Unit Exposure Concentration = 6.41E-01

Cancer risk from ingestion = Air concentration x Exposure Concentration x Inhalation Unit Risk

Hazard Index from ingestion = Air concentration x Exposure Concentration / Inhalation Reference Concentration

TABLE 4.13 CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - YOUNG CHILD RESIDENTS - GROUNDWATER

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Young Child	Site 17	CGW	Chemical Concentration in Groundwater	Average	ug/L	(1)	Chronic Daily Intake (CDI) (mg/kg/day) =
				CF	Conversion Factor	0.001	mg/ug	--	
				IR-GW	Ingestion Rate of Groundwater	0.66	L/day	USEPA, 1997	CGW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	234	days/year	USEPA, 1994	BW x AT
				ED	Exposure Duration	2	years	USEPA, 1993	
				BW	Body Weight	15	kg	USEPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 1989	
Dermal	Residents	Young Child	Site 17	Daevent	Dermally Absorbed Dose per Event	Calculated	mg/cm2-event	USEPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				Cw	Chemical Concentration in Groundwater	Average	ug/L	(1)	
				FA	Fraction Absorbed	Chemical Specific	unitless	USEPA, 2004	DAevent x EV x EF x ED x SA
				CF	Conversion factor	0.001	L/cm^3	- -	BW x AT
				Kp	Permeability coefficient	Chemical Specific	cm/hr	USEPA, 2004	
				τ	Lag time	Chemical Specific	hr/event	USEPA, 2004	For inorganics
				t*	Time it takes to reach steady state	Chemical Specific	hr/event	USEPA, 2004	DAevent = Kp x CW x CF x tevent
				tevent	Duration of event	0.33	hr/event	USEPA, 1997	
				B	Bunge model constant	Chemical Specific	unitless	USEPA, 2004	For organics if tevent <= t*
				SA	Skin Surface Available for Contact	6,600	cm2	USEPA, 2004	DAevent= 2 x FA x Kp x Cw x CF x sqrt[(6 x τ x tevent)/pi]
				EV	Event Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	234	days/year	USEPA, 1994	DAevent =FA x Kp x Cw x CF x [tevent/(1+B) +
				ED	Exposure Duration	2	years	USEPA, 1993	2 x τ +(1 + 3B + $3B^2$)/(1+B^2)
				BW	Body Weight	15	kg	USEPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 1989	

Notes:

1 - Professional judgment.

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 1994: USEPA Region I Risk Updates, August 1994.

USEPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supple

Unit Intake Calculations

Ingestion Intake = (IR-GW x EF x ED x CF)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 8.06E-07

Noncancer Ingestion Intake = 2.82E-05

Cancer Dermal Intake = 8.06E+00

Noncancer Dermal Intake = 2.82E+02

TABLE 4.13 CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - YOUNG CHILD RESIDENTS - GROUNDWATER

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Cancer risk from ingestion = Groundwater concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Groundwater concentration x Cancer Dermal Intake x DAevent x Dermal Cancer Slope Factor

Hazard Index from ingestion = Groundwater concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Groundwater concentration x Noncancer Dermal Intake x DAevent / Dermal Reference Dose

TABLE 4.14.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - YOUNG CHILD RESIDENT - GROUNDWATER TO AIR

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: 0
Medium: Groundwater
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Residents	Young Child	Site 17	CA	Chemical concentration in air	Calculated	mg/m3	Adelman Method, USEPA, 1991	Exposure Concentration (mg/m3) =
				CW	Chemical concentration in water.	Average	ug/L	--	
				CF	Conversion Factor	0.001	mg/ug	--	CA x ET x EF x ED
				ET	Exposure Time	12	hours/day	(1)	AT x 24 hours/day
				EF	Exposure Frequency	350	days/year	(1)	
				ED	Exposure Duration	6	years	(1)	CA = CW x CF x VF
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2190	days	USEPA, 1989	
				VF	Volatilization Factor	0.5	(mg/m3)/(mg/L)	USEPA, 1991	

Notes:

1 - Professional judgment.

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1991: Risk Assessment Guidance for Superfund. Vo1 Human Health Evaluation Manual, Part B. EPA/540/R-92/003.

Unit Intake Calculations

Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Carcinogenic Chemicals	Noncarcinogenic Chemicals
Cancer Inhalation Intake = 4.11E-02	Noncancer Inhalation Intake = 4.79E-01

Cancer risk from ingestion = Air concentration x Cancer Inhalation Intake x Inhalation Cancer Slope Factor

Hazard Index from ingestion = Air concentration x Noncancer Inhalation Intake / Inhalation Reference Dose

TABLE 4.15 CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - ADOLESCENT RESIDENTS - SOILS

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Future
Medium: Surface/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adolescent	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	50	mg/day	USEPA, 1993	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	USEPA, 1993	BW x AT
				EF	Exposure Frequency	234	days/year	USEPA, 1994	
				ED	Exposure Duration	2	years	USEPA, 1993	
				BW	Body Weight	52	kg	USEPA, 1997	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 1989	
Dermal	Resident	Adolescent	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	5,300	cm2	USEPA, 2004	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	234	days/year	USEPA, 1994	
				ED	Exposure Duration	2	years	USEPA, 1993	
				BW	Body Weight	52	kg	USEPA, 1997	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 1989	

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 1994: USEPA Region I Risk Updates, August 1994.

USEPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 1.76E-08 Cancer Dermal Intake = 7.47E-08

Noncancer Ingestion Intake = 6.16E-07 Noncancer Dermal Intake = 2.61E-06

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

TABLE 4.16 CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - ADOLESCENT RESIDENTS - SOILS TO AIR

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Adolescent	Site 17	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	24	hours/day	USEPA, 1993	CA x ET x EF x ED
				CF	Conversion Factor	24	hours/day	--	
				EF	Exposure Frequency	234	days/year	USEPA, 1994	AT x 24 hours/day
				ED	Exposure Duration	2	years	USEPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 1989	
				PEF	Particulate Emission Factor	9.37E+09	m3/kg	USEPA, 2002a	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	74.32	g/m2-s per kg/m3	USEPA, 2008	
				Ut	Equivalent threshold of wind velocity at 7m.	11.32	m/sec	USEPA, 2008	
				Um	Mean annual wind speed	3.89	m/sec	USEPA, 2008	
				V	Fraction of vegetative cover	0.5	unitless	USEPA, 2008	
				F(x)	Function dependent of Um/Ut	0.0391	unitless	USEPA, 2008	

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. USEPA/540/1-86/060.

USEPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 1994: USEPA Region I Risk Updates, August 1994.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2008: Soil Screening Guidance calculation Internet site at http://risk.lsd.ornl.gov/calc_start.htm. Site-specific values for Hartford, Connecticut.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Cancer Unit Exposure Concentration = 1.83E-02 Noncancer Unit Exposure Concentration = 6.41E-01

Cancer risk from ingestion = Air concentration x Exposure Concentration x Inhalation Unit Risk

Hazard Index from ingestion = Air concentration x Exposure Concentration / Inhalation Reference Concentration

TABLE 4.17 CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - ADOLESCENT RESIDENTS - GROUNDWATER

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Adolescent	Site 17	CGW	Chemical Concentration in Groundwater	Average	ug/L	(1)	Chronic Daily Intake (CDI) (mg/kg/day) =
				CF	Conversion Factor	0.001	mg/ug	--	
				IR-GW	Ingestion Rate of Groundwater	0.87	L/day	USEPA, 1997	CGW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	234	days/year	USEPA, 1994	BW x AT
				ED	Exposure Duration	2	years	USEPA, 1993	
				BW	Body Weight	42	kg	MEDEP, 1994	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 1989	
Dermal	Residents	Adolescent	Site 17	Daevent	Dermally Absorbed Dose per Event	Calculated	mg/cm2-event	USEPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				Cw	Chemical Concentration in Groundwater	Average	ug/L	(1)	
				FA	Fraction Absorbed	Chemical Specific	unitless	USEPA, 2004	DAevent x EV x EF x ED x SA
				CF	Conversion factor	0.001	L/cm^3	- -	BW x AT
				Kp	Permeability coefficient	Chemical Specific	cm/hr	USEPA, 2004	
				τ	Lag time	Chemical Specific	hr/event	USEPA, 2004	For inorganics
				t*	Time it takes to reach steady state	Chemical Specific	hr/event	USEPA, 2004	DAevent = Kp x CW x CF x tevent
				tevent	Duration of event	0.25	hr/event	USEPA, 1997	
				B	Bunge model constant	Chemical Specific	unitless	USEPA, 2004	For organics if tevent <= t*
				SA	Skin Surface Available for Contact	13,100	cm2	USEPA, 2004	DAevent= 2 x FA x Kp x Cw x CF x sqrt[(6 x τ x tevent)/pi]
				EV	Event Frequency	1	events/day	USEPA, 2004	
				ET	Exposure Time	0.25	hours/day	USEPA, 2004	For organics if tevent > t*
				EF	Exposure Frequency	234	days/year	USEPA, 1994	DAevent =FA x Kp x Cw x CF x [tevent/(1+B) +
				ED	Exposure Duration	2	years	USEPA, 1993	2 x τ +(1 + 3B + $3B^2$)/(1+B^2)
				BW	Body Weight	42	kg	MEDEP, 1994	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 1989	

Notes:

1 - Professional judgment.

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 1994: USEPA Region I Risk Updates, August 1994.

USEPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Ingestion Intake = (IR-GW x EF x ED x CF)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 3.79E-07

Noncancer Ingestion Intake = 1.33E-05

Cancer Dermal Intake = 5.71E+00

Noncancer Dermal Intake = 2.00E+02

TABLE 4.17 CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - ADOLESCENT RESIDENTS - GROUNDWATER

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Cancer risk from ingestion = Groundwater concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Groundwater concentration x Cancer Dermal Intake x DAevent x Dermal Cancer Slope Factor

Hazard Index from ingestion = Groundwater concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Groundwater concentration x Noncancer Dermal Intake x DAevent / Dermal Reference Dose

TABLE 4.18.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - ADOLESCENT RESIDENT - GROUNDWATER TO AIR

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: 0
Medium: Groundwater
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Residents	Adolescent	Site 17	CA	Chemical concentration in air	Calculated	mg/m3	Adelman Method, USEPA, 1991	Exposure Concentration (mg/m3) =
				CW	Chemical concentration in water.	Average	ug/L	--	
				CF	Conversion Factor	0.001	mg/ug	--	CA x ET x EF x ED
				ET	Exposure Time	12	hours/day	(1)	AT x 24 hours/day
				EF	Exposure Frequency	350	days/year	(1)	
				ED	Exposure Duration	10	years	(1)	CA = CW x CF x VF
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3650	days	USEPA, 1989	
				VF	Volatilization Factor	0.5	(mg/m3)/(mg/L)	USEPA, 1991	

Notes:

1 - Professional judgment.

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1991: Risk Assessment Guidance for Superfund. Vo1 Human Health Evaluation Manual, Part B. EPA/540/R-92/003.

Unit Intake Calculations

Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Carcinogenic Chemicals	Noncarcinogenic Chemicals
Cancer Inhalation Intake = 6.85E-02	Noncancer Inhalation Intake = 4.79E-01

Cancer risk from ingestion = Air concentration x Cancer Inhalation Intake x Inhalation Cancer Slope Factor

Hazard Index from ingestion = Air concentration x Noncancer Inhalation Intake / Inhalation Reference Dose

TABLE 4.19 CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - ADULT RESIDENTS - SOILS

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Future
Medium: Surface/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	50	mg/day	USEPA, 1993	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	CS x IRS x CF3 x FI x EF x ED
				FI	Fraction Ingested	1	unitless	USEPA, 1993	BW x AT
				EF	Exposure Frequency	234	days/year	USEPA, 1994	
				ED	Exposure Duration	7	years	USEPA, 1993	
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 1989	
Dermal	Resident	Adult	Site 17	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	5,700	cm2	USEPA, 2004	CS x CF3 x SA x SSAF x DABS x EV x EF x ED
				SSAF	Soil to Skin Adherence Factor	0.01	mg/cm2/event	USEPA, 2004	BW x AT
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	234	days/year	USEPA, 1994	
				ED	Exposure Duration	7	years	USEPA, 1993	
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 1989	

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

USEPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 1994: USEPA Region I Risk Updates, August 1994.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Unit Intake Calculations

Incidental Ingestion Intake = (IR-S x CF3 x FI x EF x ED)/(BW x AT)

Dermal Intake = (CF3 x SA x SSAF x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 4.58E-08 Cancer Dermal Intake = 5.22E-08

Noncancer Ingestion Intake = 4.58E-07 Noncancer Dermal Intake = 5.22E-07

Cancer risk from ingestion = Soil concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Soil concentration x Cancer Dermal Intake x Absorption Factor x Dermal Cancer Slope Factor

Hazard Index from ingestion = Soil concentration x Noncancer Ingestion Intake / Oral Reference Dose

Hazard Index from dermal contact = Soil concentration x Noncancer Dermal Intake x Absorption Factor / Dermal Reference Dose

TABLE 4.20 CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - ADULT RESIDENTS - SOILS TO AIR

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Future
Medium: Surface/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Adult	Site 17	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	24	hours/day	USEPA, 1993	CA x ET x EF x ED
				CF	Conversion Factor	24	hours/day	--	
				EF	Exposure Frequency	234	days/year	USEPA, 1994	AT x 24 hours/day
				ED	Exposure Duration	7	years	USEPA, 1993	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	2555	days	USEPA, 1989	
				PEF	Particulate Emission Factor	9.37E+09	m3/kg	USEPA, 2002a	$PEF = \frac{Q / C \times 3600}{0.036 \times (1 - V) \times (U_m / U_t)^3 \times F(x)}$
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	74.32	g/m2-s per kg/m3	USEPA, 2008	
				Ut	Equivalent threshold of wind velocity at 7m.	11.32	m/sec	USEPA, 2008	
				Um	Mean annual wind speed	3.89	m/sec	USEPA, 2008	x = 0.886 * Ut / Um
				V	Fraction of vegetative cover	0.5	unitless	USEPA, 2008	
				F(x)	Function dependent of Um/Ut	0.0391	unitless	USEPA, 2008	

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. USEPA/540/1-86/060.

USEPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 1994: USEPA Region I Risk Updates, August 1994.

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.

USEPA, 2008: Soil Screening Guidance calculation Internet site at http://risk.lsd.ornl.gov/calc_start.htm. Site-specific values for Portland, Maine.

Unit Intake Calculations

Unit Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Cancer Unit Exposure Concentration = 6.41E-02 Noncancer Unit Exposure Concentration = 6.41E-01

Cancer risk from ingestion = Air concentration x Exposure Concentration x Inhalation Unit Risk

Hazard Index from ingestion = Air concentration x Exposure Concentration / Inhalation Reference Concentration

TABLE 4.21 CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - ADULT RESIDENTS - GROUNDWATER

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Adult	Site 17	CGW	Chemical Concentration in Groundwater	Average	ug/L	(1)	Chronic Daily Intake (CDI) (mg/kg/day) =
				CF	Conversion Factor	0.001	mg/ug	--	
				IR-GW	Ingestion Rate of Groundwater	1.4	L/day	USEPA, 1994	CGW x CF x IR-GW x EF x ED
				EF	Exposure Frequency	234	days/year	USEPA, 1994	BW x AT
				ED	Exposure Duration	7	years	USEPA, 1993	
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 1989	
Dermal	Residents	Adult	Site 17	Daevent	Dermally Absorbed Dose per Event	Calculated	mg/cm2-event	USEPA, 2004	Dermally Absorbed Dose (mg/kg/day) =
				Cw	Chemical Concentration in Groundwater	Average	ug/L	(1)	
				FA	Fraction Absorbed	Chemical Specific	unitless	USEPA, 2004	DAevent x EV x EF x ED x SA
				CF	Conversion factor	0.001	L/cm^3	- -	BW x AT
				Kp	Permeability coefficient	Chemical Specific	cm/hr	USEPA, 2004	
				τ	Lag time	Chemical Specific	hr/event	USEPA, 2004	For inorganics
				t*	Time it takes to reach steady state	Chemical Specific	hr/event	USEPA, 2004	DAevent = Kp x CW x CF x tevent
				tevent	Duration of event	0.25	hr/event	USEPA, 1997	
				B	Bunge model constant	Chemical Specific	unitless	USEPA, 2004	For organics if tevent <= t*
				SA	Skin Surface Available for Contact	18,000	cm2	USEPA, 2004	DAevent= 2 x FA x Kp x Cw x CF x sqrt[(6 x τ x tevent)/pi]
				EV	Event Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	234	days/year	USEPA, 1994	DAevent =FA x Kp x Cw x CF x [tevent/(1+B) +
				ED	Exposure Duration	7	years	USEPA, 1993	2 x τ +(1 + 3B + $3B^2$)/(1+B^2)
				BW	Body Weight	70	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA, 1989	

Notes:

1 - Professional judgment.

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

USEPA, 1994: USEPA Region I Risk Updates, August 1994.

USEPA, 1997: Exposure Factors Handbook. USEPA/600/8-95/002FA.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supple

Unit Intake Calculations

Ingestion Intake = (IR-GW x EF x ED x CF)/(BW x AT)

Dermal Intake = (SA x EV x EF x ED)/(BW x AT)

Cancer Ingestion Intake = 1.28E-06

Noncancer Ingestion Intake = 1.28E-05

Cancer Dermal Intake = 1.65E+01

Noncancer Dermal Intake = 1.65E+02

TABLE 4.21 CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - ADULT RESIDENTS - GROUNDWATER

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Cancer risk from ingestion = Groundwater concentration x Cancer Ingestion Intake x Oral Cancer Slope Factor

Cancer risk from dermal contact = Groundwater concentration x Cancer Dermal Intake x DAevent x Dermal Cancer Slope Factor

TABLE 4.22.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURES - ADULT RESIDENT - GROUNDWATER TO AIR

SITE 17 REMEDIAL INVESTIGATION, NAVAL AIR STATION, BRUNSWICK, MAINE

Scenario Timeframe: 0
Medium: Groundwater
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Residents	Adult	Site 17	CA	Chemical concentration in air	Calculated	mg/m3	Adelman Method, USEPA, 1991	Exposure Concentration (mg/m3) =
				CW	Chemical concentration in water.	Average	ug/L	--	
				CF	Conversion Factor	0.001	mg/ug	--	CA x ET x EF x ED
				ET	Exposure Time	12	hours/day	(1)	AT x 24 hours/day
				EF	Exposure Frequency	350	days/year	(1)	
				ED	Exposure Duration	14	years	(1)	CA = CW x CF x VF
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	5110	days	USEPA, 1989	
				VF	Volatilization Factor	0.5	(mg/m3)/(mg/L)	USEPA, 1991	

Notes:

1 - Professional judgment.

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 1991: Risk Assessment Guidance for Superfund. Vo1 Human Health Evaluation Manual, Part B. EPA/540/R-92/003.

Unit Intake Calculations

Exposure Concentration = (ET x EF x ED)/(AT x 24 hours/day)

Carcinogenic Chemicals	Noncarcinogenic Chemicals
Cancer Inhalation Intake = 9.59E-02	Noncancer Inhalation Intake = 4.79E-01

Cancer risk from ingestion = Air concentration x Cancer Inhalation Intake x Inhalation Cancer Slope Factor

Hazard Index from ingestion = Air concentration x Noncancer Inhalation Intake / Inhalation Reference Dose

TABLE 4.23
INTERMEDIATE VARIABLES FOR CALCULATING DA(EVENT)
SITE 17 REMEDIAL INVESTIGATION
NAVAL AIR STATION BRUNSWICK, BRUNSWICK, MAINE

Chemical of Potential Concern	Media	Dermal Absorption Fraction (soil)	FA	Kp		T(event)		Tau		T*		B
			Value	Value	Units	Value	Units	Value	Units	Value	Units	Value
Inorganics												
Arsenic	Soil	0.03	1	0.001	cm/hr	NA	NA	NA	NA	NA	NA	NA
EPHs												
C11-C22 Aromatics[(1)]	Groundwater	0.36	1	5.24E-01	cm/hr	(2)	hr	7.26E-01	hr	3.02E+00	hr	2.47E+00
Naphthalene	Groundwater	0.13	1	4.66E-02	cm/hr	(2)	hr	5.58E-01	hr	1.34E+00	hr	2.03E-01
Pesticides/PCBs												
4,4'-DDT	Soil, Groundwater	0.03	0	2.7E-01	cm/hr	(2)	hr	1.0E+01	hr	4.3E+01	hr	1.9E+00
Alpha-Chlordane	Soil	0.04	0.7	3.38E-02	cm/hr	(1)	hr	2.1E+01	hr	5.1E+01	hr	2.6E-01
Dieldrin	Soil	0.1	0.8	1.2E-02	cm/hr	(2)	hr	1.5E+01	hr	3.5E+01	hr	9.2E-02
Gamma-Chlordane	Soil	0.04	0.7	3.4E-02	cm/hr	(2)	hr	2.1E+01	hr	5.1E+01	hr	2.6E-01
Heptachlor	Soil	0.1	0.8	8.6E-03	cm/hr	(2)	hr	1.3E+01	hr	3.2E+01	hr	6.4E-02
Heptachlor Epoxide	Soil, Groundwater	0.1	1	2.0E-02	cm/hr	(2)	hr	1.6E+01	hr	3.8E+01	hr	1.5E-01

Notes:

All values except those for C11-C22 Aromatics are from EPA's Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final, July 2004.

1 - C11-C22 Aromatic values are from the Massachusetts Environmental Protection Agency document titled "Characterizing Risks Posed by Petroleum Contaminated Sites: *Implementation of the MADEP VPH/EPH Approach* , Final Policy, October 31, 2002.

2 - T(event) is as follows: RME: 4 hours for the construction worker; 1 hr for hypothetical child residents and 0.58 hrs for hypothetical adolescent and adult residents.
CTE: 2 hours for the construction worker; 0.33 hr for hypothetical child residents and 0.25 hrs for hypothetical adolescent and adult residents.

EPHs = Extractable Petroleum Hydrocarbons
FA = Fraction Absorbed Water
Kp = Dermal Permeability Coefficient of Compound in Water
T(event) = Event Duration
Tau = Lag Time
VPH = Volatile Petroleum Hydrocarbons
MADEP = Mass
T* = Time to Reach Steady-State
B = Dimensionless Ratio of the Permeability Coefficient of a Compound Through the Stratum Corneum Relative to its Permeability Coefficient Across the Viable Epidermis
NA = Not applicable.

RAGS PART D TABLE 5

Non-Cancer Toxicity Data

LIST OF TABLES
RAGS PART D TABLE 5
NON-CANCER TOXICITY DATA

Table No.

5-1 Non-Cancer Toxicity Data - Oral/Dermal
5-2 Non-Cancer Toxicity Data - Inhalation

TABLE 5.1
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal[1]	Absorbed RfD for Dermal[2]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Pesticides/PCBs										
4,4'-DDT	Chronic	5.0E-04	mg/kg/day	1	5.00E-04	mg/kg/day	Liver	100/1	IRIS	3/08/2010
4,4'-DDD	Chronic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Alpha-chlordane [3]	Chronic	5.0E-04	mg/kg/day	1	5.00E-04	mg/kg/day	Liver	300/1	IRIS	3/08/2010
Dieldrin	Chronic	5.0E-05	mg/kg/day	1	5.00E-05	mg/kg/day	Liver	100/1	IRIS	3/08/2010
Gamma Chlordane [3]	Chronic	5.0E-04	mg/kg/day	1	5.00E-04	mg/kg/day	Liver	300/1	IRIS	3/08/2010
Heptachlor	Chronic	5.0E-04	mg/kg/day	1	5.00E-04	mg/kg/day	Liver	300/1	IRIS	3/08/2010
Heptachlor Epoxide	Chronic	1.3E-05	mg/kg/day	1	1.30E-05	mg/kg/day	Liver	1000/1	IRIS	3/08/2010
Extractable Petroleum Hydrocarbons										
Inorganics										
Arsenic	Chronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	Skin, CVS	3/1	IRIS	3/08/2010

Notes:

1 - U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R/99/005.

2 - Adjusted dermal RfD = Oral RfD x Oral Absorption Efficiency for Dermal.

3 - Values are for chlordane.

Definitions:

CNS = Central Nervous System
CVS = Cardiovascular system
GS = Gastrointestinal
HEAST = Health Effects Assessment Summary Tables
IRIS = Integrated Risk Information System
MADEP = Massachusetts Department of Environmental Protection
NA = Not Available.
PPRTV = Provisional Peer Reviewed Toxicity Values
RfC = Reference concentration
RfD = Reference Dose

TABLE 5.2
NON-CANCER TOXICITY DATA -- INHALATION
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD[1]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Pesticides/PCBs									
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
Alpha-Chlordane [2]	Chronic	7.0E-04	mg/m^3	2.0E-04	(mg/kg/day)	Liver	1000/1	IRIS	3/08/2010
Dieldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gamma-Chlordane [2]	Chronic	7.0E-04	mg/m^3	2.0E-04	(mg/kg/day)	Liver	1000/1	IRIS	3/08/2010
Heptachlor	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor Epoxide	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics									
Arsenic	Chronic	1.50E-05	mg/m^3	4.3E-06	(mg/kg/day)	NA	NA	Cal EPA	12/2009

Notes:

1 - Extrapolated RfD = RfC *$20m^3$/day / 70 kg

2 - Values are for chlordane.

Definitions:

Cal EPA = California EPA

CNS = Central Nervous System

HEAST= Health Effects Assessment Summary Tables

IRIS = Integrated Risk Information System

MADEP = Massachusetts Department of Environmental Protection

NA = Not Applicable

PPRTV = Provisional Peer Reviewed Toxicity Values

RfC = Reference concentration

RfD = Reference Dose

RAGS PART D TABLE 6

Cancer Toxicity Data

LIST OF TABLES
RAGS PART D TABLE 6
CANCER TOXICITY DATA

Table No.

6-1 Cancer Toxicity Data - Oral/Dermal
6-2 Cancer Toxicity Data - Inhalation

TABLE 6.1
CANCER TOXICITY DATA -- ORAL/DERMAL
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal[1]	Absorbed Cancer Slope Factor for Dermal[2]		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Pesticides/PCBs								
4,4'-DDT	3.4E-01	$(mg/kg/day)^{-1}$	1	3.4E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	3/08/2010
4,4'-DDD	2.4E-01	$(mg/kg/day)^{-1}$	1	2.4E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	3/08/2010
Alpha-Chlordane [3]	3.5E-01	$(mg/kg/day)^{-1}$	1	3.5E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	3/08/2010
Dieldrin	1.6E+01	$(mg/kg/day)^{-1}$	1	1.6E+01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	3/08/2010
Gamma-Chlordane [3]	3.5E-01	$(mg/kg/day)^{-1}$	1	3.5E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	3/08/2010
Heptachlor	4.5E+00	$(mg/kg/day)^{-1}$	1	4.5E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	3/08/2010
Heptachlor Epoxide	9.1E+00	$(mg/kg/day)^{-1}$	1	9.1E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	3/08/2010
Inorganics								
Arsenic	1.5E+00	$(mg/kg/day)^{-1}$	1	1.5E+00	$(mg/kg/day)^{-1}$	A (Human Carcinogen)	IRIS	3/08/2010

Notes:
1 - USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R/99/005.
2 - Adjusted cancer slope factor for dermal = Oral cancer slope factor / Oral Absorption Efficiency for Dermal.
3 - Values are for chlordane.

Acroynms:
IRIS = Integrated Risk Information System.
NA = Not Available.

TABLE 6.2
CANCER TOXICITY DATA -- INHALATION
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor[1]		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Pesticides/PCBs							
4,4'-DDT	9.7E-05	$(ug/m3)^{-1}$	3.4E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	3/08/2010
4,4'-DDD	6.9E-05	$(ug/m3)^{-1}$	2.4E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	3/8/2010
Alpha-Chlordane [2]	1.0E-04	$(ug/m3)^{-1}$	3.6E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	3/08/2010
Dieldrin	4.6E-03	$(ug/m3)^{-1}$	1.6E+01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	3/08/2010
Gamma-Chlordane [2]	1.0E-04	$(ug/m3)^{-1}$	3.6E-01	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	3/08/2010
Heptachlor	1.3E-03	$(ug/m3)^{-1}$	4.6E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	3/08/2010
Heptachlor Epoxide	2.6E-03	$(ug/m3)^{-1}$	9.1E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	IRIS	3/08/2010
Inorganics							
Arsenic	4.3E-03	$(ug/m^3)^{-1}$	1.5E+01	$(mg/kg/day)^{-1}$	A / Known human carcinogen	IRIS	3/08/2010

Notes:

1 - Inhalation CSF = Unit Risk * 70 kg / $20m^3$/day.

2 - Values are for chlordane.

Definitions:

IRIS = Integrated Risk Information System.

NA = Not Available.

RAGS PART D TABLE 7

Calculation of Chemical Cancer Risk and Non-Cancer Hazards

LIST OF TABLES
RAGS PART D TABLE 7
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Table No.

Resonable Maximum Exposure

7.1 RME Construction Workers
7.2 RME Industrial Workers
7.3 RME Adolescent Trespassers
7.4 RME Adult Trespassers
7.5 RME Young Child Residents
7.6 RME Adolescent Residents
7.7 RME Adult Residents

Central Tendency Exposure

7.1 CTE Construction Workers
7.2 CTE Industrial Workers
7.3 CTE Adolescent Trespassers
7.4 CTE Adult Trespassers
7.5 CTE Young Child Residents
7.6 CTE Adolescent Residents
7.7 CTE Adult Residents

SITE-SPECIFIC

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Heptachlor Epoxide	0.020	mg/kg	5.5E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	5.0E-09	3.9E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.003
			Exp. Route Total								5.0E-09					0.003
			Dermal	Heptachlor Epoxide	0.020	mg/kg	1.7E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.5E-09	1.2E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0009
			Exp. Route Total								1.5E-09					0.0009
		Exposure Point Total									6.5E-09					0.004
	Exposure Medium Total										6.5E-09					0.004
	Air	Site 17	Inhalation	Heptachlor Epoxide	1.2E-8	mg/m^3	2.4E-11	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	6.3E-11	1.7E-09	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								6.3E-11					--
		Exposure Point Total									6.3E-11					--
	Exposure Medium Total										6.3E-11					--
Medium Total											6.6E-09					0.004
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	MONURON	0.050	mg/kg	1.4E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.7E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	6.4E-08	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	2.2E-08	4.5E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.009
				ALPHA-CHLORDANE	0.400	mg/kg	1.1E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	3.9E-09	7.7E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.002
				DIELDRIN	0.003	mg/kg	8.3E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	1.3E-09	5.8E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.0001
				GAMMA-CHLORDANE	0.400	mg/kg	1.1E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	3.9E-09	7.7E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.002
				HEPTACHLOR	0.030	mg/kg	8.3E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	3.7E-09	5.8E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0001
				HEPTACHLOR EPOXIDE	0.030	mg/kg	8.3E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	7.6E-09	5.8E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.004
			Exp. Route Total								4.2E-08					0.02
			Dermal	MONURON	0.050	mg/kg	4.2E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.9E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	5.7E-09	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	1.9E-09	4.0E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0008
				ALPHA-CHLORDANE	0.400	mg/kg	1.3E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	4.6E-10	9.3E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				DIELDRIN	0.003	mg/kg	2.5E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	4.0E-10	1.7E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00003
				GAMMA-CHLORDANE	0.400	mg/kg	1.3E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	4.6E-10	9.3E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				HEPTACHLOR	0.030	mg/kg	2.5E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	1.1E-09	1.7E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				HEPTACHLOR EPOXIDE	0.030	mg/kg	2.5E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	2.3E-09	1.7E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.001
			Exp. Route Total								6.7E-09					0.003
		Exposure Point Total									4.9E-08					0.02
	Exposure Medium Total										4.9E-08					0.02
	Air	Site 17	Inhalation	MONURON	3.1E-8	mg/m^3	6.0E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.2E-09	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	1.4E-6	mg/m^3	2.8E-09	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	2.7E-10	1.9E-07	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	2.5E-7	mg/m^3	4.8E-10	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	4.8E-11	3.4E-08	(mg/m^3)	7.0E-04	(mg/m^3)	0.00005
				DIELDRIN	1.9E-9	mg/m^3	3.6E-12	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	1.7E-11	2.5E-10	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	2.5E-7	mg/m^3	4.8E-10	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	4.8E-11	3.4E-08	(mg/m^3)	7.0E-04	(mg/m^3)	0.00005
				HEPTACHLOR	1.9E-8	mg/m^3	3.6E-11	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	4.7E-11	2.5E-09	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	1.9E-8	mg/m^3	3.6E-11	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	9.4E-11	2.5E-09	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								5.2E-10					0.00010
		Exposure Point Total									5.2E-10					0.00010
	Exposure Medium Total										5.2E-10					0.00010
Medium Total											4.9E-08					0.02

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Site 17	Ingestion	4,4'-DDD	1.200	ug/L	2.0E-10	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	4.8E-11	1.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	2.7E-10	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	9.1E-11	1.9E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00004
			Exp. Route Total								1.4E-10					0.00004
			Dermal	4,4'-DDD	1.200	ug/L	0.0E+00	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	0.0E+00	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									1.4E-10					0.00004
	Exposure Medium Total										1.4E-10					0.00004
	Air	Site 17	Inhalation	4,4'-DDD	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	6.9E-05	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					--
	Exposure Medium Total										- -					--
Medium Total											1.4E-10					0.00004

TABLE 7.2.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Heptachlor Epoxide	0.020	mg/kg	7.0E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	6.4E-08	2.0E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.002
			Exp. Route Total								6.4E-08					0.002
			Dermal	Heptachlor Epoxide	0.020	mg/kg	4.6E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	4.2E-08	1.3E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.001
			Exp. Route Total								4.2E-08					0.001
		Exposure Point Total									1.1E-07					0.002
	Exposure Medium Total										1.1E-07					0.002
	Air	Site 17	Inhalation	Heptachlor Epoxide	2.1E-12	mg/m^3	1.7E-13	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	4.5E-13	4.9E-13	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								4.5E-13					0.00
		Exposure Point Total									4.5E-13					--
	Exposure Medium Total										4.5E-13					--
Medium Total											1.1E-07					0.002
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	MONURON	0.050	mg/kg	1.7E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.9E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	8.0E-07	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	2.7E-07	2.3E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.005
				ALPHA-CHLORDANE	0.400	mg/kg	1.4E-07	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	4.9E-08	3.9E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0008
				DIELDRIN	0.003	mg/kg	1.0E-09	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	1.7E-08	2.9E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00006
				GAMMA-CHLORDANE	0.400	mg/kg	1.4E-07	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	4.9E-08	3.9E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0008
				HEPTACHLOR	0.030	mg/kg	1.0E-08	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	4.7E-08	2.9E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00006
				HEPTACHLOR EPOXIDE	0.030	mg/kg	1.0E-08	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	9.5E-08	2.9E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.002
			Exp. Route Total								5.3E-07					0.01
			Dermal	MONURON	0.050	mg/kg	1.2E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.6E-07	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	5.4E-08	4.5E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0009
				ALPHA-CHLORDANE	0.400	mg/kg	3.7E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.3E-08	1.0E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				DIELDRIN	0.003	mg/kg	6.9E-10	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	1.1E-08	1.9E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00004
				GAMMA-CHLORDANE	0.400	mg/kg	3.7E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.3E-08	1.0E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				HEPTACHLOR	0.030	mg/kg	6.9E-09	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	3.1E-08	1.9E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00004
				HEPTACHLOR EPOXIDE	0.030	mg/kg	6.9E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	6.3E-08	1.9E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.001
			Exp. Route Total								1.9E-07					0.003
		Exposure Point Total									7.2E-07					0.01
	Exposure Medium Total										7.2E-07					0.01
	Air	Site 17	Inhalation	MONURON	5.3E-12	mg/m^3	4.4E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.2E-12	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	2.0E-11	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	1.9E-12	5.6E-11	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	3.5E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	3.5E-13	9.7E-12	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000001
				DIELDRIN	3.2E-13	mg/m^3	2.6E-14	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	1.2E-13	7.3E-14	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	3.5E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	3.5E-13	9.7E-12	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000001
				HEPTACHLOR	3.2E-12	mg/m^3	2.6E-13	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	3.4E-13	7.3E-13	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	2.6E-13	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	6.8E-13	7.3E-13	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								3.8E-12					0.00000003
		Exposure Point Total									3.8E-12					0.00000003
	Exposure Medium Total										3.8E-12					0.00000003
Medium Total											7.2E-07					0.01

TABLE 7.3.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Heptachlor Epoxide	0.020	mg/kg	4.8E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	4.4E-09	3.4E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0003
			Exp. Route Total								4.4E-09					0.0003
			Dermal	Heptachlor Epoxide	0.020	mg/kg	5.1E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	4.7E-09	3.6E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0003
			Exp. Route Total								4.7E-09					0.0003
		Exposure Point Total									9.1E-09					0.001
	Exposure Medium Total										9.1E-09					0.001
	Air	Site 17	Inhalation	Heptachlor Epoxide	2.1E-12	mg/m^3	3.6E-15	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	9.4E-15	2.5E-14	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								9.4E-15					--
		Exposure Point Total									9.4E-15					--
	Exposure Medium Total										9.4E-15					--
Medium Total											9.1E-09					0.001
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	MONURON	0.050	mg/kg	1.2E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.5E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	5.6E-08	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	1.9E-08	3.9E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0008
				ALPHA-CHLORDANE	0.400	mg/kg	9.7E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	3.4E-09	6.8E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0001
				DIELDRIN	0.003	mg/kg	7.3E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	1.2E-09	5.1E-10	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00001
				GAMMA-CHLORDANE	0.400	mg/kg	9.7E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	3.4E-09	6.8E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0001
				HEPTACHLOR	0.030	mg/kg	7.3E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	3.3E-09	5.1E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00001
				HEPTACHLOR EPOXIDE	0.030	mg/kg	7.3E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	6.6E-09	5.1E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0004
			Exp. Route Total								3.7E-08					0.001
			Dermal	MONURON	0.050	mg/kg	1.3E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.0E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.8E-08	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	6.0E-09	1.2E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				ALPHA-CHLORDANE	0.400	mg/kg	4.1E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.4E-09	2.9E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00006
				DIELDRIN	0.003	mg/kg	7.7E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	1.2E-09	5.4E-10	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00001
				GAMMA-CHLORDANE	0.400	mg/kg	4.1E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.4E-09	2.9E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00006
				HEPTACHLOR	0.030	mg/kg	7.7E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	3.5E-09	5.4E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00001
				HEPTACHLOR EPOXIDE	0.030	mg/kg	7.7E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	7.0E-09	5.4E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0004
			Exp. Route Total								2.1E-08					0.001
		Exposure Point Total									5.7E-08					0.002
	Exposure Medium Total										5.7E-08					0.002
	Air	Site 17	Inhalation	MONURON	5.3E-12	mg/m^3	9.1E-15	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.3E-14	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	4.2E-13	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	4.0E-14	2.9E-12	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	7.2E-14	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	7.2E-15	5.1E-13	(mg/m^3)	7.0E-04	(mg/m^3)	--
				DIELDRIN	3.2E-13	mg/m^3	5.4E-16	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	2.5E-15	3.8E-15	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	7.2E-14	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	7.2E-15	5.1E-13	(mg/m^3)	7.0E-04	(mg/m^3)	--
				HEPTACHLOR	3.2E-12	mg/m^3	5.4E-15	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	7.1E-15	3.8E-14	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	5.4E-15	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	1.4E-14	3.8E-14	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								7.9E-14					--
		Exposure Point Total									7.9E-14					--
	Exposure Medium Total										7.9E-14					--
Medium Total											5.7E-08					0.002

TABLE 7.4.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Heptachlor Epoxide	0.020	mg/kg	4.1E-10	(mg/kg/day)	9.1E+00	(mg/kg/day)-1	3.7E-09	2.0E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0002
			Exp. Route Total								3.7E-09					0.0002
			Dermal	Heptachlor Epoxide	0.020	mg/kg	1.6E-10	(mg/kg/day)	9.1E+00	(mg/kg/day)-1	1.5E-09	8.1E-10	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00006
			Exp. Route Total								1.5E-09					0.0001
		Exposure Point Total									5.2E-09					0.0002
	Exposure Medium Total										5.2E-09					0.0002
	Air	Site 17	Inhalation	Heptachlor Epoxide	2.1E-12	mg/m3	5.1E-15	(mg/m3)	2.6E-03	(ug/m3)-1	1.3E-14	2.5E-14	(mg/m3)	NA	(mg/m3)	--
			Exp. Route Total								1.3E-14					--
		Exposure Point Total									1.3E-14					--
	Exposure Medium Total										1.3E-14					--
Medium Total											5.2E-09					0.0002
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	MONURON	0.050	mg/kg	1.0E-09	(mg/kg/day)	NA	(mg/kg/day)-1	- -	5.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	4.7E-08	(mg/kg/day)	3.4E-01	(mg/kg/day)-1	1.6E-08	2.3E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0005
				ALPHA-CHLORDANE	0.400	mg/kg	8.1E-09	(mg/kg/day)	3.5E-01	(mg/kg/day)-1	2.8E-09	4.1E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00008
				DIELDRIN	0.003	mg/kg	6.1E-11	(mg/kg/day)	1.6E+01	(mg/kg/day)-1	9.8E-10	3.1E-10	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.000006
				GAMMA-CHLORDANE	0.400	mg/kg	8.1E-09	(mg/kg/day)	3.5E-01	(mg/kg/day)-1	2.8E-09	4.1E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00008
				HEPTACHLOR	0.030	mg/kg	6.1E-10	(mg/kg/day)	4.5E+00	(mg/kg/day)-1	2.7E-09	3.1E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000006
				HEPTACHLOR EPOXIDE	0.030	mg/kg	6.1E-10	(mg/kg/day)	9.1E+00	(mg/kg/day)-1	5.6E-09	3.1E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0002
			Exp. Route Total								3.1E-08					0.001
			Dermal	MONURON	0.050	mg/kg	4.1E-10	(mg/kg/day)	NA	(mg/kg/day)-1	- -	2.0E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	5.6E-09	(mg/kg/day)	3.4E-01	(mg/kg/day)-1	1.9E-09	2.8E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00006
				ALPHA-CHLORDANE	0.400	mg/kg	1.3E-09	(mg/kg/day)	3.5E-01	(mg/kg/day)-1	4.5E-10	6.5E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00001
				DIELDRIN	0.003	mg/kg	2.4E-11	(mg/kg/day)	1.6E+01	(mg/kg/day)-1	3.9E-10	1.2E-10	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.000002
				GAMMA-CHLORDANE	0.400	mg/kg	1.3E-09	(mg/kg/day)	3.5E-01	(mg/kg/day)-1	4.5E-10	6.5E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00001
				HEPTACHLOR	0.030	mg/kg	2.4E-10	(mg/kg/day)	4.5E+00	(mg/kg/day)-1	1.1E-09	1.2E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000002
				HEPTACHLOR EPOXIDE	0.030	mg/kg	2.4E-10	(mg/kg/day)	9.1E+00	(mg/kg/day)-1	2.2E-09	1.2E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00009
			Exp. Route Total								6.5E-09					0.0002
		Exposure Point Total									3.7E-08					0.001
	Exposure Medium Total										3.7E-08					0.001
	Air	Site 17	Inhalation	MONURON	5.3E-12	mg/m3	1.3E-14	(mg/m3)	NA	(ug/m3)-1	- -	6.3E-14	(mg/m3)	NA	(mg/m3)	--
				4,4'-DDT	2.5E-10	mg/m3	5.8E-13	(mg/m3)	9.7E-05	(ug/m3)-1	5.7E-14	2.9E-12	(mg/m3)	NA	(mg/m3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m3	1.0E-13	(mg/m3)	1.0E-04	(ug/m3)-1	1.0E-14	5.1E-13	(mg/m3)	7.0E-04	(mg/m3)	--
				DIELDRIN	3.2E-13	mg/m3	7.6E-16	(mg/m3)	4.6E-03	(ug/m3)-1	3.5E-15	3.8E-15	(mg/m3)	NA	(mg/m3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m3	1.0E-13	(mg/m3)	1.0E-04	(ug/m3)-1	1.0E-14	5.1E-13	(mg/m3)	7.0E-04	(mg/m3)	--
				HEPTACHLOR	3.2E-12	mg/m3	7.6E-15	(mg/m3)	1.3E-03	(ug/m3)-1	9.9E-15	3.8E-14	(mg/m3)	NA	(mg/m3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m3	7.6E-15	(mg/m3)	2.6E-03	(ug/m3)-1	2.0E-14	3.8E-14	(mg/m3)	NA	(mg/m3)	--
			Exp. Route Total								1.1E-13					--
		Exposure Point Total									1.1E-13					--
	Exposure Medium Total										1.1E-13					--
Medium Total											3.7E-08					0.001

TABLE 7.5.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Heptachlor Epoxide	0.020	mg/kg	2.3E-08	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	2.1E-07	2.7E-07	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.02
			Exp. Route Total								2.1E-07					0.02
			Dermal	Heptachlor Epoxide	0.020	mg/kg	6.6E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	6.0E-08	7.7E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.006
			Exp. Route Total								6.0E-08					0.006
		Exposure Point Total									2.7E-07					0.03
	Exposure Medium Total										2.7E-07					0.03
	Air	Site 17	Inhalation	Heptachlor Epoxide	2.1E-12	mg/m^3	1.8E-13	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	4.6E-13	2.0E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								4.6E-13					--
		Exposure Point Total									4.6E-13					--
	Exposure Medium Total										4.6E-13					--
Medium Total											2.7E-07					0.03
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	MONURON	0.050	mg/kg	5.9E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	2.7E-06	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	9.2E-07	3.2E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.06
				ALPHA-CHLORDANE	0.400	mg/kg	4.7E-07	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.6E-07	5.5E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.01
				DIELDRIN	0.003	mg/kg	3.5E-09	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	5.6E-08	4.1E-08	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.0008
				GAMMA-CHLORDANE	0.400	mg/kg	4.7E-07	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.6E-07	5.5E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.01
				HEPTACHLOR	0.030	mg/kg	3.5E-08	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	1.6E-07	4.1E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0008
				HEPTACHLOR EPOXIDE	0.030	mg/kg	3.5E-08	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	3.2E-07	4.1E-07	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.03
			Exp. Route Total								1.8E-06					0.1
			Dermal	MONURON	0.050	mg/kg	1.6E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	2.3E-07	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	7.7E-08	2.6E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.005
				ALPHA-CHLORDANE	0.400	mg/kg	5.3E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.8E-08	6.1E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.001
				DIELDRIN	0.003	mg/kg	9.9E-10	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	1.6E-08	1.2E-08	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.0002
				GAMMA-CHLORDANE	0.400	mg/kg	5.3E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.8E-08	6.1E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.001
				HEPTACHLOR	0.030	mg/kg	9.9E-09	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	4.4E-08	1.2E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				HEPTACHLOR EPOXIDE	0.030	mg/kg	9.9E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	9.0E-08	1.2E-07	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.009
			Exp. Route Total								2.6E-07					0.02
		Exposure Point Total									2.0E-06					0.1
	Exposure Medium Total										2.0E-06					0.1
	Air	Site 17	Inhalation	MONURON	5.3E-12	mg/m^3	4.4E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	2.0E-11	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	2.0E-12	2.4E-10	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	3.5E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	3.5E-13	4.1E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000006
				DIELDRIN	3.2E-13	mg/m^3	2.6E-14	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	1.2E-13	3.1E-13	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	3.5E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	3.5E-13	4.1E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000006
				HEPTACHLOR	3.2E-12	mg/m^3	2.6E-13	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	3.4E-13	3.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	2.6E-13	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	6.8E-13	3.1E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								3.8E-12					0.0000001
		Exposure Point Total									3.8E-12					0.0000001
	Exposure Medium Total										3.8E-12					0.0000001
Medium Total											2.0E-06					0.1
Groundwater	Groundwater	Site 17	Ingestion	4,4'-DDD	1.200	ug/L	7.0E-06	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	1.7E-06	8.2E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	9.4E-06	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	3.2E-06	1.1E-04	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.2
			Exp. Route Total								4.9E-06					0.2
			Dermal	4,4'-DDD	1.200	ug/L	0.0E+00	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	0.0E+00	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--

TABLE 7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Exposure Point Total									4.9E-06					0.2
	Exposure Medium Total										4.9E-06					0.2
	Air	Site 17	Inhalation	4,4'-DDD	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	6.9E-05	(ug/m^3)$^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	9.7E-05	(ug/m^3)$^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					--
	Exposure Medium Total										- -					--
Medium Total											4.9E-06					0.2

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.6.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION,NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Heptachlor Epoxide	0.020	mg/kg	5.3E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	4.8E-08	3.7E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.003
			Exp. Route Total								4.8E-08					0.003
			Dermal	Heptachlor Epoxide	0.020	mg/kg	5.6E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	5.1E-08	3.9E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.003
			Exp. Route Total								5.1E-08					0.003
		Exposure Point Total									9.9E-08					0.006
	Exposure Medium Total										9.9E-08					0.006
	Air	Site 17	Inhalation	Heptachlor Epoxide	2.1E-12	mg/m^3	2.9E-13	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	7.6E-13	2.0E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								7.6E-13					--
		Exposure Point Total									7.6E-13					--
	Exposure Medium Total										7.6E-13					--
Medium Total											9.9E-08					0.006
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	MONURON	0.050	mg/kg	1.3E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	6.1E-07	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	2.1E-07	4.2E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.008
				ALPHA-CHLORDANE	0.400	mg/kg	1.1E-07	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	3.7E-08	7.4E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.001
				DIELDRIN	0.003	mg/kg	7.9E-10	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	1.3E-08	5.5E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.0001
				GAMMA-CHLORDANE	0.400	mg/kg	1.1E-07	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	3.7E-08	7.4E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.001
				HEPTACHLOR	0.030	mg/kg	7.9E-09	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	3.6E-08	5.5E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0001
				HEPTACHLOR EPOXIDE	0.030	mg/kg	7.9E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	7.2E-08	5.5E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.004
			Exp. Route Total								4.0E-07					0.02
			Dermal	MONURON	0.050	mg/kg	1.4E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.9E-07	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	6.6E-08	1.3E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.003
				ALPHA-CHLORDANE	0.400	mg/kg	4.5E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.6E-08	3.1E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0006
				DIELDRIN	0.003	mg/kg	8.4E-10	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	1.3E-08	5.9E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.0001
				GAMMA-CHLORDANE	0.400	mg/kg	4.5E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.6E-08	3.1E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0006
				HEPTACHLOR	0.030	mg/kg	8.4E-09	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	3.8E-08	5.9E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0001
				HEPTACHLOR EPOXIDE	0.030	mg/kg	8.4E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	7.6E-08	5.9E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.005
			Exp. Route Total								2.2E-07					0.009
		Exposure Point Total									6.2E-07					0.02
	Exposure Medium Total										6.2E-07					0.02
	Air	Site 17	Inhalation	MONURON	5.3E-12	mg/m^3	7.3E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	3.4E-11	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	3.3E-12	2.4E-10	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	5.8E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	5.8E-13	4.1E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000006
				DIELDRIN	3.2E-13	mg/m^3	4.4E-14	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	2.0E-13	3.1E-13	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	5.8E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	5.8E-13	4.1E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000006
				HEPTACHLOR	3.2E-12	mg/m^3	4.4E-13	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	5.7E-13	3.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	4.4E-13	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	1.1E-12	3.1E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								6.3E-12					0.0000001
		Exposure Point Total									6.3E-12					0.0000001
	Exposure Medium Total										6.3E-12					0.0000001
Medium Total											6.2E-07					0.02
Groundwater	Groundwater	Site 17	Ingestion	4,4'-DDD	1.200	ug/L	6.3E-06	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	1.5E-06	4.4E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	8.4E-06	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	2.9E-06	5.9E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.1
			Exp. Route Total								4.4E-06					0.1
			Dermal	4,4'-DDD	1.200	ug/L	0.0E+00	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	0.0E+00	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--

TABLE 7.6.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION,NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Exposure Point Total									4.4E-06					0.1
	Exposure Medium Total										4.4E-06					0.1
	Air	Site 17	Inhalation	4,4'-DDD	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	6.9E-05	(ug/m^3)$^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	0.000	mg/m^3	0.0E+00	(mg/m^3)	9.7E-05	(ug/m^3)$^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					--
	Exposure Medium Total										- -					--
Medium Total											4.4E-06					0.1

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Heptachlor Epoxide	0.020	mg/kg	5.5E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	5.0E-08	2.7E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.002
			Exp. Route Total								5.0E-08					0.002
			Dermal	Heptachlor Epoxide	0.020	mg/kg	2.2E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	2.0E-08	1.1E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0008
			Exp. Route Total								2.0E-08					0.0008
		Exposure Point Total									7.0E-08					0.003
	Exposure Medium Total										7.0E-08					0.003
	Air	Site 17	Inhalation	Heptachlor Epoxide	2.1E-12	mg/m^3	4.1E-13	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	1.1E-12	2.0E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								1.1E-12					--
		Exposure Point Total									1.1E-12					--
	Exposure Medium Total										1.1E-12					--
Medium Total											7.0E-08					0.003
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	MONURON	0.050	mg/kg	1.4E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	6.3E-07	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	2.1E-07	3.2E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.006
				ALPHA-CHLORDANE	0.400	mg/kg	1.1E-07	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	3.8E-08	5.5E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.001
				DIELDRIN	0.003	mg/kg	8.2E-10	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	1.3E-08	4.1E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00008
				GAMMA-CHLORDANE	0.400	mg/kg	1.1E-07	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	3.8E-08	5.5E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.001
				HEPTACHLOR	0.030	mg/kg	8.2E-09	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	3.7E-08	4.1E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00008
				HEPTACHLOR EPOXIDE	0.030	mg/kg	8.2E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	7.5E-08	4.1E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.003
			Exp. Route Total								4.2E-07					0.01
			Dermal	MONURON	0.050	mg/kg	5.5E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.7E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	7.5E-08	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	2.6E-08	3.8E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0008
				ALPHA-CHLORDANE	0.400	mg/kg	1.7E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	6.1E-09	8.7E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				DIELDRIN	0.003	mg/kg	3.3E-10	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	5.2E-09	1.6E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00003
				GAMMA-CHLORDANE	0.400	mg/kg	1.7E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	6.1E-09	8.7E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				HEPTACHLOR	0.030	mg/kg	3.3E-09	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	1.5E-08	1.6E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				HEPTACHLOR EPOXIDE	0.030	mg/kg	3.3E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	3.0E-08	1.6E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.001
			Exp. Route Total								8.8E-08					0.002
		Exposure Point Total									5.0E-07					0.01
	Exposure Medium Total										5.0E-07					0.01
	Air	Site 17	Inhalation	MONURON	5.3E-12	mg/m^3	1.0E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	4.7E-11	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	4.6E-12	2.4E-10	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	8.2E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	8.2E-13	4.1E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000006
				DIELDRIN	3.2E-13	mg/m^3	6.1E-14	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	2.8E-13	3.1E-13	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	8.2E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	8.2E-13	4.1E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000006
				HEPTACHLOR	3.2E-12	mg/m^3	6.1E-13	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	8.0E-13	3.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	6.1E-13	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	1.6E-12	3.1E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								8.9E-12					0.0000001
		Exposure Point Total									8.9E-12					0.0000001
	Exposure Medium Total										8.9E-12					0.0000001
Medium Total											5.0E-07					0.01
Groundwater	Groundwater	Site 17	Ingestion	4,4'-DDD	1.200	ug/L	6.6E-06	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	1.6E-06	3.3E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	8.8E-06	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	3.0E-06	4.4E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.09
			Exp. Route Total								4.6E-06					0.09
			Dermal	4,4'-DDD	1.200	ug/L	0.0E+00	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	0.0E+00	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--

TABLE 7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
		Exposure Point Total									4.6E-06					0.09
	Exposure Medium Total										4.6E-06					0.09
	Air	Site 17	Inhalation	4,4'-DDD	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	6.9E-05	(ug/m^3)$^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	0.000	mg/m^3	0.0E+00	(mg/m^3)	9.7E-05	(ug/m^3)$^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					--
	Exposure Medium Total										- -					--
Medium Total											4.6E-06					0.09

TABLE 7.1.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Heptachlor Epoxide	0.020	mg/kg	1.4E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.3E-09	9.7E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0007
			Exp. Route Total								1.3E-09					0.0007
			Dermal	Heptachlor Epoxide	0.020	mg/kg	2.8E-11	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	2.5E-10	1.9E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0001
			Exp. Route Total								2.5E-10					0.0001
		Exposure Point Total									1.5E-09					0.0009
	Exposure Medium Total										1.5E-09					0.0009
	Air	Site 17	Inhalation	Heptachlor Epoxide	1.2E-8	mg/m^3	1.2E-11	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	3.1E-11	8.5E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								3.1E-11					--
		Exposure Point Total									3.1E-11					--
	Exposure Medium Total										3.1E-11					--
Medium Total											1.5E-09					0.0009
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	MONURON	0.050	mg/kg	3.5E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.6E-08	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	5.4E-09	1.1E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.002
				ALPHA-CHLORDANE	0.400	mg/kg	2.8E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	9.7E-10	1.9E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0004
				DIELDRIN	0.003	mg/kg	2.1E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	3.3E-10	1.5E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00003
				GAMMA-CHLORDANE	0.400	mg/kg	2.8E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	9.7E-10	1.9E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0004
				HEPTACHLOR	0.030	mg/kg	2.1E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	9.3E-10	1.5E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				HEPTACHLOR EPOXIDE	0.030	mg/kg	2.1E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.9E-09	1.5E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.001
			Exp. Route Total								1.1E-08					0.004
			Dermal	MONURON	0.050	mg/kg	6.9E-11	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.8E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	9.5E-10	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	3.2E-10	6.7E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0001
				ALPHA-CHLORDANE	0.400	mg/kg	2.2E-10	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	7.7E-11	1.5E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				DIELDRIN	0.003	mg/kg	4.2E-12	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	6.6E-11	2.9E-10	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.000006
				GAMMA-CHLORDANE	0.400	mg/kg	2.2E-10	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	7.7E-11	1.5E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				HEPTACHLOR	0.030	mg/kg	4.2E-11	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	1.9E-10	2.9E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000006
				HEPTACHLOR EPOXIDE	0.030	mg/kg	4.2E-11	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	3.8E-10	2.9E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0002
			Exp. Route Total								1.1E-09					0.0004
		Exposure Point Total									1.2E-08					0.005
	Exposure Medium Total										1.2E-08					0.005
	Air	Site 17	Inhalation	MONURON	3.1E-8	mg/m^3	3.0E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.1E-09	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	1.4E-6	mg/m^3	1.4E-09	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	1.3E-10	9.7E-08	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	2.5E-7	mg/m^3	2.4E-10	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	2.4E-11	1.7E-08	(mg/m^3)	7.0E-04	(mg/m^3)	0.00002
				DIELDRIN	1.9E-9	mg/m^3	1.8E-12	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	8.3E-12	1.3E-10	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	2.5E-7	mg/m^3	2.4E-10	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	2.4E-11	1.7E-08	(mg/m^3)	7.0E-04	(mg/m^3)	0.00002
				HEPTACHLOR	1.9E-8	mg/m^3	1.8E-11	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	2.4E-11	1.3E-09	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	1.9E-8	mg/m^3	1.8E-11	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	4.7E-11	1.3E-09	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								2.6E-10					0.00005
		Exposure Point Total									2.6E-10					0.00005
	Exposure Medium Total										2.6E-10					0.00005
Medium Total											1.2E-08					0.005

TABLE 7.1.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Site 17	Ingestion	4,4'-DDD	1.200	ug/L	1.0E-10	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	2.4E-11	7.0E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	1.3E-10	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	4.6E-11	9.4E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
			Exp. Route Total								7.0E-11					0.00002
			Dermal	4,4'-DDD	1.200	ug/L	0.0E+00	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	0.0E+00	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									7.0E-11					0.00002
	Exposure Medium Total										7.0E-11					0.00002
	Air	Site 17	Inhalation	4,4'-DDD	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	6.9E-05	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					--
	Exposure Medium Total										- -					--
Medium Total											7.0E-11					0.00002

TABLE 7.2.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17		Heptachlor Epoxide	0.020	mg/kg	1.1E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.0E-08	8.6E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0007
			Exp. Route Total								1.0E-08					0.0007
			Dermal	Heptachlor Epoxide	0.020	mg/kg	1.5E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.3E-09	1.1E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00009
			Exp. Route Total								1.3E-09					0.0001
		Exposure Point Total									1.1E-08					0.0007
	Exposure Medium Total										1.1E-08					0.0007
	Air	Site 17	Inhalation	Heptachlor Epoxide	2.1E-12	mg/m^3	5.5E-14	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	1.4E-13	4.3E-13	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								1.4E-13					--
		Exposure Point Total									1.4E-13					--
	Exposure Medium Total										1.4E-13					--
Medium Total											1.1E-08					0.0007
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	MONURON	0.050	mg/kg	2.8E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.3E-07	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	4.3E-08	9.9E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.002
				ALPHA-CHLORDANE	0.400	mg/kg	2.2E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	7.7E-09	1.7E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0003
				DIELDRIN	0.003	mg/kg	1.7E-10	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	2.6E-09	1.3E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00003
				GAMMA-CHLORDANE	0.400	mg/kg	2.2E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	7.7E-09	1.7E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0003
				HEPTACHLOR	0.030	mg/kg	1.7E-09	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	7.4E-09	1.3E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				HEPTACHLOR EPOXIDE	0.030	mg/kg	1.7E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.5E-08	1.3E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0010
			Exp. Route Total								8.4E-08					0.004
			Dermal	MONURON	0.050	mg/kg	3.6E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.8E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	5.0E-09	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	1.7E-09	3.9E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00008
				ALPHA-CHLORDANE	0.400	mg/kg	1.2E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	4.1E-10	9.1E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
				DIELDRIN	0.003	mg/kg	2.2E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	3.5E-10	1.7E-10	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.000003
				GAMMA-CHLORDANE	0.400	mg/kg	1.2E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	4.1E-10	9.1E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
				HEPTACHLOR	0.030	mg/kg	2.2E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	9.8E-10	1.7E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000003
				HEPTACHLOR EPOXIDE	0.030	mg/kg	2.2E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	2.0E-09	1.7E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0001
			Exp. Route Total								5.8E-09					0.0003
		Exposure Point Total									8.9E-08					0.004
	Exposure Medium Total										8.9E-08					0.004
	Air	Site 17	Inhalation	MONURON	5.3E-12	mg/m^3	1.4E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	6.3E-12	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	6.1E-13	4.9E-11	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	1.1E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	1.1E-13	8.5E-12	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000001
				DIELDRIN	3.2E-13	mg/m^3	8.2E-15	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	3.8E-14	6.4E-14	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	1.1E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	1.1E-13	8.5E-12	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000001
				HEPTACHLOR	3.2E-12	mg/m^3	8.2E-14	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	1.1E-13	6.4E-13	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	8.2E-14	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	2.1E-13	6.4E-13	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								1.2E-12					--
		Exposure Point Total									1.2E-12					--
	Exposure Medium Total										1.2E-12					--
Medium Total											8.9E-08					0.004

TABLE 7.3.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17		Heptachlor Epoxide	0.020	mg/kg	9.8E-11	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	8.9E-10	6.8E-10	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00005
			Exp. Route Total								8.9E-10					0.00005
			Dermal	Heptachlor Epoxide	0.020	mg/kg	4.1E-11	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	3.8E-10	2.9E-10	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00002
			Exp. Route Total								3.8E-10					0.00002
		Exposure Point Total									1.3E-09					0.00008
	Exposure Medium Total										1.3E-09					0.00008
	Air	Site 17	Inhalation	Heptachlor Epoxide	2.1E-12	mg/m^3	9.1E-16	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	2.4E-15	6.3E-15	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								2.4E-15					--
		Exposure Point Total									2.4E-15					--
	Exposure Medium Total										2.4E-15					--
Medium Total											1.3E-09					0.00008
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	MONURON	0.050	mg/kg	2.4E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.1E-08	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	3.8E-09	7.9E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				ALPHA-CHLORDANE	0.400	mg/kg	2.0E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	6.8E-10	1.4E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				DIELDRIN	0.003	mg/kg	1.5E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	2.3E-10	1.0E-10	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.000002
				GAMMA-CHLORDANE	0.400	mg/kg	2.0E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	6.8E-10	1.4E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				HEPTACHLOR	0.030	mg/kg	1.5E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	6.6E-10	1.0E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000002
				HEPTACHLOR EPOXIDE	0.030	mg/kg	1.5E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.3E-09	1.0E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00008
			Exp. Route Total								7.4E-09					0.0003
			Dermal	MONURON	0.050	mg/kg	1.0E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.3E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.4E-09	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	4.9E-10	1.0E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
				ALPHA-CHLORDANE	0.400	mg/kg	3.3E-10	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.2E-10	2.3E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000005
				DIELDRIN	0.003	mg/kg	6.2E-12	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	1.0E-10	4.4E-11	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.000001
				GAMMA-CHLORDANE	0.400	mg/kg	3.3E-10	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.2E-10	2.3E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000005
				HEPTACHLOR	0.030	mg/kg	6.2E-11	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	2.8E-10	4.4E-10	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000001
				HEPTACHLOR EPOXIDE	0.030	mg/kg	6.2E-11	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	5.7E-10	4.4E-10	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00003
			Exp. Route Total								1.7E-09					0.0001
		Exposure Point Total									9.1E-09					0.00006
	Exposure Medium Total										9.1E-09					0.00006
	Air	Site 17	Inhalation	MONURON	5.3E-12	mg/m^3	2.3E-15	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.6E-14	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	1.0E-13	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	1.0E-14	7.3E-13	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	1.8E-14	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	1.8E-15	1.3E-13	(mg/m^3)	7.0E-04	(mg/m^3)	- -
				DIELDRIN	3.2E-13	mg/m^3	1.4E-16	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	6.2E-16	9.5E-16	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	1.8E-14	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	1.8E-15	1.3E-13	(mg/m^3)	7.0E-04	(mg/m^3)	- -
				HEPTACHLOR	3.2E-12	mg/m^3	1.4E-15	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	1.8E-15	9.5E-15	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	1.4E-15	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	3.5E-15	9.5E-15	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								2.0E-14					--
		Exposure Point Total									2.0E-14					--
	Exposure Medium Total										2.0E-14					--
Medium Total											9.1E-09					0.0001

TABLE 7.4.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Heptachlor Epoxide	0.020	mg/kg	1.0E-10	(mg/kg/day)	9.1E+00	(mg/kg/day)-1	9.3E-10	5.1E-10	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00004
			Exp. Route Total								9.3E-10					0.00004
			Dermal	Heptachlor Epoxide	0.020	mg/kg	1.2E-11	(mg/kg/day)	9.1E+00	(mg/kg/day)-1	1.1E-10	5.8E-11	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.000004
			Exp. Route Total								1.1E-10					0.000004
		Exposure Point Total									1.0E-09					0.00004
	Exposure Medium Total										1.0E-09					0.00004
	Air	Site 17	Inhalation	Heptachlor Epoxide	2.1E-12	mg/m3	1.3E-15	(mg/m3)	2.6E-03	(ug/m3)-1	3.3E-15	6.3E-15	(mg/m3)	NA	(mg/m3)	--
			Exp. Route Total								3.3E-15					--
		Exposure Point Total									3.3E-15					--
	Exposure Medium Total										3.3E-15					--
Medium Total											1.0E-09					0.00004
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	MONURON	0.050	mg/kg	2.5E-10	(mg/kg/day)	NA	(mg/kg/day)-1	- -	1.3E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.2E-08	(mg/kg/day)	3.4E-01	(mg/kg/day)-1	4.0E-09	5.9E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0001
				ALPHA-CHLORDANE	0.400	mg/kg	2.0E-09	(mg/kg/day)	3.5E-01	(mg/kg/day)-1	7.1E-10	1.0E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
				DIELDRIN	0.003	mg/kg	1.5E-11	(mg/kg/day)	1.6E+01	(mg/kg/day)-1	2.4E-10	7.6E-11	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.000002
				GAMMA-CHLORDANE	0.400	mg/kg	2.0E-09	(mg/kg/day)	3.5E-01	(mg/kg/day)-1	7.1E-10	1.0E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
				HEPTACHLOR	0.030	mg/kg	1.5E-10	(mg/kg/day)	4.5E+00	(mg/kg/day)-1	6.9E-10	7.6E-10	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000002
				HEPTACHLOR EPOXIDE	0.030	mg/kg	1.5E-10	(mg/kg/day)	9.1E+00	(mg/kg/day)-1	1.4E-09	7.6E-10	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00006
			Exp. Route Total								7.7E-09					0.0002
			Dermal	MONURON	0.050	mg/kg	2.9E-11	(mg/kg/day)	NA	(mg/kg/day)-1	- -	1.5E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	4.0E-10	(mg/kg/day)	3.4E-01	(mg/kg/day)-1	1.4E-10	2.0E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000004
				ALPHA-CHLORDANE	0.400	mg/kg	9.3E-11	(mg/kg/day)	3.5E-01	(mg/kg/day)-1	3.2E-11	4.6E-10	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000001
				DIELDRIN	0.003	mg/kg	1.7E-12	(mg/kg/day)	1.6E+01	(mg/kg/day)-1	2.8E-11	8.7E-12	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.0000002
				GAMMA-CHLORDANE	0.400	mg/kg	9.3E-11	(mg/kg/day)	3.5E-01	(mg/kg/day)-1	3.2E-11	4.6E-10	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000001
				HEPTACHLOR	0.030	mg/kg	1.7E-11	(mg/kg/day)	4.5E+00	(mg/kg/day)-1	7.8E-11	8.7E-11	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0000002
				HEPTACHLOR EPOXIDE	0.030	mg/kg	1.7E-11	(mg/kg/day)	9.1E+00	(mg/kg/day)-1	1.6E-10	8.7E-11	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00001
			Exp. Route Total								4.7E-10					0.00001
		Exposure Point Total									8.2E-09					0.0002
	Exposure Medium Total										8.2E-09					0.0002
	Air	Site 17	Inhalation	MONURON	5.3E-12	mg/m3	3.2E-15	(mg/m3)	NA	(ug/m3)-1	- -	1.6E-14	(mg/m3)	NA	(mg/m3)	--
				4,4'-DDT	2.5E-10	mg/m3	1.5E-13	(mg/m3)	9.7E-05	(ug/m3)-1	1.4E-14	7.3E-13	(mg/m3)	NA	(mg/m3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m3	2.5E-14	(mg/m3)	1.0E-04	(ug/m3)-1	2.5E-15	1.3E-13	(mg/m3)	7.0E-04	(mg/m3)	--
				DIELDRIN	3.2E-13	mg/m3	1.9E-16	(mg/m3)	4.6E-03	(ug/m3)-1	8.7E-16	9.5E-16	(mg/m3)	NA	(mg/m3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m3	2.5E-14	(mg/m3)	1.0E-04	(ug/m3)-1	2.5E-15	1.3E-13	(mg/m3)	7.0E-04	(mg/m3)	--
				HEPTACHLOR	3.2E-12	mg/m3	1.9E-15	(mg/m3)	1.3E-03	(ug/m3)-1	2.5E-15	9.5E-15	(mg/m3)	NA	(mg/m3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m3	1.9E-15	(mg/m3)	2.6E-03	(ug/m3)-1	4.9E-15	9.5E-15	(mg/m3)	NA	(mg/m3)	--
			Exp. Route Total								2.7E-14					--
		Exposure Point Total									2.7E-14					--
	Exposure Medium Total										2.7E-14					--
Medium Total											8.2E-09					0.0002

TABLE 7.5.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Heptachlor Epoxide	0.020	mg/kg	2.6E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	2.4E-08	9.2E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.007
			Exp. Route Total								2.4E-08					0.007
			Dermal	Heptachlor Epoxide	0.020	mg/kg	2.9E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	2.7E-09	1.0E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0008
			Exp. Route Total								2.7E-09					0.0008
		Exposure Point Total									2.6E-08					0.008
	Exposure Medium Total										2.6E-08					0.008
	Air	Site 17	Inhalation	Heptachlor Epoxide	2.1E-12	mg/m^3	3.9E-14	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	1.0E-13	1.4E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								1.0E-13					--
		Exposure Point Total									1.0E-13					--
	Exposure Medium Total										1.0E-13					--
Medium Total											2.6E-08					0.008
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	MONURON	0.050	mg/kg	6.5E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	3.0E-07	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	1.0E-07	1.1E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.02
				ALPHA-CHLORDANE	0.400	mg/kg	5.2E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.8E-08	1.8E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.004
				DIELDRIN	0.003	mg/kg	3.9E-10	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	6.3E-09	1.4E-08	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.0003
				GAMMA-CHLORDANE	0.400	mg/kg	5.2E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.8E-08	1.8E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.004
				HEPTACHLOR	0.030	mg/kg	3.9E-09	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	1.8E-08	1.4E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0003
				HEPTACHLOR EPOXIDE	0.030	mg/kg	3.9E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	3.6E-08	1.4E-07	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.01
			Exp. Route Total								2.0E-07					0.04
			Dermal	MONURON	0.050	mg/kg	7.3E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.0E-08	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	3.4E-09	3.5E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0007
				ALPHA-CHLORDANE	0.400	mg/kg	2.3E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	8.2E-10	8.2E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				DIELDRIN	0.003	mg/kg	4.4E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	7.0E-10	1.5E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00003
				GAMMA-CHLORDANE	0.400	mg/kg	2.3E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	8.2E-10	8.2E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				HEPTACHLOR	0.030	mg/kg	4.4E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	2.0E-09	1.5E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				HEPTACHLOR EPOXIDE	0.030	mg/kg	4.4E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	4.0E-09	1.5E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.001
			Exp. Route Total								1.2E-08					0.002
		Exposure Point Total									2.1E-07					0.04
	Exposure Medium Total										2.1E-07					0.04
	Air	Site 17	Inhalation	MONURON	5.3E-12	mg/m^3	9.8E-14	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.4E-12	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	4.5E-12	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	4.4E-13	1.6E-10	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	7.8E-13	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	7.8E-14	2.7E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000004
				DIELDRIN	3.2E-13	mg/m^3	5.9E-15	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	2.7E-14	2.1E-13	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	7.8E-13	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	7.8E-14	2.7E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000004
				HEPTACHLOR	3.2E-12	mg/m^3	5.9E-14	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	7.6E-14	2.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	5.9E-14	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	1.5E-13	2.1E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								8.5E-13					0.00000008
		Exposure Point Total									8.5E-13					0.00000008
	Exposure Medium Total										8.5E-13					0.00000008
Medium Total											2.1E-07					0.04
Groundwater	Groundwater	Site 17	Ingestion	4,4'-DDD	1.200	ug/L	1.0E-06	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	2.5E-07	3.6E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	1.4E-06	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	4.7E-07	4.8E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.10
			Exp. Route Total								7.2E-07					0.10
			Dermal	4,4'-DDD	1.200	ug/L	0.0E+00	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	0.0E+00	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--

TABLE 7.5.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Exposure Point Total									7.2E-07					0.10
	Exposure Medium Total										7.2E-07					0.10
	Air	Site 17	Inhalation	4,4'-DDD	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	6.9E-05	(ug/m^3)$^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	9.7E-05	(ug/m^3)$^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					--
	Exposure Medium Total										- -					--
Medium Total											7.2E-07					0.10

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.6.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION,NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Heptachlor Epoxide	0.020	mg/kg	3.5E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	3.2E-09	1.2E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0009
			Exp. Route Total								3.2E-09					0.0009
			Dermal	Heptachlor Epoxide	0.020	mg/kg	4.0E-11	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	3.7E-10	1.4E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0001
			Exp. Route Total								3.7E-10					0.0001
		Exposure Point Total									3.6E-09					0.001
	Exposure Medium Total										3.6E-09					0.001
	Air	Site 17	Inhalation	Heptachlor Epoxide	2.1E-12	mg/m^3	3.9E-14	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	1.0E-13	1.4E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								1.0E-13					--
		Exposure Point Total									1.0E-13					--
	Exposure Medium Total										1.0E-13					--
Medium Total											3.6E-09					0.001
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	MONURON	0.050	mg/kg	8.8E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	4.1E-08	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	1.4E-08	1.4E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.003
				ALPHA-CHLORDANE	0.400	mg/kg	7.0E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	2.5E-09	2.5E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0005
				DIELDRIN	0.003	mg/kg	5.3E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	8.5E-10	1.8E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00004
				GAMMA-CHLORDANE	0.400	mg/kg	7.0E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	2.5E-09	2.5E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0005
				HEPTACHLOR	0.030	mg/kg	5.3E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	2.4E-09	1.8E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00004
				HEPTACHLOR EPOXIDE	0.030	mg/kg	5.3E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	4.8E-09	1.8E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.001
			Exp. Route Total								2.7E-08					0.005
			Dermal	MONURON	0.050	mg/kg	1.0E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.5E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.4E-09	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	4.7E-10	4.8E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00010
				ALPHA-CHLORDANE	0.400	mg/kg	3.2E-10	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.1E-10	1.1E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
				DIELDRIN	0.003	mg/kg	6.0E-12	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	9.6E-11	2.1E-10	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.000004
				GAMMA-CHLORDANE	0.400	mg/kg	3.2E-10	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.1E-10	1.1E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
				HEPTACHLOR	0.030	mg/kg	6.0E-11	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	2.7E-10	2.1E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000004
				HEPTACHLOR EPOXIDE	0.030	mg/kg	6.0E-11	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	5.5E-10	2.1E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0002
			Exp. Route Total								1.6E-09					0.0003
		Exposure Point Total									2.8E-08					0.006
	Exposure Medium Total										2.8E-08					0.006
	Air	Site 17	Inhalation	MONURON	5.3E-12	mg/m^3	9.8E-14	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.4E-12	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	4.5E-12	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	4.4E-13	1.6E-10	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	7.8E-13	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	7.8E-14	2.7E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000004
				DIELDRIN	3.2E-13	mg/m^3	5.9E-15	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	2.7E-14	2.1E-13	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	7.8E-13	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	7.8E-14	2.7E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000004
				HEPTACHLOR	3.2E-12	mg/m^3	5.9E-14	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	7.6E-14	2.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	5.9E-14	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	1.5E-13	2.1E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								8.5E-13					0.00000008
		Exposure Point Total									8.5E-13					0.00000008
	Exposure Medium Total										8.5E-13					0.00000008
Medium Total											2.8E-08					0.006
Groundwater	Groundwater	Site 17	Ingestion	4,4'-DDD	1.200	ug/L	3.7E-07	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	8.8E-08	1.3E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	4.9E-07	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	1.7E-07	1.7E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.03
			Exp. Route Total								2.5E-07					0.03
			Dermal	4,4'-DDD	1.200	ug/L	0.0E+00	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	0.0E+00	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--

TABLE 7.6.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION,NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Exposure Point Total									2.5E-07					0.03
	Exposure Medium Total										2.5E-07					0.03
	Air	Site 17	Inhalation	4,4'-DDD	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	6.9E-05	(ug/m^3)$^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	0.000	mg/m^3	0.0E+00	(mg/m^3)	9.7E-05	(ug/m^3)$^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					--
	Exposure Medium Total										- -					--
Medium Total											2.5E-07					0.03

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.7.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Heptachlor Epoxide	0.020	mg/kg	9.2E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	8.3E-09	9.2E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0007
			Exp. Route Total								8.3E-09					0.0007
			Dermal	Heptachlor Epoxide	0.020	mg/kg	1.0E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	9.5E-10	1.0E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00008
			Exp. Route Total								9.5E-10					0.00008
		Exposure Point Total									9.3E-09					0.0008
	Exposure Medium Total										9.3E-09					0.0008
	Air	Site 17	Inhalation	Heptachlor Epoxide	2.1E-12	mg/m^3	1.4E-13	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	3.6E-13	1.4E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								3.6E-13					--
		Exposure Point Total									3.6E-13					--
	Exposure Medium Total										3.6E-13					--
Medium Total											9.3E-09					0.0008
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	MONURON	0.050	mg/kg	2.3E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.1E-07	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	3.6E-08	1.1E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.002
				ALPHA-CHLORDANE	0.400	mg/kg	1.8E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	6.4E-09	1.8E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0004
				DIELDRIN	0.003	mg/kg	1.4E-10	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	2.2E-09	1.4E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00003
				GAMMA-CHLORDANE	0.400	mg/kg	1.8E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	6.4E-09	1.8E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0004
				HEPTACHLOR	0.030	mg/kg	1.4E-09	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	6.2E-09	1.4E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				HEPTACHLOR EPOXIDE	0.030	mg/kg	1.4E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.3E-08	1.4E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.001
			Exp. Route Total								7.0E-08					0.004
			Dermal	MONURON	0.050	mg/kg	2.6E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	3.6E-09	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	1.2E-09	3.6E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00007
				ALPHA-CHLORDANE	0.400	mg/kg	8.4E-10	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	2.9E-10	8.4E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
				DIELDRIN	0.003	mg/kg	1.6E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	2.5E-10	1.6E-10	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.000003
				GAMMA-CHLORDANE	0.400	mg/kg	8.4E-10	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	2.9E-10	8.4E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
				HEPTACHLOR	0.030	mg/kg	1.6E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	7.0E-10	1.6E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000003
				HEPTACHLOR EPOXIDE	0.030	mg/kg	1.6E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.4E-09	1.6E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0001
			Exp. Route Total								4.2E-09					0.0002
		Exposure Point Total									7.4E-08					0.004
	Exposure Medium Total										7.4E-08					0.004
	Air	Site 17	Inhalation	MONURON	5.3E-12	mg/m^3	3.4E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.4E-12	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	1.6E-11	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	1.5E-12	1.6E-10	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	2.7E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	2.7E-13	2.7E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000004
				DIELDRIN	3.2E-13	mg/m^3	2.1E-14	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	9.4E-14	2.1E-13	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	2.7E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	2.7E-13	2.7E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000004
				HEPTACHLOR	3.2E-12	mg/m^3	2.1E-13	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	2.7E-13	2.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	2.1E-13	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	5.3E-13	2.1E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								3.0E-12					0.00000008
		Exposure Point Total									3.0E-12					0.00000008
	Exposure Medium Total										3.0E-12					0.00000008
Medium Total											7.4E-08					0.004
Groundwater	Groundwater	Site 17	Ingestion	4,4'-DDD	1.200	ug/L	1.5E-06	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	3.7E-07	1.5E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	2.1E-06	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	7.0E-07	2.1E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.04
			Exp. Route Total								1.1E-06					0.04
			Dermal	4,4'-DDD	1.200	ug/L	0.0E+00	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	0.0E+00	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--

TABLE 7.7.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
		Exposure Point Total									1.1E-06					0.04
	Exposure Medium Total										1.1E-06					0.04
	Air	Site 17	Inhalation	4,4'-DDD	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	6.9E-05	(ug/m^3)$^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	0.000	mg/m^3	0.0E+00	(mg/m^3)	9.7E-05	(ug/m^3)$^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					--
	Exposure Medium Total										- -					--
Medium Total											1.1E-06					0.04

CUMULATIVE

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Arsenic	8.00	mg/kg	2.2E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	3.3E-07	1.5E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.05
				Heptachlor Epoxide	0.020	mg/kg	5.5E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	5.0E-09	3.9E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.003
			Exp. Route Total								3.4E-07					0.05
			Dermal	Arsenic	8.00	mg/kg	2.0E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	3.0E-08	1.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.005
				Heptachlor Epoxide	0.020	mg/kg	1.7E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.5E-09	1.2E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0009
			Exp. Route Total								3.1E-08					0.006
		Exposure Point Total									3.7E-07					0.06
	Exposure Medium Total										3.7E-07					0.06
	Air	Site 17	Inhalation	Arsenic	4.9E-6	mg/m^3	9.7E-09	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	4.2E-08	6.8E-07	(mg/m^3)	1.5E-05	(mg/m^3)	0.05
				Heptachlor Epoxide	1.2E-8	mg/m^3	2.4E-11	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	6.3E-11	1.7E-09	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								4.2E-08					0.05
		Exposure Point Total									4.2E-08					0.05
	Exposure Medium Total										4.2E-08					0.05
Medium Total											4.1E-07					0.1
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	ARSENIC	4.40	mg/kg	1.2E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.8E-07	8.5E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.03
				MONURON	0.050	mg/kg	1.4E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.7E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	6.4E-08	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	2.2E-08	4.5E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.009
				ALPHA-CHLORDANE	0.400	mg/kg	1.1E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	3.9E-09	7.7E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.002
				DIELDRIN	0.003	mg/kg	8.3E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	1.3E-09	5.8E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.0001
				GAMMA-CHLORDANE	0.400	mg/kg	1.1E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	3.9E-09	7.7E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.002
				HEPTACHLOR	0.030	mg/kg	8.3E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	3.7E-09	5.8E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0001
				HEPTACHLOR EPOXIDE	0.030	mg/kg	8.3E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	7.6E-09	5.8E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.004
			Exp. Route Total								2.2E-07					0.05
			Dermal	ARSENIC	4.40	mg/kg	1.1E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.6E-08	7.7E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
				MONURON	0.050	mg/kg	4.2E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.9E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	5.7E-09	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	1.9E-09	4.0E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0008
				ALPHA-CHLORDANE	0.400	mg/kg	1.3E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	4.6E-10	9.3E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				DIELDRIN	0.003	mg/kg	2.5E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	4.0E-10	1.7E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00003
				GAMMA-CHLORDANE	0.400	mg/kg	1.3E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	4.6E-10	9.3E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				HEPTACHLOR	0.030	mg/kg	2.5E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	1.1E-09	1.7E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				HEPTACHLOR EPOXIDE	0.030	mg/kg	2.5E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	2.3E-09	1.7E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.001
			Exp. Route Total								2.3E-08					0.005
		Exposure Point Total									2.5E-07					0.05
	Exposure Medium Total										2.5E-07					0.05
	Air	Site 17	Inhalation	ARSENIC	2.7E-6	mg/m^3	5.3E-09	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	2.3E-08	3.7E-07	(mg/m^3)	1.5E-05	(mg/m^3)	0.02
				MONURON	3.1E-8	mg/m^3	6.0E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.2E-09	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	1.4E-6	mg/m^3	2.8E-09	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	2.7E-10	1.9E-07	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	2.5E-7	mg/m^3	4.8E-10	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	4.8E-11	3.4E-08	(mg/m^3)	7.0E-04	(mg/m^3)	0.00005
				DIELDRIN	1.9E-9	mg/m^3	3.6E-12	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	1.7E-11	2.5E-10	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	2.5E-7	mg/m^3	4.8E-10	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	4.8E-11	3.4E-08	(mg/m^3)	7.0E-04	(mg/m^3)	0.00005
				HEPTACHLOR	1.9E-8	mg/m^3	3.6E-11	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	4.7E-11	2.5E-09	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	1.9E-8	mg/m^3	3.6E-11	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	9.4E-11	2.5E-09	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								2.3E-08					0.02
		Exposure Point Total									2.3E-08					0.02
	Exposure Medium Total										2.3E-08					0.02
Medium Total											2.7E-07					0.08

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Site 17	Ingestion	4,4'-DDD	1.200	ug/L	2.0E-10	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	4.8E-11	1.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	2.7E-10	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	9.1E-11	1.9E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00004
			Exp. Route Total								1.4E-10					0.00004
			Dermal	4,4'-DDD	1.200	ug/L	0.0E+00	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	0.0E+00	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									1.4E-10					0.00004
	Exposure Medium Total										1.4E-10					0.00004
	Air	Site 17	Inhalation	4,4'-DDD	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	6.9E-05	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					--
	Exposure Medium Total										- -					--
Medium Total											1.4E-10					0.00004

TABLE 7.2.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Arsenic	8.00	mg/kg	2.8E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	4.2E-06	7.8E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.03
				Heptachlor Epoxide	0.020	mg/kg	7.0E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	6.4E-08	2.0E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.002
			Exp. Route Total								4.3E-06					0.03
			Dermal	Arsenic	8.00	mg/kg	5.5E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	8.3E-07	1.5E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.005
				Heptachlor Epoxide	0.020	mg/kg	4.6E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	4.2E-08	1.3E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0010
			Exp. Route Total								8.7E-07					0.006
		Exposure Point Total									5.1E-06					0.03
	Exposure Medium Total										5.1E-06					0.03
	Air	Site 17	Inhalation	Arsenic	8.5E-10	mg/m^3	7.0E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	3.0E-10	1.9E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00001
				Heptachlor Epoxide	2.1E-12	mg/m^3	1.7E-13	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	4.5E-13	4.9E-13	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								3.0E-10					0.00001
		Exposure Point Total									3.0E-10					0.00001
	Exposure Medium Total										3.0E-10					0.00001
Medium Total											5.1E-06					0.03
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	ARSENIC	4.40	mg/kg	1.5E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.3E-06	4.3E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				MONURON	0.050	mg/kg	1.7E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.9E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	8.0E-07	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	2.7E-07	2.3E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.005
				ALPHA-CHLORDANE	0.400	mg/kg	1.4E-07	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	4.9E-08	3.9E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0008
				DIELDRIN	0.003	mg/kg	1.0E-09	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	1.7E-08	2.9E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00006
				GAMMA-CHLORDANE	0.400	mg/kg	1.4E-07	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	4.9E-08	3.9E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0008
				HEPTACHLOR	0.030	mg/kg	1.0E-08	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	4.7E-08	2.9E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00006
				HEPTACHLOR EPOXIDE	0.030	mg/kg	1.0E-08	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	9.5E-08	2.9E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.002
			Exp. Route Total								2.8E-06					0.02
			Dermal	ARSENIC	4.40	mg/kg	3.0E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	4.6E-07	8.5E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
				MONURON	0.050	mg/kg	1.2E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.6E-07	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	5.4E-08	4.5E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0009
				ALPHA-CHLORDANE	0.400	mg/kg	3.7E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.3E-08	1.0E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				DIELDRIN	0.003	mg/kg	6.9E-10	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	1.1E-08	1.9E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00004
				GAMMA-CHLORDANE	0.400	mg/kg	3.7E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.3E-08	1.0E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				HEPTACHLOR	0.030	mg/kg	6.9E-09	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	3.1E-08	1.9E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00004
				HEPTACHLOR EPOXIDE	0.030	mg/kg	6.9E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	6.3E-08	1.9E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.001
			Exp. Route Total								6.4E-07					0.006
		Exposure Point Total									3.5E-06					0.03
	Exposure Medium Total										3.5E-06					0.03
	Air	Site 17	Inhalation	ARSENIC	4.7E-10	mg/m^3	3.8E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	1.6E-10	1.1E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.000007
				MONURON	5.3E-12	mg/m^3	4.4E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.2E-12	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	2.0E-11	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	1.9E-12	5.6E-11	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	3.5E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	3.5E-13	9.7E-12	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000001
				DIELDRIN	3.2E-13	mg/m^3	2.6E-14	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	1.2E-13	7.3E-14	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	3.5E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	3.5E-13	9.7E-12	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000001
				HEPTACHLOR	3.2E-12	mg/m^3	2.6E-13	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	3.4E-13	7.3E-13	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	2.6E-13	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	6.8E-13	7.3E-13	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								1.7E-10					0.000007
		Exposure Point Total									1.7E-10					0.000007
	Exposure Medium Total										1.7E-10					0.000007
Medium Total											3.5E-06					0.03

TABLE 7.3.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Arsenic	8.00	mg/kg	1.9E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.9E-07	1.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.005
				Heptachlor Epoxide	0.020	mg/kg	4.8E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	4.4E-09	3.4E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0003
			Exp. Route Total								3.0E-07					0.005
			Dermal	Arsenic	8.00	mg/kg	6.2E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	9.2E-08	4.3E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Heptachlor Epoxide	0.020	mg/kg	5.1E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	4.7E-09	3.6E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0003
			Exp. Route Total								9.7E-08					0.002
		Exposure Point Total									3.9E-07					0.006
	Exposure Medium Total										3.9E-07					0.006
	Air	Site 17	Inhalation	Arsenic	8.5E-10	mg/m^3	1.4E-12	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	6.2E-12	1.0E-11	(mg/m^3)	1.5E-05	(mg/m^3)	0.0000007
				Heptachlor Epoxide	2.1E-12	mg/m^3	3.6E-15	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	9.4E-15	2.5E-14	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								6.2E-12					0.0000007
		Exposure Point Total									6.2E-12					0.0000007
	Exposure Medium Total										6.2E-12					0.0000007
Medium Total											3.9E-07					0.006
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	ARSENIC	4.40	mg/kg	1.1E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.6E-07	7.5E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				MONURON	0.050	mg/kg	1.2E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.5E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	5.6E-08	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	1.9E-08	3.9E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0008
				ALPHA-CHLORDANE	0.400	mg/kg	9.7E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	3.4E-09	6.8E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0001
				DIELDRIN	0.003	mg/kg	7.3E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	1.2E-09	5.1E-10	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00001
				GAMMA-CHLORDANE	0.400	mg/kg	9.7E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	3.4E-09	6.8E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0001
				HEPTACHLOR	0.030	mg/kg	7.3E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	3.3E-09	5.1E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00001
				HEPTACHLOR EPOXIDE	0.030	mg/kg	7.3E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	6.6E-09	5.1E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0004
			Exp. Route Total								2.0E-07					0.004
			Dermal	ARSENIC	4.40	mg/kg	3.4E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	5.1E-08	2.4E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0008
				MONURON	0.050	mg/kg	1.3E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.0E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.8E-08	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	6.0E-09	1.2E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				ALPHA-CHLORDANE	0.400	mg/kg	4.1E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.4E-09	2.9E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00006
				DIELDRIN	0.003	mg/kg	7.7E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	1.2E-09	5.4E-10	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00001
				GAMMA-CHLORDANE	0.400	mg/kg	4.1E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.4E-09	2.9E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00006
				HEPTACHLOR	0.030	mg/kg	7.7E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	3.5E-09	5.4E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00001
				HEPTACHLOR EPOXIDE	0.030	mg/kg	7.7E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	7.0E-09	5.4E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0004
			Exp. Route Total								7.1E-08					0.002
		Exposure Point Total									2.7E-07					0.006
	Exposure Medium Total										2.7E-07					0.006
	Air	Site 17	Inhalation	ARSENIC	4.7E-10	mg/m^3	8.0E-13	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	3.4E-12	5.6E-12	(mg/m^3)	1.5E-05	(mg/m^3)	0.0000004
				MONURON	5.3E-12	mg/m^3	9.1E-15	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.3E-14	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	4.2E-13	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	4.0E-14	2.9E-12	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	7.2E-14	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	7.2E-15	5.1E-13	(mg/m^3)	7.0E-04	(mg/m^3)	--
				DIELDRIN	3.2E-13	mg/m^3	5.4E-16	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	2.5E-15	3.8E-15	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	7.2E-14	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	7.2E-15	5.1E-13	(mg/m^3)	7.0E-04	(mg/m^3)	--
				HEPTACHLOR	3.2E-12	mg/m^3	5.4E-15	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	7.1E-15	3.8E-14	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	5.4E-15	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	1.4E-14	3.8E-14	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								3.5E-12					0.0000004
		Exposure Point Total									3.5E-12					0.0000004
	Exposure Medium Total										3.5E-12					0.0000004
Medium Total											2.7E-07					0.006

TABLE 7.4.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Arsenic	8.00	mg/kg	1.6E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.4E-07	8.1E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
				Heptachlor Epoxide	0.020	mg/kg	4.1E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	3.7E-09	2.0E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0002
			Exp. Route Total								2.5E-07					0.003
			Dermal	Arsenic	8.00	mg/kg	1.9E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.9E-08	9.7E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0003
				Heptachlor Epoxide	0.020	mg/kg	1.6E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.5E-09	8.1E-10	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00006
			Exp. Route Total								3.1E-08					0.0004
		Exposure Point Total									2.8E-07					0.003
	Exposure Medium Total										2.8E-07					0.003
	Air	Site 17	Inhalation	Arsenic	8.5E-10	mg/m^3	2.0E-12	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	8.7E-12	1.0E-11	(mg/m^3)	1.5E-05	(mg/m^3)	0.0000007
				Heptachlor Epoxide	2.1E-12	mg/m^3	5.1E-15	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	1.3E-14	2.5E-14	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								8.7E-12					0.0000007
		Exposure Point Total									8.7E-12					0.0000007
	Exposure Medium Total										8.7E-12					0.0000007
Medium Total											2.8E-07					0.003
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	ARSENIC	4.40	mg/kg	9.0E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.3E-07	4.5E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				MONURON	0.050	mg/kg	1.0E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	4.7E-08	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	1.6E-08	2.3E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0005
				ALPHA-CHLORDANE	0.400	mg/kg	8.1E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	2.8E-09	4.1E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00008
				DIELDRIN	0.003	mg/kg	6.1E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	9.8E-10	3.1E-10	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.000006
				GAMMA-CHLORDANE	0.400	mg/kg	8.1E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	2.8E-09	4.1E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00008
				HEPTACHLOR	0.030	mg/kg	6.1E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	2.7E-09	3.1E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000006
				HEPTACHLOR EPOXIDE	0.030	mg/kg	6.1E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	5.6E-09	3.1E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0002
			Exp. Route Total								1.7E-07					0.002
			Dermal	ARSENIC	4.40	mg/kg	1.1E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.6E-08	5.4E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0002
				MONURON	0.050	mg/kg	4.1E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.0E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	5.6E-09	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	1.9E-09	2.8E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00006
				ALPHA-CHLORDANE	0.400	mg/kg	1.3E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	4.5E-10	6.5E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00001
				DIELDRIN	0.003	mg/kg	2.4E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	3.9E-10	1.2E-10	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.000002
				GAMMA-CHLORDANE	0.400	mg/kg	1.3E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	4.5E-10	6.5E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00001
				HEPTACHLOR	0.030	mg/kg	2.4E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	1.1E-09	1.2E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000002
				HEPTACHLOR EPOXIDE	0.030	mg/kg	2.4E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	2.2E-09	1.2E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00009
			Exp. Route Total								2.3E-08					0.0004
		Exposure Point Total									1.9E-07					0.003
	Exposure Medium Total										1.9E-07					0.003
	Air	Site 17	Inhalation	ARSENIC	4.7E-10	mg/m^3	1.1E-12	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	4.8E-12	5.6E-12	(mg/m^3)	1.5E-05	(mg/m^3)	0.0000004
				MONURON	5.3E-12	mg/m^3	1.3E-14	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.3E-14	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	5.8E-13	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	5.7E-14	2.9E-12	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	1.0E-13	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	1.0E-14	5.1E-13	(mg/m^3)	7.0E-04	(mg/m^3)	--
				DIELDRIN	3.2E-13	mg/m^3	7.6E-16	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	3.5E-15	3.8E-15	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	1.0E-13	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	1.0E-14	5.1E-13	(mg/m^3)	7.0E-04	(mg/m^3)	--
				HEPTACHLOR	3.2E-12	mg/m^3	7.6E-15	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	9.9E-15	3.8E-14	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	7.6E-15	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	2.0E-14	3.8E-14	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								4.9E-12					0.0000004
		Exposure Point Total									4.9E-12					0.0000004
	Exposure Medium Total										4.9E-12					0.0000004
Medium Total											1.9E-07					0.003

TABLE 7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Arsenic	8.00	mg/kg	9.4E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.4E-05	1.1E-04	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.4
				Heptachlor Epoxide	0.020	mg/kg	2.3E-08	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	2.1E-07	2.7E-07	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.02
			Exp. Route Total								1.4E-05					0.4
			Dermal	Arsenic	8.00	mg/kg	7.9E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.2E-06	9.2E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.03
				Heptachlor Epoxide	0.020	mg/kg	6.6E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	6.0E-08	7.7E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.006
			Exp. Route Total								1.2E-06					0.04
		Exposure Point Total									1.6E-05					0.4
	Exposure Medium Total										1.6E-05					0.4
	Air	Site 17	Inhalation	Arsenic	8.5E-10	mg/m^3	7.0E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	3.0E-10	8.2E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00005
				Heptachlor Epoxide	2.1E-12	mg/m^3	1.8E-13	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	4.6E-13	2.0E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								3.0E-10					0.00005
		Exposure Point Total									3.0E-10					0.00005
	Exposure Medium Total										3.0E-10					0.00005
Medium Total											1.6E-05					0.4
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	ARSENIC	4.40	mg/kg	5.2E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	7.7E-06	6.0E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.2
				MONURON	0.050	mg/kg	5.9E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	2.7E-06	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	9.2E-07	3.2E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.06
				ALPHA-CHLORDANE	0.400	mg/kg	4.7E-07	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.6E-07	5.5E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.01
				DIELDRIN	0.003	mg/kg	3.5E-09	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	5.6E-08	4.1E-08	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.0008
				GAMMA-CHLORDANE	0.400	mg/kg	4.7E-07	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.6E-07	5.5E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.01
				HEPTACHLOR	0.030	mg/kg	3.5E-08	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	1.6E-07	4.1E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0008
				HEPTACHLOR EPOXIDE	0.030	mg/kg	3.5E-08	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	3.2E-07	4.1E-07	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.03
			Exp. Route Total								9.5E-06					0.3
			Dermal	ARSENIC	4.40	mg/kg	4.3E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	6.5E-07	5.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				MONURON	0.050	mg/kg	1.6E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	2.3E-07	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	7.7E-08	2.6E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.005
				ALPHA-CHLORDANE	0.400	mg/kg	5.3E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.8E-08	6.1E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.001
				DIELDRIN	0.003	mg/kg	9.9E-10	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	1.6E-08	1.2E-08	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.0002
				GAMMA-CHLORDANE	0.400	mg/kg	5.3E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.8E-08	6.1E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.001
				HEPTACHLOR	0.030	mg/kg	9.9E-09	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	4.4E-08	1.2E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				HEPTACHLOR EPOXIDE	0.030	mg/kg	9.9E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	9.0E-08	1.2E-07	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.009
			Exp. Route Total								9.1E-07					0.03
		Exposure Point Total									1.0E-05					0.4
	Exposure Medium Total										1.0E-05					0.4
	Air	Site 17	Inhalation	ARSENIC	4.7E-10	mg/m^3	3.9E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	1.7E-10	4.5E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00003
				MONURON	5.3E-12	mg/m^3	4.4E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	2.0E-11	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	2.0E-12	2.4E-10	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	3.5E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	3.5E-13	4.1E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000006
				DIELDRIN	3.2E-13	mg/m^3	2.6E-14	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	1.2E-13	3.1E-13	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	3.5E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	3.5E-13	4.1E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000006
				HEPTACHLOR	3.2E-12	mg/m^3	2.6E-13	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	3.4E-13	3.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	2.6E-13	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	6.8E-13	3.1E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								1.7E-10					0.00003
		Exposure Point Total									1.7E-10					0.00003
	Exposure Medium Total										1.7E-10					0.00003
Medium Total											1.0E-05					0.4

TABLE 7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Site 17	Ingestion	4,4'-DDD	1.200	ug/L	7.0E-06	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	1.7E-06	8.2E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	9.4E-06	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	3.2E-06	1.1E-04	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.2
			Exp. Route Total								4.9E-06					0.2
			Dermal	4,4'-DDD	1.200	ug/L	0.0E+00	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	0.0E+00	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									4.9E-06					0.2
	Exposure Medium Total										4.9E-06					0.2
	Air	Site 17	Inhalation	4,4'-DDD	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	6.9E-05	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					--
	Exposure Medium Total										- -					--
Medium Total											4.9E-06					0.2

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.6.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION,NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Arsenic	8.00	mg/kg	2.1E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	3.2E-06	1.5E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.05
				Heptachlor Epoxide	0.020	mg/kg	5.3E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	4.8E-08	3.7E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.003
			Exp. Route Total								3.2E-06					0.05
			Dermal	Arsenic	8.00	mg/kg	6.7E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.0E-06	4.7E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Heptachlor Epoxide	0.020	mg/kg	5.6E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	5.1E-08	3.9E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.003
			Exp. Route Total								1.1E-06					0.02
		Exposure Point Total									4.3E-06					0.07
	Exposure Medium Total										4.3E-06					0.07
	Air	Site 17	Inhalation	Arsenic	8.5E-10	mg/m^3	1.2E-10	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	5.0E-10	8.2E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00005
				Heptachlor Epoxide	2.1E-12	mg/m^3	2.9E-13	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	7.6E-13	2.0E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								5.0E-10					0.00005
		Exposure Point Total									5.0E-10					0.00005
	Exposure Medium Total										5.0E-10					0.00005
Medium Total											4.3E-06					0.07
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	ARSENIC	4.40	mg/kg	1.2E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.7E-06	8.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.03
				MONURON	0.050	mg/kg	1.3E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	6.1E-07	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	2.1E-07	4.2E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.008
				ALPHA-CHLORDANE	0.400	mg/kg	1.1E-07	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	3.7E-08	7.4E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.001
				DIELDRIN	0.003	mg/kg	7.9E-10	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	1.3E-08	5.5E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.0001
				GAMMA-CHLORDANE	0.400	mg/kg	1.1E-07	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	3.7E-08	7.4E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.001
				HEPTACHLOR	0.030	mg/kg	7.9E-09	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	3.6E-08	5.5E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0001
				HEPTACHLOR EPOXIDE	0.030	mg/kg	7.9E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	7.2E-08	5.5E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.004
			Exp. Route Total								2.1E-06					0.04
			Dermal	ARSENIC	4.40	mg/kg	3.7E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	5.5E-07	2.6E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.009
				MONURON	0.050	mg/kg	1.4E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.9E-07	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	6.6E-08	1.3E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.003
				ALPHA-CHLORDANE	0.400	mg/kg	4.5E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.6E-08	3.1E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0006
				DIELDRIN	0.003	mg/kg	8.4E-10	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	1.3E-08	5.9E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.0001
				GAMMA-CHLORDANE	0.400	mg/kg	4.5E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.6E-08	3.1E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0006
				HEPTACHLOR	0.030	mg/kg	8.4E-09	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	3.8E-08	5.9E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0001
				HEPTACHLOR EPOXIDE	0.030	mg/kg	8.4E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	7.6E-08	5.9E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.005
			Exp. Route Total								7.8E-07					0.02
		Exposure Point Total									2.9E-06					0.06
	Exposure Medium Total										2.9E-06					0.06
	Air	Site 17	Inhalation	ARSENIC	4.7E-10	mg/m^3	6.4E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	2.8E-10	4.5E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00003
				MONURON	5.3E-12	mg/m^3	7.3E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	3.4E-11	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	3.3E-12	2.4E-10	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	5.8E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	5.8E-13	4.1E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000006
				DIELDRIN	3.2E-13	mg/m^3	4.4E-14	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	2.0E-13	3.1E-13	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	5.8E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	5.8E-13	4.1E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000006
				HEPTACHLOR	3.2E-12	mg/m^3	4.4E-13	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	5.7E-13	3.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	4.4E-13	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	1.1E-12	3.1E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								2.8E-10					0.00003
		Exposure Point Total									2.8E-10					0.00003
	Exposure Medium Total										2.8E-10					0.00003
Medium Total											2.9E-06					0.06

TABLE 7.6.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION,NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Site 17	Ingestion	4,4'-DDD	1.200	ug/L	6.3E-06	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	1.5E-06	4.4E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	8.4E-06	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	2.9E-06	5.9E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.1
			Exp. Route Total								4.4E-06					0.1
			Dermal	4,4'-DDD	1.200	ug/L	0.0E+00	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	0.0E+00	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									4.4E-06					0.1
	Exposure Medium Total										4.4E-06					0.1
	Air	Site 17	Inhalation	4,4'-DDD	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	6.9E-05	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	0.000	mg/m^3	0.0E+00	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					--
	Exposure Medium Total										- -					--
Medium Total											4.4E-06					0.1

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Arsenic	8.00	mg/kg	2.2E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	3.3E-06	1.1E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.04
				Heptachlor Epoxide	0.020	mg/kg	5.5E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	5.0E-08	2.7E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.002
			Exp. Route Total								3.3E-06					0.04
			Dermal	Arsenic	8.00	mg/kg	2.6E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	3.9E-07	1.3E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.004
				Heptachlor Epoxide	0.020	mg/kg	2.2E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	2.0E-08	1.1E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0008
			Exp. Route Total								4.1E-07					0.005
		Exposure Point Total									3.8E-06					0.04
	Exposure Medium Total										3.8E-06					0.04
	Air	Site 17	Inhalation	Arsenic	8.5E-10	mg/m^3	1.6E-10	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	7.0E-10	8.2E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00005
				Heptachlor Epoxide	2.1E-12	mg/m^3	4.1E-13	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	1.1E-12	2.0E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								7.1E-10					0.00005
		Exposure Point Total									7.1E-10					0.00005
	Exposure Medium Total										7.1E-10					0.00005
Medium Total											3.8E-06					0.04
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	ARSENIC	4.40	mg/kg	1.2E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.8E-06	6.0E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				MONURON	0.050	mg/kg	1.4E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.8E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	6.3E-07	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	2.1E-07	3.2E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.006
				ALPHA-CHLORDANE	0.400	mg/kg	1.1E-07	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	3.8E-08	5.5E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.001
				DIELDRIN	0.003	mg/kg	8.2E-10	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	1.3E-08	4.1E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00008
				GAMMA-CHLORDANE	0.400	mg/kg	1.1E-07	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	3.8E-08	5.5E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.001
				HEPTACHLOR	0.030	mg/kg	8.2E-09	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	3.7E-08	4.1E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00008
				HEPTACHLOR EPOXIDE	0.030	mg/kg	8.2E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	7.5E-08	4.1E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.003
			Exp. Route Total								2.2E-06					0.03
			Dermal	ARSENIC	4.40	mg/kg	1.4E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.2E-07	7.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				MONURON	0.050	mg/kg	5.5E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.7E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	7.5E-08	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	2.6E-08	3.8E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0008
				ALPHA-CHLORDANE	0.400	mg/kg	1.7E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	6.1E-09	8.7E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				DIELDRIN	0.003	mg/kg	3.3E-10	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	5.2E-09	1.6E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00003
				GAMMA-CHLORDANE	0.400	mg/kg	1.7E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	6.1E-09	8.7E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				HEPTACHLOR	0.030	mg/kg	3.3E-09	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	1.5E-08	1.6E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				HEPTACHLOR EPOXIDE	0.030	mg/kg	3.3E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	3.0E-08	1.6E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.001
			Exp. Route Total								3.0E-07					0.005
		Exposure Point Total									2.5E-06					0.04
	Exposure Medium Total										2.5E-06					0.04
	Air	Site 17	Inhalation	ARSENIC	4.7E-10	mg/m^3	9.0E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	3.9E-10	4.5E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00003
				MONURON	5.3E-12	mg/m^3	1.0E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	4.7E-11	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	4.6E-12	2.4E-10	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	8.2E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	8.2E-13	4.1E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000006
				DIELDRIN	3.2E-13	mg/m^3	6.1E-14	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	2.8E-13	3.1E-13	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	8.2E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	8.2E-13	4.1E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000006
				HEPTACHLOR	3.2E-12	mg/m^3	6.1E-13	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	8.0E-13	3.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	6.1E-13	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	1.6E-12	3.1E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								4.0E-10					0.00003
		Exposure Point Total									4.0E-10					0.00003
	Exposure Medium Total										4.0E-10					0.00003
Medium Total											2.5E-06					0.04

TABLE 7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Site 17	Ingestion	4,4'-DDD	1.200	ug/L	6.6E-06	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	1.6E-06	3.3E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	8.8E-06	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	3.0E-06	4.4E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.09
			Exp. Route Total								4.6E-06					0.09
			Dermal	4,4'-DDD	1.200	ug/L	0.0E+00	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	0.0E+00	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									4.6E-06					0.09
	Exposure Medium Total										4.6E-06					0.09
	Air	Site 17	Inhalation	4,4'-DDD	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	6.9E-05	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	0.000	mg/m^3	0.0E+00	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					--
	Exposure Medium Total										- -					--
Medium Total											4.6E-06					0.09

TABLE 7.1.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Arsenic	8.00	mg/kg	5.5E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	8.3E-08	3.9E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Heptachlor Epoxide	0.020	mg/kg	1.4E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.3E-09	9.7E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0007
			Exp. Route Total								8.4E-08					0.01
			Dermal	Arsenic	8.00	mg/kg	3.3E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	5.0E-09	2.3E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0008
				Heptachlor Epoxide	0.020	mg/kg	2.8E-11	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	2.5E-10	1.9E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0001
			Exp. Route Total								5.2E-09					0.0009
		Exposure Point Total									9.0E-08					0.01
	Exposure Medium Total										9.0E-08					0.01
	Air	Site 17	Inhalation	Arsenic	4.9E-6	mg/m^3	4.8E-09	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	2.1E-08	3.4E-07	(mg/m^3)	1.5E-05	(mg/m^3)	0.02
				Heptachlor Epoxide	1.2E-8	mg/m^3	1.2E-11	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	3.1E-11	8.5E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								2.1E-08					0.02
		Exposure Point Total									2.1E-08					0.02
	Exposure Medium Total										2.1E-08					0.02
Medium Total											1.1E-07					0.04
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	ARSENIC	4.40	mg/kg	3.0E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	4.6E-08	2.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.007
				MONURON	0.050	mg/kg	3.5E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.4E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.6E-08	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	5.4E-09	1.1E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.002
				ALPHA-CHLORDANE	0.400	mg/kg	2.8E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	9.7E-10	1.9E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0004
				DIELDRIN	0.003	mg/kg	2.1E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	3.3E-10	1.5E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00003
				GAMMA-CHLORDANE	0.400	mg/kg	2.8E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	9.7E-10	1.9E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0004
				HEPTACHLOR	0.030	mg/kg	2.1E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	9.3E-10	1.5E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				HEPTACHLOR EPOXIDE	0.030	mg/kg	2.1E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.9E-09	1.5E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.001
			Exp. Route Total								5.6E-08					0.01
			Dermal	ARSENIC	4.40	mg/kg	1.8E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.7E-09	1.3E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0004
				MONURON	0.050	mg/kg	6.9E-11	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.8E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	9.5E-10	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	3.2E-10	6.7E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0001
				ALPHA-CHLORDANE	0.400	mg/kg	2.2E-10	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	7.7E-11	1.5E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				DIELDRIN	0.003	mg/kg	4.2E-12	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	6.6E-11	2.9E-10	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.000006
				GAMMA-CHLORDANE	0.400	mg/kg	2.2E-10	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	7.7E-11	1.5E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				HEPTACHLOR	0.030	mg/kg	4.2E-11	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	1.9E-10	2.9E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000006
				HEPTACHLOR EPOXIDE	0.030	mg/kg	4.2E-11	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	3.8E-10	2.9E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0002
			Exp. Route Total								3.9E-09					0.0009
		Exposure Point Total									6.0E-08					0.01
	Exposure Medium Total										6.0E-08					0.01
	Air	Site 17	Inhalation	ARSENIC	2.7E-6	mg/m^3	2.7E-09	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	1.1E-08	1.9E-07	(mg/m^3)	1.5E-05	(mg/m^3)	0.01
				MONURON	3.1E-8	mg/m^3	3.0E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.1E-09	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	1.4E-6	mg/m^3	1.4E-09	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	1.3E-10	9.7E-08	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	2.5E-7	mg/m^3	2.4E-10	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	2.4E-11	1.7E-08	(mg/m^3)	7.0E-04	(mg/m^3)	0.00002
				DIELDRIN	1.9E-9	mg/m^3	1.8E-12	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	8.3E-12	1.3E-10	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	2.5E-7	mg/m^3	2.4E-10	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	2.4E-11	1.7E-08	(mg/m^3)	7.0E-04	(mg/m^3)	0.00002
				HEPTACHLOR	1.9E-8	mg/m^3	1.8E-11	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	2.4E-11	1.3E-09	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	1.9E-8	mg/m^3	1.8E-11	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	4.7E-11	1.3E-09	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								1.2E-08					0.01
		Exposure Point Total									1.2E-08					0.01
	Exposure Medium Total										1.2E-08					0.01
Medium Total											7.2E-08					0.02

TABLE 7.1.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Site 17	Ingestion	4,4'-DDD	1.200	ug/L	1.0E-10	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	2.4E-11	7.0E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	1.3E-10	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	4.6E-11	9.4E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
			Exp. Route Total								7.0E-11					0.00002
			Dermal	4,4'-DDD	1.200	ug/L	0.0E+00	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	0.0E+00	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									7.0E-11					0.00002
	Exposure Medium Total										7.0E-11					0.00002
	Air	Site 17	Inhalation	4,4'-DDD	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	6.9E-05	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					--
	Exposure Medium Total										- -					--
Medium Total											7.0E-11					0.00002

TABLE 7.2.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Arsenic	8.00	mg/kg	4.4E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	6.6E-07	3.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Heptachlor Epoxide	0.020	mg/kg	1.1E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.0E-08	8.6E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0007
			Exp. Route Total								6.7E-07					0.01
			Dermal	Arsenic	8.00	mg/kg	1.7E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.6E-08	1.4E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0005
				Heptachlor Epoxide	0.020	mg/kg	1.5E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.3E-09	1.1E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00009
			Exp. Route Total								2.8E-08					0.0005
		Exposure Point Total									7.0E-07					0.01
	Exposure Medium Total										7.0E-07					0.01
	Air	Site 17	Inhalation	Arsenic	8.5E-10	mg/m^3	2.2E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	9.4E-11	1.7E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00001
				Heptachlor Epoxide	2.1E-12	mg/m^3	5.5E-14	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	1.4E-13	4.3E-13	(mg/m^3)	NA	(mg/m^3)	0.00000
			Exp. Route Total								9.5E-11					0.00001
		Exposure Point Total									9.5E-11					0.00001
	Exposure Medium Total										9.5E-11					0.00001
Medium Total											7.0E-07					0.01
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	ARSENIC	4.40	mg/kg	2.4E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	3.6E-07	1.9E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.006
				MONURON	0.050	mg/kg	2.8E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.3E-07	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	4.3E-08	9.9E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.002
				ALPHA-CHLORDANE	0.400	mg/kg	2.2E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	7.7E-09	1.7E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0003
				DIELDRIN	0.003	mg/kg	1.7E-10	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	2.6E-09	1.3E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00003
				GAMMA-CHLORDANE	0.400	mg/kg	2.2E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	7.7E-09	1.7E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0003
				HEPTACHLOR	0.030	mg/kg	1.7E-09	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	7.4E-09	1.3E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				HEPTACHLOR EPOXIDE	0.030	mg/kg	1.7E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.5E-08	1.3E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0010
			Exp. Route Total								4.5E-07					0.010
			Dermal	ARSENIC	4.40	mg/kg	9.6E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.4E-08	7.5E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0002
				MONURON	0.050	mg/kg	3.6E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.8E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	5.0E-09	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	1.7E-09	3.9E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00008
				ALPHA-CHLORDANE	0.400	mg/kg	1.2E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	4.1E-10	9.1E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
				DIELDRIN	0.003	mg/kg	2.2E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	3.5E-10	1.7E-10	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.000003
				GAMMA-CHLORDANE	0.400	mg/kg	1.2E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	4.1E-10	9.1E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
				HEPTACHLOR	0.030	mg/kg	2.2E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	9.8E-10	1.7E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000003
				HEPTACHLOR EPOXIDE	0.030	mg/kg	2.2E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	2.0E-09	1.7E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0001
			Exp. Route Total								2.0E-08					0.0005
		Exposure Point Total									4.7E-07					0.01
	Exposure Medium Total										4.7E-07					0.01
	Air	Site 17	Inhalation	ARSENIC	4.7E-10	mg/m^3	1.2E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	5.2E-11	9.4E-11	(mg/m^3)	1.5E-05	(mg/m^3)	0.000006
				MONURON	5.3E-12	mg/m^3	1.4E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	6.3E-12	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	6.1E-13	4.9E-11	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	1.1E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	1.1E-13	8.5E-12	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000001
				DIELDRIN	3.2E-13	mg/m^3	8.2E-15	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	3.8E-14	6.4E-14	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	1.1E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	1.1E-13	8.5E-12	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000001
				HEPTACHLOR	3.2E-12	mg/m^3	8.2E-14	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	1.1E-13	6.4E-13	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	8.2E-14	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	2.1E-13	6.4E-13	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								5.3E-11					0.000006
		Exposure Point Total									5.3E-11					0.000006
	Exposure Medium Total										5.3E-11					0.000006
Medium Total											4.7E-07					0.01

TABLE 7.3.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Arsenic	8.00	mg/kg	3.9E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	5.9E-08	2.7E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Heptachlor Epoxide	0.020	mg/kg	9.8E-11	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	8.9E-10	6.8E-10	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00005
			Exp. Route Total								6.0E-08					0.001
			Dermal	Arsenic	8.00	mg/kg	5.0E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	7.5E-09	3.5E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0001
				Heptachlor Epoxide	0.020	mg/kg	4.1E-11	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	3.8E-10	2.9E-10	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00002
			Exp. Route Total								7.8E-09					0.0001
		Exposure Point Total									6.7E-08					0.001
	Exposure Medium Total										6.7E-08					0.001
	Air	Site 17	Inhalation	Arsenic	8.5E-10	mg/m^3	3.6E-13	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	1.6E-12	2.5E-12	(mg/m^3)	1.5E-05	(mg/m^3)	0.0000002
				Heptachlor Epoxide	2.1E-12	mg/m^3	9.1E-16	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	2.4E-15	6.3E-15	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								1.6E-12					0.0000002
		Exposure Point Total									1.6E-12					0.0000002
	Exposure Medium Total										1.6E-12					0.0000002
Medium Total											6.7E-08					0.001
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	ARSENIC	4.40	mg/kg	2.2E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	3.2E-08	1.5E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0005
				MONURON	0.050	mg/kg	2.4E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.1E-08	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	3.8E-09	7.9E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				ALPHA-CHLORDANE	0.400	mg/kg	2.0E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	6.8E-10	1.4E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				DIELDRIN	0.003	mg/kg	1.5E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	2.3E-10	1.0E-10	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.000002
				GAMMA-CHLORDANE	0.400	mg/kg	2.0E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	6.8E-10	1.4E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				HEPTACHLOR	0.030	mg/kg	1.5E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	6.6E-10	1.0E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000002
				HEPTACHLOR EPOXIDE	0.030	mg/kg	1.5E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.3E-09	1.0E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00008
			Exp. Route Total								4.0E-08					0.0008
			Dermal	ARSENIC	4.40	mg/kg	2.7E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	4.1E-09	1.9E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00006
				MONURON	0.050	mg/kg	1.0E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.3E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.4E-09	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	4.9E-10	1.0E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
				ALPHA-CHLORDANE	0.400	mg/kg	3.3E-10	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.2E-10	2.3E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000005
				DIELDRIN	0.003	mg/kg	6.2E-12	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	1.0E-10	4.4E-11	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.000001
				GAMMA-CHLORDANE	0.400	mg/kg	3.3E-10	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.2E-10	2.3E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000005
				HEPTACHLOR	0.030	mg/kg	6.2E-11	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	2.8E-10	4.4E-10	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000001
				HEPTACHLOR EPOXIDE	0.030	mg/kg	6.2E-11	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	5.7E-10	4.4E-10	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00003
			Exp. Route Total								5.8E-09					0.0001
		Exposure Point Total									4.5E-08					0.001
	Exposure Medium Total										4.5E-08					0.001
	Air	Site 17	Inhalation	ARSENIC	4.7E-10	mg/m^3	2.0E-13	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	8.6E-13	1.4E-12	(mg/m^3)	1.5E-05	(mg/m^3)	0.00000009
				MONURON	5.3E-12	mg/m^3	2.3E-15	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.6E-14	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	1.0E-13	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	1.0E-14	7.3E-13	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	1.8E-14	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	1.8E-15	1.3E-13	(mg/m^3)	7.0E-04	(mg/m^3)	--
				DIELDRIN	3.2E-13	mg/m^3	1.4E-16	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	6.2E-16	9.5E-16	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	1.8E-14	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	1.8E-15	1.3E-13	(mg/m^3)	7.0E-04	(mg/m^3)	--
				HEPTACHLOR	3.2E-12	mg/m^3	1.4E-15	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	1.8E-15	9.5E-15	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	1.4E-15	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	3.5E-15	9.5E-15	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								8.8E-13					0.00000009
		Exposure Point Total									8.8E-13					0.00000009
	Exposure Medium Total										8.8E-13					0.00000009
Medium Total											4.5E-08					0.001

TABLE 7.3.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Arsenic	8.00	mg/kg	3.9E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	5.9E-08	2.7E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Heptachlor Epoxide	0.020	mg/kg	9.8E-11	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	8.9E-10	6.8E-10	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00005
			Exp. Route Total								6.0E-08					0.001
			Dermal	Arsenic	8.00	mg/kg	5.0E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	7.5E-09	3.5E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0001
				Heptachlor Epoxide	0.020	mg/kg	4.1E-11	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	3.8E-10	2.9E-10	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00002
			Exp. Route Total								7.8E-09					0.0001
		Exposure Point Total									6.7E-08					0.001
	Exposure Medium Total										6.7E-08					0.001
	Air	Site 17	Inhalation	Arsenic	8.5E-10	mg/m^3	3.6E-13	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	1.6E-12	2.5E-12	(mg/m^3)	1.5E-05	(mg/m^3)	0.0000002
				Heptachlor Epoxide	2.1E-12	mg/m^3	9.1E-16	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	2.4E-15	6.3E-15	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								1.6E-12					0.0000002
		Exposure Point Total									1.6E-12					0.0000002
	Exposure Medium Total										1.6E-12					0.0000002
Medium Total											6.7E-08					0.001
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	ARSENIC	4.40	mg/kg	2.2E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	3.2E-08	1.5E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0005
				MONURON	0.050	mg/kg	2.4E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.1E-08	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	3.8E-09	7.9E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				ALPHA-CHLORDANE	0.400	mg/kg	2.0E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	6.8E-10	1.4E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				DIELDRIN	0.003	mg/kg	1.5E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	2.3E-10	1.0E-10	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.000002
				GAMMA-CHLORDANE	0.400	mg/kg	2.0E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	6.8E-10	1.4E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				HEPTACHLOR	0.030	mg/kg	1.5E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	6.6E-10	1.0E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000002
				HEPTACHLOR EPOXIDE	0.030	mg/kg	1.5E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.3E-09	1.0E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00008
			Exp. Route Total								4.0E-08					0.0008
			Dermal	ARSENIC	4.40	mg/kg	2.7E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	4.1E-09	1.9E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00006
				MONURON	0.050	mg/kg	1.0E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.3E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.4E-09	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	4.9E-10	1.0E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
				ALPHA-CHLORDANE	0.400	mg/kg	3.3E-10	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.2E-10	2.3E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000005
				DIELDRIN	0.003	mg/kg	6.2E-12	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	1.0E-10	4.4E-11	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.000001
				GAMMA-CHLORDANE	0.400	mg/kg	3.3E-10	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.2E-10	2.3E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000005
				HEPTACHLOR	0.030	mg/kg	6.2E-11	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	2.8E-10	4.4E-10	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000001
				HEPTACHLOR EPOXIDE	0.030	mg/kg	6.2E-11	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	5.7E-10	4.4E-10	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00003
			Exp. Route Total								5.8E-09					0.0001
		Exposure Point Total									4.5E-08					0.001
	Exposure Medium Total										4.5E-08					0.001
	Air	Site 17	Inhalation	ARSENIC	4.7E-10	mg/m^3	2.0E-13	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	8.6E-13	1.4E-12	(mg/m^3)	1.5E-05	(mg/m^3)	0.00000009
				MONURON	5.3E-12	mg/m^3	2.3E-15	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.6E-14	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	1.0E-13	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	1.0E-14	7.3E-13	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	1.8E-14	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	1.8E-15	1.3E-13	(mg/m^3)	7.0E-04	(mg/m^3)	--
				DIELDRIN	3.2E-13	mg/m^3	1.4E-16	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	6.2E-16	9.5E-16	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	1.8E-14	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	1.8E-15	1.3E-13	(mg/m^3)	7.0E-04	(mg/m^3)	--
				HEPTACHLOR	3.2E-12	mg/m^3	1.4E-15	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	1.8E-15	9.5E-15	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	1.4E-15	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	3.5E-15	9.5E-15	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								8.8E-13					0.00000009
		Exposure Point Total									8.8E-13					0.00000009
	Exposure Medium Total										8.8E-13					0.00000009
Medium Total											4.5E-08					0.001

TABLE 7.4.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Arsenic	8.00	mg/kg	4.1E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	6.1E-08	2.0E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Heptachlor Epoxide	0.020	mg/kg	1.0E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	9.3E-10	5.1E-10	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00004
			Exp. Route Total								6.2E-08					0.001
			Dermal	Arsenic	8.00	mg/kg	1.4E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.1E-09	7.0E-09	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00002
				Heptachlor Epoxide	0.020	mg/kg	1.2E-11	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.1E-10	5.8E-11	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.000004
			Exp. Route Total								2.2E-09					0.00003
		Exposure Point Total									6.4E-08					0.001
	Exposure Medium Total										6.4E-08					0.001
	Air	Site 17	Inhalation	Arsenic	8.5E-10	mg/m^3	5.1E-13	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	2.2E-12	2.5E-12	(mg/m^3)	1.5E-05	(mg/m^3)	0.0000002
				Heptachlor Epoxide	2.1E-12	mg/m^3	1.3E-15	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	3.3E-15	6.3E-15	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								2.2E-12					0.0000002
		Exposure Point Total									2.2E-12					0.0000002
	Exposure Medium Total										2.2E-12					0.0000002
Medium Total											6.4E-08					0.001
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	ARSENIC	4.40	mg/kg	2.2E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	3.4E-08	1.1E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0004
				MONURON	0.050	mg/kg	2.5E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.2E-08	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	4.0E-09	5.9E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0001
				ALPHA-CHLORDANE	0.400	mg/kg	2.0E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	7.1E-10	1.0E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
				DIELDRIN	0.003	mg/kg	1.5E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	2.4E-10	7.6E-11	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.000002
				GAMMA-CHLORDANE	0.400	mg/kg	2.0E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	7.1E-10	1.0E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
				HEPTACHLOR	0.030	mg/kg	1.5E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	6.9E-10	7.6E-10	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000002
				HEPTACHLOR EPOXIDE	0.030	mg/kg	1.5E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.4E-09	7.6E-10	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00006
			Exp. Route Total								4.1E-08					0.0006
			Dermal	ARSENIC	4.40	mg/kg	7.7E-10	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.1E-09	3.8E-09	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00001
				MONURON	0.050	mg/kg	2.9E-11	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	4.0E-10	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	1.4E-10	2.0E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000004
				ALPHA-CHLORDANE	0.400	mg/kg	9.3E-11	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	3.2E-11	4.6E-10	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000001
				DIELDRIN	0.003	mg/kg	1.7E-12	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	2.8E-11	8.7E-12	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.0000002
				GAMMA-CHLORDANE	0.400	mg/kg	9.3E-11	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	3.2E-11	4.6E-10	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000001
				HEPTACHLOR	0.030	mg/kg	1.7E-11	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	7.8E-11	8.7E-11	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0000002
				HEPTACHLOR EPOXIDE	0.030	mg/kg	1.7E-11	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.6E-10	8.7E-11	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00001
			Exp. Route Total								1.6E-09					0.00003
		Exposure Point Total									4.3E-08					0.001
	Exposure Medium Total										4.3E-08					0.001
	Air	Site 17	Inhalation	ARSENIC	4.7E-10	mg/m^3	2.8E-13	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	1.2E-12	1.4E-12	(mg/m^3)	1.5E-05	(mg/m^3)	0.00000009
				MONURON	5.3E-12	mg/m^3	3.2E-15	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.6E-14	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	1.5E-13	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	1.4E-14	7.3E-13	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	2.5E-14	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	2.5E-15	1.3E-13	(mg/m^3)	7.0E-04	(mg/m^3)	--
				DIELDRIN	3.2E-13	mg/m^3	1.9E-16	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	8.7E-16	9.5E-16	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	2.5E-14	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	2.5E-15	1.3E-13	(mg/m^3)	7.0E-04	(mg/m^3)	--
				HEPTACHLOR	3.2E-12	mg/m^3	1.9E-15	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	2.5E-15	9.5E-15	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	1.9E-15	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	4.9E-15	9.5E-15	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								1.2E-12					0.00000009
		Exposure Point Total									1.2E-12					0.00000009
	Exposure Medium Total										1.2E-12					0.00000009
Medium Total											4.3E-08					0.001

TABLE 7.5.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Arsenic	8.00	mg/kg	1.0E-06	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.6E-06	3.7E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.1
				Heptachlor Epoxide	0.020	mg/kg	2.6E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	2.4E-08	9.2E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.007
			Exp. Route Total								1.6E-06					0.1
			Dermal	Arsenic	8.00	mg/kg	3.5E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	5.3E-08	1.2E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.004
				Heptachlor Epoxide	0.020	mg/kg	2.9E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	2.7E-09	1.0E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0008
			Exp. Route Total								5.5E-08					0.005
		Exposure Point Total									1.6E-06					0.1
	Exposure Medium Total										1.6E-06					0.1
	Air	Site 17	Inhalation	Arsenic	8.5E-10	mg/m^3	1.6E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	6.7E-11	5.5E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00004
				Heptachlor Epoxide	2.1E-12	mg/m^3	3.9E-14	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	1.0E-13	1.4E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								6.7E-11					0.00004
		Exposure Point Total									6.7E-11					0.00004
	Exposure Medium Total										6.7E-11					0.00004
Medium Total											1.6E-06					0.1
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	ARSENIC	4.40	mg/kg	5.8E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	8.6E-07	2.0E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.07
				MONURON	0.050	mg/kg	6.5E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	3.0E-07	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	1.0E-07	1.1E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.02
				ALPHA-CHLORDANE	0.400	mg/kg	5.2E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.8E-08	1.8E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.004
				DIELDRIN	0.003	mg/kg	3.9E-10	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	6.3E-09	1.4E-08	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.0003
				GAMMA-CHLORDANE	0.400	mg/kg	5.2E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.8E-08	1.8E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.004
				HEPTACHLOR	0.030	mg/kg	3.9E-09	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	1.8E-08	1.4E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0003
				HEPTACHLOR EPOXIDE	0.030	mg/kg	3.9E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	3.6E-08	1.4E-07	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.01
			Exp. Route Total								1.1E-06					0.1
			Dermal	ARSENIC	4.40	mg/kg	1.9E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.9E-08	6.8E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				MONURON	0.050	mg/kg	7.3E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.0E-08	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	3.4E-09	3.5E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0007
				ALPHA-CHLORDANE	0.400	mg/kg	2.3E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	8.2E-10	8.2E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				DIELDRIN	0.003	mg/kg	4.4E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	7.0E-10	1.5E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00003
				GAMMA-CHLORDANE	0.400	mg/kg	2.3E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	8.2E-10	8.2E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0002
				HEPTACHLOR	0.030	mg/kg	4.4E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	2.0E-09	1.5E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				HEPTACHLOR EPOXIDE	0.030	mg/kg	4.4E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	4.0E-09	1.5E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.001
			Exp. Route Total								4.1E-08					0.005
		Exposure Point Total									1.1E-06					0.1
	Exposure Medium Total										1.1E-06					0.1
	Air	Site 17	Inhalation	ARSENIC	4.7E-10	mg/m^3	8.6E-12	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	3.7E-11	3.0E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00002
				MONURON	5.3E-12	mg/m^3	9.8E-14	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.4E-12	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	4.5E-12	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	4.4E-13	1.6E-10	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	7.8E-13	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	7.8E-14	2.7E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000004
				DIELDRIN	3.2E-13	mg/m^3	5.9E-15	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	2.7E-14	2.1E-13	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	7.8E-13	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	7.8E-14	2.7E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000004
				HEPTACHLOR	3.2E-12	mg/m^3	5.9E-14	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	7.6E-14	2.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	5.9E-14	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	1.5E-13	2.1E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								3.8E-11					0.00002
		Exposure Point Total									3.8E-11					0.00002
	Exposure Medium Total										3.8E-11					0.00002
Medium Total											1.1E-06					0.1

TABLE 7.5.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Site 17	Ingestion	4,4'-DDD	1.200	ug/L	1.0E-06	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	2.5E-07	3.6E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	1.4E-06	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	4.7E-07	4.8E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.10
			Exp. Route Total								7.2E-07					0.10
			Dermal	4,4'-DDD	1.200	ug/L	0.0E+00	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	0.0E+00	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									7.2E-07					0.10
	Exposure Medium Total										7.2E-07					0.10
	Air	Site 17	Inhalation	4,4'-DDD	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	6.9E-05	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					--
	Exposure Medium Total										- -					--
Medium Total											7.2E-07					0.10

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.6.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION,NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Arsenic	8.00	mg/kg	1.4E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	2.1E-07	4.9E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Heptachlor Epoxide	0.020	mg/kg	3.5E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	3.2E-09	1.2E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0009
			Exp. Route Total								2.1E-07					0.02
			Dermal	Arsenic	8.00	mg/kg	4.8E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	7.2E-09	1.7E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0006
				Heptachlor Epoxide	0.020	mg/kg	4.0E-11	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	3.7E-10	1.4E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0001
			Exp. Route Total								7.6E-09					0.0007
		Exposure Point Total									2.2E-07					0.02
	Exposure Medium Total										2.2E-07					0.02
	Air	Site 17	Inhalation	Arsenic	8.5E-10	mg/m^3	1.6E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	6.7E-11	5.5E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00004
				Heptachlor Epoxide	2.1E-12	mg/m^3	3.9E-14	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	1.0E-13	1.4E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								6.7E-11					0.00004
		Exposure Point Total									6.7E-11					0.00004
	Exposure Medium Total										6.7E-11					0.00004
Medium Total											2.2E-07					0.02
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	ARSENIC	4.40	mg/kg	7.7E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.2E-07	2.7E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.009
				MONURON	0.050	mg/kg	8.8E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.1E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	4.1E-08	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	1.4E-08	1.4E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.003
				ALPHA-CHLORDANE	0.400	mg/kg	7.0E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	2.5E-09	2.5E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0005
				DIELDRIN	0.003	mg/kg	5.3E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	8.5E-10	1.8E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00004
				GAMMA-CHLORDANE	0.400	mg/kg	7.0E-09	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	2.5E-09	2.5E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0005
				HEPTACHLOR	0.030	mg/kg	5.3E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	2.4E-09	1.8E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00004
				HEPTACHLOR EPOXIDE	0.030	mg/kg	5.3E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	4.8E-09	1.8E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.001
			Exp. Route Total								1.4E-07					0.01
			Dermal	ARSENIC	4.40	mg/kg	2.7E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	4.0E-09	9.3E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0003
				MONURON	0.050	mg/kg	1.0E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.5E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.4E-09	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	4.7E-10	4.8E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00010
				ALPHA-CHLORDANE	0.400	mg/kg	3.2E-10	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.1E-10	1.1E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
				DIELDRIN	0.003	mg/kg	6.0E-12	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	9.6E-11	2.1E-10	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.000004
				GAMMA-CHLORDANE	0.400	mg/kg	3.2E-10	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	1.1E-10	1.1E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
				HEPTACHLOR	0.030	mg/kg	6.0E-11	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	2.7E-10	2.1E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000004
				HEPTACHLOR EPOXIDE	0.030	mg/kg	6.0E-11	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	5.5E-10	2.1E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0002
			Exp. Route Total								5.6E-09					0.0006
		Exposure Point Total									1.5E-07					0.01
	Exposure Medium Total										1.5E-07					0.01
	Air	Site 17	Inhalation	ARSENIC	4.7E-10	mg/m^3	8.6E-12	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	3.7E-11	3.0E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00002
				MONURON	5.3E-12	mg/m^3	9.8E-14	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.4E-12	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	4.5E-12	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	4.4E-13	1.6E-10	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	7.8E-13	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	7.8E-14	2.7E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000004
				DIELDRIN	3.2E-13	mg/m^3	5.9E-15	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	2.7E-14	2.1E-13	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	7.8E-13	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	7.8E-14	2.7E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000004
				HEPTACHLOR	3.2E-12	mg/m^3	5.9E-14	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	7.6E-14	2.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	5.9E-14	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	1.5E-13	2.1E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								3.8E-11					0.00002
		Exposure Point Total									3.8E-11					0.00002
	Exposure Medium Total										3.8E-11					0.00002
Medium Total											1.5E-07					0.02

TABLE 7.6.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION,NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Site 17	Ingestion	4,4'-DDD	1.200	ug/L	3.7E-07	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	8.8E-08	1.3E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	4.9E-07	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	1.7E-07	1.7E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.03
			Exp. Route Total								2.5E-07					0.03
			Dermal	4,4'-DDD	1.200	ug/L	0.0E+00	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	0.0E+00	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									2.5E-07					0.03
	Exposure Medium Total										2.5E-07					0.03
	Air	Site 17	Inhalation	4,4'-DDD	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	6.9E-05	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	0.000	mg/m^3	0.0E+00	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					--
	Exposure Medium Total										- -					--
Medium Total											2.5E-07					0.03

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.7.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Site 17	Ingestion	Arsenic	8.00	mg/kg	3.7E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	5.5E-07	3.7E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Heptachlor Epoxide	0.020	mg/kg	9.2E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	8.3E-09	9.2E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0007
			Exp. Route Total								5.6E-07					0.01
			Dermal	Arsenic	8.00	mg/kg	1.3E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.9E-08	1.3E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0004
				Heptachlor Epoxide	0.020	mg/kg	1.0E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	9.5E-10	1.0E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.00008
			Exp. Route Total								2.0E-08					0.0005
		Exposure Point Total									5.8E-07					0.01
	Exposure Medium Total										5.8E-07					0.01
	Air	Site 17	Inhalation	Arsenic	8.5E-10	mg/m^3	5.5E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	2.4E-10	5.5E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00004
				Heptachlor Epoxide	2.1E-12	mg/m^3	1.4E-13	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	3.6E-13	1.4E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								2.4E-10					0.00004
		Exposure Point Total									2.4E-10					0.00004
	Exposure Medium Total										2.4E-10					0.00004
Medium Total											5.8E-07					0.01
Subsurface Soil	Subsurface Soil	Site 17	Ingestion	ARSENIC	4.40	mg/kg	2.0E-07	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	3.0E-07	2.0E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.007
				MONURON	0.050	mg/kg	2.3E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	1.1E-07	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	3.6E-08	1.1E-06	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.002
				ALPHA-CHLORDANE	0.400	mg/kg	1.8E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	6.4E-09	1.8E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0004
				DIELDRIN	0.003	mg/kg	1.4E-10	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	2.2E-09	1.4E-09	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.00003
				GAMMA-CHLORDANE	0.400	mg/kg	1.8E-08	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	6.4E-09	1.8E-07	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.0004
				HEPTACHLOR	0.030	mg/kg	1.4E-09	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	6.2E-09	1.4E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00003
				HEPTACHLOR EPOXIDE	0.030	mg/kg	1.4E-09	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.3E-08	1.4E-08	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.001
			Exp. Route Total								3.7E-07					0.01
			Dermal	ARSENIC	4.40	mg/kg	6.9E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.0E-08	6.9E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0002
				MONURON	0.050	mg/kg	2.6E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	2.30	mg/kg	3.6E-09	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	1.2E-09	3.6E-08	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00007
				ALPHA-CHLORDANE	0.400	mg/kg	8.4E-10	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	2.9E-10	8.4E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
				DIELDRIN	0.003	mg/kg	1.6E-11	(mg/kg/day)	1.6E+01	$(mg/kg/day)^{-1}$	2.5E-10	1.6E-10	(mg/kg/day)	5.0E-05	(mg/kg/day)	0.000003
				GAMMA-CHLORDANE	0.400	mg/kg	8.4E-10	(mg/kg/day)	3.5E-01	$(mg/kg/day)^{-1}$	2.9E-10	8.4E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.00002
				HEPTACHLOR	0.030	mg/kg	1.6E-10	(mg/kg/day)	4.5E+00	$(mg/kg/day)^{-1}$	7.0E-10	1.6E-09	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.000003
				HEPTACHLOR EPOXIDE	0.030	mg/kg	1.6E-10	(mg/kg/day)	9.1E+00	$(mg/kg/day)^{-1}$	1.4E-09	1.6E-09	(mg/kg/day)	1.3E-05	(mg/kg/day)	0.0001
			Exp. Route Total								1.5E-08					0.0005
		Exposure Point Total									3.9E-07					0.01
	Exposure Medium Total										3.9E-07					0.01
	Air	Site 17	Inhalation	ARSENIC	4.7E-10	mg/m^3	3.0E-11	(mg/m^3)	4.3E-03	$(ug/m^3)^{-1}$	1.3E-10	3.0E-10	(mg/m^3)	1.5E-05	(mg/m^3)	0.00002
				MONURON	5.3E-12	mg/m^3	3.4E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.4E-12	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	2.5E-10	mg/m^3	1.6E-11	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	1.5E-12	1.6E-10	(mg/m^3)	NA	(mg/m^3)	--
				ALPHA-CHLORDANE	4.3E-11	mg/m^3	2.7E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	2.7E-13	2.7E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000004
				DIELDRIN	3.2E-13	mg/m^3	2.1E-14	(mg/m^3)	4.6E-03	$(ug/m^3)^{-1}$	9.4E-14	2.1E-13	(mg/m^3)	NA	(mg/m^3)	--
				GAMMA-CHLORDANE	4.3E-11	mg/m^3	2.7E-12	(mg/m^3)	1.0E-04	$(ug/m^3)^{-1}$	2.7E-13	2.7E-11	(mg/m^3)	7.0E-04	(mg/m^3)	0.00000004
				HEPTACHLOR	3.2E-12	mg/m^3	2.1E-13	(mg/m^3)	1.3E-03	$(ug/m^3)^{-1}$	2.7E-13	2.1E-12	(mg/m^3)	NA	(mg/m^3)	--
				HEPTACHLOR EPOXIDE	3.2E-12	mg/m^3	2.1E-13	(mg/m^3)	2.6E-03	$(ug/m^3)^{-1}$	5.3E-13	2.1E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								1.3E-10					0.00002
		Exposure Point Total									1.3E-10					0.00002
	Exposure Medium Total										1.3E-10					0.00002
Medium Total											3.9E-07					0.01

TABLE 7.7.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Site 17	Ingestion	4,4'-DDD	1.200	ug/L	1.5E-06	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	3.7E-07	1.5E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	2.1E-06	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	7.0E-07	2.1E-05	(mg/kg/day)	5.0E-04	(mg/kg/day)	0.04
			Exp. Route Total								1.1E-06					0.04
			Dermal	4,4'-DDD	1.200	ug/L	0.0E+00	(mg/kg/day)	2.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				4,4'-DDT	1.6	ug/L	0.0E+00	(mg/kg/day)	3.4E-01	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.0E-04	(mg/kg/day)	--
			Exp. Route Total								- -					--
		Exposure Point Total									1.1E-06					0.04
	Exposure Medium Total										1.1E-06					0.04
	Air	Site 17	Inhalation	4,4'-DDD	0.0E+0	mg/m^3	0.0E+00	(mg/m^3)	6.9E-05	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
				4,4'-DDT	0.000	mg/m^3	0.0E+00	(mg/m^3)	9.7E-05	$(ug/m^3)^{-1}$	- -	0.0E+00	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								- -					--
		Exposure Point Total									- -					--
	Exposure Medium Total										- -					--
Medium Total											1.1E-06					0.04

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SUMMARY OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

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9.1 RME Construction Workers
9.2 RME Industrial Workers
9.3 RME Adolescent Trespassers
9.4 RME Adult Trespassers
9.5 RME Young Child Residents
9.6 RME Adolescent Residents
9.7 RME Adult Residents
9.8 RME Lifelong Trespassers
9.9 RME Lifelong Residents

Central Tendency Exposure

9.1 CTE Construction Workers
9.2 CTE Industrial Workers
9.3 CTE Adolescent Trespassers
9.4 CTE Adult Trespassers
9.5 CTE Young Child Residents
9.6 CTE Adolescent Residents
9.7 CTE Adult Residents
9.8 CTE Lifelong Trespassers
9.9 CTE Lifelong Residents

RAGS PART D TABLE 9

Calculation of Chemical Cancer Risk and Non-Cancer Hazards

SITE-SPECIFIC

TABLE 9.1.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Heptachlor Epoxide	5E-09	--	2E-09	--	7E-09	Liver	0.003	- -	0.0009	0.004
			Chemical Total	5E-09	--	2E-09	--	7E-09		0.003	--	0.0009	0.004
		Exposure Point Total						7E-09					0.004
	Exposure Medium Total							7E-09					0.004
	Air	Site 17	Heptachlor Epoxide	--	6E-11	--	--	6E-11	NA	- -	--	- -	--
			Chemical Total	--	6E-11	--	--	6E-11		- -	--	- -	--
		Exposure Point Total						6E-11					--
	Exposure Medium Total							6E-11					--
Medium Total								7E-09					0.004
Subsurface Soil	Subsurface Soil	Site 17	MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	2E-08	--	2E-09	--	2E-08	Liver	0.009	- -	0.0008	0.010
			ALPHA-CHLORDANE	4E-09	--	5E-10	--	4E-09	Liver	0.002	- -	0.0002	0.002
			DIELDRIN	1E-09	--	4E-10	--	2E-09	Liver	0.0001	- -	0.00003	0.0002
			GAMMA-CHLORDANE	4E-09	--	5E-10	--	4E-09	Liver	0.002	- -	0.0002	0.002
			HEPTACHLOR	4E-09	--	1E-09	--	5E-09	Liver	0.0001	- -	0.00003	0.0002
			HEPTACHLOR EPOXIDE	8E-09	--	2E-09	--	1E-08	Liver	0.004	- -	0.001	0.006
			Chemical Total	4E-08	--	7E-09	--	5E-08		0.02	--	0.003	0.02
		Exposure Point Total						5E-08					0.02
	Exposure Medium Total							5E-08					0.02
	Air	Site 17	MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	3E-10	--	--	3E-10	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	5E-11	--	--	5E-11	NA	- -	0.00005	- -	0.00005
			DIELDRIN	--	2E-11	--	--	2E-11	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	5E-11	--	--	5E-11	NA	- -	0.00005	- -	0.00005
			HEPTACHLOR	--	5E-11	--	--	5E-11	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	9E-11	--	--	9E-11	NA	- -	--	- -	--
			Chemical Total	--	5E-10	--	--	5E-10		- -	0.00010	- -	0.00010
		Exposure Point Total						5E-10					0.00010
	Exposure Medium Total							5E-10					0.00010
Medium Total								5E-08					0.02

TABLE 9.1.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Site 17	4,4'-DDD	5E-11	--	- -	--	5E-11	NA	--	- -	--	--
			4,4'-DDT	9E-11	--	- -	--	9E-11	Liver	0.00004	- -	--	0.00004
			Chemical Total	1E-10	--	- -	--	1E-10		0.00004	--	--	0.00004
		Exposure Point Total						1E-10					0.00004
	Exposure Medium Total							1E-10					0.00004
	Air	Site 17	4,4'-DDD	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	- -	--	--	- -	NA	- -	--	- -	--
			Chemical Total	--	- -	--	--	- -		- -	--	- -	--
		Exposure Point Total						- -					--
	Exposure Medium Total							- -					--
Medium Total								1E-10					0.00004

Total Liver HI 0.02

TABLE 9.2.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Heptachlor Epoxide	6E-08	--	4E-08	--	1E-07	Liver	0.002	- -	0.001	0.002
			Chemical Total	6E-08	--	4E-08	--	1E-07		0.002	--	0.001	0.002
		Exposure Point Total						1E-07					0.002
	Exposure Medium Total							1E-07					0.002
	Air	Site 17	Heptachlor Epoxide	--	5E-13	--	--	5E-13	NA	- -	--	- -	--
			Chemical Total	--	5E-13	--	--	5E-13		- -	--	- -	--
		Exposure Point Total						5E-13					--
	Exposure Medium Total							5E-13					--
Medium Total								1E-07					0.002
Subsurface Soil	Subsurface Soil	Site 17	MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	3E-07	--	5E-08	--	3E-07	Liver	0.005	- -	0.0009	0.005
			ALPHA-CHLORDANE	5E-08	--	1E-08	--	6E-08	Liver	0.0008	- -	0.0002	0.0010
			DIELDRIN	2E-08	--	1E-08	--	3E-08	Liver	0.00006	- -	0.00004	0.00010
			GAMMA-CHLORDANE	5E-08	--	1E-08	--	6E-08	Liver	0.0008	- -	0.0002	0.0010
			HEPTACHLOR	5E-08	--	3E-08	--	8E-08	Liver	0.00006	- -	0.00004	0.00010
			HEPTACHLOR EPOXIDE	1E-07	--	6E-08	--	2E-07	Liver	0.002	- -	0.001	0.004
			Chemical Total	5E-07	--	2E-07	--	7E-07		0.01	--	0.003	0.01
		Exposure Point Total						7E-07					0.01
	Exposure Medium Total							7E-07					0.01
	Air	Site 17	MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	2E-12	--	--	2E-12	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	3E-13	--	--	3E-13	NA	- -	0.00000001	- -	0.00000001
			DIELDRIN	--	1E-13	--	--	1E-13	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	3E-13	--	--	3E-13	NA	- -	0.00000001	- -	0.00000001
			HEPTACHLOR	--	3E-13	--	--	3E-13	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	7E-13	--	--	7E-13	NA	- -	--	- -	--
			Chemical Total	--	4E-12	--	--	4E-12		- -	0.00000003	- -	--
		Exposure Point Total						4E-12					--
	Exposure Medium Total							4E-12					--
Medium Total								7E-07					0.01

TABLE 9.2.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Liver HI 0.01

TABLE 9.3.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Heptachlor Epoxide	4E-09	--	5E-09	--	9E-09	Liver	0.0003	- -	0.0003	0.0005
			Chemical Total	4E-09	--	5E-09	--	9E-09		0.0003	--	0.0003	0.001
		Exposure Point Total						9E-09					0.001
	Exposure Medium Total							9E-09					0.001
	Air	Site 17	Heptachlor Epoxide	--	9E-15	--	--	9E-15	NA	- -	--	- -	--
			Chemical Total	--	9E-15	--	--	9E-15		- -	--	- -	--
		Exposure Point Total						9E-15					--
	Exposure Medium Total							9E-15					--
Medium Total								9E-09					0.001
Subsurface Soil	Subsurface Soil	Site 17	MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	2E-08	--	6E-09	--	2E-08	Liver	0.0008	- -	0.0002	0.001
			ALPHA-CHLORDANE	3E-09	--	1E-09	--	5E-09	Liver	0.0001	- -	0.00006	0.0002
			DIELDRIN	1E-09	--	1E-09	--	2E-09	Liver	0.00001	- -	0.00001	0.00002
			GAMMA-CHLORDANE	3E-09	--	1E-09	--	5E-09	Liver	0.0001	- -	0.00006	0.0002
			HEPTACHLOR	3E-09	--	3E-09	--	7E-09	Liver	0.00001	- -	0.00001	0.00002
			HEPTACHLOR EPOXIDE	7E-09	--	7E-09	--	1E-08	Liver	0.0004	- -	0.0004	0.0008
			Chemical Total	4E-08	--	2E-08	--	6E-08		0.001	--	0.001	0.002
		Exposure Point Total						6E-08					0.002
	Exposure Medium Total							6E-08					0.002
	Air	Site 17	MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	4E-14	--	--	4E-14	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	7E-15	--	--	7E-15	NA	- -	--	- -	--
			DIELDRIN	--	2E-15	--	--	2E-15	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	7E-15	--	--	7E-15	NA	- -	--	- -	--
			HEPTACHLOR	--	7E-15	--	--	7E-15	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	1E-14	--	--	1E-14	NA	- -	--	- -	--
			Chemical Total	--	8E-14	--	--	8E-14		- -	--	- -	--
		Exposure Point Total						8E-14					--
	Exposure Medium Total							8E-14					--
Medium Total								6E-08					0.002

TABLE 9.3.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Liver HI 0.003

TABLE 9.4.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Heptachlor Epoxide	4E-09	--	1E-09	--	5E-09	Liver	0.0002	- -	0.00006	0.0002
			Chemical Total	4E-09	--	1E-09	--	5E-09		0.0002	--	0.0001	0.0002
		Exposure Point Total						5E-09					0.0002
	Exposure Medium Total							5E-09					0.0002
	Air	Site 17	Heptachlor Epoxide	--	1E-14	--	--	1E-14	NA	- -	--	- -	--
			Chemical Total	--	1E-14	--	--	1E-14		- -	--	- -	--
		Exposure Point Total						1E-14					--
	Exposure Medium Total							1E-14					--
Medium Total								5E-09					0.0002
Subsurface Soil	Subsurface Soil	Site 17	MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	2E-08	--	2E-09	--	2E-08	Liver	0.0005	- -	0.00006	0.0005
			ALPHA-CHLORDANE	3E-09	--	5E-10	--	3E-09	Liver	0.00008	- -	0.00001	0.00009
			DIELDRIN	1E-09	--	4E-10	--	1E-09	Liver	0.000006	- -	0.000002	0.000009
			GAMMA-CHLORDANE	3E-09	--	5E-10	--	3E-09	Liver	0.00008	- -	0.00001	0.00009
			HEPTACHLOR	3E-09	--	1E-09	--	4E-09	Liver	0.000006	- -	0.000002	0.000009
			HEPTACHLOR EPOXIDE	6E-09	--	2E-09	--	8E-09	Liver	0.0002	- -	0.00009	0.0003
			Chemical Total	3E-08	--	7E-09	--	4E-08		0.001	--	0.0002	0.001
		Exposure Point Total						4E-08					0.001
	Exposure Medium Total							4E-08					0.001
	Air	Site 17	MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	6E-14	--	--	6E-14	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	1E-14	--	--	1E-14	NA	- -	--	- -	--
			DIELDRIN	--	3E-15	--	--	3E-15	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	1E-14	--	--	1E-14	NA	- -	--	- -	--
			HEPTACHLOR	--	1E-14	--	--	1E-14	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	2E-14	--	--	2E-14	NA	- -	--	- -	--
			Chemical Total	--	1E-13	--	--	1E-13		- -	--	- -	--
		Exposure Point Total						1E-13					--
	Exposure Medium Total							1E-13					--
Medium Total								4E-08					0.001

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Liver HI 0.001

TABLE 9.5.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Heptachlor Epoxide	2E-07	--	6E-08	--	3E-07	Liver	0.02	- -	0.006	0.03
			Chemical Total	2E-07	--	6E-08	--	3E-07		0.02	--	0.006	0.03
		Exposure Point Total						3E-07					0.03
	Exposure Medium Total							3E-07					0.03
	Air	Site 17	Heptachlor Epoxide	--	5E-13	--	--	5E-13	NA	- -	--	- -	--
			Chemical Total	--	5E-13	--	--	5E-13		- -	--	- -	--
		Exposure Point Total						5E-13					--
	Exposure Medium Total							5E-13					--
Medium Total								3E-07					0.03
Subsurface Soil	Subsurface Soil	Site 17	MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	9E-07	--	8E-08	--	1E-06	Liver	0.06	- -	0.005	0.07
			ALPHA-CHLORDANE	2E-07	--	2E-08	--	2E-07	Liver	0.01	- -	0.001	0.01
			DIELDRIN	6E-08	--	2E-08	--	7E-08	Liver	0.0008	- -	0.0002	0.001
			GAMMA-CHLORDANE	2E-07	--	2E-08	--	2E-07	Liver	0.01	- -	0.001	0.01
			HEPTACHLOR	2E-07	--	4E-08	--	2E-07	Liver	0.0008	- -	0.0002	0.001
			HEPTACHLOR EPOXIDE	3E-07	--	9E-08	--	4E-07	Liver	0.03	- -	0.009	0.04
			Chemical Total	2E-06	--	3E-07	--	2E-06		0.1	--	0.02	0.1
		Exposure Point Total						2E-06					0.1
	Exposure Medium Total							2E-06					0.1
	Air	Site 17	MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	2E-12	--	--	2E-12	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	4E-13	--	--	4E-13	NA	- -	0.00000006	- -	0.00000006
			DIELDRIN	--	1E-13	--	--	1E-13	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	4E-13	--	--	4E-13	NA	- -	0.00000006	- -	0.00000006
			HEPTACHLOR	--	3E-13	--	--	3E-13	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	7E-13	--	--	7E-13	NA	- -	--	- -	--
			Chemical Total	--	4E-12	--	--	4E-12		- -	0.0000001	- -	0.0000001
		Exposure Point Total						4E-12					0.0000001
	Exposure Medium Total							4E-12					0.0000001
Medium Total								2E-06					0.1

TABLE 9.5.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Site 17	4,4'-DDD	2E-06	--	- -	--	2E-06	NA	--	- -	--	--
			4,4'-DDT	3E-06	--	- -	--	3E-06	Liver	0.2	- -	--	0.2
			Chemical Total	5E-06	--	- -	--	5E-06		0.2	--	--	0.2
		Exposure Point Total						5E-06					0.2
	Exposure Medium Total							5E-06					0.2
	Air	Site 17	4,4'-DDD	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	- -	--	--	- -	NA	- -	- -	- -	- -
			Chemical Total	--	- -	--	--	- -		- -	--	- -	--
		Exposure Point Total						- -					--
	Exposure Medium Total							- -					--
Medium Total								5E-06					0.2

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Liver HI 0.4

TABLE 9.6.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION,NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Heptachlor Epoxide	5E-08	--	5E-08	--	1E-07	Liver	0.003	- -	0.003	0.006
			Chemical Total	5E-08	--	5E-08	--	1E-07		0.003	--	0.003	0.006
		Exposure Point Total						1E-07					0.006
	Exposure Medium Total							1E-07					0.006
	Air	Site 17	Heptachlor Epoxide	--	8E-13	--	--	8E-13	NA	- -	--	- -	--
			Chemical Total	--	8E-13	--	--	8E-13		- -	--	- -	--
		Exposure Point Total						8E-13					--
	Exposure Medium Total							8E-13					--
Medium Total								1E-07					0.006
Subsurface Soil	Subsurface Soil	Site 17	MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	2E-07	--	7E-08	--	3E-07	Liver	0.008	- -	0.003	0.01
			ALPHA-CHLORDANE	4E-08	--	2E-08	--	5E-08	Liver	0.001	- -	0.0006	0.002
			DIELDRIN	1E-08	--	1E-08	--	3E-08	Liver	0.0001	- -	0.0001	0.0002
			GAMMA-CHLORDANE	4E-08	--	2E-08	--	5E-08	Liver	0.001	- -	0.0006	0.002
			HEPTACHLOR	4E-08	--	4E-08	--	7E-08	Liver	0.0001	- -	0.0001	0.0002
			HEPTACHLOR EPOXIDE	7E-08	--	8E-08	--	1E-07	Liver	0.004	- -	0.005	0.009
			Chemical Total	4E-07	--	2E-07	--	6E-07		0.02	--	0.009	0.02
		Exposure Point Total						6E-07					0.02
	Exposure Medium Total							6E-07					0.02
	Air	Site 17	MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	3E-12	--	--	3E-12	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	6E-13	--	--	6E-13	NA	- -	0.00000006	- -	0.00000006
			DIELDRIN	--	2E-13	--	--	2E-13	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	6E-13	--	--	6E-13	NA	- -	0.00000006	- -	0.00000006
			HEPTACHLOR	--	6E-13	--	--	6E-13	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	1E-12	--	--	1E-12	NA	- -	--	- -	--
			Chemical Total	--	6E-12	--	--	6E-12		- -	0.0000001	- -	0.0000001
		Exposure Point Total						6E-12					0.0000001
	Exposure Medium Total							6E-12					0.0000001
Medium Total								6E-07					0.02

TABLE 9.6.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION,NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Site 17	4,4'-DDD	2E-06	--	- -	--	2E-06	NA	--	- -	--	--
			4,4'-DDT	3E-06	--	- -	--	3E-06	Liver	0.1	- -	--	0.1
			Chemical Total	4E-06	--	- -	--	4E-06		0.1	--	--	0.1
		Exposure Point Total						4E-06					0.1
	Exposure Medium Total							4E-06					0.1
	Air	Site 17	4,4'-DDD	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	- -	--	--	- -	NA	- -	--	- -	--
			Chemical Total	--	- -	--	--	- -		- -	--	- -	--
		Exposure Point Total						- -					--
	Exposure Medium Total							- -					--
Medium Total								4E-06					0.1

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Liver HI 0.1

TABLE 9.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Heptachlor Epoxide	5E-08	--	2E-08	--	7E-08	Liver	0.002	- -	0.0008	0.003
			Chemical Total	5E-08	--	2E-08	--	7E-08		0.002	--	0.0008	0.003
		Exposure Point Total						7E-08					0.003
	Exposure Medium Total							7E-08					0.003
	Air	Site 17	Heptachlor Epoxide	--	1E-12	--	--	1E-12	NA	- -	--	- -	--
			Chemical Total	--	1E-12	--	--	1E-12		- -	--	- -	--
		Exposure Point Total						1E-12					--
	Exposure Medium Total							1E-12					--
Medium Total								7E-08					0.003
Subsurface Soil	Subsurface Soil	Site 17	MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	2E-07	--	3E-08	--	2E-07	Liver	0.006	- -	0.0008	0.007
			ALPHA-CHLORDANE	4E-08	--	6E-09	--	4E-08	Liver	0.001	- -	0.0002	0.001
			DIELDRIN	1E-08	--	5E-09	--	2E-08	Liver	0.00008	- -	0.00003	0.0001
			GAMMA-CHLORDANE	4E-08	--	6E-09	--	4E-08	Liver	0.001	- -	0.0002	0.001
			HEPTACHLOR	4E-08	--	1E-08	--	5E-08	Liver	0.00008	- -	0.00003	0.0001
			HEPTACHLOR EPOXIDE	7E-08	--	3E-08	--	1E-07	Liver	0.003	- -	0.001	0.004
			Chemical Total	4E-07	--	9E-08	--	5E-07		0.01	--	0.002	0.01
		Exposure Point Total						5E-07					0.01
	Exposure Medium Total							5E-07					0.01
	Air	Site 17	MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	5E-12	--	--	5E-12	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	8E-13	--	--	8E-13	NA	- -	0.00000006	- -	0.00000006
			DIELDRIN	--	3E-13	--	--	3E-13	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	8E-13	--	--	8E-13	NA	- -	0.00000006	- -	0.00000006
			HEPTACHLOR	--	8E-13	--	--	8E-13	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	2E-12	--	--	2E-12	NA	- -	--	- -	--
			Chemical Total	--	9E-12	--	--	9E-12		- -	0.0000001	- -	0.0000001
		Exposure Point Total						9E-12					0.0000001
	Exposure Medium Total							9E-12					0.0000001
Medium Total								5E-07					0.01

TABLE 9.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Site 17	4,4'-DDD	2E-06	--	- -	--	2E-06	NA	--	- -	--	--
			4,4'-DDT	3E-06	--	- -	--	3E-06	Liver	0.09	- -	--	0.09
			Chemical Total	5E-06	--	- -	--	5E-06		0.09	--	--	0.09
		Exposure Point Total						5E-06					0.09
	Exposure Medium Total							5E-06					0.09
	Air	Site 17	4,4'-DDD	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	- -	--	--	- -	NA	- -	- -	- -	--
			Chemical Total	--	- -	--	--	- -		- -	--	- -	--
		Exposure Point Total						- -					--
	Exposure Medium Total							- -					--
Medium Total								5E-06					0.09

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Liver HI 0.1

TABLE 9.8.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Heptachlor Epoxide	8E-09	--	6E-09	--	1E-08
			Chemical Total	8E-09	--	6E-09	--	1E-08
		Exposure Point Total						1E-08
	Exposure Medium Total							1E-08
	Air	Site 17	Heptachlor Epoxide	--	2E-14	--	--	2E-14
			Chemical Total	--	2E-14	--	--	2E-14
		Exposure Point Total						2E-14
	Exposure Medium Total							2E-14
Medium Total								1E-08
Subsurface Soil	Subsurface Soil	Site 17	MONURON	- -	--	- -	--	- -
			4,4'-DDT	3E-08	--	8E-09	--	4E-08
			ALPHA-CHLORDANE	6E-09	--	2E-09	--	8E-09
			DIELDRIN	2E-09	--	2E-09	--	4E-09
			GAMMA-CHLORDANE	6E-09	--	2E-09	--	8E-09
			HEPTACHLOR	6E-09	--	5E-09	--	1E-08
			HEPTACHLOR EPOXIDE	1E-08	--	9E-09	--	2E-08
			Chemical Total	7E-08	--	3E-08	--	9E-08
		Exposure Point Total						9E-08
Subsurface Soil	Exposure Medium Total							9E-08
	Air	Site 17	MONURON	--	- -	--	--	- -
			4,4'-DDT	--	1E-13	--	--	1E-13
			ALPHA-CHLORDANE	--	2E-14	--	--	2E-14
			DIELDRIN	--	6E-15	--	--	6E-15
			GAMMA-CHLORDANE	--	2E-14	--	--	2E-14
			HEPTACHLOR	--	2E-14	--	--	2E-14
			HEPTACHLOR EPOXIDE	--	3E-14	--	--	3E-14
			Chemical Total	--	2E-13	--	--	2E-13
		Exposure Point Total						2E-13
	Exposure Medium Total							2E-13
Medium Total								9E-08

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.9.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Heptachlor Epoxide	3E-07	--	1E-07	--	4E-07
			Chemical Total	3E-07	--	1E-07	--	4E-07
		Exposure Point Total						4E-07
	Exposure Medium Total							4E-07
	Air	Site 17	Heptachlor Epoxide	--	2E-12	--	--	2E-12
			Chemical Total	--	2E-12	--	--	2E-12
		Exposure Point Total						2E-12
	Exposure Medium Total							2E-12
Medium Total								4E-07
Subsurface Soil	Subsurface Soil	Site 17	MONURON	- -	--	- -	--	- -
			4,4'-DDT	1E-06	--	2E-07	--	2E-06
			ALPHA-CHLORDANE	2E-07	--	4E-08	--	3E-07
			DIELDRIN	8E-08	--	3E-08	--	1E-07
			GAMMA-CHLORDANE	2E-07	--	4E-08	--	3E-07
			HEPTACHLOR	2E-07	--	1E-07	--	3E-07
			HEPTACHLOR EPOXIDE	5E-07	--	2E-07	--	7E-07
			Chemical Total	3E-06	--	6E-07	--	3E-06
		Exposure Point Total						3E-06

TABLE 9.9.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Subsurface Soil	Exposure Medium Total							3E-06
	Air	Site 17	MONURON	--	- -	--	--	- -
			4,4'-DDT	--	1E-11	--	--	1E-11
			ALPHA-CHLORDANE	--	2E-12	--	--	2E-12
			DIELDRIN	--	6E-13	--	--	6E-13
			GAMMA-CHLORDANE	--	2E-12	--	--	2E-12
			HEPTACHLOR	--	2E-12	--	--	2E-12
			HEPTACHLOR EPOXIDE	--	3E-12	--	--	3E-12
			Chemical Total	--	2E-11	--	--	2E-11
		Exposure Point Total						2E-11
	Exposure Medium Total							2E-11
Medium Total								3E-06
Groundwater	Groundwater	Site 17	4,4'-DDD	5E-06	--	- -	--	5E-06
			4,4'-DDT	9E-06	--	- -	--	9E-06
			Chemical Total	1E-05	--	- -	--	1E-05
		Exposure Point Total						1E-05
	Exposure Medium Total							1E-05
	Air	Site 17	4,4'-DDD	--	- -	--	--	- -
		Site 17	4,4'-DDT	--	- -	--	--	- -
			Chemical Total	--	- -	--	--	- -
		Exposure Point Total						- -

TABLE 9.9.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future

Receptor Population: Residents

Receptor Age: Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
	Exposure Medium Total							- -
Medium Total								1E-05

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.1.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Heptachlor Epoxide	1E-09	--	3E-10	--	2E-09	Liver	0.0007	- -	0.0001	0.0009
			Chemical Total	1E-09	--	3E-10	--	2E-09		0.0007	--	0.0001	0.0009
		Exposure Point Total						2E-09					0.0009
	Exposure Medium Total							2E-09					0.0009
	Air	Site 17	Heptachlor Epoxide	--	3E-11	--	--	3E-11	NA	- -	--	- -	--
			Chemical Total	--	3E-11	--	--	3E-11		- -	--	- -	--
		Exposure Point Total						3E-11					--
	Exposure Medium Total							3E-11					--
Medium Total								2E-09					0.0009
ARSENIC	Subsurface Soil	Site 17	MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	5E-09	--	3E-10	--	6E-09	Liver	0.002	- -	0.0001	0.002
			ALPHA-CHLORDANE	1E-09	--	8E-11	--	1E-09	Liver	0.0004	- -	0.00003	0.0004
			DIELDRIN	3E-10	--	7E-11	--	4E-10	Liver	0.00003	- -	0.000006	0.00003
			GAMMA-CHLORDANE	1E-09	--	8E-11	--	1E-09	Liver	0.0004	- -	0.00003	0.0004
			HEPTACHLOR	9E-10	--	2E-10	--	1E-09	Liver	0.00003	- -	0.000006	0.00003
			HEPTACHLOR EPOXIDE	2E-09	--	4E-10	--	2E-09	Liver	0.001	- -	0.0002	0.001
			Chemical Total	1E-08	--	1E-09	--	1E-08		0.004	--	0.0004	0.005
		Exposure Point Total						1E-08					0.005
	Exposure Medium Total							1E-08					0.005
	Air	Site 17	MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	1E-10	--	--	1E-10	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	2E-11	--	--	2E-11	NA	- -	0.00002	- -	0.00002
			DIELDRIN	--	8E-12	--	--	8E-12	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	2E-11	--	--	2E-11	NA	- -	0.00002	- -	0.00002
			HEPTACHLOR	--	2E-11	--	--	2E-11	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	5E-11	--	--	5E-11	NA	- -	--	- -	--
			Chemical Total	--	3E-10	--	--	3E-10		- -	0.00005	- -	0.00005
		Exposure Point Total						3E-10					0.00005
	Exposure Medium Total							3E-10					0.00005
Medium Total								1E-08					0.005

TABLE 9.1.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Site 17	4,4'-DDD	2E-11	--	- -	--	2E-11	NA	--	- -	--	--
			4,4'-DDT	5E-11	--	- -	--	5E-11	Liver	0.00002	- -	--	0.00002
			Chemical Total	7E-11	--	- -	--	7E-11		0.00002	--	--	0.00002
		Exposure Point Total						7E-11					0.00002
	Exposure Medium Total							7E-11					0.00002
	Air	Site 17	4,4'-DDD	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	- -	--	--	- -	NA	- -	--	- -	--
			Chemical Total	--	- -	--	--	- -		- -	--	- -	--
		Exposure Point Total						- -					--
	Exposure Medium Total							- -					--
Medium Total								7E-11					0.00002

Total Liver HI 0.006

TABLE 9.2.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Heptachlor Epoxide	1E-08	--	1E-09	--	1E-08	Liver	0.0007	- -	0.00009	0.0007
			Chemical Total	1E-08	--	1E-09	--	1E-08		0.00	--	0.0001	0.0007
		Exposure Point Total						1E-08					0.0007
	Exposure Medium Total							1E-08					0.0007
	Air	Site 17	Heptachlor Epoxide	--	1E-13	--	--	1E-13	NA	- -	--	- -	--
			Chemical Total	--	1E-13	--	--	1E-13		- -	- -	- -	--
		Exposure Point Total						1E-13					--
	Exposure Medium Total							1E-13					--
Medium Total								1E-08					0.0007
Subsurface Soil	Subsurface Soil	Site 17	MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	4E-08	--	2E-09	--	4E-08	Liver	0.002	- -	0.00008	0.002
			ALPHA-CHLORDANE	8E-09	--	4E-10	--	8E-09	Liver	0.0003	- -	0.00002	0.0004
			DIELDRIN	3E-09	--	3E-10	--	3E-09	Liver	0.00003	- -	0.000003	0.00003
			GAMMA-CHLORDANE	8E-09	--	4E-10	--	8E-09	Liver	0.0003	- -	0.00002	0.0004
			HEPTACHLOR	7E-09	--	1E-09	--	8E-09	Liver	0.00003	- -	0.000003	0.00003
			HEPTACHLOR EPOXIDE	2E-08	--	2E-09	--	2E-08	Liver	0.0010	- -	0.0001	0.001
			Chemical Total	8E-08	--	6E-09	--	9E-08		0.004	--	0.0003	0.004
		Exposure Point Total						9E-08					0.004
	Exposure Medium Total							9E-08					0.004
	Air	Site 17	MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	6E-13	--	--	6E-13	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	1E-13	--	--	1E-13	NA	- -	0.00000001	- -	0.00000001
			DIELDRIN	--	4E-14	--	--	4E-14	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	1E-13	--	--	1E-13	NA	- -	0.00000001	- -	0.00000001
			HEPTACHLOR	--	1E-13	--	--	1E-13	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	2E-13	--	--	2E-13	NA	- -	--	- -	--
			Chemical Total	--	1E-12	--	--	1E-12		- -	0.00000002	- -	0.00000002
		Exposure Point Total						1E-12					0.00000002
	Exposure Medium Total							1E-12					0.00000002
Medium Total								9E-08					0.004

TABLE 9.2.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Liver HI 0.005

TABLE 9.3.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Heptachlor Epoxide	9E-10	--	4E-10	--	1E-09	Liver	0.00005	- -	0.00002	0.00008
			Chemical Total	9E-10	--	4E-10	--	1E-09		0.00005	--	0.00002	0.00008
		Exposure Point Total						1E-09					0.00008
	Exposure Medium Total							1E-09					0.00008
	Air	Site 17	Heptachlor Epoxide	--	2E-15	--	--	2E-15	NA	- -	--	- -	--
			Chemical Total	--	2E-15	--	--	2E-15		- -	- -	- -	--
		Exposure Point Total						2E-15					--
	Exposure Medium Total							2E-15					--
Medium Total								1E-09					0.00008
Subsurface Soil	Subsurface Soil	Site 17	MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	4E-09	--	5E-10	--	4E-09	Liver	0.0002	- -	0.00002	0.0002
			ALPHA-CHLORDANE	7E-10	--	1E-10	--	8E-10	Liver	0.00003	- -	0.000005	0.00003
			DIELDRIN	2E-10	--	1E-10	--	3E-10	Liver	0.000002	- -	0.000001	0.000003
			GAMMA-CHLORDANE	7E-10	--	1E-10	--	8E-10	Liver	0.00003	- -	0.000005	0.00003
			HEPTACHLOR	7E-10	--	3E-10	--	9E-10	Liver	0.000002	- -	0.000001	0.000003
			HEPTACHLOR EPOXIDE	1E-09	--	6E-10	--	2E-09	Liver	0.00008	- -	0.00003	0.0001
			Chemical Total	7E-09	--	2E-09	--	9E-09		0.0003	--	0.0001	0.0004
		Exposure Point Total						9E-09					0.0004
	Exposure Medium Total							9E-09					0.0004
	Air	Site 17	MONURON	--	- -	--	--	- -	NA	- -	- -	- -	--
			4,4'-DDT	--	1E-14	--	--	1E-14	NA	- -	- -	- -	--
			ALPHA-CHLORDANE	--	2E-15	--	--	2E-15	NA	- -	- -	- -	--
			DIELDRIN	--	6E-16	--	--	6E-16	NA	- -	- -	- -	--
			GAMMA-CHLORDANE	--	2E-15	--	--	2E-15	NA	- -	- -	- -	--
			HEPTACHLOR	--	2E-15	--	--	2E-15	NA	- -	- -	- -	--
			HEPTACHLOR EPOXIDE	--	4E-15	--	--	4E-15	NA	- -	- -	- -	--
			Chemical Total	--	2E-14	--	--	2E-14		- -	- -	- -	--
		Exposure Point Total						2E-14					--
	Exposure Medium Total							2E-14					--
Medium Total								9E-09					0.0004

TABLE 9.3.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Liver HI 0.0004

TABLE 9.4.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Heptachlor Epoxide	9E-10	--	1E-10	--	1E-09	Liver	0.00004	- -	0.000004	0.00004
			Chemical Total	9E-10	--	1E-10	--	1E-09		0.00004	--	0.000004	0.00004
		Exposure Point Total						1E-09					0.00004
	Exposure Medium Total							1E-09					0.00004
	Air	Site 17	Heptachlor Epoxide	--	3E-15	--	--	3E-15	NA	- -	--	- -	--
			Chemical Total	--	3E-15	--	--	3E-15		- -	- -	- -	--
		Exposure Point Total						3E-15					--
	Exposure Medium Total							3E-15					--
Medium Total								1E-09					0.00004
Subsurface Soil	Subsurface Soil	Site 17	MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	4E-09	--	1E-10	--	4E-09	Liver	0.0001	- -	0.000004	0.0001
			ALPHA-CHLORDANE	7E-10	--	3E-11	--	7E-10	Liver	0.00002	- -	0.000001	0.00002
			DIELDRIN	2E-10	--	3E-11	--	3E-10	Liver	0.000002	- -	0.0000002	0.000002
			GAMMA-CHLORDANE	7E-10	--	3E-11	--	7E-10	Liver	0.00002	- -	0.000001	0.00002
			HEPTACHLOR	7E-10	--	8E-11	--	8E-10	Liver	0.000002	- -	0.0000002	0.000002
			HEPTACHLOR EPOXIDE	1E-09	--	2E-10	--	2E-09	Liver	0.00006	- -	0.00001	0.0001
			Chemical Total	8E-09	--	5E-10	--	8E-09		0.0002	--	0.0000	0.0002
		Exposure Point Total						8E-09					0.0002
	Exposure Medium Total							8E-09					0.0002
	Air	Site 17	MONURON	--	- -	--	--	- -	NA	- -	- -	- -	--
			4,4'-DDT	--	1E-14	--	--	1E-14	NA	- -	- -	- -	--
			ALPHA-CHLORDANE	--	3E-15	--	--	3E-15	NA	- -	- -	- -	--
			DIELDRIN	--	9E-16	--	--	9E-16	NA	- -	- -	- -	--
			GAMMA-CHLORDANE	--	3E-15	--	--	3E-15	NA	- -	- -	- -	--
			HEPTACHLOR	--	2E-15	--	--	2E-15	NA	- -	- -	- -	--
			HEPTACHLOR EPOXIDE	--	5E-15	--	--	5E-15	NA	- -	- -	- -	--
			Chemical Total	--	3E-14	--	--	3E-14		- -	- -	- -	--
		Exposure Point Total						3E-14					--
	Exposure Medium Total							3E-14					--
Medium Total								8E-09					0.0002

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Liver HI 0.0003

TABLE 9.5.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Heptachlor Epoxide	2E-08	--	3E-09	--	3E-08	Liver	0.007	- -	0.0008	0.008
			Chemical Total	2E-08	--	3E-09	--	3E-08		0.007	--	0.0008	0.008
		Exposure Point Total						3E-08					0.008
	Exposure Medium Total							3E-08					0.008
	Air	Site 17	Heptachlor Epoxide	--	1E-13	--	--	1E-13	NA	- -	--	- -	--
			Chemical Total	--	1E-13	--	--	1E-13		- -	--	- -	--
		Exposure Point Total						1E-13					--
	Exposure Medium Total							1E-13					--
Medium Total								3E-08					0.008
Subsurface Soil	Subsurface Soil	Site 17	MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	1E-07	--	3E-09	--	1E-07	Liver	0.02	- -	0.0007	0.02
			ALPHA-CHLORDANE	2E-08	--	8E-10	--	2E-08	Liver	0.004	- -	0.0002	0.004
			DIELDRIN	6E-09	--	7E-10	--	7E-09	Liver	0.0003	- -	0.00003	0.0003
			GAMMA-CHLORDANE	2E-08	--	8E-10	--	2E-08	Liver	0.004	- -	0.0002	0.004
			HEPTACHLOR	2E-08	--	2E-09	--	2E-08	Liver	0.0003	- -	0.00003	0.0003
			HEPTACHLOR EPOXIDE	4E-08	--	4E-09	--	4E-08	Liver	0.01	- -	0.001	0.01
			Chemical Total	2E-07	--	1E-08	--	2E-07		0.04	--	0.002	0.04
		Exposure Point Total						2E-07					0.04
	Exposure Medium Total							2E-07					0.04
	Air	Site 17	MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	4E-13	--	--	4E-13	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	8E-14	--	--	8E-14	NA	- -	0.00000004	- -	0.00000004
			DIELDRIN	--	3E-14	--	--	3E-14	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	8E-14	--	--	8E-14	NA	- -	0.00000004	- -	0.00000004
			HEPTACHLOR	--	8E-14	--	--	8E-14	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	2E-13	--	--	2E-13	NA	- -	--	- -	--
			Chemical Total	--	8E-13	--	--	8E-13		- -	0.00000008	- -	0.00000008
		Exposure Point Total						8E-13					0.00000008
	Exposure Medium Total							8E-13					0.00000008
Medium Total								2E-07					0.04

TABLE 9.5.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Site 17	4,4'-DDD	2E-07	--	- -	--	2E-07	NA	--	- -	--	--
			4,4'-DDT	5E-07	--	- -	--	5E-07	Liver	0.10	- -	--	0.10
			Chemical Total	7E-07	--	- -	--	7E-07		0.10	--	--	0.10
		Exposure Point Total						7E-07					0.10
	Exposure Medium Total							7E-07					0.10
	Air	Site 17	4,4'-DDD	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	- -	--	--	- -	NA	- -	--	- -	--
			Chemical Total	--	- -	--	--	- -		- -	--	- -	--
		Exposure Point Total						- -					--
	Exposure Medium Total							- -					--
Medium Total								7E-07					0.10

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Liver HI 0.1

TABLE 9.6.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION,NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Heptachlor Epoxide	3E-09	--	4E-10	--	4E-09	Liver	0.0009	- -	0.0001	0.001
			Chemical Total	3E-09	--	4E-10	--	4E-09		0.0009	--	0.0001	0.001
		Exposure Point Total						4E-09					0.001
	Exposure Medium Total							4E-09					0.001
	Air	Site 17	Heptachlor Epoxide	--	1E-13	--	--	1E-13	NA	- -	--	- -	--
			Chemical Total	--	1E-13	--	--	1E-13		- -	--	- -	--
		Exposure Point Total						1E-13					--
	Exposure Medium Total							1E-13					--
Medium Total								4E-09					0.001
Subsurface Soil	Subsurface Soil	Site 17	MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	1E-08	--	5E-10	--	1E-08	Liver	0.003	- -	0.00010	0.003
			ALPHA-CHLORDANE	2E-09	--	1E-10	--	3E-09	Liver	0.0005	- -	0.00002	0.0005
			DIELDRIN	8E-10	--	1E-10	--	9E-10	Liver	0.00004	- -	0.000004	0.00004
			GAMMA-CHLORDANE	2E-09	--	1E-10	--	3E-09	Liver	0.0005	- -	0.00002	0.0005
			HEPTACHLOR	2E-09	--	3E-10	--	3E-09	Liver	0.00004	- -	0.000004	0.00004
			HEPTACHLOR EPOXIDE	5E-09	--	5E-10	--	5E-09	Liver	0.001	- -	0.0002	0.002
			Chemical Total	3E-08	--	2E-09	--	3E-08		0.005	--	0.0003	0.006
		Exposure Point Total						3E-08					0.006
	Exposure Medium Total							3E-08					0.006
	Air	Site 17	MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	4E-13	--	--	4E-13	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	8E-14	--	--	8E-14	NA	- -	0.00000004	- -	0.00000004
			DIELDRIN	--	3E-14	--	--	3E-14	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	8E-14	--	--	8E-14	NA	- -	0.00000004	- -	0.00000004
			HEPTACHLOR	--	8E-14	--	--	8E-14	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	2E-13	--	--	2E-13	NA	- -	--	- -	--
			Chemical Total	--	8E-13	--	--	8E-13		- -	0.00000008	- -	0.00000008
		Exposure Point Total						8E-13					0.00000008
	Exposure Medium Total							8E-13					0.00000008
Medium Total								3E-08					0.006

TABLE 9.6.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION,NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Site 17	4,4'-DDD	9E-08	--	- -	--	9E-08	NA	--	- -	--	--
			4,4'-DDT	2E-07	--	- -	--	2E-07	Liver	0.03	- -	--	0.03
			Chemical Total	3E-07	--	- -	--	3E-07		0.03	--	--	0.03
		Exposure Point Total						3E-07					0.03
	Exposure Medium Total							3E-07					0.03
	Air	Site 17	4,4'-DDD	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	- -	--	--	- -	NA	- -	- -	- -	- -
			Chemical Total	--	- -	--	--	- -		- -	--	- -	--
		Exposure Point Total						- -					--
	Exposure Medium Total							- -					--
Medium Total								3E-07					0.03

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Liver HI 0.04

TABLE 9.7.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Heptachlor Epoxide	8E-09	--	1E-09	--	9E-09	Liver	0.0007	- -	0.00008	0.0008
			Chemical Total	8E-09	--	1E-09	--	9E-09		0.0007	--	0.00008	0.0008
		Exposure Point Total						9E-09					0.0008
	Exposure Medium Total							9E-09					0.0008
	Air	Site 17	Heptachlor Epoxide	--	4E-13	--	--	4E-13	NA	- -	--	- -	--
			Chemical Total	--	4E-13	--	--	4E-13		- -	--	- -	--
		Exposure Point Total						4E-13					--
	Exposure Medium Total							4E-13					--
Medium Total								9E-09					0.0008
Subsurface Soil	Subsurface Soil	Site 17	MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	4E-08	--	1E-09	--	4E-08	Liver	0.002	- -	0.00007	0.002
			ALPHA-CHLORDANE	6E-09	--	3E-10	--	7E-09	Liver	0.0004	- -	0.00002	0.0004
			DIELDRIN	2E-09	--	3E-10	--	2E-09	Liver	0.00003	- -	0.000003	0.00003
			GAMMA-CHLORDANE	6E-09	--	3E-10	--	7E-09	Liver	0.0004	- -	0.00002	0.0004
			HEPTACHLOR	6E-09	--	7E-10	--	7E-09	Liver	0.00003	- -	0.000003	0.00003
			HEPTACHLOR EPOXIDE	1E-08	--	1E-09	--	1E-08	Liver	0.001	- -	0.0001	0.001
			Chemical Total	7E-08	--	4E-09	--	7E-08		0.004	--	0.0002	0.004
		Exposure Point Total						7E-08					0.004
	Exposure Medium Total							7E-08					0.004
	Air	Site 17	MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	2E-12	--	--	2E-12	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	3E-13	--	--	3E-13	NA	- -	0.00000004	- -	0.00000004
			DIELDRIN	--	9E-14	--	--	9E-14	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	3E-13	--	--	3E-13	NA	- -	0.00000004	- -	0.00000004
			HEPTACHLOR	--	3E-13	--	--	3E-13	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	5E-13	--	--	5E-13	NA	- -	--	- -	--
			Chemical Total	--	3E-12	--	--	3E-12		- -	0.00000008	- -	0.00000008
		Exposure Point Total						3E-12					0.00000008
	Exposure Medium Total							3E-12					0.00000008
Medium Total								7E-08					0.004

TABLE 9.7.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Site 17	4,4'-DDD	4E-07	--	- -	--	4E-07	NA	--	- -	--	--
			4,4'-DDT	7E-07	--	- -	--	7E-07	Liver	0.04	- -	--	0.04
			Chemical Total	1E-06	--	- -	--	1E-06		0.04	--	--	0.04
		Exposure Point Total						1E-06					0.04
	Exposure Medium Total							1E-06					0.04
	Air	Site 17	4,4'-DDD	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	- -	--	--	- -	NA	- -	- -	- -	--
			Chemical Total	--	- -	--	--	- -		- -	--	- -	--
		Exposure Point Total						- -					--
	Exposure Medium Total							- -					--
Medium Total								1E-06					0.04

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total Liver HI 0.05

TABLE 9.8.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Heptachlor Epoxide	2E-09	--	5E-10	--	2E-09
			Chemical Total	2E-09	--	5E-10	--	2E-09
		Exposure Point Total						2E-09
	Exposure Medium Total							2E-09
	Air	Site 17	Heptachlor Epoxide	--	6E-15	--	--	6E-15
			Chemical Total	--	6E-15	--	--	6E-15
		Exposure Point Total						6E-15
	Exposure Medium Total							6E-15
Medium Total								2E-09
Subsurface Soil	Subsurface Soil	Site 17	MONURON	- -	--	- -	--	- -
			4,4'-DDT	8E-09	--	6E-10	--	8E-09
			ALPHA-CHLORDANE	1E-09	--	1E-10	--	2E-09
			DIELDRIN	5E-10	--	1E-10	--	6E-10
			GAMMA-CHLORDANE	1E-09	--	1E-10	--	2E-09
			HEPTACHLOR	1E-09	--	4E-10	--	2E-09
			HEPTACHLOR EPOXIDE	3E-09	--	7E-10	--	3E-09
			Chemical Total	2E-08	--	2E-09	--	2E-08
		Exposure Point Total						2E-08
Subsurface Soil	Exposure Medium Total							2E-08
	Air	Site 17	MONURON	--	- -	--	--	- -
			4,4'-DDT	--	2E-14	--	--	2E-14
			ALPHA-CHLORDANE	--	4E-15	--	--	4E-15
			DIELDRIN	--	1E-15	--	--	1E-15
			GAMMA-CHLORDANE	--	4E-15	--	--	4E-15
			HEPTACHLOR	--	4E-15	--	--	4E-15
			HEPTACHLOR EPOXIDE	--	8E-15	--	--	8E-15
			Chemical Total	--	5E-14	--	--	5E-14
		Exposure Point Total						5E-14
	Exposure Medium Total							5E-14
Medium Total								2E-08

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.9.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Heptachlor Epoxide	4E-08	--	4E-09	--	4E-08
			Chemical Total	4E-08	--	4E-09	--	4E-08
		Exposure Point Total						4E-08
	Exposure Medium Total							4E-08
	Air	Site 17	Heptachlor Epoxide	--	6E-13	--	--	6E-13
			Chemical Total	--	6E-13	--	--	6E-13
		Exposure Point Total						6E-13
	Exposure Medium Total							6E-13
Medium Total								4E-08
Subsurface Soil	Subsurface Soil	Site 17	MONURON	- -	--	- -	--	- -
			4,4'-DDT	2E-07	--	5E-09	--	2E-07
			ALPHA-CHLORDANE	3E-08	--	1E-09	--	3E-08
			DIELDRIN	9E-09	--	1E-09	--	1E-08
			GAMMA-CHLORDANE	3E-08	--	1E-09	--	3E-08
			HEPTACHLOR	3E-08	--	3E-09	--	3E-08
			HEPTACHLOR EPOXIDE	5E-08	--	6E-09	--	6E-08
			Chemical Total	3E-07	--	2E-08	--	3E-07
		Exposure Point Total						3E-07

TABLE 9.9.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Subsurface Soil	Exposure Medium Total							3E-07
	Air	Site 17	MONURON	--	- -	--	--	- -
			4,4'-DDT	--	2E-12	--	--	2E-12
			ALPHA-CHLORDANE	--	4E-13	--	--	4E-13
			DIELDRIN	--	1E-13	--	--	1E-13
			GAMMA-CHLORDANE	--	4E-13	--	--	4E-13
			HEPTACHLOR	--	4E-13	--	--	4E-13
			HEPTACHLOR EPOXIDE	--	8E-13	--	--	8E-13
			Chemical Total	--	5E-12	--	--	5E-12
		Exposure Point Total						5E-12
	Exposure Medium Total							5E-12
Medium Total								3E-07
Groundwater	Groundwater	Site 17	4,4'-DDD	7E-07	--	- -	--	7E-07
			4,4'-DDT	1E-06	--	- -	--	1E-06
			Chemical Total	2E-06	--	- -	--	2E-06
		Exposure Point Total						2E-06
	Exposure Medium Total							2E-06
	Air	Site 17	4,4'-DDD	--	- -	--	--	- -
Groundwater	Air	Site 17	4,4'-DDT	--	- -	--	--	- -
			Chemical Total	--	- -	--	--	- -
		Exposure Point Total						- -

TABLE 9.9.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future

Receptor Population: Residents

Receptor Age: Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
	Exposure Medium Total							- -
Medium Total								2E-06

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

CUMULATIVE

TABLE 9.1.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Arsenic	3E-07	--	3E-08	--	4E-07	Skin, CVS	0.05	- -	0.005	0.06
			Heptachlor Epoxide	5E-09	--	2E-09	--	7E-09	Liver	0.003	- -	0.0009	0.004
			Chemical Total	3E-07	--	3E-08	--	4E-07		0.05	--	0.006	0.06
		Exposure Point Total						4E-07					0.06
	Exposure Medium Total							4E-07					0.06
	Air	Site 17	Arsenic	--	4E-08	--	--	4E-08	NA	- -	0.05	- -	0.05
			Heptachlor Epoxide	--	6E-11	--	--	6E-11	NA	- -	--	- -	--
			Chemical Total	--	4E-08	--	--	4E-08		- -	0.05	- -	0.05
		Exposure Point Total						4E-08					0.05
	Exposure Medium Total							4E-08					0.05
Medium Total								4E-07					0.1
Subsurface Soil	Subsurface Soil	Site 17	ARSENIC	2E-07	--	2E-08	--	2E-07	Skin, CVS	0.03	- -	0.003	0.03
			MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	2E-08	--	2E-09	--	2E-08	Liver	0.009	- -	0.0008	0.010
			ALPHA-CHLORDANE	4E-09	--	5E-10	--	4E-09	Liver	0.002	- -	0.0002	0.002
			DIELDRIN	1E-09	--	4E-10	--	2E-09	Liver	0.0001	- -	0.00003	0.0002
			GAMMA-CHLORDANE	4E-09	--	5E-10	--	4E-09	Liver	0.002	- -	0.0002	0.002
			HEPTACHLOR	4E-09	--	1E-09	--	5E-09	Liver	0.0001	- -	0.00003	0.0002
			HEPTACHLOR EPOXIDE	8E-09	--	2E-09	--	1E-08	Liver	0.004	- -	0.001	0.006
			Chemical Total	2E-07	--	2E-08	--	2E-07		0.05	--	0.005	0.05
		Exposure Point Total						2E-07					0.05
	Exposure Medium Total							2E-07					0.05
	Air	Site 17	ARSENIC	--	2E-08	--	--	2E-08	NA	- -	0.02	- -	0.02
			MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	3E-10	--	--	3E-10	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	5E-11	--	--	5E-11	NA	- -	0.00005	- -	0.00005
			DIELDRIN	--	2E-11	--	--	2E-11	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	5E-11	--	--	5E-11	NA	- -	0.00005	- -	0.00005
			HEPTACHLOR	--	5E-11	--	--	5E-11	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	9E-11	--	--	9E-11	NA	- -	--	- -	--
			Chemical Total	--	2E-08	--	--	2E-08		- -	0.02	- -	0.02
		Exposure Point Total						2E-08					0.02
	Exposure Medium Total							2E-08					0.02
Medium Total								3E-07					0.08

TABLE 9.1.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Site 17	4,4'-DDD	5E-11	--	- -	--	5E-11	NA	--	- -	--	--
			4,4'-DDT	9E-11	--	- -	--	9E-11	Liver	0.00004	- -	--	0.00004
			Chemical Total	1E-10	--	- -	--	1E-10		0.00004	--	--	0.00004
		Exposure Point Total						1E-10					0.00004
	Exposure Medium Total							1E-10					0.00004
	Air	Site 17	4,4'-DDD	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	- -	--	--	- -	NA	- -	--	- -	--
			Chemical Total	--	- -	--	--	- -		- -	--	- -	--
		Exposure Point Total						- -					--
	Exposure Medium Total							- -					--
Medium Total								1E-10					0.00004

Total CVS HI	0.09
Total Liver HI	0.02
Total Skin HI	0.09

TABLE 9.2.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Arsenic	4E-06	--	8E-07	--	5E-06	Skin, CVS	0.03	- -	0.005	0.03
			Heptachlor Epoxide	6E-08	--	4E-08	--	1E-07	Liver	0.002	- -	0.0010	0.002
			Chemical Total	4E-06	--	9E-07	--	5E-06		0.03	--	0.006	0.03
		Exposure Point Total						5E-06					0.03
	Exposure Medium Total							5E-06					0.03
	Air	Site 17	Arsenic	--	3E-10	--	--	3E-10	NA	- -	0.00001	- -	0.00001
			Heptachlor Epoxide	--	5E-13	--	--	5E-13	NA	- -	--	- -	--
			Chemical Total	--	3E-10	--	--	3E-10		- -	0.00001	- -	0.00001
		Exposure Point Total						3E-10					0.00001
	Exposure Medium Total							3E-10					0.00001
Medium Total								5E-06					0.03
Subsurface Soil	Subsurface Soil	Site 17	ARSENIC	2E-06	--	5E-07	--	3E-06	Skin, CVS	0.01	- -	0.003	0.02
			MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	3E-07	--	5E-08	--	3E-07	Liver	0.005	- -	0.0009	0.005
			ALPHA-CHLORDANE	5E-08	--	1E-08	--	6E-08	Liver	0.0008	- -	0.0002	0.0010
			DIELDRIN	2E-08	--	1E-08	--	3E-08	Liver	0.00006	- -	0.00004	0.00010
			GAMMA-CHLORDANE	5E-08	--	1E-08	--	6E-08	Liver	0.0008	- -	0.0002	0.0010
			HEPTACHLOR	5E-08	--	3E-08	--	8E-08	Liver	0.00006	- -	0.00004	0.00010
			HEPTACHLOR EPOXIDE	1E-07	--	6E-08	--	2E-07	Liver	0.002	- -	0.001	0.004
			Chemical Total	3E-06	--	6E-07	--	3E-06		0.02	--	0.006	0.03
		Exposure Point Total						3E-06					0.03
	Exposure Medium Total							3E-06					0.03
	Air	Site 17	ARSENIC	--	2E-10	--	--	2E-10	NA	- -	0.000007	- -	0.000007
			MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	2E-12	--	--	2E-12	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	3E-13	--	--	3E-13	NA	- -	0.00000001	- -	0.00000001
			DIELDRIN	--	1E-13	--	--	1E-13	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	3E-13	--	--	3E-13	NA	- -	0.00000001	- -	0.00000001
			HEPTACHLOR	--	3E-13	--	--	3E-13	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	7E-13	--	--	7E-13	NA	- -	--	- -	--
			Chemical Total	--	2E-10	--	--	2E-10		- -	0.000007	- -	0.000007
		Exposure Point Total						2E-10					0.000007
	Exposure Medium Total							2E-10					0.000007
Medium Total								3E-06					0.03

TABLE 9.2.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future

Receptor Population: Industrial Worker

Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total CVS HI	0.05
Total Liver HI	0.01
Total Skin HI	0.05

TABLE 9.3.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Arsenic	3E-07	--	9E-08	--	4E-07	Skin, CVS	0.005	- -	0.001	0.006
			Heptachlor Epoxide	4E-09	--	5E-09	--	9E-09	Liver	0.0003	- -	0.0003	0.0005
			Chemical Total	3E-07	--	1E-07	--	4E-07		0.005	--	0.002	0.006
		Exposure Point Total						4E-07					0.006
	Exposure Medium Total							4E-07					0.006
	Air	Site 17	Arsenic	--	6E-12	--	--	6E-12	NA	- -	0.0000007	- -	0.0000007
			Heptachlor Epoxide	--	9E-15	--	--	9E-15	NA	- -	--	- -	--
			Chemical Total	--	6E-12	--	--	6E-12		- -	0.0000007	- -	0.0000007
		Exposure Point Total						6E-12					0.0000007
	Exposure Medium Total							6E-12					0.0000007
Medium Total								4E-07					0.006
Subsurface Soil	Subsurface Soil	Site 17	ARSENIC	2E-07	--	5E-08	--	2E-07	Skin, CVS	0.002	- -	0.0008	0.003
			MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	2E-08	--	6E-09	--	2E-08	Liver	0.0008	- -	0.0002	0.001
			ALPHA-CHLORDANE	3E-09	--	1E-09	--	5E-09	Liver	0.0001	- -	0.00006	0.0002
			DIELDRIN	1E-09	--	1E-09	--	2E-09	Liver	0.00001	- -	0.00001	0.00002
			GAMMA-CHLORDANE	3E-09	--	1E-09	--	5E-09	Liver	0.0001	- -	0.00006	0.0002
			HEPTACHLOR	3E-09	--	3E-09	--	7E-09	Liver	0.00001	- -	0.00001	0.00002
			HEPTACHLOR EPOXIDE	7E-09	--	7E-09	--	1E-08	Liver	0.0004	- -	0.0004	0.0008
			Chemical Total	2E-07	--	7E-08	--	3E-07		0.004	--	0.002	0.006
		Exposure Point Total						3E-07					0.006
	Exposure Medium Total							3E-07					0.006
	Air	Site 17	ARSENIC	--	3E-12	--	--	3E-12	NA	- -	0.0000004	- -	0.0000004
			MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	4E-14	--	--	4E-14	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	7E-15	--	--	7E-15	NA	- -	--	- -	--
			DIELDRIN	--	2E-15	--	--	2E-15	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	7E-15	--	--	7E-15	NA	- -	--	- -	--
			HEPTACHLOR	--	7E-15	--	--	7E-15	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	1E-14	--	--	1E-14	NA	- -	--	- -	--
			Chemical Total	--	4E-12	--	--	4E-12		- -	0.0000004	- -	0.0000004
		Exposure Point Total						4E-12					0.0000004
	Exposure Medium Total							4E-12					0.0000004
Medium Total								3E-07					0.006

TABLE 9.3.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future

Receptor Population: Trespasser

Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total CVS HI	0.009
Total Liver HI	0.003
Total Skin HI	0.009

TABLE 9.4.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Arsenic	2E-07	--	3E-08	--	3E-07	Skin, CVS	0.003	- -	0.0003	0.003
			Heptachlor Epoxide	4E-09	--	1E-09	--	5E-09	Liver	0.0002	- -	0.00006	0.0002
			Chemical Total	2E-07	--	3E-08	--	3E-07		0.003	--	0.0004	0.003
		Exposure Point Total						3E-07					0.003
	Exposure Medium Total							3E-07					0.003
	Air	Site 17	Arsenic	--	9E-12	--	--	9E-12	NA	- -	0.0000007	- -	0.0000007
			Heptachlor Epoxide	--	1E-14	--	--	1E-14	NA	- -	--	- -	--
			Chemical Total	--	9E-12	--	--	9E-12		- -	0.0000007	- -	0.0000007
		Exposure Point Total						9E-12					0.0000007
	Exposure Medium Total							9E-12					0.0000007
Medium Total								3E-07					0.003
Subsurface Soil	Subsurface Soil	Site 17	ARSENIC	1E-07	--	2E-08	--	2E-07	Skin, CVS	0.001	- -	0.0002	0.002
			MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	2E-08	--	2E-09	--	2E-08	Liver	0.0005	- -	0.00006	0.0005
			ALPHA-CHLORDANE	3E-09	--	5E-10	--	3E-09	Liver	0.00008	- -	0.00001	0.00009
			DIELDRIN	1E-09	--	4E-10	--	1E-09	Liver	0.000006	- -	0.000002	0.000009
			GAMMA-CHLORDANE	3E-09	--	5E-10	--	3E-09	Liver	0.00008	- -	0.00001	0.00009
			HEPTACHLOR	3E-09	--	1E-09	--	4E-09	Liver	0.000006	- -	0.000002	0.000009
			HEPTACHLOR EPOXIDE	6E-09	--	2E-09	--	8E-09	Liver	0.0002	- -	0.00009	0.0003
			Chemical Total	2E-07	--	2E-08	--	2E-07		0.002	--	0.0004	0.003
		Exposure Point Total						2E-07					0.003
	Exposure Medium Total							2E-07					0.003
	Air	Site 17	ARSENIC	--	5E-12	--	--	5E-12	NA	- -	0.0000004	- -	0.0000004
			MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	6E-14	--	--	6E-14	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	1E-14	--	--	1E-14	NA	- -	--	- -	--
			DIELDRIN	--	3E-15	--	--	3E-15	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	1E-14	--	--	1E-14	NA	- -	--	- -	--
			HEPTACHLOR	--	1E-14	--	--	1E-14	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	2E-14	--	--	2E-14	NA	- -	--	- -	--
			Chemical Total	--	5E-12	--	--	5E-12		- -	0.0000004	- -	0.0000004
		Exposure Point Total						5E-12					0.0000004
	Exposure Medium Total							5E-12					0.0000004
Medium Total								2E-07					0.003

TABLE 9.4.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future

Receptor Population: Trespasser

Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total CVS HI	0.005
Total Liver HI	0.001
Total Skin HI	0.005

TABLE 9.5.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Arsenic	1E-05	--	1E-06	--	2E-05	Skin, CVS	0.4	- -	0.03	0.4
			Heptachlor Epoxide	2E-07	--	6E-08	--	3E-07	Liver	0.02	- -	0.006	0.03
			Chemical Total	1E-05	--	1E-06	--	2E-05		0.4	--	0.04	0.4
		Exposure Point Total						2E-05					0.4
	Exposure Medium Total							2E-05					0.4
	Air	Site 17	Arsenic	--	3E-10	--	--	3E-10	NA	- -	0.00005	- -	0.00005
			Heptachlor Epoxide	--	5E-13	--	--	5E-13	NA	- -	--	- -	--
			Chemical Total	--	3E-10	--	--	3E-10		- -	0.00005	- -	0.00005
		Exposure Point Total						3E-10					0.00005
	Exposure Medium Total							3E-10					0.00005
Medium Total								2E-05					0.4
Subsurface Soil	Subsurface Soil	Site 17	ARSENIC	8E-06	--	7E-07	--	8E-06	Skin, CVS	0.2	- -	0.02	0.2
			MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	9E-07	--	8E-08	--	1E-06	Liver	0.06	- -	0.005	0.07
			ALPHA-CHLORDANE	2E-07	--	2E-08	--	2E-07	Liver	0.01	- -	0.001	0.01
			DIELDRIN	6E-08	--	2E-08	--	7E-08	Liver	0.0008	- -	0.0002	0.001
			GAMMA-CHLORDANE	2E-07	--	2E-08	--	2E-07	Liver	0.01	- -	0.001	0.01
			HEPTACHLOR	2E-07	--	4E-08	--	2E-07	Liver	0.0008	- -	0.0002	0.001
			HEPTACHLOR EPOXIDE	3E-07	--	9E-08	--	4E-07	Liver	0.03	- -	0.009	0.04
			Chemical Total	1E-05	--	9E-07	--	1E-05		0.3	--	0.03	0.4
		Exposure Point Total						1E-05					0.4
	Exposure Medium Total							1E-05					0.4
	Air	Site 17	ARSENIC	--	2E-10	--	--	2E-10	NA	- -	0.00003	- -	0.00003
			MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	2E-12	--	--	2E-12	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	4E-13	--	--	4E-13	NA	- -	0.00000006	- -	0.00000006
			DIELDRIN	--	1E-13	--	--	1E-13	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	4E-13	--	--	4E-13	NA	- -	0.00000006	- -	0.00000006
			HEPTACHLOR	--	3E-13	--	--	3E-13	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	7E-13	--	--	7E-13	NA	- -	--	- -	--
			Chemical Total	--	2E-10	--	--	2E-10		- -	0.00003	- -	0.00003
		Exposure Point Total						2E-10					0.00003
	Exposure Medium Total							2E-10					0.00003
Medium Total								1E-05					0.4

TABLE 9.5.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Site 17	4,4'-DDD	2E-06	--	- -	--	2E-06	NA	--	- -	--	--
			4,4'-DDT	3E-06	--	- -	--	3E-06	Liver	0.2	- -	--	0.2
			Chemical Total	5E-06	--	- -	--	5E-06		0.2	--	--	0.2
		Exposure Point Total						5E-06					0.2
	Exposure Medium Total							5E-06					0.2
	Air	Site 17	4,4'-DDD	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	- -	--	--	- -	NA	- -	- -	- -	- -
			Chemical Total	--	- -	--	--	- -		- -	--	- -	--
		Exposure Point Total						- -					--
	Exposure Medium Total							- -					--
Medium Total								5E-06					0.2

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total CVS HI	0.6
Total Liver HI	0.4
Total Skin HI	0.6

TABLE 9.6.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION,NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Arsenic	3E-06	--	1E-06	--	4E-06	Skin, CVS	0.05	- -	0.02	0.06
			Heptachlor Epoxide	5E-08	--	5E-08	--	1E-07	Liver	0.003	- -	0.003	0.006
			Chemical Total	3E-06	--	1E-06	--	4E-06		0.05	--	0.02	0.07
		Exposure Point Total						4E-06					0.07
	Exposure Medium Total							4E-06					0.07
	Air	Site 17	Arsenic	--	5E-10	--	--	5E-10	NA	- -	0.00005	- -	0.00005
			Heptachlor Epoxide	--	8E-13	--	--	8E-13	NA	- -	--	- -	--
			Chemical Total	--	5E-10	--	--	5E-10		- -	0.00005	- -	0.00005
		Exposure Point Total						5E-10					0.00005
	Exposure Medium Total							5E-10					0.00005
Medium Total								4E-06					0.07
Subsurface Soil	Subsurface Soil	Site 17	ARSENIC	2E-06	--	6E-07	--	2E-06	Skin, CVS	0.03	- -	0.009	0.04
			MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	2E-07	--	7E-08	--	3E-07	Liver	0.008	- -	0.003	0.01
			ALPHA-CHLORDANE	4E-08	--	2E-08	--	5E-08	Liver	0.001	- -	0.0006	0.002
			DIELDRIN	1E-08	--	1E-08	--	3E-08	Liver	0.0001	- -	0.0001	0.0002
			GAMMA-CHLORDANE	4E-08	--	2E-08	--	5E-08	Liver	0.001	- -	0.0006	0.002
			HEPTACHLOR	4E-08	--	4E-08	--	7E-08	Liver	0.0001	- -	0.0001	0.0002
			HEPTACHLOR EPOXIDE	7E-08	--	8E-08	--	1E-07	Liver	0.004	- -	0.005	0.009
			Chemical Total	2E-06	--	8E-07	--	3E-06		0.04	--	0.02	0.06
		Exposure Point Total						3E-06					0.06
	Exposure Medium Total							3E-06					0.06
	Air	Site 17	ARSENIC	--	3E-10	--	--	3E-10	NA	- -	0.00003	- -	0.00003
			MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	3E-12	--	--	3E-12	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	6E-13	--	--	6E-13	NA	- -	0.00000006	- -	0.00000006
			DIELDRIN	--	2E-13	--	--	2E-13	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	6E-13	--	--	6E-13	NA	- -	0.00000006	- -	0.00000006
			HEPTACHLOR	--	6E-13	--	--	6E-13	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	1E-12	--	--	1E-12	NA	- -	--	- -	--
			Chemical Total	--	3E-10	--	--	3E-10		- -	0.00003	- -	0.00003
		Exposure Point Total						3E-10					0.00003
	Exposure Medium Total							3E-10					0.00003
Medium Total								3E-06					0.06

TABLE 9.6.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION,NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Site 17	4,4'-DDD	2E-06	--	- -	--	2E-06	NA	--	- -	--	--
			4,4'-DDT	3E-06	--	- -	--	3E-06	Liver	0.1	- -	--	0.1
			Chemical Total	4E-06	--	- -	--	4E-06		0.1	--	--	0.1
		Exposure Point Total						4E-06					0.1
	Exposure Medium Total							4E-06					0.1
	Air	Site 17	4,4'-DDD	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	- -	--	--	- -	NA	- -	--	- -	--
			Chemical Total	--	- -	--	--	- -		- -	--	- -	--
		Exposure Point Total						- -					--
	Exposure Medium Total							- -					--
Medium Total								4E-06					0.1

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total CVS HI	0.1
Total Liver HI	0.1
Total Skin HI	0.1

TABLE 9.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Arsenic	3E-06	--	4E-07	--	4E-06	Skin, CVS	0.04	- -	0.004	0.04
			Heptachlor Epoxide	5E-08	--	2E-08	--	7E-08	Liver	0.002	- -	0.0008	0.003
			Chemical Total	3E-06	--	4E-07	--	4E-06		0.04	--	0.005	0.04
		Exposure Point Total						4E-06					0.04
	Exposure Medium Total							4E-06					0.04
	Air	Site 17	Arsenic	--	7E-10	--	--	7E-10	NA	- -	0.00005	- -	0.00005
			Heptachlor Epoxide	--	1E-12	--	--	1E-12	NA	- -	--	- -	--
			Chemical Total	--	7E-10	--	--	7E-10		- -	0.00005	- -	0.00005
		Exposure Point Total						7E-10					0.00005
	Exposure Medium Total							7E-10					0.00005
Medium Total								4E-06					0.04
Subsurface Soil	Subsurface Soil	Site 17	ARSENIC	2E-06	--	2E-07	--	2E-06	Skin, CVS	0.02	- -	0.002	0.02
			MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	2E-07	--	3E-08	--	2E-07	Liver	0.006	- -	0.0008	0.007
			ALPHA-CHLORDANE	4E-08	--	6E-09	--	4E-08	Liver	0.001	- -	0.0002	0.001
			DIELDRIN	1E-08	--	5E-09	--	2E-08	Liver	0.00008	- -	0.00003	0.0001
			GAMMA-CHLORDANE	4E-08	--	6E-09	--	4E-08	Liver	0.001	- -	0.0002	0.001
			HEPTACHLOR	4E-08	--	1E-08	--	5E-08	Liver	0.00008	- -	0.00003	0.0001
			HEPTACHLOR EPOXIDE	7E-08	--	3E-08	--	1E-07	Liver	0.003	- -	0.001	0.004
			Chemical Total	2E-06	--	3E-07	--	3E-06		0.03	--	0.005	0.04
		Exposure Point Total						3E-06					0.04
	Exposure Medium Total							3E-06					0.04
	Air	Site 17	ARSENIC	--	4E-10	--	--	4E-10	NA	- -	0.00003	- -	0.00003
			MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	5E-12	--	--	5E-12	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	8E-13	--	--	8E-13	NA	- -	0.00000006	- -	0.00000006
			DIELDRIN	--	3E-13	--	--	3E-13	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	8E-13	--	--	8E-13	NA	- -	0.00000006	- -	0.00000006
			HEPTACHLOR	--	8E-13	--	--	8E-13	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	2E-12	--	--	2E-12	NA	- -	--	- -	--
			Chemical Total	--	4E-10	--	--	4E-10		- -	0.00003	- -	0.00003
		Exposure Point Total						4E-10					0.00003
	Exposure Medium Total							4E-10					0.00003
Medium Total								3E-06					0.04

TABLE 9.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Site 17	4,4'-DDD	2E-06	--	- -	--	2E-06	NA	--	- -	--	--
			4,4'-DDT	3E-06	--	- -	--	3E-06	Liver	0.09	- -	--	0.09
			Chemical Total	5E-06	--	- -	--	5E-06		0.09	--	--	0.09
		Exposure Point Total						5E-06					0.09
	Exposure Medium Total							5E-06					0.09
	Air	Site 17	4,4'-DDD	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	- -	--	--	- -	NA	- -	- -	- -	--
			Chemical Total	--	- -	--	--	- -		- -	--	- -	--
		Exposure Point Total						- -					--
	Exposure Medium Total							- -					--
Medium Total								5E-06					0.09

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total CVS HI	0.06
Total Liver HI	0.1
Total Skin HI	0.06

TABLE 9.8.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Arsenic	5E-07	--	1E-07	--	7E-07
			Heptachlor Epoxide	8E-09	--	6E-09	--	1E-08
			Chemical Total	5E-07	--	1E-07	--	7E-07
		Exposure Point Total						7E-07
	Exposure Medium Total							7E-07
	Air	Site 17	Arsenic	--	1E-11	--	--	1E-11
			Heptachlor Epoxide	--	2E-14	--	--	2E-14
			Chemical Total	--	1E-11	--	--	1E-11
		Exposure Point Total						1E-11
	Exposure Medium Total							1E-11
Medium Total								7E-07
Subsurface Soil	Subsurface Soil	Site 17	ARSENIC	3E-07	--	7E-08	--	4E-07
			MONURON	- -	--	- -	--	- -
			4,4'-DDT	3E-08	--	8E-09	--	4E-08
			ALPHA-CHLORDANE	6E-09	--	2E-09	--	8E-09
			DIELDRIN	2E-09	--	2E-09	--	4E-09
			GAMMA-CHLORDANE	6E-09	--	2E-09	--	8E-09
			HEPTACHLOR	6E-09	--	5E-09	--	1E-08
			HEPTACHLOR EPOXIDE	1E-08	--	9E-09	--	2E-08
			Chemical Total	4E-07	--	9E-08	--	5E-07
		Exposure Point Total						5E-07

TABLE 9.8.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Subsurface Soil	Exposure Medium Total							5E-07
	Air	Site 17	ARSENIC	--	8E-12	--	--	8E-12
			MONURON	--	- -	--	--	- -
			4,4'-DDT	--	1E-13	--	--	1E-13
			ALPHA-CHLORDANE	--	2E-14	--	--	2E-14
			DIELDRIN	--	6E-15	--	--	6E-15
			GAMMA-CHLORDANE	--	2E-14	--	--	2E-14
			HEPTACHLOR	--	2E-14	--	--	2E-14
			HEPTACHLOR EPOXIDE	--	3E-14	--	--	3E-14
			Chemical Total	--	8E-12	--	--	8E-12
		Exposure Point Total						8E-12
	Exposure Medium Total							8E-12
Medium Total								5E-07

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.9.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Arsenic	2E-05	--	3E-06	--	2E-05
			Heptachlor Epoxide	3E-07	--	1E-07	--	4E-07
			Chemical Total	2E-05	--	3E-06	--	2E-05
		Exposure Point Total						2E-05
	Exposure Medium Total							2E-05
	Air	Site 17	Arsenic	--	2E-09	--	--	2E-09
			Heptachlor Epoxide	--	2E-12	--	--	2E-12
			Chemical Total	--	2E-09	--	--	2E-09
		Exposure Point Total						2E-09
	Exposure Medium Total							2E-09
Medium Total								2E-05
Subsurface Soil	Subsurface Soil	Site 17	ARSENIC	1E-05	--	1E-06	--	1E-05
			MONURON	- -	--	- -	--	- -
			4,4'-DDT	1E-06	--	2E-07	--	2E-06
			ALPHA-CHLORDANE	2E-07	--	4E-08	--	3E-07
			DIELDRIN	8E-08	--	3E-08	--	1E-07
			GAMMA-CHLORDANE	2E-07	--	4E-08	--	3E-07
			HEPTACHLOR	2E-07	--	1E-07	--	3E-07
			HEPTACHLOR EPOXIDE	5E-07	--	2E-07	--	7E-07
			Chemical Total	1E-05	--	2E-06	--	2E-05
		Exposure Point Total						2E-05

TABLE 9.9.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Subsurface Soil	Exposure Medium Total							2E-05
	Air	Site 17	ARSENIC	--	8E-10	--	--	8E-10
			MONURON	--	- -	--	--	- -
			4,4'-DDT	--	1E-11	--	--	1E-11
			ALPHA-CHLORDANE	--	2E-12	--	--	2E-12
			DIELDRIN	--	6E-13	--	--	6E-13
			GAMMA-CHLORDANE	--	2E-12	--	--	2E-12
			HEPTACHLOR	--	2E-12	--	--	2E-12
			HEPTACHLOR EPOXIDE	--	3E-12	--	--	3E-12
			Chemical Total	--	8E-10	--	--	8E-10
		Exposure Point Total						8E-10
	Exposure Medium Total							8E-10
Medium Total								2E-05
Groundwater	Groundwater	Site 17	4,4'-DDD	2E-06	--	- -	--	2E-06
			4,4'-DDT	4E-06	--	- -	--	4E-06
			Chemical Total	6E-06	--	- -	--	6E-06
		Exposure Point Total						6E-06
	Exposure Medium Total							6E-06
	Air	Site 17	4,4'-DDD	--	- -	--	--	- -
			4,4'-DDT	--	- -	--	--	- -
			Chemical Total	--	- -	--	--	- -

TABLE 9.9.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future

Receptor Population: Residents

Receptor Age: Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Groundwater	Air	Exposure Point Total						- -
	Exposure Medium Total							- -
Medium Total								6E-06

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.1.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Arsenic	8E-08	--	5E-09	--	9E-08	Skin, CVS	0.01	- -	0.0008	0.01
			Heptachlor Epoxide	1E-09	--	3E-10	--	2E-09	Liver	0.0007	- -	0.0001	0.0009
			Chemical Total	8E-08	--	5E-09	--	9E-08		0.01	--	0.0009	0.01
		Exposure Point Total						9E-08					0.01
	Exposure Medium Total							9E-08					0.01
	Air	Site 17	Arsenic	--	2E-08	--	--	2E-08	NA	- -	0.02	- -	0.02
			Heptachlor Epoxide	--	3E-11	--	--	3E-11	NA	- -	--	- -	--
			Chemical Total	--	2E-08	--	--	2E-08		- -	0.02	- -	0.02
		Exposure Point Total						2E-08					0.02
	Exposure Medium Total							2E-08					0.02
Medium Total								1E-07					0.04
Subsurface Soil	Subsurface Soil	Site 17	ARSENIC	5E-08	--	3E-09	--	5E-08	Skin, CVS	0.007	- -	0.0004	0.008
			MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	5E-09	--	3E-10	--	6E-09	Liver	0.002	- -	0.0001	0.002
			ALPHA-CHLORDANE	1E-09	--	8E-11	--	1E-09	Liver	0.0004	- -	0.00003	0.0004
			DIELDRIN	3E-10	--	7E-11	--	4E-10	Liver	0.00003	- -	0.000006	0.00003
			GAMMA-CHLORDANE	1E-09	--	8E-11	--	1E-09	Liver	0.0004	- -	0.00003	0.0004
			HEPTACHLOR	9E-10	--	2E-10	--	1E-09	Liver	0.00003	- -	0.000006	0.00003
			HEPTACHLOR EPOXIDE	2E-09	--	4E-10	--	2E-09	Liver	0.001	- -	0.0002	0.001
			Chemical Total	6E-08	--	4E-09	--	6E-08		0.01	--	0.0009	0.01
		Exposure Point Total						6E-08					0.01
	Exposure Medium Total							6E-08					0.01
	Air	Site 17	ARSENIC	--	1E-08	--	--	1E-08	NA	- -	0.01	- -	0.01
			MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	1E-10	--	--	1E-10	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	2E-11	--	--	2E-11	NA	- -	0.00002	- -	0.00002
			DIELDRIN	--	8E-12	--	--	8E-12	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	2E-11	--	--	2E-11	NA	- -	0.00002	- -	0.00002
			HEPTACHLOR	--	2E-11	--	--	2E-11	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	5E-11	--	--	5E-11	NA	- -	--	- -	--
			Chemical Total	--	1E-08	--	--	1E-08		- -	0.01	- -	0.01
		Exposure Point Total						1E-08					0.01
	Exposure Medium Total							1E-08					0.01
Medium Total								7E-08					0.02

TABLE 9.1.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Site 17	4,4'-DDD	2E-11	--	- -	--	2E-11	NA	--	- -	--	--
			4,4'-DDT	5E-11	--	- -	--	5E-11	Liver	0.00002	- -	--	0.00002
			Chemical Total	7E-11	--	- -	--	7E-11		0.00002	--	--	0.00002
		Exposure Point Total						7E-11					0.00002
	Exposure Medium Total							7E-11					0.00002
	Air	Site 17	4,4'-DDD	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	- -	--	--	- -	NA	- -	--	- -	--
			Chemical Total	--	- -	--	--	- -		- -	--	- -	--
		Exposure Point Total						- -					--
	Exposure Medium Total							- -					--
Medium Total								7E-11					0.00002

Total CVS HI	0.02
Total Liver HI	0.006
Total Skin HI	0.02

TABLE 9.2.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Arsenic	7E-07	--	3E-08	--	7E-07	Skin, CVS	0.01	- -	0.0005	0.01
			Heptachlor Epoxide	1E-08	--	1E-09	--	1E-08	Liver	0.0007	- -	0.00009	0.0007
			Chemical Total	7E-07	--	3E-08	--	7E-07		0.01	--	0.0005	0.01
		Exposure Point Total						7E-07					0.01
	Exposure Medium Total							7E-07					0.01
	Air	Site 17	Arsenic	--	9E-11	--	--	9E-11	NA	- -	0.000011	- -	0.000011
			Heptachlor Epoxide	--	1E-13	--	--	1E-13	NA	- -	--	- -	--
			Chemical Total	--	9E-11	--	--	9E-11		- -	0.000011	- -	0.000011
		Exposure Point Total						9E-11					0.000011
	Exposure Medium Total							9E-11					0.000011
Medium Total								7E-07					0.01
Subsurface Soil	Subsurface Soil	Site 17	ARSENIC	4E-07	--	1E-08	--	4E-07	Skin, CVS	0.006	- -	0.0002	0.007
			MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	4E-08	--	2E-09	--	4E-08	Liver	0.002	- -	0.00008	0.002
			ALPHA-CHLORDANE	8E-09	--	4E-10	--	8E-09	Liver	0.0003	- -	0.00002	0.0004
			DIELDRIN	3E-09	--	3E-10	--	3E-09	Liver	0.00003	- -	0.000003	0.00003
			GAMMA-CHLORDANE	8E-09	--	4E-10	--	8E-09	Liver	0.0003	- -	0.00002	0.0004
			HEPTACHLOR	7E-09	--	1E-09	--	8E-09	Liver	0.00003	- -	0.000003	0.00003
			HEPTACHLOR EPOXIDE	2E-08	--	2E-09	--	2E-08	Liver	0.0010	- -	0.0001	0.001
			Chemical Total	4E-07	--	2E-08	--	5E-07		0.010	--	0.0005	0.01
		Exposure Point Total						5E-07					0.01
	Exposure Medium Total							5E-07					0.01
	Air	Site 17	ARSENIC	--	5E-11	--	--	5E-11	NA	- -	0.000006	- -	0.000006
			MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	6E-13	--	--	6E-13	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	1E-13	--	--	1E-13	NA	- -	0.00000001	- -	0.00000001
			DIELDRIN	--	4E-14	--	--	4E-14	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	1E-13	--	--	1E-13	NA	- -	0.00000001	- -	0.00000001
			HEPTACHLOR	--	1E-13	--	--	1E-13	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	2E-13	--	--	2E-13	NA	- -	--	- -	--
			Chemical Total	--	5E-11	--	--	5E-11		- -	0.000006	- -	0.000006
		Exposure Point Total						5E-11					0.000006
	Exposure Medium Total							5E-11					0.000006
Medium Total								5E-07					0.01

TABLE 9.2.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future

Receptor Population: Industrial Worker

Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total CVS HI	0.02
Total Liver HI	0.005
Total Skin HI	0.02

TABLE 9.3.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Arsenic	6E-08	--	7E-09	--	7E-08	Skin, CVS	0.001	- -	0.0001	0.001
			Heptachlor Epoxide	9E-10	--	4E-10	--	1E-09	Liver	0.00005	- -	0.00002	0.00008
			Chemical Total	6E-08	--	8E-09	--	7E-08		0.001	--	0.0001	0.001
		Exposure Point Total						7E-08					0.001
	Exposure Medium Total							7E-08					0.001
	Air	Site 17	Arsenic	--	2E-12	--	--	2E-12	NA	- -	0.0000002	- -	0.0000002
			Heptachlor Epoxide	--	2E-15	--	--	2E-15	NA	- -	--	- -	--
			Chemical Total	--	2E-12	--	--	2E-12		- -	0.0000002	- -	0.0000002
		Exposure Point Total						2E-12					0.0000002
	Exposure Medium Total							2E-12					0.0000002
Medium Total								7E-08					0.001
Subsurface Soil	Subsurface Soil	Site 17	ARSENIC	3E-08	--	4E-09	--	4E-08	Skin, CVS	0.0005	- -	0.00006	0.0006
			MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	4E-09	--	5E-10	--	4E-09	Liver	0.0002	- -	0.00002	0.0002
			ALPHA-CHLORDANE	7E-10	--	1E-10	--	8E-10	Liver	0.00003	- -	0.000005	0.00003
			DIELDRIN	2E-10	--	1E-10	--	3E-10	Liver	0.000002	- -	0.000001	0.000003
			GAMMA-CHLORDANE	7E-10	--	1E-10	--	8E-10	Liver	0.00003	- -	0.000005	0.00003
			HEPTACHLOR	7E-10	--	3E-10	--	9E-10	Liver	0.000002	- -	0.000001	0.000003
			HEPTACHLOR EPOXIDE	1E-09	--	6E-10	--	2E-09	Liver	0.00008	- -	0.00003	0.0001
			Chemical Total	4E-08	--	6E-09	--	5E-08		0.0008	--	0.0001	0.001
		Exposure Point Total						5E-08					0.001
	Exposure Medium Total							5E-08					0.001
	Air	Site 17	ARSENIC	--	9E-13	--	--	9E-13	NA	- -	0.00000009	- -	0.00000009
			MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	1E-14	--	--	1E-14	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	2E-15	--	--	2E-15	NA	- -	--	- -	--
			DIELDRIN	--	6E-16	--	--	6E-16	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	2E-15	--	--	2E-15	NA	- -	--	- -	--
			HEPTACHLOR	--	2E-15	--	--	2E-15	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	4E-15	--	--	4E-15	NA	- -	--	- -	--
			Chemical Total	--	9E-13	--	--	9E-13		- -	0.00000009	- -	0.00000009
		Exposure Point Total						9E-13					0.00000009
	Exposure Medium Total							9E-13					0.00000009
Medium Total								5E-08					0.001

TABLE 9.3.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future

Receptor Population: Trespasser

Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total CVS HI	0.002
Total Liver HI	0.0004
Total Skin HI	0.002

TABLE 9.4.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Arsenic	6E-08	--	2E-09	--	6E-08	Skin, CVS	0.001	- -	0.00002	0.001
			Heptachlor Epoxide	9E-10	--	1E-10	--	1E-09	Liver	0.00004	- -	0.000004	0.00004
			Chemical Total	6E-08	--	2E-09	--	6E-08		0.001	--	0.00003	0.001
		Exposure Point Total						6E-08					0.001
	Exposure Medium Total							6E-08					0.001
	Air	Site 17	Arsenic	--	2E-12	--	--	2E-12	NA	- -	0.0000002	- -	0.0000002
			Heptachlor Epoxide	--	3E-15	--	--	3E-15	NA	- -	--	- -	--
			Chemical Total	--	2E-12	--	--	2E-12		- -	0.0000002	- -	0.0000002
		Exposure Point Total						2E-12					0.0000002
	Exposure Medium Total							2E-12					0.0000002
Medium Total								6E-08					0.001
Subsurface Soil	Subsurface Soil	Site 17	ARSENIC	3E-08	--	1E-09	--	3E-08	Skin, CVS	0.0004	- -	0.00001	0.0004
			MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	4E-09	--	1E-10	--	4E-09	Liver	0.0001	- -	0.00000	0.0001
			ALPHA-CHLORDANE	7E-10	--	3E-11	--	7E-10	Liver	0.00002	- -	0.000001	0.00002
			DIELDRIN	2E-10	--	3E-11	--	3E-10	Liver	0.000002	- -	0.0000002	0.000002
			GAMMA-CHLORDANE	7E-10	--	3E-11	--	7E-10	Liver	0.00002	- -	0.000001	0.00002
			HEPTACHLOR	7E-10	--	8E-11	--	8E-10	Liver	0.000002	- -	0.0000002	0.000002
			HEPTACHLOR EPOXIDE	1E-09	--	2E-10	--	2E-09	Liver	0.00006	- -	0.00001	0.0001
			Chemical Total	4E-08	--	2E-09	--	4E-08		0.0006	--	0.0000	0.001
		Exposure Point Total						4E-08					0.001
	Exposure Medium Total							4E-08					0.001
	Air	Site 17	ARSENIC	--	1E-12	--	--	1E-12	NA	- -	0.00000009	- -	0.00000009
			MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	1E-14	--	--	1E-14	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	3E-15	--	--	3E-15	NA	- -	--	- -	--
			DIELDRIN	--	9E-16	--	--	9E-16	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	3E-15	--	--	3E-15	NA	- -	--	- -	--
			HEPTACHLOR	--	2E-15	--	--	2E-15	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	5E-15	--	--	5E-15	NA	- -	--	- -	--
			Chemical Total	--	1E-12	--	--	1E-12		- -	0.00000009	- -	0.00000009
		Exposure Point Total						1E-12					0.00000009
	Exposure Medium Total							1E-12					0.00000009
Medium Total								4E-08					0.001

TABLE 9.4.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future

Receptor Population: Trespasser

Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total CVS HI	0.001
Total Liver HI	0.0003
Total Skin HI	0.001

TABLE 9.5.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Arsenic	2E-06	--	5E-08	--	2E-06	Skin, CVS	0.1	- -	0.004	0.1
			Heptachlor Epoxide	2E-08	--	3E-09	--	3E-08	Liver	0.007	- -	0.0008	0.008
			Chemical Total	2E-06	--	6E-08	--	2E-06		0.1	--	0.005	0.1
		Exposure Point Total						2E-06					0.1
	Exposure Medium Total							2E-06					0.1
	Air	Site 17	Arsenic	--	7E-11	--	--	7E-11	NA	- -	0.00004	- -	0.00004
			Heptachlor Epoxide	--	1E-13	--	--	1E-13	NA	- -	--	- -	--
			Chemical Total	--	7E-11	--	--	7E-11		- -	0.00004	- -	0.00004
		Exposure Point Total						7E-11					0.00004
	Exposure Medium Total							7E-11					0.00004
Medium Total								2E-06					0.1
Subsurface Soil	Subsurface Soil	Site 17	ARSENIC	9E-07	--	3E-08	--	9E-07	Skin, CVS	0.07	- -	0.002	0.07
			MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	1E-07	--	3E-09	--	1E-07	Liver	0.02	- -	0.0007	0.02
			ALPHA-CHLORDANE	2E-08	--	8E-10	--	2E-08	Liver	0.004	- -	0.0002	0.004
			DIELDRIN	6E-09	--	7E-10	--	7E-09	Liver	0.0003	- -	0.00003	0.0003
			GAMMA-CHLORDANE	2E-08	--	8E-10	--	2E-08	Liver	0.004	- -	0.0002	0.004
			HEPTACHLOR	2E-08	--	2E-09	--	2E-08	Liver	0.0003	- -	0.00003	0.0003
			HEPTACHLOR EPOXIDE	4E-08	--	4E-09	--	4E-08	Liver	0.01	- -	0.001	0.01
			Chemical Total	1E-06	--	4E-08	--	1E-06		0.1	--	0.005	0.1
		Exposure Point Total						1E-06					0.1
	Exposure Medium Total							1E-06					0.1
	Air	Site 17	ARSENIC	--	4E-11	--	--	4E-11	NA	- -	0.00002	- -	0.00002
			MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	4E-13	--	--	4E-13	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	8E-14	--	--	8E-14	NA	- -	0.00000004	- -	0.00000004
			DIELDRIN	--	3E-14	--	--	3E-14	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	8E-14	--	--	8E-14	NA	- -	0.00000004	- -	0.00000004
			HEPTACHLOR	--	8E-14	--	--	8E-14	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	2E-13	--	--	2E-13	NA	- -	--	- -	--
			Chemical Total	--	4E-11	--	--	4E-11		- -	0.00002	- -	0.00002
		Exposure Point Total						4E-11					0.00002
	Exposure Medium Total							4E-11					0.00002
Medium Total								1E-06					0.1

TABLE 9.5.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Site 17	4,4'-DDD	2E-07	--	- -	--	2E-07	NA	--	- -	--	--
			4,4'-DDT	5E-07	--	- -	--	5E-07	Liver	0.10	- -	--	0.10
			Chemical Total	7E-07	--	- -	--	7E-07		0.10	--	--	0.10
		Exposure Point Total						7E-07					0.10
	Exposure Medium Total							7E-07					0.10
	Air	Site 17	4,4'-DDD	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	- -	--	--	- -	NA	- -	--	- -	--
			Chemical Total	--	- -	--	--	- -		- -	--	- -	--
		Exposure Point Total						- -					--
	Exposure Medium Total							- -					--
Medium Total								7E-07					0.10

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total CVS HI	0.2
Total Liver HI	0.1
Total Skin HI	0.2

TABLE 9.6.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION,NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Arsenic	2E-07	--	7E-09	--	2E-07	Skin, CVS	0.02	- -	0.0006	0.02
			Heptachlor Epoxide	3E-09	--	4E-10	--	4E-09	Liver	0.0009	- -	0.0001	0.001
			Chemical Total	2E-07	--	8E-09	--	2E-07		0.02	--	0.0007	0.02
		Exposure Point Total						2E-07					0.02
	Exposure Medium Total							2E-07					0.02
	Air	Site 17	Arsenic	--	7E-11	--	--	7E-11	NA	- -	0.00004	- -	0.00004
			Heptachlor Epoxide	--	1E-13	--	--	1E-13	NA	- -	--	- -	--
			Chemical Total	--	7E-11	--	--	7E-11		- -	0.00004	- -	0.00004
		Exposure Point Total						7E-11					0.00004
	Exposure Medium Total							7E-11					0.00004
Medium Total								2E-07					0.02
Subsurface Soil	Subsurface Soil	Site 17	ARSENIC	1E-07	--	4E-09	--	1E-07	Skin, CVS	0.009	- -	0.0003	0.009
			MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	1E-08	--	5E-10	--	1E-08	Liver	0.003	- -	0.00010	0.003
			ALPHA-CHLORDANE	2E-09	--	1E-10	--	3E-09	Liver	0.0005	- -	0.00002	0.0005
			DIELDRIN	8E-10	--	1E-10	--	9E-10	Liver	0.00004	- -	0.000004	0.00004
			GAMMA-CHLORDANE	2E-09	--	1E-10	--	3E-09	Liver	0.0005	- -	0.00002	0.0005
			HEPTACHLOR	2E-09	--	3E-10	--	3E-09	Liver	0.00004	- -	0.000004	0.00004
			HEPTACHLOR EPOXIDE	5E-09	--	5E-10	--	5E-09	Liver	0.001	- -	0.0002	0.002
			Chemical Total	1E-07	--	6E-09	--	1E-07		0.01	--	0.0006	0.01
		Exposure Point Total						1E-07					0.01
	Exposure Medium Total							1E-07					0.01
	Air	Site 17	ARSENIC	--	4E-11	--	--	4E-11	NA	- -	0.00002	- -	0.00002
			MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	4E-13	--	--	4E-13	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	8E-14	--	--	8E-14	NA	- -	0.00000004	- -	0.00000004
			DIELDRIN	--	3E-14	--	--	3E-14	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	8E-14	--	--	8E-14	NA	- -	0.00000004	- -	0.00000004
			HEPTACHLOR	--	8E-14	--	--	8E-14	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	2E-13	--	--	2E-13	NA	- -	--	- -	--
			Chemical Total	--	4E-11	--	--	4E-11		- -	0.00002	- -	0.00002
		Exposure Point Total						4E-11					0.00002
	Exposure Medium Total							4E-11					0.00002
Medium Total								1E-07					0.02

TABLE 9.6.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION,NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Site 17	4,4'-DDD	9E-08	--	- -	--	9E-08	NA	--	- -	--	--
			4,4'-DDT	2E-07	--	- -	--	2E-07	Liver	0.03	- -	--	0.03
			Chemical Total	3E-07	--	- -	--	3E-07		0.03	--	--	0.03
		Exposure Point Total						3E-07					0.03
	Exposure Medium Total							3E-07					0.03
	Air	Site 17	4,4'-DDD	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	- -	--	--	- -	NA	- -	- -	- -	- -
			Chemical Total	--	- -	--	--	- -		- -	--	- -	--
		Exposure Point Total						- -					--
	Exposure Medium Total							- -					--
Medium Total								3E-07					0.03

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total CVS HI	0.03
Total Liver HI	0.04
Total Skin HI	0.03

TABLE 9.7.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Arsenic	5E-07	--	2E-08	--	6E-07	Skin, CVS	0.01	- -	0.0004	0.01
			Heptachlor Epoxide	8E-09	--	1E-09	--	9E-09	Liver	0.0007	- -	0.00008	0.0008
			Chemical Total	6E-07	--	2E-08	--	6E-07		0.01	--	0.0005	0.01
		Exposure Point Total						6E-07					0.01
	Exposure Medium Total							6E-07					0.01
	Air	Site 17	Arsenic	--	2E-10	--	--	2E-10	NA	- -	0.00004	- -	0.00004
			Heptachlor Epoxide	--	4E-13	--	--	4E-13	NA	- -	--	- -	--
			Chemical Total	--	2E-10	--	--	2E-10		- -	0.00004	- -	0.00004
		Exposure Point Total						2E-10					0.00004
	Exposure Medium Total							2E-10					0.00004
Medium Total								6E-07					0.01
Subsurface Soil	Subsurface Soil	Site 17	ARSENIC	3E-07	--	1E-08	--	3E-07	Skin, CVS	0.007	- -	0.0002	0.007
			MONURON	- -	--	- -	--	- -	NA	--	- -	--	--
			4,4'-DDT	4E-08	--	1E-09	--	4E-08	Liver	0.002	- -	0.00007	0.002
			ALPHA-CHLORDANE	6E-09	--	3E-10	--	7E-09	Liver	0.0004	- -	0.00002	0.0004
			DIELDRIN	2E-09	--	3E-10	--	2E-09	Liver	0.00003	- -	0.000003	0.00003
			GAMMA-CHLORDANE	6E-09	--	3E-10	--	7E-09	Liver	0.0004	- -	0.00002	0.0004
			HEPTACHLOR	6E-09	--	7E-10	--	7E-09	Liver	0.00003	- -	0.000003	0.00003
			HEPTACHLOR EPOXIDE	1E-08	--	1E-09	--	1E-08	Liver	0.001	- -	0.0001	0.001
			Chemical Total	4E-07	--	1E-08	--	4E-07		0.01	--	0.0005	0.01
		Exposure Point Total						4E-07					0.01
	Exposure Medium Total							4E-07					0.01
	Air	Site 17	ARSENIC	--	1E-10	--	--	1E-10	NA	- -	0.00002	- -	0.00002
			MONURON	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	2E-12	--	--	2E-12	NA	- -	--	- -	--
			ALPHA-CHLORDANE	--	3E-13	--	--	3E-13	NA	- -	0.00000004	- -	0.00000004
			DIELDRIN	--	9E-14	--	--	9E-14	NA	- -	--	- -	--
			GAMMA-CHLORDANE	--	3E-13	--	--	3E-13	NA	- -	0.00000004	- -	0.00000004
			HEPTACHLOR	--	3E-13	--	--	3E-13	NA	- -	--	- -	--
			HEPTACHLOR EPOXIDE	--	5E-13	--	--	5E-13	NA	- -	--	- -	--
			Chemical Total	--	1E-10	--	--	1E-10		- -	0.00002	- -	0.00002
		Exposure Point Total						1E-10					0.00002
	Exposure Medium Total							1E-10					0.00002
Medium Total								4E-07					0.01

TABLE 9.7.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Site 17	4,4'-DDD	4E-07	--	- -	--	4E-07	NA	--	- -	--	--
			4,4'-DDT	7E-07	--	- -	--	7E-07	Liver	0.04	- -	--	0.04
			Chemical Total	1E-06	--	- -	--	1E-06		0.04	--	--	0.04
		Exposure Point Total						1E-06					0.04
	Exposure Medium Total							1E-06					0.04
	Air	Site 17	4,4'-DDD	--	- -	--	--	- -	NA	- -	--	- -	--
			4,4'-DDT	--	- -	--	--	- -	NA	- -	- -	- -	--
			Chemical Total	--	- -	--	--	- -		- -	--	- -	--
		Exposure Point Total						- -					--
	Exposure Medium Total							- -					--
Medium Total								1E-06					0.04

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total CVS HI	0.02
Total Liver HI	0.05
Total Skin HI	0.02

TABLE 9.8.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Arsenic	1E-07	--	1E-08	--	1E-07
			Heptachlor Epoxide	2E-09	--	5E-10	--	2E-09
			Chemical Total	1E-07	--	1E-08	--	1E-07
		Exposure Point Total						1E-07
	Exposure Medium Total							1E-07
	Air	Site 17	Arsenic	--	4E-12	--	--	4E-12
			Heptachlor Epoxide	--	6E-15	--	--	6E-15
			Chemical Total	--	4E-12	--	--	4E-12
		Exposure Point Total						4E-12
	Exposure Medium Total							4E-12
Medium Total								1E-07
Subsurface Soil	Subsurface Soil	Site 17	ARSENIC	7E-08	--	5E-09	--	7E-08
			MONURON	- -	--	- -	--	- -
			4,4'-DDT	8E-09	--	6E-10	--	8E-09
			ALPHA-CHLORDANE	1E-09	--	1E-10	--	2E-09
			DIELDRIN	5E-10	--	1E-10	--	6E-10
			GAMMA-CHLORDANE	1E-09	--	1E-10	--	2E-09
			HEPTACHLOR	1E-09	--	4E-10	--	2E-09
			HEPTACHLOR EPOXIDE	3E-09	--	7E-10	--	3E-09
			Chemical Total	8E-08	--	7E-09	--	9E-08
		Exposure Point Total						9E-08

TABLE 9.8.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Subsurface Soil	Exposure Medium Total							9E-08
	Air	Site 17	ARSENIC	--	2E-12	--	--	2E-12
			MONURON	--	- -	--	--	- -
			4,4'-DDT	--	2E-14	--	--	2E-14
			ALPHA-CHLORDANE	--	4E-15	--	--	4E-15
			DIELDRIN	--	1E-15	--	--	1E-15
			GAMMA-CHLORDANE	--	4E-15	--	--	4E-15
			HEPTACHLOR	--	4E-15	--	--	4E-15
			HEPTACHLOR EPOXIDE	--	8E-15	--	--	8E-15
			Chemical Total	--	2E-12	--	--	2E-12
		Exposure Point Total						2E-12
	Exposure Medium Total							2E-12
Medium Total								9E-08

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.9.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Arsenic	2E-06	--	8E-08	--	2E-06
			Heptachlor Epoxide	4E-08	--	4E-09	--	4E-08
			Chemical Total	2E-06	--	8E-08	--	2E-06
		Exposure Point Total						2E-06
	Exposure Medium Total							2E-06
	Air	Site 17	Arsenic	--	4E-10	--	--	4E-10
			Heptachlor Epoxide	--	6E-13	--	--	6E-13
			Chemical Total	--	4E-10	--	--	4E-10
		Exposure Point Total						4E-10
	Exposure Medium Total							4E-10
Medium Total								2E-06
Subsurface Soil	Subsurface Soil	Site 17	ARSENIC	1E-06	--	4E-08	--	1E-06
			MONURON	- -	--	- -	--	- -
			4,4'-DDT	2E-07	--	5E-09	--	2E-07
			ALPHA-CHLORDANE	3E-08	--	1E-09	--	3E-08
			DIELDRIN	9E-09	--	1E-09	--	1E-08
			GAMMA-CHLORDANE	3E-08	--	1E-09	--	3E-08
			HEPTACHLOR	3E-08	--	3E-09	--	3E-08
			HEPTACHLOR EPOXIDE	5E-08	--	6E-09	--	6E-08
			Chemical Total	2E-06	--	6E-08	--	2E-06
		Exposure Point Total						2E-06

TABLE 9.9.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Subsurface Soil	Exposure Medium Total							2E-06
	Air	Site 17	ARSENIC	--	2E-10	--	--	2E-10
			MONURON	--	- -	--	--	- -
			4,4'-DDT	--	2E-12	--	--	2E-12
			ALPHA-CHLORDANE	--	4E-13	--	--	4E-13
			DIELDRIN	--	1E-13	--	--	1E-13
			GAMMA-CHLORDANE	--	4E-13	--	--	4E-13
			HEPTACHLOR	--	4E-13	--	--	4E-13
			HEPTACHLOR EPOXIDE	--	8E-13	--	--	8E-13
			Chemical Total	--	2E-10	--	--	2E-10
		Exposure Point Total						2E-10
	Exposure Medium Total							2E-10
Medium Total								2E-06
Groundwater	Groundwater	Site 17	4,4'-DDD	4E-07	--	- -	--	4E-07
			4,4'-DDT	8E-07	--	- -	--	8E-07
			Chemical Total	1E-06	--	2E-07	--	2E-06
		Exposure Point Total						2E-06
	Exposure Medium Total							2E-06
	Air	Site 17	4,4'-DDD	--	- -	--	--	- -
			4,4'-DDT	--	- -	--	--	- -
			Chemical Total	--	- -	--	--	- -
Medium Total								2E-06

TABLE 9.9.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future

Receptor Population: Residents

Receptor Age: Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

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SUMMARY OF CUMULATIVE RISKS FOR COCs

Table No.

Resonable Maximum Exposure

10.1 RME Young Child Residents
10.2 RME Lifelong Residents

TABLE 10.1.RME

RISK SUMMARY TABLE - CUMULATIVE SITE RISKS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Arsenic	1E-05	--	1E-06	--	2E-05	Skin, CVS	0.4	- -	0.03	0.4
			Chemical Total	1E-05	--	1E-06	--	2E-05		0.4	--	0.04	0.4
		Exposure Point Total						2E-05					0.4
	Exposure Medium Total							2E-05					0.4
Medium Total								2E-05					0.4
Subsurface Soil	Subsurface Soil	Site 17	Arsenic	8E-06	--	7E-07	--	8E-06	Skin, CVS	0.2	- -	0.02	0.2
			Chemical Total	1E-05	--	9E-07	--	1E-05		0.3	--	0.03	0.4
		Exposure Point Total						1E-05					0.4
	Exposure Medium Total							1E-05					0.4
Medium Total								1E-05					0.4
Groundwater	Groundwater	Site 17	4,4'-DDD	2E-06	--	- -	--	2E-06	NA	--	- -	--	--
			4,4'-DDT	3E-06	--	- -	--	3E-06	Liver	0.2	- -	--	0.2
			Chemical Total	5E-06	--	- -	--	5E-06		0.2	--	--	0.2
		Exposure Point Total						5E-06					0.2
	Exposure Medium Total							5E-06					0.2
Medium Total								5E-06					0.2

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Total CVS HI	0.6
Total Liver HI	0.4
Total Skin HI	0.6

TABLE 10.1.RME

RISK SUMMARY TABLE - CUMULATIVE SITE RISKS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

TABLE 10.2.RME

RISK SUMMARY TABLE - CUMULATIVE SITE RISKS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Surface Soil	Surface Soil	Site 17	Arsenic	2E-05	--	3E-06	--	2E-05
			Chemical Total	2E-05	--	3E-06	--	2E-05
		Exposure Point Total						2E-05
	Exposure Medium Total							2E-05
Medium Total								2E-05
Subsurface Soil	Subsurface Soil	Site 17	ARSENIC	1E-05	--	1E-06	--	1E-05
			4,4'-DDT	1E-06	--	2E-07	--	2E-06
			Chemical Total	1E-05	--	2E-06	--	2E-05
		Exposure Point Total						2E-05
	Exposure Medium Total							2E-05
Medium Total								2E-05

TABLE 10.2.RME

RISK SUMMARY TABLE - CUMULATIVE SITE RISKS

REASONABLE MAXIMUM EXPOSURES

SITE 17 REMEDIAL INVESTIGATION, NAS BRUNSWICK, BRUNSWICK, MAINE

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Lifetime

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Groundwater	Groundwater	Site 17	4,4'-DDD	2E-06	--	- -	--	2E-06
			4,4'-DDT	4E-06	--	- -	--	4E-06
			Chemical Total	6E-06	--	- -	--	6E-06
		Exposure Point Total						6E-06
	Exposure Medium Total							6E-06
Medium Total								6E-06

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

ATTACHMENT C-1.5

SAMPLE CALCULATIONS

CALCULATION WORKSHEET

CLIENT: SITE 17, NAS BRUNSWICK, BRUNSWICK, MAINE		**JOB NUMBER:** 2063
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SOIL CONSTRUCTION WORKERS		
BASED ON: USEPA, DECEMBER 1989		
BY: A. COGNETTI	**CHECKED BY:** L. Ciafoni	**DATE:** 4/18/2011

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from incidental ingestion of surface soil at Site 17 NAS Brunswick.

EQUATION:

$$IEX = \frac{CS \times IR \times EF \times ED \times FI \times CF}{BW \times AT}$$

Where:

IEX	=	estimated exposure intake (mg/kg/day)
Cs	=	exposure point concentration in soil (mg/kg)
IR	=	incidental ingestion rate (mg/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
FI	=	fraction ingested from contaminated source (unitless)
CF	=	conversion factor (1.0E-6 kg/mg)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor ((mg/kg/day)$^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg/day)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFo (mg/kg/day)-1
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDo (mg/kg/day)

ASSUMPTIONS:

Cs	=	8	mg/kg	Chemical: Arsenic
IR	=	330	mg/day	
EF	=	150	days/year	
ED	=	1	years	
FI	=	1		
CF	=	1.0E-06	kg/mg	
BW	=	70	kg	
ATc	=	25550	days	
ATnc	=	365	days	
CSFo	=	1.5E+00	(mg/kg/day)$^{-1}$	
RfDo	=	3.0E-04	(mg/kg/day)	

CALCULATION WORKSHEET

CLIENT: SITE 17, NAS BRUNSWICK, BRUNSWICK, MAINE		**JOB NUMBER:** 2063
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SOIL CONSTRUCTION WORKERS		
BASED ON: USEPA, DECEMBER 1989		
BY: A. COGNETTI	**CHECKED BY:** L. Ciofani	**DATE:** 4/18/2011

EXAMPLE CARCINOGENIC CALCULATION

$$IEXc = \frac{8\ mg/kg \times 330\ mg/day \times 150\ days/year \times 1\ years \times 1 \times 1.0E\text{-}06\ kg/mg}{70\ kg \times 25550\ days}$$

IEXc = 2.21E-07 mg/kg/day

ILCR = 2.21E-07 mg/kg/day x 1.50E+00 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ILCR = 3.3E-07 ✓

EXAMPLE NONCARCINOGENIC CALCULATION

$$IEXnc = \frac{8\ mg/kg \times 330\ mg/day \times 150\ days/year \times 1\ years \times 1 \times 1.0E\text{-}06\ kg/mg}{70\ kg \times 365\ days}$$

IEXnc = 1.55E-05 mg/kg/day

HQ = 1.55E-05 mg/kg/day / 3.00E-04 (mg/kg/day) = Hazard Quotient

HQ = 5.2E-02 ✓

CALCULATION WORKSHEET

CLIENT: SITE 17, NAS BRUNSWICK, BRUNSWICK, MAINE		**JOB NUMBER:** 2063
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SOIL CONSTRUCTION WORKERS		
BASED ON: USEPA, JULY 2004		
BY: A. COGNETTI	**CHECKED BY:** L. Cinfoni	**DATE:** 4/18/2011

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from dermal contact with surface soil at Site 17 NAS Brunswick.

EQUATION:

$$DEX = \frac{Cs \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

Where:

DEX	=	estimated exposure intake (mg/kg/day)
Cs	=	exposure point concentration in soil (mg/kg)
CF	=	conversion factor (1.0E-6 kg/mg)
SA	=	skin surface available for contact (cm^2/day)
ABS	=	absorption factor (unitless)
AF	=	adherence factor (mg/cm^2)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFd	=	dermal carcinogenic slope factor ($(mg/kg/day)^{-1}$)
RfDd	=	dermal noncarcinogenic reference dose (mg/kg/day)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFd (mg/kg/day)-1
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDd (mg/kg/day)

ASSUMPTIONS:

Cs	=	8	mg/kg	Chemical: Arsenic
CF	=	1.0E-06	kg/mg	
SA	=	3300	cm^2/day	
AF	=	0.3	mg/cm^2	
ABS	=	0.03		
EF	=	150	days/year	
ED	=	1	years	
BW	=	70	kg	
ATc	=	25550	days	
ATnc	=	365	days	
CSFd	=	1.5E+00	$(mg/kg/day)^{-1}$	
RfDd	=	3.0E-04	(mg/kg/day)	

CLIENT: SITE 17, NAS BRUNSWICK, BRUNSWICK, MAINE		**JOB NUMBER:** 2063
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SOIL CONSTRUCTION WORKERS		
BASED ON: USEPA, JULY 2004		
BY: A. COGNETTI	**CHECKED BY:** L. Ciofani	**DATE:** 4/18/2011

EXAMPLE CARCINOGENIC CALCULATION

$$DEXc = \frac{8\ mg/kg \times 1.0E\text{-}06\ kg/mg \times 3300\ cm2/day \times 0.3\ mg/cm2 \times 0.03 \times 150\ days/year \times 1\ years}{70\ kg \times 25550\ days}$$

DEXc = 1.99E-08 mg/kg/day

ILCR = 1.99E-08 mg/kg/day x 1.50E+00 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ILCR = 3.0E-08 ✓

EXAMPLE NONCARCINOGENIC CALCULATION

$$DEXnc = \frac{8\ mg/kg \times 1.0E\text{-}06\ kg/mg \times 3300\ cm2/day \times 0.3\ mg/cm2 \times 0.03 \times 150\ days/year \times 1\ years}{70\ kg \times 365\ days}$$

DEXnc = 1.39E-06 mg/kg/day

HQ = 1.39E-06 mg/kg/day / 3.00E-04 (mg/kg/day) = Hazard Quotient

HQ = 4.6E-03 ✓

CALCULATION WORKSHEET

CLIENT: SITE 17, NAS BRUNSWICK, BRUNSWICK, MAINE		**JOB NUMBER:** 2063
SUBJECT: CALCULATION OF INTAKE/RISK FROM INHALATION OF FUGATIVE DUST EMISSIONS CONSTRUCTION WORKERS		
BASED ON: USEPA, JANUARY 2009		
BY: A. COGNETTI	**CHECKED BY:** L. Ciofani	**DATE:** 4/18/2011

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from inhalation of surface soil at Site 17 NAS Brunswick.

EQUATION:

$$EC = \frac{Ca \times ET \times EF \times ED}{AT \times 24\ hours/day}$$

Where:

EC	=	exposure concentration (mg/m3)
Ca	=	exposure point concentration in air (mg/m3)
	=	Cs x 1/PEF
Cs	=	exposure point concentration in soil (mg/kg)
PEF	=	particulate emission factor (m3/kg)
ET	=	exposure time (hrs/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days)
IURi	=	inhalation unit risk $((ug/m3)^{-1})$
RfCi	=	inhalation reference concentration (mg/m3)

RISKS:

ILCR (Carcinogens) = Exposure Concentration (mg/m3) x IURi (ug/m3)-1 x 1000 ug/mg
HQ (Noncarcinogens) = Exposure Concentration (mg/m3) / RFCi (mg/m3)

ASSUMPTIONS:

Cs	=	8	mg/kg	Chemical: Arsenic
PEF	=	1.62E+06	m3/kg	
Ca	=	4.94E-06	mg/m3	
ET	=	8	hours	
EF	=	150	days/year	
ED	=	1	years	
ATc	=	25550	days	
ATnc	=	365	days	
IURi	=	4.3E-03	$(ug/m3)^{-1}$	
RfCi	=	1.5E-05	(mg/m3)	

CALCULATION WORKSHEET

CLIENT: SITE 17, NAS BRUNSWICK, BRUNSWICK, MAINE		**JOB NUMBER:** 2063
SUBJECT: CALCULATION OF INTAKE/RISK FROM INHALATION OF FUGATIVE DUST EMISSIONS CONSTRUCTION WORKERS		
BASED ON: USEPA, JANUARY 2009		
BY: A. COGNETTI	**CHECKED BY:** L. Ciofani	**DATE:** 4/18/2011

EXAMPLE CARCINOGENIC CALCULATION

$$IEXc = \frac{4.94E\text{-}06 \text{ mg/m3} \times 8 \text{ hours} \times 150 \text{ days/year} \times 1 \text{ years}}{25550 \text{ days} \times 24 \text{ hours/day}}$$

IEXc = 9.66E-09 mg/m3

ILCR = 9.66E-09 mg/m3 x 4.30E-03 (ug/m3)-1 x 1000 ug/mg = Incremental Lifetime Cancer Risk

ILCR = 4.2E-08 ✓

EXAMPLE NONCARCINOGENIC CALCULATION

$$IEXnc = \frac{4.94E\text{-}06 \text{ mg/m3} \times 8 \text{ hours} \times 150 \text{ days/year} \times 1 \text{ years}}{365 \text{ days} \times 24 \text{ hours/day}}$$

IEXnc = 6.76E-07 mg/m3

HQ = 6.76E-07 mg/m3 / 1.50E-05 (mg/m3) = Hazard Quotient

HQ **4.5E-02** ✓

CALCULATION WORKSHEET

CLIENT: SITE 17, NAS BRUNSWICK, BRUNSWICK, MAINE		**JOB NUMBER:** 2063
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF GROUNDWATER CONSTRUCTION WORKERS		
BASED ON: USEPA, DECEMBER 1989		
BY: M. Kraus	**CHECKED BY:** L. Ciofani	**DATE:** 7/26/2011

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from incidental ingestion of groundwater.

EQUATION:

$$IEX = \frac{Cgw \times CF \times CRgw \times EF \times ED}{BW \times AT}$$

Where:

IEX	=	estimated exposure intake (mg/kg/day)
Cgw	=	exposure point concentration in groundwater (ug/L)
CF	=	conversion factor (1.0E-3 mg/ug)
CRgw	=	contact rate (L/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor ($(mg/kg/day)^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg/day)

RISKS:

ILCR (Carcinogens) = Intake (mg/kg/day) x CSFo (mg/kg/day)-1
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDo (mg/kg/day)

ASSUMPTIONS:

Cgw	=	1.6	ug/L	Chemical: 4,4'-DDT
CRgw	=	0.01	L/day	
CF	=	1.0E-03	mg/ug	
EF	=	30	days/year	
ED	=	1	years	
BW	=	70	kg	
ATc	=	25550	days	
ATnc	=	365	days	
CSFo	=	3.4E-01	$(mg/kg/day)^{-1}$	
RfDo	=	5.0E-04	(mg/kg/day)	

CLIENT: SITE 17, NAS BRUNSWICK, BRUNSWICK, MAINE		**JOB NUMBER:** 2063
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF GROUNDWATER CONSTRUCTION WORKERS		
BASED ON: USEPA, DECEMBER 1989		
BY: M. Kraus	**CHECKED BY:** L. Ciafani	**DATE:** 7/26/2011

EXAMPLE CARCINOGENIC CALCULATION

$$IEXc = \frac{1.6\ ug/L \times 1.0E\text{-}03\ mg/ug \times 0.01\ L/day \times 30\ days/year \times 1\ years}{70\ kg \times 25550\ days}$$

IEXc = 2.68E-10 mg/kg/day

ILCR = 2.68E-10 mg/kg/day x 3.40E-01 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ILCR = 9.1E-11

EXAMPLE NONCARCINOGENIC CALCULATION

$$IEXnc = \frac{1.6\ ug/L \times 1.0E\text{-}03\ mg/ug \times 0.01\ L/day \times 30\ days/year \times 1\ years}{70\ kg \times 365\ days}$$

IEXnc = 1.88E-08 mg/kg/day

$$HQ = \frac{1.88E\text{-}08\ mg/kg/day}{5.00E\text{-}04\ (mg/kg/day)} = \text{Hazard Quotient}$$

HQ = 3.8E-05

CLIENT: NAS Bruswick	JOB NUMBER:	
SUBJECT: CALCULATION OF PARTICUALATE EMISSION FACTOR FOR CONSTRUCTION WORKERS		
BASED ON: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (USEPA, December 2002)		
BY: M. Kraus	CHECKED BY: L. Crafi	DATE: 9/8/09

Equation 5-5
Derivation of the Particulate Emission Factor
Construction Scenario - Construction Worker

$$PEF_{sc} = Q/C_{sr} \times \frac{1}{F_d} \times \left[\frac{T \times A_R}{556 \times (W/3)^{0.4} \times \frac{(365d/yr - p)}{365d/yr} \times \Sigma VKT} \right]$$

Parameter/Definition (units)	Default
PEF_{sc}/subchronic road particulate emission factor (m^3/kg)	site-specific
Q/C_{sr}/ inverse of the ratio of the 1-h geometric mean air concentration to the emission flux along a straight road segment bisecting a square site (g/m^2-s per kg/m^3)	23.02[a] (Equation 5-6)
F_D/dispersion correction factor (unitless)	0.185 (Appendix E)
T/total time over which construction occurs (s)	site-specific
A_R/surface area of contaminated road segment (m^2) L_R/length of road segment (ft) W_R/width of road segment (ft)	274.213 ($A_R = L_R \times W_R \times 0.092903 m^2/ft^2$)
W/mean vehicle weight (tons)	site-specific
p/number of days with at least 0.01 inches of precipitation (days/year)	site-specific (Exhibit 5-2)
ΣVKT/sum of fleet vehicle kilometers traveled during the exposure duration (km)	site-specific

[a] Assumes a 0.5 acre site

Calculation of PEF for Construction Workers

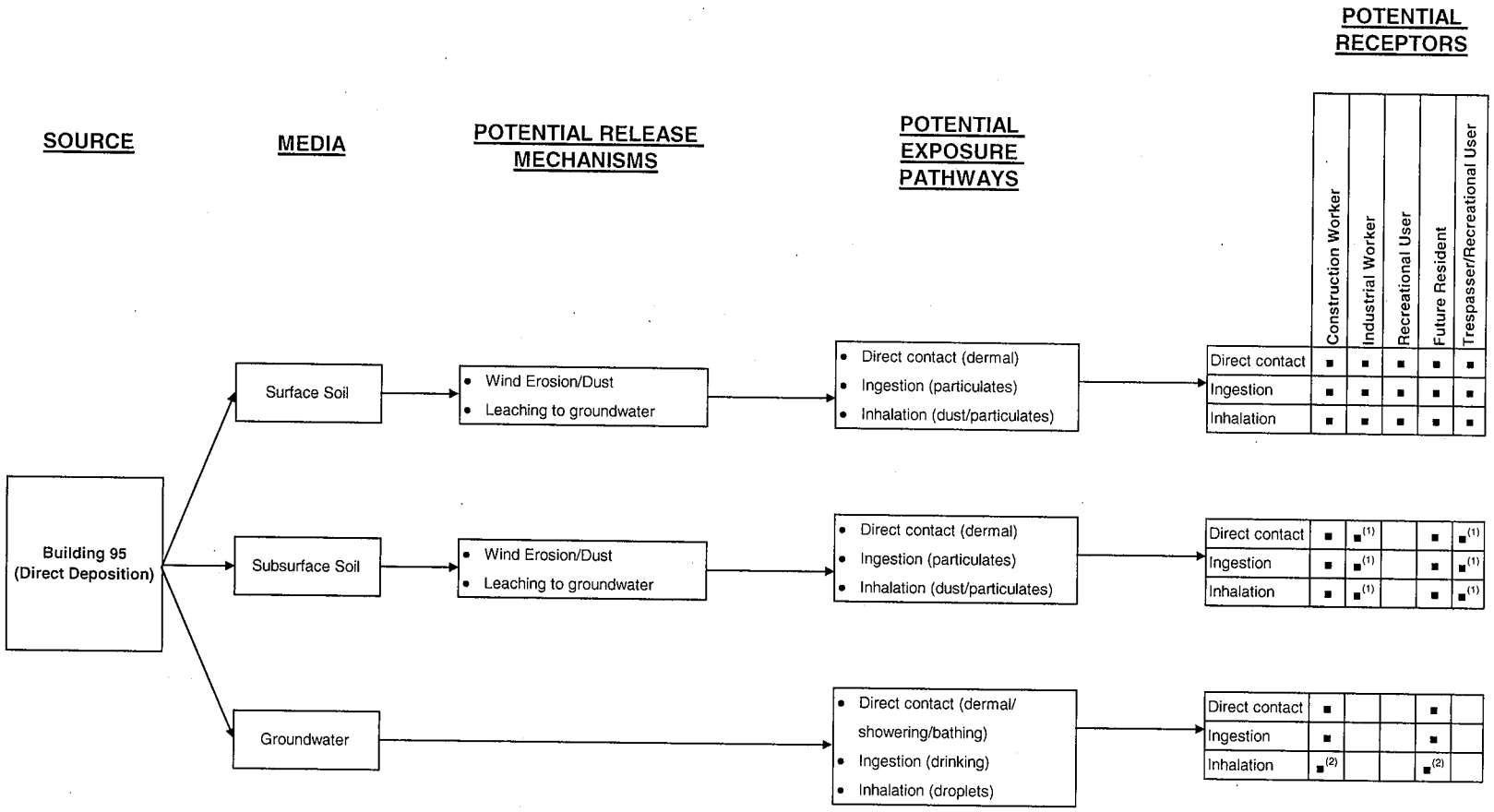
Q/C	23.02 (g/m2-s per kg/m3)	
Fd	0.185 dispersion correction factor (unitless)	
T	4.32E+06 sec	3600 sec/hr x 8hr/day x 150 days/yr
Area (A)	274.213 m^2	
W	8 tons	
p	135 day/year	
VKT	175.5 km	

PEF = 1.62E+06 m^3/kg

ATTACHMENT C-1.6

HHRA CSM FIGURE

ATTACHMENT C-1.6
SITE 17 HUMAN HEALTH CONCEPTUAL SITE MODEL
NAS BRUNSWICK
BRUNSWICK, MAINE



1 - Exposure to subsurface soil is unlikely for this receptor, and therefore risk estimates for this receptor via the subsurface soil exposure pathway are presented in the Uncertainty Section.

2 - No volatile chemicals were detected in groundwater; therefore, inhalation of chemicals in groundwater was not evaluated quantitatively.

PRO-UCL

SURFACE SOIL CALCULATIONS

1				General UCL Statistics for Full Data Sets								
2	User Selected Options											
3	From File			WorkSheet.wst								
4	Full Precision			OFF								
5	Confidence Coefficient			95%								
6	Number of Bootstrap Operations			2000								
7												
8												
9	ARSENIC											
10												
11	General Statistics											
12	Number of Valid Observations			26			Number of Distinct Observations				23	
13												
14	Raw Statistics						Log-transformed Statistics					
15	Minimum			1.5			Minimum of Log Data				0.405	
16	Maximum			18.2			Maximum of Log Data				2.901	
17	Mean			6.55			Mean of log Data				1.713	
18	Median			6.8			SD of log Data				0.634	
19	SD			3.573								
20	Std. Error of Mean			0.701								
21	Coefficient of Variation			0.546								
22	Skewness			1.101								
23												
24	Relevant UCL Statistics											
25	Normal Distribution Test						Lognormal Distribution Test					
26	Shapiro Wilk Test Statistic			0.896			Shapiro Wilk Test Statistic				0.896	
27	Shapiro Wilk Critical Value			0.92			Shapiro Wilk Critical Value				0.92	
28	Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level					
29												
30	Assuming Normal Distribution						Assuming Lognormal Distribution					
31	95% Student's-t UCL			7.747			95% H-UCL				8.839	
32	95% UCLs (Adjusted for Skewness)						95% Chebyshev (MVUE) UCL				10.6	
33	95% Adjusted-CLT UCL (Chen-1995)			7.864			97.5% Chebyshev (MVUE) UCL				12.28	
34	95% Modified-t UCL (Johnson-1978)			7.772			99% Chebyshev (MVUE) UCL				15.58	
35												
36	Gamma Distribution Test						Data Distribution					
37	k star (bias corrected)			2.825			Data Follow Appr. Gamma Distribution at 5% Significance Level					
38	Theta Star			2.319								
39	MLE of Mean			6.55								
40	MLE of Standard Deviation			3.897								
41	nu star			146.9								
42	Approximate Chi Square Value (.05)			119.9			Nonparametric Statistics					
43	Adjusted Level of Significance			0.0398			95% CLT UCL				7.703	
44	Adjusted Chi Square Value			118.3			95% Jackknife UCL				7.747	
45							95% Standard Bootstrap UCL				7.696	
46	Anderson-Darling Test Statistic			0.91			95% Bootstrap-t UCL				7.874	
47	Anderson-Darling 5% Critical Value			0.75			95% Hall's Bootstrap UCL				8.215	
48	Kolmogorov-Smirnov Test Statistic			0.163			95% Percentile Bootstrap UCL				7.712	
49	Kolmogorov-Smirnov 5% Critical Value			0.172			95% BCA Bootstrap UCL				7.881	
50	Data follow Appr. Gamma Distribution at 5% Significance Level						95% Chebyshev(Mean, Sd) UCL				9.605	

	A	B	C	D	E	F	G	H	I	J	K	L
51							97.5% Chebyshev(Mean, Sd) UCL					10.93
52	Assuming Gamma Distribution						99% Chebyshev(Mean, Sd) UCL					13.52
53	95% Approximate Gamma UCL					8.026						
54	95% Adjusted Gamma UCL					8.135						
55												
56	Potential UCL to Use						Use 95% Approximate Gamma UCL					8.026
57												
58	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
59	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
60	and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.											
61												

1				General UCL Statistics for Data Sets with Non-Detects								
2	User Selected Options											
3	From File			WorkSheet_a.wst								
4	Full Precision			OFF								
5	Confidence Coefficient			95%								
6	Number of Bootstrap Operations			2000								
7												
8												
9	ALPHA-CHLORDANE											
10												
11	General Statistics											
12	Number of Valid Data			26		Number of Detected Data				11		
13	Number of Distinct Detected Data			10		Number of Non-Detect Data				15		
14						Percent Non-Detects				57.69%		
15												
16	Raw Statistics					Log-transformed Statistics						
17	Minimum Detected			0.8		Minimum Detected				-0.223		
18	Maximum Detected			840		Maximum Detected				6.733		
19	Mean of Detected			114.4		Mean of Detected				2.693		
20	SD of Detected			251.1		SD of Detected				2.271		
21	Minimum Non-Detect			1.8		Minimum Non-Detect				0.588		
22	Maximum Non-Detect			2.1		Maximum Non-Detect				0.742		
23												
24	Note: Data have multiple DLs - Use of KM Method is recommended					Number treated as Non-Detect				18		
25	For all methods (except KM, DL/2, and ROS Methods),					Number treated as Detected				8		
26	Observations < Largest ND are treated as NDs					Single DL Non-Detect Percentage				69.23%		
27												
28	UCL Statistics											
29	Normal Distribution Test with Detected Values Only					Lognormal Distribution Test with Detected Values Only						
30	Shapiro Wilk Test Statistic			0.525		Shapiro Wilk Test Statistic				0.94		
31	5% Shapiro Wilk Critical Value			0.85		5% Shapiro Wilk Critical Value				0.85		
32	Data not Normal at 5% Significance Level					Data appear Lognormal at 5% Significance Level						
33												
34	Assuming Normal Distribution					Assuming Lognormal Distribution						
35	DL/2 Substitution Method					DL/2 Substitution Method						
36	Mean			48.96		Mean				1.105		
37	SD			168.8		SD				1.997		
38	95% DL/2 (t) UCL			105.5		95% H-Stat (DL/2) UCL				109.6		
39												
40	Maximum Likelihood Estimate(MLE) Method			N/A		Log ROS Method						
41	MLE yields a negative mean					Mean in Log Scale				1.009		
42						SD in Log Scale				2.265		
43						Mean in Original Scale				49.27		
44						SD in Original Scale				168.7		
45						95% t UCL				105.8		
46						95% Percentile Bootstrap UCL				110.6		
47						95% BCA Bootstrap UCL				156.8		
48						95% H-UCL				266.8		
49												
50	Gamma Distribution Test with Detected Values Only					Data Distribution Test with Detected Values Only						

51				k star (bias corrected)	0.302	Data appear Gamma Distributed at 5% Significance Level						
52				Theta Star	379.4							
53				nu star	6.636							
54												
55				A-D Test Statistic	0.698	Nonparametric Statistics						
56				5% A-D Critical Value	0.814	Kaplan-Meier (KM) Method						
57				K-S Test Statistic	0.814	Mean	48.97					
58				5% K-S Critical Value	0.275	SD	165.5					
59	Data appear Gamma Distributed at 5% Significance Level					SE of Mean	34.05					
60						95% KM (t) UCL	107.1					
61	Assuming Gamma Distribution					95% KM (z) UCL	105					
62	Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL	105.5					
63				Minimum	0.000001	95% KM (bootstrap t) UCL	406.9					
64				Maximum	840	95% KM (BCA) UCL	108.9					
65				Mean	48.42	95% KM (Percentile Bootstrap) UCL	113.6					
66				Median	0.000001	95% KM (Chebyshev) UCL	197.4					
67				SD	169	97.5% KM (Chebyshev) UCL	261.6					
68				k star	0.0947	99% KM (Chebyshev) UCL	387.7					
69				Theta star	511.2							
70				Nu star	4.926	Potential UCLs to Use						
71				AppChi2	1.118	95% KM (t) UCL	107.1					
72				95% Gamma Approximate UCL	213.3							
73				95% Adjusted Gamma UCL	237.3							
74	Note: DL/2 is not a recommended method.											
75												
76	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
77	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
78	For additional insight, the user may want to consult a statistician.											
79												
80												
81	GAMMA-CHLORDANE											
82												
83	General Statistics											
84				Number of Valid Data	26	Number of Detected Data	10					
85				Number of Distinct Detected Data	9	Number of Non-Detect Data	16					
86						Percent Non-Detects	61.54%					
87												
88	Raw Statistics					Log-transformed Statistics						
89				Minimum Detected	1	Minimum Detected	0					
90				Maximum Detected	760	Maximum Detected	6.633					
91				Mean of Detected	113	Mean of Detected	2.844					
92				SD of Detected	235.7	SD of Detected	2.169					
93				Minimum Non-Detect	1.8	Minimum Non-Detect	0.588					
94				Maximum Non-Detect	2.1	Maximum Non-Detect	0.742					
95												
96	Note: Data have multiple DLs - Use of KM Method is recommended					Number treated as Non-Detect	18					
97	For all methods (except KM, DL/2, and ROS Methods),					Number treated as Detected	8					
98	Observations < Largest ND are treated as NDs					Single DL Non-Detect Percentage	69.23%					
99												
100	UCL Statistics											

Normal Distribution Test with Detected Values Only		
Shapiro Wilk Test Statistic	0.546	
5% Shapiro Wilk Critical Value	0.842	
Data not Normal at 5% Significance Level		
Assuming Normal Distribution		
DL/2 Substitution Method		
Mean	44.04	
SD	152	
95% DL/2 (t) UCL	94.95	
Maximum Likelihood Estimate(MLE) Method	N/A	
MLE yields a negative mean		
Gamma Distribution Test with Detected Values Only		
k star (bias corrected)	0.316	
Theta Star	357.7	
nu star	6.319	
A-D Test Statistic	0.698	
5% A-D Critical Value	0.803	
K-S Test Statistic	0.803	
5% K-S Critical Value	0.286	
Data follow Appr. Gamma Distribution at 5% Significance Level		
Assuming Gamma Distribution		
Gamma ROS Statistics using Extrapolated Data		
Minimum	0.000001	
Maximum	760	
Mean	43.46	
Median	0.000001	
SD	152.1	
k star	0.0921	
Theta star	471.8	
Nu star	4.79	
AppChi2	1.056	
95% Gamma Approximate UCL	197.1	
95% Adjusted Gamma UCL	219.7	
Note: DL/2 is not a recommended method.		

Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.935
5% Shapiro Wilk Critical Value	0.842
Data appear Lognormal at 5% Significance Level	
Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	1.056
SD	1.943
95% H-Stat (DL/2) UCL	86.86
Log ROS Method	
Mean in Log Scale	0.791
SD in Log Scale	2.349
Mean in Original Scale	44.2
SD in Original Scale	151.9
95% t UCL	95.09
95% Percentile Bootstrap UCL	97.53
95% BCA Bootstrap UCL	135.7
95% H-UCL	300.1
Data Distribution Test with Detected Values Only	
Data Follow Appr. Gamma Distribution at 5% Significance Level	
Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	44.08
SD	149
SE of Mean	30.8
95% KM (t) UCL	96.69
95% KM (z) UCL	94.74
95% KM (jackknife) UCL	94.98
95% KM (bootstrap t) UCL	258.8
95% KM (BCA) UCL	107.8
95% KM (Percentile Bootstrap) UCL	99.56
95% KM (Chebyshev) UCL	178.3
97.5% KM (Chebyshev) UCL	236.4
99% KM (Chebyshev) UCL	350.6
Potential UCLs to Use	
95% KM (t) UCL	96.69

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

For additional insight, the user may want to consult a statistician.

HEPTACHLOR EPOXIDE

General Statistics

Number of Valid Data	26	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	21
		Percent Non-Detects	80.77%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	1.5	Minimum Detected	0.405
Maximum Detected	130	Maximum Detected	4.868
Mean of Detected	40.36	Mean of Detected	2.334
SD of Detected	56.48	SD of Detected	2.064
Minimum Non-Detect	1.8	Minimum Non-Detect	0.588
Maximum Non-Detect	9.6	Maximum Non-Detect	2.262

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	24
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	2
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	92.31%

Warning: There are only 5 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.787	Shapiro Wilk Test Statistic	0.864
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	8.675	Mean	0.467
SD	27.56	SD	1.283
95% DL/2 (t) UCL	17.91	95% H-Stat (DL/2) UCL	7.64
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	0.763
		SD in Log Scale	1.489
		Mean in Original Scale	9.692
		SD in Original Scale	27.34
		95% t UCL	18.85
		95% Percentile Bootstrap UCL	19.5
		95% BCA Bootstrap UCL	24.56
		95% H-UCL	16.84

201	Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only					
202	k star (bias corrected)					0.321	Data appear Normal at 5% Significance Level					
203	Theta Star					125.6						
204	nu star					3.214						
205												
206	A-D Test Statistic					0.471	Nonparametric Statistics					
207	5% A-D Critical Value					0.715	Kaplan-Meier (KM) Method					
208	K-S Test Statistic					0.715	Mean					9.061
209	5% K-S Critical Value					0.373	SD					26.91
210	Data appear Gamma Distributed at 5% Significance Level						SE of Mean					5.901
211							95% KM (t) UCL					19.14
212	Assuming Gamma Distribution						95% KM (z) UCL					18.77
213	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					18.26
214	Minimum					0.000001	95% KM (bootstrap t) UCL					144.6
215	Maximum					130	95% KM (BCA) UCL					65.58
216	Mean					12.23	95% KM (Percentile Bootstrap) UCL					23.63
217	Median					0.413	95% KM (Chebyshev) UCL					34.78
218	SD					28.07	97.5% KM (Chebyshev) UCL					45.91
219	k star					0.113	99% KM (Chebyshev) UCL					67.77
220	Theta star					108.6						
221	Nu star					5.853	Potential UCLs to Use					
222	AppChi2					1.565	95% KM (t) UCL					19.14
223	95% Gamma Approximate UCL					45.72	95% KM (Percentile Bootstrap) UCL					23.63
224	95% Adjusted Gamma UCL					50.24						
225	Note: DL/2 is not a recommended method.											
226												
227	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
228	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
229	For additional insight, the user may want to consult a statistician.											
230												

PRO-UCL

SUBSURFACE SOIL CALCULATIONS

1				General UCL Statistics for Data Sets with Non-Detects								
2	User Selected Options											
3	From File			WorkSheet.wst								
4	Full Precision			OFF								
5	Confidence Coefficient			95%								
6	Number of Bootstrap Operations			2000								
7												
8												
9	ARSENIC											
10												
11	General Statistics											
12	Number of Valid Data			43		Number of Detected Data				41		
13	Number of Distinct Detected Data			29		Number of Non-Detect Data				2		
14	Number of Missing Values			45		Percent Non-Detects				4.65%		
15												
16	Raw Statistics					Log-transformed Statistics						
17	Minimum Detected			1.1		Minimum Detected				0.0953		
18	Maximum Detected			8.1		Maximum Detected				2.092		
19	Mean of Detected			3.179		Mean of Detected				0.986		
20	SD of Detected			1.908		SD of Detected				0.59		
21	Minimum Non-Detect			0.89		Minimum Non-Detect				-0.117		
22	Maximum Non-Detect			0.99		Maximum Non-Detect				-0.0101		
23												
24	Note: Data have multiple DLs - Use of KM Method is recommended					Number treated as Non-Detect				2		
25	all methods (except KM, DL/2, and ROS Methods),					Number treated as Detected				41		
26	Observations < Largest ND are treated as NDs					Single DL Non-Detect Percentage				4.65%		
27												
28	UCL Statistics											
29	Normal Distribution Test with Detected Values Only					Lognormal Distribution Test with Detected Values Only						
30	Shapiro Wilk Test Statistic			0.87		Shapiro Wilk Test Statistic				0.92		
31	5% Shapiro Wilk Critical Value			0.941		5% Shapiro Wilk Critical Value				0.941		
32	Data not Normal at 5% Significance Level					Data not Lognormal at 5% Significance Level						
33												
34	Assuming Normal Distribution					Assuming Lognormal Distribution						
35	DL/2 Substitution Method					DL/2 Substitution Method						
36	Mean			3.053		Mean				0.905		
37	SD			1.95		SD				0.686		
38	95% DL/2 (t) UCL			3.553		95% H-Stat (DL/2) UCL				3.883		
39												
40	Maximum Likelihood Estimate(MLE) Method					Log ROS Method						
41	Mean			3.03		Mean in Log Scale				0.92		
42	SD			1.97		SD in Log Scale				0.649		
43	95% MLE (t) UCL			3.535		Mean in Original Scale				3.062		
44	95% MLE (Tiku) UCL			3.516		SD in Original Scale				1.938		
45						95% t UCL				3.559		
46						95% Percentile Bootstrap UCL				3.559		
47						95% BCA Bootstrap UCL				3.583		
48						95% H UCL				3.795		
49												
50	Gamma Distribution Test with Detected Values Only					Data Distribution Test with Detected Values Only						

51				k star (bias corrected)	2.874	Data do not follow a Discernable Distribution (0.05)						
52				Theta Star	1.106							
53				nu star	235.7							
54												
55				A-D Test Statistic	1.177	Nonparametric Statistics						
56				5% A-D Critical Value	0.755	Kaplan-Meier (KM) Method						
57				K-S Test Statistic	0.755	Mean	3.083					
58				5% K-S Critical Value	0.139	SD	1.892					
59	Data not Gamma Distributed at 5% Significance Level					SE of Mean	0.292					
60						95% KM (t) UCL	3.574					
61	Assuming Gamma Distribution					95% KM (z) UCL	3.563					
62	Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL	3.574					
63				Minimum	0.000001	95% KM (bootstrap t) UCL	3.623					
64				Maximum	8.1	95% KM (BCA) UCL	3.562					
65				Mean	3.031	95% KM (Percentile Bootstrap) UCL	3.556					
66				Median	2.2	95% KM (Chebyshev) UCL	4.356					
67				SD	1.982	97.5% KM (Chebyshev) UCL	4.907					
68				k star	0.703	99% KM (Chebyshev) UCL	5.989					
69				Theta star	4.312							
70				Nu star	60.46	Potential UCLs to Use						
71				AppChi2	43.58	95% KM (Chebyshev) UCL	4.356					
72				95% Gamma Approximate UCL	4.206							
73				95% Adjusted Gamma UCL	4.254							
74	Note: DL/2 is not a recommended method.											
75												
76	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
77	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
78	For additional insight, the user may want to consult a statistician.											
79												
80												
81	MONURON											
82												
83	General Statistics											
84				Number of Valid Data	38	Number of Detected Data	5					
85				Number of Distinct Detected Data	5	Number of Non-Detect Data	33					
86				Number of Missing Values	4	Percent Non-Detects	86.84%					
87												
88	Raw Statistics					Log-transformed Statistics						
89				Minimum Detected	17	Minimum Detected	2.833					
90				Maximum Detected	380	Maximum Detected	5.94					
91				Mean of Detected	127.6	Mean of Detected	4.374					
92				SD of Detected	144.4	SD of Detected	1.112					
93				Minimum Non-Detect	21	Minimum Non-Detect	3.045					
94				Maximum Non-Detect	78	Maximum Non-Detect	4.357					
95												
96	.e: Data have multiple DLs - Use of KM Method is recommended					Number treated as Non-Detect	35					
97	For all methods (except KM, DL/2, and ROS Methods),					Number treated as Detected	3					
98	Observations < Largest ND are treated as NDs					Single DL Non-Detect Percentage	92.11%					
99												
100	Warning: There are only 5 Detected Values in this data											

Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.753
5% Shapiro Wilk Critical Value	0.762

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method	
Mean	27.89
SD	61.82
95% DL/2 (t) UCL	44.81
Maximum Likelihood Estimate(MLE) Method	N/A

MLE yields a negative mean

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.964
5% Shapiro Wilk Critical Value	0.762

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method	
Mean	2.758
SD	0.765
95% H-Stat (DL/2) UCL	27.67
Log ROS Method	
Mean in Log Scale	2.839
SD in Log Scale	0.934
Mean in Original Scale	31.12
SD in Original Scale	61.61
95% t UCL	47.98
95% Percentile Bootstrap UCL	48.34
95% BCA Bootstrap UCL	63.69
95% H-UCL	37.8

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.61
Theta Star	209.1
nu star	6.104
A-D Test Statistic	0.347
5% A-D Critical Value	0.689
K-S Test Statistic	0.689
5% K-S Critical Value	0.363

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	380
Mean	34.31
Median	0.000001
SD	66.61
k star	0.102
Theta star	336.5
Nu star	7.75
AppChi2	2.591

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	31.59
SD	59.94
SE of Mean	10.87
95% KM (t) UCL	49.93
95% KM (z) UCL	49.47
95% KM (jackknife) UCL	60.57
95% KM (bootstrap t) UCL	69.48
95% KM (BCA) UCL	104.2
95% KM (Percentile Bootstrap) UCL	100
95% KM (Chebyshev) UCL	78.98
97.5% KM (Chebyshev) UCL	99.49
99% KM (Chebyshev) UCL	139.8

Potential UCLs to Use

95% KM (t) UCL	49.93

95% Gamma Approximate UCL	102.6	
95% Adjusted Gamma UCL	107.7	

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

4,4'-DDT

General Statistics

Number of Valid Data	98	Number of Detected Data	70
Number of Distinct Detected Data	64	Number of Non-Detect Data	28
		Percent Non-Detects	28.57%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	1.4	Minimum Detected	0.336
Maximum Detected	15200	Maximum Detected	9.629
Mean of Detected	1185	Mean of Detected	5.226
SD of Detected	2662	SD of Detected	2.165
Minimum Non-Detect	3.4	Minimum Non-Detect	1.224
Maximum Non-Detect	24	Maximum Non-Detect	3.178
te: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	39
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	59
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	39.80%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.342	Lilliefors Test Statistic	0.091
5% Lilliefors Critical Value	0.106	5% Lilliefors Critical Value	0.106
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	847	Mean	4.034
SD	2309	SD	2.644
95% DL/2 (t) UCL	1234	95% H-Stat (DL/2) UCL	5857
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	4.052
		SD in Log Scale	2.625
		Mean in Original Scale	847.1
		SD in Original Scale	2309
		95% t UCL	1234
		95% Percentile Bootstrap UCL	1279
		95% BCA Bootstrap UCL	1351
		95% H-UCL	5580

201	Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only					
202				k star (bias corrected)		0.355	Data appear Lognormal at 5% Significance Level					
203				Theta Star		3333						
20				nu star		49.75						
205												
206				A-D Test Statistic		2.215	Nonparametric Statistics					
207				5% A-D Critical Value		0.851				Kaplan-Meier (KM) Method		
208				K-S Test Statistic		0.851				Mean		846.9
209				5% K-S Critical Value		0.115				SD		2297
210	Data not Gamma Distributed at 5% Significance Level									SE of Mean		233.7
211										95% KM (t) UCL		1235
212	Assuming Gamma Distribution									95% KM (z) UCL		1231
213				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL		1234
214				Minimum		0.000001				95% KM (bootstrap t) UCL		1396
215				Maximum		15200				95% KM (BCA) UCL		1284
216				Mean		846.1				95% KM (Percentile Bootstrap) UCL		1258
217				Median		49.5				95% KM (Chebyshev) UCL		1866
218				SD		2309				97.5% KM (Chebyshev) UCL		2306
219				k star		0.118				99% KM (Chebyshev) UCL		3172
220				Theta star		7170						
221				Nu star		23.13	Potential UCLs to Use					
222				AppChi2		13.19				97.5% KM (Chebyshev) UCL		2306
223				95% Gamma Approximate UCL		1484						
224				95% Adjusted Gamma UCL		1497						
22	te: DL/2 is not a recommended method.											
226												
227	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
228	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
229	For additional insight, the user may want to consult a statistician.											
230												
231												
232	ALPHA-CHLORDANE											
233												
234	General Statistics											
235				Number of Valid Data		98				Number of Detected Data		52
236				Number of Distinct Detected Data		49				Number of Non-Detect Data		46
237										Percent Non-Detects		46.94%
238												
239	Raw Statistics						Log-transformed Statistics					
240				Minimum Detected		0.78				Minimum Detected		-0.248
241				Maximum Detected		3100				Maximum Detected		8.039
242				Mean of Detected		229.1				Mean of Detected		3.21
243				SD of Detected		596.7				SD of Detected		2.29
244				Minimum Non-Detect		0.12				Minimum Non-Detect		-2.12
24				Maximum Non-Detect		30				Maximum Non-Detect		3.401
24												
247	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		76
248	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		22
249	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		77.55%
250												

	A	B	C	D	E	F	G	H	I	J	K	L
251	UCL Statistics											
252	Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only					
253					Lilliefors Test Statistic	0.351					Lilliefors Test Statistic	0.0985
254					5% Lilliefors Critical Value	0.123					5% Lilliefors Critical Value	0.123
255	Data not Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level					
256												
257	Assuming Normal Distribution						Assuming Lognormal Distribution					
258					DL/2 Substitution Method						DL/2 Substitution Method	
259					Mean	122.5					Mean	1.745
260					SD	447.4					SD	2.433
261					95% DL/2 (t) UCL	197.6					95% H-Stat (DL/2) UCL	295.5
262												
263					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
264	MLE yields a negative mean										Mean in Log Scale	1.12
265											SD in Log Scale	2.938
266											Mean in Original Scale	121.8
267											SD in Original Scale	447.6
268											95% t UCL	196.9
269											95% Percentile Bootstrap UCL	206.7
270											95% BCA Bootstrap UCL	236
271											95% H-UCL	926.3
272												
273	Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only					
274					k star (bias corrected)	0.304	Data appear Lognormal at 5% Significance Level					
275					Theta Star	754.6						
276					nu star	31.58						
277												
278					A-D Test Statistic	2.448	Nonparametric Statistics					
279					5% A-D Critical Value	0.861					Kaplan-Meier (KM) Method	
280					K-S Test Statistic	0.861					Mean	122.1
281					5% K-S Critical Value	0.134					SD	445.3
282	Data not Gamma Distributed at 5% Significance Level										SE of Mean	45.42
283											95% KM (t) UCL	197.5
284	Assuming Gamma Distribution										95% KM (z) UCL	196.8
285					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	197.2
286					Minimum	0.000001					95% KM (bootstrap t) UCL	325
287					Maximum	3100					95% KM (BCA) UCL	208.3
288					Mean	121.6					95% KM (Percentile Bootstrap) UCL	202.2
289					Median	0.915					95% KM (Chebyshev) UCL	320.1
290					SD	447.7					97.5% KM (Chebyshev) UCL	405.8
291					k star	0.0905					99% KM (Chebyshev) UCL	574
292					Theta star	1344						
293					Nu star	17.73	Potential UCLs to Use					
294					AppChi2	9.195					97.5% KM (Chebyshev) UCL	405.8
295					95% Gamma Approximate UCL	234.4						
296					95% Adjusted Gamma UCL	236.8						
297	Note: DL/2 is not a recommended method.											
298												
299	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
300	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											

For additional insight, the user may want to consult a statistician.

DIELDRIN

General Statistics

Number of Valid Data	98	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	90
		Percent Non-Detects	91.84%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.68	Minimum Detected	-0.386
Maximum Detected	43	Maximum Detected	3.761
Mean of Detected	13.15	Mean of Detected	1.575
SD of Detected	15.67	SD of Detected	1.702
Minimum Non-Detect	0.12	Minimum Non-Detect	-2.12
Maximum Non-Detect	40	Maximum Non-Detect	3.689

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	97
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	1
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	98.98%

Warning: There are only 8 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.818	Shapiro Wilk Test Statistic	0.871
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	4.131	Mean	0.584
SD	6.456	SD	1.456
95% DL/2 (t) UCL	5.214	95% H-Stat (DL/2) UCL	7.771
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.86
		SD in Log Scale	1.924
		Mean in Original Scale	1.158
		SD in Original Scale	5.536
		95% t UCL	2.087
		95% Percentile Bootstrap UCL	2.197
		95% BCA Bootstrap UCL	2.622
		95% H-UCL	0.696

Gamma Distribution Test with Detected Values Only		
k star (bias corrected)	0.468	
Theta Star	28.12	
nu star	7.481	
A-D Test Statistic	0.527	
5% A-D Critical Value	0.754	
K-S Test Statistic	0.754	
5% K-S Critical Value	0.307	
Data appear Gamma Distributed at 5% Significance Level		
Assuming Gamma Distribution		
Gamma ROS Statistics using Extrapolated Data		
Minimum	0.000001	
Maximum	43	
Mean	1.073	
Median	0.000001	
SD	5.55	
k star	0.0721	
Theta star	14.89	
Nu star	14.12	
AppChi2	6.655	
95% Gamma Approximate UCL	2.277	
95% Adjusted Gamma UCL	2.304	

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only			
Data appear Gamma Distributed at 5% Significance Level			
Nonparametric Statistics			
Kaplan-Meier (KM) Method			
Mean	1.813		
SD	5.485		
SE of Mean	0.606		
95% KM (t) UCL	2.819		
95% KM (z) UCL	2.809		
95% KM (jackknife) UCL	2.71		
95% KM (bootstrap t) UCL	3.408		
95% KM (BCA) UCL	3.781		
95% KM (Percentile Bootstrap) UCL	3.144		
95% KM (Chebyshev) UCL	4.453		
97.5% KM (Chebyshev) UCL	5.595		
99% KM (Chebyshev) UCL	7.839		
Potential UCLs to Use			
95% KM (t) UCL	2.819		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

GAMMA-CHLORDANE

General Statistics			
Number of Valid Data	98	Number of Detected Data	52
Number of Distinct Detected Data	45	Number of Non-Detect Data	46
		Percent Non-Detects	46.94%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.81	Minimum Detected	-0.211
Maximum Detected	2700	Maximum Detected	7.901
Mean of Detected	216.4	Mean of Detected	3.104
SD of Detected	535.2	SD of Detected	2.349
Minimum Non-Detect	0.72	Minimum Non-Detect	-0.329
Maximum Non-Detect	30	Maximum Non-Detect	3.401
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	77
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	21
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	78.57%

UCL Statistics

Normal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.344
5% Lilliefors Critical Value	0.123
Data not Normal at 5% Significance Level	

Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.0911
5% Lilliefors Critical Value	0.123
Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution	
DL/2 Substitution Method	
Mean	115.8
SD	402.7
95% DL/2 (t) UCL	183.3
Maximum Likelihood Estimate(MLE) Method	N/A
MLE yields a negative mean	

Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	1.797
SD	2.276
95% H-Stat (DL/2) UCL	192.4
Log ROS Method	
Mean in Log Scale	1.068
SD in Log Scale	2.931
Mean in Original Scale	115.1
SD in Original Scale	402.9
95% t UCL	182.7
95% Percentile Bootstrap UCL	187.5
95% BCA Bootstrap UCL	217.8
95% H-UCL	854.4

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.298
Theta Star	725.4
nu star	31.02
A-D Test Statistic	2.447
5% A-D Critical Value	0.862
K-S Test Statistic	0.862
5% K-S Critical Value	0.134
Data not Gamma Distributed at 5% Significance Level	

Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	2700
Mean	114.8
Median	0.965
SD	403
k star	0.0905
Theta star	1269
Nu star	17.73
AppChi2	9.196
95% Gamma Approximate UCL	221.3
95% Adjusted Gamma UCL	223.6

Data Distribution Test with Detected Values Only
Data appear Lognormal at 5% Significance Level

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	115.4
SD	400.7
SE of Mean	40.87
95% KM (t) UCL	183.2
95% KM (z) UCL	182.6
95% KM (jackknife) UCL	182.9
95% KM (bootstrap t) UCL	270.9
95% KM (BCA) UCL	195.6
95% KM (Percentile Bootstrap) UCL	190.9
95% KM (Chebyshev) UCL	293.5
97.5% KM (Chebyshev) UCL	370.6
99% KM (Chebyshev) UCL	522.1

Potential UCLs to Use	
97.5% KM (Chebyshev) UCL	370.6

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

For additional insight, the user may want to consult a statistician.

EPTACHLOR

General Statistics

Number of Valid Data	98	Number of Detected Data	27
Number of Distinct Detected Data	27	Number of Non-Detect Data	71
		Percent Non-Detects	72.45%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.21	Minimum Detected	-1.561
Maximum Detected	390	Maximum Detected	5.966
Mean of Detected	60.84	Mean of Detected	2.54
SD of Detected	98.34	SD of Detected	2.207
Minimum Non-Detect	0.18	Minimum Non-Detect	-1.715
Maximum Non-Detect	30	Maximum Non-Detect	3.401
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	88
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	10
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	89.80%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.663	Shapiro Wilk Test Statistic	0.949
5% Shapiro Wilk Critical Value	0.923	5% Shapiro Wilk Critical Value	0.923
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	18.4	Mean	0.891
SD	57.37	SD	1.773
95% DL/2 (t) UCL	28.02	95% H-Stat (DL/2) UCL	20.6
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.091
		SD in Log Scale	2.941
		Mean in Original Scale	16.96
		SD in Original Scale	57.73
		95% t UCL	26.64
		95% Percentile Bootstrap UCL	27.24
		95% BCA Bootstrap UCL	29.94
		95% H-UCL	102.7

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only
k star (bias corrected)	0.395	Data appear Gamma Distributed at 5% Significance Level
Theta Star	153.9	
nu star	21.34	

501				A-D Test Statistic	0.389	Nonparametric Statistics						
502				5% A-D Critical Value	0.826					Kaplan-Meier (KM) Method		
503				K-S Test Statistic	0.826					Mean	17.14	
50				5% K-S Critical Value	0.18					SD	57.39	
505	Data appear Gamma Distributed at 5% Significance Level									SE of Mean	5.91	
506										95% KM (t) UCL	26.96	
507	Assuming Gamma Distribution									95% KM (z) UCL	26.86	
508	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL	26.81	
509				Minimum	0.000001					95% KM (bootstrap t) UCL	33.46	
510				Maximum	390					95% KM (BCA) UCL	26.94	
511				Mean	16.76					95% KM (Percentile Bootstrap) UCL	27.2	
512				Median	0.000001					95% KM (Chebyshev) UCL	42.9	
513				SD	57.78					97.5% KM (Chebyshev) UCL	54.05	
514				k star	0.0745					99% KM (Chebyshev) UCL	75.94	
515				Theta star	225							
516				Nu star	14.6	Potential UCLs to Use						
517				AppChi2	6.984					95% KM (t) UCL	26.96	
518				95% Gamma Approximate UCL	35.04							
519				95% Adjusted Gamma UCL	35.44							
520	Note: DL/2 is not a recommended method.											
521												
522	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
523	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
524	For additional insight, the user may want to consult a statistician.											
52												
526												
527	HEPTACHLOR EPOXIDE											
528												
529	General Statistics											
530				Number of Valid Data	98					Number of Detected Data	16	
531				Number of Distinct Detected Data	16					Number of Non-Detect Data	82	
532										Percent Non-Detects	83.67%	
533												
534	Raw Statistics					Log-transformed Statistics						
535				Minimum Detected	0.61					Minimum Detected	-0.494	
536				Maximum Detected	580					Maximum Detected	6.363	
537				Mean of Detected	107.2					Mean of Detected	2.75	
538				SD of Detected	184.9					SD of Detected	2.432	
539				Minimum Non-Detect	0.12					Minimum Non-Detect	-2.12	
540				Maximum Non-Detect	31					Maximum Non-Detect	3.434	
541												
542	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect	90	
543	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected	8	
544	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage	91.84%	
54												
546	UCL Statistics											
547	Normal Distribution Test with Detected Values Only					Lognormal Distribution Test with Detected Values Only						
548				Shapiro Wilk Test Statistic	0.628					Shapiro Wilk Test Statistic	0.918	
549				5% Shapiro Wilk Critical Value	0.887					5% Shapiro Wilk Critical Value	0.887	
550	Data not Normal at 5% Significance Level					Data appear Lognormal at 5% Significance Level						

Assuming Normal Distribution		
DL/2 Substitution Method		
Mean	19.75	
SD	82.48	
95% DL/2 (t) UCL	33.59	
Maximum Likelihood Estimate(MLE) Method	N/A	
MLE yields a negative mean		

Assuming Lognormal Distribution	
DL/2 Substitution Method	
Mean	0.701
SD	1.749
95% H-Stat (DL/2) UCL	16.12
Log ROS Method	
Mean in Log Scale	-2.122
SD in Log Scale	3.017
Mean in Original Scale	17.71
SD in Original Scale	82.84
95% t UCL	31.6
95% Percentile Bootstrap UCL	33.06
95% BCA Bootstrap UCL	38.63
95% H-UCL	49.15

Gamma Distribution Test with Detected Values Only	
k star (bias corrected)	0.326
Theta Star	329.1
nu star	10.42
A-D Test Statistic	0.525
5% A-D Critical Value	0.828
K-S Test Statistic	0.828
5% K-S Critical Value	0.232
Data appear Gamma Distributed at 5% Significance Level	

Data Distribution Test with Detected Values Only	
Data appear Gamma Distributed at 5% Significance Level	

Assuming Gamma Distribution	
Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	580
Mean	18.24
Median	0.000001
SD	82.87
k star	0.0688
Theta star	265.1
Nu star	13.49
AppChi2	6.224
95% Gamma Approximate UCL	39.54
95% Adjusted Gamma UCL	40.02

Nonparametric Statistics	
Kaplan-Meier (KM) Method	
Mean	18.13
SD	82.33
SE of Mean	8.59
95% KM (t) UCL	32.39
95% KM (z) UCL	32.26
95% KM (jackknife) UCL	32.01
95% KM (bootstrap t) UCL	59.82
95% KM (BCA) UCL	35.25
95% KM (Percentile Bootstrap) UCL	33.95
95% KM (Chebyshev) UCL	55.57
97.5% KM (Chebyshev) UCL	71.77
99% KM (Chebyshev) UCL	103.6
Potential UCLs to Use	
95% KM (t) UCL	32.39

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

For additional insight, the user may want to consult a statistician.

C.2 ECOLOGICAL RISK ASSESSMENT

1.0 ECOLOGICAL RISK ASSESSMENT

The goal of the ERA for Site 17 was to evaluate the potential for adverse ecological impacts of site-related contamination and to determine the need for further investigation and/or remedial action at the site. The ERA contains information to enable scientists and managers to conclude either that ecological risks at the Site are most likely negligible or that further information is necessary to evaluate potential ecological risks at the Site.

The ERA was conducted in accordance with the following guidance documents:

- Navy Policy for Conducting Ecological Risk Assessment, Navy, 1999.
- Navy Guidance for Conducting Ecological Risk Assessments (http://web.ead.anl.gov/ecorisk/index.cfm)
- Final Guidelines for Ecological Risk Assessment, U.S. EPA, 1998.
- Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, U.S. EPA, 1997.

The ERA consists of Steps 1, 2, and 3a of the eight step ERA process. The first two screening steps comprise the screening-level ecological risk assessment (SERA), and correspond with Tier 1 of the Navy Policy (Navy, 1999), where conservative exposure estimates are compared to screening-level and threshold toxicity values. Step 3a is the first step of a baseline ecological risk assessment (BERA) and consists of refining the Tier 1 assumptions following Steps 1 and 2 to further focus the ERA process on the chemicals of greatest concern at a site. Step 3a corresponds with the first part of Tier 2 of the Navy Policy (Navy, 1999). Steps 3b through 7 consist of additional site-specific investigations/biological studies, but are not included in this ERA because no additional site-specific investigations/biological studies were conducted at the Site. Finally, Step 8, Risk Management, is incorporated throughout the ERA process in cooperation with the regulators. Steps 1, 2, and 3a are described below. See Attachment C-2.1 for a flowchart of the ERA process.

1.1 TIER 1, STEP 1: SCREENING-LEVEL PROBLEM FORMULATION AND ECOLOGICAL EFFECTS EVALUATION

Problem formulation is the first step of an ERA. The problem formulation process enables the risk assessor to identify the ecological resources to be protected (known as assessment endpoints); the

measurements used to evaluate risks to those resources (known as measurement endpoints); and the chemicals, geographic areas, and environmental media relevant to the risk assessment.

1.1.1 Environmental Setting

The site compasses an area of approximately 0.7 acres. Currently, a large portion of the site is covered with grass. To the south of Avenue B the site is grass covered and contains an abandoned train track bed with a few trees and a parking lot further south. To the north of Avenue B between Fifth Street and Sixth Street, the area is partially wooded. During the December 2010 soil excavation, the site was mainly cleared of trees and shrubs. The site topography slopes gently downward from the west and north to the east and southeast and has no distinct surface water drainage features. The surrounding area is relatively level.

1.1.2 Potential Sources of Contamination

Site 17 housed base pest control operations that included storage, mixing, and disposal of pesticides and herbicides from the late 1940s until 1985. During the winter months, chemicals were stored in the building to keep them from freezing. Additional storage space was available in the detached storage building located to the north.

1.1.3 Potential Exposure Pathways

Terrestrial ecological receptors such as plants, soil invertebrates, mammals, birds, and can be exposed to contaminated surface soil through direct contact as they search for food and burrow into the soil. Mammals, birds, and can also ingest contaminated surface soil and food items in which contaminants have accumulated. Some terrestrial receptors such as burrowing mammals could be exposed to shallow layers of contaminated subsurface soils, but depth to groundwater is shallow at this site and can limit the presence of burrowing animals. Terrestrial receptors are not substantially exposed to subsurface soils, so that pathway was not evaluated in the ERA. For this project, the surface soil depth interval was 0 to 1 foot below the ground surface.

1.1.4 Assessment and Measurement Endpoints

Assessment endpoints are explicit expressions of the environmental value that is to be protected (U.S. EPA, 1997). The selection of these endpoints is based on the habitats present, the migration pathways of chemicals, and the routes that chemicals may take to enter receptors. Measurement endpoints are estimates of biological impacts (e.g., mortality, growth, reproduction) that are used to evaluate the

assessment endpoints. The assessment endpoints and measurement endpoints used to evaluate Site 17 data are presented in Table C-2.1. The potential receptors at the site include soil invertebrates, terrestrial plants, herbivorous mammals and birds, and insectivorous mammals and birds (see Table C-2.1).

For vertebrate receptors, selection of a particular species is required so that intake through eating can be estimated. The following surrogate species were used for the food chain modeling that was conducted to evaluate risks to mammals and birds:

- Herbivorous mammal: meadow vole
- Herbivorous bird: bobwhite quail
- Insectivorous mammal: short-tailed shrew
- Insectivorous bird: American robin

USEPA guidance (USEPA, 1997) states that "it is not practical or possible to directly evaluate risks to all of the individual components of the ecosystem at a site. Instead, assessment endpoints focus the risk assessment on particular components of the ecosystem that could be adversely affected by chemicals from the site." Therefore, this ERA focuses on the endpoints tending to yield the highest risks, which should account for endpoints that have lower risks.

Large carnivorous birds and mammals were not selected as assessment endpoints because their home range (hundreds of acres) is much larger than the site (<1 acre), so they would only consume a small portion of food from this area. Therefore, risks would be greater to small mammals and birds that obtain all or most of their food from the site. Although some limited reptiles (i.e., snakes) may be present at the site, they were not selected as assessment endpoints because of the general lack of toxicity information and the lack of methods to evaluate their exposure to chemicals.

1.1.5 Conceptual Site Model

A conceptual site model (CSM) in ERA problem formulation is a written description of predicted relationships between ecological entities and the stressors to which they may be exposed (U.S. EPA, 1998). The CSM consists of two primary components: predicted relationships among stressor, exposure, and assessment endpoint response, and a diagram that illustrates the relationships (U.S. EPA, 1998). At Site 17, the sources of the chemicals include storage, mixing and disposal of pesticides, as, well as, washing of pesticide equipment. Figure 1 in Attachment C-2 provides an ecological CSM for Site 17. Pesticides were released to the environment via disposal and spills. Therefore, the immediate exposure medium is the surface soil. Terrestrial plants, invertebrates, and vertebrates are exposed to the surface soil by direct contact and ingestion of soil and/or other food items that have accumulated the chemicals

from the soil. For this ERA, surface soil was defined as 0 to 1 foot where exposure to ecological receptors is expected to be greatest. Also depths to groundwater range from 0.5 to 5 feet at the site, which can limit the presence of certain ecological receptors such as burrowing animals.

1.2 TIER 1, STEP 2: SCREENING-LEVEL EXPOSURE ESTIMATE AND RISK QUOTIENTS

1.2.1 Ecological Effects Evaluation

The preliminary ecological effects evaluation is an investigation of the relationship between the exposure to a chemical and the potential for adverse effects resulting from exposure. In this step, conservative screening levels for evaluating the toxicity to ecological receptors from the detected levels of chemicals at the sites were compiled. Receptor-specific screening levels were used for plants, soil invertebrates, mammals, and birds, when available. The screening levels and their sources are presented in Table C-2.2.

Terrestrial plants and soil invertebrates

Risks to terrestrial plants and soil invertebrates resulting from direct exposure to chemicals were evaluated by comparing the chemical concentrations in the surface soil to screening levels. In order of preference, the first sources selected for the screening levels were the U.S. EPA Ecological Soil Screening Levels (Eco SSLs) (http://www.epa.gov/ecotox/ecossl/). If an Eco SSL was not available for a particular chemical or receptor, then Canadian Soil Quality Guidelines (CCME, 1999, 2001), followed by Oak Ridge National Laboratory (ORNL) Toxicological Benchmarks for plants (Efroymson et al., 1997b) and invertebrates (Efroymson et al., 1997a), and U.S. EPA Region 5 Ecological Screening Levels (U.S. EPA, 2003) were used. Eco SSLs were used first because they are the most current soil screening levels. The screening levels are presented in Table C-2.2. These screening levels are expressed in units of concentration because terrestrial plants and soil invertebrates are directly exposed to the soil.

Mammals and birds

Potential risks to mammals and birds resulting from exposure to chemicals in the surface soil were evaluated by comparing chemical concentrations to ecological screening levels (Table C-2.2). The screening levels consist of the U.S. EPA Eco SSLs (http://www.epa.gov/ecotox/ecossl/) and U.S. EPA Region 5 Ecological Screening Levels (U.S. EPA, 2003). Eco SSLs were used first because they are the most current soil screening levels. If a chemical concentration exceeds its screening level or a screening

level is not available, the chemical was evaluated using food chain models for risks to mammals and birds.

Risks to mammals and birds from exposures to chemicals in the surface soil were determined by estimating the Chronic Daily Intake (CDI) and comparing the CDI to toxicity reference values (TRVs) representing acceptable daily doses in mg/kg-day. The TRVs, including no observed adverse effect levels (NOAELs), and lowest observed adverse effect levels (LOAELs) were obtained from wildlife studies presented in the U.S. EPA Eco SSLs (http://www.epa.gov/ecotox/ecossl/) and ORNL Toxicological Benchmarks for Wildlife: 1996 Revision (Sample et al., 1996) and were supplemented with other toxicity information when necessary. Attachment C-2.2 presents the TRVs for each chemical and the sources (i.e., NOAELs and LOAELs) of the TRVs used in this ERA. If a subchronic study was used to develop the TRV, the final value was multiplied by a factor of 0.1 to account for uncertainty between subchronic and chronic effects. Also, the LOAEL was multiplied by a factor of 0.1 to estimate a NOAEL TRV if only a LOAEL study was available. The chemical-specific Eco SSL documents provide both NOAELs and LOAELS for various studies, but TRVs are generally calculated only for NOAELs. The geometric mean of the chemical-specific growth and reproduction LOAELs from the chemical-specific Eco SSL documents were used as the LOAEL TRVs for several metals and 4,4'-DDT. This approach was used because the survival LOAELs tend to be greater than growth or reproductive LOAELs and the selected LOAELs were generally much lower than many NOAELs for growth, reproduction, and survival.

1.2.2 Exposure Characterization

Terrestrial soil invertebrates and plants are exposed to chemicals in the surface soil through ingestion and/or direct contact. Maximum chemical concentrations in soil were used in the screening step to select COPCs.

Doses in mg/kg-day were estimated for terrestrial wildlife (mammals and birds) using exposure equations. The following equation was used to calculate the exposure dose for terrestrial wildlife from exposure to chemicals in soil (and associated food items such as plants and invertebrates):

$$CDI = \frac{[(Cf * If) + (Cs * Is)] * H}{BW}$$

Where:

CDI	=	Chronic daily intake (mg/kg-day)
Cf	=	Chemical concentration in food – (see discussion below)
Cs	=	Chemical concentration in surface soil (mg/kg)

If = Food ingestion rate (kg/day)
Is = Incidental surface soil ingestion rate (kg/day)
H = Portion of food intake from the contaminated area (unitless)
BW = Body weight (kg)

The exposure assumptions (i.e., ingestion rate, body weight) were obtained primarily from the Wildlife Exposure Factors Handbook (U.S. EPA, 1993) with other sources used as necessary. Food ingestion rates were presented on a dry weight basis and chemical concentrations in the food items were estimated in dry weight concentrations. This was done to be consistent with chemical concentrations in soil, which are reported on a dry weight basis. The exposure assumptions are presented in Table C-2.3 and the calculation of exposure assumptions are presented in Attachment C-2.3.

Chemical concentrations in food items for soil insectivorous and herbivorous receptors were calculated using soil-to-invertebrate or soil-to-plant bioaccumulation factors (BAFs) and regression equations from the U.S. EPA Eco SSL Guidance Document (2007) or BAFs from other published sources. The sources of the BAFs are documented in Attachment C-2.4. The following equation was used to calculate chemical concentrations in plants or invertebrates when BAFs were used:

$$Cf = Cs * BAF$$

Where:

Cf = Chemical concentration in food (mg/kg)
Cs = Chemical concentration in surface soil (mg/kg)
BAF = Biota-soil bioaccumulation factor (unitless) (soil to plant or soil to earthworm)

The following sources of plants/earthworm BAFs were used to calculate the chemical concentrations in plants and earthworms:

- Plant and invertebrate BAFs: Guidance for Developing Ecological Soil Screening Level (U.S. EPA, 2007).

- Plant BAFs: ORNL Risk Assessment Information System (http://rais.ornl.gov/cgi-bin/tools/TOX_search?select=chem_spef).

- Earthworm BAFs (Pesticides): Terrestrial Ecological Evaluation Process. (Washington State Department of Ecology, 2011) and literature-derived soil to earthworm BAFs (see Attachment C-2.4).

A default value of 1.0 was used for the BAF when chemical-specific data was not available.

The food chain model scenarios were calculated using various exposure assumptions to present a range of potential risks. Receptor profiles and food model calculations are presented in Attachment C-2.5. For selection of chemicals as COPCs, the following set of Tier 1 exposure assumptions was used:

- Maximum soil concentrations
- Conservative receptor body weight and ingestion rates
- Receptors spend 100% of their time at the site

1.2.3 Risk Characterization

An Ecological Effects Quotient (EEQ) approach was used to characterize the risk to ecological receptors. This approach characterizes the potential effects by comparing exposure concentrations with the effects data. When EEQs exceed 1.0, it is an indication that ecological receptors are potentially at risk, although additional evaluation or data may be necessary to confirm with greater certainty whether ecological receptors are actually at risk, especially because most benchmarks are developed using conservative exposure assumptions and/or studies. An EEQ should not be construed as being probabilistic; rather, it is a numerical indicator of the extent to which an EPC exceeds or is less than a benchmark. The EEQs for plants, soil invertebrates, and wildlife were calculated as follows:

$$EEQ = \frac{C_{ss}}{SSSL}$$

where:

C_{ss} = Contaminant concentration in surface soil (µg/kg)

SSSL = Surface Soil Screening Level (µg/kg), as described above

The EEQs for the terrestrial wildlife model were calculated as follows:

$$EEQ = \frac{CDI}{TRV}$$

where:

EEQ	=	Ecological effects quotient (unitless)
CDI	=	Chronic daily intake dose (mg/kg-day)
TRV	=	Toxicity reference value (NOAEL or LOAEL) (mg/kg-day)

1.2.4 Selection of Chemicals of Potential Concern

The final part of the screening evaluation includes the initial selection of ecological COPCs. Chemicals that were not retained as COPCs are assumed to only cause negligible risk to ecological receptors and were not evaluated further in the ERA. Chemicals that were initially selected as COPCs were further evaluated in Step 3a. The initial ecological COPCs were selected by the following procedures:

- For soil invertebrates and plants, chemicals with EEQs greater than 1.0 (using screening values) were selected as COPCs because they have a potential to cause risk to ecological receptors.

- For wildlife receptors, chemicals with EEQs greater than 1.0 based on the food chain model using NOAELs were selected as COPCs because they have the potential to cause risks to higher trophic level mammals and birds.

- Chemicals without screening values were selected as COPCs, but only evaluated qualitatively.

Table C-2.4 presents the chemicals that were retained as COPCs in surface soil for potential risks to plants and invertebrates from Site 17. This table also presents the chemicals that were retained for food chain modeling for mammals and birds.

1.2.5 Tier 1, Step 2: Risks to Terrestrial Plants and Soil Invertebrates

Terrestrial Plants

Two pesticides (alpha-chlordane and gamma-chlordane) and one inorganic (arsenic) were selected as COPCs because they were detected at a maximum concentration that resulted in an EEQ greater than 1.0. Two pesticides (heptachlor and heptachlor epoxide) were selected as COPCs because a screening level was not available.

Soil Invertebrates

One inorganic (arsenic) was selected as a COPC because it was detected at a maximum concentration that resulted in an EEQ greater than 1.0. Five pesticides (alpha-chlordane, gamma-BHC, gamma-chlordane, heptachlor, and heptachlor epoxide) were selected as COPCs because a screening level was not available.

1.2.6 Tier 1, Step 2: Risks to Mammals and Birds

Table C-2.5 summarizes the results of the Tier 1 inputs food chain modeling for terrestrial receptors. Attachment C-2.5 presents the calculation worksheets. The following summarizes the results of the food chain modeling using maximum concentrations and Tier 1 input parameters:

- Herbivorous mammal: No chemicals had EEQs greater than 1.0 in the food chain model.
- Herbivorous bird: No chemicals had EEQs greater than 1.0 in the food chain model.
- Insectivorous mammal: Total DDT had an EEQ greater than 1.0 in the food chain model
- Insectivorous bird: Three pesticides (alpha-chlordane, gamma-chlordane, and total DDT) and one inorganic (lead) had EEQs greater than 1.0 in the food chain model.

1.3 TIER 2, STEP 3A: COPC REFINEMENT

The purposes of Step 3a are to re-evaluate the COPCs that were retained from Tier 1 for further evaluation in a Tier 2 BERA and to identify and eliminate from further consideration those COPCs that were retained because of the use of very conservative exposure scenarios. Using less conservative (but more realistic) assumptions, the Tier 1 risk estimates were recalculated and the new estimates were used to refine the list of COPCs identified by the Tier 1 screening risk assessment (SRA) in order to remove some or all of the COPCs from further consideration and focus any additional efforts on chemicals that are of primary ecological concern.

For chemicals that are evaluated further in Step 3a, the following factors were evaluated, as appropriate, to determine if the risks are great enough to warrant additional evaluations. Note that all of these factors may not be discussed for each chemical and/or receptor group.

- Magnitude of criterion exceedance: Although the magnitude of the risks may not relate directly to the magnitude of a criterion exceedance, the magnitude of the criterion exceedance may be one item used in a lines-of-evidence approach to determine the need for further site evaluation. The greater the criterion exceedance, the greater the probability and concern that an unacceptable risk exists.

- Frequency of chemical detection and spatial distribution: A chemical detected at a low frequency typically is of less concern than a chemical detected at higher frequency if toxicity and concentrations and spatial areas represented by the data are similar. All else being equal, chemicals detected frequently were given greater consideration than those detected relatively infrequently. In addition, the spatial distribution of a chemical may be evaluated to determine the area that a sample represents.

- Contaminant bioavailability: Many contaminants (especially inorganics) are present in the environment in forms that are typically not bioavailable, and the limited bioavailability was considered when evaluating the exposures of receptors to site contaminants. Contaminants with generally less bioavailability were considered to be less toxic than the more bioavailable contaminants, all other factors being equal.

- Additional Benchmarks: Alternative benchmarks were used to further evaluate risks to specific groups of ecological receptors (e.g., plants and invertebrates).

- Food Chain Modeling: Exposure via the food chain is a major pathway of concern for chemicals known to significantly bioaccumulate and/or biomagnify. Thus, potential risk to upper level receptors was evaluated using food chain models. The Tier 1 exposure doses calculated for terrestrial wildlife were re-calculated using the following Tier 2, Step 3A exposure assumptions and chemical concentrations:

  - 95th Percentile UCL soil concentrations
  - Average receptor body weights and ingestion rates

- Background: Concentrations of chemicals in surface soil were compared to background concentration data. If the concentrations of a detected chemicals are not statistically greater than the background concentrations, the chemical was considered similar to background, not site-related, and eliminated as a COPC. No chemicals were eliminated as COPCs due to the comparison to background concentration data. A statistical comparison of elevated arsenic detections in fill material compared to arsenic concentrations in all other site soils found that the population of arsenic concentrations in fill material is distinct and greater than arsenic concentrations in all other site soils (Appendix E.6). Elevated arsenic concentrations are attributed to fill material and therefore not considered to be site related

1.3.1 Tier 2, Step 3A: Terrestrial Plants and Soil Invertebrates

Terrestrial Plants

Alpha-chlordane and gamma-chlordane were initially selected as COPCs because they exceeded their screening value. Alpha-chlordane exceeded its screening value in only 2 of 26 samples and gamma-chlordane exceeded its screening value in only 1 of 26 samples. Alpha-chlordane and gamma-chlordane were infrequently detected at concentrations exceeding their screening values; therefore, these pesticides are unlikely to impact plants and are eliminated as COPCs for plants.

Heptachlor and heptachlor epoxide were initially selected as COPCs because screening values were not available. Heptachlor and heptachlor epoxide were infrequently detected and were generally detected at low concentrations. Heptachlor and heptachlor epoxide were detected in 6 sample and 5 samples of 26 samples, respectively. Detected concentrations ranged from 0.25 to 130 µg/kg. Only two samples had detected concentrations of heptachlor and heptachlor epoxide greater than 5.6 µg/kg. The maximum concentrations of heptachlor and heptachlor epoxide were detected in sample SB-17-206 (69 µg/kg and 130 µg/kg, respectively) and the next greatest concentrations were detected in sample SB-17-207 (28 µg/kg and 63 µg/kg, respectively). The area with the greatest concentrations is small because to the north these locations are bounded by the road (Avenue B) and concentrations in adjacent samples were much less (≤5.6 µg/kg). Also, all detected concentrations were well below the Los Alamos National Laboratory ecological screening level for plants of 400 µg/kg for heptachlor (LANL, 2009). For these reasons, these pesticides are not expected to impact plants and are eliminated as COPCs for plants.

Arsenic was initially selected as a COPC because its maximum detected concentration (18.2 mg/kg in SB-17-103) slightly exceeded its screening value (18 mg/kg). Only one of 26 samples had a detected concentration greater than the screening value for arsenic. The next greatest concentration of 10.7 mg/kg was detected in an adjacent sample (SB-17-102). Only a small area has an arsenic concentration exceeding the screening value and the site is vegetated so it does not appear that plants are impacted. Therefore, significant impacts to plants are not expected, so arsenic is eliminated as a COPC for plants.

Soil Invertebrates

Several pesticides (alpha-chlordane, gamma-BHC, gamma-chlordane, heptachlor, and heptachlor epoxide) were initially selected as COPCs because screening values were not available. The following pesticides were infrequently detected: gamma-BHC (1 of 26 samples), heptachlor (6 of 26 samples), and heptachlor epoxide (5 of 26 samples). Alpha-chlordane and gamma-chlordane were detected in 11 and 10 samples of 26 samples, respectively. Maximum concentrations of alpha-chlordane (840 µg/kg), gamma-chlordane (760 µg/kg), heptachlor (69 µg/kg), and heptachlor epoxide (130 µg/kg) were detected in sample SB-17-206. Next greatest concentrations of alpha-chlordane (240 µg/kg), gamma-chlordane (180 µg/kg), heptachlor (28 µg/kg), and heptachlor epoxide (63 µg/kg) were detected in sample SB-17-207. The sample locations are bounded to the north by Avenue B. Nearby samples, SB-17-208 and SB-17-123 had low detected concentrations of pesticides bounding the area of high pesticide concentrations to the east and southwest, respectively. An alternative benchmark was not available for alpha-chlordane and gamma-chlordane; however, their maximum concentrations were less than the Canadian Soil Quality Guideline of 12,000 ug/kg for total DDT derived using toxicological data for vascular plants and soil invertebrates (CCME, 1999b). Alpha-chlordane and gamma-chlordane are from the same class of pesticide (organochlorine) as total DDT and are therefore likely to have similar toxicity. For these

reasons, impacts to soil invertebrates are expected to be minimal, and these pesticides are eliminated as COPCs for soil invertebrates.

Arsenic was initially selected as a COPC because its maximum detected concentration (18.2 mg/kg) slightly exceeded its screening value (17 mg/kg). No other samples had detected concentrations greater than the screening value for arsenic. The screening value is based on risk to plants and effective concentrations indicated that invertebrates were generally less sensitive than plants to arsenic (CCME, 2001). An alternative benchmark for invertebrates is 60 mg/kg (Efroymson et al., 1997). The concentration of arsenic was much lower than this benchmark. Also, arsenic is not site-related. Therefore, impacts to invertebrates from arsenic are not expected and arsenic is eliminated as a COPC for invertebrates.

1.3.2 Tier 2, Step 3A: Mammals and Birds

The EEQs from the terrestrial food chain modeling were greater than 1.0 for several chemicals using maximum chemical concentrations and Tier 1 exposure assumptions (see Section 5.2.2). Therefore, as part of the Step 3a refinement, risks for this pathway were recalculated using 95% UCL chemical concentrations in surface soil and sediment and Tier 2, Step 3A exposure assumptions (i.e., average ingestion rates, average body weights); however it was assumed that receptors obtained 100 percent of food from the site (see Table C-2.3).

Table C-2.6 summarizes the results of the Tier 2, Step 3A inputs food chain modeling for terrestrial receptors. Attachment C-2.5 presents the calculation worksheets. A discussion of the risks to mammal and birds is presented below.

- Soil herbivorous mammal: The NOAEL EEQs were less than 1.0; therefore, no chemicals are retained as COPCs for soil herbivorous mammals.

- Soil herbivorous bird: The NOAEL EEQs were less than 1.0; therefore, no chemicals are retained as COPCs for soil herbivorous birds.

- Soil insectivorous mammal: The NOAEL EEQ for total DDT for the shrew (4.0) was greater than 1.0. The LOAEL EEQ was less than 1.0.

- Soil insectivorous bird: The NOAEL EEQ for total DDT for the robin (4.3) was greater than 1.0. The LOAEL EEQ was less than 1.0.

The food chain model assumes that the receptors obtain their entire diet from the site. The site is only 0.7 acres and is surrounded by roads so it is unlikely that the site comprises the entire home-range for

most wildlife receptors. The home range for a robin is 0.7 acres based on data from a Tennessee and a New York dense conifer forest (see Attachment C-2.5). In a more urban area like the site, the home range of the robin is likely to be greater so it is not likely that a robin or other insectivorous bird would only feed at the site 100 percent of the time. The same is true for small insectivorous mammals, which have larger home ranges (see Attachment C-2.5). In addition, because of the relatively small size of the site, the surrounding urban habitat, and the division of the site by a road, significant populations of small mammals or birds are not likely to be present at the site. Therefore, impacts to birds and mammals would be limited to a few individuals. However, because of the reasons presented above, and because none of the LOAEL EEQs were greater than 1.0, impacts to mammals and birds are not likely. For that reason, total DDT is not retained as a COPC for soil insectivorous mammals and soil insectivorous birds.

1.4 ECOLOGICAL RISK UNCERTAINTY ANALYSIS

This section presents some of the general uncertainties associated with the ecological risk assessment.

1.4.1 Uncertainty in Assessment Endpoints and Measurement Endpoints

Measurement endpoints were used to evaluate the assessment endpoints that were selected for this ERA, but the measurement endpoints were not the same as the assessment endpoints. Therefore, the measures were used to predict effects to the assessment endpoints by selecting surrogate species that were evaluated. For example, mortality of a shrew was used to assess mortality of the small mammal population. However, predicting mortality to a shrew may either under or overprotect the small mammal population, resulting from differences in ingestion rates, toxicity, food preferences, etc., between the different species.

Several endpoints were not quantitatively evaluated in the ERA. For example, risks to reptiles were not evaluated because exposure factors are not established for most species, and toxicity data are very limited. Therefore, risks to these receptors could not be determined.

Risks to endangered and threatened species were not specifically calculated. There is a low likelihood of these species, or species of special concern, inhabiting the site as it is within an industrial area.

1.4.2 Uncertainty in Exposure Characterization

The contaminant dose to terrestrial wildlife is calculated using an equation that incorporates ingestion rates, body weights, bioaccumulation factors, and other exposure factors. These exposure factors are

obtained from literature studies or predicted using various equations. Ingestion rates and body weights vary between species, especially between species inhabiting different areas.

Bioaccumulation of contaminants into various biological media (i.e., plants, invertebrates) depends on the characteristics of the media such as pH, organic carbon, etc. The bioaccumulation factors that were used for the ERA came from a variety of literature sources because no site-specific values are available. There are uncertainties associated with accumulation factors from the literature because they may either underpredict or overpredict tissue concentrations, depending upon how representative the factors are for site conditions.

1.4.3 Uncertainty in Ecological Effects Data

Uncertainty exists in the ecological effects data, including the screening levels and wildlife TRVs. Several of the screening levels are very conservative, and typically are based on studies where the bioavailability of the chemical is much greater than it is in the environment. Also, toxicity data was not available or was limited for some chemicals.

The NOAELs/LOAELs used for the wildlife endpoints species are based on species other than the endpoint species (e.g., rats). Uncertainty exists in the application of toxicity data across species because the contaminant may be more or less toxic to the endpoint species than it was to the test study species.

1.4.4 Uncertainty in Risk Characterization

Detection limits for some compounds were greater than ecological benchmarks; therefore, exposure point concentrations are less accurate and risk may be underestimated for those compounds.

The potential for adverse risks exists if an EEQ is greater than 1.0 regardless of the magnitude of the EEQ. Although the relationship between the magnitude of an EEQ and toxicity is not necessarily linear, the magnitude of an EEQ can be used as a rough approximation of the extent of potential risks, especially if there is sufficient confidence in the screening level used. Uncertainty exists in how the predicted risks to a species at the site translate into risk to the population in the area as a whole.

As discussed in Sections 1.1.3 and 1.1.5, ecological receptors evaluated in the ERA are not expected to be exposed to subsurface soil. Metals concentrations in surface and subsurface soil are similar. However, additional pesticides, some herbicides, and one volatile organic compound (tetrachloroethene) were detected in subsurface soil. At some locations, concentrations of pesticides detected in subsurface soil were greater than maximum concentrations detected in surface soil. If the site would be re-

developed in the future, ecological receptors may be exposed to subsurface soil; however, exposure to subsurface soil was not evaluated due to the considerable amount of uncertainty associated with predicting subsurface soil concentrations after potential re-development. Some terrestrial receptors, such as burrowing mammals, could be exposed to shallow layers of contaminated subsurface soils; however this is unlikely due to the water table being as close as 0.5 ft below ground surface. Also, burrowing mammals are not expected at the site because limited habitat is available since the site was cleared of shrubs and trees.

There is uncertainty in the depth of surface soil samples that were used in the ERA. Only samples from the 0 to 1 foot interval were used in ERA in accordance with the work plan, but there were some MEDEP concerns that ecological receptors could be exposed to soil in the 0 to 2 foot interval. Because no samples were specifically collected in this interval, the Navy agreed to discuss how the results for soil samples collected with a starting depth between 0 and less than 2 feet compare to the results for soil samples collected within the 0 to 1 foot interval. This data set included samples collected from 0 to 1 foot, 1 to 3 feet, and 1 to 4 feet. For simplicity of discussion in this section, the samples from 0 to 1 foot will be referred to as the "shallow soil samples" and the samples with starting depth between 0 and less than 2 feet (including the 0 to 1, 1 to 3, and 1 to 4 ft samples) will be referred to as the "deeper soil samples."

Table C-2.7 presents summary statistics for the combined shallow and deeper soil sample data set. The food chain model for the deeper soil samples is included in Attachment C.2-6. By comparing the results between Table C-2.7 and Table C-2.4 (which only includes the shallow samples), it can be seen that three chemicals (monuron, dieldrin, and endosulfan I) were detected in the deeper soil samples but not the shallow soil samples. These chemicals were detected infrequently [monuron (1 of 44 samples), dieldrin (4 of 57 samples), and endosulfan (2 of 57 samples)] and at relatively low concentrations [monuron (0.017 mg/kg), dieldrin (0.043 mg/kg), and endosulfan (0.0059 mg/kg)]. Therefore, not evaluating them in the ERA did not significantly change the conclusions of the ERA.

For arsenic and lead, the maximum and average detected concentrations were lower in the deeper soil sample data set, so any risks from these metals would decrease using the deeper soil samples. The maximum and average detected concentrations for cyanide slightly increased, but the maximum detected concentration is still less than the screening level of 0.9 mg/kg for plants and invertebrates. The 95% UCL for cyanide also increased slightly, but the EEQs in the food chain model would still be much lower than 1.0. Finally, for zinc, the maximum detected concentration slightly increased from 48 mg/kg to 55 mg/kg in the deeper soil data set, which is still lower than the screening levels for plants (160 mg/kg) and invertebrates (120 mg/kg). Also, the EEQs in the food chain model would still be less than 1 using the maximum detected concentration. For these reasons, risks to plants, invertebrates, birds, and mammals ecological receptors from metals in the deeper soil would still be acceptable.

For total DDT, the maximum detected concentrations were 1,503 µg/kg in the shallow soil and 7,800 µg/kg in the deeper soil, but the average concentration only changed from 232 µg/kg to 390 µg/kg. The maximum detected concentration was still lower than the Canadian soil quality guideline for plants and invertebrates of 12,000 µg/kg so risks to plants and invertebrates are not expected from exposure to the deeper soil. The 95% UCL values were 585 µg/kg in the shallow soil and 1,013 µg/kg in the deeper soil. This 1,013 µg/kg value would slightly increase the EEQs from 4.3 (robin) and 4.0 (shrew) in the Tier 2 food chain model to 7.4 (robin) and 6.9 (shrew). Note that a large portion of the 0.7 acres has been excavated and filled with clean soil. Therefore, the locations with the elevated levels of pesticides only make up a small portion of the 0.7 acre site which means the 95% UCL is really an overestimation of the concentration for the exposure area. Because of this, the rationale provided in Section 1.3.2 regarding habitat, and the fact that the LOAEL EEQs were less than one indicates that risks to these receptors are not significant enough to warrant further action.

The maximum detected concentrations of alpha- and gamma-chlordane were 840 and 760 µg/kg in the shallow soil and 3,100 and 2,700 µg/kg in the deeper soil, respectively. The average concentrations for these pesticides only changed from 49 and 44 µg/kg in the shallow samples to 86 and 77 µg/kg in the deeper samples, respectively. Only a few toxicity data were available for evaluating risks to plants and invertebrates from chlordane. The Region V EPA soil screening level for chlordane is 224 µg/kg and is based on plant toxicity data. The plant screening level for chlordane in the Los Alamos ECORISK database (2009) is 2,200 µg/kg. The primary source is not known for either value. The only soil benchmarks found for invertebrates were 1,000 µg/kg, which is an Ecological Indicator Concentration for Protection of Terrestrial Plants and Animals from the Washington State Department of Ecology (WA DOE), and 43 µg/kg, as cited in the Casmalia Resources Superfund Site Final RI Report (U.S. EPA, 2011) (and suggested by MEDEP). The primary source of the Washington State number is not known. The 43 µg/kg is based on a value of 4,300 µg/kg for insects divided by 100. The authors of the Casmalia report assumed that the 4,300 µg/kg value was an LC50, since invertebrate toxicity tests typically measure mortality, but this was not confirmed. The report also noted that empirical data were available from the ECOTOX database, such as a 14-day earthworm LC50 of 23,900 µg/kg. The authors of the Casmalia report determined that the 4,300 µg/kg value for insects should be selected as the most appropriate invertebrates toxicity data for chlordane. The 4,300 µg/kg value was then divided by 100 to extrapolate from an acute lethal concentration to a chronic no observed adverse effects concentration (NOAEC), resulting in a value of 43 µg/kg. As presented above, although the maximum detected concentrations of alpha- and gamma-chlordane are greater than the plant and invertebrate screening benchmarks, most of the detected concentrations are less than the plant screening level of Region V plant benchmark of 224 µg/kg and Washington State invertebrate benchmark of 1,000 µg/kg and the lowest observable adverse effects concentration (LOAEC) of 430 µg/kg. In fact, only 4 and 7 locations of

57 locations had detected chlordane concentrations that were greater than the plant benchmark of 224 µg/kg and the invertebrate NOAEC of 43 µg/kg, respectively. Therefore, the plant and invertebrate population at the site is not expected to be significantly impacted so the potential isolated risks to these receptors do not warrant further action.

Regarding risks to wildlife, the 95% UCL values increased from 110 µg/kg and 97 µg/kg for alpha- and gamma-chlordane in the shallow soil, respectively, to 650 µg/kg and 571 µg/kg, respectively in the deeper soil. The EEQs would still be less than 1.0 in the Tier 2 food chain model so risks to these receptors are not significant enough to warrant further action.

Dieldrin was detected relatively infrequently at the site (in 4 of 57). The only plant benchmarks found were a value in the Los Alamos ECORISK database (2009) of 10,000 µg/kg and a value cited in the Casmialia Report of 1,000 µg/kg. The Casmalia report calculated the benchmark by dividing a value of 10,000 µg/kg by 10, because the 1,000 µg/kg value was LOEC. For invertebrates, MEDEP suggested an invertebrate benchmark value of 500 µg/kg, which is a NOAEC for earthworms as cited in the Casmalia Report. The maximum detected concentration of dieldrin, 43 µg/kg, is much lower than either of these benchmarks so risk to plants and invertebrates from dieldrin is not expected. Regarding risks to wildlife, the 95% UCL value of 4.3 µg/kg would not result in EEQs greater than 1.0 in the Tier 2 food chain model so risks to these receptors are not significant enough to warrant further action.

Gamma-BHC was detected relatively infrequently at the site (in 2 of 57) and at a relatively low concentration (91 µg/kg). The maximum concentration was found in a deeper soil sample. The maximum detected concentration was the only value that exceeded the Region V EPA soil screening level of 5 µg/kg for plants, but it was lower than the plant screening level in the Los Alamos ECORISK database (2009) of 100 µg/kg. MEDEP suggested an invertebrate benchmark value of 30 µg/kg, which is a NOAEC for earthworms as cited in the Casmalia Resources Superfund Site Final RI Report (U.S. EPA, 2011). Other invertebrate toxicity values cited in the Casmilia report are LC50s of 500, 59,000 and 200,000 µg/kg, and a NOAEC of 50 µg/kg. Because only one location has a gamma-BHC concentration that exceeds some of the NOAECs for plants or invertebrates, but does not exceed other benchmarks, the plant and invertebrate population at the site is not expected to be significantly impacted so the potential isolated risks to these receptors do not warrant further action. Regarding risks to wildlife, the maximum detected concentration of 91 µg/kg in the deeper soil would still result in an EEQ of less than 1.0 in the Tier 1 and Tier 2 food chain model.

Heptachlor and heptachlor epoxide were both detected relatively infrequently at the site (in 10 of 57 and 9 of 57 samples, respectively). The only plant benchmark found was a value in the Los Alamos ECORISK database (2009) of 400 µg/kg. Only one detected concentration was greater than this benchmark.

MEDEP recommended an invertebrate benchmark value of 7 µg/kg, as cited in the Casmalia Resources Superfund Site Final RI Report (U.S. EPA, 2011). The Casmalia report calculated the benchmark by dividing a value of 700 µg/kg by 100, with the assumption that the 700 µg/kg value was an LC50, since invertebrate toxicity tests typically measure mortality, but this was not confirmed. Only 4 locations had detected heptachlor and heptachlor epoxide concentrations that were greater than the invertebrate NOAEC of 7 µg/kg. Therefore, the plant and invertebrate population at the site is not expected to be significantly impacted so the potential isolated risks to these receptors do not warrant further action. Regarding risks to wildlife, the 95% UCL value increased slightly from 9.4 µg/kg and 19 µg/kg for heptachlor and heptachlor epoxide in the shallow soil, respectively, to 21.7 µg/kg and 31.7 µg/kg, respectively in the deeper soil. The EEQs would still be less than 1.0 in the Tier 2 food chain model so risks to these receptors are not significant enough to warrant further action.

1.5 ECOLOGICAL RISK ASSESSMENT SUMMARY

This section presents a summary of the conclusions of the ecological risk assessment that was conducted for the site.

1.5.1 Risks to Terrestrial Plants and Invertebrates

No chemicals were retained as COPCs for risks to terrestrial plants and invertebrates.

1.5.2 Risks to Mammals and Birds

No chemicals were retained as COPCs for risks to birds and mammals based on the evaluation of surface soil data. Even if receptors were exposed to higher levels of contamination, impacts to birds and mammals would be limited to a few individuals, if any, because of the relatively small size of the site, lack of habitat, urban surroundings, and division of the site by a road. Based on the aforementioned factors, significant populations of small mammals or birds are not likely to be present at the site, and therefore there would be no or low potential risk to these ecological receptors.

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TABLE C-2.1

ASSESSMENT ENDPOINTS AND MEASUREMENT ENDPOINTS
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNWICK, MAINE

Assessment Endpoint	Measurement Endpoints
Adverse effects on the survival, reproduction, and/or growth of soil invertebrates	• Survival, growth, and/or reproduction of soil invertebrates were evaluated by comparing the measured concentrations of chemicals in the surface soil to invertebrate soil screening levels.
Adverse effects on the survival, reproduction, and/or growth of terrestrial plants	• Survival, growth, and/or reproduction of terrestrial plants were evaluated by comparing the measured concentrations of chemicals in the surface soil to plant soil screening levels.
Adverse effects on the survival, reproduction, and/or increase in development effects of insectivorous birds	• Survival, reproduction, and/or increase in development effects of birds were evaluated by comparing the estimated ingested dose of contaminants in the surface soil and earthworms to No Observed Adverse Effects Levels (NOAELs) and Lowest Observed Adverse Effects Levels (LOAELs) for surrogate wildlife species.
Adverse effects on the survival, reproduction, and/or increase in development effects of insectivorous mammals	• Survival, reproduction, and/or increase in development effects of mammals were evaluated by comparing the estimated ingested dose of contaminants in the surface soil and earthworms to NOAELs and LOAELs for surrogate wildlife species.
Adverse effects on the survival, reproduction, and/or increase in development effects of herbivorous birds	• Survival, reproduction, and/or increase in development effects of birds were evaluated by comparing the estimated ingested dose of contaminants in the surface soil and plants to NOAELs and LOAELs for surrogate wildlife species.
Adverse effects on the survival, reproduction, and/or increase in development effects of herbivorous mammals	• Survival, reproduction, and/or increase in development effects of mammals will be evaluated by comparing the estimated ingested dose of contaminants in the surface soil and plants to NOAELs and LOAELs for surrogate wildlife species.

TABLE C-2.2

SOIL SCREENING VALUES
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Parameter	Ecological Screening Level							
	Plants		Invertebrates		Avian		Mammals	
	Value	Source	Value	Source	Value	Source	Value	Source
PESTICIDES/PCBS (UG/KG)								
4,4'-DDD	12000	CCME	12000	CCME	93	EcoSSL	21	EcoSSL
4,4'-DDE	12000	CCME	12000	CCME	93	EcoSSL	21	EcoSSL
4,4'-DDT	12000	CCME	12000	CCME	93	EcoSSL	21	EcoSSL
ALPHA-CHLORDANE	224	Reg 5	NA	NA	NA	NA	NA	NA
GAMMA-BHC (LINDANE)	5	Reg 5	NA	NA	NA	NA	NA	NA
GAMMA-CHLORDANE	224	Reg 5	NA	NA	NA	NA	NA	NA
HEPTACHLOR	NA	NA	NA	NA	NA	NA	5.98	Reg 5
HEPTACHLOR EPOXIDE	NA	NA	NA	NA	NA	NA	152	Reg 5
TOTAL DDT	12000	CCME	12000	CCME	93	EcoSSL	21	EcoSSL
METALS (MG/KG)								
ARSENIC	18	EcoSSL	17	CCME	43	EcoSSL	46	EcoSSL
CYANIDE	0.9	CCME	0.9	CCME	NA	NA	NA	NA
LEAD	120	EcoSSL	1,700	EcoSSL	11	EcoSSL	56	EcoSSL
ZINC	160	EcoSSL	120	EcoSSL	46	EcoSSL	79	EcoSSL

NA - Not Available

Screening Level Sources in the Order of Preference:
EcoSSL - EPA Ecological Soil Screening Levels (U.S. EPA, 2005, 2007, 2008)
CCME - Canadian Council of Ministers of the Environment (CCME, 1999, 2001)
ORNL - Oak Ridge National Laboratory Toxicological Benchmarks for plants and invertebrates(Efroymson et al., 1997a and 1997b)
Reg 5 - U.S. EPA Region 5 Ecological Screening Levels (U.S. EPA, 2003)

TABLE C-2.3

EXPOSURE PARAMETERS FOR THE TERRESTRIAL WILDLIFE MODEL
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

	Tier 1 Inputs		Tier 2, Step 3A Inputs	
Species/Exposure Inputs	**Values**	**Units**	**Values**	**Units**
Meadow Vole				
Body Weight = BW	1.700E-02	kg	3.580E-02	kg
Food Ingestion Rate = If	1.878E-03	kg/day	1.744E-03	kg/day
Soil Ingestion Rate = Is	6.010E-05	kg/day	2.093E-05	kg/day
Home Range = HR	Assume 100% on site		6.590E-02	acres
Bobwhite Quail				
Body Weight = BW	1.540E-01	kg	1.751E-01	kg
Food Ingestion Rate = If	1.628E-02	kg/day	1.361E-02	kg/day
Soil Ingestion Rate = Is	2.263E-03	kg/day	8.302E-04	kg/day
Home Range = HR	Assume 100% on site		1.880E+01	acres
Short-Tailed Shrew				
Body Weight = BW	1.500E-02	kg	1.610E-02	kg
Food Ingestion Rate = If	1.600E-03	kg/day	1.433E-03	kg/day
Soil Ingestion Rate - Is	4.801E-05	kg/day	1.289E-05	kg/day
Home Range = HR	Assume 100% on site		9.699E-01	acres
American Robin				
Body Weight = BW	7.73E-02	kg	8.04E-02	kg
Food Ingestion Rate = If	1.25E-02	kg/day	1.19E-02	kg/day
Soil Ingestion Rate - Is	2.05E-03	kg/day	7.60E-04	kg/day
Home Range = HR	Assume 100% on site		6.10E-01	acres

Notes:

The soil ingestion rates were calculated by multiplying the food ingestion rates by the following incidental soil ingestion rates:

	Conservative	50th Percentile	Source
Meadow Vole	3.2%	1.2%	1
Bobwhite quail	13.9%	6.1%	1, 2
Short-tailed Shrew	3%	0.90%	1
American Robin	16.40%	6.40%	1, 3

1 - U.S. EPA (U.S. Environmental Protection Agency), 2007. Ecological Soil Screening Level Guidance, Office of Emergency and Remedial Response. February.
2 - Based on the mourning dove.
3 - Based on the American woodcock.

TABLE C-2.4

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE SOIL
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	Frequency of Detection	Minimum Concentration	Maximum Concentration	Sample of Maximum Concentration	Minimum Nondetect	Maximum Nondetect	Average of Positive Results[1]	Overall Average[2]	EEQs				COPC (yes/no)?	Rationale for COPC Selection	Further Evaluated in Terrestrial Food Chain Modeling (yes/no)?[3]
									Plants	Invertebrates	Avian	Mammals			
PESTICIDES/PCBS (UG/KG)															
4,4'-DDD	12/26	3.2 J	100	SB-17-112-0001	3.5	4.1	23.6	11.9	0.008	0.008	**1.1**	**4.8**	YES	ASL	NO[4]
4,4'-DDE	23/26	0.7 J	250	SB-17-125-0001	3.7	4.1	31.8	28.4	0.02	0.02	**2.7**	**11.9**	YES	ASL	NO[4]
4,4'-DDT	17/26	8.2 J	1200 J	SB-17-112-0001, SB-17-125-0001	3.5	31	295	195	0.10	0.10	**12.9**	**57.1**	YES	ASL	NO[4]
ALPHA-CHLORDANE	11/26	0.8 J	840 J	SB-17-206-0001	1.8	2.1	114	49.0	**3.8**	**NA**	**NA**	**NA**	YES	ASL/NSL	YES
GAMMA-BHC (LINDANE)	1/26	1.5 J	1.5 J	SB-17-133-0001	0.17	9.6	1.50	0.948	0.30	**NA**	**NA**	**NA**	YES	NSL	YES
GAMMA-CHLORDANE	10/26	1 J	760 J	SB-17-206-0001	1.8	2.1	113	44.0	**3.4**	**NA**	**NA**	**NA**	YES	ASL/NSL	YES
HEPTACHLOR	6/26	0.25 J	69 J	SB-17-206-0001	1.8	9.6	16.5	4.70	**NA**	**NA**	**NA**	**11.5**	YES	ASL/NSL	YES
HEPTACHLOR EPOXIDE	5/26	1.5 J	130 J	SB-17-206-0001	1.8	9.6	40.4	8.68	**NA**	**NA**	**NA**	0.86	YES	NSL	YES
TOTAL DDT[5]	24/26	0.7	1503	SB-17-125-0001	0	0	252	232	0.13	0.13	**16.2**	**71.6**	YES	ASL	YES
METALS (MG/KG)															
ARSENIC	26/26	1.4	18.2	SB-17-103-0001	-	-	6.55	6.55	**1.0**	**1.1**	0.42	0.40	YES	ASL	NO
CYANIDE	1/26	0.34 J	0.34 J	SB-17-125-0001	0.4	0.6	0.340	0.262	0.38	0.38	**NA**	**NA**	YES	NSL	YES
LEAD	26/26	4.7	37.5	SB-17-131-0001	-	-	12.8	12.8	0.31	0.02	**3.4**	0.67	YES	ASL	YES
ZINC	26/26	10.9	47.7	SB-17-131-0001	-	-	27.6	27.6	0.30	0.40	**1.0**	0.60	YES	ASL	YES

Shaded cells indicate that the EEQ exceeds 1 or no screening level is available.
EEQs are calculated by dividing the chemical concentration by its screening level presented in Table 5-2.
1 - Average of detected concentrations only.
2 - Average of all analytical results including one-half of the detection limit for non-detects.
3 - Chemicals with EEQs for birds or mammals greater than 1.0 or chemicals without bird or mammal screening values are retained for food chain modeling.
4 - Sum of DDD, DDE, and DDT evaluated in Food Chain Model.
5 - Detection limit of DDT result used when all results were non-detects.

Abbreviations:
COPC = Chemical of Potential Concern
EEQ = Ecological Effects Quotient
NA = Not available or not applicable

Rationale Codes for COPC Selection:
ASL = Above COPC Screening Level
NSL = No Screening Level Available

TABLE C-2.5

TERRESTRIAL FOOD CHAIN MODEL - TIER 1 SCENARIO
INSECTIVOROUS AND HERBIVOROUS RECEPTORS
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	Herbivorous Receptors EEQs				Insectivorous Receptors EEQs			
	Bobwhite Quail		Meadow Vole		Robin		Short-Tailed Shrew	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
PESTICIDES/PCBS								
ALPHA-CHLORDANE	6.2E-03	1.2E-03	8.8E-04	4.4E-04	1.1E+00	2.3E-01	3.5E-01	1.7E-01
GAMMA-BHC (LINDANE)	3.2E-05	3.2E-06	6.2E-06	6.2E-07	1.2E-03	1.2E-04	2.0E-04	2.0E-05
GAMMA-CHLORDANE	5.6E-03	1.1E-03	7.6E-04	3.8E-04	1.0E+00	2.1E-01	3.2E-01	1.6E-01
HEPTACHLOR	1.2E-03	1.2E-04	3.3E-03	3.3E-04	1.2E-01	1.2E-02	7.4E-01	7.4E-02
HEPTACHLOR EPOXIDE	2.8E-03	2.8E-04	1.2E-02	1.2E-03	7.2E-02	7.2E-03	4.2E-01	4.2E-02
TOTAL DDT	1.5E-01	1.2E-02	1.2E-01	3.1E-03	1.2E+01	1.0E+00	1.2E+01	3.2E-01
METALS								
CYANIDE	NV	NV	5.6E-04	5.6E-05	NV	NV	5.4E-04	5.4E-05
LEAD	4.7E-01	1.7E-02	7.6E-02	1.9E-03	2.1E+00	7.6E-02	3.7E-01	9.2E-03
ZINC	7.6E-02	2.9E-02	6.2E-02	1.6E-02	7.6E-01	2.9E-01	4.3E-01	1.1E-01

Cells are shaded if the value is greater than 1.0

NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
EEQ - Ecological Effects Quotient
NV - No value determined

TABLE C-2.6

TERRESTRIAL FOOD CHAIN MODEL - TIER 2, STEP 3A SCENARIO
INSECTIVOROUS AND HERBIVOROUS RECEPTORS
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	Herbivorous Receptors EEQs				Insectivorous Receptors EEQs			
	Bobwhite Quail		Meadow Vole		Robin		Short-Tailed Shrew	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
PESTICIDES/PCBS								
ALPHA-CHLORDANE	2.9E-04	5.8E-05	2.7E-05	1.4E-05	1.4E-01	2.7E-02	3.8E-02	1.9E-02
GAMMA-CHLORDANE	2.5E-04	5.0E-05	2.2E-05	1.1E-05	1.2E-01	2.4E-02	3.4E-02	1.7E-02
TOTAL DDT	3.1E-02	2.6E-03	2.0E-02	5.4E-04	4.3E+00	3.6E-01	4.0E+00	1.0E-01
METALS								
LEAD	1.0E-01	3.8E-03	1.5E-02	3.7E-04	7.6E-01	2.8E-02	1.4E-01	3.6E-03

Cells are shaded if the value is greater than 1.0
Only includes chemicals with EEQs greater than 1 in the conservative food chain model.
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
EEQ - Ecological Effects Quotient
NV - No value determined

TABLE C-2.7

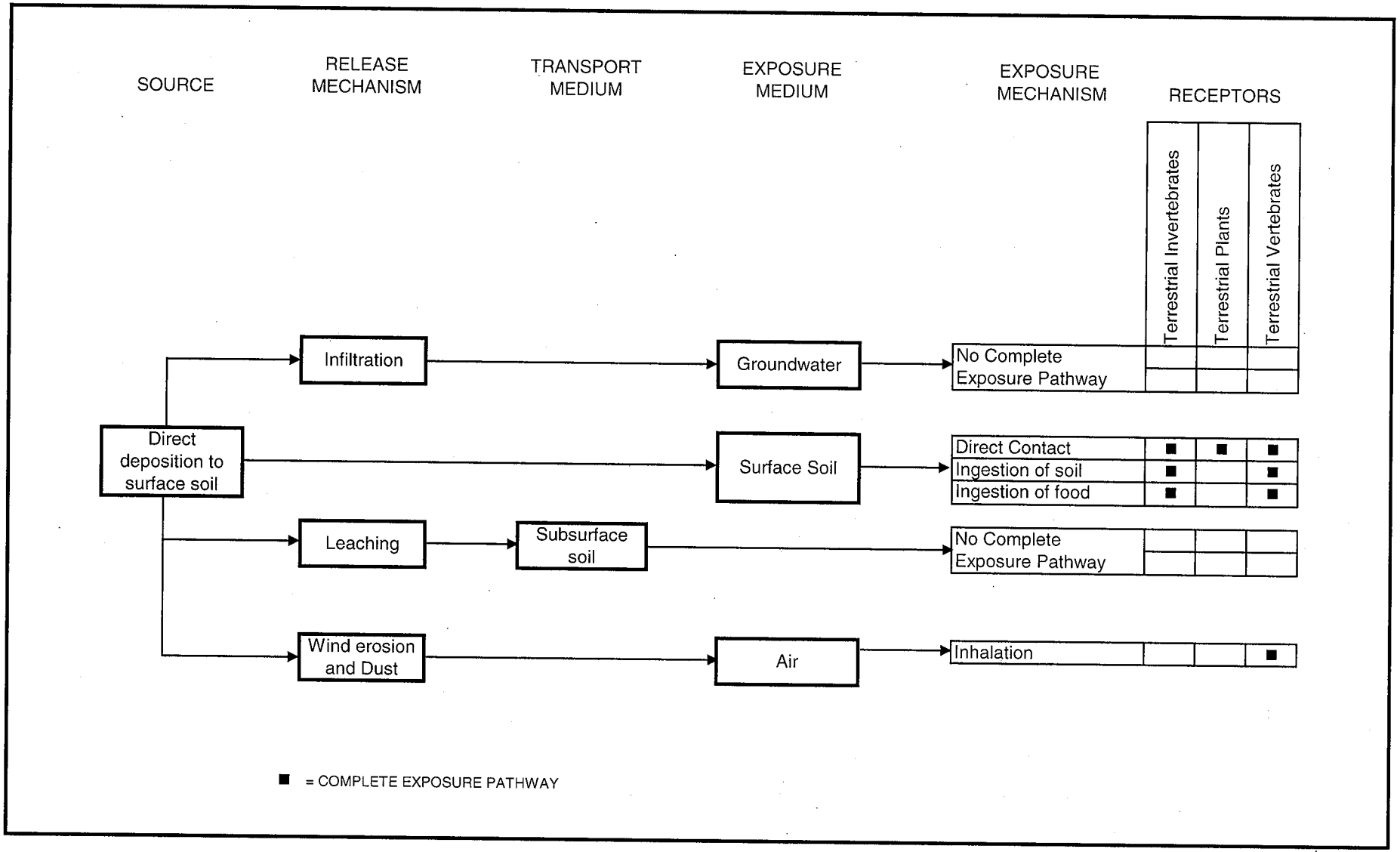
SUMMARY STATISTICS FOR SURFACE WITH A STARTING DEPTH BETWEEN 0 AND 2 FEET BGS
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	Frequency of Detection		Mininum Detected	Maximum Detected	Sample of Maximum Detected	Mean of Positive Detects[1]	Mean of All Samples[2]	95% UCL[3]
	Number	Percent						
HERBICIDES (UG/KG)								
MONURON	1/44	2%	17 J	17 J	SB-17-133-0104	17.0	12.6	NA
METALS (MG/KG)								
ARSENIC	53/53	100%	1.3	18.2	SB-17-103-0001	4.96	4.96	NA
CYANIDE	2/44	5%	0.34 J	0.6	SB-17-130-0104	0.470	0.283	NC
LEAD	53/53	100%	1.8	37.5	SB-17-131-0001	9.34	9.34	11.4
ZINC	53/53	100%	10	54.5	SB-17-119-0104	23.2	23.2	25.6
MISCELLANEOUS PARAMETERS								
TOTAL SOLIDS (%)	13/13	100%	79	97	SB-17-206-0001	89.5	89.5	NA
PESTICIDES (UG/KG)								
4,4'-DDD	28/57	49%	1.1 J	520	SB-17-112-0104	55.5	28.2	NA
4,4'-DDE	46/57	81%	0.51 J	250	SB-17-125-0001	33.7	27.6	NA
4,4'-DDT	35/57	61%	8.2 J	7200 J	SB-17-112-0104	545	336	NA
ALPHA-CHLORDANE	26/57	46%	0.78 J	3100 J	SB-17-206-0103	187	86.2	650
DIELDRIN	4/57	7%	1.4 J	43	SB-17-148-0104	19.8	3.84	4.3
ENDOSULFAN I	2/57	4%	4.3	5.9	SB-17-147-0104	5.10	1.47	NA
GAMMA-BHC (LINDANE)	2/57	4%	1.5 J	91	SB-17-124-0104	46.3	2.91	NC
GAMMA-CHLORDANE	24/57	42%	0.81 J	2700 J	SB-17-206-0103	181	77.2	571
HEPTACHLOR	10/57	18%	0.21 J	390 J	SB-17-206-0103	52.7	10.5	21.7
HEPTACHLOR EPOXIDE	9/57	16%	0.81 J	530 J	SB-17-206-0103	87.6	15.1	31.7
TOTAL DDT[4]	47/57	82%	0.51	7800	SB-17-112-0104	472	390	1013
PETROLEUM HYDROCARBONS (MG/KG)								
DIESEL RANGE ORGANICS	1/1	100%	14	14	SB-17-111-0104	NA	NA	NA

Footnotes:
1 - Average of detected concentrations only.
2 - Average of all analytical results including one-half of the detection limit for non-detects.
3 - ProUCL version 4.1.00; 95% UCL only calculated for chemicals evaluated in the food chain model.
4 - Detection limit of DDT result used when all results were non-detects.
NA - Not applicable
NC - Could not be calculated; insufficient number of detections to determine 95% UCL.
J - Estimated value
UCL - Upper Confidence Limit

FIGURE 1

ECOLOGICAL CONCEPTUAL SITE MODEL
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE



ATTACHMENT C-2.1

NAVY ECOLOGICAL RISK ASSESSMENT TIER APPROACH

Navy Ecological Risk Assessment Tiered Approach

RPM Input and Risk Management Consideration[3]
Step 8: Risk Management

Tier 1. Screening Risk Assessment (SRA): Identify pathways and compare exposure point concentrations to bench marks.

Step 1: Site visit; Pathway Identification/Problem Formulation; Toxicity Evaluation

Step 2: Exposure Estimate; Risk Calculation (SMDP)[1]

Proceed to Exit Criteria for SRA

Exit Criteria for the Screening Risk Assessment: Decision for exiting or continuing the ecological risk assessment.

1) Site passes screening risk assessment. A determination is made that the site poses acceptable risk and shall be closed out for ecological concerns.

2) Site fails screening risk assessment: The site must have both complete pathway and unacceptable risk. As a result the site will either have an interim cleanup or moves to the second tier.

Tier 2. Baseline Ecological Risk Assessment (BERA): Detailed assessment of exposure and hazard to "assessment endpoints" (ecological qualities to be protected). Develop site specific values that are protective of the environment.

Step 3a: Refinement of Conservative Exposure Assumptions[2] (SRA)----**Proceed to Exit Criteria for Step 3a**

Step 3b: Problem Formulation - Toxicity Evaluation; Assessment Endpoints; Conceptual Model; Risk Hypothesis (SMDP)

Step 4: Study Design/DQO - Line of Evidence; Measurement Endpoints; Work Plan and Sampling & Analysis Plan (SMDP)

Step 5: Verification of Field Sampling Design (SMDP)

Step 6: Site Investigation and Data Analysis (SMDP)

Step 7: Risk Characterization

Proceed to Exit Criteria for BERA

Exit Criteria Step 3a Refinement

1) If re-evaluation of the conservative exposure assumptions (SRA) support an acceptable risk determination then the site exits the ecological risk assessment process.

2) If re-evaluation of the conservative exposure assumptions (SRA) do not support an acceptable risk determination then the site continues in the Baseline Ecological Risk Assessment process. **Proceed to Step 3b.**

Exit Criteria Baseline Risk Assessment

1) If the site poses acceptable risk then no further evaluation and no remediation from an ecological perspective is warranted.

2) If the site poses unacceptable ecological risk and additional evaluation in the form of remedy development and evaluation is appropriate, proceed to third tier.

Tier 3. Evaluation of Remedial Alternative (RAGs C)

a. Develop site specific risk based cleanup values.

B. Qualitatively evaluate risk posed to the environment by implementation of each alternative (short term) impacts and estimate risk reduction provided by each (long-term) impacts; provide quantitative evaluation where appropriate. Weigh alternative using the remaining CERCLA 9 Evaluation Criteria. Plan for monitoring and site closeout.

Notes: 1) See EPA's 8 Steps ERA Process for requirements for each Scientific Management Decision Point (SMDP).

2) Refinement Includes but is not limited to background, bioavailability, detection frequency. Etc.

3) Risk Management is incorporated throughout the tiered approach.

ATTACHMENT C-2.1
NAVY TIERED APPROACH

ATTACHMENT C-2.2

MAMMAL AND BIRD TOXICITY REFERENCE VALUES

ATTACHMENT C-2.2
CALCULATION OF GEOMETRIC MEANS OF NOAELS AND LOAELS
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Lead				Zinc				DDT			
Bird		Mammal		Bird		Mammal		Bird		Mammal	
NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
0.194	1.94	0.71	7	13.8	98.8	8.23	82.3	0.0396	0.396	0.11	0.274
1.63	3.26	1	5	14.4	105	8.89	75.9	0.0563	0.281	0.139	0.694
2.69	4.04	2.6	26	24.7	66.5	9.64	452	0.0754	0.754	0.147	0.735
5.63	126	3	6	55	76.7	14.4	2514	0.113	1.13	0.371	1.79
12	135	4.5	10	57.3	123	30	4927	0.197	1.97	0.731	17.1
12.6	0.11	5	74.9	63.9	84.8	34	4878	0.37	0.494	0.894	19
67.4	0.194	5.5	45	64.1	31.2	37.9	12.2	0.563	1.892	1.3	99
125	3.26	7.5	170	67.8	88	41.2	81.1	0.563	5.2	1.65	50
1.56	11.8	8.9	180	106	101	42.1	232	0.592	6.07	1.71	85.3
2.77	93.1	9.1	63.2	14.4	205	42.5	326	1.3	21.1	2.28	38.8
4.64	377	12.4	111	15	367	60	326	1.93	32.5	2.4	95.6
5.93	15.6	18	54.6	16.1	988	88	353	1.94	46.9	2.57	0.02
6.14	59.3	25.4	82	21.5	988	89.6	424	1.95	42.5	5.1	0.02
7.1	61.4	27.5	285	28.7	86.6	89.6	103	1.98	29	6.7	0.636
11.1	71	31.6	270	35.4	105	97.8	87.1	2.47	37.5	7.07	0.7
11.2	111	32.5	150	36.6	111	101	2514	2.47	51.5	7.62	0.731
12.6	112	33.3	1440	43.3	106	110	4927	2.47	0.211	9.9	1
13.5	126	41	506	55	111	167	4878	2.72	0.281	10	2
14.2	67.4	47.3	506	55.1	112	181	2838	2.74	0.294	12.4	2
20	125	56	552	55.3	150	234	8.71	2.74	0.366	17.1	3
25	123	64.8	587	63.2	114	347	16.1	2.83	0.473	17.2	3.82
28.4	38.2	64.9	1500	70.6	172	458	28.2	2.83	0.494	25.8	4.22
34.5	53.1	90.1	2	74.3	174	479	75.7	2.99	0.494	32.2	6.6
54.3	64.3	100	2.49	74.7	185	975	81.1	3.01	0.562	47.8	9.9
61.3	76.3	115	2.94	75	145	2486	89.1	3.03	0.563	50	16.2
66.9	124	116	3.62	75.7	149	4.33	424	3.08	0.563	60.7	25.3
	152	120	5.5	85.9	194	4.78	667	4.51	0.563	99	200
	163	144	6.76	86.8	286	4.78	956	4.67	0.563	100	4.19
	200	202	16.6	92.3	297	9.64	968	4.67	0.563	0.694	33.7
	262	202	46.4	96.9	232	10.3		5.2	0.563	0.735	96.5
	270	276	49.6	99.1	237	11.7		5.28	1.12	1.27	137
	273	294	50	103	354	13.5		6.09	1.13	1.42	0.2
	282	441	55.5	103	503	14.4		6.09	1.14	1.43	1.75
		600	61.2	129	480	14.9		6.5	1.14	1.5	7.5
		601	78.6	129	21.6	15.7		9.37	1.24	1.77	15
		639	99.8	142	31	15.7		9.85	1.36	2	47.3
		0.15	137	143	39	18		11.5	1.44	2.04	62.9
		0.5	139	148	65.7	20.2		12.3	1.68	6.54	
		1	154	155	88	28.9		12.7	2.25	7.07	
		1.27	171	158	101	30		14.1	2.2	12.4	
		1.99	175	177	126	30.4		14.2	2.25	13.5	
		2.4	178	252	132	30.6		14.5	2.25	13.5	
		2.98	198	367	143	33.2		16.4	2.25	13.6	
		4.7	200		252	34		22.4	2.25	13.7	
		4.71	218		190	42.1		22.9	2.25	16.9	
		5.64	221		284	42.5		25	2.25	17.5	
		5.8	222		315	43.5		25	2.41	17.6	
		7.79	230		433	63.7		25.7	2.41	19.4	
		9.1	258		757	56		37.6	2.73	19.4	
		10	330		914	60		0.227	2.8	19.5	
		10.6	354		988	88		0.558	2.81	19.6	
		10.7	360		1370	97.5		1.1	4.22	22.6	
		10.7	360			99.1		1.47	4.57	26.5	
		15.1	362			103		1.93	4.58	48.3	
		15.4	364			106		2.99	4.94	60.7	
		15.5	381			110		3.01	5.19	76.2	
		16.1	381			234		9.85	6.02	90.3	
		16.3	381			282		11.5	6.29	96.3	
		18	404			295		12.2	12.5	98.8	
		18.3	420			458		12.3	13	200	
		18.9	437			470		13.4	13		
		24.3	579			479		13.8	13.8		
		32.5	600			597		14.1	14.8		
		32.7	635			825		14.2	36		
		38.5	646			845		16.4	2.27		
		43	651			846		18	2.79		
		50	750			1419		21.1	2.95		
		71.5	762			1684		22.4	42.5		
		75	828			2486		25	0.592		
		100	833					25	0.713		
		120	991					25.1	1.04		
		136	1370					28.5	3.08		
		137	1770					30.7	6.02		
		139	1990					35.6	6.02		
		169	2570					37.6	13		
		171	2570					72	18.9		
		180	2570						42.5		

ATTACHMENT C-2.2
CALCULATION OF GEOMETRIC MEANS OF NOAELS AND LOAELS
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

	Lead				Zinc				DDT			
	Bird		Mammal		Bird		Mammal		Bird		Mammal	
			187	2840								
			200	3630								
			200	6170								
			218	5								
			230	13								
			285	8.9								
			362	28.2								
			364	29								
			400	532								
			400	50.4								
			431	163								
			441	180								
			534	178								
			632	225								
			651	383								
			750	1360								
			1260	508								
			1500	373								
				460								
				800								
				800								
				1264								
				2530								
				3.3								
				15								
				28.7								
				29								
				29								
				29.5								
				29.9								
				30.4								
				46.4								
				50								
				61.5								
				100								
				173								
				200								
				272								
				328								
				354								
				371								
				400								
				400								
				404								
				442								
				638								
				748								
				991								
				1000								
				1430								
				1600								
				2390								
				2400								
				2650								
Geomean	10.9	44.6	40.7	186	66.1	171	75.4	298	4.66	2.70	7.65	5.56
Value used in Eco SSL	1.63	NA	4.7	NA	66.1	NA	75.4	NA	0.227	NA	0.147	NA

ATTACHMENT C-2.2

WILDLIFE TOXICITY REFERENCE VALUES
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

PARAMETER	Mammal		Bird	
	NOAEL	LOAEL	NOAEL	LOAEL
PESTICIDES/PCBs				
Alpha-Chlordane	4.58	9.16	2.14	10.7
Dieldrin	0.015	1.27	0.0709	0.8
Gamma-BHC (Lindane)	8	80	2	20
Gamma-Chlordane	4.58	9.16	2.14	10.7
Heptachlor	0.1	1	0.92	9.2
Heptachlor Epoxide	0.1	1	0.92	9.2
Total DDT	0.147	5.56	0.227	2.7
INORGANICS				
Cyanide	68.7	687	NV	NV
Lead	4.7	186.4	1.63	44.63
Zinc	75.4	297.58	66.1	171.44

Notes:

The sources of these NOAELS and LOAELS are presented in the table titled "Sources and Endpoints for NOAELS and LOAELS for Terrestrial Wildlife" in this appendix.

ATTACHMENT C-2.2
SOURCES AND ENDPOINTS FOR NOAELS AND LOAELS FOR TERRESTRIAL WILDLIFE

Parameters	Concentration (mg/kg-day)	Endpoint	Effect	Chronic/ Subchronic	Species	Primary Reference	Source of Reference
Pesticides							
4,4'-DDT	5.56	LOAEL	reproduction & growth	chronic	mammals	USEPA, 2007	
4,4'-DDT	2.7	LOAEL	reproduction & growth	chronic	birds	USEPA, 2007	
4,4'-DDT	0.147	NOAEL	reproduction & growth	chronic	mammals	USEPA, 2007	
4,4'-DDT	0.227	NOAEL	reproduction & growth	chronic	birds	USEPA, 2007	
Dieldrin	0.8	LOAEL	reproduction & growth	chronic	birds	USEPA, 2007	
Dieldrin	1.27	LOAEL	reproduction & growth	chronic	mammals	USEPA, 2007	
Dieldrin	0.0709	NOAEL	reproduction & growth	chronic	birds	USEPA, 2007	
Dieldrin	0.015	NOAEL	reproduction & growth	chronic	mammals	USEPA, 2007	
Chlordane	10.7	LOAEL	mortality	chronic	red-winged blackbird	Stickel et al., 1983	Sample et.al., 1996
Chlordane	9.16	LOAEL	reproduction	chronic	mouse	WHO, 1984	Sample et.al., 1996
Chlordane	2.14	NOAEL	mortality	chronic	red-winged blackbird	Stickel et al., 1983	Sample et.al., 1996
Chlordane	4.58	NOAEL	reproduction	chronic	mouse	WHO, 1984	Sample et.al., 1996
gamma-BHC (lindane)	20	LOAEL	reproductive	chronic	mallard duck	Chakravarty and Lahiri, 1986	Sample et.al., 1996
gamma-BHC (lindane)	8	NOAEL	reproductive	chronic	rat	Palmer et al., 1978	Sample et.al., 1996
Heptachlor	1	LOAEL	reproduction	chronic	mink	Crum et al., 1993	Sample et.al., 1996
Heptachlor	0.92	NOAEL	mortality	chronic	quail	Los Alamos, 2009	
Inorganics							
Cyanide	68.7	NOAEL	reproductive	chronic	rat	Tewe and Maner, 1981	Sample et.al., 1996
Lead	44.6	LOAEL	reproduction & growth	chronic	birds	USEPA, 2005	
Lead	186.4	LOAEL	reproduction & growth	chronic	mammals	USEPA, 2005	
Lead	1.63	NOAEL	reproduction & growth	chronic	chicken	USEPA, 2005	
Lead	4.7	NOAEL	reproduction & growth	chronic	rat	USEPA, 2005	
Zinc	297.58	LOAEL	reproduction & growth	chronic	mammals	USEPA, 2007	
Zinc	171.44	LOAEL	reproduction & growth	chronic	birds	USEPA, 2007	
Zinc	75.4	NOAEL	reproduction & growth	chronic	mammals	USEPA, 2007	
Zinc	66.1	NOAEL	reproduction & growth	chronic	birds	USEPA, 2007	

Notes:

NOAEL = No Observed Adverse Effects Level

LOAEL = Lowest Observed Adverse Effects Level

The LOAELs used for 4,4'-DDT, lead, and zinc were calculated as the geometric mean of growth and reproduction data from the Ecological Soil Screening Levels (U.S. EPA, 2005, 2007).

References for the NOAELS and LOAELs are presented in this Attachment and Titled "TRV Source and Endpoint References".

SOURCES AND ENPOINTS FOR NOAELS AND LOAELS FOR TERRESTRIAL WILDLIFE

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ATTACHMENT C-2.3

CALCULATION OF EXPOSURE ASSUMPTIONS

ATTACHMENT C-2.3

DRY WEIGHT DERIVATION OF BODY WEIGHT, FOOD INTAKE, AND WATER INTAKE FACTORS FOR TERRESTRIAL FOOD CHAIN MODELS
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK, MAINE

	Data from EPA (1993)			Derivation of Factors for Modeling		
Species/Factor	Age/Sex/ Cond./Seas.	Value	Study Average	Calculation of Values		Notes
Short-Tailed Shrew						
Body Weight (g)	A B	15	15	Minimum Value	0.0150 kg	
				Maximum Value	0.01921 kg	
	M summer	19.21	17.27	Overall Study Average	0.01613 kg	
	F summer	17.4				
	M fall	16.87				
	M fall	15.58				
Food Ingestion Rate (g/g-day)	A B	0.49		Conservative value:	0.0016 kg/day	Maximum ingestion rate * Average Body weight * 0.16[1]
	A B	0.62		Average value	0.00143 kg/day	Average ingestion rate * Average Body weight * 0.16[1]
	Overall Study Average		0.555			[1] - 0.16 = percent solids in earthworms to convert to a dry weight ingestion rate
Water Ingestion Rate (g/g-day)	A B	0.223		Conservative value:	0.00428 L/day	Ingestion rate * Maximum Body weight
				Average value	0.00360 L/day	Ingestion rate * Average Body weight
Meadow Vole						
Body Weight (g)	A M summer	40	36.7	Minimum Value	0.017 kg	
	A F summer	33.4		Maximum Value	0.052 kg	
				Overall Study Average	0.0358 kg	
	A M spring	52.4	48.0			
	A F spring	43.5				
	A B spring	26	21.2			
	A B summer	24.3				
	A B fall	17				
	A B winter	17.5				
	A M	35.5	37.3			
	A F	39				
Food Ingestion Rate (g/g-day)		0.3	0.33	Conservative value:	0.001878 kg/day	Maximum ingestion rate * Average Body weight * 0.15 [1]
		0.35				
				Average value	0.001744 kg/day	Average ingestion rate * Average Body weight * 0.15[1]
						[1] - 0.15 = percent solids in vegetation to convert to a dry weight ingestion rate
Water Ingestion Rate	A B	0.21	0.18	Conservative value:	0.007513 L/day	Maximum ingestion rate * Average Body weight
	A B	0.14		Average value	0.006261 L/day	Average ingestion rate * Average Body weight

ATTACHMENT C-2.3

DRY WEIGHT DERIVATION OF BODY WEIGHT, FOOD INTAKE, AND WATER INTAKE FACTORS FOR TERRESTRIAL FOOD CHAIN MODELS
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK, MAINE

Species/Factor	Data from EPA (1993) Age/Sex/ Cond./Seas.	Value	Study Average	Derivation of Factors for Modeling Calculation of Values		Notes
Northern Bobwhite Quail						
Body Weight (g)	A B fall	189.9	191	Minimum Value	0.154 kg	
	A B winter	193.9		Maximum Value	0.194 kg	
	A B spring	190		Overall Study Average	0.1751 kg	
	A M winter	181	177			
	A M summer	163				
	A F winter	183				
	A F summer	180				
	A M winter	161	157			
	A M summer	154				
	A F winter	157				
	A F summer	157				
Food Ingestion Rate (g/g-day)	A B winter	0.093	0.078	Conservative value:	0.01628 kg/day	Maximum ingestion rate * Average Body weight
	A B spring	0.067				
	A B summer	0.079		Average value	0.01361 kg/day	Average ingestion rate * Average Body weight
	A B fall	0.072				
						Dry weight to wet weight conversion factor not needed because food items on a dry weight basis in the wildlife exposure factors handbook.
Water Ingestion Rate (g/g-day)	A M summer	0.1	0.11	Conservative value:	0.022762 L/day	Maximum ingestion rate * Average Body weight
	A F summer	0.13				
	A M summer	0.11		Average value	0.01926 L/day	Average ingestion rate * Average Body weight
	A F summer	0.1				
American Robin						
Body Weight (g)	A B	77.3	77.3	Minimum Value	0.0773 kg	
				Maximum Value	0.0862 kg	
	A M nonbreeding	86.2		Overall Study Average	0.0804 kg	
	A F nonbreeding	83.6	84.9			
	A M breeding	77.4				
	A F breeding	80.6	79			
Food Ingestion Rate (g/g-day)	B B free-living	0.89		*For Eating Mostly Fruit*		
				Conservative value:	0.0281 kg/day	Maximum ingestion rate * Average Body weight * 0.23[1]
	- B free-living	1.52		Average value	0.0223 kg/day	Average ingestion rate * Average Body weight * 0.23[1]
						[1] - 0.23 = percent solids in fruit to convert to a dry weight ingestion rate
	Overall Study Average		1.21			
				Based on Metabolic Scaling		
					0.01247 kg/day	Used maximum body weight in below equation
					0.01188 kg/day	Used average body weight in below equation
						Food ingestion rates were calculated from Nagy et al., (1999) for insectivores as follows: $FI = (9.7*BW(g)^{0.705})/18kJ/g/1000$
Water Ingestion Rate (g/g-day)	A B	0.14		Conservative value:	0.012 L/day	Ingestion rate * Maximum Body weight
				Average value	0.011 L/day	Ingestion rate * Average Body weight

Notes:
A = Adult
F = Female, M = Male, B = Both
BW = Body Weight

ATTACHMENT C-2.4

BIOACCUMULATION FACTORS

ATTACHMENT C-2.4
SOIL TO EARTHWORM BAFS FOR PESTICIDES

This attachment presents the literature-derived soil to earthworm bioaccumulation factors (BAF) that were incorporated into the food chain models for several pesticides because values were not available in other sources.

The average BAFs for pesticides were calculated from field studies summarized in various studies. The sources of the BAF are listed in the footnotes in Attachment Table 1. BAFs were calculated by dividing the worm concentration by the soil concentration (if the BAFs were not calculated within the study). The BAFs were either presented on a wet-weight or dry weight basis. Wet weight BAFs were derived by multiplying the dry weight BAF by 0.16, which is the percent solids of soil invertebrates (Sample et. al., 1997), while dry-weight BAFs were derived by dividing the dry weight BAF by 0.16. For this ERA, the dry-weight BAFs were used in the food chain model.

An average BAF was calculated for each pesticide, when data from more than one study were available. The compost studies (from Beyer 1990) were not used in the calculation of the average BAFs because properties of the compost may be different than soil. The average BAF was used for both the conservative and average food chain models.

ATTACHMENT C-2.4

TERRESTRIAL FOOD CHAIN MODEL - BIOACCUMULATION FACTORS
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	Plant Bioaccumulation Factors			Earthworm Bioaccumulation Factors		
	Conservative[1]	Average[1]		Conservative[1]	Average[1]	
PESTICIDES/PCBS						
TOTAL DDT	Regression equation from Eco SSL		[2]	1.12E+01	1.12E+01	[2]
ALPHA-CHLORDANE	1.12E-02	1.12E-02	[3]	1.78E+01	1.78E+01	[4]
DIELDRIN	4.10E-01	4.10E-01	[2]	1.47E+01	1.47E+01	[2]
GAMMA-BHC (LINDANE)	2.68E-01	2.68E-01	[3]	1.01E+01	1.01E+01	[4]
GAMMA-CHLORDANE	9.50E-03	9.50E-03	[3]	1.78E+01	1.78E+01	[4]
HEPTACHLOR	1.12E-02	1.12E-02	[3]	1.00E+01	1.00E+01	[5]
HEPTACHLOR EPOXIDE	4.98E-02	4.98E-02	[3]	3.00E+00	3.00E+00	[5]
Metals						
CYANIDE	1.00E+00	1.00E+00		1.00E+00	1.00E+00	
LEAD	Regression equation from Eco SSL		[2]	Regression equation from Eco SSL		[2]
ZINC	Regression equation from Eco SSL		[2]	Regression equation from Eco SSL		[2]

A default value of 1.0 was assigned to chemicals with unknown BAFs. No footnotes are listed by these values.

1 - Conservative and average refers to the exposure scenarios for which the uptake factors are used.
2 - U.S. EPA (2007). Where "Regression equation from Eco-SSL" is given, tissue concentration will be calculated using regression equations from U.S. EPA (2007), Attachment 4-1, Tables 4a (for inorganics), 4b (for organics).
3 - ORNL Risk Assessment Information System (http://rais.ornl.gov/cgi-bin/tools/TOX_search?select=chem_spef)
4 - Washington State Department of Ecology (2011).
5 - Calculated from literature field studies (see Attachment).

ATTACHMENT C-2.4

EARTHWORM BAFS FOR PESTICIDES

Parameter	Study Values					Calculated Values		Reference	Comments
	Worm Concentration		Soil Conc. (dry weight)	Dry Weight BAF	Wet Weight BAF	Final Dry Weight[1] BAF	Final Wet Weight[2] BAF		
	Dry Weight	Wet Weight							
Heptachlor	NA	NA	NA	10	NA	10	1.60	1	soil type unknown (11-year field study)
Average dry/wet weight BAF from field studies[3]				***NA***	***NA***	***10***	***1.6***		
Heptachlor epoxide	NA	NA	NA	3	NA	3.0	0.48	2	from data collected in 9 agricultural fields

Notes:

BAF - bioaccumulation factor = worm concentration/soil concentration

NA - Not applicable

The percent solids of earthworms is assummed to be 0.16 (Sample et al., 1997)

1 - The calculated dry weight BAF was either obtained directly from the study or was calculated by dividing the wet weight BAF by 0.16

2 - The calculated wet weight BAF was either obtained directly from the study or was calculated by multiplying the dry weight BAF by 0.16

References

1 - Beyer and Gish, 1980 and Beyer and Krynitsky, 1989

2 - Gish, 1970

References

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ATTACHMENT C-2.5

RECEPTOR PROFILES AND
FOOD CHAIN MODEL CALCULATION SHEETS

ATTACHMENT C-2.5

RECEPTOR PROFILES
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

The following sections present the receptor profiles for the short-tailed shrew, American robin, meadow vole, northern bobwhite quail. The majority of the information for the profiles was obtained from the Wildlife Exposure Factors Handbook (USEPA, 1993). The data for the incidental soil ingestion rates were obtained from the Estimates of Soil Ingestion by Wildlife (Beyer, 1994) or the USEPA Ecological Soil Screening Guidance (USEPA, 2007).

The food and water ingestion rates listed in g/g (of body weight)-day on a wet weight basis were converted to dry weight for the ERA. The home ranges are presented in hectares in USEPA (1993) but were converted to acres by multiplying the number of hectares by 2.471. In most cases, the maximum and average ingestion rates were multiplied by the average body weights to convert the ingestion rates from g/g-day to mg/kg-day because if the maximum ingestion rate was multiplied by the minimum body weight, there would be some cases where the ingestion rate for the conservative food chain model would be lower than the ingestion rate for the average food chain model. Also note that the estimated percent of soil in the diets are listed in dry weight. The attached table presents the calculation of the exposure parameters and how the calculations were done.

The receptors were selected because Site 17 which is mostly grass covered with a partially wooded area includes potential habitat for these receptors. Also, potential food sources for the receptors such as plants and invertebrates are likely present at the site. The typical habitats of the receptors are described within each profile.

Short-Tailed Shrew (*Blarina brevicauda*)

Shrews inhabit a wide variety of habitats and are common in areas with abundant vegetative cover. They need cool, moist habitats because of their high metabolic and water-loss rates. The short-tailed shrew is primarily carnivorous, eating insects such as earthworms, slugs, and snails.

The adult body weight for the short-tailed shrew in various habitats ranged from 0.015 to 0.01921 kg with an average of 0.0161 kg. The listed food ingestion rates for shrews are 0.49 and 0.62 g/g-day (wet-weight). The water ingestion rate was listed as 0.223 g/g-day. The food and water ingestion rates in kg/day and L/day, respectively, were calculated as shown in the attached table. The food ingestion rates were then multiplied by 0.16, which is the percent solids of worms (Sample et al., 1997) to convert the ingestion rate from a wet-weight value to a dry-weight value. The incidental soil ingestion rate was calculated by multiplying the ingestion rate

by the percentage of soil that is incidentally ingested (assumed 3 percent for conservative food chain model and 0.9 percent for the average food chain model) from USEPA (2007). 3 percent is the 90th percentile value and 0.9 percent is the 50th percentile value from USEPA (2007). The home range for the shrew (0. 9699 acres) was calculated using data from a tamarek bog in Manitoba (only value available).

American Robin (*Turdus migratorius*)

American robins' habitats include parks, lawns, moist forests, swamps, open woodlands, and orchards. Robins forage on the ground in open areas, along habitat edges, or the edges of streams. They also may forage above ground in shrubs and within the lower branches of trees. In the months preceding and during the breeding season, robins feed primarily on invertebrates and on some fruits. During the rest of the year their diet consists primarily of fruits.

The adult body weight for the American robin in New York woodlands and forests and in Pennsylvania ranged from 0.0773 to 0.0862 kg with an average of 0.0804 kg. The only listed food ingestion rates were for robins in Kansas (1.52 g/g-day) and California (0.89 g/g-day), with an average of 1.205 g/g-day. Studies calculating ingestion rates for the robin included in the USEPA (1993) are based on a diet comprised of berries. Based on these studies, the food and water ingestion rates in kg/day and L/day, respectively, were calculated as shown in the attached table. The food ingestion rates were then multiplied by 0.23, which is the percent solids of fruit (Sample et al., 1997) to convert the ingestion rate from a wet-weight value to a dry-weight value. However, because it is assumed that the robin 100 percent of the robin's diet are worms for the food chain models, the ingestion rate for the robin was calculated using field metabolism scaling as presented on the attached table (Nagy et al., 1999). These are the values that will be used in the food chain model for this site.

The water ingestion rate was estimated as 0.14 g/g-day. The incidental soil ingestion rate was calculated by multiplying the ingestion rate by the percentage of soil that is incidentally ingested (assumed 16.4 percent for the conservative food chain model and 6.4 percent for the average food chain model) from USEPA (2007). The 16.4 percent and 6.4 percent values are based on the American woodcock.

The home range for the robin was calculated using data from Tennessee and a New York dense conifer forest. The values ranged from 0.27 to 1.04 acres with an average home range of 0.6095 acres.

Meadow Vole (*Microtus pennsylvanicus*)

Meadow voles inhabit grassy fields, marshes, and bogs; however, they prefer fields with more grass, more cover, and fewer woody plants. They typically consume green succulent vegetation, sedges, seeds, roots, bark, fungi, insects, and animal matter. However, green succulent vegetation makes up the majority of their diet.

The adult body weight for the vole ranges from 0.017 to 0.0524 kg with an average of 0.0358 kg. The only listed food ingestion rates for voles range from 0.30 to 0.35 g/g-day (wet-weight), with an average of 0.325 g/g-day. The water ingestion rates are 0.14 (estimated) and 0.21 g/g-day, with an average of 0.175 g/g-day. The food and water ingestion rates in kg/day and L/day, respectively, were calculated as shown in the attached table. The food ingestion rates were then multiplied by 0.15, which is the percent solids of vegetation (Sample et al., 1997) to convert the ingestion rate from a wet-weight value to a dry-weight value. The incidental soil ingestion rate was calculated by multiplying the ingestion rate by the percentage of soil that is incidentally ingested (assumed 3.2 percent for conservative food chain model and 1.2 percent for the average food chain model) from USEPA (2007). 3.2 percent is the 90th percentile value and 1.2 percent is the 50th percentile value from USEPA (2007). The home range for the meadow vole ranges from 0.000494 to 0.2051 acres with an average home range of 0.0659 acres.

Northern Bobwhite Quail (*Colinus virginianus*)

Quails inhabit grasslands, idle fields, pastures, and large clumps of grasses. Bobwhite quails forage in areas with open vegetation, some bare ground, and light litter. Seeds from weeds, woody plants, and grasses comprise the majority of an adult's diet, although green vegetation has been found to dominate the diet of this species in winter in the southern areas of the United States.

The adult body weight for the bobwhite quail ranges from 0.154 to 0.1939 kg with an average of 0.1751 kg. The listed food ingestion rates for quails range from 0.067 to 0.093 g/g-day (dry-weight), with an average of 0.078 g/g-day. The water ingestion rate is estimated as 0.10 and 0.11 g/g-day, and measured as 0.10 to 0.13 g/g-day, for an average water ingestion rate of 0.11 g/g-day. The food and water ingestion rates in kg/day and L/day, respectively, were calculated as shown in the attached table. The food ingestion rates were already presented as dry-weight values because bird seed was the food source. The incidental soil ingestion rate was calculated by multiplying the ingestion rate by the percentage of soil that is incidentally ingested (assumed 13.9 percent for conservative food chain model and 6.1 percent for the average food chain model) from USEPA (2007). The 13.9 percent and 6.1 percent values are based on the mourning dove. The home range for the quail ranges from 8.9 to 41.3 acres with an average home range of 18.8 acres.

References:

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ATTACHMENT C-2.5

CHEMICAL CONCENTRATIONS IN SURFACE SOIL AND TISSUE
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	Surface Soil Concentrations (mg/kg)				Earthworm Bioaccumulation Factors		Earthworm Concentrations (mg/kg)		Plant Bioaccumulation Factors		Plant Concentrations (mg/kg)	
	Maximum Detection	95% UCL	Average of Positive Detections	95% UCL or Average (1, 2)	Conservative	Average	Maximum Detection	Average	Conservative	Average	Maximum Detection	Average
PESTICIDES/PCBS												
ALPHA-CHLORDANE	8.40E-01	1.10E-01	1.10E-01	1.10E-01	1.78E+01	1.78E+01	1.50E+01	1.96E+00	1.12E-02	1.12E-02	9.41E-03	1.23E-03
GAMMA-BHC (LINDANE)	1.50E-03	NA	1.50E-03	1.50E-03	1.01E+01	1.01E+01	1.52E-02	1.52E-02	2.68E-01	2.68E-01	4.02E-04	4.02E-04
GAMMA-CHLORDANE	7.60E-01	9.70E-02	1.10E-01	9.70E-02	1.78E+01	1.78E+01	1.35E+01	1.73E+00	9.50E-03	9.50E-03	7.22E-03	9.22E-04
HEPTACHLOR	6.90E-02	9.40E-03	1.70E-02	9.40E-03	1.00E+01	1.00E+01	6.90E-01	9.40E-02	1.12E-02	1.12E-02	7.73E-04	1.05E-04
HEPTACHLOR EPOXIDE	1.30E-01	1.90E-02	4.00E-02	1.90E-02	3.00E+00	3.00E+00	3.90E-01	5.70E-02	4.98E-02	4.98E-02	6.47E-03	9.46E-04
TOTAL DDT	1.50E+00	5.85E-01	2.52E-01	5.85E-01	1.12E+01	1.12E+01	1.68E+01	6.55E+00	Regression equation from Eco SSL		1.10E-01	5.42E-02
METALS												
CYANIDE	3.40E-01	NA	3.40E-01	3.40E-01	1.00E+00	1.00E+00	3.40E-01	3.40E-01	1.00E+00	1.00E+00	3.40E-01	3.40E-01
LEAD	3.75E+01	1.55E+01	1.28E+01	1.55E+01	Regression equation from Eco SSL		1.50E+01	7.34E+00	Regression equation from Eco SSL		2.02E+00	1.23E+00
ZINC	4.77E+01	3.07E+01	2.76E+01	3.07E+01	Regression equation from Eco SSL		3.04E+02	2.63E+02	Regression equation from Eco SSL		4.11E+01	3.22E+01

1 - The average positive detections value was used only if a 95% UCL was not able to be calculated.
2- If Total DDT was nondetected in a sample, the detection limit for 4,4'-DDT was used to calculate the 95% UCL.

ATTACHMENT C-2.5

MEADOW VOLE - TIER 1 INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - SURFACE SOIL
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	Max Soil Conc. (mg/kg)	Vegetation Conc. (mg/kg)	Dose (mg/kg/d) from:		Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients	
			Soil	Veget.				NOAEL	LOAEL
PESTICIDES/PCBS									
ALPHA-CHLORDANE	8.40E-01	9.41E-03	2.97E-03	1.04E-03	4.01E-03	4.58E+00	9.16E+00	8.75E-04	4.38E-04
GAMMA-BHC (LINDANE)	1.50E-03	4.02E-04	5.30E-06	4.44E-05	4.97E-05	8.00E+00	8.00E+01	6.21E-06	6.21E-07
GAMMA-CHLORDANE	7.60E-01	7.22E-03	2.69E-03	7.98E-04	3.48E-03	4.58E+00	9.16E+00	7.61E-04	3.80E-04
HEPTACHLOR	6.90E-02	7.73E-04	2.44E-04	8.54E-05	3.29E-04	1.00E-01	1.00E+00	3.29E-03	3.29E-04
HEPTACHLOR EPOXIDE	1.30E-01	6.47E-03	4.60E-04	7.15E-04	1.17E-03	1.00E-01	1.00E+00	1.17E-02	1.17E-03
TOTAL DDT	1.50E+00	1.10E-01	5.31E-03	1.22E-02	1.75E-02	1.47E-01	5.56E+00	1.19E-01	3.15E-03
METALS									
CYANIDE	3.40E-01	3.40E-01	1.20E-03	3.76E-02	3.88E-02	6.87E+01	6.87E+02	5.64E-04	5.64E-05
LEAD	3.75E+01	2.02E+00	1.33E-01	2.24E-01	3.56E-01	4.70E+00	1.86E+02	7.58E-02	1.91E-03
ZINC	4.77E+01	4.11E+01	1.69E-01	4.54E+00	4.71E+00	7.54E+01	2.98E+02	6.25E-02	1.58E-02

Cells are shaded if the value is greater than 1.0

Body Weight = (BW)	1.70E-02	kg
Food Ingestion Rate = (If)	1.88E-03	kg/day
Soil Ingestion Rate = (Is)	6.01E-05	kg/day
Home Range = (HR)	Assume 100% on site	
Contaminated Area = (CA)	Assume equal to home range	

Dose (soil) = (Cs * Is)(H)/BW
Dose (vegetation) = (Cv * If)(H)/BW
Cv = Contaminant concentration in vegetation
Cs = Contaminant concentration in soil
Total Dose = Dose (soil) + Dose (vegetation)
H=CA/HR (Assume = to 1)

Conc = Concentration
LOAEL = Lowest Observed Adverse Effects Concentration
NOAEL = No Observed Adverse Effects Concentration

ATTACHMENT C-2.5

MEADOW VOLE - TIER 2, STEP 3A INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - SURFACE SOIL
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	95% UCL Soil Conc. (mg/kg)	Vegetation Conc. (mg/kg)	Dose (mg/kg/d) from: Soil	Dose (mg/kg/d) from: Veget.	Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients NOAEL	Hazard Quotients LOAEL
PESTICIDES/PCBS									
ALPHA-CHLORDANE	1.10E-01	1.23E-03	6.43E-05	6.00E-05	1.24E-04	4.58E+00	9.16E+00	2.71E-05	1.36E-05
GAMMA-BHC (LINDANE)	1.50E-03	4.02E-04	8.77E-07	1.96E-05	2.05E-05	8.00E+00	8.00E+01	2.56E-06	2.56E-07
GAMMA-CHLORDANE	9.70E-02	9.22E-04	5.67E-05	4.49E-05	1.02E-04	4.58E+00	9.16E+00	2.22E-05	1.11E-05
HEPTACHLOR	9.40E-03	1.05E-04	5.50E-06	5.13E-06	1.06E-05	1.00E-01	1.00E+00	1.06E-04	1.06E-05
HEPTACHLOR EPOXIDE	1.90E-02	9.46E-04	1.11E-05	4.61E-05	5.72E-05	1.00E-01	1.00E+00	5.72E-04	5.72E-05
TOTAL DDT	5.85E-01	5.42E-02	3.42E-04	2.64E-03	2.98E-03	1.47E-01	5.56E+00	2.03E-02	5.36E-04
METALS									
CYANIDE	3.40E-01	3.40E-01	1.99E-04	1.66E-02	1.68E-02	6.87E+01	6.87E+02	2.44E-04	2.44E-05
LEAD	1.55E+01	1.23E+00	9.06E-03	6.01E-02	6.91E-02	4.70E+00	1.86E+02	1.47E-02	3.71E-04
ZINC	3.07E+01	3.22E+01	1.79E-02	1.57E+00	1.59E+00	7.54E+01	2.98E+02	2.10E-02	5.33E-03

Body Weight = (BW)	3.58E-02	kg
Food Ingestion Rate = (If)	1.74E-03	kg/day
Soil Ingestion Rate = (Is)	2.09E-05	kg/day
Home Range = (HR)	6.59E-02	acres
Contaminated Area = (CA)	Assume equal to home range	

Dose (soil) = (Cs * Is)(H)/BW
Dose (vegetation) = (Cv * If)(H)/BW
Cv = Contaminant concentration in vegetation
Cs = Contaminant concentration in soil
Total Dose = Dose (soil) + Dose (vegetation)
H=CA/HR (Assume = to 1)

Conc = Concentration
LOAEL = Lowest Observed Adverse Effects Concentration
NOAEL = No Observed Adverse Effects Concentration

ATTACHMENT C-2.5

BOBWHITE QUAIL - TIER 1 INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - SURFACE SOIL
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	Max Soil Conc. (mg/kg)	Vegetation Conc. (mg/kg)	Dose (mg/kg/d) from: Soil	Dose (mg/kg/d) from: Veget.	Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients NOAEL	Hazard Quotients LOAEL
PESTICIDES/PCBS									
ALPHA-CHLORDANE	8.40E-01	9.41E-03	1.23E-02	9.95E-04	1.33E-02	2.14E+00	1.07E+01	6.2E-03	1.2E-03
GAMMA-BHC (LINDANE)	1.50E-03	4.02E-04	2.20E-05	4.25E-05	6.45E-05	2.00E+00	2.00E+01	3.2E-05	3.2E-06
GAMMA-CHLORDANE	7.60E-01	7.22E-03	1.12E-02	7.63E-04	1.19E-02	2.14E+00	1.07E+01	5.6E-03	1.1E-03
HEPTACHLOR	6.90E-02	7.73E-04	1.01E-03	8.17E-05	1.10E-03	9.20E-01	9.20E+00	1.2E-03	1.2E-04
HEPTACHLOR EPOXIDE	1.30E-01	6.47E-03	1.91E-03	6.84E-04	2.59E-03	9.20E-01	9.20E+00	2.8E-03	2.8E-04
TOTAL DDT	1.50E+00	1.10E-01	2.21E-02	1.17E-02	3.37E-02	2.27E-01	2.70E+00	1.5E-01	1.2E-02
METALS									
CYANIDE	3.40E-01	3.40E-01	5.00E-03	3.59E-02	4.09E-02	NV	NV	NV	NV
LEAD	3.75E+01	2.02E+00	5.51E-01	2.14E-01	7.65E-01	1.63E+00	4.46E+01	4.7E-01	1.7E-02
ZINC	4.77E+01	4.11E+01	7.01E-01	4.35E+00	5.05E+00	6.61E+01	1.71E+02	7.6E-02	2.9E-02

Cells are shaded if the value is greater than 1.0

Body Weight = (BW)	1.54E-01	kg	Dose (soil) = (Cs * Is)(H)/BW	Conc = Concentration
Food Ingestion Rate = (If)	1.63E-02	kg/day	Dose (vegetation) = (Cv * If)(H)/BW	LOAEL = Lowest Observed Adverse Effects Concentration
Soil Ingestion Rate = (Is)	2.26E-03	kg/day	Cv = Contaminant concentration in vegetation	NOAEL = No Observed Adverse Effects Concentration
Home Range = (HR)	Assume 100% on site		Cs = Contaminant concentration in soil	NV = No value
Contaminated Area = (CA)	Assume equal to home range		Total Dose = Dose (soil) + Dose (vegetation)	
			H=CA/HR (Assume = to 1)	

ATTACHMENT C-2.5

BOBWHITE QUAIL - TIER 2, STEP 3A INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - SURFACE SOIL
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	95% UCL Soil Conc. (mg/kg)	Vegetation Conc. (mg/kg)	Dose (mg/kg/d) from:		Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients	
			Soil	Veget.				NOAEL	LOAEL
PESTICIDES/PCBS									
ALPHA-CHLORDANE	1.10E-01	1.23E-03	5.22E-04	9.58E-05	6.17E-04	2.14E+00	1.07E+01	2.9E-04	5.8E-05
GAMMA-BHC (LINDANE)	1.50E-03	4.02E-04	7.11E-06	3.12E-05	3.84E-05	2.00E+00	2.00E+01	1.9E-05	1.9E-06
GAMMA-CHLORDANE	9.70E-02	9.22E-04	4.60E-04	7.16E-05	5.32E-04	2.14E+00	1.07E+01	2.5E-04	5.0E-05
HEPTACHLOR	9.40E-03	1.05E-04	4.46E-05	8.18E-06	5.28E-05	9.20E-01	9.20E+00	5.7E-05	5.7E-06
HEPTACHLOR EPOXIDE	1.90E-02	9.46E-04	9.01E-05	7.35E-05	1.64E-04	9.20E-01	9.20E+00	1.8E-04	1.8E-05
TOTAL DDT	5.85E-01	5.42E-02	2.77E-03	4.21E-03	6.99E-03	2.27E-01	2.70E+00	3.1E-02	2.6E-03
METALS									
CYANIDE	3.40E-01	3.40E-01	1.61E-03	2.64E-02	2.80E-02	NV	NV	NV	NV
LEAD	1.55E+01	1.23E+00	7.35E-02	9.59E-02	1.69E-01	1.63E+00	4.46E+01	1.0E-01	3.8E-03
ZINC	3.07E+01	3.22E+01	1.46E-01	2.50E+00	2.65E+00	6.61E+01	1.71E+02	4.0E-02	1.5E-02

Body Weight = (BW)	1.75E-01	kg
Food Ingestion Rate = (If)	1.36E-02	kg/day
Soil Ingestion Rate = (Is)	8.30E-04	kg/day
Home Range = (HR)	1.88E+01	acres
Contaminated Area = (CA)	Assume equal to home range	

Dose (soil) = (Cs * Is)(H)/BW
Dose (vegetation) = (Cv * If)(H)/BW
Cv = Contaminant concentration in vegetation
Cs = Contaminant concentration in soil
Total Dose = Dose (soil) + Dose (vegetation)
H=CA/HR (Assume = to 1)

Conc = Concentration
LOAEL = Lowest Observed Adverse Effects Concentration
NOAEL = No Observed Adverse Effects Concentration
NV = No value

ATTACHMENT C-2.5

SHORT-TAILED SHREW - TIER 1 INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - SURFACE SOIL
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	Max Soil Conc. (mg/kg)	Invertebrate Conc. (mg/kg)	Dose (mg/kg/d) from: Soil	Dose (mg/kg/d) from: Invert.	Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients NOAEL	Hazard Quotients LOAEL
PESTICIDES/PCBS									
ALPHA-CHLORDANE	8.40E-01	1.50E+01	2.69E-03	1.60E+00	1.60E+00	4.58E+00	9.16E+00	3.5E-01	1.7E-01
GAMMA-BHC (LINDANE)	1.50E-03	1.52E-02	4.80E-06	1.62E-03	1.62E-03	8.00E+00	8.00E+01	2.0E-04	2.0E-05
GAMMA-CHLORDANE	7.60E-01	1.35E+01	2.43E-03	1.44E+00	1.45E+00	4.58E+00	9.16E+00	3.2E-01	1.6E-01
HEPTACHLOR	6.90E-02	6.90E-01	2.21E-04	7.36E-02	7.38E-02	1.00E-01	1.00E+00	7.4E-01	7.4E-02
HEPTACHLOR EPOXIDE	1.30E-01	3.90E-01	4.16E-04	4.16E-02	4.20E-02	1.00E-01	1.00E+00	4.2E-01	4.2E-02
TOTAL DDT	1.50E+00	1.68E+01	4.81E-03	1.80E+00	1.80E+00	1.47E-01	5.56E+00	1.2E+01	3.2E-01
METALS									
CYANIDE	3.40E-01	3.40E-01	1.09E-03	3.63E-02	3.74E-02	6.87E+01	6.87E+02	5.4E-04	5.4E-05
LEAD	3.75E+01	1.50E+01	1.20E-01	1.60E+00	1.72E+00	4.70E+00	1.86E+02	3.7E-01	9.2E-03
ZINC	4.77E+01	3.04E+02	1.53E-01	3.24E+01	3.26E+01	7.54E+01	2.98E+02	4.3E-01	1.1E-01

Cells are shaded if the value is greater than 1.0

Body Weight = (BW)	1.50E-02	kg
Food Ingestion Rate = (If)	1.60E-03	kg/day
Soil Ingestion Rate = (Is)	4.80E-05	kg/day
Home Range = (HR)	Assume 100% on site	
Contaminated Area = (CA)	Assume equal to home range	

Dose (soil) = (Cs * Is)(H)/BW
Dose (invertebrate) = (Ci * If)(H)/BW
Ci = Contaminant concentration in invertebrate
Cs = Contaminant concentration in soil
Total Dose = Dose (soil) + Dose (vegetation)
H=CA/HR (Assume = to 1)

Conc = Concentration
LOAEL = Lowest Observed Adverse Effects Concentration
NOAEL = No Observed Adverse Effects Concentration

ATTACHMENT C-2.5

SHORT-TAILED SHREW - TIER 2, STEP 3A INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - SURFACE SOIL
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	95% UCL Soil Conc. (mg/kg)	Invertebrate Conc. (mg/kg)	Dose (mg/kg/d) from:		Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients	
			Soil	Invert.				NOAEL	LOAEL
PESTICIDES/PCBS									
ALPHA-CHLORDANE	1.10E-01	1.96E+00	8.81E-05	1.74E-01	1.74E-01	4.58E+00	9.16E+00	3.8E-02	1.9E-02
GAMMA-BHC (LINDANE)	1.50E-03	1.52E-02	1.20E-06	1.35E-03	1.35E-03	8.00E+00	8.00E+01	1.7E-04	1.7E-05
GAMMA-CHLORDANE	9.70E-02	1.73E+00	7.77E-05	1.54E-01	1.54E-01	4.58E+00	9.16E+00	3.4E-02	1.7E-02
HEPTACHLOR	9.40E-03	9.40E-02	7.53E-06	8.36E-03	8.37E-03	1.00E-01	1.00E+00	8.4E-02	8.4E-03
HEPTACHLOR EPOXIDE	1.90E-02	5.70E-02	1.52E-05	5.07E-03	5.09E-03	1.00E-01	1.00E+00	5.1E-02	5.1E-03
TOTAL DDT	5.85E-01	6.55E+00	4.68E-04	5.83E-01	5.83E-01	1.47E-01	5.56E+00	4.0E+00	1.0E-01
METALS									
CYANIDE	3.40E-01	3.40E-01	2.72E-04	3.03E-02	3.05E-02	6.87E+01	6.87E+02	4.4E-04	4.4E-05
LEAD	1.55E+01	7.34E+00	1.24E-02	6.53E-01	6.66E-01	4.70E+00	1.86E+02	1.4E-01	3.6E-03
ZINC	3.07E+01	2.63E+02	2.46E-02	2.34E+01	2.34E+01	7.54E+01	2.98E+02	3.1E-01	7.9E-02

Cells are shaded if the value is greater than 1.0

Body Weight = (BW)	1.61E-02	kg
Food Ingestion Rate = (If)	1.43E-03	kg/day
Soil Ingestion Rate = (Is)	1.29E-05	kg/day
Home Range = (HR)	9.70E-01	acres
Contaminated Area = (CA)	Assume equal to home range	

Dose (soil) = (Cs * Is)(H)/BW
Dose (invertebrate) = (Ci * If)(H)/BW
Ci = Contaminant concentration in invertebrate
Cs = Contaminant concentration in soil
Total Dose = Dose (soil) + Dose (vegetation)
H=CA/HR (Assume = to 1)

Conc = Concentration
LOAEL = Lowest Observed Adverse Effects Concentration
NOAEL = No Observed Adverse Effects Concentration

ATTACHMENT C-2.5

AMERICAN ROBIN - TIER 1 INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - SURFACE SOIL
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	Max Soil Conc. (mg/kg)	Invertebrate Conc. (mg/kg)	Dose (mg/kg/d) from: Soil	Dose (mg/kg/d) from: Invert.	Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients NOAEL	Hazard Quotients LOAEL
PESTICIDES/PCBS									
ALPHA-CHLORDANE	8.40E-01	1.50E+01	2.22E-02	2.41E+00	2.44E+00	2.14E+00	1.07E+01	1.1E+00	2.3E-01
GAMMA-BHC (LINDANE)	1.50E-03	1.52E-02	3.97E-05	2.44E-03	2.48E-03	2.00E+00	2.00E+01	1.2E-03	1.2E-04
GAMMA-CHLORDANE	7.60E-01	1.35E+01	2.01E-02	2.18E+00	2.20E+00	2.14E+00	1.07E+01	1.0E+00	2.1E-01
HEPTACHLOR	6.90E-02	6.90E-01	1.83E-03	1.11E-01	1.13E-01	9.20E-01	9.20E+00	1.2E-01	1.2E-02
HEPTACHLOR EPOXIDE	1.30E-01	3.90E-01	3.44E-03	6.29E-02	6.64E-02	9.20E-01	9.20E+00	7.2E-02	7.2E-03
TOTAL DDT	1.50E+00	1.68E+01	3.98E-02	2.72E+00	2.76E+00	2.27E-01	2.70E+00	1.2E+01	1.0E+00
METALS									
CYANIDE	3.40E-01	3.40E-01	9.00E-03	5.49E-02	6.39E-02	NV	NV	NV	NV
LEAD	3.75E+01	1.50E+01	9.92E-01	2.42E+00	3.41E+00	1.63E+00	4.46E+01	2.1E+00	7.6E-02
ZINC	4.77E+01	3.04E+02	1.26E+00	4.90E+01	5.03E+01	6.61E+01	1.71E+02	7.6E-01	2.9E-01

Cells are shaded if the value is greater than 1.0

Body Weight = (BW)	7.73E-02	kg
Food Ingestion Rate = (If)	1.25E-02	kg/day
Soil Ingestion Rate = (Is)	2.05E-03	kg/day
Home Range = (HR)	Assume 100% on site	
Contaminated Area = (CA)	Assume equal to home range	

Dose (soil) = (Cs * Is)(H)/BW
Dose (invertebrate) = (Ci * If)(H)/BW
Ci = Contaminant concentration in invertebrate
Cs = Contaminant concentration in soil
Total Dose = Dose (soil) + Dose (vegetation)
H=CA/HR (Assume = to 1)

Conc = Concentration
LOAEL = Lowest Observed Adverse Effects Concentration
NOAEL = No Observed Adverse Effects Concentration
NV = No value

ATTACHMENT C-2.5

AMERICAN ROBIN - TIER 2, STEP 3A INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - SURFACE SOIL
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	95% UCL Soil Conc. (mg/kg)	Invertebrate Conc. (mg/kg)	Dose (mg/kg/d) from: Soil	Dose (mg/kg/d) from: Invert.	Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients NOAEL	Hazard Quotients LOAEL
PESTICIDES/PCBS									
ALPHA-CHLORDANE	1.10E-01	1.96E+00	1.04E-03	2.89E-01	2.90E-01	2.14E+00	1.07E+01	1.4E-01	2.7E-02
GAMMA-BHC (LINDANE)	1.50E-03	1.52E-02	1.42E-05	2.24E-03	2.25E-03	2.00E+00	2.00E+01	1.1E-03	1.1E-04
GAMMA-CHLORDANE	9.70E-02	1.73E+00	9.17E-04	2.55E-01	2.56E-01	2.14E+00	1.07E+01	1.2E-01	2.4E-02
HEPTACHLOR	9.40E-03	9.40E-02	8.89E-05	1.39E-02	1.40E-02	9.20E-01	9.20E+00	1.5E-02	1.5E-03
HEPTACHLOR EPOXIDE	1.90E-02	5.70E-02	1.80E-04	8.42E-03	8.60E-03	9.20E-01	9.20E+00	9.3E-03	9.3E-04
TOTAL DDT	5.85E-01	6.55E+00	5.53E-03	9.68E-01	9.73E-01	2.27E-01	2.70E+00	4.3E+00	3.6E-01
METALS									
CYANIDE	3.40E-01	3.40E-01	3.21E-03	5.02E-02	5.34E-02	NV	NV	NV	NV
LEAD	1.55E+01	7.34E+00	1.47E-01	1.08E+00	1.23E+00	1.63E+00	4.46E+01	7.6E-01	2.8E-02
ZINC	3.07E+01	2.63E+02	2.90E-01	3.89E+01	3.91E+01	6.61E+01	1.71E+02	5.9E-01	2.3E-01

Body Weight = (BW)	8.04E-02	kg	Dose (soil) = (Cs * Is)(H)/BW	Conc = Concentration
Food Ingestion Rate = (If)	1.19E-02	kg/day	Dose (invertebrate) = (Ci * If)(H)/BW	LOAEL = Lowest Observed Adverse Effects Concentration
Soil Ingestion Rate = (Is)	7.60E-04	kg/day	Ci = Contaminant concentration in invertebrate	NOAEL = No Observed Adverse Effects Concentration
Home Range = (HR)	6.10E-01	acres	Cs = Contaminant concentration in soil	NV = No value
Contaminated Area = (CA)	Assume equal to home range		Total Dose = Dose (soil) + Dose (vegetation)	
			H=CA/HR (Assume = to 1)	

ATTACHMENT C-2.6

DEEPER SOIL
FOOD CHAIN MODEL CALCULATION SHEETS

ATTACHMENT C-2.6

CHEMICAL CONCENTRATIONS IN SURFACE SOIL AND TISSUE - DEEPER SOIL SAMPLES
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	Surface Soil Concentrations (mg/kg)				Earthworm Bioaccumulation Factors		Earthworm Concentrations (mg/kg)		Plant Bioaccumulation Factors		Plant Concentrations (mg/kg)	
	Maximum Detection	95% UCL	Average of Positive Detections	95% UCL or Average [1, 2]	Conservative	Average	Maximum Detection	Average	Conservative	Average	Maximum Detection	Average
PESTICIDES/PCBS												
ALPHA-CHLORDANE	3.10E+00	6.50E-01	1.87E-01	6.50E-01	1.78E+01	1.78E+01	5.52E+01	1.16E+01	1.12E-02	1.12E-02	3.47E-02	7.28E-03
DIELDRIN	4.30E-02	4.30E-03	1.98E-02	4.30E-03	1.47E+01	1.47E+01	6.32E-01	6.32E-02	4.10E-01	4.10E-01	1.76E-02	1.76E-03
GAMMA-BHC (LINDANE)	9.10E-02	NA	4.63E-02	4.63E-02	1.01E+01	1.01E+01	9.19E-01	4.68E-01	2.68E-01	2.68E-01	2.44E-02	1.24E-02
GAMMA-CHLORDANE	2.70E+00	5.71E-01	1.81E-01	5.71E-01	1.78E+01	1.78E+01	4.81E+01	1.02E+01	9.50E-03	9.50E-03	2.57E-02	5.42E-03
HEPTACHLOR	3.90E-01	2.17E-02	5.27E-02	2.17E-02	1.00E+01	1.00E+01	3.90E+00	2.17E-01	1.12E-02	1.12E-02	4.37E-03	2.43E-04
HEPTACHLOR EPOXIDE	5.30E-01	3.17E-02	8.76E-02	3.17E-02	3.00E+00	3.00E+00	1.59E+00	9.51E-02	4.98E-02	4.98E-02	2.64E-02	1.58E-03
TOTAL DDT	7.80E+00	1.01E+00	4.72E-01	1.01E+00	1.12E+01	1.12E+01	8.74E+01	1.13E+01	Regression equation from Eco SSL		3.80E-01	8.19E-02
METALS												
CYANIDE	6.00E-01	NA	4.70E-01	4.70E-01	1.00E+00	1.00E+00	6.00E-01	4.70E-01	1.00E+00	1.00E+00	6.00E-01	4.70E-01
LEAD	3.75E+01	1.14E+01	9.34E+00	1.14E+01	Regression equation from Eco SSL		1.50E+01	5.73E+00	Regression equation from Eco SSL		2.02E+00	1.04E+00
ZINC	5.45E+01	2.56E+01	2.32E+01	2.56E+01	Regression equation from Eco SSL		3.17E+02	2.48E+02	Regression equation from Eco SSL		4.43E+01	2.91E+01

1 - The average positive detections value was used only if a 95% UCL was not able to be calculated.
2- If Total DDT was nondetected in a sample, the detection limit for 4,4'-DDT was used to calculate the 95% UCL.

ATTACHMENT C-2.6

MEADOW VOLE - TIER 1 INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - DEEPER SOIL SAMPLES
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	Max Soil Conc. (mg/kg)	Vegetation Conc. (mg/kg)	Dose (mg/kg/d) from:		Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients	
			Soil	Veget.				NOAEL	LOAEL
PESTICIDES/PCBS									
ALPHA-CHLORDANE	3.10E+00	3.47E-02	1.10E-02	3.84E-03	1.48E-02	4.58E+00	9.16E+00	3.23E-03	1.62E-03
DIELDRIN	4.30E-02	1.76E-02	1.52E-04	1.95E-03	2.10E-03	1.50E-02	1.27E+00	1.40E-01	1.65E-03
GAMMA-BHC (LINDANE)	9.10E-02	2.44E-02	3.22E-04	2.69E-03	3.02E-03	8.00E+00	8.00E+01	3.77E-04	3.77E-05
GAMMA-CHLORDANE	2.70E+00	2.57E-02	9.54E-03	2.83E-03	1.24E-02	4.58E+00	9.16E+00	2.70E-03	1.35E-03
HEPTACHLOR	3.90E-01	4.37E-03	1.38E-03	4.83E-04	1.86E-03	1.00E-01	1.00E+00	1.86E-02	1.86E-03
HEPTACHLOR EPOXIDE	5.30E-01	2.64E-02	1.87E-03	2.92E-03	4.79E-03	1.00E-01	1.00E+00	4.79E-02	4.79E-03
TOTAL DDT	7.80E+00	3.80E-01	2.76E-02	4.20E-02	6.96E-02	1.47E-01	5.56E+00	4.73E-01	1.25E-02
METALS									
CYANIDE	6.00E-01	6.00E-01	2.12E-03	6.63E-02	6.84E-02	6.87E+01	6.87E+02	9.96E-04	9.96E-05
LEAD	3.75E+01	2.02E+00	1.33E-01	2.24E-01	3.56E-01	4.70E+00	1.86E+02	7.58E-02	1.91E-03
ZINC	5.45E+01	4.43E+01	1.93E-01	4.89E+00	5.08E+00	7.54E+01	2.98E+02	6.74E-02	1.71E-02

Cells are shaded if the value is greater than 1.0

Body Weight = (BW)	1.70E-02	kg
Food Ingestion Rate = (If)	1.88E-03	kg/day
Soil Ingestion Rate = (Is)	6.01E-05	kg/day
Home Range = (HR)	Assume 100% on site	
Contaminated Area = (CA)	Assume equal to home range	

Dose (soil) = (Cs * Is)(H)/BW
Dose (vegetation) = (Cv * If)(H)/BW
Cv = Contaminant concentration in vegetation
Cs = Contaminant concentration in soil
Total Dose = Dose (soil) + Dose (vegetation)
H=CA/HR (Assume = to 1)

Conc = Concentration
LOAEL = Lowest Observed Adverse Effects Concentration
NOAEL = No Observed Adverse Effects Concentration

ATTACHMENT C-2.6

MEADOW VOLE - TIER 2, STEP 3A INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - DEEPER SOIL SAMPLES
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	95% UCL Soil Conc. (mg/kg)	Vegetation Conc. (mg/kg)	Dose (mg/kg/d) from:		Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients	
			Soil	Veget.				NOAEL	LOAEL
PESTICIDES/PCBS									
ALPHA-CHLORDANE	6.50E-01	7.28E-03	3.80E-04	3.55E-04	7.35E-04	4.58E+00	9.16E+00	1.60E-04	8.02E-05
DIELDRIN	4.30E-03	1.76E-03	2.51E-06	8.59E-05	8.84E-05	1.50E-02	1.27E+00	5.89E-03	6.96E-05
GAMMA-BHC (LINDANE)	4.63E-02	1.24E-02	2.71E-05	6.04E-04	6.32E-04	8.00E+00	8.00E+01	7.89E-05	7.89E-06
GAMMA-CHLORDANE	5.71E-01	5.42E-03	3.34E-04	2.64E-04	5.98E-04	4.58E+00	9.16E+00	1.31E-04	6.53E-05
HEPTACHLOR	2.17E-02	2.43E-04	1.27E-05	1.18E-05	2.45E-05	1.00E-01	1.00E+00	2.45E-04	2.45E-05
HEPTACHLOR EPOXIDE	3.17E-02	1.58E-03	1.85E-05	7.69E-05	9.54E-05	1.00E-01	1.00E+00	9.54E-04	9.54E-05
TOTAL DDT	1.01E+00	8.19E-02	5.92E-04	3.99E-03	4.58E-03	1.47E-01	5.56E+00	3.12E-02	8.24E-04
METALS									
CYANIDE	4.70E-01	4.70E-01	2.75E-04	2.29E-02	2.32E-02	6.87E+01	6.87E+02	3.37E-04	3.37E-05
LEAD	1.14E+01	1.04E+00	6.66E-03	5.06E-02	5.72E-02	4.70E+00	1.86E+02	1.22E-02	3.07E-04
ZINC	2.56E+01	2.91E+01	1.50E-02	1.42E+00	1.43E+00	7.54E+01	2.98E+02	1.90E-02	4.82E-03

Body Weight = (BW)	3.58E-02	kg
Food Ingestion Rate = (If)	1.74E-03	kg/day
Soil Ingestion Rate = (Is)	2.09E-05	kg/day
Home Range = (HR)	6.59E-02	acres
Contaminated Area = (CA)	Assume equal to home range	

Dose (soil) = (Cs * Is)(H)/BW
Dose (vegetation) = (Cv * If)(H)/BW
Cv = Contaminant concentration in vegetation
Cs = Contaminant concentration in soil
Total Dose = Dose (soil) + Dose (vegetation)
H=CA/HR (Assume = to 1)

Conc = Concentration
LOAEL = Lowest Observed Adverse Effects Concentration
NOAEL = No Observed Adverse Effects Concentration

ATTACHMENT C-2.6

BOBWHITE QUAIL - TIER 1 INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - DEEPER SOIL SAMPLES
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	Max Soil Conc. (mg/kg)	Vegetation Conc. (mg/kg)	Dose (mg/kg/d) from:		Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients	
			Soil	Veget.				NOAEL	LOAEL
PESTICIDES/PCBS									
ALPHA-CHLORDANE	3.10E+00	3.47E-02	4.56E-02	3.67E-03	4.92E-02	2.14E+00	1.07E+01	2.3E-02	4.6E-03
DIELDRIN	4.30E-02	1.76E-02	6.32E-04	1.86E-03	2.50E-03	7.09E-02	8.00E-01	3.5E-02	3.1E-03
GAMMA-BHC (LINDANE)	9.10E-02	2.44E-02	1.34E-03	2.58E-03	3.92E-03	2.00E+00	2.00E+01	2.0E-03	2.0E-04
GAMMA-CHLORDANE	2.70E+00	2.57E-02	3.97E-02	2.71E-03	4.24E-02	2.14E+00	1.07E+01	2.0E-02	4.0E-03
HEPTACHLOR	3.90E-01	4.37E-03	5.73E-03	4.62E-04	6.19E-03	9.20E-01	9.20E+00	6.7E-03	6.7E-04
HEPTACHLOR EPOXIDE	5.30E-01	2.64E-02	7.79E-03	2.79E-03	1.06E-02	9.20E-01	9.20E+00	1.1E-02	1.1E-03
TOTAL DDT	7.80E+00	3.80E-01	1.15E-01	4.02E-02	1.55E-01	2.27E-01	2.70E+00	6.8E-01	5.7E-02
METALS									
CYANIDE	6.00E-01	6.00E-01	8.82E-03	6.34E-02	7.22E-02	NV	NV	NV	NV
LEAD	3.75E+01	2.02E+00	5.51E-01	2.14E-01	7.65E-01	1.63E+00	4.46E+01	4.7E-01	1.7E-02
ZINC	5.45E+01	4.43E+01	8.01E-01	4.68E+00	5.48E+00	6.61E+01	1.71E+02	8.3E-02	3.2E-02

Cells are shaded if the value is greater than 1.0

Body Weight = (BW)	1.54E-01	kg
Food Ingestion Rate = (If)	1.63E-02	kg/day
Soil Ingestion Rate = (Is)	2.26E-03	kg/day
Home Range = (HR)	Assume 100% on site	
Contaminated Area = (CA)	Assume equal to home range	

Dose (soil) = (Cs * Is)(H)/BW
Dose (vegetation) = (Cv * If)(H)/BW
Cv = Contaminant concentration in vegetation
Cs = Contaminant concentration in soil
Total Dose = Dose (soil) + Dose (vegetation)
H=CA/HR (Assume = to 1)

Conc = Concentration
LOAEL = Lowest Observed Adverse Effects Concentration
NOAEL = No Observed Adverse Effects Concentration
NV = No value

ATTACHMENT C-2.6

BOBWHITE QUAIL - TIER 2, STEP 3A INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - DEEPER SOIL SAMPLES
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	95% UCL Soil Conc. (mg/kg)	Vegetation Conc. (mg/kg)	Dose (mg/kg/d) from:		Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients	
			Soil	Veget.				NOAEL	LOAEL
PESTICIDES/PCBS									
ALPHA-CHLORDANE	6.50E-01	7.28E-03	3.08E-03	5.66E-04	3.65E-03	2.14E+00	1.07E+01	1.7E-03	3.4E-04
DIELDRIN	4.30E-03	1.76E-03	2.04E-05	1.37E-04	1.57E-04	7.09E-02	8.00E-01	2.2E-03	2.0E-04
GAMMA-BHC (LINDANE)	4.63E-02	1.24E-02	2.20E-04	9.64E-04	1.18E-03	2.00E+00	2.00E+01	5.9E-04	5.9E-05
GAMMA-CHLORDANE	5.71E-01	5.42E-03	2.71E-03	4.22E-04	3.13E-03	2.14E+00	1.07E+01	1.5E-03	2.9E-04
HEPTACHLOR	2.17E-02	2.43E-04	1.03E-04	1.89E-05	1.22E-04	9.20E-01	9.20E+00	1.3E-04	1.3E-05
HEPTACHLOR EPOXIDE	3.17E-02	1.58E-03	1.50E-04	1.23E-04	2.73E-04	9.20E-01	9.20E+00	3.0E-04	3.0E-05
TOTAL DDT	1.01E+00	8.19E-02	4.80E-03	6.37E-03	1.12E-02	2.27E-01	2.70E+00	4.9E-02	4.1E-03
METALS									
CYANIDE	4.70E-01	4.70E-01	2.23E-03	3.65E-02	3.88E-02	NV	NV	NV	NV
LEAD	1.14E+01	1.04E+00	5.41E-02	8.07E-02	1.35E-01	1.63E+00	4.46E+01	8.3E-02	3.0E-03
ZINC	2.56E+01	2.91E+01	1.21E-01	2.26E+00	2.38E+00	6.61E+01	1.71E+02	3.6E-02	1.4E-02

Body Weight = (BW)	1.75E-01	kg
Food Ingestion Rate = (If)	1.36E-02	kg/day
Soil Ingestion Rate = (Is)	8.30E-04	kg/day
Home Range = (HR)	1.88E+01	acres
Contaminated Area = (CA)	Assume equal to home range	

Dose (soil) = (Cs * Is)(H)/BW
Dose (vegetation) = (Cv * If)(H)/BW
Cv = Contaminant concentration in vegetation
Cs = Contaminant concentration in soil
Total Dose = Dose (soil) + Dose (vegetation)
H=CA/HR (Assume = to 1)

Conc = Concentration
LOAEL = Lowest Observed Adverse Effects Concentration
NOAEL = No Observed Adverse Effects Concentration
NV = No value

ATTACHMENT C-2.6

SHORT-TAILED SHREW - TIER 1 INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - DEEPER SOIL SAMPLES
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	Max Soil Conc. (mg/kg)	Invertebrate Conc. (mg/kg)	Dose (mg/kg/d) from:		Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients	
			Soil	Invert.				NOAEL	LOAEL
PESTICIDES/PCBS									
ALPHA-CHLORDANE	3.10E+00	5.52E+01	9.92E-03	5.89E+00	5.90E+00	4.58E+00	9.16E+00	1.3E+00	6.4E-01
DIELDRIN	4.30E-02	6.32E-01	1.38E-04	6.74E-02	6.76E-02	1.50E-02	1.27E+00	4.5E+00	5.3E-02
GAMMA-BHC (LINDANE)	9.10E-02	9.19E-01	2.91E-04	9.81E-02	9.83E-02	8.00E+00	8.00E+01	1.2E-02	1.2E-03
GAMMA-CHLORDANE	2.70E+00	4.81E+01	8.64E-03	5.13E+00	5.14E+00	4.58E+00	9.16E+00	1.1E+00	5.6E-01
HEPTACHLOR	3.90E-01	3.90E+00	1.25E-03	4.16E-01	4.17E-01	1.00E-01	1.00E+00	4.2E+00	4.2E-01
HEPTACHLOR EPOXIDE	5.30E-01	1.59E+00	1.70E-03	1.70E-01	1.71E-01	1.00E-01	1.00E+00	1.7E+00	1.7E-01
TOTAL DDT	7.80E+00	8.74E+01	2.50E-02	9.32E+00	9.35E+00	1.47E-01	5.56E+00	6.4E+01	1.7E+00
METALS									
CYANIDE	6.00E-01	6.00E-01	1.92E-03	6.40E-02	6.59E-02	6.87E+01	6.87E+02	9.6E-04	9.6E-05
LEAD	3.75E+01	1.50E+01	1.20E-01	1.60E+00	1.72E+00	4.70E+00	1.86E+02	3.7E-01	9.2E-03
ZINC	5.45E+01	3.17E+02	1.74E-01	3.39E+01	3.40E+01	7.54E+01	2.98E+02	4.5E-01	1.1E-01

Cells are shaded if the value is greater than 1.0

Body Weight = (BW)	1.50E-02	kg
Food Ingestion Rate = (If)	1.60E-03	kg/day
Soil Ingestion Rate = (Is)	4.80E-05	kg/day
Home Range = (HR)	Assume 100% on site	
Contaminated Area = (CA)	Assume equal to home range	

Dose (soil) = (Cs * Is)(H)/BW
Dose (invertebrate) = (Ci * If)(H)/BW
Ci = Contaminant concentration in invertebrate
Cs = Contaminant concentration in soil
Total Dose = Dose (soil) + Dose (vegetation)
H=CA/HR (Assume = to 1)

Conc = Concentration
LOAEL = Lowest Observed Adverse Effects Concentration
NOAEL = No Observed Adverse Effects Concentration

ATTACHMENT C-2.6

SHORT-TAILED SHREW - TIER 2, STEP 3A INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - DEEPER SOIL SAMPLES
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	95% UCL Soil Conc. (mg/kg)	Invertebrate Conc. (mg/kg)	Dose (mg/kg/d) from: Soil	Dose (mg/kg/d) from: Invert.	Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients NOAEL	Hazard Quotients LOAEL
PESTICIDES/PCBS									
ALPHA-CHLORDANE	6.50E-01	1.16E+01	5.21E-04	1.03E+00	1.03E+00	4.58E+00	9.16E+00	2.2E-01	1.1E-01
DIELDRIN	4.30E-03	6.32E-02	3.44E-06	5.62E-03	5.63E-03	1.50E-02	1.27E+00	3.8E-01	4.4E-03
GAMMA-BHC (LINDANE)	4.63E-02	4.68E-01	3.71E-05	4.16E-02	4.16E-02	8.00E+00	8.00E+01	5.2E-03	5.2E-04
GAMMA-CHLORDANE	5.71E-01	1.02E+01	4.57E-04	9.04E-01	9.05E-01	4.58E+00	9.16E+00	2.0E-01	9.9E-02
HEPTACHLOR	2.17E-02	2.17E-01	1.74E-05	1.93E-02	1.93E-02	1.00E-01	1.00E+00	1.9E-01	1.9E-02
HEPTACHLOR EPOXIDE	3.17E-02	9.51E-02	2.54E-05	8.46E-03	8.49E-03	1.00E-01	1.00E+00	8.5E-02	8.5E-03
TOTAL DDT	1.01E+00	1.13E+01	8.11E-04	1.01E+00	1.01E+00	1.47E-01	5.56E+00	6.9E+00	1.8E-01
METALS									
CYANIDE	4.70E-01	4.70E-01	3.76E-04	4.18E-02	4.22E-02	6.87E+01	6.87E+02	6.1E-04	6.1E-05
LEAD	1.14E+01	5.73E+00	9.13E-03	5.10E-01	5.19E-01	4.70E+00	1.86E+02	1.1E-01	2.8E-03
ZINC	2.56E+01	2.48E+02	2.05E-02	2.20E+01	2.21E+01	7.54E+01	2.98E+02	2.9E-01	7.4E-02

Cells are shaded if the value is greater than 1.0

Body Weight = (BW)	1.61E-02	kg
Food Ingestion Rate = (If)	1.43E-03	kg/day
Soil Ingestion Rate = (Is)	1.29E-05	kg/day
Home Range = (HR)	9.70E-01	acres
Contaminated Area = (CA)	Assume equal to home range	

Dose (soil) = (Cs * Is)(H)/BW
Dose (invertebrate) = (Ci * If)(H)/BW
Ci = Contaminant concentration in invertebrate
Cs = Contaminant concentration in soil
Total Dose = Dose (soil) + Dose (vegetation)
H=CA/HR (Assume = to 1)

Conc = Concentration
LOAEL = Lowest Observed Adverse Effects Concentration
NOAEL = No Observed Adverse Effects Concentration

ATTACHMENT C-2.6

AMERICAN ROBIN - TIER 1 INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - DEEPER SOIL SAMPLES
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	Max Soil Conc. (mg/kg)	Invertebrate Conc. (mg/kg)	Dose (mg/kg/d) from: Soil	Dose (mg/kg/d) from: Invert.	Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients NOAEL	Hazard Quotients LOAEL
PESTICIDES/PCBS									
ALPHA-CHLORDANE	3.10E+00	5.52E+01	8.20E-02	8.91E+00	8.99E+00	2.14E+00	1.07E+01	4.2E+00	8.4E-01
DIELDRIN	4.30E-02	6.32E-01	1.14E-03	1.02E-01	1.03E-01	7.09E-02	8.00E-01	1.5E+00	1.3E-01
GAMMA-BHC (LINDANE)	9.10E-02	9.19E-01	2.41E-03	1.48E-01	1.51E-01	2.00E+00	2.00E+01	7.5E-02	7.5E-03
GAMMA-CHLORDANE	2.70E+00	4.81E+01	7.15E-02	7.76E+00	7.83E+00	2.14E+00	1.07E+01	3.7E+00	7.3E-01
HEPTACHLOR	3.90E-01	3.90E+00	1.03E-02	6.29E-01	6.40E-01	9.20E-01	9.20E+00	7.0E-01	7.0E-02
HEPTACHLOR EPOXIDE	5.30E-01	1.59E+00	1.40E-02	2.57E-01	2.71E-01	9.20E-01	9.20E+00	2.9E-01	2.9E-02
TOTAL DDT	7.80E+00	8.74E+01	2.06E-01	1.41E+01	1.43E+01	2.27E-01	2.70E+00	6.3E+01	5.3E+00
METALS									
CYANIDE	6.00E-01	6.00E-01	1.59E-02	9.68E-02	1.13E-01	NV	NV	NV	NV
LEAD	3.75E+01	1.50E+01	9.92E-01	2.42E+00	3.41E+00	1.63E+00	4.46E+01	2.1E+00	7.6E-02
ZINC	5.45E+01	3.17E+02	1.44E+00	5.12E+01	5.27E+01	6.61E+01	1.71E+02	8.0E-01	3.1E-01

Cells are shaded if the value is greater than 1.0

Body Weight = (BW)	7.73E-02	kg
Food Ingestion Rate = (If)	1.25E-02	kg/day
Soil Ingestion Rate = (Is)	2.05E-03	kg/day
Home Range = (HR)	Assume 100% on site	
Contaminated Area = (CA)	Assume equal to home range	

Dose (soil) = (Cs * Is)(H)/BW
Dose (invertebrate) = (Ci * If)(H)/BW
Ci = Contaminant concentration in invertebrate
Cs = Contaminant concentration in soil
Total Dose = Dose (soil) + Dose (vegetation)
H=CA/HR (Assume = to 1)

Conc = Concentration
LOAEL = Lowest Observed Adverse Effects Concentration
NOAEL = No Observed Adverse Effects Concentration
NV = No value

ATTACHMENT C-2.6

AMERICAN ROBIN - TIER 2, STEP 3A INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - DEEPER SOIL SAMPLES
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	95% UCL Soil Conc. (mg/kg)	Invertebrate Conc. (mg/kg)	Dose (mg/kg/d) from: Soil	Dose (mg/kg/d) from: Invert.	Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	Hazard Quotients NOAEL	Hazard Quotients LOAEL
PESTICIDES/PCBS									
ALPHA-CHLORDANE	6.50E-01	1.16E+01	6.15E-03	1.71E+00	1.72E+00	2.14E+00	1.07E+01	8.0E-01	1.6E-01
DIELDRIN	4.30E-03	6.32E-02	4.07E-05	9.34E-03	9.38E-03	7.09E-02	8.00E-01	1.3E-01	1.2E-02
GAMMA-BHC (LINDANE)	4.63E-02	4.68E-01	4.38E-04	6.91E-02	6.95E-02	2.00E+00	2.00E+01	3.5E-02	3.5E-03
GAMMA-CHLORDANE	5.71E-01	1.02E+01	5.40E-03	1.50E+00	1.51E+00	2.14E+00	1.07E+01	7.0E-01	1.4E-01
HEPTACHLOR	2.17E-02	2.17E-01	2.05E-04	3.21E-02	3.23E-02	9.20E-01	9.20E+00	3.5E-02	3.5E-03
HEPTACHLOR EPOXIDE	3.17E-02	9.51E-02	3.00E-04	1.40E-02	1.43E-02	9.20E-01	9.20E+00	1.6E-02	1.6E-03
TOTAL DDT	1.01E+00	1.13E+01	9.58E-03	1.68E+00	1.69E+00	2.27E-01	2.70E+00	7.4E+00	6.2E-01
METALS									
CYANIDE	4.70E-01	4.70E-01	4.44E-03	6.94E-02	7.39E-02	NV	NV	NV	NV
LEAD	1.14E+01	5.73E+00	1.08E-01	8.47E-01	9.54E-01	1.63E+00	4.46E+01	5.9E-01	2.1E-02
ZINC	2.56E+01	2.48E+02	2.42E-01	3.66E+01	3.68E+01	6.61E+01	1.71E+02	5.6E-01	2.1E-01

Body Weight = (BW)	8.04E-02	kg	Dose (soil) = (Cs * Is)(H)/BW	Conc = Concentration
Food Ingestion Rate = (If)	1.19E-02	kg/day	Dose (invertebrate) = (Ci * If)(H)/BW	LOAEL = Lowest Observed Adverse Effects Concentration
Soil Ingestion Rate = (Is)	7.60E-04	kg/day	Ci = Contaminant concentration in invertebrate	NOAEL = No Observed Adverse Effects Concentration
Home Range = (HR)	6.10E-01	acres	Cs = Contaminant concentration in soil	NV = No value
Contaminated Area = (CA)	Assume equal to home range		Total Dose = Dose (soil) + Dose (vegetation)	
			H=CA/HR (Assume = to 1)	

ATTACHMENT C-2.6

TERRESTRIAL FOOD CHAIN MODEL - DEEPER SOIL SAMPLES, TIER 1 SCENARIO
INSECTIVOROUS AND HERBIVOROUS RECEPTORS
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	Herbivorous Receptors EEQs				Insectivorous Receptors EEQs			
	Bobwhite Quail		Meadow Vole		Robin		Short-Tailed Shrew	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
PESTICIDES/PCBS								
ALPHA-CHLORDANE	2.3E-02	4.6E-03	3.2E-03	1.6E-03	4.2E+00	8.4E-01	1.3E+00	6.4E-01
DIELDRIN	3.5E-02	3.1E-03	1.4E-01	1.7E-03	1.5E+00	1.3E-01	4.5E+00	5.3E-02
GAMMA-BHC (LINDANE)	2.0E-03	2.0E-04	3.8E-04	3.8E-05	7.5E-02	7.5E-03	1.2E-02	1.2E-03
GAMMA-CHLORDANE	2.0E-02	4.0E-03	2.7E-03	1.4E-03	3.7E+00	7.3E-01	1.1E+00	5.6E-01
HEPTACHLOR	6.7E-03	6.7E-04	1.9E-02	1.9E-03	7.0E-01	7.0E-02	4.2E+00	4.2E-01
HEPTACHLOR EPOXIDE	1.1E-02	1.1E-03	4.8E-02	4.8E-03	2.9E-01	2.9E-02	1.7E+00	1.7E-01
TOTAL DDT	6.8E-01	5.7E-02	4.7E-01	1.3E-02	6.3E+01	5.3E+00	6.4E+01	1.7E+00
METALS								
CYANIDE	NV	NV	1.0E-03	1.0E-04	NV	NV	9.6E-04	9.6E-05
LEAD	4.7E-01	1.7E-02	7.6E-02	1.9E-03	2.1E+00	7.6E-02	3.7E-01	9.2E-03
ZINC	8.3E-02	3.2E-02	6.7E-02	1.7E-02	8.0E-01	3.1E-01	4.5E-01	1.1E-01

Cells are shaded if the value is greater than 1.0

NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
EEQ - Ecological Effects Quotient
NV - No value determined

ATTACHMENT C-2.6

TERRESTRIAL FOOD CHAIN MODEL - DEEPER SOIL SAMPLES, TIER 2, STEP 3A SCENARIO
INSECTIVOROUS AND HERBIVOROUS RECEPTORS
SITE 17 ECOLOGICAL RISK ASSESSMENT
NAS BRUNSWICK
BRUNSWICK, MAINE

Chemical	Herbivorous Receptors EEQs				Insectivorous Receptors EEQs			
	Bobwhite Quail		Meadow Vole		Robin		Short-Tailed Shrew	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
PESTICIDES/PCBS								
ALPHA-CHLORDANE	1.7E-03	3.4E-04	1.6E-04	8.0E-05	8.0E-01	1.6E-01	2.2E-01	1.1E-01
DIELDRIN	2.2E-03	2.0E-04	5.9E-03	7.0E-05	1.3E-01	1.2E-02	3.8E-01	4.4E-03
GAMMA-CHLORDANE	1.5E-03	2.9E-04	1.3E-04	6.5E-05	7.0E-01	1.4E-01	2.0E-01	9.9E-02
HEPTACHLOR	1.3E-04	1.3E-05	2.5E-04	2.5E-05	3.5E-02	3.5E-03	1.9E-01	1.9E-02
HEPTACHLOR EPOXIDE	3.0E-04	3.0E-05	9.5E-04	9.5E-05	1.6E-02	1.6E-03	8.5E-02	8.5E-03
TOTAL DDT	4.9E-02	4.1E-03	3.1E-02	8.2E-04	7.4E+00	6.2E-01	6.9E+00	1.8E-01
METALS								
LEAD	8.3E-02	3.0E-03	1.2E-02	3.1E-04	5.9E-01	2.1E-02	1.1E-01	2.8E-03

Cells are shaded if the value is greater than 1.0
Only includes chemicals with EEQs greater than 1 in the conservative food chain model.
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
EEQ - Ecological Effects Quotient
NV - No value determined

APPENDIX D

2008 REMEDIAL INVESTIGATION SAMPLE INFORMATION

D.1 2008 RI SOIL SAMPLE ANALYTICAL RESULTS

D.2 2008 RI GROUNDWATER ANALYTICAL RESULTS

D.3 2008 DATA VALIDATION MEMORANDUM

D.1 2008 RI SOIL SAMPLE ANALYTICAL RESULTS

TABLE D.1
2008 RI SOIL ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	SB-17-101		SB-17-101		SB-17-102		SB-17-102		SB-17-103		SB-17-103		SB-17-104		SB-17-104	
SAMPLE ID	SB-17-101-0001		SB-17-101-0104		SB-17-102-0001		SB-17-102-0104		SB-17-103-0001		SB-17-103-0104		SB-17-104-0001		SB-17-104-0104	
TOP DEPTH	0		1		0		1		0		1		0		1	
BOTTOM DEPTH	1		4		1		4		1		4		1		4	
SAMPLE DATE	20081017		20081017		20081017		20081017		20081017		20081017		20081017		20081017	
PESTICIDES/PCBs (UG/KG)																
4,4'-DDD	2.7	JB	1.7	JB	0.55	JB	3.6	U	0.55	JB	10	B	0.58	JB	6.5	B
4,4'-DDE	13		1.3	J	0.7	J	3.6	U	0.88	J	3.6	J	0.8	J	1.7	J
4,4'-DDT	12	B	13	B	2.6	JB	1.7	JB	3.4	JB	53	B	4.2	B	4	B
ALDRIN	1.9	U	1.8	U	1.8	U	1.9	U	1.8	U	1.9	U	1.9	U	1.9	U
ALPHA-BHC	1.9	U	1.8	U	1.8	U	1.9	U	1.8	U	1.9	U	1.9	U	1.9	U
ALPHA-CHLORDANE	1.9	U	1.8	U	1.8	U	1.9	U	1.8	U	1.9	U	1.9	U	1.9	U
BETA-BHC	1.9	U	1.8	U	1.8	U	1.9	U	1.8	U	1.9	U	1.9	U	1.9	U
DELTA-BHC	1.9	U	1.8	U	1.8	U	1.9	U	1.8	U	1.9	U	1.9	U	1.9	U
DIELDRIN	3.8	U	3.5	U	3.5	U	3.6	U	3.5	U	3.7	U	3.6	U	3.7	U
ENDOSULFAN I	1.9	U	1.8	U	1.8	U	1.9	U	1.8	U	1.9	U	1.9	U	1.9	U
ENDOSULFAN II	3.8	U	3.5	U	3.5	U	3.6	U	3.5	U	3.7	U	3.6	U	3.7	U
ENDOSULFAN SULFATE	3.8	U	3.5	U	3.5	U	3.6	U	3.5	U	3.7	U	3.6	U	3.7	U
ENDRIN	3.8	U	3.5	U	3.5	U	3.6	U	3.5	U	3.7	U	3.6	U	3.7	U
ENDRIN ALDEHYDE	3.8	U	3.5	U	3.5	U	3.6	U	3.5	U	3.7	U	3.6	U	3.7	U
ENDRIN KETONE	3.8	U	3.5	U	3.5	U	3.6	U	3.5	U	3.7	U	3.6	U	3.7	U
GAMMA-BHC (LINDANE)	1.9	U	1.8	U	1.8	U	1.9	U	1.8	U	1.9	U	1.9	U	1.9	U
GAMMA-CHLORDANE	1.9	U	1.8	U	1.8	U	1.9	U	1.8	U	1.9	U	1.9	U	1.9	U
HEPTACHLOR	1.9	U	1.8	U	1.8	U	1.9	U	1.8	U	1.9	U	1.9	U	1.9	U
HEPTACHLOR EPOXIDE	1.9	U	1.8	U	1.8	U	1.9	U	1.8	U	1.9	U	1.9	U	1.9	U
METHOXYCHLOR	19	U	18	U	18	U	19	U	18	U	19	U	19	U	19	U
PYRETHRINS	900	U	840	U	850	U	890	U	850	U	900	U	870	U	910	U
RESMETHRIN	450	U	420	U	420	U	450	U	420	U	450	U	430	U	460	U
TOXAPHENE	38	U	35	U	35	U	36	U	35	U	37	U	36	U	37	U
PETROLEUM HYDROCARBONS (MG/KG)																
DIESEL RANGE ORGANICS																
ORGANOPHOSPHOROUS PESTICIDES (UG/KG)																
4-AMINOPYRIDINE	56	U	53	U	53	U	56	U	53	U	56	U	54	U	57	U
DIAZINON	56	U	53	U	53	U	56	U	53	U	56	U	54	U	57	U
MALATHION	56	U	53	U	53	U	56	U	53	U	56	U	54	U	57	U
SIMAZINE	56	U	53	U	53	U	56	U	53	U	56	U	54	U	57	U
HERBICIDES (UG/KG)																
2,4,5-T	38	U	35	U	35	U	36	U	35	U	37	U	36	U	37	U
2,4-D	38	U	35	U	35	U	36	U	35	U	37	U	36	U	37	U
CARBARYL	22	U	21	U	21	U	22	U	21	U	23	U	22	U	23	U
DIURON	22	U	21	U	21	U	22	U	21	U	23	U	22	U	23	U
MALEIC HYDRAZIDE	22	U	21	U	21	U	22	U	21	U	23	U	22	U	23	U

TABLE D.1
2008 RI SOIL ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	**SB-17-101**		**SB-17-101**		**SB-17-102**		**SB-17-102**		**SB-17-103**		**SB-17-103**		**SB-17-104**		**SB-17-104**	
SAMPLE ID	**SB-17-101-0001**		**SB-17-101-0104**		**SB-17-102-0001**		**SB-17-102-0104**		**SB-17-103-0001**		**SB-17-103-0104**		**SB-17-104-0001**		**SB-17-104-0104**	
TOP DEPTH	**0**		**1**		**0**		**1**		**0**		**1**		**0**		**1**	
BOTTOM DEPTH	**1**		**4**		**1**		**4**		**1**		**4**		**1**		**4**	
SAMPLE DATE	**20081017**		**20081017**		**20081017**		**20081017**		**20081017**		**20081017**		**20081017**		**20081017**	
MONURON	22	U	21	U	21	U	22	U	21	U	23	U	22	U	23	U
PROPOXUR	22	U	21	U	21	U	22	U	21	U	23	U	22	U	23	U
ROTENONE	22	U	21	U	21	U	22	U	21	U	23	U	22	U	23	U
INORGANICS (MG/KG)																
ALUMINUM	8430		4500		6540		5130		7300		5680		8120		5990	
ANTIMONY	0.64	U	0.54	U	0.66	U	0.51	U	0.67	U	0.04	B	0.65	U	0.77	U
ARSENIC	**2**		**1.3**		**10.7**		**4.6**		**18.2**		**6.1**		**9.4**		**8.1**	
BARIUM	11.2		8.6		20.4		14.3		23		16.3		24.6		17.4	
BERYLLIUM	0.4	B	0.31	B	0.29	B	0.27	B	0.32	B	0.29		0.35	B	0.3	B
CADMIUM	0.8	U	0.68	U	0.83	U	0.64	U	0.02	B	0.02	B	0.01	B	0.96	U
CALCIUM	570		464		2270		1380		2290		1630		2220		1980	
CHROMIUM	7.5		5.7		13		9.4		13.3		9.7		14.8		11.9	
COBALT	1.6	B	2.6		3.9		2.7		4.2		3.2		4		3.4	
COPPER	4.3		3.7		8.4		5.9		8.7		6.6		9.3		7.7	
CYANIDE	0.55	U	0.5	U	0.5	U	0.55	U	0.55	U	0.55	U	0.55	U	0.55	U
IRON	7520		5480		7960		7500		8660		7340		9420		8110	
LEAD	8.1		2.5		10		2.4		11.1		5.1		11		3.4	
MAGNESIUM	700		1040		2010		1770		2010		1680		2180		1840	
MANGANESE	81.7		86.4		132		102		159		112		159		126	
MERCURY	0.04		0.028	U	0.02	B	0.03	U	0.02	B	0.033	U	0.01	B	0.01	B
NICKEL	4.3		5.2		11.4		7.6		11.4		8.7		12.3		10.1	
POTASSIUM	316		449		1440		1190		1430		1120		1490		1250	
SELENIUM	0.8	U	0.68	U	0.83	U	0.64	U	0.84	U	0.57	U	0.81	U	0.96	U
SILVER	0.07	B	0.06	B	0.11	B	0.1	B	0.11	B	0.1	B	0.18	B	0.09	B
SODIUM	61.9	B	46.3	B	229		121		229		153		210		189	
THALLIUM	1.2	U	1	U	1.2	U	0.96	U	1.3	U	0.85	U	1.2	U	1.4	U
VANADIUM	15.2		9.3		14.2		13		15.2		12.9		16.5		13.3	
ZINC	11.7		10.3		21.9		16.6		25.8		17.8		26.7		17.9	
MISCELLANEOUS PARAMETERS																
PERCENT MOISTURE (%)	11		5.2		5.6		10.6		5.5		11.4		7.7		12.4	
TOTAL ORGANIC CARBON (MG/KG)																
TOTAL ORGANIC CARBON (UG/KG)																
TOTAL SOLIDS (%)	87		95		94		91		94		90		91		88	

B - Laboratory blank contamination
U - Not detected
UJ - Estimated non-detected result
J - Estimated result

TABLE D.1
2008 RI SOIL ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	SB-17-105		SB-17-105		SB-17-105		SB-17-106		SB-17-106		SB-17-107		SB-17-107		SB-17-107	
SAMPLE ID	SB-17-105-0001		SB-17-DUP07		SB-17-105-0104		SB-17-106-0001		SB-17-106-0104		SB-17-107-0001		SB-17-107-0104		SB-17-107-0408	
TOP DEPTH	0		0		1		0		1		0		1		4	
BOTTOM DEPTH	1		1		4		1		4		1		4		8	
SAMPLE DATE	20081020		20081020		20081020		20081017		20081017		20081020		20081020		20081020	
PESTICIDES/PCBs (UG/KG)																
4,4'-DDD	3.7	U	0.58	J	3.4	U	10		2.6	J	1.2	J	0.84	J	4.2	U
4,4'-DDE	17	B	14	B	1.1	JB	8.3		3.5	U	2.1	JB	2.6	JB	1.6	JB
4,4'-DDT	28	B	28	B	1.2	JB	210	B	24	B	19	B	5	B	1.6	JB
ALDRIN	1.9	U	1.9	U	1.8	U	1.8	U	1.8	U	2.1	U	2	U	2.1	U
ALPHA-BHC	1.9	U	1.9	U	1.8	U	1.8	U	1.8	U	2.1	U	2	U	2.1	U
ALPHA-CHLORDANE	1.9	U	1.9	U	1.8	U	1.8	U	1.8	U	1.1	J	2	U	2.1	U
BETA-BHC	1.9	U	1.9	U	1.8	U	1.8	U	1.8	U	2.1	U	2	U	2.1	U
DELTA-BHC	1.9	U	1.9	U	1.8	U	1.8	U	1.8	U	2.1	U	2	U	2.1	U
DIELDRIN	3.7	U	3.6	U	3.4	U	3.6	U	3.5	U	4.1	U	4	U	4.2	U
ENDOSULFAN I	1.9	U	1.9	U	1.8	U	1.8	U	1.8	U	2.1	U	2	U	2.1	U
ENDOSULFAN II	3.7	U	3.6	U	3.4	U	3.6	U	3.5	U	4.1	U	4	U	4.2	U
ENDOSULFAN SULFATE	3.7	U	3.6	U	3.4	U	3.6	U	3.5	U	4.1	U	4	U	4.2	U
ENDRIN	3.7	U	3.6	U	3.4	U	3.6	U	3.5	U	4.1	U	4	U	4.2	U
ENDRIN ALDEHYDE	3.7	U	3.6	U	3.4	U	3.6	U	3.5	U	4.1	U	4	U	4.2	U
ENDRIN KETONE	3.7	U	3.6	U	3.4	U	3.6	U	3.5	U	4.1	U	4	U	4.2	U
GAMMA-BHC (LINDANE)	1.9	U	1.9	U	1.8	U	1.8	U	1.8	U	2.1	U	2	U	2.1	U
GAMMA-CHLORDANE	1.9	U	1.9	U	1.8	U	1.8	U	1.8	U	1	J	2	U	2.1	U
HEPTACHLOR	1.9	U	1.9	U	1.8	U	1.8	U	1.8	U	2.1	U	2	U	2.1	U
HEPTACHLOR EPOXIDE	1.9	U	1.9	U	1.8	U	1.8	U	1.8	U	2.1	U	2	U	2.1	U
METHOXYCHLOR	19	U	19	U	18	U	18	U	18	U	21	U	20	U	21	U
PYRETHRINS	890	U	920	U	1100	U	880	U	850	U	880	U	1100	U	1000	U
RESMETHRIN	440	U	460	U	550	U	440	U	420	U	440	U	550	U	510	U
TOXAPHENE	37	U	36	U	34	U	36	U	35	U	41	U	40	U	42	U
PETROLEUM HYDROCARBONS (MG																
DIESEL RANGE ORGANICS																
ORGANOPHOSPHOROUS PESTICIDE																
4-AMINOPYRIDINE	56	U	57	U	69	U	55	U	53	U	55	U	69	U	64	U
DIAZINON	56	U	57	U	69	U	55	U	53	U	55	U	69	U	64	U
MALATHION	56	U	57	U	69	U	55	U	53	U	55	U	69	U	64	U
SIMAZINE	56	U	57	U	69	U	55	U	53	U	55	U	69	U	64	U
HERBICIDES (UG/KG)																
2,4,5-T	37	U	36	U	34	U	36	U	35	U	41	U	40	U	42	U
2,4-D	37	U	36	U	34	U	36	U	35	U	41	U	40	U	42	U
CARBARYL	22	U	23	U	28	U	22	U	21	U	22	U	28	U	26	U
DIURON	22	U	23	U	28	U	22	U	21	U	22	U	28	U	26	U
MALEIC HYDRAZIDE	22	U	23	U	28	U	22	U	21	U	22	U	28	U	26	U

TABLE D.1
2008 RI SOIL ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	**SB-17-105**		**SB-17-105**		**SB-17-105**		**SB-17-106**		**SB-17-106**		**SB-17-107**		**SB-17-107**		**SB-17-107**	
SAMPLE ID	**SB-17-105-0001**		**SB-17-DUP07**		**SB-17-105-0104**		**SB-17-106-0001**		**SB-17-106-0104**		**SB-17-107-0001**		**SB-17-107-0104**		**SB-17-107-0408**	
TOP DEPTH	**0**		**0**		**1**		**0**		**1**		**0**		**1**		**4**	
BOTTOM DEPTH	**1**		**1**		**4**		**1**		**4**		**1**		**4**		**8**	
SAMPLE DATE	**20081020**		**20081020**		**20081020**		**20081017**		**20081017**		**20081020**		**20081020**		**20081020**	
MONURON	22	U	23	U	28	U	22	U	21	U	22	U	28	U	26	U
PROPOXUR	22	U	23	U	28	U	22	U	21	U	22	U	28	U	26	U
ROTENONE	22	U	23	U	28	U	22	U	21	U	22	U	28	U	26	U
INORGANICS (MG/KG)																
ALUMINUM	5460		5900		5960		6780		6440		6730		6400		4130	
ANTIMONY	0.65	U	0.62	U	0.65	U	0.74	U	0.64	U	0.51	U	0.62	U	0.58	U
ARSENIC	**1.4**		**1.6**		**1.5**		**2.4**		**1.7**		**7.8**		**6.8**		**1.5**	
BARIUM	10.4		8.7		9.4		16		10.7		21.4		18.4		9.2	
BERYLLIUM	0.2	B	0.22	B	0.32	B	0.35	B	0.4		0.26	B	0.27	B	0.21	B
CADMIUM	0.04	B	0.77	U	0.82	U	0.01	B	0.8	U	0.64	U	0.77	U	0.72	U
CALCIUM	311		356		358		542		376		2020		1740		717	
CHROMIUM	4.6		5		6.4		8.8		6.9		12.5		12.3		6.5	
COBALT	1.2	B	1.2	B	2.9		2.6	B	2.7		3.2		3.4		1.5	B
COPPER	3.3		3.5		4.3		6		4.3		7.8		7.4		3.8	
CYANIDE	0.55	U	0.55	U	0.5	U	0.5	U	0.55	U	0.6	U	0.6	U	0.6	U
IRON	4600		5160		6070		7970		6540		7770		7820		4410	
LEAD	11.4		7.8		3		23.2		7.5		9		5.6		2.5	
MAGNESIUM	459		557		1280		1430		1040		1990		2100		1220	
MANGANESE	38.5		49.1		132		96.6		65.9		135		97.8		56.6	
MERCURY	0.02	B	0.02	B	0.034	U	0.02	B	0.02	B	0.037	U	0.036	U	0.04	U
NICKEL	3.2	B	3.2		6		6.7		5.8		10.5		10.2		5	
POTASSIUM	183		232		473		586		374		1300		1400		586	
SELENIUM	0.57	B	0.44	B	0.33	B	0.92	U	0.8	U	0.64	U	0.77	U	0.72	U
SILVER	1.2	U	1.2	U	1.2	U	0.09	B	0.07	B	0.96	U	1.2	U	1.1	U
SODIUM	36.3	B	41.7	B	41.2	B	51.3	B	45.3	B	220		187		40.3	B
THALLIUM	0.24	B	0.14	B	0.15	B	1.4	U	1.2	U	0.16	B	0.18	B	0.16	B
VANADIUM	9.4		10.3		10.3		14.8		11.2		14.1		16		11.7	
ZINC	13.2		10.9		11.9		21.8		10.6		25		18.4		11.9	
MISCELLANEOUS PARAMETERS																
PERCENT MOISTURE (%)	10		12.8		27.6		8.6		5.7		8.7		27.9		22	
TOTAL ORGANIC CARBON (MG/KG)																
TOTAL ORGANIC CARBON (UG/KG)																
TOTAL SOLIDS (%)	89		90		95		92		94		80		84		79	

B - Laboratory blank contamination
U - Not detected
UJ - Estimated non-detected result
J - Estimated result

TABLE D.1
2008 RI SOIL ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	SB-17-108		SB-17-108		SB-17-109		SB-17-109		SB-17-110		SB-17-111		SB-17-112		SB-17-112	
SAMPLE ID	SB-17-108-0001		SB-17-108-0104		SB-17-109-0001		SB-17-109-0104		SB-17-110-0104		SB-17-111-0104		SB-17-112-0001		SB-17-112-0104	
TOP DEPTH	0		1		0		1		1		1		0		1	
BOTTOM DEPTH	1		4		1		4		4		4		1		4	
SAMPLE DATE	20081020		20081020		20081016		20081016		20081016		20081020		20081020		20081020	
PESTICIDES/PCBs (UG/KG)																
4,4'-DDD	0.58	J	4.3	U	11		0.8	J	220		2.2	J	100	B	520	B
4,4'-DDE	12	B	3.3	JB	9.3		3.4	U	56	J	12	B	46	B	80	
4,4'-DDT	8.2	B	5	B	180	B	2.8	JB	1000	B	28	B	50	JB	**7200**	**B**
ALDRIN	2	U	2.2	U	1.8	U	1.8	U	18	U	1.9	U	2	U	20	U
ALPHA-BHC	2	U	2.2	U	1.8	U	1.8	U	18	U	1.9	U	2	U	20	U
ALPHA-CHLORDANE	2	U	2.2	U	1.8	U	1.8	U	18	U	1.9	U	7		20	U
BETA-BHC	2	U	2.2	U	1.8	U	1.8	U	18	U	1.9	U	2	U	20	U
DELTA-BHC	2	U	2.2	U	1.8	U	1.8	U	18	U	1.9	U	2	U	20	U
DIELDRIN	3.8	U	4.3	U	3.6	U	3.4	U	36	U	3.6	U	4	U	40	U
ENDOSULFAN I	2	U	2.2	U	1.8	U	1.8	U	18	U	1.9	U	2	U	20	U
ENDOSULFAN II	3.8	U	4.3	U	3.6	U	3.4	U	36	U	3.6	U	4	U	40	U
ENDOSULFAN SULFATE	3.8	U	4.3	U	3.6	U	3.4	U	36	U	3.6	U	4	U	40	U
ENDRIN	3.8	U	4.3	U	3.6	U	3.4	U	36	U	3.6	U	4	U	40	U
ENDRIN ALDEHYDE	3.8	U	4.3	U	3.6	U	3.4	U	36	U	3.6	U	4	U	40	U
ENDRIN KETONE	3.8	U	4.3	U	3.6	U	3.4	U	36	U	3.6	U	4	U	40	U
GAMMA-BHC (LINDANE)	2	U	2.2	U	1.8	U	1.8	U	18	U	1.9	U	2	U	20	U
GAMMA-CHLORDANE	2	U	2.2	U	1.8	U	1.8	U	18	U	1.9	U	7.7		20	U
HEPTACHLOR	2	U	2.2	U	1.8	U	1.8	U	18	U	1.9	U	2	U	20	U
HEPTACHLOR EPOXIDE	2	U	2.2	U	1.8	U	1.8	U	18	U	1.9	U	2	U	20	U
METHOXYCHLOR	20	U	22	U	18	U	18	U	180	U	19	U	20	U	200	U
PYRETHRINS	1100	U	960	U	880	U	840	U	860	U	880	U	970	U	960	U
RESMETHRIN	540	U	480	U	440	U	420	U	430	U	440	U	490	U	480	U
TOXAPHENE	38	U	43	U	36	U	34	U	360	U	36	U	40	U	400	U
PETROLEUM HYDROCARBONS (MG/																
DIESEL RANGE ORGANICS											14					
ORGANOPHOSPHOROUS PESTICIDE																
4-AMINOPYRIDINE	68	U	60	U	55	U	53	U	54	U	55	U	61	U	60	U
DIAZINON	68	U	60	U	55	U	53	U	54	U	55	U	61	U	60	U
MALATHION	68	U	60	U	55	U	53	U	54	U	55	U	61	U	60	U
SIMAZINE	68	U	60	U	55	U	53	U	54	U	55	U	61	U	60	U
HERBICIDES (UG/KG)																
2,4,5-T	38	U	43	U	36	U	34	U	36	U	36	U	40	U	40	U
2,4-D	38	U	43	U	36	U	34	U	36	U	36	U	40	U	40	U
CARBARYL	27	U	24	U	22	U	21	U	22	U	22	U	24	U	24	U
DIURON	27	U	24	U	22	U	21	U	22	U	22	U	24	U	24	U
MALEIC HYDRAZIDE	27	U	24	U	22	U	21	U	22	U	22	U	24	U	24	U

TABLE D.1
2008 RI SOIL ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	SB-17-108		SB-17-108		SB-17-109		SB-17-109		SB-17-110		SB-17-111		SB-17-112		SB-17-112	
SAMPLE ID	SB-17-108-0001		SB-17-108-0104		SB-17-109-0001		SB-17-109-0104		SB-17-110-0104		SB-17-111-0104		SB-17-112-0001		SB-17-112-0104	
TOP DEPTH	0		1		0		1		1		1		0		1	
BOTTOM DEPTH	1		4		1		4		4		4		1		4	
SAMPLE DATE	20081020		20081020		20081016		20081016		20081016		20081020		20081020		20081020	
MONURON	27	U	24	U	22	U	21	U	22	U	22	U	24	U	24	U
PROPOXUR	27	U	24	U	22	U	21	U	22	U	22	U	24	U	24	U
ROTENONE	27	U	24	U	22	U	21	U	22	U	22	U	24	U	24	U
INORGANICS (MG/KG)																
ALUMINUM	8080		6980		6840		4620		7650		8410		8970		5930	
ANTIMONY	0.64	U	0.68	U	0.78	U	0.55	U	0.74	U	0.62	U	0.76	U	0.68	U
ARSENIC	**5.2**		**3.1**		**1.8**		**1.4**		**2.2**		**3.4**		**9.4**		**2.2**	
BARIUM	22.1		19.4		11.2		8.5		10.4		22.7		26.8		18.6	
BERYLLIUM	0.32	B	0.32	B	0.28	B	0.28	B	0.37	B	0.37	B	0.34	B	0.28	B
CADMIUM	0.8	U	0.85	U	0.04	B	0.68	U	0.92	U	0.77	U	0.95	U	0.84	U
CALCIUM	1110		1020		502		366		561		823		1830		870	
CHROMIUM	12.4		10.1		6.7		5.3		8		11.8		17.2		9.1	
COBALT	3.5		3.6		1.4	B	2.7		2.8	B	4.2		4.1		3.2	
COPPER	7.3		7		4.7		4.3		3.9		7.8		10.1		6.5	
CYANIDE	0.55	U	0.65	U	0.55	U	0.5	U	0.55	U	0.55	U	0.6	U	0.6	U
IRON	9000		8880		6100		5300		7200		10600		10100		8160	
LEAD	6.2		6.2		14.2		2.6		3.7		7.7		4.7		3.6	
MAGNESIUM	2110		2220		663		1100		1070		2390		2590		2180	
MANGANESE	135		145		59.3		90.4		70.6		212		142		104	
MERCURY	0.02	B	0.041	U	0.03	B	0.033	U	0.02	B	0.035	U	0.038	U	0.04	U
NICKEL	9.8		8.2		4		5.9		5.9		9.6		14.1		7.1	
POTASSIUM	1180		1150		274		462		533		1220		1600		1280	
SELENIUM	0.8	U	0.85	U	0.98	U	0.68	U	0.92	U	0.34	B	0.95	U	0.84	U
SILVER	1.2	U	1.3	U	0.07	B	0.06	B	1.4	U	1.2	U	1.4	U	1.3	U
SODIUM	110		80.6	B	54.3	B	40.2	B	52.5	B	65.4	B	203		59.8	B
THALLIUM	0.19	B	0.17	B	1.5	U	1	U	1.4	U	0.17	B	0.21	B	0.09	B
VANADIUM	16.7		16.1		12.7		8.8		12.6		18.5		20.1		15	
ZINC	23		19.9		17.6		11.2		11.7		23.7		24.6		18.9	
MISCELLANEOUS PARAMETERS																
PERCENT MOISTURE (%)	26.1		16.4		9.2		4.9		7.3		9.6		17.6		16.9	
TOTAL ORGANIC CARBON (MG/KG)											14	B				
TOTAL ORGANIC CARBON (UG/KG)																
TOTAL SOLIDS (%)	86		77		92		96		92		91		83		83	

B - Laboratory blank contamination
U - Not detected
UJ - Estimated non-detected result
J - Estimated result

TABLE D.1
2008 RI SOIL ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	SB-17-113		SB-17-113		SB-17-114		SB-17-114		SB-17-115		SB-17-116		SB-17-117		SB-17-118	
SAMPLE ID	SB-17-113-0001		SB-17-113-0104		SB-17-114-0001		SB-17-114-0104		SB-17-115-0710		SB-17-116-0407		SB-17-117-0104		SB-17-118-0001	
TOP DEPTH	0		1		0		1		7		4		1		0	
BOTTOM DEPTH	1		4		1		4		10		7		4		1	
SAMPLE DATE	20081020		20081020		20081016		20081016		20081016		20081016		20081017		20081020	
PESTICIDES/PCBs (UG/KG)																
4,4'-DDD	8.7	B	84	B	17		2.5	J	4	U	2.4	J	60	B	7.6	B
4,4'-DDE	15		84		22		0.51	J	4	U	19		160		52	
4,4'-DDT	45	B	580	B	380	B	16	B	1.5	JB	96	B	1100	B	210	B
ALDRIN	1.9	U	2.1	U	1.8	U	1.8	U	2.1	U	2.2	U	10	U	1.8	U
ALPHA-BHC	1.9	U	2.1	U	1.8	U	1.8	U	2.1	U	2.2	U	10	U	1.8	U
ALPHA-CHLORDANE	1.9	U	14	J	1.8	U	1.8	U	2.1	U	2.2	U	67		1.8	U
BETA-BHC	1.9	U	2.1	U	1.8	U	1.8	U	2.1	U	2.2	U	10	U	1.8	U
DELTA-BHC	1.9	U	2.1	U	1.8	U	1.8	U	2.1	U	2.2	U	10	U	1.8	U
DIELDRIN	3.6	U	4.1	U	3.6	U	3.5	U	4	U	4.2	U	20	U	3.5	U
ENDOSULFAN I	1.9	U	2.1	U	1.8	U	1.8	U	2.1	U	2.2	U	10	U	1.8	U
ENDOSULFAN II	3.6	U	4.1	U	3.6	U	3.5	U	4	U	4.2	U	20	U	3.5	U
ENDOSULFAN SULFATE	3.6	U	4.1	U	3.6	U	3.5	U	4	U	4.2	U	20	U	3.5	U
ENDRIN	3.6	U	4.1	U	3.6	U	3.5	U	4	U	4.2	U	20	U	3.5	U
ENDRIN ALDEHYDE	3.6	U	4.1	U	3.6	U	3.5	U	4	U	4.2	U	20	U	3.5	U
ENDRIN KETONE	3.6	U	4.1	U	3.6	U	3.5	U	4	U	4.2	U	20	U	3.5	U
GAMMA-BHC (LINDANE)	1.9	U	2.1	U	1.8	U	1.8	U	2.1	U	2.2	U	10	U	1.8	U
GAMMA-CHLORDANE	1.9	U	14		1.8	U	1.8	U	2.1	U	2.2	U	70		1.8	U
HEPTACHLOR	0.52	JB	2.1	U	1.8	U	1.8	U	2.1	U	2.2	U	10	U	1.8	U
HEPTACHLOR EPOXIDE	1.9	U	2.1	U	1.8	U	1.8	U	2.1	U	2.2	U	11	J	1.8	U
METHOXYCHLOR	19	U	21	U	18	U	18	U	21	U	22	U	100	U	18	U
PYRETHRINS	1100	U	930	U	880	U	840	U	980	U	1000	U	980	U	870	U
RESMETHRIN	540	U	460	U	440	U	420	U	490	U	520	U	490	U	430	U
TOXAPHENE	36	U	41	U	36	U	35	U	40	U	42	U	200	U	35	U
PETROLEUM HYDROCARBONS (MG/																
DIESEL RANGE ORGANICS									1.3	J						
ORGANOPHOSPHOROUS PESTICIDE																
4-AMINOPYRIDINE	68	U	58	U	55	U	53	U	61	U	65	U	61	U	54	U
DIAZINON	68	U	58	U	55	U	53	U	61	U	65	U	61	U	54	U
MALATHION	68	U	58	U	55	U	53	U	61	U	65	U	61	U	54	U
SIMAZINE	68	U	58	U	55	U	53	U	61	U	65	U	61	U	54	U
HERBICIDES (UG/KG)																
2,4,5-T	36	U	41	U	36	U	35	U	40	U	42	U	40	U	35	U
2,4-D	36	U	41	U	36	U	35	U	40	U	42	U	40	U	35	U
CARBARYL	27	U	23	U	110	U	21	U	25	U	26	U	24	U	22	U
DIURON	27	U	23	U	110	U	21	U	25	U	26	U	24	U	22	U
MALEIC HYDRAZIDE	27	U	23	U	22	U	21	U	25	U	26	U	24	U	22	U

TABLE D.1
2008 RI SOIL ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	**SB-17-113**		**SB-17-113**		**SB-17-114**		**SB-17-114**		**SB-17-115**		**SB-17-116**		**SB-17-117**		**SB-17-118**	
SAMPLE ID	**SB-17-113-0001**		**SB-17-113-0104**		**SB-17-114-0001**		**SB-17-114-0104**		**SB-17-115-0710**		**SB-17-116-0407**		**SB-17-117-0104**		**SB-17-118-0001**	
TOP DEPTH	**0**		**1**		**0**		**1**		**7**		**4**		**1**		**0**	
BOTTOM DEPTH	**1**		**4**		**1**		**4**		**10**		**7**		**4**		**1**	
SAMPLE DATE	**20081020**		**20081020**		**20081016**		**20081016**		**20081016**		**20081016**		**20081017**		**20081020**	
MONURON	27	U	23	U	110	U	21	U	25	U	26	U	24	U	22	U
PROPOXUR	27	U	23	U	110	U	21	U	25	U	100		24	U	22	U
ROTENONE	27	U	23	U	110	U	21	U	25	U	26	U	24	U	22	U
INORGANICS (MG/KG)																
ALUMINUM	7780		7040		4990		6100		3520		7580		6200		7660	
ANTIMONY	0.63	U	0.76	U	0.63	U	0.6	U	0.55	U	0.05	B	0.86	U	0.56	U
ARSENIC	**8.3**		**4.1**		**1.8**		**1.8**		**1.1**		**1.5**		**3**		**6.8**	
BARIUM	24		18.5		10.6		9.2		8.3		10.5		16.9		25.5	
BERYLLIUM	0.34	B	0.34	B	0.23	B	0.35	B	0.19	B	0.4	B	0.34	B	0.32	B
CADMIUM	0.79	U	0.06	B	0.06	B	0.75	U	0.69	U	0.83	U	0.04	B	0.69	U
CALCIUM	2470		1170		512		378		678		758		924		2490	
CHROMIUM	16.3		11.1		5.6		6.6		5.6		9		10.4		15.7	
COBALT	5.2		2.6	B	1.2	B	2.9		1.8	B	2.3	B	3.6		5	
COPPER	12.8		9.6		5.8		4.2		4.6		5.2		7.8		12.1	
CYANIDE	0.55	U	0.6	U	0.55	U	0.5	U	0.6	U	0.6	U	0.6	U	0.5	U
IRON	10200		6930		4910		6170		5210		5250		8440		8870	
LEAD	12.4		32.3		17.8		3.4		2		4.2		7.4		9.1	
MAGNESIUM	2660		1660		691		1240		1300		1560		2020		2400	
MANGANESE	144		96.4		57.8		125		67.6		90.6		138		168	
MERCURY	0.03	B	0.02	B	0.02	B	0.029	U	0.036	U	0.039	U	0.01	B	0.05	
NICKEL	15		8.7		3.8		6.3		4.9		5.8		8.2		14.5	
POTASSIUM	1620		760		340		458		652		658		1160		1500	
SELENIUM	0.79	U	0.96	U	0.78	U	0.75	U	0.69	U	0.83	U	1.1	U	0.69	U
SILVER	1.2	U	1.4	U	0.06	B	1.1	U	1	U	0.08	B	0.14	B	1	U
SODIUM	239		112		50.7	B	44.7	B	44.2	B	59.4	B	92.3	B	302	
THALLIUM	0.29	B	0.24	B	1.2	U	1.1	U	1	U	1.2	U	1.6	U	1	U
VANADIUM	18.6		17.1		11		10		9.1		10.6		15.1		16.8	
ZINC	29		21		17.6		13.4		12.4		17		23.6		25.1	
MISCELLANEOUS PARAMETERS																
PERCENT MOISTURE (%)	26.6		13.9		9.1		5.2		18.4		22.5		18.3		8	
TOTAL ORGANIC CARBON (MG/KG)																
TOTAL ORGANIC CARBON (UG/KG)									400	J						
TOTAL SOLIDS (%)	90		80		92		95		82		78		83		94	

B - Laboratory blank contamination
U - Not detected
UJ - Estimated non-detected result
J - Estimated result

TABLE D.1
2008 RI SOIL ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	SB-17-118		SB-17-119		SB-17-120		SB-17-120		SB-17-121		SB-17-121		SB-17-121		SB-17-122	
SAMPLE ID	SB-17-118-0104		SB-17-119-0104		SB-17-120-0205		SB-17-DUP05		SB-17-121-0205		SB-17-121-0710		SB-17-121-1215		SB-17-122-0407	
TOP DEPTH	1		1		2		2		2		7		12		4	
BOTTOM DEPTH	4		4		5		5		5		10		15		7	
SAMPLE DATE	20081020		20081016		20081016		20081016		20081016		20081016		20081016		20081017	
PESTICIDES/PCBs (UG/KG)																
4,4'-DDD	0.72	J	1.5	J	25		54		**54000**		32		15		5.2	
4,4'-DDE	10	B	2.7	J	18		33		**25000**		15		4.4		5	U
4,4'-DDT	22	B	9.7	B	910	B	**2200**	**B**	**1500000**	**B**	830	B	230	B	65	B
ALDRIN	2	U	1.9	U	2.2	U	2.3	U	1100	U	2.1	U	2.1	U	2.6	U
ALPHA-BHC	2	U	1.9	U	2.2	U	2.3	U	1100	U	2.1	U	2.1	U	2.6	U
ALPHA-CHLORDANE	1.3	J	1.2	J	19		21		1100	U	2.1	U	1.2	J	2.6	U
BETA-BHC	2	U	1.9	U	2.2	U	2.3	U	1100	U	2.1	U	2.1	U	2.6	U
DELTA-BHC	2	U	1.9	U	2.2	U	2.3	U	1100	U	2.1	U	2.1	U	2.6	U
DIELDRIN	3.8	U	3.6	U	4.3	U	4.5	U	2200	U	4.1	U	4.2	U	5	U
ENDOSULFAN I	2	U	1.9	U	2.2	U	2.3	U	1100	U	2.1	U	2.1	U	2.6	U
ENDOSULFAN II	3.8	U	3.6	U	4.3	U	4.5	U	2200	U	4.1	U	4.2	U	5	U
ENDOSULFAN SULFATE	3.8	U	3.6	U	4.3	U	4.5	U	2200	U	4.1	U	4.2	U	5	U
ENDRIN	3.8	U	3.6	U	4.3	U	4.5	U	2200	U	4.1	U	4.2	U	5	U
ENDRIN ALDEHYDE	3.8	U	3.6	U	4.3	U	4.5	U	2200	U	4.1	U	4.2	U	5	U
ENDRIN KETONE	3.8	U	3.6	U	4.3	U	4.5	U	2200	U	4.1	U	4.2	U	5	U
GAMMA-BHC (LINDANE)	2	U	1.9	U	2.2	U	2.3	U	1100	U	2.1	U	2.1	U	2.6	U
GAMMA-CHLORDANE	1.1	J	1.2	J	19		21		1100	U	2.1	U	1.1	J	2.6	U
HEPTACHLOR	2	U	1.9	U	1.7	J	2.3	U	1100	U	2.1	U	2.1	U	2.6	U
HEPTACHLOR EPOXIDE	2	U	1.9	U	2.2	U	2.3	U	1100	U	2.1	U	2.1	U	2.6	U
METHOXYCHLOR	20	U	19	U	22	U	23	U	11000	U	21	U	21	U	26	U
PYRETHRINS	930	U	920	U	1100	U	1100	U	110000	U	1100	U	1000	U	1500	U
RESMETHRIN	470	U	460	U	530	U	530	U	57000	U	530	U	500	U	730	U
TOXAPHENE	38	U	36	U	43	U	45	U	22000	U	41	U	42	U	50	U
PETROLEUM HYDROCARBONS (MG/																
DIESEL RANGE ORGANICS									**1700**		6.2	U	13		**200**	
ORGANOPHOSPHOROUS PESTICIDE																
4-AMINOPYRIDINE	58	U	57	U	66	U	66	U	71	U	66	U	62	U	91	U
DIAZINON	58	U	57	U	66	U	66	U	71	U	66	U	62	U	91	U
MALATHION	58	U	57	U	66	U	66	U	31	J	66	U	62	U	91	U
SIMAZINE	58	U	57	U	66	U	66	U	71	U	66	U	62	U	91	U
HERBICIDES (UG/KG)																
2,4,5-T	38	U	36	U	43	U	45	U	44	U	41	U	42	U	50	U
2,4-D	38	U	36	U	43	U	45	U	44	U	41	U	42	U	50	U
CARBARYL	23	U	23	U	27	U	26	U	28	U	27	U	25	U	36	U
DIURON	23	U	23	U	27	U	26	U	28	U	27	U	25	U	36	U
MALEIC HYDRAZIDE	23	U	23	U	27	U	26	U	24	J	27	U	12	J	36	U

TABLE D.1
2008 RI SOIL ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	SB-17-118		SB-17-119		SB-17-120		SB-17-120		SB-17-121		SB-17-121		SB-17-121		SB-17-122	
SAMPLE ID	SB-17-118-0104		SB-17-119-0104		SB-17-120-0205		SB-17-DUP05		SB-17-121-0205		SB-17-121-0710		SB-17-121-1215		SB-17-122-0407	
TOP DEPTH	1		1		2		2		2		7		12		4	
BOTTOM DEPTH	4		4		5		5		5		10		15		7	
SAMPLE DATE	20081020		20081016		20081016		20081016		20081016		20081016		20081016		20081017	
MONURON	23	U	23	U	27	U	26	U	28	U	27	U	25	U	36	U
PROPOXUR	23	U	23	U	370		470		140		27	U	25	U	36	U
ROTENONE	23	U	23	U	27	U	26	U	28	U	27	U	25	U	36	U
INORGANICS (MG/KG)																
ALUMINUM	6030		3650		8280		8290		7180		3830		9720		5360	
ANTIMONY	0.55	U	0.62	U	0.61	U	0.57	U	0.66	U	0.64	U	0.57	U	0.84	U
ARSENIC	**3.2**		**1.4**		**2.2**		**1.8**		**1.6**		**1.1**		**5.2**		**1.5**	
BARIUM	14.4		10.4		14.1		14.1		10.6		10.1		37.4		12.8	
BERYLLIUM	0.29	B	0.27	B	0.3	B	0.29	B	0.43		0.26	B	0.53		0.64	
CADMIUM	0.69	U	0.78	U	0.02	B	0.07	B	0.04	B	0.8	U	0.04	B	1	U
CALCIUM	837		844		588		593		793		918		2170		1220	
CHROMIUM	9.1		6.2		7.8		7.4		6.9		6.3		19.6		8.3	
COBALT	3.3		2.7		1.5	B	1.4	B	1.7	B	3.4		7		2.3	B
COPPER	6.5		5.2		3.5		3.5		3.5		5		14		6	
CYANIDE	0.6	U	0.55	U	0.65	U	0.65	U	0.7	U	0.6	U	0.65	U	0.7	U
IRON	7380		6040		7140		6010		6270		7940		12000		5340	
LEAD	6.1		2.4		5.7		5.6		5.9		2.3		4.9		3	
MAGNESIUM	1740		1420		888		786		991		1300		3880		1460	
MANGANESE	128		136		50.2		46.4		68.7		156		203		80.6	
MERCURY	0.038	U	0.035	U	0.03	B	0.04	B	0.044	U	0.03	U	0.036	U	0.044	U
NICKEL	8.6		5.9		4.4		4.3		4.4		5.4		15.1		6.5	
POTASSIUM	810		752		393		322		358		706		2710		706	
SELENIUM	0.69	U	0.78	U	0.33	B	0.42	B	0.82	U	0.8	U	0.71	U	1	U
SILVER	1	U	0.05	B	1.1	U	1.1	U	1.2	U	0.08	B	0.06	B	1.6	U
SODIUM	71.6		49.2	B	50.8	B	48.2	B	40.1	B	56.8	B	190		64.7	B
THALLIUM	0.1	B	1.2	U	1.1	U	1.1	U	1.2	U	1.2	U	1.1	U	1.6	U
VANADIUM	13		10.4		12.5		12		11.4		9.9		27.6		12.6	
ZINC	18		54.5		25.8		31.7		35.5		14.2		33.9		15.2	
MISCELLANEOUS PARAMETERS																
PERCENT MOISTURE (%)	14.2		12.9		24.6		23.9		29.8		24.7		19.9		45	
TOTAL ORGANIC CARBON (MG/KG)																
TOTAL ORGANIC CARBON (UG/KG)					28000		24000									
TOTAL SOLIDS (%)	86		91		76		73		75		81		79		66	

B - Laboratory blank contamination
U - Not detected
UJ - Estimated non-detected result
J - Estimated result

TABLE D.1
2008 RI SOIL ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	SB-17-122		SB-17-123		SB-17-123		SB-17-124		SB-17-124		SB-17-125		SB-17-125		SB-17-125	
SAMPLE ID	SB-17-DUP06		SB-17-123-0001		SB-17-123-0104		SB-17-124-0001		SB-17-124-0104		SB-17-125-0001		SB-17-125-0104		SB-17-125-0608	
TOP DEPTH	4		0		1		0		1		0		1		6	
BOTTOM DEPTH	7		1		4		1		4		1		4		8	
SAMPLE DATE	20081017		20081015		20081015		20081016		20081016		20081015		20081015		20081015	
PESTICIDES/PCBs (UG/KG)																
4,4'-DDD	4.7	U	3.7	U	64	J	3.8	U	2.9	J	53		39		3.6	JB
4,4'-DDE	4.7	U	3.7	U	72	J	3.8	U	8.3		250		67		3.7	U
4,4'-DDT	4.8	B	1.5	J	530		2.7	J	72		1200		390		52	B
ALDRIN	2.4	U	1.9	U	90	U	2	U	2	U	9.6	U	2	U	1.9	U
ALPHA-BHC	2.4	U	1.9	U	90	U	2	U	2	U	9.6	U	2	U	1.9	U
ALPHA-CHLORDANE	2.4	U	0.8	J	200	J	2	U	2	U	100		32	J	1.9	U
BETA-BHC	2.4	U	1.9	U	90	U	2	U	2	U	9.6	U	2	U	1.9	U
DELTA-BHC	2.4	U	1.9	U	90	U	2	U	2	U	9.6	U	2	U	1.9	U
DIELDRIN	4.7	U	3.7	U	170	U	3.8	U	3.9	U	19	U	4	U	3.7	U
ENDOSULFAN I	2.4	U	1.9	U	90	U	2	U	2	U	9.6	U	2	U	1.9	U
ENDOSULFAN II	4.7	U	3.7	U	170	U	3.8	U	3.9	U	19	U	4	U	3.7	U
ENDOSULFAN SULFATE	4.7	U	3.7	U	170	U	3.8	U	3.9	U	19	U	4	U	3.7	U
ENDRIN	4.7	U	3.7	U	170	U	3.8	U	3.9	U	19	U	4	U	3.7	U
ENDRIN ALDEHYDE	4.7	U	3.7	U	170	U	3.8	U	3.9	U	19	U	4	U	3.7	U
ENDRIN KETONE	4.7	U	3.7	U	170	U	3.8	U	3.9	U	19	U	4	U	3.7	U
GAMMA-BHC (LINDANE)	2.4	U	1.9	U	90	U	2	U	91		9.6	U	2	U	1.9	U
GAMMA-CHLORDANE	2.4	U	1	J	250		2	U	2	U	130		2	U	1.9	U
HEPTACHLOR	2.4	U	1.9	U	25	J	2	U	2	U	9.6	U	2	U	1.9	U
HEPTACHLOR EPOXIDE	2.4	U	1.9	U	90	U	2	U	2	U	9.6	U	2	U	1.9	U
METHOXYCHLOR	24	U	19	U	900	U	20	U	20	U	96	U	20	U	19	U
PYRETHRINS	1100	U	960	U	950	U	1000	U	930	U			920	U	980	U
RESMETHRIN	540	U	480	U	470	U	500	U	470	U			460	U	490	U
TOXAPHENE	47	U	37	U	1700	U	38	U	39	U	190	U	40	U	37	U
PETROLEUM HYDROCARBONS (MG/																
DIESEL RANGE ORGANICS	**120**															
ORGANOPHOSPHOROUS PESTICIDE																
4-AMINOPYRIDINE	68	U	60	U	59	U	62	U	58	U	56	U	58	U	61	U
DIAZINON	68	U	60	U	59	U	62	U	58	U	56	U	58	U	61	U
MALATHION	68	U	60	U	59	U	62	U	58	U	56	U	58	U	61	U
SIMAZINE	68	U	60	U	59	U	62	U	58	U	56	U	58	U	61	U
HERBICIDES (UG/KG)																
2,4,5-T	47	U	37	U	35	U	38	U	39	U	37	U	40	U	37	U
2,4-D	47	U	37	U	35	U	38	U	39	U	37	U	40	U	37	U
CARBARYL	27	U	24	U	24	U	25	U	23	U	22	U	23	U	25	U
DIURON	27	U	24	U	24	U	25	U	23	U	22	U	23	U	25	U
MALEIC HYDRAZIDE	27	U	24	U	24	U	25	U	23	U	22	U	23	U	25	U

TABLE D.1
2008 RI SOIL ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	SB-17-122		SB-17-123		SB-17-123		SB-17-124		SB-17-124		SB-17-125		SB-17-125		SB-17-125	
SAMPLE ID	SB-17-DUP06		SB-17-123-0001		SB-17-123-0104		SB-17-124-0001		SB-17-124-0104		SB-17-125-0001		SB-17-125-0104		SB-17-125-0608	
TOP DEPTH	4		0		1		0		1		0		1		6	
BOTTOM DEPTH	7		1		4		1		4		1		4		8	
SAMPLE DATE	20081017		20081015		20081015		20081016		20081016		20081015		20081015		20081015	
MONURON	27	U	24	U	24	U	25	U	23	U	22	U	23	U	25	U
PROPOXUR	27	U	24	U	24	U	25	U	23	U	22	U	23	U	25	U
ROTENONE	27	U	24	U	24	U	25	U	23	U	22	U	23	U	25	U
INORGANICS (MG/KG)																
ALUMINUM	5140		12200		3180		12500		6700		10300		5920		3690	
ANTIMONY	0.72	U	0.7	UJ	0.43	UJ	0.1	B	0.68	U	0.06	J	0.06	J	0.76	UJ
ARSENIC	**1.3**		**9.1**	**J**	**1.4**	**J**	**8.6**		**4.2**		**5.6**	**J**	**2.7**	**J**	0.89	UJ
BARIUM	10.6		34		7.5		36.7		14.4		192		15.8		10.1	
BERYLLIUM	0.59		0.5		0.24	J	0.54		0.37	B	0.49		0.27	J	0.37	J
CADMIUM	0.02	B	0.88	U	0.54	U	0.01	B	0.85	U	0.06	UJ	0.11	UJ	0.95	U
CALCIUM	933		1800		520		1750		1080		3080		842		822	
CHROMIUM	7.8		20.6	J	4.9	J	22.5		10.4		21	J	8.2	J	6.5	J
COBALT	2.2	B	4.7		2.5		5.1		3		4.2		2.7		2.1	J
COPPER	6		9.4		3.9		10.6		6.2		14.3		7.3		4.3	
CYANIDE	0.7	U	0.5	U	0.5	U	0.55	U	0.55	U	0.34	J	0.55	U	0.5	U
IRON	4780		12000		5170		12300		6970		9940		6940		4170	
LEAD	2.9		5.7		1.8		6		4.4		23		7		1.9	
MAGNESIUM	1330		2770		1100		2850		1670		2720		1400		1400	
MANGANESE	73.1		220		104		210		100		155		129		71.9	
MERCURY	0.04	U	0.02	J	0.031	U	0.01	B	0.036	U	0.033	U	0.036	U	0.031	U
NICKEL	5.8		14.8		4.4		15.9		8.6		14.6		7.3		5.7	
POTASSIUM	642		1680		456		1820		1010		1600		643		781	
SELENIUM	0.89	U	0.88	U	0.54	U	0.92	U	0.85	U	0.58	U	0.34	UJ	0.95	U
SILVER	1.3	U	0.23	J	0.81	U	0.24	B	1.3	U	0.08	J	0.96	U	1.4	U
SODIUM	59.9	B	183		34.5	J	229		129		395		96		63.8	J
THALLIUM	1.3	U	1.3	U	0.81	U	1.4	U	1.3	U	0.88	U	0.96	U	1.4	U
VANADIUM	12.2		23.4		8.3		25.4		13		23.4		12.7		9.2	
ZINC	14.5		32.7		10		36.4		16.6		40.8		24.2		13.6	
MISCELLANEOUS PARAMETERS																
PERCENT MOISTURE (%)	26.6		17		15.5		19.6		14.3		10		13.4		18.5	
TOTAL ORGANIC CARBON (MG/KG)																
TOTAL ORGANIC CARBON (UG/KG)																
TOTAL SOLIDS (%)	71		89		95		86		85		89		83		89	

B - Laboratory blank contamination
U - Not detected
UJ - Estimated non-detected result
J - Estimated result

TABLE D.1
2008 RI SOIL ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	SB-17-126		SB-17-126		SB-17-127		SB-17-128		SB-17-129		SB-17-129		SB-17-130		SB-17-130	
SAMPLE ID	SB-17-126-0001		SB-17-126-0104		SB-17-127-0306		SB-17-128-0506		SB-17-129-0306		SB-17-DUP04		SB-17-130-0001		SB-17-130-0104	
TOP DEPTH	0		1		3		5		3		3		0		1	
BOTTOM DEPTH	1		4		6		6		6		6		1		4	
SAMPLE DATE	20081015		20081015		20081015		20081015		20081015		20081015		20081015		20081015	
PESTICIDES/PCBs (UG/KG)																
4,4'-DDD	3.5	U	3.6	U	3.9	U	4.5	U	5.3	U	5.5	U	3.6	U	3.6	U
4,4'-DDE	19		3.6	U	3.9	U	4.5	U	5.3	U	5.5	U	4.6		3.6	U
4,4'-DDT	110		4.8		1.6	J	4.5	U	3	J	4.8	J	26		2.5	J
ALDRIN	1.8	U	1.9	U	2	U	2.3	U	2.7	U	2.8	U	1.8	U	1.9	U
ALPHA-BHC	1.8	U	1.9	U	2	U	2.3	U	2.7	U	2.8	U	1.8	U	1.9	U
ALPHA-CHLORDANE	13	J	1.9	U	3.5		2.3	U	2.7	U	2.8	U	0.99	J	1.9	U
BETA-BHC	1.8	U	1.9	U	2	U	2.3	U	2.7	U	2.8	U	1.8	U	1.9	U
DELTA-BHC	1.8	U	1.9	U	2	U	2.3	U	2.7	U	2.8	U	1.8	U	1.9	U
DIELDRIN	3.5	U	3.6	U	3.9	U	4.5	U	5.3	U	5.5	U	3.6	U	3.6	U
ENDOSULFAN I	1.8	U	1.9	U	2	U	2.3	U	2.7	U	2.8	U	1.8	U	1.9	U
ENDOSULFAN II	3.5	U	3.6	U	3.9	U	4.5	U	5.3	U	5.5	U	3.6	U	3.6	U
ENDOSULFAN SULFATE	3.5	U	3.6	U	3.9	U	4.5	U	5.3	U	5.5	U	3.6	U	3.6	U
ENDRIN	3.5	U	3.6	U	3.9	U	4.5	U	5.3	U	5.5	U	3.6	U	3.6	U
ENDRIN ALDEHYDE	3.5	U	3.6	U	3.9	U	4.5	U	5.3	U	5.5	U	3.6	U	3.6	U
ENDRIN KETONE	3.5	U	3.6	U	3.9	U	4.5	U	5.3	U	5.5	U	3.6	U	3.6	U
GAMMA-BHC (LINDANE)	1.8	U	1.9	U	2	U	2.3	U	2.7	U	2.8	U	1.8	U	1.9	U
GAMMA-CHLORDANE	17	J	1.9	U	3.8	J	1.1	J	2.7	U	2.8	U	1.8	U	1.9	U
HEPTACHLOR	1.8	U	1.9	U	2	U	2.3	U	2.7	U	2.8	U	1.8	U	1.9	U
HEPTACHLOR EPOXIDE	1.8	U	1.9	U	2	U	2.3	U	2.7	U	2.8	U	1.8	U	1.9	U
METHOXYCHLOR	18	U	19	U	20	U	23	U	27	U	28	U	18	U	19	U
PYRETHRINS	850	U	880	U	950	U	1000	U	1000	U	1700	U	850	U	880	U
RESMETHRIN	420	U	440	U	480	U	510	U	510	U	850	U	430	U	440	U
TOXAPHENE	35	U	36	U	39	U	45	U	53	U	55	U	36	U	36	U
PETROLEUM HYDROCARBONS (MG/																
DIESEL RANGE ORGANICS																
ORGANOPHOSPHOROUS PESTICIDE																
4-AMINOPYRIDINE	53	U	55	U	59	U	63	U	63	U	110	U	53	U	55	U
DIAZINON	53	U	55	U	59	U	63	U	63	U	110	U	53	U	55	U
MALATHION	53	U	55	U	59	U	63	U	63	U	110	U	53	U	55	U
SIMAZINE	53	U	55	U	59	U	63	U	63	U	110	U	53	U	55	U
HERBICIDES (UG/KG)																
2,4,5-T	35	U	36	U	39	U	45	U	53	U	55	U	36	U	36	U
2,4-D	35	U	36	U	39	U	45	U	53	U	55	U	36	U	36	U
CARBARYL	21	U	22	U	24	U	25	U	130	U	210	U	21	U	22	U
DIURON	21	U	22	U	24	U	25	U	130	U	210	U	21	U	22	U
MALEIC HYDRAZIDE	21	U	22	U	24	U	25	U	25	U	42	U	21	U	22	U

TABLE D.1
2008 RI SOIL ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	**SB-17-126**		**SB-17-126**		**SB-17-127**		**SB-17-128**		**SB-17-129**		**SB-17-129**		**SB-17-130**		**SB-17-130**	
SAMPLE ID	**SB-17-126-0001**		**SB-17-126-0104**		**SB-17-127-0306**		**SB-17-128-0506**		**SB-17-129-0306**		**SB-17-DUP04**		**SB-17-130-0001**		**SB-17-130-0104**	
TOP DEPTH	**0**		**1**		**3**		**5**		**3**		**3**		**0**		**1**	
BOTTOM DEPTH	**1**		**4**		**6**		**6**		**6**		**6**		**1**		**4**	
SAMPLE DATE	**20081015**		**20081015**		**20081015**		**20081015**		**20081015**		**20081015**		**20081015**		**20081015**	
MONURON	21	U	22	U	24	U	61		550		210		21	U	22	U
PROPOXUR	21	U	22	U	24	U	15	J	94	J	210	U	21	U	22	U
ROTENONE	21	U	22	U	24	U	25	U	130	U	210	U	21	U	22	U
INORGANICS (MG/KG)																
ALUMINUM	5300		3660		3330		5980		6450		8020		9480		5660	
ANTIMONY	0.59	UJ	0.7	UJ	0.69	UJ	0.78	UJ	1.1	UJ	0.75	UJ	0.5	UJ	0.8	UJ
ARSENIC	**3**	**J**	**1.6**	**J**	0.99	UJ	**1.4**	**J**	**2**	**J**	**8.7**	**J**	**5.9**	**J**	**1.7**	**J**
BARIUM	17.6		9.6		8		12.3		16.2		24.4		33.5		10.5	
BERYLLIUM	0.24	J	0.25	J	0.2	J	0.44	J	0.46	J	0.54		0.45		0.35	J
CADMIUM	0.07	UJ	0.88	U	0.01	UJ	0.02	UJ	1.4	U	0.94	U	0.08	UJ	0.05	UJ
CALCIUM	1170		788		697		928		854		1100		1800		537	
CHROMIUM	10.7	J	5.8	J	5.4	J	8.1	J	8.7	J	17.4	J	25.1	J	8	J
COBALT	2.5		2.6		1.7	J	2.6	J	2.3	J	3.2		4.6		2.2	J
COPPER	10.8		5		3.9		4.6		6.4		7.4		23.9		4.4	
CYANIDE	0.5	U	0.5	U	0.65	U	0.65	U	0.7	U	0.8	U	0.5	U	0.6	
IRON	6790		6020		4970		5950		5750		8390		12800		6930	
LEAD	20.6		2.5		2.1		3.6		4.7		4.3		23.8		4.4	
MAGNESIUM	1710		1350		1220		1720		1580		2070		3370		1300	
MANGANESE	123		142		82		86.3		89.5		130		184		97.2	
MERCURY	0.035	U	0.034	U	0.037	U	0.037	U	0.051	U	0.05	U	0.03		0.036	U
NICKEL	7.8		5.9		4		6.8		6.3		9.4		14.8		5.6	
POTASSIUM	821		644		507		674		712		1020		1510		577	
SELENIUM	0.74	U	0.88	U	0.86	U	0.98	U	1.4	U	0.94	U	0.63	U	1	U
SILVER	1.1	U	1.3	U	1.3	U	1.5	U	2.1	U	1.4	U	0.05	J	1.5	U
SODIUM	132		64.3	J	44	J	61.2	J	107	J	144		276		75	J
THALLIUM	1.1	U	1.3	U	0.14	UJ	1.5	U	2.1	U	1.4	U	0.94	U	1.5	U
VANADIUM	13.1		9.8		9.4		11.4		14.8		19		22.4		13.6	
ZINC	38		15		10.3		21.6		17.5		20.2		46		12.6	
MISCELLANEOUS PARAMETERS																
PERCENT MOISTURE (%)	5.7		8.6		15.8		20.8		21.2		52.8		6		8.7	
TOTAL ORGANIC CARBON (MG/KG)																
TOTAL ORGANIC CARBON (UG/KG)																
TOTAL SOLIDS (%)	94		90		84		73		62		60		93		90	

B - Laboratory blank contamination
U - Not detected
UJ - Estimated non-detected result
J - Estimated result

TABLE D.1
2008 RI SOIL ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	SB-17-131		SB-17-131		SB-17-132		SB-17-132		SB-17-132		SB-17-132		SB-17-132		SB-17-133	
SAMPLE ID	SB-17-131-0001		SB-17-131-0104		SB-17-132-0001		SB-17-132-0104		SB-17-DUP01		SB-17-132-0408		SB-17-DUP08		SB-17-133-0001	
TOP DEPTH	0		1		0		1		1		4		4		0	
BOTTOM DEPTH	1		4		1		4		4		8		8		1	
SAMPLE DATE	20081014		20081014		20081014		20081014		20081014		20081020		20081020		20081014	
PESTICIDES/PCBs (UG/KG)																
4,4'-DDD	3.7	U	3	J	3.7	U	3.2	J	2.9	J	8.4	U	6.8	U	4	U
4,4'-DDE	34		8.4		3.4	J	12		9.9		2.5	JB	6.8	U	33	
4,4'-DDT	77	B	47	B	5.4	B	11	B	15	B	4.9	JB	6.8	U	31	B
ALDRIN	1.9	U	2	U	1.9	U	2.2	U	2.2	U	4.3	U	3.5	U	2.1	U
ALPHA-BHC	1.9	U	2	U	1.9	U	2.2	U	2.2	U	4.3	U	3.5	U	2.1	U
ALPHA-CHLORDANE	1.9	U	0.78	J	1.9	U	2.2	U	2.2	U	4.3	U	3.5	U	2.1	U
BETA-BHC	1.9	U	2	U	1.9	U	2.2	U	2.2	U	4.3	U	3.5	U	2.1	U
DELTA-BHC	1.9	U	2	U	1.9	U	2.2	U	2.2	U	4.3	U	3.5	U	2.1	U
DIELDRIN	3.7	U	3.8	U	3.7	U	4.2	U	4.2	U	8.4	U	6.8	U	4	U
ENDOSULFAN I	1.9	U	2	U	1.9	U	2.2	U	2.2	U	4.3	U	3.5	U	2.1	U
ENDOSULFAN II	3.7	U	3.8	U	3.7	U	4.2	U	4.2	U	8.4	U	6.8	U	4	U
ENDOSULFAN SULFATE	3.7	U	3.8	U	3.7	U	4.2	U	4.2	U	8.4	U	6.8	U	4	U
ENDRIN	3.7	U	3.8	U	3.7	U	4.2	U	4.2	U	8.4	U	6.8	U	4	U
ENDRIN ALDEHYDE	3.7	U	3.8	U	3.7	U	4.2	U	4.2	U	8.4	U	6.8	U	4	U
ENDRIN KETONE	3.7	U	3.8	U	3.7	U	4.2	U	4.2	U	8.4	U	6.8	U	4	U
GAMMA-BHC (LINDANE)	1.9	U	2	U	1.9	U	2.2	U	2.2	U	4.3	U	3.5	U	1.5	J
GAMMA-CHLORDANE	1.9	U	1	J	1.9	U	2.2	U	2.2	U	4.3	U	3.5	U	2.1	U
HEPTACHLOR	1	J	2	U	1.9	U	2.2	U	2.2	U	4.3	U	3.5	U	2.1	U
HEPTACHLOR EPOXIDE	1.9	U	2	U	1.9	U	2.2	U	2.2	U	4.3	U	3.5	U	2.1	U
METHOXYCHLOR	19	U	20	U	19	U	22	U	22	U	43	U	35	U	21	U
PYRETHRINS	900	U	930	U	880	U	1000	U	1000	U	1300	U	1500	U	980	U
RESMETHRIN	450	U	470	U	440	U	510	U	510	U	630	U	740	U	490	U
TOXAPHENE	37	U	38	U	37	U	42	U	42	U	84	U	68	U	40	U
PETROLEUM HYDROCARBONS (MG/																
DIESEL RANGE ORGANICS																
ORGANOPHOSPHOROUS PESTICIDE																
4-AMINOPYRIDINE	56	U	58	U	55	U	64	U	63	U	78	U	92	U	61	U
DIAZINON	56	U	58	U	55	U	64	U	63	U	78	U	92	U	61	U
MALATHION	56	U	58	U	55	U	64	U	63	U	78	U	92	U	61	U
SIMAZINE	56	U	58	U	55	U	64	U	63	U	78	U	92	U	61	U
HERBICIDES (UG/KG)																
2,4,5-T	37	U	38	U	37	U	42	U	42	U	84	U	68	U	40	U
2,4-D	37	U	38	U	37	U	42	U	42	U	84	U	68	U	40	U
CARBARYL	22	U	23	U	110	U	130	U	130	U	31	U	37	U	24	U
DIURON	22	U	23	U	110	U	130	U	130	U	31	U	37	U	24	U
MALEIC HYDRAZIDE	22	U	23	U	22	U	26	U	25	U	31	U	37	U	24	U

TABLE D.1
2008 RI SOIL ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	SB-17-131		SB-17-131		SB-17-132		SB-17-132		SB-17-132		SB-17-132		SB-17-132		SB-17-133	
SAMPLE ID	SB-17-131-0001		SB-17-131-0104		SB-17-132-0001		SB-17-132-0104		SB-17-DUP01		SB-17-132-0408		SB-17-DUP08		SB-17-133-0001	
TOP DEPTH	0		1		0		1		1		4		4		0	
BOTTOM DEPTH	1		4		1		4		4		8		8		1	
SAMPLE DATE	20081014		20081014		20081014		20081014		20081014		20081020		20081020		20081014	
MONURON	22	U	23	U	110	U	130	U	130	U	20	J	140		24	U
PROPOXUR	22	U	23	U	110	U	130	U	130	U	31	U	37	U	24	U
ROTENONE	22	U	23	U	110	U	130	U	130	U	31	U	37	U	24	U
INORGANICS (MG/KG)																
ALUMINUM	8520		7830		9510		8610		9140		12800		10800		9820	
ANTIMONY	0.45	UJ	0.49	UJ	0.5	UJ	0.56	UJ	0.83	UJ	1.3	U	0.91	U	0.71	UJ
ARSENIC	**6.8**	**J**	**6**	**J**	**6.9**	**J**	**3.4**	**J**	**3.6**	**J**	**4.4**		**3.6**		**7.9**	**J**
BARIUM	31.9		19.1		28.8		20.8		24.8		35.8		26.7		28.2	
BERYLLIUM	0.35		0.35		0.36		0.42		0.38	J	0.76	B	0.85		0.4	J
CADMIUM	0.18	J	0.06	UJ	0.09	UJ	0.1	UJ	0.1	UJ	1.7	U	1.1	U	0.11	UJ
CALCIUM	1590		1160		1680		1020		1240		2220		1400		1850	
CHROMIUM	18.2	J	12.5	J	16.1	J	13.6	J	15.3	J	21.2		16.4		17.8	J
COBALT	4.6		3.8		4.3		3.8		3.5		5.7		4.6		4.7	
COPPER	17.2		9.6		10		9.5		11.4		12.8		9.6		12.9	
CYANIDE	0.5	U	0.55	U	0.55	U	0.6	U	0.6	U	1.3	U	1	U	0.6	U
IRON	11400		9740		10000		9390		9980		15200		11400		11400	
LEAD	37.5		6.2		12.3		12.6		12.8		6.3		5.2		16.6	
MAGNESIUM	2610		2210		2460		1950		2050		4110		3050		2610	
MANGANESE	188		152		179		145		170		200		142		208	
MERCURY	0.04		0.036	U	0.037	U	0.02	J	0.03	J	0.06	B	0.065	U	0.03	J
NICKEL	12.8		11.8		13.8		9		9.4		14.5		11.5		12.1	
POTASSIUM	1360		1200		1500		796		954		1980		1430		1110	
SELENIUM	0.3	UJ	0.62	U	0.27	UJ	0.6	UJ	0.47	UJ	1.7	U	1.1	U	0.35	UJ
SILVER	0.04	J	0.92	U	0.95	U	0.06	J	1.6	U	2.5	U	1.7	U	0.06	J
SODIUM	142		87		155		67.8	J	92.1	J	133	B	87.6	B	147	
THALLIUM	0.16	UJ	0.13	UJ	0.09	UJ	0.16	UJ	1.6	U	0.13	B	0.18	B	0.09	UJ
VANADIUM	18.8		17.1		18.9		17.4		18.3		33		25.8		21.1	
ZINC	47.7		25.5		34.4		27.8		29.6		33.4		25.7		36.1	
MISCELLANEOUS PARAMETERS																
PERCENT MOISTURE (%)	10.7		14.3		9.3		21.9		21		36.1		45.9		18.2	
TOTAL ORGANIC CARBON (MG/KG)																
TOTAL ORGANIC CARBON (UG/KG)																
TOTAL SOLIDS (%)	89		86		88		79		78		39		49		82	

B - Laboratory blank contamination
U - Not detected
UJ - Estimated non-detected result
J - Estimated result

TABLE D.1
2008 RI SOIL ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	SB-17-133		SB-17-134		SB-17-134		SB-17-135		SB-17-136		SB-17-137		SB-17-138		SB-17-139	
SAMPLE ID	SB-17-133-0104		SB-17-134-0203		SB-17-DUP03		SB-17-135-0203		SB-17-136-0203		SB-17-137-0203		SB-17-138-0203		SB-17-139-0203	
TOP DEPTH	1		2		2		2		2		2		2		2	
BOTTOM DEPTH	4		3		3		3		3		3		3		3	
SAMPLE DATE	20081014		20081015		20081015		20081015		20081015		20081015		20081015		20081015	
PESTICIDES/PCBs (UG/KG)																
4,4'-DDD	4.1	U	3.6	U	3.6	U	20	J	1.9	J	4	U	9.8	J	3.3	J
4,4'-DDE	1.8	J	0.96	J	0.95	J	27		11		4	U	50		7.3	
4,4'-DDT	2.2	JB	7.6	B	7.5	B	490		60		1.6	JB	120	B	56	
ALDRIN	2.1	U	1.9	U	1.9	U	1.9	U	1.9	U	2.1	U	1.9	U	1.9	U
ALPHA-BHC	2.1	U	1.9	U	1.9	U	1.9	U	1.9	U	2.1	U	1.9	U	1.9	U
ALPHA-CHLORDANE	2.1	U	4.3		4.9		94		7.6	J	2.1	U	52		44	
BETA-BHC	2.1	U	1.9	U	1.9	U	1.9	U	1.9	U	2.1	U	1.9	U	1.9	U
DELTA-BHC	2.1	U	1.9	U	1.9	U	1.9	U	1.9	U	2.1	U	1.9	U	1.9	U
DIELDRIN	4.1	U	3.6	U	3.6	U	3.8	U	3.8	U	4	U	3.6	U	3.6	U
ENDOSULFAN I	2.1	U	1.9	U	1.9	U	1.9	U	1.9	U	2.1	U	1.9	U	1.9	U
ENDOSULFAN II	4.1	U	3.6	U	3.6	U	3.8	U	3.8	U	4	U	3.6	U	3.6	U
ENDOSULFAN SULFATE	4.1	U	3.6	U	3.6	U	3.8	U	3.8	U	4	U	3.6	U	3.6	U
ENDRIN	4.1	U	3.6	U	3.6	U	3.8	U	3.8	U	4	U	3.6	U	3.6	U
ENDRIN ALDEHYDE	4.1	U	3.6	U	3.6	U	3.8	U	3.8	U	4	U	3.6	U	3.6	U
ENDRIN KETONE	4.1	U	3.6	U	3.6	U	3.8	U	3.8	U	4	U	3.6	U	3.6	U
GAMMA-BHC (LINDANE)	2.1	U	1.9	U	1.9	U	1.9	U	1.9	U	2.1	U	1.9	U	1.9	U
GAMMA-CHLORDANE	2.1	U	5.9		7.2		120		10		2.1	U	65		52	
HEPTACHLOR	2.1	U	1.9	U	1.9	U	12		1.9	U	2.1	U	1.9	U	4.7	
HEPTACHLOR EPOXIDE	2.1	U	1.9	U	1.9	U	1.9	U	1.9	U	2.1	U	1.9	U	1.9	U
METHOXYCHLOR	21	U	19	U	19	U	19	U	19	U	21	U	19	U	19	U
PYRETHRINS	1100	U	870	U	870	U	900	U	910	U	940	U	880	U	880	U
RESMETHRIN	530	U	440	U	440	U	450	U	460	U	470	U	440	U	440	U
TOXAPHENE	41	U	36	U	36	U	38	U	38	U	40	U	36	U	36	U
PETROLEUM HYDROCARBONS (MG/																
DIESEL RANGE ORGANICS																
ORGANOPHOSPHOROUS PESTICIDE																
4-AMINOPYRIDINE	67	U														
DIAZINON	67	U														
MALATHION	67	U														
SIMAZINE	67	U														
HERBICIDES (UG/KG)																
2,4,5-T	41	U														
2,4-D	41	U														
CARBARYL	27	U														
DIURON	27	U														
MALEIC HYDRAZIDE	27	U														

TABLE D.1
2008 RI SOIL ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	**SB-17-133**		**SB-17-134**	**SB-17-134**	**SB-17-135**	**SB-17-136**	**SB-17-137**	**SB-17-138**	**SB-17-139**
SAMPLE ID	**SB-17-133-0104**		**SB-17-134-0203**	**SB-17-DUP03**	**SB-17-135-0203**	**SB-17-136-0203**	**SB-17-137-0203**	**SB-17-138-0203**	**SB-17-139-0203**
TOP DEPTH	**1**		**2**	**2**	**2**	**2**	**2**	**2**	**2**
BOTTOM DEPTH	**4**		**3**	**3**	**3**	**3**	**3**	**3**	**3**
SAMPLE DATE	**20081014**		**20081015**	**20081015**	**20081015**	**20081015**	**20081015**	**20081015**	**20081015**
MONURON	17	J							
PROPOXUR	27	U							
ROTENONE	27	U							
INORGANICS (MG/KG)									
ALUMINUM	7530								
ANTIMONY	0.67	UJ							
ARSENIC	**2**	**J**							
BARIUM	13.2								
BERYLLIUM	0.39	J							
CADMIUM	0.01	UJ							
CALCIUM	655								
CHROMIUM	8.2	J							
COBALT	2.3	J							
COPPER	4.2								
CYANIDE	0.6	U							
IRON	6880								
LEAD	4.1								
MAGNESIUM	1420								
MANGANESE	73.7								
MERCURY	0.03	J							
NICKEL	5.6								
POTASSIUM	701								
SELENIUM	0.44	UJ							
SILVER	1.3	U							
SODIUM	52.9	J							
THALLIUM	1.3	U							
VANADIUM	13.9								
ZINC	13.7								
MISCELLANEOUS PARAMETERS									
PERCENT MOISTURE (%)	25.1		8.2	8.1	11	12.2	15.1	9.5	9
TOTAL ORGANIC CARBON (MG/KG)									
TOTAL ORGANIC CARBON (UG/KG)									
TOTAL SOLIDS (%)	80		91	91	88	88	82	90	90

B - Laboratory blank contamination
U - Not detected
UJ - Estimated non-detected result
J - Estimated result

TABLE D.1
2008 RI SOIL ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	SB-17-140		SB-17-141		SB-17-141		SB-17-142		SB-17-142		SB-17-143		SB-17-144		SB-17-145	
SAMPLE ID	SB-17-140-0203		SB-17-141-0203		SB-17-141-0307		SB-17-142-0203		SB-17-DUP02		SB-17-143-0203		SB-17-144-0203		SB-17-145-0203	
TOP DEPTH	2		2		3		2		2		2		2		2	
BOTTOM DEPTH	3		3		7		3		3		3		3		3	
SAMPLE DATE	20081015		20081015		20081020		20081015		20081015		20081015		20081015		20081015	
PESTICIDES/PCBs (UG/KG)																
4,4'-DDD	2.1	J	3.7	U	0.78	J	3.7	U	3.6	U	3.6	U	2.9	J	2.1	J
4,4'-DDE	2.5	J	0.8	J	1.6	JB	3.7	U	3.6	U	3.6	U	13		8.9	
4,4'-DDT	29		3.7	JB	13	B	1.8	J	2.5	J	1.7	JB	82	B	64	B
ALDRIN	1.9	U	1.9	U	2.6	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U
ALPHA-BHC	1.9	U	1.9	U	2.6	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U
ALPHA-CHLORDANE	3.9		1.9	U	2.6	U	1.9	U	1.9	U	1.9	U	14		11	
BETA-BHC	1.9	U	1.9	U	2.6	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U
DELTA-BHC	1.9	U	1.9	U	2.6	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U
DIELDRIN	3.7	U	3.7	U	5	U	3.7	U	3.6	U	3.6	U	3.8	U	3.6	U
ENDOSULFAN I	1.9	U	1.9	U	2.6	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U
ENDOSULFAN II	3.7	U	3.7	U	5	U	3.7	U	3.6	U	3.6	U	3.8	U	3.6	U
ENDOSULFAN SULFATE	3.7	U	3.7	U	5	U	3.7	U	3.6	U	3.6	U	3.8	U	3.6	U
ENDRIN	3.7	U	3.7	U	5	U	3.7	U	3.6	U	3.6	U	3.8	U	3.6	U
ENDRIN ALDEHYDE	3.7	U	3.7	U	5	U	3.7	U	3.6	U	3.6	U	3.8	U	3.6	U
ENDRIN KETONE	3.7	U	3.7	U	5	U	3.7	U	3.6	U	3.6	U	3.8	U	3.6	U
GAMMA-BHC (LINDANE)	1.9	U	1.9	U	2.6	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U
GAMMA-CHLORDANE	4.9		1.9	U	2.6	U	1.9	U	1.9	U	1.9	U	17		10	
HEPTACHLOR	1.1	J	1.9	U	2.6	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U
HEPTACHLOR EPOXIDE	1.9	U	1.9	U	2.6	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U
METHOXYCHLOR	19	U	19	U	26	U	19	U	19	U	19	U	19	U	19	U
PYRETHRINS	900	U	940	U	1200	U	880	U	870	U	890	U	900	U	890	U
RESMETHRIN	450	U	470	U	610	U	440	U	440	U	450	U	450	U	450	U
TOXAPHENE	37	U	37	U	50	U	37	U	36	U	36	U	38	U	36	U
PETROLEUM HYDROCARBONS (MG/																
DIESEL RANGE ORGANICS																
ORGANOPHOSPHOROUS PESTICIDE																
4-AMINOPYRIDINE					76	U										
DIAZINON					76	U										
MALATHION					76	U										
SIMAZINE					76	U										
HERBICIDES (UG/KG)																
2,4,5-T					50	U										
2,4-D					50	U										
CARBARYL					30	U										
DIURON					30	U										
MALEIC HYDRAZIDE					30	U										

TABLE D.1
2008 RI SOIL ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	**SB-17-140**	**SB-17-141**	**SB-17-141**	**SB-17-142**	**SB-17-142**	**SB-17-143**	**SB-17-144**	**SB-17-145**
SAMPLE ID	**SB-17-140-0203**	**SB-17-141-0203**	**SB-17-141-0307**	**SB-17-142-0203**	**SB-17-DUP02**	**SB-17-143-0203**	**SB-17-144-0203**	**SB-17-145-0203**
TOP DEPTH	**2**	**2**	**3**	**2**	**2**	**2**	**2**	**2**
BOTTOM DEPTH	**3**	**3**	**7**	**3**	**3**	**3**	**3**	**3**
SAMPLE DATE	**20081015**	**20081015**	**20081020**	**20081015**	**20081015**	**20081015**	**20081015**	**20081015**
MONURON			100					
PROPOXUR			30 U					
ROTENONE			30 U					
INORGANICS (MG/KG)								
ALUMINUM			5360					
ANTIMONY			1.1 U					
ARSENIC			**1.9**					
BARIUM			14					
BERYLLIUM			0.31 B					
CADMIUM			1.3 U					
CALCIUM			899					
CHROMIUM			7.5					
COBALT			2.2 B					
COPPER			5.6					
CYANIDE			0.75 U					
IRON			6370					
LEAD			3					
MAGNESIUM			1560					
MANGANESE			95.8					
MERCURY			0.049 U					
NICKEL			6					
POTASSIUM			664					
SELENIUM			1.3 U					
SILVER			2 U					
SODIUM			71.4 B					
THALLIUM			0.14 B					
VANADIUM			12.7					
ZINC			15.6					
MISCELLANEOUS PARAMETERS								
PERCENT MOISTURE (%)	11.4	14.7	34.4	9.1	8.1	10.3	10.7	10.6
TOTAL ORGANIC CARBON (MG/KG)								
TOTAL ORGANIC CARBON (UG/KG)								
TOTAL SOLIDS (%)	89	88	66	90	91	90	88	90

B - Laboratory blank contamination
U - Not detected
UJ - Estimated non-detected result
J - Estimated result

D.2 2008 RI GROUNDWATER ANALYTICAL RESULTS

TABLE D.2
2008 GROUNDWATER ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	MW-17-01	MW-17-02	MW-17-03	MW-17-03	MW-17-03	MW-17-04
SAMPLE ID	S17-GW-MW1701	S17-GW-MW1702	S17-GW-MW1703	S17-GW-MW1703-AVG	S17-GW-DUP01	S17-GW-MW1704
SAMPLE DATE	20081209	20081208	20081208	20081208	20081208	20081209
Pesticides/PCBs (ug/L)						
4,4'-DDD	0.094 U	4.3	0.095 U	0.0945 U	0.094 U	0.094 U
4,4'-DDE	0.017 J	0.12	0.095 U	0.017 J	0.017 J	0.094 U
4,4'-DDT	0.015 J	2.1	0.095 U	0.0945 U	0.094 U	0.094 U
ALDRIN	0.047 U	0.047 U	0.048 U	0.0475 U	0.047 U	0.047 U
ALPHA-BHC	0.047 U	0.047 U	0.048 U	0.0475 U	0.047 U	0.047 U
ALPHA-CHLORDANE	0.047 U	0.057	0.048 U	0.0475 U	0.047 U	0.09
BETA-BHC	0.047 U	0.047 U	0.048 U	0.0475 U	0.047 U	0.047 U
DELTA-BHC	0.047 U	0.047 U	0.048 U	0.0475 U	0.047 U	0.047 U
DIELDRIN	0.016 J	1.7	0.095 U	0.0945 U	0.094 U	0.094 U
ENDOSULFAN I	0.047 U	0.95	0.048 U	0.0475 U	0.047 U	0.047 U
ENDOSULFAN II	0.094 U	0.094 U	0.095 U	0.0945 U	0.094 U	0.094 U
ENDOSULFAN SULFATE	0.094 U	0.094 U	0.095 U	0.0945 U	0.094 U	0.094 U
ENDRIN	0.094 U	0.094 U	0.095 U	0.0945 U	0.094 U	0.094 U
ENDRIN ALDEHYDE	0.094 U	0.094 U	0.095 U	0.0945 U	0.094 U	0.027 J
ENDRIN KETONE	0.094 U	0.094 U	0.095 U	0.0945 U	0.094 U	0.094 U
GAMMA-BHC (LINDANE)	0.047 U	0.047 U	0.015 J	0.015 J	0.047 U	0.047 U
GAMMA-CHLORDANE	0.047 U	0.11	0.048 U	0.0475 U	0.047 U	0.1
HEPTACHLOR	0.015 J	0.047 U	0.048 U	0.0475 U	0.047 U	0.047 U
HEPTACHLOR EPOXIDE	0.047 U	0.047 U	0.016 J	0.016 J	0.047 U	0.047 U
METHOXYCHLOR	0.47 U	0.47 U	0.48 U	0.475 U	0.47 U	0.47 U
TOXAPHENE	0.94 U	0.94 U	0.95 U	0.945 U	0.94 U	0.94 U
Petroleum Hydrocarbons (ug/L)						
DIESEL RANGE ORGANICS	85	210	66	67	68	45 J
Organophosphorous Pesticides (ug/L)						
4-AMINOPYRIDINE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
DIAZINON	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
MALATHION	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
PYRETHRINS	1.2 U	120 U	1.2 U	1.2 U	1.2 U	12 U
RESMETHRIN	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SIMAZINE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Herbicides (ug/L)						
2,4,5-T	2.8 U	2.8 U	2.9 U	2.85 U	2.8 U	2.8 U
2,4-D	2.8 U	2.8 U	2.9 U	2.85 U	2.8 U	2.8 U
CARBARYL	1 U	1 U	1 U	1 U	1 U	1 U
DIURON	1 U	1 U	1 U	1 U	1 U	1 U
MALEIC HYDRAZIDE	1.3 J	1.8 J	1.5 J	1.5 J	2 U	2 U
MONURON	1 U	1 U	1 U	1 U	1 U	1 U
PROPOXUR	1 U	0.43 J	1 U	1 U	1 U	1 U
ROTENONE	1 U	1 U	1 U	1 U	1 U	1 U

TABLE D.2
2008 GROUNDWATER ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	MW-17-01	MW-17-02	MW-17-03	MW-17-03	MW-17-03	MW-17-04
SAMPLE ID	S17-GW-MW1701	S17-GW-MW1702	S17-GW-MW1703	S17-GW-MW1703-AVG	S17-GW-DUP01	S17-GW-MW1704
SAMPLE DATE	20081209	20081208	20081208	20081208	20081208	20081209
Inorganics (ug/L)						
ARSENIC	1.69 U	1.69 U	1.69 U	1.69 U	1.69 U	1.69 U
CYANIDE	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
LEAD	0.97 U	0.97 U	0.97 U	0.97 U	0.97 U	1.2 J
ZINC	5.6 J	5.5 J	5.5 J	5.75 J	6 J	3.4 J

J - Estimated
U - Not Detected
UJ - Estimated Not

TABLE D.2
2008 GROUNDWATER ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	MW-17-NASB-65	MW-17-NASB-66	MW-17-NASB-68	MW-17-NASB-98
SAMPLE ID	S17-GW-MWNASB65	S17-GW-MWNASB66	S17-GW-MWNASB68	S17-GW-MWNASB98
SAMPLE DATE	20081209	20081209	20081209	20081209
Pesticides/PCBs (ug/L)				
4,4'-DDD	0.094 U	0.094 U	0.094 U	0.094 U
4,4'-DDE	0.017 J	0.094 U	0.017 J	0.017 J
4,4'-DDT	0.094 U	0.094 U	0.094 U	0.094 U
ALDRIN	0.047 U	0.047 U	0.047 U	0.047 U
ALPHA-BHC	0.047 U	0.047 U	0.047 U	0.047 U
ALPHA-CHLORDANE	0.018 J	0.047 U	0.047 U	0.047 U
BETA-BHC	0.047 U	0.047 U	0.047 U	0.047 U
DELTA-BHC	0.047 U	0.047 U	0.047 U	0.047 U
DIELDRIN	0.094 U	0.094 U	0.094 U	0.094 U
ENDOSULFAN I	0.047 U	0.047 U	0.047 U	0.047 U
ENDOSULFAN II	0.094 U	0.094 U	0.094 U	0.094 U
ENDOSULFAN SULFATE	0.094 U	0.094 U	0.094 U	0.094 U
ENDRIN	0.094 U	0.094 U	0.094 U	0.094 U
ENDRIN ALDEHYDE	0.094 U	0.094 U	0.094 U	0.094 U
ENDRIN KETONE	0.094 U	0.094 U	0.094 U	0.094 U
GAMMA-BHC (LINDANE)	0.047 U	0.047 U	0.047 U	0.047 U
GAMMA-CHLORDANE	0.018 J	0.047 U	0.047 U	0.047 U
HEPTACHLOR	0.047 U	0.047 U	0.047 U	0.047 U
HEPTACHLOR EPOXIDE	0.017 J	0.047 U	0.047 U	0.047 U
METHOXYCHLOR	0.47 U	0.47 U	0.47 U	0.47 U
TOXAPHENE	0.94 U	0.94 U	0.94 U	0.94 U
Petroleum Hydrocarbons (				
DIESEL RANGE ORGANICS				
Organophosphorous Pesti				
4-AMINOPYRIDINE	0.5 U	0.5 U	0.5 U	0.5 U
DIAZINON	0.05 U	0.05 U	0.05 U	0.05 U
MALATHION	0.1 U	0.1 U	0.1 U	0.1 U
PYRETHRINS	1.2 U	1.2 U	1.2 U	1.2 U
RESMETHRIN	0.5 U	0.5 U	0.5 U	0.5 U
SIMAZINE	0.5 U	0.5 U	0.5 U	0.5 U
Herbicides (ug/L)				
2,4,5-T	2.8 U	2.8 U	2.8 U	2.8 U
2,4-D	2.8 U	2.8 U	2.8 U	2.8 U
CARBARYL	1 U	1 U	1 U	1 U
DIURON	1 U	1 U	1 U	1 U
MALEIC HYDRAZIDE	1.3 J	2 U	2 U	1.9 J
MONURON	1 U	1 U	1 U	0.36 J
PROPOXUR	1 U	1 U	0.33 J	1 U
ROTENONE	1 U	1 U	1 U	1 U

TABLE D.2
2008 GROUNDWATER ANALYTICAL RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, BRUNSWICK, MAINE

SAMPLE LOCATION	MW-17-NASB-65	MW-17-NASB-66	MW-17-NASB-68	MW-17-NASB-98
SAMPLE ID	S17-GW-MWNASB65	S17-GW-MWNASB66	S17-GW-MWNASB68	S17-GW-MWNASB98
SAMPLE DATE	20081209	20081209	20081209	20081209
Inorganics (ug/L)				
ARSENIC	1.69 U	1.69 U	4.5 U	1.69 U
CYANIDE	10 UJ	10 UJ	10 UJ	10 UJ
LEAD	0.97 U	0.97 U	0.97 U	0.97 U
ZINC	3.7 J	20.7 J	5.7 J	2.22 U

J - Estimated
U - Not Detected
UJ - Estimated Not

D.3 2008 DATA VALIDATION MEMORANDA

TETRA TECH

INTERNAL CORRESPONDENCE

C-NAVY-03-09-3095W

Date: March 13, 2009

c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Lucy Guzman/Jennifer Cardinal (no copy) JC

Subject: Tier II Organic Data Validation, SDG 57290
APPL Inc, through Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Pyrethrin & Resmethrin/Organophosphorus Pesticides/Carbamates/Maleic Hydrazide:

19/Soils/	SB-17-123-0001	SB-17-123-0104	SB-17-125-0001
	SB-17-125-0104	SB-17-126-0001	SB-17-126-0104
	SB-17-127-0306	SB-17-128-0506	SB-17-129-0306
	SB-17-130-0001	SB-17-130-0104	SB-17-131-0001
	SB-17-131-0104	SB-17-132-0001	SB-17-132-0104
	SB-17-133-0001	SB-17-133-0104	SB-17-DUP01
	SB-17-DUP04		

(Field Duplicate Pairs: SB-17-132-0104/SB-17-DUP01, SB-17-129-0306/SB-17-DUP04)

Pyrethrin & Resmethrin:

14/Soils/	SB-17-134-0203	SB-17-135-0203	SB-17-136-0203
	SB-17-137-0203	SB-17-138-0203	SB-17-139-0203
	SB-17-140-0203	SB-17-141-0203	SB-17-142-0203
	SB-17-143-0203	SB-17-144-0203	SB-17-145-0203
	SB-17-DUP02	SB-17-DUP03	

(Field Duplicate Pairs: SB-17-142-0203/SB-17-DUP02, SB-17-134-0203/SB-17-DUP03)

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the following special pesticides analytical data for the samples in this SDG.

Compound	Method of Analysis/ Instrumentation
Pyrethrins or Pyrethrum	SW-846 Method 8081A / GC/ECD
Resmethrin or Esmethrin	SW-846 Method 8081A / GC/MS
Avitrol or 4-Aminopyridine	SW-846 Method 8141A / GC/MS
Diazinon	SW-846 Method 8141A/ GC/NPD
Malathion	
Simazine or Simaz	
Maleic Hydrazide	SW-846 Method 8321A / LC/MS

Compound	Method of Analysis/ Instrumentation
Carbaryl or Sevin	SW-846 Method 8321A / LC/MS & LC/MS/MS
Diuron or Drexel	
Monuron	
Propoxur or Baygon	
Rotenone or Rotenon	

The samples were collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine on October 14 and 15, 2008. Sample collection and analysis was performed according to the requirements of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The pesticides validation was performed in accordance with the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Organic Analyses, Part III, February 2004.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The data were evaluated based on the following parameters:

- Data Completeness
- Preservation and Technical Holding Times
- * GC/ECD Instrument Performance check (Retention Times)
- * Initial and Continuing Calibrations
- * Blanks
- Surrogate Compounds
- * Internal Standards
- Matrix Spike/Matrix Spike Duplicate
- Laboratory Control Sample/Laboratory Control Sample Duplicate
- Field Duplicates
- * Analyte Identification/Quantitation
- * Percent Solids
- * Reporting Limits

* All criteria were met for this parameter.

Data Completeness

Method 8081A Organochlorine Pesticides

On March 10, 2009 the laboratory provided the linear regression fit equations for the initial calibration; an explanation of how the MDLs were established; IC spectra for the resmethrin I and resmethrin II compounds; a resubmittal of the initial calibration summary Form 6 for both the surrogate compounds and the target pyrethrins including the concentration of the initial calibration standards; and an

explanation of "Mix A" and "Mix B" surrogates. A second source calibration standard was not available at the time of analysis.

Method 8141A Organophosphorus Pesticides

On March 10, 2009 the laboratory provided the linear regression fit equations for the initial calibration; IC spectrum for avitrol (4-aminopyridine); a resubmittal of the initial calibration summary Form 6 including the response areas, the concentration of the initial calibration standards, and footnotes explaining calibration abbreviations used by the laboratory; and a resubmittal of the LCS/LCSD QC summary forms with separate simazine results to show that simazine was not spiked in the LCS associate with this SDG. (Simazine was not added to the original LCS due to analyst error. The simazine spike results reported are from the nearest LCS.) A second source calibration standard was not available at the time of analysis.

Method 8321A Carbamate pesticides

On March 10, 2009 the laboratory provided the internal standard summary form since it was missing from the original data package.

Method 8321A Maleic Hydrazide

On March 10, 2009 the laboratory provided the linear regression fit equations for the initial calibration, a revised initial calibration summary Form 6, and the internal standard summary form. A second source calibration standard was not available at the time of analysis.

Preservation and Technical Holding Times

Method 8141A Organophosphorus Pesticides

The extraction holding time for the re-extracted samples SB-17-131-0104RE, SB-17-132-0001RE, SB-17-DUP01RE, SB-17-133-0001RE, and SB-17-133-0104RE was exceeded by 9 days. The non-detected organophosphorus results in the affected samples are estimated (UJ).

The extraction holding time was exceeded for the samples listed above; therefore, the project accuracy goals may be impacted. The non-detected results in the affected samples are usable as estimated quantitation limits which may be biased low.

Method 8321A Carbamate Pesticides

The extraction holding time for the re-extracted samples SB-17-132-0001RE and SB-17-132-0104RE was exceeded by 25 days. The non-detected carbamate results in the affected samples are estimated (UJ).

The extraction holding time was exceeded for the samples listed above; therefore, the project accuracy goals may be impacted. The non-detected results in the affected samples are usable as estimated quantitation limits which may be biased low.

Surrogate Spike Recoveries

Method 8141A Organophosphorus Pesticides

The following samples had surrogate spike recoveries outside of the recovery limits:

Sample	Tributylphosphate QC Limits 65-159%	Triphenylphosphate QC Limits 50-149%	Action	
			(+)	NDs
SB-17-132-0104	0.72	0.00	-	UR
SB-17-DUP04	29.9	24.2	-	UJ

- Criterion met

The surrogates tributylphosphate and triphenylphosphate recovered below QC criteria for sample SB-17-DUP04; therefore, the project accuracy goals may be impacted. The non-detected pesticide results in sample SB-17-DUP04 are usable as estimated quantitation limits which may be biased low.

The surrogates tributylphosphate and triphenylphosphate recovered extremely low or did not recover for sample SB-17-132-0104 in the original and re-extraction analyses. The non-detected organophosphorus pesticide results in sample SB-17-132-0104 are rejected due to poor surrogate recoveries. These results are not usable for project decisions and the data completeness goals may be impacted.

Method 8321A Carbamate Pesticides

The following samples had surrogate spike recoveries outside of the recovery limits:

Sample	Isoxaben QC Limits 38-145%	Tributylphosphate QC Limits 34-146%	Action	
			(+)	NDs
SB-17-128-0506	-	33.2	J	UJ
SB-17-126-0001	-	32.5	-	UJ
SB-17-130-0001	-	24.4	-	UJ
SB-17-125-0001	21.1	18.9	-	UJ
SB-17-132-0104RE	-	29.8	-	UJ

- Criterion met

The surrogates isoxaben and tributylphosphate recovered below QC criteria for the samples listed above; therefore, the project accuracy goals may be impacted. The positive and non-detected pesticide results in the affected samples are usable as estimated values and estimated quantitation limits which may be biased low.

Method 8321A Maleic Hydrazide

The following samples had surrogate spike recoveries outside of the recovery limits:

Sample	Isoxaben QC Limits 10-125%	Action	
		(+)	NDs
SB-17-131-0001	8.01	-	UJ
SB-17-132-0104	2.52	-	UJ
SB-17-DUP01	4.52	-	UJ
SB-17-133-0001	9.08	-	UJ
SB-17-128-0506	8.82	-	UJ
SB-17-129-0306	2.45	-	UJ
SB-17-DUP04	2.57	-	UJ

The surrogate isoxaben recovered below the QC criteria for samples listed above; therefore, the project accuracy goals may be impacted. The non-detected maleic hydrazide results in affected samples are usable as estimated quantitation limits which may be biased low.

Matrix Spike/Matrix Spike Duplicates

Method 8141A Organophosphorus Pesticides

Simazine was not included in the matrix spike standard. Professional judgment was applied to estimate all the sample results (all non-detected) due to lack of matrix spike accuracy and precision information for this compound. The non-detected results are usable as estimated quantitation limits.

Method 8321A Carbamate Pesticides

The following table summarizes the matrix spiking recoveries below the QC limits and the relative percent differences (RPDs) above the QC limit in the matrix spike and matrix spike duplicate (MS/MSD) analysis of sample SB-17-125-0104:

Compound	RPD	QC Limit	MS %Rec.	MSD %Rec.	QC Limits	Action	
		RPD			%Rec.	(+)	ND
Propoxur	55.4	25	48.9	-	67-122	-	UJ
Rotenone	148.4		6.4	42.9	70-130	-	UJ
Carbaryl	38.2		-	-	-	-	UJ
Diuron	73.1		-	-	-	-	UJ
Monuron	36.5		-	-	-	-	UJ

- Criterion met

Propoxur and rotenone recovered below QC criteria in the MS/MSD analysis of sample SB-17-125-0104; therefore, the project accuracy goals may be impacted. The non-detected propoxur and rotenone results in sample SB-17-125-0104 are usable as estimated quantitation limits which may be biased low.

Propoxur, rotenone, carbaryl, diuron, and monuron had relative percent differences (RPD) above the QC criterion in the MS/MSD analysis of sample SB-17-125-0104; therefore, the project precision goals

may be impacted. The non-detected propoxur, rotenone, carbaryl, diuron, and monuron results in sample SB-17-125-0104 are usable as estimated quantitation limits for which the bias is indeterminate.

Method 8321A Maleic Hydrazide

The following table summarizes the matrix spiking recovery below the QC limits in the matrix spike and matrix spike duplicate analysis of sample SB-17-125-0104:

Compound	MS %REC	MSD %REC	QC Limits	Action	
			%REC	(+)	ND
Maleic Hydrazide	18.9	15.9	70-130	-	UJ

Maleic hydrazide recovered below QC criteria in the MS/MSD analysis of sample SB-17-125-0104; therefore, the project accuracy goals may be impacted. The non-detected maleic hydrazide result in sample SB-17-125-0104 is usable as an estimated quantitation limit which may be biased low.

Laboratory Control Sample/Laboratory Control Sample Duplicate

Method 8321A Carbamate Pesticides

The following table summarizes the recovery below the QC limits in the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analysis:

Compound	%Rec.	QC Limits	Affected Samples	Action	
		%Rec.		(+)	ND
Rotenone	38.2	70-130	All samples except SB-17-132-0001RE, SB-17-132-0104RE	-	UJ

Rotenone recovered below QC criteria in the LCS/LCSD analysis; therefore, the project accuracy goals may be impacted. The non-detected rotenone results in the affected soil samples are usable as estimated quantitation limits which may be biased low.

Field Duplicates

Method 8321A Carbamate Pesticides

Professional judgment was applied to estimated the monuron results in the field duplicate pair SB-17-129-0306/SB-17-DUP04 since this compound was reported above 2x the quantitation limit (at 550 µg/kg) for sample SB-17-129-0306 while it was reported at the quantitation limit (at 210 µg/kg) in the field duplicate sample SB-17-DUP04. The project precision goals may be impacted. The positive monuron results in samples SB-17-129-0306 and SB-17-DUP04 are usable as estimated values for which the bias is indeterminate.

Professional judgment was applied to estimated the propoxur results in the field duplicate pair SB-17-129-0306/SB-17-DUP04 since this compound was reported as a positive result (at 94J µg/kg) for sample SB-17-129-0306 while it was reported as non-detect (at 210 U µg/kg) in the field duplicate sample SB-17-DUP04. The project precision goals may be impacted. The positive and non-detected propoxur results in samples SB-17-129-0306 and SB-17-DUP04 are usable as estimated values and estimated quantitation limits for which the bias is indeterminate.

Reporting Limits

All positive results below the quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

The project action limits were achieved.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Method 8081A Organochlorine Pesticides

The project goals with respect to accuracy, precision, sensitivity, and completeness were met for the Method 8081A Organochlorine Pesticides data set. Data usability was not impacted with regards to accuracy, precision, sensitivity, and completeness.

Method 8141A Organophosphorus Pesticides

The project goals with respect to accuracy were met for the Method 8141A Organophosphorus Pesticides data set with the following exceptions. Samples SB-17-131-0104RE, SB-17-132-0001RE, SB-17-DUP01RE, SB-17-133-0001RE, and SB-17-133-0104RE were qualified as estimated due to holding time exceedances; the affected results may be biased low. The non-detected pesticide results in sample SB-17-DUP04 were qualified as estimated due to low surrogate recoveries; the affected results may be biased low. Although specific method criteria were not met in these instances, the affected non-detected results are usable as estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to accuracy and precision were met for the Method 8141A Organophosphorus Pesticides data set with the following exception. Simazine was not included in the matrix spike standard. Professional judgment was applied to estimate all the sample results (all non-detected) due to lack of matrix spike accuracy and precision information for this compound. Although specific method criteria were not met in these instances, the affected non-detected results are usable as estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to completeness were met for the Method 8141A Organophosphorus Pesticides data set with the following exception. The organophosphorus pesticide results in sample SB-

17-132-0104 were rejected due to extremely low or no surrogate recoveries. These results are not usable for project decisions and the data completeness goals are impacted.

The project goals with respect to sensitivity were met for the Method 8141A Organophosphorus Pesticides data set. Data usability was not impacted with regards to sensitivity.

Method 8321A Carbamate pesticides

The project goals with respect to accuracy were met for the Method 8321A Carbamate Pesticides data set with the following exceptions. Samples SB-17-132-0001RE and SB-17-132-0104RE were qualified as estimated due to holding time exceedances; the affected results may be biased low. The carbamate pesticide results in select soil samples were qualified as estimated due to low surrogate recoveries; the affected results may be biased low. Propoxur and rotenone were qualified as estimated in sample SB-17-125-0104 due to low MS/MSD recoveries; the affected results may be biased low. Rotenone was qualified as estimated in select soil samples due to low LCS/LCSD recoveries; the affected results may be biased low. Although specific method criteria were not met in these instances, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to precision were met for the Method 8321A Carbamate Pesticides data set with the following exceptions. Propoxur, rotenone, carbaryl, diuron, and monuron were qualified as estimated in sample SB-17-125-0104 due to poor MS/MSD precision. Monuron and propoxur were qualified as estimated in samples SB-17-129-0306 and SB-17-DUP04 due to poor field duplicate precision. Although specific method criteria were not met in these instances, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to sensitivity and completeness were met for the Method 8321A Carbamate Pesticides data set. Data usability was not impacted with regards to sensitivity and completeness.

Method 8321A Maleic Hydrazide

The project goals with respect to accuracy were met for the Method 8321A Maleic Hydrazide data set with the following exceptions. The maleic hydrazide results in select soil samples were qualified as estimated due to low surrogate recoveries; the affected results may be biased low. The maleic hydrazide result was qualified as estimated in sample SB-17-125-0104 due to low MS/MSD recoveries; the affected result may be biased low. Although specific method criteria were not met in these instances, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to precision, sensitivity, and completeness were met for the Method 8321A Maleic Hydrazide data set. Data usability was not impacted with regards to precision, sensitivity, and completeness.

Tables:	Data Validation Qualifiers and Codes
	Data Summary Tables
Enclosures:	Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	SB-17-123-0001			SB-17-123-0104			SB-17-125-0001			SB-17-125-0104		
SDG: 57290	LAB_ID	AX85907			AX85908			AX85903			AX85904		
FRACTION: PEST	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	83.0			84.5			90.0			86.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		960	U		950	U		890	U		920	U	
RESMETHRIN		480	U		470	U		440	U		460	U	

PROJ_NO: 02063	NSAMPLE	SB-17-126-0001			SB-17-126-0104			SB-17-127-0306			SB-17-128-0506		
SDG: 57290	LAB_ID	AX85899			AX85900			AX85897			AX85898		
FRACTION: PEST	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.3			91.4			84.2			79.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		850	U		880	U		950	U		1000	U	
RESMETHRIN		420	U		440	U		480	U		510	U	

PROJ_NO: 02063	NSAMPLE	SB-17-129-0306			SB-17-130-0001			SB-17-130-0104			SB-17-131-0001		
SDG: 57290	LAB_ID	AX85905			AX85901			AX85902			AX85876		
FRACTION: PEST	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/14/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	78.8			94.0			91.3			89.3		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		1000	U		850	U		880	U		900	U	
RESMETHRIN		510	U		430	U		440	U		450	U	

PROJ_NO: 02063	NSAMPLE	SB-17-131-0104			SB-17-132-0001			SB-17-132-0104			SB-17-133-0001		
SDG: 57290	LAB_ID	AX85877			AX85878			AX85879			AX85881		
FRACTION: PEST	SAMP_DATE	10/14/2008			10/14/2008			10/14/2008			10/14/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	85.7			90.7			78.1			81.8		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		930	U		880	U		1000	U		980	U	
RESMETHRIN		470	U		440	U		510	U		490	U	

PROJ_NO: 02063	NSAMPLE	SB-17-133-0104			SB-17-134-0203			SB-17-135-0203			SB-17-136-0203		
SDG: 57290	LAB_ID	AX85882			AX85887			AX85892			AX85891		
FRACTION: PEST	SAMP_DATE	10/14/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	74.9			91.8			89.0			87.8		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		1100	U		870	U		900	U		910	U	
RESMETHRIN		530	U		440	U		450	U		460	U	

PROJ_NO: 02063	NSAMPLE	SB-17-137-0203			SB-17-138-0203			SB-17-139-0203			SB-17-140-0203		
SDG: 57290	LAB_ID	AX85883			AX85889			AX85896			AX85893		
FRACTION: PEST	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	84.9			90.5			91.0			88.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		940	U		880	U		880	U		900	U	
RESMETHRIN		470	U		440	U		440	U		450	U	

PROJ_NO: 02063	NSAMPLE	SB-17-141-0203			SB-17-142-0203			SB-17-143-0203			SB-17-144-0203		
SDG: 57290	LAB_ID	AX85884			AX85894			AX85890			AX85886		
FRACTION: PEST	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	85.3			90.9			89.7			89.3		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		940	U		880	U		890	U		900	U	
RESMETHRIN		470	U		440	U		450	U		450	U	

PROJ_NO: 02063	NSAMPLE	SB-17-145-0203			SB-17-DUP01			SB-17-DUP02			SB-17-DUP03		
SDG: 57290	LAB_ID	AX85885			AX85880			AX85895			AX85888		
FRACTION: PEST	SAMP_DATE	10/15/2008			10/14/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			FD			FD			FD		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	89.4			79.0			91.9			91.9		
	DUP_OF				SB-17-132-0104			SB-17-142-0203			SB-17-134-0203		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		890	U		1000	U		870	U		870	U	
RESMETHRIN		450	U		510	U		440	U		440	U	

PROJ_NO: 02063	NSAMPLE	SB-17-DUP04		
SDG: 57290	LAB_ID	AX85906		
FRACTION: PEST	SAMP_DATE	10/15/2008		
MEDIA: SOIL	QC_TYPE	FD		
	UNITS	UG/KG		
	PCT_SOLIDS	47.2		
	DUP_OF	SB-17-129-0306		
PARAMETER		RESULT	VQL	QLCD
PYRETHRINS		1700	U	
RESMETHRIN		850	U	

PROJ_NO: 02063	NSAMPLE	SB-17-123-0001			SB-17-123-0104			SB-17-125-0001			SB-17-125-0104		
SDG: 57290	LAB_ID	AX85907			AX85908			AX85903			AX85904		
FRACTION: OPEST	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	83.0			84.5			90.0			86.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		60	U		59	U		56	U		58	U	
DIAZINON		60	U		59	U		56	U		58	U	
MALATHION		60	U		59	U		56	U		58	U	
SIMAZINE		60	UJ	D	59	UJ	D	56	UJ	D	58	UJ	D

PROJ_NO: 02063	NSAMPLE	SB-17-126-0001			SB-17-126-0104			SB-17-127-0306			SB-17-128-0506		
SDG: 57290	LAB_ID	AX85899			AX85900			AX85897			AX85898		
FRACTION: OPEST	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.3			91.4			84.2			79.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		53	U		55	U		59	U		63	U	
DIAZINON		53	U		55	U		59	U		63	U	
MALATHION		53	U		55	U		59	U		63	U	
SIMAZINE		53	UJ	D	55	UJ	D	59	UJ	D	63	UJ	D

PROJ_NO: 02063	NSAMPLE	SB-17-129-0306			SB-17-130-0001			SB-17-130-0104			SB-17-131-0001		
SDG: 57290	LAB_ID	AX85905			AX85901			AX85902			AX85876		
FRACTION: OPEST	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/14/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	78.8			94.0			91.3			89.3		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		63	U		53	U		55	U		56	U	
DIAZINON		63	U		53	U		55	U		56	U	
MALATHION		63	U		53	U		55	U		56	U	
SIMAZINE		63	UJ	D	53	UJ	D	55	UJ	D	56	UJ	D

PROJ_NO: 02063	NSAMPLE	SB-17-131-0104RE			SB-17-132-0001RE			SB-17-132-0104			SB-17-133-0001RE		
SDG: 57290	LAB_ID	AX85877			AX85878			AX85879			AX85881		
FRACTION: OPEST	SAMP_DATE	10/14/2008			10/14/2008			10/14/2008			10/14/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	85.7			90.7			78.1			81.8		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		58	UJ	H	55	UJ	H	64	UR	R	61	UJ	H
DIAZINON		58	UJ	H	55	UJ	H	64	UR	R	61	UJ	H
MALATHION		58	UJ	H	55	UJ	H	64	UR	R	61	UJ	H
SIMAZINE		58	UJ	DH	55	UJ	DH	64	UR	R	61	UJ	DH

PROJ_NO: 02063	NSAMPLE	SB-17-133-0104RE			SB-17-DUP01RE			SB-17-DUP04		
SDG: 57290	LAB_ID	AX85882			AX85880			AX85906		
FRACTION: OPEST	SAMP_DATE	10/14/2008			10/14/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			FD			FD		
	UNITS	UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	74.9			79.0			47.2		
	DUP_OF				SB-17-132-0104			SB-17-129-0306		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		67	UJ	H	63	UJ	H	110	UJ	R
DIAZINON		67	UJ	H	63	UJ	H	110	UJ	R
MALATHION		67	UJ	H	63	UJ	H	110	UJ	R
SIMAZINE		67	UJ	DH	63	UJ	DH	110	UJ	DR

PROJ_NO: 02063	NSAMPLE	SB-17-123-0001			SB-17-123-0001RE			SB-17-123-0104			SB-17-123-0104RE		
SDG: 57290	LAB_ID	AX85907			AX85907			AX85908			AX85908		
FRACTION: HERB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	83.0			83.0			84.5			84.5		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		24	U					24	U				
DIURON		24	U					24	U				
MALEIC HYDRAZIDE					24	U					24	U	
MONURON		24	U					24	U				
PROPOXUR		24	U					24	U				
ROTENONE		24	UJ	E				24	UJ	E			

PROJ_NO: 02063	NSAMPLE	SB-17-125-0001			SB-17-125-0001RE			SB-17-125-0104			SB-17-125-0104RE		
SDG: 57290	LAB_ID	AX85903			AX85903			AX85904			AX85904		
FRACTION: HERB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	90.0			90.0			86.6			86.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		22	UJ	R				23	UJ	D			
DIURON		22	UJ	R				23	UJ	D			
MALEIC HYDRAZIDE					22	U					23	UJ	D
MONURON		22	UJ	R				23	UJ	D			
PROPOXUR		22	UJ	R				23	UJ	D			
ROTENONE		22	UJ	ER				23	UJ	DE			

PROJ_NO: 02063	NSAMPLE	SB-17-126-0001			SB-17-126-0001RE			SB-17-126-0104			SB-17-126-0104RE		
SDG: 57290	LAB_ID	AX85899			AX85899			AX85900			AX85900		
FRACTION: HERB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.3			94.3			91.4			91.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		21	UJ	R				22	U				
DIURON		21	UJ	R				22	U				
MALEIC HYDRAZIDE					21	U					22	U	
MONURON		21	UJ	R				22	U				
PROPOXUR		21	UJ	R				22	U				
ROTENONE		21	UJ	ER				22	UJ	E			

PROJ_NO: 02063	NSAMPLE	SB-17-127-0306			SB-17-127-0306RE			SB-17-128-0506			SB-17-128-0506RE		
SDG: 57290	LAB_ID	AX85897			AX85897			AX85898			AX85898		
FRACTION: HERB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	84.2			84.2			79.2			79.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		24	U					25	UJ	R			
DIURON		24	U					25	UJ	R			
MALEIC HYDRAZIDE					24	U					25	UJ	R
MONURON		24	U					61	J	R			
PROPOXUR		24	U					15	J	PR			
ROTENONE		24	UJ	E				25	UJ	ER			

PROJ_NO: 02063	NSAMPLE	SB-17-129-0306			SB-17-129-0306RE			SB-17-130-0001			SB-17-130-0001RE		
SDG: 57290	LAB_ID	AX85905			AX85905			AX85901			AX85901		
FRACTION: HERB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	78.8			78.8			94.0			94.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		130	U					21	UJ	R			
DIURON		130	U					21	UJ	R			
MALEIC HYDRAZIDE					25	UJ	R				21	U	
MONURON		550	J	G				21	UJ	R			
PROPOXUR		94	J	GP				21	UJ	R			
ROTENONE		130	UJ	E				21	UJ	ER			

PROJ_NO: 02063	NSAMPLE	SB-17-130-0104			SB-17-130-0104RE			SB-17-131-0001			SB-17-131-0001RE		
SDG: 57290	LAB_ID	AX85902			AX85902			AX85876			AX85876		
FRACTION: HERB	SAMP_DATE	10/15/2008			10/15/2008			10/14/2008			10/14/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	91.3			91.3			89.3			89.3		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		22	U					22	U				
DIURON		22	U					22	U				
MALEIC HYDRAZIDE					22	U					22	UJ	R
MONURON		22	U					22	U				
PROPOXUR		22	U					22	U				
ROTENONE		22	UJ	E				22	UJ	E			

PROJ_NO: 02063	NSAMPLE	SB-17-131-0104			SB-17-131-0104RE			SB-17-132-0001RE			SB-17-132-0104RE		
SDG: 57290	LAB_ID	AX85877			AX85877			AX85878			AX85879		
FRACTION: HERB	SAMP_DATE	10/14/2008			10/14/2008			10/14/2008			10/14/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	85.7			85.7			90.7			78.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		23	U					22	UJ	H	26	UJ	HR
DIURON		23	U					22	UJ	H	26	UJ	HR
MALEIC HYDRAZIDE					23	U		22	U		26	UJ	R
MONURON		23	U					22	UJ	H	26	UJ	HR
PROPOXUR		23	U					22	UJ	H	26	UJ	HR
ROTENONE		23	UJ	E				22	UJ	H	26	UJ	HR

PROJ_NO: 02063	NSAMPLE	SB-17-133-0001			SB-17-133-0001RE			SB-17-133-0104			SB-17-133-0104RE		
SDG: 57290	LAB_ID	AX85881			AX85881			AX85882			AX85882		
FRACTION: HERB	SAMP_DATE	10/14/2008			10/14/2008			10/14/2008			10/14/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	81.8			81.8			74.9			74.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		24	U					27	U				
DIURON		24	U					27	U				
MALEIC HYDRAZIDE					24	UJ	R				27	U	
MONURON		24	U					17	J	P			
PROPOXUR		24	U					27	U				
ROTENONE		24	UJ	E				27	UJ	E			

PROJ_NO: 02063	NSAMPLE	SB-17-DUP01			SB-17-DUP01RE			SB-17-DUP04			SB-17-DUP04RE		
SDG: 57290	LAB_ID	AX85880			AX85880			AX85906			AX85906		
FRACTION: HERB	SAMP_DATE	10/14/2008			10/14/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	FD			FD			FD			FD		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	79.0			79.0			47.2			47.2		
	DUP_OF	SB-17-132-0104			SB-17-132-0104			SB-17-129-0306			SB-17-129-0306		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		130	U					210	U				
DIURON		130	U					210	U				
MALEIC HYDRAZIDE					25	UJ	R				42	UJ	R
MONURON		130	U					210	J	G			
PROPOXUR		130	U					210	UJ	G			
ROTENONE		130	UJ	E				210	UJ	E			

TETRA TECH

INTERNAL CORRESPONDENCE

C-NAVY-03-09-3094W

Date: March 12, 2009

c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Jennifer Cardinal (no copy) JD

Subject: Tier II Organic Data Validation, SDG 57291
APPL Inc, through Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Special Pesticides:

15/Soils/	SB-17-109-0001	SB-17-109-0104	SB-17-110-0104
	SB-17-114-0001	SB-17-114-0104	SB-17-115-0710
	SB-17-116-0407	SB-17-119-0104	SB-17-120-0205
	SB-17-121-0205	SB-17-121-0710	SB-17-121-1215
	SB-17-124-0001	SB-17-124-0104	SB-17-DUP05
	(Field Duplicate Pair: SB-17-120-0205/SB-17-DUP05)		
2/Rinsate Blanks/	SB-17-RB01	SB-17-RB02	

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the following special pesticide analytical data for the samples in this SDG.

Compound	Method of Analysis/ Instrumentation
Pyrethrins or Pyrethrum	SW-846 Method 8081A / GC/ECD
Resmethrin or Esmethrin	SW-846 Method 8081A / GC/MS
Avitrol or 4-Aminopyridine	SW-846 Method 8141A / GC/MS
Diazinon	SW-846 Method 8141A/ GC/NPD
Malathion	
Simazine or Simaz	
Maleic Hydrazide	SW-846 Method 8321A / LC/MS
Carbaryl or Sevin	SW-846 Method 8321A / LC/MS & LC/MS/MS
Diuron or Drexel	
Monuron	
Propoxur or Baygon	
Rotenone or Rotenon	

The samples in this SDG were collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine on October 16, 2008. Sample collection and analysis was performed according to the requirements of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The pesticides validation was performed in accordance with the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Organic Analyses, Part III, February 2004.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The data were evaluated based on the following parameters:

- Data Completeness
- * Preservation and Technical Holding Times
- * GC/ECD Instrument Performance Check (Retention Times)
- * Initial and Continuing Calibrations
- * Blanks
- Surrogate Compounds
- Internal Standards
- Matrix Spike/Matrix Spike Duplicate
- Laboratory Control Sample/Laboratory Control Sample Duplicate
- * Field Duplicates
- * Analyte Identification/Quantitation
- * Percent Solids
- * Reporting Limits

* All criteria were met for this parameter.

Data Completeness

Method 8081A Organochlorine Pesticides

On March 9, 2009 the laboratory provided the linear regression fit equations for the initial calibration; an explanation of how the MDLs were established; IC spectra for the resmethrin I and resmethrin II compounds; a resubmittal of the initial calibration summary Form 6 for both the surrogate compounds and the target pyrethrins including the concentration of the initial calibration standards; and an explanation of "Mix A" and "Mix B" surrogates. A second source calibration standard was not available.

Method 8141A Organophosphorus Pesticides

On March 9, 2009 the laboratory provided the linear regression fit equations for the initial calibration; an explanation of how the MDLs were established; IC spectra for avitrol (4-aminopyridine); a resubmittal of the initial calibration summary Form 6 including the response areas, the concentration of the initial calibration standards, and footnotes explaining calibration abbreviations used by the laboratory; and a resubmittal of the LCS/LCSD QC summary forms with separate simazine results to show that simazine was not spiked in the LCS associate with this SDG. (Simazine was not added to the original LCS due to analyst error. The simazine spike results reported are from the nearest LCS.) A second source calibration standard was not available.

Method 8321A Carbamate pesticides

On March 9, 2009 the laboratory provided the internal standard summary form since it was missing from the original data package.

Method 8321A Maleic Hydrazide

On March 9, 2009 the laboratory provided the linear regression fit equations for the initial calibration and the internal standard summary form since they were missing from the original data package. A second source calibration standard was not available.

Surrogate Spike Recoveries

Method 8321A Carbamate Pesticides

The following samples had surrogate spike recoveries outside of the recovery limits:

Sample	Tributylphosphate QC Limits 34-146%	Action	
		(+)	NDs
SB-17-124-0001	27.1	-	UJ
SB-17-124-0104	30.0	-	UJ
SB-17-109-0001	21.7	-	UJ
SB-17-120-0205	25.6	-	UJ
SB-17-DUP05	29.6	-	UJ
SB-17-121-0205	23.4	-	UJ

The surrogate tributylphosphate recovered below the QC criteria for samples listed above; therefore, the project accuracy goals may be impacted. The non-detected carbamate pesticide results in affected samples are usable as estimated quantitation limits which may be biased low.

Internal Standard Performance

Method 8321A Carbamate Pesticides

The area of the internal standard ridomil was below the QC limits (43596753.88 to 174287015.51) for the following samples:

Sample	Internal Standard (IS)	IS Area	Action
			(ND)
SB-17-124-0001	Ridomil	31684810.45	UJ
SB-17-124-0104	Ridomil	35292306.29	UJ
SB-17-115-0710	Ridomil	34847896.57	UJ
SB-17-110-0104	Ridomil	42740769.92	UJ
SB-17-114-0104	Ridomil	27712424.40	UJ
SB-17-109-0001	Ridomil	24223563.29	UJ
SB-17-109-0104	Ridomil	18709050.78	UJ

Sample	Internal Standard (IS)	IS Area	Action (ND)
SB-17-120-0205	Ridomil	28208904.75	UJ
SB-17-DUP05	Ridomil	27326758.70	UJ
SB-17-116-0407	Ridomil	29403123.63	UJ
SB-17-121-0205	Ridomil	25568707.16	UJ
SB-17-121-0710	Ridomil	22891753.88	UJ
SB-17-121-1215	Ridomil	34588382.45	UJ

The internal standard performance for ridomil was outside of the QC limits; therefore, the project accuracy goals may be impacted. The compounds quantitated against this internal standard are diuron and monuron. The non-detected diuron and monuron results in the affected samples are usable as estimated quantitation limits.

Matrix Spike/Matrix Spike Duplicate

Method 8081A Organochlorine Pesticides

Pyrethrum was not recovered in the matrix spike/matrix spike duplicate (MS/MSD) analysis of sample SB-17-121-0205. The non-detected pyrethrum result in sample SB-17-121-0205 was rejected (UR). This result is not usable for project decisions and the data completeness goals may be impacted.

Method 8141A Organophosphorus Pesticides

Simazine was not included in the matrix spike standard. In addition, this compound was not included in the laboratory control sample associated with the samples in this SDG. Professional judgment was applied to estimate all the sample results (all non-detected) due to lack of matrix spike accuracy and precision information for this compound. The non-detected results are usable as estimated quantitation limits.

Method 8321A Carbamate Pesticides

The following table summarizes the matrix spiking recoveries below the QC limits and the relative percent differences (RPDs) above the QC limit in the matrix spike and matrix spike duplicate (MS/MSD) analysis of sample SB-17-121-0205:

Compound	RPD	QC Limits RPD	MS %REC	MSD %REC	QC Limits %REC	Action (+)	Action ND
Carbaryl	127.1	25	14.2	3.2	31-191	-	UJ
Proxopur	-	-	51	64.5	67-122	J	-
Rotenone	140	25	7	1.2	70-130	-	UJ

- Criterion met

Carbaryl, proxopur, and rotenone recovered below QC criteria in the MS/MSD analysis of sample SB-17-121-0205; therefore, the project accuracy goals may be impacted. The positive and non-detected carbaryl, proxopur, and rotenone results in sample SB-17-121-0205 are usable as estimated values and estimated quantitation limits which may be biased low.

Carbaryl and rotenone has relative percent differences (RPD) above the QC criterion in the MS/MSD analysis of sample SB-17-121-0205; therefore, the project precision goals may be impacted. The non-detected carbaryl and rotenone results in sample SB-17-121-0205 are usable as estimated quantitation limits for which the bias is indeterminate.

Method 8321A Maleic Hydrazide

The following table summarizes the matrix spiking recovery below the QC limits in the matrix spike and matrix spike duplicate analysis of sample SB-17-121-0205:

Compound	MS %REC	MSD %REC	QC Limits %REC	Action (+)	Action ND
Maleic Hydrazide	-	66.3	70-130	J	-

- Criterion met

Maleic hydrazide recovered below QC criteria in the MSD analysis of sample SB-17-121-0205; therefore, the project accuracy goals may be impacted. The positive maleic hydrazide result in sample SB-17-121-0205 is usable as an estimated value which may be biased low.

Laboratory Control Sample/Laboratory Control Sample Duplicate

Method 8141A Organophosphorus Pesticides

Simazine was not included in the laboratory control sample standard. In addition, this compound was not included in the matrix spike associated with the samples in this SDG. Professional judgment was applied to estimate all the sample results (all non-detected) due to lack of laboratory control sample accuracy and precision information for this compound. The non-detected results are usable as estimated quantitation limits.

Method 8321A Carbamate Pesticides

The following table summarizes the recovery below the QC limits in the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analysis:

Compound	%REC	QC Limits %REC	Affected Samples	Action (+)	Action ND
Rotenone	64.0	70-130	All soil samples	-	UJ

Rotenone recovered below QC criteria in the LCS/LCSD analysis; therefore, the project accuracy goals may be impacted. The non-detected rotenone results in all soil samples are usable as estimated quantitation limits which may be biased low.

Method 8321A Maleic Hydrazide

The following table summarizes the recovery below the QC limits in the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analysis:

Compound	%REC	QC Limits %REC	Affected Samples	Action (+)	Action ND
Maleic hydrazide	324, 328	70-130	SB-17-121-0205, SB-17-121-1215	J	-

Maleic hydrazide recovered above QC criteria in the LCS/LCSD analysis; therefore, the project accuracy goals may be impacted. The positive maleic hydrazide results in samples SB-17-121-0205 and SB-17-121-1215 are usable as estimated values which may be biased high.

Reporting Limits

All positive results below the quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

The project action limits were achieved.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Method 8081A Organochlorine Pesticides

The project goals with respect to completeness were met for the Method 8081A Organochlorine Pesticides data set with the following exception. Pyrethrum was rejected in sample SB-17-121-0205 due to no MS/MSD recovery. This result is not usable for project decisions and the data completeness goals are impacted.

The project goals with respect to accuracy, precision, and sensitivity were met for the Method 8081A Organochlorine Pesticides data set. Data usability was not impacted with regards to accuracy, precision, and sensitivity.

Method 8141A Organophosphorus Pesticides

The project goals with respect to accuracy and precision were met for the Method 8141A Organophosphorus Pesticides data set with the following exception. Simazine was not included in the matrix spike standard. In addition, this compound was not included in the laboratory control sample associated with these SDG. Professional judgment was applied to estimate all the sample results (all non-detected) due to lack of matrix spike accuracy and precision information for this compound. Although specific method criteria were not met in this instance, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to sensitivity and completeness were met for the Method 8141A Organophosphorus Pesticides data set. Data usability was not impacted with regards to sensitivity and completeness.

Method 8321A Carbamate pesticides

The project goals with respect to accuracy were met for the Method 8321A Carbamate Pesticides data set with the following exceptions. The non-detected results in select soil samples were qualified as estimated due to low recoveries of the surrogate tributylphosphate; the affected results may be biased low. The non-detected diuron and monuron results in select soil samples were qualified as estimate due to the poor performance of the internal standard ridomil. Carbaryl, proxopur, and rotenone were qualified as estimated in sample SB-17-121-0205 due to low MS/MSD recoveries; the affected results may be biased low. The non-detected rotenone results were qualified as estimated in all soil samples due to low LCS/LCSD recoveries; the affected results may be biased low. Although specific method criteria were not met in these instances, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to precision were met for the Method 8321A Carbamate Pesticides data set with the following exception. The non-detected carbaryl and rotenone results were qualified as estimated in sample SB-17-121-0205 due to poor MS/MSD precision. Although specific method criteria were not met in this instance, the affected non-detected results are usable as estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to sensitivity and completeness were met for the Method 8321A Carbamate Pesticides data set. Data usability was not impacted with regards to sensitivity and completeness.

Method 8321A Maleic Hydrazide

The project goals with respect to accuracy were met for the Method 8321A Maleic Hydrazide data set with the following exceptions. The positive maleic hydrazide results were qualified as estimated in samples SB-17-121-0205 and SB-17-121-1215 due to high LCS/LCSD recoveries; the affected results may be biased high. However, the positive maleic hydrazide result was qualified as estimated in sample SB-17-121-0205 due to a low MSD recovery; the affected result may be biased low. Although specific method criteria were not met in these instances, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to precision, sensitivity, and completeness were met for the Method 8321A Maleic Hydrazide data set. Data usability was not impacted with regards to precision, sensitivity, and completeness.

Tables: Data Validation Qualifiers and Codes
Data Summary Tables

Enclosures: Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	SB-17-109-0001			SB-17-109-0104			SB-17-110-0104			SB-17-114-0001		
SDG: 57291	LAB_ID	AX85916			AX85917			AX85913			AX85914		
FRACTION: PEST	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	90.8			95.1			92.7			90.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		880	U		840	U		860	U		880	U	
RESMETHRIN		440	U		420	U		430	U		440	U	

PROJ_NO: 02063	NSAMPLE	SB-17-114-0104			SB-17-115-0710			SB-17-116-0407			SB-17-119-0104		
SDG: 57291	LAB_ID	AX85915			AX85912			AX85920			AX85911		
FRACTION: PEST	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.8			81.6			77.5			87.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		840	U		980	U		1000	U		920	U	
RESMETHRIN		420	U		490	U		520	U		460	U	

PROJ_NO: 02063	NSAMPLE	SB-17-120-0205			SB-17-121-0205			SB-17-121-0710			SB-17-121-1215		
SDG: 57291	LAB_ID	AX85918			AX85921			AX85922			AX85923		
FRACTION: PEST	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	75.4			70.2			75.3			80.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		1100	U		110000	UR	D	1100	U		1000	U	
RESMETHRIN		530	U		57000	U		530	U		500	U	

PROJ_NO: 02063	NSAMPLE	SB-17-124-0001			SB-17-124-0104			SB-17-DUP05		
SDG: 57291	LAB_ID	AX85909			AX85910			AX85919		
FRACTION: PEST	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			FD		
	UNITS	UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	80.4			85.7			76.1		
	DUP_OF							SB-17-120-0205		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		1000	U		930	U		1100	U	
RESMETHRIN		500	U		470	U		530	U	

PROJ_NO: 02063	NSAMPLE	SB-17-RB01			SB-17-RB02		
SDG: 57291	LAB_ID	AX85924			AX85926		
FRACTION: PEST	SAMP_DATE	10/16/2008			10/16/2008		
MEDIA: WATER	QC_TYPE	RB			RB		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS						
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		1.2	U		1.2	U	
RESMETHRIN		0.5	U		0.5	U	

PROJ_NO: 02063	NSAMPLE	SB-17-109-0001			SB-17-109-0104			SB-17-110-0104			SB-17-114-0001		
SDG: 57291	LAB_ID	AX85916			AX85917			AX85913			AX85914		
FRACTION: OPEST	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	90.8			95.1			92.7			90.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		55	U		53	U		54	U		55	U	
DIAZINON		55	U		53	U		54	U		55	U	
MALATHION		55	U		53	U		54	U		55	U	
SIMAZINE		55	UJ	DE	53	UJ	DE	54	UJ	DE	55	UJ	DE

PROJ_NO: 02063	NSAMPLE	SB-17-114-0104			SB-17-115-0710			SB-17-116-0407			SB-17-119-0104		
SDG: 57291	LAB_ID	AX85915			AX85912			AX85920			AX85911		
FRACTION: OPEST	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.8			81.6			77.5			87.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		53	U		61	U		65	U		57	U	
DIAZINON		53	U		61	U		65	U		57	U	
MALATHION		53	U		61	U		65	U		57	U	
SIMAZINE		53	UJ	DE	61	UJ	DE	65	UJ	DE	57	UJ	DE

PROJ_NO: 02063	NSAMPLE	SB-17-120-0205			SB-17-121-0205			SB-17-121-0710			SB-17-121-1215		
SDG: 57291	LAB_ID	AX85918			AX85921			AX85922			AX85923		
FRACTION: OPEST	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	75.4			70.2			75.3			80.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		66	U		71	U		66	U		62	U	
DIAZINON		66	U		71	U		66	U		62	U	
MALATHION		66	U		31	J	P	66	U		62	U	
SIMAZINE		66	UJ	DE	71	UJ	DE	66	UJ	DE	62	UJ	DE

PROJ_NO: 02063	NSAMPLE	SB-17-124-0001			SB-17-124-0104			SB-17-DUP05		
SDG: 57291	LAB_ID	AX85909			AX85910			AX85919		
FRACTION: OPEST	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			FD		
	UNITS	UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	80.4			85.7			76.1		
	DUP_OF							SB-17-120-0205		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		62	U		58	U		66	U	
DIAZINON		62	U		58	U		66	U	
MALATHION		62	U		58	U		66	U	
SIMAZINE		62	UJ	DE	58	UJ	DE	66	UJ	DE

PROJ_NO: 02063	NSAMPLE	SB-17-RB01			SB-17-RB02		
SDG: 57291	LAB_ID	AX85924			AX85926		
FRACTION: OPEST	SAMP_DATE	10/16/2008			10/16/2008		
MEDIA: WATER	QC_TYPE	RB			RB		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS						
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		0.5	U		0.5	U	
DIAZINON		0.05	U		0.05	U	
MALATHION		0.1	U		0.1	U	
SIMAZINE		0.5	UJ	DE	0.5	UJ	DE

PROJ_NO: 02063	NSAMPLE	SB-17-109-0001			SB-17-109-0001RE			SB-17-109-0104			SB-17-109-0104RE		
SDG: 57291	LAB_ID	AX85916			AX85916			AX85917			AX85917		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	90.8			90.8			95.1			95.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		22	UJ	R				21	U				
DIURON		22	UJ	NR				21	UJ	N			
MALEIC HYDRAZIDE					22	U					21	U	
MONURON		22	UJ	NR				21	UJ	N			
PROPOXUR		22	UJ	R				21	U				
ROTENONE		22	UJ	ER				21	UJ	E			

PROJ_NO: 02063	NSAMPLE	SB-17-110-0104			SB-17-110-0104RE			SB-17-114-0001			SB-17-114-0001RE		
SDG: 57291	LAB_ID	AX85913			AX85913			AX85914			AX85914		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	92.7			92.7			90.9			90.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		22	U					110	U				
DIURON		22	UJ	N				110	UJ	N			
MALEIC HYDRAZIDE					22	U					22	U	
MONURON		22	UJ	N				110	UJ	N			
PROPOXUR		22	U					110	U				
ROTENONE		22	UJ	E				110	UJ	E			

PROJ_NO: 02063	NSAMPLE	SB-17-114-0104			SB-17-114-0104RE			SB-17-115-0710			SB-17-115-0710RE		
SDG: 57291	LAB_ID	AX85915			AX85915			AX85912			AX85912		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.8			94.8			81.6			81.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		21	U					25	U				
DIURON		21	U					25	UJ	N			
MALEIC HYDRAZIDE					21	U					25	U	
MONURON		21	U					25	UJ	N			
PROPOXUR		21	U					25	U				
ROTENONE		21	UJ	E				25	UJ	E			

PROJ_NO: 02063	NSAMPLE	SB-17-116-0407			SB-17-116-0407RE			SB-17-119-0104			SB-17-119-0104RE		
SDG: 57291	LAB_ID	AX85920			AX85920			AX85911			AX85911		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	77.5			77.5			87.1			87.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		26	U					23	U				
DIURON		26	UJ	N				23	U				
MALEIC HYDRAZIDE					26	U					23	U	
MONURON		26	UJ	N				23	U				
PROPOXUR		100						23	U				
ROTENONE		26	UJ	E				23	UJ	E			

PROJ_NO: 02063	NSAMPLE	SB-17-120-0205			SB-17-120-0205DL			SB-17-120-0205RE			SB-17-121-0205		
SDG: 57291	LAB_ID	AX85918			AX85918			AX85918			AX85921		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	75.4			75.4			75.4			70.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		27	UJ	R							28	UJ	DR
DIURON		27	UJ	NR							28	UJ	NR
MALEIC HYDRAZIDE								27	U				
MONURON		27	UJ	NR							28	UJ	NR
PROPOXUR					370						140	J	DR
ROTENONE		27	UJ	ER							28	UJ	DER

PROJ_NO: 02063	NSAMPLE	SB-17-121-0205RE			SB-17-121-0710			SB-17-121-0710RE			SB-17-121-1215		
SDG: 57291	LAB_ID	AX85921			AX85922			AX85922			AX85923		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	70.2			75.3			75.3			80.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL					27	U					25	U	
DIURON					27	UJ	N				25	UJ	N
MALEIC HYDRAZIDE		24	J	DEP				27	U				
MONURON					27	UJ	N				25	UJ	N
PROPOXUR					27	U					25	U	
ROTENONE					27	UJ	E				25	UJ	E

PROJ_NO: 02063	NSAMPLE	SB-17-121-1215RE			SB-17-124-0001			SB-17-124-0001RE			SB-17-124-0104		
SDG: 57291	LAB_ID	AX85923			AX85909			AX85909			AX85910		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	80.1			80.4			80.4			85.7		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL					25	UJ	R				23	UJ	R
DIURON					25	UJ	NR				23	UJ	NR
MALEIC HYDRAZIDE		12	J	EP				25	U				
MONURON					25	UJ	NR				23	UJ	NR
PROPOXUR					25	UJ	R				23	UJ	R
ROTENONE					25	UJ	ER				23	UJ	ER

PROJ_NO: 02063	NSAMPLE	SB-17-124-0104RE			SB-17-DUP05			SB-17-DUP05DL			SB-17-DUP05RE		
SDG: 57291	LAB_ID	AX85910			AX85919			AX85919			AX85919		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			FD			FD			FD		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	85.7			76.1			76.1			76.1		
	DUP_OF				SB-17-120-0205			SB-17-120-0205			SB-17-120-0205		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL					26	UJ	R						
DIURON					26	UJ	NR						
MALEIC HYDRAZIDE		23	U								26	U	
MONURON					26	UJ	NR						
PROPOXUR								470					
ROTENONE					26	UJ	ER						

PROJ_NO: 02063	NSAMPLE	SB-17-RB01			SB-17-RB01RE			SB-17-RB02			SB-17-RB02RE		
SDG: 57291	LAB_ID	AX85924			AX85924			AX85926			AX85926		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: WATER	QC_TYPE	RB			RB			RB			RB		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		1	U					1	U				
DIURON		1	U					1	U				
MALEIC HYDRAZIDE					2	U					2	U	
MONURON		1	U					1	U				
PROPOXUR		1	U					1	U				
ROTENONE		1	U					1	U				

TETRA TECH

INTERNAL CORRESPONDENCE

C-NAVY-03-09-3096W

Date: March 13, 2009

c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Jennifer Cardinal (no copy) JC

Subject: Tier II Organic Data Validation, SDG 57292
APPL Inc, through Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Special Pesticides:

13/Soils/	SB-17-101-0001	SB-17-101-0104	SB-17-102-0001
	SB-17-102-0104	SB-17-103-0001	SB-17-103-0104
	SB-17-104-0001	SB-17-104-0104	SB-17-106-0001
	SB-17-106-0104	SB-17-117-0104	SB-17-122-0407
	SB-17-DUP06		
	(Field Duplicate Pair: SB-17-122-0407/SB-17-DUP06)		
1/Field Blank/	SWB-17-01		
2/Rinsate Blanks/	SB-17-RB03	SB-17-RB04	

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the following special pesticide analytical data for the samples in this SDG.

Compound	Method of Analysis/ Instrumentation
Pyrethrins or Pyrethrum	SW-846 Method 8081A / GC/ECD
Resmethrin or Esmethrin	SW-846 Method 8081A / GC/MS
Avitrol or 4-Aminopyridine	SW-846 Method 8141A / GC/MS
Diazinon	SW-846 Method 8141A/ GC/NPD
Malathion	
Simazine or Simaz	
Maleic Hydrazide	SW-846 Method 8321A / LC/MS
Carbaryl or Sevin	SW-846 Method 8321A / LC/MS & LC/MS/MS
Diuron or Drexel	
Monuron	
Propoxur or Baygon	
Rotenone or Rotenon	

The samples in this SDG were collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine on October 17, 2008. Sample collection and analysis was performed according to the requirements of

the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The pesticides validation was performed in accordance with the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Organic Analyses, Part III, February 2004.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The data were evaluated based on the following parameters:

	• Data Completeness
	• Preservation and Technical Holding Times
*	• GC/ECD Instrument Performance Check (Retention Times)
*	• Initial and Continuing Calibrations
*	• Blanks
	• Surrogate Compounds
	• Internal Standards
NA	• Matrix Spike/Matrix Spike Duplicate
	• Laboratory Control Sample/Laboratory Control Sample Duplicate
*	• Field Duplicates
*	• Analyte Identification/Quantitation
*	• Percent Solids
*	• Reporting Limits

* All criteria were met for this parameter.
NA Not applicable for this SDG.

Data Completeness

Method 8081A Organochlorine Pesticides

On March 10, 2009 the laboratory provided the linear regression fit equations for the initial calibration; an explanation of how the MDLs were established; IC spectra for the resmethrin I and resmethrin II compounds; a resubmittal of the initial calibration summary Form 6 for both the surrogate compounds and the target pyrethrins including the concentration of the initial calibration standards; and an explanation of "Mix A" and "Mix B" surrogates. A second source calibration standard was not available at the time of analysis.

Method 8141A Organophosphorus Pesticides

On March 10, 2009 the laboratory provided the linear regression fit equations for the initial calibration; IC spectrum for avitrol (4-aminopyridine); a resubmittal of the initial calibration summary Form 6 including the response areas, the concentration of the initial calibration standards, and footnotes explaining calibration abbreviations used by the laboratory; and a resubmittal of the LCS/LCSD QC summary forms with separate simazine results to show that simazine was not spiked in the LCS

associated with this SDG. (Simazine was not added to the original LCS due to analyst error. The simazine spike results reported are from the nearest LCS.) A second source calibration standard was not available at the time of analysis.

Method 8321A Carbamate Pesticides

On March 10, 2009 the laboratory provided the internal standard summary form since it was missing from the original data package.

Method 8321A Maleic Hydrazide

On March 10, 2009 the laboratory provided the linear regression fit equations for the initial calibration, a revised initial calibration summary Form 6, and the internal standard summary form. A second source calibration standard was not available at the time of analysis.

Preservation and Technical Holding Times

Method 8321A Carbamate Pesticides

The extraction holding time for samples SB-17-122-0407RE and SB-17-DUP06RE was exceeded by 21 days for both samples; therefore, the project accuracy goals may be impacted. The non-detected carbamate sample results in samples SB-17-122-0407RE and SB-17-DUP06RE are estimated (UJ). The affected non-detected results are usable as estimated quantitation limits which may be biased low.

Surrogate Spike Recoveries

Method 8321A Carbamate Pesticides

The following samples had surrogate spike recoveries outside of the recovery limits:

Sample	Tributylphosphate QC Limits (34-146%)	Action	
		(+)	NDs
SB-17-106-0001	27.6	-	UJ
SB-17-122-0407RE	19.8	-	UJ
SB-17-DUP06RE	10.3	-	UJ
SB-17-117-0104	23.6	-	UJ

The surrogate tributylphosphate recovered below the QC criteria for samples listed above; therefore, the project accuracy goals may be impacted. The non-detected carbamate pesticide results in affected samples are usable as estimated quantitation limits which may be biased low.

Method 8321A Maleic Hydrazide

The following samples had surrogate spike recoveries outside of the recovery limits:

Sample	Isoxaben QC Limits (10-125%)	Action	
		(+)	NDs
SB-17-122-0407	6.27	-	UJ
SB-17-101-0001	3.99	-	UJ
SB-17-103-0001	9.39	-	UJ

The surrogate isoxaben recovered below the QC criteria for samples listed above; therefore, the project accuracy goals may be impacted. The non-detected maleic hydrazide results in affected samples are usable as estimated quantitation limits which may be biased low.

Internal Standard Performance

Method 8321A Carbamate Pesticides

The area of the internal standard ridomil was below the QC limits for the following samples:

Sample	Internal Standard (IS)	IS Area	QC Limits	Action (ND)
SB-17-106-0001	Ridomil	24733218.63	43596753.88 – 174387015.51	UJ
SB-17-106-0104	Ridomil	34980108.17		UJ
SB-17-122-0407	Ridomil	16198513.80		UJ
SB-17-DUP06	Ridomil	13219364.52		UJ
SB-17-117-0104	Ridomil	24648080.22		UJ
SB-17-103-0001	Ridomil	11482936.78	12228944.71 – 48915778.83	UJ

The internal standard performance for ridomil was outside of the QC limits; therefore, the project accuracy goals may be impacted. The compounds quantitated against this internal standard are diuron and monuron. The non-detected diuron and monuron results in the affected samples are usable as estimated quantitation limits.

Laboratory Control Sample/Laboratory Control Sample Duplicate

Method 8141A Organophosphorus Pesticides

Simazine was not included in the laboratory control sample standard. Professional judgment was applied to estimate all the sample results (all non-detected) due to lack of laboratory control sample accuracy and precision information for this compound. The non-detected results are usable as estimated quantitation limits.

Method 8321A Carbamate Pesticides

The following table summarizes the recovery below the QC limits in the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analysis:

Compound	%REC	QC Limits %REC	Affected Samples	Action (+)	Action ND
Rotenone	64.0	70-130	SB-17-106-0001, SB-17-106-0104, SB-17-117-0104	-	UJ

Rotenone recovered below QC criteria in the LCS/LCSD analysis; therefore, the project accuracy goals may be impacted. The non-detected rotenone results in the affected soil samples are usable as estimated quantitation limits which may be biased low.

Reporting Limits

All positive results below the quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

The project action limits were achieved.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Method 8081A Organochlorine Pesticides

The project goals with respect to accuracy, precision, sensitivity, and completeness were met for the Method 8081A Organochlorine Pesticides data set. Data usability was not impacted with regards to accuracy, precision, sensitivity, and completeness.

Method 8141A Organophosphorus Pesticides

The project goals with respect to accuracy and precision were met for the Method 8141A Organophosphorus Pesticides data set with the following exception. Simazine was not included in the laboratory control sample standard. Professional judgment was applied to estimate all the sample results (all non-detected) due to lack of LCS accuracy and precision information for this compound. Although specific method criteria were not met in this instance, the affected non-detected results are usable as estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to sensitivity and completeness were met for the Method 8141A Organophosphorus Pesticides data set. Data usability was not impacted with regards to sensitivity and completeness.

Method 8321A Carbamate Pesticides

The project goals with respect to accuracy were met for the Method 8321A Carbamate Pesticides data set with the following exceptions. Samples SB-17-122-0407RE and SB-17-DUP06RE were qualified as estimated due to holding time exceedances; the affected results may be biased low. The carbamate results in select soil samples were qualified as estimated due to low surrogate recoveries; the affected results may be biased low. The non-detected diuron and monuron results in select soil samples were qualified as estimated due to the poor performance of the internal standard ridomil. Rotenone was qualified as estimated in select samples due to low LCS/LCSD recoveries; the affected results may be biased low. Although specific method criteria were not met in these instances, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to precision, sensitivity, and completeness were met for the Method 8321A Carbamate Pesticides data set. Data usability was not impacted with regards to precision, sensitivity, and completeness.

Method 8321A Maleic Hydrazide

The project goals with respect to accuracy were met for the Method 8321A Maleic Hydrazide data set with the following exceptions. The maleic hydrazide results in select soil samples were qualified as estimated due to low surrogate recoveries; the affected results may be biased low. Although specific method criteria were not met in these instances, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to precision, sensitivity, and completeness were met for the Method 8321A Maleic Hydrazide data set. Data usability was not impacted with regards to precision, sensitivity, and completeness.

Tables: Data Validation Qualifiers and Codes
Data Summary Tables

Enclosures: Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	SB-17-101-0001			SB-17-101-0104			SB-17-102-0001			SB-17-102-0104		
SDG: 57292	LAB_ID	AX85932			AX85933			AX85934			AX85935		
FRACTION: PEST	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	89.0			94.8			94.4			89.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		900	U		840	U		850	U		890	U	
RESMETHRIN		450	U		420	U		420	U		450	U	

PROJ_NO: 02063	NSAMPLE	SB-17-103-0001			SB-17-103-0104			SB-17-104-0001			SB-17-104-0104		
SDG: 57292	LAB_ID	AX85936			AX85937			AX85938			AX85939		
FRACTION: PEST	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.5			88.6			92.3			87.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		850	U		900	U		870	U		910	U	
RESMETHRIN		420	U		450	U		430	U		460	U	

PROJ_NO: 02063	NSAMPLE	SB-17-106-0001			SB-17-106-0104			SB-17-117-0104			SB-17-122-0407		
SDG: 57292	LAB_ID	AX85927			AX85928			AX85931			AX85929		
FRACTION: PEST	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	91.4			94.3			81.7			55.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		880	U		850	U		980	U		1500	U	
RESMETHRIN		440	U		420	U		490	U		730	U	

PROJ_NO: 02063	NSAMPLE	SB-17-DUP06		
SDG: 57292	LAB_ID	AX85930		
FRACTION: PEST	SAMP_DATE	10/17/2008		
MEDIA: SOIL	QC_TYPE	FD		
	UNITS	UG/KG		
	PCT_SOLIDS	73.4		
	DUP_OF	SB-17-122-0407		
PARAMETER		RESULT	VQL	QLCD
PYRETHRINS		1100	U	
RESMETHRIN		540	U	

PROJ_NO: 02063	NSAMPLE	SB-17-RB03			SB-17-RB04			SWB-17-01		
SDG: 57292	LAB_ID	AX85941			AX85942			AX85940		
FRACTION: PEST	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008		
MEDIA: WATER	QC_TYPE	RB			RB			FB		
	UNITS	UG/L			UG/L			UG/L		
	PCT_SOLIDS									
	DUP_OF									
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		1.2	U		1.2	U		1.2	U	
RESMETHRIN		0.5	U		0.5	U		0.5	U	

PROJ_NO: 02063	NSAMPLE	SB-17-101-0001			SB-17-101-0104			SB-17-102-0001			SB-17-102-0104		
SDG: 57292	LAB_ID	AX85932			AX85933			AX85934			AX85935		
FRACTION: OPEST	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	89.0			94.8			94.4			89.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		56	U		53	U		53	U		56	U	
DIAZINON		56	U		53	U		53	U		56	U	
MALATHION		56	U		53	U		53	U		56	U	
SIMAZINE		56	UJ	E	53	UJ	E	53	UJ	E	56	UJ	E

PROJ_NO: 02063	NSAMPLE	SB-17-103-0001			SB-17-103-0104			SB-17-104-0001			SB-17-104-0104		
SDG: 57292	LAB_ID	AX85936			AX85937			AX85938			AX85939		
FRACTION: OPEST	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.5			88.6			92.3			87.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		53	U		56	U		54	U		57	U	
DIAZINON		53	U		56	U		54	U		57	U	
MALATHION		53	U		56	U		54	U		57	U	
SIMAZINE		53	UJ	E	56	UJ	E	54	UJ	E	57	UJ	E

PROJ_NO: 02063	NSAMPLE	SB-17-106-0001			SB-17-106-0104			SB-17-117-0104			SB-17-122-0407		
SDG: 57292	LAB_ID	AX85927			AX85928			AX85931			AX85929		
FRACTION: OPEST	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	91.4			94.3			81.7			55.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		55	U		53	U		61	U		91	U	
DIAZINON		55	U		53	U		61	U		91	U	
MALATHION		55	U		53	U		61	U		91	U	
SIMAZINE		55	UJ	E	53	UJ	E	61	UJ	E	91	UJ	E

PROJ_NO: 02063	NSAMPLE	SB-17-DUP06		
SDG: 57292	LAB_ID	AX85930		
FRACTION: OPEST	SAMP_DATE	10/17/2008		
MEDIA: SOIL	QC_TYPE	FD		
	UNITS	UG/KG		
	PCT_SOLIDS	73.4		
	DUP_OF	SB-17-122-0407		
PARAMETER		RESULT	VQL	QLCD
4-AMINOPYRIDINE		68	U	
DIAZINON		68	U	
MALATHION		68	U	
SIMAZINE		68	UJ	E

PROJ_NO: 02063	NSAMPLE	SB-17-RB03			SB-17-RB04			SWB-17-01		
SDG: 57292	LAB_ID	AX85941			AX85942			AX85940		
FRACTION: OPEST	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008		
MEDIA: WATER	QC_TYPE	RB			RB			FB		
	UNITS	UG/L			UG/L			UG/L		
	PCT_SOLIDS									
	DUP_OF									
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		0.5	U		0.5	U		0.5	U	
DIAZINON		0.05	U		0.05	U		0.05	U	
MALATHION		0.1	U		0.1	U		0.1	U	
SIMAZINE		0.5	UJ	E	0.5	UJ	E	0.5	UJ	E

PROJ_NO: 02063	NSAMPLE	SB-17-101-0001			SB-17-101-0001RE			SB-17-101-0104			SB-17-101-0104RE		
SDG: 57292	LAB_ID	AX85932			AX85932			AX85933			AX85933		
FRACTION: HERB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	89.0			89.0			94.8			94.8		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		22	U					21	U				
DIURON		22	U					21	U				
MALEIC HYDRAZIDE					22	UJ	R				21	U	
MONURON		22	U					21	U				
PROPOXUR		22	U					21	U				
ROTENONE		22	U					21	U				

PROJ_NO: 02063	NSAMPLE	SB-17-102-0001			SB-17-102-0001RE			SB-17-102-0104			SB-17-102-0104RE		
SDG: 57292	LAB_ID	AX85934			AX85934			AX85935			AX85935		
FRACTION: HERB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.4			94.4			89.4			89.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		21	U					22	U				
DIURON		21	U					22	U				
MALEIC HYDRAZIDE					21	U					22	U	
MONURON		21	U					22	U				
PROPOXUR		21	U					22	U				
ROTENONE		21	U					22	U				

PROJ_NO: 02063	NSAMPLE	SB-17-103-0001			SB-17-103-0001RE			SB-17-103-0104			SB-17-103-0104RE		
SDG: 57292	LAB_ID	AX85936			AX85936			AX85937			AX85937		
FRACTION: HERB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.5			94.5			88.6			88.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		21	U					23	U				
DIURON		21	UJ	N				23	U				
MALEIC HYDRAZIDE					21	UJ	R				23	U	
MONURON		21	UJ	N				23	U				
PROPOXUR		21	U					23	U				
ROTENONE		21	U					23	U				

PROJ_NO: 02063	NSAMPLE	SB-17-104-0001			SB-17-104-0001RE			SB-17-104-0104			SB-17-104-0104RE		
SDG: 57292	LAB_ID	AX85938			AX85938			AX85939			AX85939		
FRACTION: HERB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	92.3			92.3			87.6			87.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		22	U					23	U				
DIURON		22	U					23	U				
MALEIC HYDRAZIDE					22	U					23	U	
MONURON		22	U					23	U				
PROPOXUR		22	U					23	U				
ROTENONE		22	U					23	U				

PROJ_NO: 02063	NSAMPLE	SB-17-106-0001			SB-17-106-0001RE			SB-17-106-0104			SB-17-106-0104RE		
SDG: 57292	LAB_ID	AX85927			AX85927			AX85928			AX85928		
FRACTION: HERB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	91.4			91.4			94.3			94.3		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		22	UJ	R				21	U				
DIURON		22	UJ	NR				21	UJ	N			
MALEIC HYDRAZIDE					22	U					21	U	
MONURON		22	UJ	NR				21	UJ	N			
PROPOXUR		22	UJ	R				21	U				
ROTENONE		22	UJ	ER				21	UJ	E			

PROJ_NO: 02063	NSAMPLE	SB-17-117-0104			SB-17-117-0104RE			SB-17-122-0407RE			SB-17-DUP06RE		
SDG: 57292	LAB_ID	AX85931			AX85931			AX85929			AX85930		
FRACTION: HERB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			FD		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	81.7			81.7			55.0			73.4		
	DUP_OF										SB-17-122-0407		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		24	UJ	R				36	UJ	HR	27	UJ	HR
DIURON		24	UJ	NR				36	UJ	HNR	27	UJ	HNR
MALEIC HYDRAZIDE					24	U		36	UJ	R	27	U	
MONURON		24	UJ	NR				36	UJ	HNR	27	UJ	HNR
PROPOXUR		24	UJ	R				36	UJ	HR	27	UJ	HR
ROTENONE		24	UJ	ER				36	UJ	HR	27	UJ	HR

PROJ_NO: 02063	NSAMPLE	SB-17-RB03			SB-17-RB03RE			SB-17-RB04			SB-17-RB04RE		
SDG: 57292	LAB_ID	AX85941			AX85941			AX85942			AX85942		
FRACTION: HERB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: WATER	QC_TYPE	RB			RB			RB			RB		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		1	U					1	U				
DIURON		1	U					1	U				
MALEIC HYDRAZIDE					2	U					2	U	
MONURON		1	U					1	U				
PROPOXUR		1	U					1	U				
ROTENONE		1	U					1	U				

PROJ_NO: 02063	NSAMPLE	SWB-17-01			SWB-17-01RE		
SDG: 57292	LAB_ID	AX85940			AX85940		
FRACTION: HERB	SAMP_DATE	10/17/2008			10/17/2008		
MEDIA: WATER	QC_TYPE	FB			FB		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS						
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		1	U				
DIURON		1	U				
MALEIC HYDRAZIDE					2	U	
MONURON		1	U				
PROPOXUR		1	U				
ROTENONE		1	U				

INTERNAL CORRESPONDENCE

C-NAVY-03-09-3085W

Date: March 10, 2009

c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Lucy Guzman (no copy)

Subject: Tier II Organic Data Validation, SDG 57333
APPL Inc, through Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Special Pesticides:

19/Soils/	SB-17-105-0001	SB-17-105-0104	SB-17-107-0001
	SB-17-107-0104	SB-17-107-0408	SB-17-108-0001
	SB-17-108-0104	SB-17-111-0104	SB-17-112-0001
	SB-17-112-0104	SB-17-113-0001	SB-17-113-0104
	SB-17-118-0001	SB-17-118-0104	SB-17-125-0608
	SB-17-132-0408	SB-17-141-0307	SB-17-DUP07
	SB-17-DUP08		

(Field Duplicate Pairs: SB-17-105-0001/SB-17-DUP07, SB-17-132-0408/SB-17-DUP08)

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the following special pesticides analytical data for the samples in this SDG.

Compound	Method of Analysis/ Instrumentation
Pyrethrins or Pyrethrum	SW-846 Method 8081A / GC/ECD
Resmethrin or Esmethrin	SW-846 Method 8081A / GC/MS
Avitrol or 4-Aminopyridine	SW-846 Method 8141A / GC/MS
Diazinon	SW-846 Method 8141A/ GC/NPD
Malathion	
Simazine or Simaz	
Maleic Hydrazide	SW-846 Method 8321A / LC/MS
Carbaryl or Sevin	SW-846 Method 8321A / LC/MS & LC/MS/MS
Diuron or Drexel	
Monuron	
Propoxur or Baygon	
Rotenone or Rotenon	

The samples were collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine on October 15 & 20, 2008. Sample collection and analysis was performed according to the requirements of the

Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The pesticides and herbicide validation was performed in accordance with the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Organic Analyses, Part III, February 2004.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The data were evaluated based on the following parameters:

- Data Completeness
- Preservation and Technical Holding Times
- * GC/ECD Instrument Performance Check (Retention Times)
- * Initial and Continuing Calibrations
- * Blanks
- Surrogate Compounds
- Internal Standards
- Matrix Spike/Matrix Spike Duplicate
- Laboratory Control Sample/Laboratory Control Sample Duplicate
- Field Duplicates
- * Analyte Identification/Quantitation
- * Reporting Limits

* All criteria were met for this parameter.

Data Completeness

Method 8081A

TtNUS requested the laboratory to submit the following items: MDL study for pyrethrin and resmethrin, instrument tune, spectra for the resmethrin I and resmethrin II compounds, and second source initial calibration verification standard. In addition, the laboratory was asked to resubmit the initial calibration summary Form 6 for both the surrogate compounds and the target pyrethrins and provide the concentration of the initial calibration standards. For the resmethrin analysis the laboratory was requested to provide the linear regression fit equation for the initial calibration. The requested information was received on February 19 and March 9 and 10, 2009.

Method 8141A

The laboratory was requested to re-submit quantitation raw data for the avitrol (4-aminopyridine) initial and continuing calibration standards showing the target analytes , areas and retention times missing in the original package and resubmit Form 6 to include standard concentration and a footnote explaining calibration abbreviations used by the laboratory. Also to delete pages 131 and 132 from the data package since these pages do not belong to this analysis. In addition the laboratory was requested to resubmit the case narrative to include explanation of method proficiency results for simazine from LCS

standards not analyze with the field samples from this SDG; and the continuing calibration summary Form 7 for the phosphorous pesticides including the "#2" suffix next to the target compounds to indicate these results belong to the second column, confirmation analysis. The requested information was received on February 26 and March 9, 2009.

Method 8321A, Maleic Hydrazide

The laboratory was requested to submit the missing first page of the extraction worksheet on 10/29/08 and an explanation of raised reporting limits because the first two-level initial calibration standards data points were eliminated. The requested information was received on February 26 and March 9, 2009.

Method 8321A Carbamate pesticides

The laboratory was request to submit the internal standard summary form missing from the original submittal and to correct the extraction date for sample SB-17-125-0608 in the worksheet page 279. The requested information was received on February 26 and March 9, 2009.

Preservation and Technical Holding Times

Method 8141A Organophosphorous Pesticides

The extraction holding time for sample SB-17-125-0608 was exceed by 1 day. The sample results, all non-detected are estimated (UJ); results may be biased low. The project accuracy goals may be impacted; non-detected results in the affected sample are usable as estimated quantitation limits which may be biased low.

Method 8321A Carbamate pesticides

The extraction holding time for sample SB-17-125-0608 was exceed by 9 days. The sample results, all non-detected are estimated (UJ), results may be biased low. The project accuracy goals may be impacted; non-detected results in the affected samples are usable as estimated quantitation limits which may be biased low.

Surrogate Spike Recoveries

Method 8321A Maleic Hydrazide

The following samples had surrogate spike recoveries outside of the recovery limits:

Sample	Isoxaben QC Limits 10-125%	Action	
		(+)	NDs
SB-17-125-0608	3.75	-	UJ
SB-17-105-0001	1.1	-	UJ
SB-17-107-0001	8.62	-	UJ
SB-17-107-0408	9.2	-	UJ
SB-17-108-0001	6.76	-	UJ

The surrogate isoxaben recovered below the QC criteria for samples listed above consequently, the project accuracy goals may be impacted. The non-detected maleic hydrazide results in affected samples are usable as estimated quantitation limits which may be biased low.

Method 8321A Carbamate Pesticides

The following samples had surrogate spike recoveries outside of the recovery limits:

Sample	Isoxaben QC Limits 32-145%	Tributyl Phosphate QC Limits 34-146	Action	
			(+)	NDs
SB-17-125-0608	-	26.2	-	UJ
SB-17-DUP07	-	25.9	-	UJ
SB-17-112-0001	-	28.8	-	UJ

- criteria met

The surrogate tributyl phosphate recovered below QC criteria for the samples listed above consequently, the project accuracy goals may be impacted. The non-detected pesticide results in the affected samples are usable as estimated quantitation limits which may be biased low.

Internal Standard Performance

Method 8321A Carbamate Pesticides

The area of the internal standard ridomil was below the QC limits (12228944.31 to 48915778.83) for the following samples:

Sample	Internal Standard (IS)	IS Area	Action
			(ND)
SB-17-125-0608	Ridomil	12007602.39	UJ
SB-17-DUP07	Ridomil	10701394.30	UJ
SB-17-112-0001	Ridomil	11478771.41	UJ

The compounds quantitated against this internal standard are diuron and monuron. These compounds in the affected samples are estimated (UJ). The project accuracy goals may be impacted for diuron and monuron in affected samples. The non-detected monuron and diuron results in the affected samples are usable as estimated quantitation limits.

Matrix Spike/Matrix Spike Duplicates

Method 8141A Organophosphorous Pesticides

Simazine was not included in the matrix spike standard. In addition, this compound was not included in the laboratory control samples associated with these SDG. Professional judgment was applied to estimate all the simazine sample results (all non-detected) due to lack of matrix spike accuracy and precision information for this compound. The non-detected results are usable as estimated quantitation limits.

Method 8321A Carbamate Pesticides

The following table summarizes the matrix spiking recovery below the QC limits in the matrix spike and matrix spike duplicate analysis of sample SB-17-112-0104:

Compound	MS %REC	MSD %REC	QC Limits	Action	
			%REC	(+)	ND
Propoxur	-	63	67-122	-	UJ

- criterion met

Propoxur recovered below QC criteria in the matrix spike duplicate analysis of sample SB-17-112-0104, consequently, the project accuracy goals may be impacted. The non-detected propuxur result in sample SB-17-112-0104 is usable as estimated quantitation limits which may be biased low.

Field Duplicates

Method 8321A Carbamate Pesticides

Professional judgment was applied to estimated the monuron results in the field duplicate pair SB-17-132-0408/SB-17-DUP08 since this compound was reported below the quantitation limit (at 20J ug/kg) for sample SB-17-132-0408 while it was reported above 2x the quantitation limit (at 140 ug/kg) in the field duplicate sample SB-17-DUP08. The project precision goals may be impacted. The positive monuron results in samples SB-17-132-0408 and SB-17-DUP08 are usable as estimated values for which the bias is indeterminate.

Reporting Limits

All positive results below the quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

The project required quantitation limits were not met for simazine, malathion, carbaryl, diuron, maleic hidrazide, monuron, propoxur, and rotenone due to the percent moisture of the samples. However the project action limits were not exceeded, consequently, the data usability is not impacted.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Method 8081A Pyrethrins/Resmethrin

The project goals with respect to accuracy, precision, sensitivity, and completeness were met for the organochloride pesticide data set.

Method 8141A Organophosphorous Pesticides

The project goals with respect to accuracy and precision were met for the organophosphorous pesticides data set with the following exception. The non-detected simazine results are estimated due to lack of matrix spike and LCS accuracy and precision information for this compound. The results for sample SB-17-125-0608 are estimated due to exceeded extraction holding time; values may be biased low. Although specific QC criteria were not met in this instance, data usability is not impacted and the affected non-detected results are usable as estimated values and estimated quantitation limits.

The project goals with respect to sensitivity and completeness were met for the organophosphorous pesticide data set.

Method 8321A Maleic Hydrazide

The project goals with respect to accuracy were met for this data set with the following exception. The surrogate recovered below the QC criteria for samples SB-17-125-0608, SB-17-105-0001, SB-17-107-0001, SB-17-107-0408, and SB-17-108-0001 consequently, the project accuracy goals may be impacted. Although specific method criteria were not met in these instances, the affected non-detected results are usable as estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to precision, sensitivity, and completeness were met for the organophosphorous pesticide data set.

Method 8321A Carbamate Pesticides

The project goals with respect to accuracy were met for this data set with the following exception. The results for sample SB-17-125-0608 are estimated due was exceeded by holding time; results may be biased low. Diuron and monuron are estimated in selected samples due to low internal standard areas. Results for selected samples are estimated due to low surrogate recovery; results may be biased low. Propoxur result in sample SB-17-112-0104 is estimated due to a low matrix spike recovery; result may be biased low. Although specific method criteria were not met in these instances, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to precision were met for this data set with the following exception. The positive monuron results in the field duplicate pair samples SB-17-132-0408 and SB-17-DUP08 due to poor field duplicate precision. Although specific QC criterion was not met in this instance, the affected positive results are usable as estimated values which may have a minor impact on data usability.

The project goals with respect to sensitivity and completeness were met for the carbamate pesticide data set.

Tables: Data Validation Qualifiers and Codes
Data Summary Tables
Enclosures: Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	SB-17-105-0001			SB-17-105-0104			SB-17-107-0001			SB-17-107-0104		
SDG: 57333	LAB_ID	AX86079			AX86080			AX86081			AX86082		
FRACTION: PEST	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	90.0			72.4			91.3			72.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		890	U		1100	U		880	U		1100	U	
RESMETHRIN		440	U		550	U		440	U		550	U	

PROJ_NO: 02063	NSAMPLE	SB-17-107-0408			SB-17-108-0001			SB-17-108-0104			SB-17-111-0104		
SDG: 57333	LAB_ID	AX86083			AX86084			AX86085			AX86087		
FRACTION: PEST	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	78.0			73.9			83.6			90.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		1000	U		1100	U		960	U		880	U	
RESMETHRIN		510	U		540	U		480	U		440	U	

PROJ_NO: 02063	NSAMPLE	SB-17-112-0001			SB-17-112-0104			SB-17-113-0001			SB-17-113-0104		
SDG: 57333	LAB_ID	AX86088			AX86089			AX86090			AX86091		
FRACTION: PEST	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	82.4			83.1			73.4			86.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		970	U		960	U		1100	U		930	U	
RESMETHRIN		490	U		480	U		540	U		460	U	

PROJ_NO: 02063	NSAMPLE	SB-17-118-0001			SB-17-118-0104			SB-17-125-0608			SB-17-132-0408		
SDG: 57333	LAB_ID	AX86092			AX86093			AX86078			AX86094		
FRACTION: PEST	SAMP_DATE	10/20/2008			10/20/2008			10/15/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	92.0			85.8			81.5			63.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		870	U		930	U		980	U		1300	U	
RESMETHRIN		430	U		470	U		490	U		630	U	

PROJ_NO: 02063	NSAMPLE	SB-17-141-0307			SB-17-DUP07			SB-17-DUP08		
SDG: 57333	LAB_ID	AX86096			AX86086			AX86095		
FRACTION: PEST	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			FD			FD		
	UNITS	UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	65.6			87.2			54.1		
	DUP_OF				SB-17-105-0001			SB-17-132-0408		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		1200	U		920	U		1500	U	
RESMETHRIN		610	U		460	U		740	U	

PROJ_NO: 02063	NSAMPLE	SB-17-105-0001			SB-17-105-0104			SB-17-107-0001			SB-17-107-0104		
SDG: 57333	LAB_ID	AX86079			AX86080			AX86081			AX86082		
FRACTION: OPEST	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	90.0			72.4			91.3			72.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		56	U		69	U		55	U		69	U	
DIAZINON		56	U		69	U		55	U		69	U	
MALATHION		56	U		69	U		55	U		69	U	
SIMAZINE		56	UJ	DE	69	UJ	DE	55	UJ	DE	69	UJ	DE

PROJ_NO: 02063	NSAMPLE	SB-17-107-0408			SB-17-108-0001			SB-17-108-0104			SB-17-111-0104		
SDG: 57333	LAB_ID	AX86083			AX86084			AX86085			AX86087		
FRACTION: OPEST	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	78.0			73.9			83.6			90.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		64	U		68	U		60	U		55	U	
DIAZINON		64	U		68	U		60	U		55	U	
MALATHION		64	U		68	U		60	U		55	U	
SIMAZINE		64	UJ	DE	68	UJ	DE	60	UJ	DE	55	UJ	DE

PROJ_NO: 02063	NSAMPLE	SB-17-112-0001			SB-17-112-0104			SB-17-113-0001			SB-17-113-0104		
SDG: 57333	LAB_ID	AX86088			AX86089			AX86090			AX86091		
FRACTION: OPEST	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	82.4			83.1			73.4			86.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		61	U		60	U		68	U		58	U	
DIAZINON		61	U		60	U		68	U		58	U	
MALATHION		61	U		60	U		68	U		58	U	
SIMAZINE		61	UJ	DE	60	UJ	DE	68	UJ	DE	58	UJ	DE

PROJ_NO: 02063	NSAMPLE	SB-17-118-0001			SB-17-118-0104			SB-17-125-0608RE			SB-17-132-0408		
SDG: 57333	LAB_ID	AX86092			AX86093			AX86078			AX86094		
FRACTION: OPEST	SAMP_DATE	10/20/2008			10/20/2008			10/15/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	92.0			85.8			81.5			63.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		54	U		58	U		61	UJ	H	78	U	
DIAZINON		54	U		58	U		61	UJ	H	78	U	
MALATHION		54	U		58	U		61	UJ	H	78	U	
SIMAZINE		54	UJ	DE	58	UJ	DE	61	UJ	DEH	78	UJ	DE

PROJ_NO: 02063	NSAMPLE	SB-17-141-0307			SB-17-DUP07			SB-17-DUP08		
SDG: 57333	LAB_ID	AX86096			AX86086			AX86095		
FRACTION: OPEST	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			FD			FD		
	UNITS	UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	65.6			87.2			54.1		
	DUP_OF				SB-17-105-0001			SB-17-132-0408		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		76	U		57	U		92	U	
DIAZINON		76	U		57	U		92	U	
MALATHION		76	U		57	U		92	U	
SIMAZINE		76	UJ	DE	57	UJ	DE	92	UJ	DE

PROJ_NO: 02063	NSAMPLE	SB-17-105-0001			SB-17-105-0001RE			SB-17-105-0104			SB-17-105-0104RE		
SDG: 57333	LAB_ID	AX86079			AX86079			AX86080			AX86080		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	90.0			90.0			72.4			72.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		22	U					28	U				
DIURON		22	UJ	N				28	U				
MALEIC HYDRAZIDE					22	UJ	R				28	U	
MONURON		22	UJ	N				28	U				
PROPOXUR		22	U					28	U				
ROTENONE		22	U					28	U				

PROJ_NO: 02063	NSAMPLE	SB-17-107-0001			SB-17-107-0001RE			SB-17-107-0104			SB-17-107-0104RE		
SDG: 57333	LAB_ID	AX86081			AX86081			AX86082			AX86082		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	91.3			91.3			72.1			72.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		22	U					28	U				
DIURON		22	U					28	U				
MALEIC HYDRAZIDE					22	UJ	R				28	U	
MONURON		22	U					28	U				
PROPOXUR		22	U					28	U				
ROTENONE		22	U					28	U				

PROJ_NO: 02063	NSAMPLE	SB-17-107-0408			SB-17-107-0408RE			SB-17-108-0001			SB-17-108-0001RE		
SDG: 57333	LAB_ID	AX86083			AX86083			AX86084			AX86084		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	78.0			78.0			73.9			73.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		26	U					27	U				
DIURON		26	U					27	U				
MALEIC HYDRAZIDE					26	UJ	R				27	UJ	R
MONURON		26	U					27	U				
PROPOXUR		26	U					27	U				
ROTENONE		26	U					27	U				

PROJ_NO: 02063	NSAMPLE	SB-17-108-0104			SB-17-108-0104RE			SB-17-111-0104			SB-17-111-0104RE		
SDG: 57333	LAB_ID	AX86085			AX86085			AX86087			AX86087		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	83.6			83.6			90.4			90.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		24	U					22	U				
DIURON		24	U					22	U				
MALEIC HYDRAZIDE					24	U					22	U	
MONURON		24	U					22	U				
PROPOXUR		24	U					22	U				
ROTENONE		24	U					22	U				

PROJ_NO: 02063	NSAMPLE	SB-17-112-0001			SB-17-112-0001RE			SB-17-112-0104			SB-17-112-0104RE		
SDG: 57333	LAB_ID	AX86088			AX86088			AX86089			AX86089		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	82.4			82.4			83.1			83.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		24	UJ	R				24	U				
DIURON		24	UJ	NR				24	U				
MALEIC HYDRAZIDE					24	U					24	U	
MONURON		24	UJ	NR				24	U				
PROPOXUR		24	UJ	R				24	UJ	D			
ROTENONE		24	UJ	R				24	U				

PROJ_NO: 02063	NSAMPLE	SB-17-113-0001			SB-17-113-0001RE			SB-17-113-0104			SB-17-113-0104RE		
SDG: 57333	LAB_ID	AX86090			AX86090			AX86091			AX86091		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	73.4			73.4			86.1			86.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		27	U					23	U				
DIURON		27	U					23	U				
MALEIC HYDRAZIDE					27	U					23	U	
MONURON		27	U					23	U				
PROPOXUR		27	U					23	U				
ROTENONE		27	U					23	U				

PROJ_NO: 02063	NSAMPLE	SB-17-118-0001			SB-17-118-0001RE			SB-17-118-0104			SB-17-118-0104RE		
SDG: 57333	LAB_ID	AX86092			AX86092			AX86093			AX86093		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	92.0			92.0			85.8			85.8		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		22	U					23	U				
DIURON		22	U					23	U				
MALEIC HYDRAZIDE					22	U					23	U	
MONURON		22	U					23	U				
PROPOXUR		22	U					23	U				
ROTENONE		22	U					23	U				

PROJ_NO: 02063	NSAMPLE	SB-17-125-0608			SB-17-125-0608RE			SB-17-132-0408			SB-17-132-0408RE		
SDG: 57333	LAB_ID	AX86078			AX86078			AX86094			AX86094		
FRACTION: HERB	SAMP_DATE	10/15/2008			10/15/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	81.5			81.5			63.9			63.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		25	UJ	HR				31	U				
DIURON		25	UJ	HNR				31	U				
MALEIC HYDRAZIDE					25	UJ	R				31	U	
MONURON		25	UJ	HNR				20	J	GP			
PROPOXUR		25	UJ	HR				31	U				
ROTENONE		25	UJ	HR				31	U				

PROJ_NO: 02063	NSAMPLE	SB-17-141-0307			SB-17-141-0307RE			SB-17-DUP07			SB-17-DUP07RE		
SDG: 57333	LAB_ID	AX86096			AX86096			AX86086			AX86086		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			FD			FD		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	65.6			65.6			87.2			87.2		
	DUP_OF							SB-17-105-0001			SB-17-105-0001		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		30	U					23	UJ	R			
DIURON		30	U					23	UJ	NR			
MALEIC HYDRAZIDE					30	U					23	U	
MONURON		100						23	UJ	NR			
PROPOXUR		30	U					23	UJ	R			
ROTENONE		30	U					23	UJ	R			

PROJ_NO: 02063	NSAMPLE	SB-17-DUP08			SB-17-DUP08RE		
SDG: 57333	LAB_ID	AX86095			AX86095		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	FD			FD		
	UNITS	UG/KG			UG/KG		
	PCT_SOLIDS	54.1			54.1		
	DUP_OF	SB-17-132-0408			SB-17-132-0408		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		37	U				
DIURON		37	U				
MALEIC HYDRAZIDE					37	U	
MONURON		140	J	G			
PROPOXUR		37	U				
ROTENONE		37	U				

TETRA TECH

INTERNAL CORRESPONDENCE

C-NAVY-03-09-3086W

Date: March 11, 2009

c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Jennifer Cardinal (no copy) JC

Subject: Tier II Organic Data Validation, SDG 57717
APPL Inc, through Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Special Pesticides:

9/Groundwaters/	S17-GW-DUP01	S17-GW-MW1701
	S17-GW-MW1702	S17-GW-MW1703
	S17-GW-MW1704	S17-GW-MWNASB65
	S17-GW-MWNASB66	S17-GW-MWNASB68
	S17-GW-MWNASB98	
	(Field Duplicate Pair: S17-GW-MW1703/S17-GW-DUP01)	
1/Rinsate Blank/	S17-GW-RB01	

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the following special pesticide analytical data for the samples in this SDG.

Compound	Method of Analysis/ Instrumentation
Pyrethrins or Pyrethrum	SW-846 Method 8081A / GC/ECD
Resmethrin or Esmethrin	SW-846 Method 8081A / GC/MS
Avitrol or 4-Aminopyridine	SW-846 Method 8141A / GC/MS
Diazinon	SW-846 Method 8141A/ GC/NPD
Malathion	
Simazine or Simaz	
Maleic Hydrazide	SW-846 Method 8321A / LC/MS
Carbaryl or Sevin	SW-846 Method 8321A / LC/MS & LC/MS/MS
Diuron or Drexel	
Monuron	
Propoxur or Baygon	
Rotenone or Rotenon	

The samples in this SDG were collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine from December 8 to 10, 2008. Sample collection and analysis was performed according to the requirements of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The pesticides validation was performed in accordance with the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Organic Analyses, Part III, February 2004.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The data were evaluated based on the following parameters:

	• Data Completeness
*	• Preservation and Technical Holding Times
*	• GC/ECD Instrument Performance Check (Retention Times)
*	• Initial and Continuing Calibrations
*	• Blanks
*	• Surrogate Compounds
*	• Internal Standards
*	• Matrix Spike/Matrix Spike Duplicate
*	• Laboratory Control Sample/Laboratory Control Sample Duplicate
*	• Field Duplicates
*	• Analyte Identification/Quantitation
*	• Reporting Limits

* All criteria were met for this parameter.

Data Completeness

Method 8081A Organochlorine Pesticides

On March 9, 2009 the laboratory provided the linear regression fit equations for the initial calibration; an explanation of how the MDLs were established; IC spectra for the resmethrin I and resmethrin II compounds; a resubmittal of the initial calibration summary Form 6 for both the surrogate compounds and the target pyrethrins including the concentration of the initial calibration standards; and an explanation of "Mix A" and "Mix B" surrogates. A second source calibration standard was not available.

Method 8141A Organophosphorus Pesticides

On March 9, 2009 the laboratory provided the linear regression fit equations for the initial calibration; an explanation of how the MDLs were established; IC spectra for avitrol (4-aminopyridine); and a resubmittal of the initial calibration summary Form 6 including the response areas, the concentrations of the initial calibration standards, and footnotes explaining calibration abbreviations used by the laboratory. A second source calibration standard was not available.

Method 8321A Carbamate Pesticides

On March 9, 2009 the laboratory provided the internal standard summary form since it was missing from the original data package.

Method 8321A Maleic Hydrazide

On March 9, 2009 the laboratory provided a resubmittal of the initial calibration summary Form 6 including the concentrations of the initial calibration standards and the internal standard summary form since they were missing from the original data package. A second source calibration standard was not available.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

The project goals with respect to accuracy, precision, sensitivity, and completeness were met for all analyses in this SDG. Data usability was not impacted with regards to accuracy, precision, sensitivity, and completeness.

Tables: Data Validation Qualifiers and Codes
Data Summary Tables

Enclosures: Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	S17-GW-DUP01			S17-GW-MW1701			S17-GW-MW1702			S17-GW-MW1703		
SDG: 57717	LAB_ID	AX88792			AX88793			AX88790			AX88791		
FRACTION: PEST	SAMP_DATE	12/8/2008			12/9/2008			12/8/2008			12/8/2008		
MEDIA: WATER	QC_TYPE	FD			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF	S17-GW-MW1703											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		1.2	U		1.2	U		120	U		1.2	U	
RESMETHRIN		0.5	U		0.5	U		0.5	U		0.5	U	

PROJ_NO: 02063	NSAMPLE	S17-GW-MW1704			S17-GW-MWNASB65			S17-GW-MWNASB66			S17-GW-MWNASB68		
SDG: 57717	LAB_ID	AX88794			AX88795			AX88797			AX88796		
FRACTION: PEST	SAMP_DATE	12/9/2008			12/9/2008			12/9/2008			12/9/2008		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		12	U		1.2	U		1.2	U		1.2	U	
RESMETHRIN		0.5	U		0.5	U		0.5	U		0.5	U	

PROJ_NO: 02063	NSAMPLE	S17-GW-MWNASB98			S17-GW-RB01		
SDG: 57717	LAB_ID	AX88798			AX88799		
FRACTION: PEST	SAMP_DATE	12/9/2008			12/10/2008		
MEDIA: WATER	QC_TYPE	NM			RB		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS						
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		1.2	U		1.2	U	
RESMETHRIN		0.5	U		0.5	U	

PROJ_NO: 02063	NSAMPLE	S17-GW-DUP01			S17-GW-MW1701			S17-GW-MW1702			S17-GW-MW1703		
SDG: 57717	LAB_ID	AX88792			AX88793			AX88790			AX88791		
FRACTION: OPEST	SAMP_DATE	12/8/2008			12/9/2008			12/8/2008			12/8/2008		
MEDIA: WATER	QC_TYPE	FD			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF	S17-GW-MW1703											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		0.5	U		0.5	U		0.5	U		0.5	U	
DIAZINON		0.05	U		0.05	U		0.05	U		0.05	U	
MALATHION		0.1	U		0.1	U		0.1	U		0.1	U	
SIMAZINE		0.5	U		0.5	U		0.5	U		0.5	U	

PROJ_NO: 02063	NSAMPLE	S17-GW-MW1704			S17-GW-MWNASB65			S17-GW-MWNASB66			S17-GW-MWNASB68		
SDG: 57717	LAB_ID	AX88794			AX88795			AX88797			AX88796		
FRACTION: OPEST	SAMP_DATE	12/9/2008			12/9/2008			12/9/2008			12/9/2008		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		0.5	U		0.5	U		0.5	U		0.5	U	
DIAZINON		0.05	U		0.05	U		0.05	U		0.05	U	
MALATHION		0.1	U		0.1	U		0.1	U		0.1	U	
SIMAZINE		0.5	U		0.5	U		0.5	U		0.5	U	

PROJ_NO: 02063	NSAMPLE	S17-GW-MWNASB98			S17-GW-RB01		
SDG: 57717	LAB_ID	AX88798			AX88799		
FRACTION: OPEST	SAMP_DATE	12/9/2008			12/10/2008		
MEDIA: WATER	QC_TYPE	NM			RB		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS						
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		0.5	U		0.5	U	
DIAZINON		0.05	U		0.05	U	
MALATHION		0.1	U		0.1	U	
SIMAZINE		0.5	U		0.5	U	

PROJ_NO: 02063	NSAMPLE	S17-GW-DUP01			S17-GW-DUP01RE			S17-GW-MW1701			S17-GW-MW1701RE		
SDG: 57717	LAB_ID	AX88792			AX88792			AX88793			AX88793		
FRACTION: HERBA	SAMP_DATE	12/8/2008			12/8/2008			12/9/2008			12/9/2008		
MEDIA: WATER	QC_TYPE	FD			FD			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF	S17-GW-MW1703			S17-GW-MW1703								
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		1	U					1	U				
DIURON		1	U					1	U				
MALEIC HYDRAZIDE					2	U					1.3	J	P
MONURON		1	U					1	U				
PROPOXUR		1	U					1	U				
ROTENONE		1	U					1	U				

PROJ_NO: 02063	NSAMPLE	S17-GW-MW1702			S17-GW-MW1702RE			S17-GW-MW1703			S17-GW-MW1703RE		
SDG: 57717	LAB_ID	AX88790			AX88790			AX88791			AX88791		
FRACTION: HERBA	SAMP_DATE	12/8/2008			12/8/2008			12/8/2008			12/8/2008		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		1	U					1	U				
DIURON		1	U					1	U				
MALEIC HYDRAZIDE					1.8	J	P				1.5	J	P
MONURON		1	U					1	U				
PROPOXUR		0.43	J	P				1	U				
ROTENONE		1	U					1	U				

PROJ_NO: 02063	NSAMPLE	S17-GW-MW1704			S17-GW-MW1704RE			S17-GW-MWNASB65			S17-GW-MWNASB65RE		
SDG: 57717	LAB_ID	AX88794			AX88794			AX88795			AX88795		
FRACTION: HERBA	SAMP_DATE	12/9/2008			12/9/2008			12/9/2008			12/9/2008		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		1	U					1	U				
DIURON		1	U					1	U				
MALEIC HYDRAZIDE					2	U					1.3	J	P
MONURON		1	U					1	U				
PROPOXUR		1	U					1	U				
ROTENONE		1	U					1	U				

PROJ_NO: 02063	NSAMPLE	S17-GW-MWNASB66			S17-GW-MWNASB66RE			S17-GW-MWNASB68			S17-GW-MWNASB68RE		
SDG: 57717	LAB_ID	AX88797			AX88797			AX88796			AX88796		
FRACTION: HERBA	SAMP_DATE	12/9/2008			12/9/2008			12/9/2008			12/9/2008		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		1	U					1	U				
DIURON		1	U					1	U				
MALEIC HYDRAZIDE					2	U					2	U	
MONURON		1	U					1	U				
PROPOXUR		1	U					0.33	J	P			
ROTENONE		1	U					1	U				

PROJ_NO: 02063	NSAMPLE	S17-GW-MWNASB98			S17-GW-MWNASB98RE			S17-GW-RB01			S17-GW-RB01RE		
SDG: 57717	LAB_ID	AX88798			AX88798			AX88799			AX88799		
FRACTION: HERBA	SAMP_DATE	12/9/2008			12/9/2008			12/10/2008			12/10/2008		
MEDIA: WATER	QC_TYPE	NM			NM			RB			RB		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		1	U					1	U				
DIURON		1	U					1	U				
MALEIC HYDRAZIDE					1.9	J	P				2	U	
MONURON		0.36	J					1	U				
PROPOXUR		1	U					1	U				
ROTENONE		1	U					1	U				

TETRA TECH

INTERNAL CORRESPONDENCE

C-NAVY-03-09-3074W

Date: March 2, 2009

c: File G00646-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Jennifer Cardinal (no copy) JC

Subject: Tier II Inorganic Data Validation, SDG CTO070-1
Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Arsenic/Lead/Zinc/Cyanide:

20/Soils/	SB-17-123-0001	SB-17-123-0104	SB-17-125-0001
	SB-17-125-0104	SB-17-125-0608	SB-17-126-0001
	SB-17-126-0104	SB-17-127-0306	SB-17-128-0506
	SB-17-129-0306	SB-17-130-0001	SB-17-130-0104
	SB-17-131-0001	SB-17-131-0104	SB-17-132-0001
	SB-17-132-0104	SB-17-133-0001	SB-17-133-0104
	SB-17-DUP01	SB-17-DUP04	

(Field Duplicate Pairs: SB-17-132-0104/SB-17-DUP01, SB-17-129-0306/SB-17-DUP04)

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the arsenic, lead, zinc, and cyanide analytical data from the samples collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine from October 14-15, 2008. Sample collection and analysis was performed according to the requirements of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The metals (arsenic, lead, and zinc) analysis was performed according to USEPA SW-846 Methods 6010B. The cyanide analysis was performed according to USEPA SW-846 M9012. The Tier II data validation was performed in accordance with the Region I EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part IV, Inorganic Data Validation Functional Guidelines, November 2008.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The analytical data in this SDG were evaluated based on the following parameters:

- Data Completeness
- * Holding Times
- * Calibration Verification
- Laboratory Blank Analyses
- * ICP Interference Check Sample Results
- * Matrix Spike/Matrix Spike Duplicate
- * Laboratory Duplicate Results

* • Laboratory Control Sample Results
• Field Duplicate Precision
* • ICP Serial Dilution Results
* • Percent Solids
• Reporting Limits

* All quality control criteria were met for this parameter.

Data Completeness

Metals

On February 24, 2009 the laboratory resubmitted all metals QC summary forms to report only arsenic, lead, and zinc as requested in the Work Plan and to report all results to the method detection limits.

Laboratory Blank Analyses

Metals

The following table summarizes the level of blank contamination detected in the laboratory blanks associated with the soil samples:

Analyte	Maximum Conc.	Action Level	Affected Samples
Arsenic	2.17 µg/L	1.09 mg/kg	SB-17-125-0608, SB-17-127-0306

The positive arsenic results below the blank action level were changed to non-detected values (U) at elevated reporting limits due to laboratory blank contamination.

The action level in the table above is based on an assumption of 100 percent solids, 1 g of sample analyzed, and a dilution factor of 1. The action level for each sample is different, based on the actual percent solids, amount of soil sample analyzed, and the dilution factor.

Arsenic contamination was found in the laboratory blank; therefore, the project sensitivity goals may be impacted since the elevated detection limits exceed the project action limit for arsenic. The non-detected arsenic results in the affected samples are usable as estimated reporting limits.

Field Duplicate Precision

Metals

The following table summarizes the analyte that recovered outside of the 50% RPD QC limit in the analysis of the field duplicate pair SB-17-129-0306/SB-17-DUP04:

Analyte	Sample Result	Duplicate Result	RPD	Action	
				(+)	NDs
Arsenic	2 mg/kg	8.7 mg/kg	125	J	

Additionally, the absolute difference of the arsenic results below 5xQL exceeded 4xQL for the field duplicate analysis of SB-17-129-0306/SB-17-DUP04.

The positive arsenic results are estimated (J) in the soil samples due to poor field duplicate precision. The results of the field duplicate analysis exceeded the QC limits for arsenic; therefore, the project precision goals may be impacted. The positive arsenic results in the affected soil samples are usable as estimated values for which the bias is indeterminate.

Reporting Limits

The positive results below than the laboratory's quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

Metals

The laboratory reported non-detected metals results down to the MDL.

The laboratory reporting limits met all project action limits with the following exception. The arsenic reporting limit for sample SB-17-129-0306 did not meet the project action limit due to the high moisture content of the sample. Data usability is not impacted since this arsenic result is positive.

Reporting limits were raised for arsenic in select samples due to blank contamination. As discussed above in the Laboratory Blank Analyses section, the project sensitivity goals may be impacted arsenic in samples SB-17-125-0608 and SB-17-127-0306.

Cyanide

The laboratory reported non-detected cyanide results down to the QL.

The laboratory reporting limits met the project action limit for cyanide for all samples.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity, and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Metals

The project goals with respect to precision were met for the metals data set with the following exception. Arsenic was qualified as estimated in all soil samples due to poor field duplicate precision. Although specific method criteria were not met in this instance, the affected positive results are usable as estimated values which may have a minor impact on data usability.

The project goals with respect to sensitivity were met for the metals data set with the following exceptions. The arsenic reporting limits were elevated for samples SB-17-125-0608 and SB-17-127-0306 due to blank actions. The elevated detection limits exceed the arsenic project action limit. Data usability may be impacted.

The project goals with respect to accuracy and completeness were met for the metals data set. Data usability is not impacted with regards to accuracy and completeness.

Cyanide

The project goals with respect to accuracy, precision, sensitivity, and completeness were met for the cyanide data set. Data usability is not impacted with regards to accuracy, precision, sensitivity, and completeness.

Tables: Data Validation Qualifiers and Codes
Data Summary Tables

Enclosures: Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	SB-17-123-0001			SB-17-123-0104			SB-17-125-0001			SB-17-125-0104		
SDG: CTO070-1	LAB_ID	SB5867-034			SB5867-035			SB5867-030			SB5867-031		
FRACTION: M	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	89.2			94.7			88.6			82.8		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		9.1	J	G	1.4	J	G	5.6	J	G	2.7	J	G
LEAD		5.7			1.8			23			7		
ZINC		32.7			10			40.8			24.2		

PROJ_NO: 02063	NSAMPLE	SB-17-125-0608			SB-17-126-0001			SB-17-126-0104			SB-17-127-0306		
SDG: CTO070-1	LAB_ID	SB5867-029			SB5867-025			SB5867-026			SB5867-023		
FRACTION: M	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	89.0			94.4			90.5			84.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		0.89	UJ	AG	3	J	G	1.6	J	G	0.99	UJ	AG
LEAD		1.9			20.6			2.5			2.1		
ZINC		13.6			38			15			10.3		

PROJ_NO: 02063	NSAMPLE	SB-17-128-0506			SB-17-129-0306			SB-17-130-0001			SB-17-130-0104		
SDG: CTO070-1	LAB_ID	SB5867-024			SB5867-032			SB5867-027			SB5867-028		
FRACTION: M	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	73.2			62.1			92.7			90.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		1.4	J	G	2	J	G	5.9	J	G	1.7	J	G
LEAD		3.6			4.7			23.8			4.4		
ZINC		21.6			17.5			46			12.6		

PROJ_NO: 02063	NSAMPLE	SB-17-131-0001			SB-17-131-0104			SB-17-132-0001			SB-17-132-0104		
SDG: CTO070-1	LAB_ID	SB5867-002			SB5867-003			SB5867-004			SB5867-005		
FRACTION: M	SAMP_DATE	10/14/2008			10/14/2008			10/14/2008			10/14/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	89.1			86.3			88.4			78.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		6.8	J	G	6	J	G	6.9	J	G	3.4	J	G
LEAD		37.5			6.2			12.3			12.6		
ZINC		47.7			25.5			34.4			27.8		

PROJ_NO: 02063	NSAMPLE	SB-17-133-0001			SB-17-133-0104			SB-17-DUP01			SB-17-DUP04		
SDG: CTO070-1	LAB_ID	SB5867-007			SB5867-008			SB5867-006			SB5867-033		
FRACTION: M	SAMP_DATE	10/14/2008			10/14/2008			10/14/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			FD			FD		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	82.0			79.8			78.1			60.3		
	DUP_OF							SB-17-132-0104			SB-17-129-0306		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		7.9	J	G	2	J	G	3.6	J	G	8.7	J	G
LEAD		16.6			4.1			12.8			4.3		
ZINC		36.1			13.7			29.6			20.2		

PROJ_NO: 02063	NSAMPLE	SB-17-123-0001			SB-17-123-0104			SB-17-125-0001			SB-17-125-0104		
SDG: CTO070-1	LAB_ID	SB5867-34			SB5867-35			SB5867-30			SB5867-31		
FRACTION: MISC	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	89.2			94.7			88.6			82.8		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.5	U		0.5	U		0.34	J	P	0.55	U	

PROJ_NO: 02063	NSAMPLE	SB-17-125-0608			SB-17-126-0001			SB-17-126-0104			SB-17-127-0306		
SDG: CTO070-1	LAB_ID	SB5867-29			SB5867-25			SB5867-26			SB5867-23		
FRACTION: MISC	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	89.0			94.4			90.5			84.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.5	U		0.5	U		0.5	U		0.65	U	

PROJ_NO: 02063	NSAMPLE	SB-17-128-0506			SB-17-129-0306			SB-17-130-0001			SB-17-130-0104		
SDG: CTO070-1	LAB_ID	SB5867-24			SB5867-32			SB5867-27			SB5867-28		
FRACTION: MISC	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	73.2			62.1			92.7			90.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.65	U		0.7	U		0.5	U		0.6		

PROJ_NO: 02063	NSAMPLE	SB-17-131-0001			SB-17-131-0104			SB-17-132-0001			SB-17-132-0104		
SDG: CTO070-1	LAB_ID	SB5867-2			SB5867-3			SB5867-4			SB5867-5		
FRACTION: MISC	SAMP_DATE	10/14/2008			10/14/2008			10/14/2008			10/14/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	89.1			86.3			88.4			78.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.5	U		0.55	U		0.55	U		0.6	U	

PROJ_NO: 02063	NSAMPLE	SB-17-133-0001			SB-17-133-0104			SB-17-DUP01			SB-17-DUP04		
SDG: CTO070-1	LAB_ID	SB5867-7			SB5867-8			SB5867-6			SB5867-33		
FRACTION: MISC	SAMP_DATE	10/14/2008			10/14/2008			10/14/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			FD			FD		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	82.0			79.8			78.1			60.3		
	DUP_OF							SB-17-132-0104			SB-17-129-0306		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.6	U		0.6	U		0.6	U		0.8	U	

TETRA TECH

INTERNAL CORRESPONDENCE

C-NAVY-02-09-3069W

Date: February 23, 2009

c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Jennifer Cardinal (no copy) JC

Subject: Tier II Organic Data Validation, SDG CTO070-1
Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Pesticides/Herbicides:

20/Soils/	SB-17-123-0001	SB-17-123-0104	SB-17-125-0001
	SB-17-125-0104	SB-17-125-0608	SB-17-126-0001
	SB-17-126-0104	SB-17-127-0306	SB-17-128-0506
	SB-17-129-0306	SB-17-130-0001	SB-17-130-0104
	SB-17-131-0001	SB-17-131-0104	SB-17-132-0001
	SB-17-132-0104	SB-17-133-0001	SB-17-133-0104
	SB-17-DUP01	SB-17-DUP04	

(Field Duplicate Pairs: SB-17-132-0104/SB-17-DUP01, SB-17-129-0306/SB-17-DUP04)

Pesticides:

14/Soils/	SB-17-134-0203	SB-17-135-0203	SB-17-136-0203
	SB-17-137-0203	SB-17-138-0203	SB-17-139-0203
	SB-17-140-0203	SB-17-141-0203	SB-17-142-0203
	SB-17-143-0203	SB-17-144-0203	SB-17-145-0203
	SB-17-DUP02	SB-17-DUP03	

(Field Duplicate Pairs: SB-17-142-0203/SB-17-DUP02, SB-17-134-0203/SB-17-DUP03)

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the pesticide and herbicide analytical data for the samples in this SDG. The samples were collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine from October 14-15, 2008. Sample collection and analysis was performed according to the requirements of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The pesticide and herbicide analyses were performed according to USEPA SW-846 Methods 8081 and 8151, respectively. The pesticides and herbicide validation was performed in accordance with the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Organic Analyses, Part III, February 2004.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The data were evaluated based on the following parameters:

- Data Completeness
- * Preservation and Technical Holding Times
- * Pesticide Degradation
- Initial and Continuing Calibrations
- Blanks
- * Surrogate Compounds
- Matrix Spike/Matrix Spike Duplicate
- Laboratory Control Sample/Laboratory Control Sample Duplicate
- * Field Duplicates
- Analyte Identification
- Reporting Limits

* All criteria were met for this parameter.

Data Completeness

The laboratory noted that the sample container for sample SB-17-134-0203 was labeled with the sampling time 12:30 while the chain-of-custody was labeled with the sampling time 12:35. Per TtNUS field sampler, J. Traut, the correct sampling time is 12:35.

The laboratory noted that the sample container for sample SB-17-DUP03 was labeled with the sample time 12:35 while the chain-of-custody was labeled with the sample time 12:40. Per TtNUS field sampler, J. Traut, the correct sampling time is 12:40.

The herbicide analysis was canceled for select samples as noted by the TtNUS field sampler, J. Traut, on the chain-of-custody forms on October 16, 2008.

The laboratory was contacted regarding the initial calibration verification (ICV) summary forms for the DRO, pesticides, and herbicides analyses. On February 19, 2009 the laboratory explained that the ICV results are reported with the calibration verification forms.

Initial and Continuing Calibrations

Pesticides

The following table summarizes the pesticide compounds that failed to meet the continuing calibration (CC) criterion of %D <25:

Compound	%D Range	Action		Affected Samples
		(+)	NDs	
4,4'-DDT	-52.00 to -47.40	J		SB-17-138-0203(DL), SB-17-144-0203(DL)
4,4'-DDD	25.20 to 94.80	J	UJ	SB-17-140-0203, SB-17-142-0203, SB-17-DUP02, SB-17-139-0203, SB-17-127-0306, SB-17-128-0506, SB-17-126-0001, SB-17-126-0104, SB-17-130-0001

Although the %D was outside of the QC limits for 4,4'-DDT and 4,4'-DDD; the project accuracy goals were not impacted since the instrument calibration variability is below safety margin of greater than 100% allocated for these compounds in the soil samples. The positive and non-detected results in the affected samples are usable as estimated values and estimated quantitation limits.

Blanks

Pesticides

The following table summarizes the level of blank contamination detected in the laboratory blank associated with the samples.

Compound	Type of Blank	Maximum Conc. (µg/Kg)	Action Level (µg/Kg)	Affected Samples
4,4'-DDD	Method	1.7	8.5	SB-17-125-0608, SB-17-131-0104, SB-17-132-0104, SB-17-136-0203, SB-17-139-0203, SB-17-140-0203, SB-17-144-0203, SB-17-145-0203, SB-17-DUP01
4,4'-DDT	Method	9.4	47	SB-17-123-0001, SB-17-127-0306, SB-17-129-0306, SB-17-130-0104, SB-17-133-0104, SB-17-137-0203, SB-17-141-0203, SB-17-142-0203, SB-17-143-0203, SB-17-DUP02, SB-17-DUP04, SB-17-126-0004, SB-17-130-0001, SB-17-132-0001, SB-17-132-0104, SB-17-133-0001, SB-17-134-0203, SB-17-140-0203, SB-17-DUP01, SB-17-DUP03

Blank actions were applied to the affected samples due to 4,4'-DDT and 4,4'-DDD method blank contamination. The 5x rule applies for these pesticide compounds. The positive results for 4,4'-DDT and 4,4'-DDD in the affected samples were changed to non-detected values at the sample-specific project quantitation limit or at elevated quantitation limits.

Although 4,4'-DDT and 4,4'-DDD contamination was found in the laboratory method blank, the project sensitivity goals are not impacted since the non-detected values do not exceed the project action limits for these compounds. The 4,4'-DDT and 4,4'-DDD results in the affected samples are usable as non-detected values.

Matrix Spike/Matrix Spike Duplicates

Pesticides

The following table summarizes the results of the matrix spike and/or matrix spike duplicate (MS/MSD) analysis of sample SB-17-135-0203 that were outside of the QC limits:

Analyte	% Rec.	QC Limits	Action	
			(+)	NDs
Heptachlor	58	59-118	J	
4,4'-DDE	36	69-120	J	
Endosulfan I	56	58-108		UJ
4,4'-DDD	56, 36	61-127	J	

The percent recovery criteria were not met for heptachlor, 4,4'-DDE, endosulfan I, and 4,4'-DDD; therefore, the project accuracy goals may be impacted. The affected positive and non-detected results in sample SB-17-135-0203 are usable as estimated values and estimated quantitation limits which may be biased low

The following table summarizes the results of the matrix spike and/or matrix spike duplicate (MS/MSD) analysis of sample SB-17-125-0104 that were outside of the QC limits:

Analyte	% Rec.	QC Limits	Action	
			(+)	NDs
Alpha-chlordane	8, 36	64-121	J	
4,4'-DDD	20	61-127	J	

The percent recovery criteria were not met for alpha-chlordane and 4,4'-DDD; therefore, the project accuracy goals may be impacted. The affected positive results in sample SB-17-125-0104 are usable as estimated values which may be biased low

Laboratory Control Sample/Laboratory Control Sample Duplicates

Pesticides

The following table summarizes the pesticide compound that failed to meet the LCS recovery limits:

Compound	% Rec.	QC Limits	Action		Affected Samples
			(+)	NDs	
Gamma-BHC	65	67-116	J	UJ	SB-17-133-0001, SB-17-133-0104, SB-17-137-0203, SB-17-141-0203, SB-17-145-0203, SB-17-144-0203, SB-17-134-0203, SB-17-DUP03, SB-17-138-0203, SB-17-143-0203
4,4'-DDE	65	69-120	J	UJ	
Endosulfan I	43	58-108		UJ	
Endosulfan II	54	63-116		UJ	
Endrin	57	63-118		UJ	

The laboratory control sample recovery criteria were not met for gamma-BHC, 4,4'-DDE, endosulfan I, endosulfan II, and endrin; therefore, the project accuracy goals may be impacted. The positive and non-detected gamma-BHC, 4,4'-DDE, endosulfan I, endosulfan II results in the affected samples are usable as estimated values and estimated quantitation limits which may be biased low.

Analyte Identification/Quantitation

Pesticides

The relative percent difference (RPD) between the results of analytical columns 1 and 2 exceeded the 40% RPD QC criterion for the compounds in the following samples:

Sample	Analyte	RPD	Action (+)
SB-17-131-0001	Heptachlor	41.5	J
SB-17-131-0104	Gamma-chlordane	63.1	J
SB-17-138-0203	4,4'-DDD	79.3	J
	Alpha-chlordane	40.5	J
SB-17-136-0203	Alpha-chlordane	41.5	J
	4,4'-DDD	55.1	J
SB-17-135-0203	4,4'-DDD	48.4	J
SB-17-127-0306	Gamma-chlordane	44.3	J
SB-17-126-0001	Gamma-chlordane	50.4	J
	Alpha-chlordane	49.1	J
SB-17-125-0104	Alpha-chlordane	55.0	J
SB-17-123-0104	Alpha-chlordane	40.5	J

The analyte quantitation relative percent differences exceeded the 40% RPD QC limit for the compounds in the samples listed above; therefore, the project accuracy goals may be impacted. The affected results in these samples are usable as estimated values.

Reporting Limits

All positive results below the quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

Herbicides

The project action limit for 2,4-D was not met due to the percent moisture of the samples. Data usability may be impacted.

Pesticides

Project action limits were not achievable for all pesticides except for 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, methoxychlor, and toxaphene as highlighted in SAP Worksheet 15a of the Remedial Investigation Work

Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008. Data usability may be impacted.

The reporting limits were raised for 4,4'-DDT and 4,4'-DDD in select samples due to blank contamination. As discussed in the Blanks section, the project sensitivity goals are not impacted.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Pesticides

The project goals with respect to accuracy were met for the pesticides data set with the following exceptions. Heptachlor, 4,4'-DDE, endosulfan I, and 4,4'-DDD were qualified as estimated in sample SB-17-135-0203 due to low MS/MSD recoveries; the affected results may be biased low. Alpha-chlordane and 4,4'-DDD were qualified as estimated in sample SB-17-125-0104 due to low MS/MSD recoveries; the affected results may be biased low. Gamma-BHC, 4,4'-DDE, endosulfan I, endosulfan II, and endrin were qualified as estimated in select samples due to low LCS recoveries; the affected results may be biased low. Select compounds were qualified as estimated in some samples due to analytical interferences detected in the dual column analysis. Although specific method criteria were not met in these instances, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability. Additionally, 4,4'-DDT and 4,4'-DDD were qualified as estimated in select samples due to instrument calibration variability. Although specific method criteria were not met in these instances, data usability is not impacted and the affected positive and non-detected results are usable as estimated values and estimated quantitation limits.

The project goals with respect to sensitivity were met for the pesticides data set with the following exception. Project action limits were not achievable for all pesticides except for 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, methoxychlor, and toxaphene. Data usability may be impacted.

The project goals with respect to precision and completeness were met for the pesticides data set. Data usability was not impacted with regards to precision and completeness.

Herbicides

The project goals with respect to sensitivity were not met for 2,4-D was not met due to the percent moisture of the samples. Data usability may be impacted.

The project goals with respect to accuracy, precision, and completeness were met for the herbicides data set. Data usability was not impacted with regards to accuracy, precision, and completeness.

Tables: Data Validation Qualifiers and Codes
Data Summary Tables

Enclosures: Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	SB-17-123-0001			SB-17-123-0104			SB-17-123-0104DL			SB-17-125-0001		
SDG: CTO070-1	LAB_ID	SB5867-34RA3			SB5867-35DL2			SB5867-35DL			SB5867-30DL2		
FRACTION: PEST/PCB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	89.2			94.7			94.7			88.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		3.7	U		20						53		
4,4'-DDE		3.7	U		49						250		
4,4'-DDT		3.7	U	A				530					
ALDRIN		1.9	U		9	U					9.6	U	
ALPHA-BHC		1.9	U		9	U					9.6	U	
ALPHA-CHLORDANE		0.8	J	P	200	J	U				100		
BETA-BHC		1.9	U		9	U					9.6	U	
DELTA-BHC		1.9	U		9	U					9.6	U	
DIELDRIN		3.7	U		17	U					19	U	
ENDOSULFAN I		1.9	U		9	U					9.6	U	
ENDOSULFAN II		3.7	U		17	U					19	U	
ENDOSULFAN SULFATE		3.7	U		17	U					19	U	
ENDRIN		3.7	U		17	U					19	U	
ENDRIN ALDEHYDE		3.7	U		17	U					19	U	
ENDRIN KETONE		3.7	U		17	U					19	U	
GAMMA-BHC (LINDANE)		1.9	U		9	U					9.6	U	
GAMMA-CHLORDANE		1	J	P	280						130		
HEPTACHLOR		1.9	U		11						9.6	U	
HEPTACHLOR EPOXIDE		1.9	U		9	U					9.6	U	
METHOXYCHLOR		19	U		90	U					96	U	
TOXAPHENE		37	U		170	U					190	U	

PROJ_NO: 02063	NSAMPLE	SB-17-125-0001DL			SB-17-125-0104			SB-17-125-0104DL			SB-17-125-0608		
SDG: CTO070-1	LAB_ID	SB5867-30DL			SB5867-31RA			SB5867-31DL			SB5867-29RA		
FRACTION: PEST/PCB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	88.6			82.8			82.8			89.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD					39	J	D				3.7	U	A
4,4'-DDE					67						3.7	U	
4,4'-DDT		1200						390			52		
ALDRIN					2	U					1.9	U	
ALPHA-BHC					2	U					1.9	U	
ALPHA-CHLORDANE					32	J	DU				1.9	U	
BETA-BHC					2	U					1.9	U	
DELTA-BHC					2	U					1.9	U	
DIELDRIN					4	U					3.7	U	
ENDOSULFAN I					2	U					1.9	U	
ENDOSULFAN II					4	U					3.7	U	
ENDOSULFAN SULFATE					4	U					3.7	U	
ENDRIN					4	U					3.7	U	
ENDRIN ALDEHYDE					4	U					3.7	U	
ENDRIN KETONE					4	U					3.7	U	
GAMMA-BHC (LINDANE)					2	U					1.9	U	
GAMMA-CHLORDANE					2	U					1.9	U	
HEPTACHLOR					2	U					1.9	U	
HEPTACHLOR EPOXIDE					2	U					1.9	U	
METHOXYCHLOR					20	U					19	U	
TOXAPHENE					40	U					37	U	

PROJ_NO: 02063	NSAMPLE	SB-17-126-0001			SB-17-126-0001DL			SB-17-126-0104			SB-17-127-0306		
SDG: CTO070-1	LAB_ID	SB5867-25			SB5867-25DL			SB5867-26			SB5867-23		
FRACTION: PEST/PCB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.4			94.4			90.5			84.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		3.5	UJ	C				3.6	UJ	C	3.9	UJ	C
4,4'-DDE		19						3.6	U		3.9	U	
4,4'-DDT					110			4.8	U	A	3.9	U	A
ALDRIN		1.8	U					1.9	U		2	U	
ALPHA-BHC		1.8	U					1.9	U		2	U	
ALPHA-CHLORDANE		13	J	U				1.9	U		3.5		
BETA-BHC		1.8	U					1.9	U		2	U	
DELTA-BHC		1.8	U					1.9	U		2	U	
DIELDRIN		3.5	U					3.6	U		3.9	U	
ENDOSULFAN I		1.8	U					1.9	U		2	U	
ENDOSULFAN II		3.5	U					3.6	U		3.9	U	
ENDOSULFAN SULFATE		3.5	U					3.6	U		3.9	U	
ENDRIN		3.5	U					3.6	U		3.9	U	
ENDRIN ALDEHYDE		3.5	U					3.6	U		3.9	U	
ENDRIN KETONE		3.5	U					3.6	U		3.9	U	
GAMMA-BHC (LINDANE)		1.8	U					1.9	U		2	U	
GAMMA-CHLORDANE		17	J	U				1.9	U		3.8	J	U
HEPTACHLOR		1.8	U					1.9	U		2	U	
HEPTACHLOR EPOXIDE		1.8	U					1.9	U		2	U	
METHOXYCHLOR		18	U					19	U		20	U	
TOXAPHENE		35	U					36	U		39	U	

PROJ_NO: 02063	NSAMPLE	SB-17-128-0506			SB-17-129-0306			SB-17-130-0001			SB-17-130-0104		
SDG: CTO070-1	LAB_ID	SB5867-24			SB5867-32RA			SB5867-27			SB5867-28RA		
FRACTION: PEST/PCB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	73.2			62.1			92.7			90.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		4.5	UJ	C	5.3	U		3.6	UJ	C	3.6	U	
4,4'-DDE		4.5	U		5.3	U		4.6			3.6	U	
4,4'-DDT		4.5	U		5.3	U	A	26	U	A	3.6	U	A
ALDRIN		2.3	U		2.7	U		1.8	U		1.9	U	
ALPHA-BHC		2.3	U		2.7	U		1.8	U		1.9	U	
ALPHA-CHLORDANE		2.3	U		2.7	U		0.99	J	P	1.9	U	
BETA-BHC		2.3	U		2.7	U		1.8	U		1.9	U	
DELTA-BHC		2.3	U		2.7	U		1.8	U		1.9	U	
DIELDRIN		4.5	U		5.3	U		3.6	U		3.6	U	
ENDOSULFAN I		2.3	U		2.7	U		1.8	U		1.9	U	
ENDOSULFAN II		4.5	U		5.3	U		3.6	U		3.6	U	
ENDOSULFAN SULFATE		4.5	U		5.3	U		3.6	U		3.6	U	
ENDRIN		4.5	U		5.3	U		3.6	U		3.6	U	
ENDRIN ALDEHYDE		4.5	U		5.3	U		3.6	U		3.6	U	
ENDRIN KETONE		4.5	U		5.3	U		3.6	U		3.6	U	
GAMMA-BHC (LINDANE)		2.3	U		2.7	U		1.8	U		1.9	U	
GAMMA-CHLORDANE		1.1	J	P	2.7	U		1.8	U		1.9	U	
HEPTACHLOR		2.3	U		2.7	U		1.8	U		1.9	U	
HEPTACHLOR EPOXIDE		2.3	U		2.7	U		1.8	U		1.9	U	
METHOXYCHLOR		23	U		27	U		18	U		19	U	
TOXAPHENE		45	U		53	U		36	U		36	U	

PROJ_NO: 02063	NSAMPLE	SB-17-131-0001			SB-17-131-0104			SB-17-132-0001			SB-17-132-0104		
SDG: CTO070-1	LAB_ID	SB5867-2RA2			SB5867-3RA			SB5867-4RA			SB5867-5RA		
FRACTION: PEST/PCB	SAMP_DATE	10/14/2008			10/14/2008			10/14/2008			10/14/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	89.1			86.3			88.4			78.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		3.7	U		3.8	U	A	3.7	U		4.2	U	A
4,4'-DDE		34			8.4			3.4	J	P	12		
4,4'-DDT		77			47			5.4	U	A	11	U	A
ALDRIN		1.9	U		2	U		1.9	U		2.2	U	
ALPHA-BHC		1.9	U		2	U		1.9	U		2.2	U	
ALPHA-CHLORDANE		1.9	U		0.78	J	P	1.9	U		2.2	U	
BETA-BHC		1.9	U		2	U		1.9	U		2.2	U	
DELTA-BHC		1.9	U		2	U		1.9	U		2.2	U	
DIELDRIN		3.7	U		3.8	U		3.7	U		4.2	U	
ENDOSULFAN I		1.9	U		2	U		1.9	U		2.2	U	
ENDOSULFAN II		3.7	U		3.8	U		3.7	U		4.2	U	
ENDOSULFAN SULFATE		3.7	U		3.8	U		3.7	U		4.2	U	
ENDRIN		3.7	U		3.8	U		3.7	U		4.2	U	
ENDRIN ALDEHYDE		3.7	U		3.8	U		3.7	U		4.2	U	
ENDRIN KETONE		3.7	U		3.8	U		3.7	U		4.2	U	
GAMMA-BHC (LINDANE)		1.9	U		2	U		1.9	U		2.2	U	
GAMMA-CHLORDANE		1.9	U		1	J	PU	1.9	U		2.2	U	
HEPTACHLOR		1	J	PU	2	U		1.9	U		2.2	U	
HEPTACHLOR EPOXIDE		1.9	U		2	U		1.9	U		2.2	U	
METHOXYCHLOR		19	U		20	U		19	U		22	U	
TOXAPHENE		37	U		38	U		37	U		42	U	

PROJ_NO: 02063	NSAMPLE	SB-17-133-0001			SB-17-133-0104			SB-17-134-0203			SB-17-135-0203		
SDG: CTO070-1	LAB_ID	SB5867-7			SB5867-8			SB5867-13			SB5867-18		
FRACTION: PEST/PCB	SAMP_DATE	10/14/2008			10/14/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	82.0			79.8			90.7			87.5		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		4	U		4.1	U		3.6	U		20	J	DU
4,4'-DDE		33	J	E	1.8	J	EP	0.96	J	EP	27	J	D
4,4'-DDT		31	U	A	4.1	U	A	7.6	U	A			
ALDRIN		2.1	U		2.1	U		1.9	U		1.9	U	
ALPHA-BHC		2.1	U		2.1	U		1.9	U		1.9	U	
ALPHA-CHLORDANE		2.1	U		2.1	U		4.3					
BETA-BHC		2.1	U		2.1	U		1.9	U		1.9	U	
DELTA-BHC		2.1	U		2.1	U		1.9	U		1.9	U	
DIELDRIN		4	U		4.1	U		3.6	U		3.8	U	
ENDOSULFAN I		2.1	UJ	E	2.1	UJ	E	1.9	UJ	E	1.9	UJ	D
ENDOSULFAN II		4	UJ	E	4.1	UJ	E	3.6	UJ	E	3.8	U	
ENDOSULFAN SULFATE		4	U		4.1	U		3.6	U		3.8	U	
ENDRIN		4	UJ	E	4.1	UJ	E	3.6	UJ	E	3.8	U	
ENDRIN ALDEHYDE		4	U		4.1	U		3.6	U		3.8	U	
ENDRIN KETONE		4	U		4.1	U		3.6	U		3.8	U	
GAMMA-BHC (LINDANE)		1.5	J	EP	2.1	UJ	E	1.9	UJ	E	1.9	U	
GAMMA-CHLORDANE		2.1	U		2.1	U		5.9					
HEPTACHLOR		2.1	U		2.1	U		1.9	U		12	J	D
HEPTACHLOR EPOXIDE		2.1	U		2.1	U		1.9	U		1.9	U	
METHOXYCHLOR		21	U		21	U		19	U		19	U	
TOXAPHENE		40	U		41	U		36	U		38	U	

PROJ_NO: 02063	NSAMPLE	SB-17-135-0203DL			SB-17-136-0203			SB-17-137-0203			SB-17-138-0203		
SDG: CTO070-1	LAB_ID	SB5867-18DL			SB5867-17			SB5867-9			SB5867-15		
FRACTION: PEST/PCB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	87.5			87.6			82.0			90.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD					3.8	UJ	AU	4	U		9.8	J	U
4,4'-DDE					11			4	UJ	E	50	J	E
4,4'-DDT		490			60			4	U	A			
ALDRIN					1.9	U		2.1	U		1.9	U	
ALPHA-BHC					1.9	U		2.1	U		1.9	U	
ALPHA-CHLORDANE		94			7.6	J	U	2.1	U		52	J	U
BETA-BHC					1.9	U		2.1	U		1.9	U	
DELTA-BHC					1.9	U		2.1	U		1.9	U	
DIELDRIN					3.8	U		4	U		3.6	U	
ENDOSULFAN I					1.9	U		2.1	UJ	E	1.9	UJ	E
ENDOSULFAN II					3.8	U		4	UJ	E	3.6	UJ	E
ENDOSULFAN SULFATE					3.8	U		4	U		3.6	U	
ENDRIN					3.8	U		4	UJ	E	3.6	UJ	E
ENDRIN ALDEHYDE					3.8	U		4	U		3.6	U	
ENDRIN KETONE					3.8	U		4	U		3.6	U	
GAMMA-BHC (LINDANE)					1.9	U		2.1	UJ	E	1.9	UJ	E
GAMMA-CHLORDANE		120			10			2.1	U		65		
HEPTACHLOR					1.9	U		2.1	U		1.9	U	
HEPTACHLOR EPOXIDE					1.9	U		2.1	U		1.9	U	
METHOXYCHLOR					19	U		21	U		19	U	
TOXAPHENE					38	U		40	U		36	U	

PROJ_NO: 02063	NSAMPLE	SB-17-138-0203DL			SB-17-139-0203			SB-17-140-0203			SB-17-141-0203		
SDG: CTO070-1	LAB_ID	SB5867-15DL			SB5867-22			SB5867-19			SB5867-10		
FRACTION: PEST/PCB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	90.2			90.2			89.0			88.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD					3.6	UJ	AC	3.7	UJ	AC	3.7	U	
4,4'-DDE					7.3			2.5	J	P	0.8	J	EP
4,4'-DDT		120	J	C	56			29	U	A	3.7	U	A
ALDRIN					1.9	U		1.9	U		1.9	U	
ALPHA-BHC					1.9	U		1.9	U		1.9	U	
ALPHA-CHLORDANE					44			3.9			1.9	U	
BETA-BHC					1.9	U		1.9	U		1.9	U	
DELTA-BHC					1.9	U		1.9	U		1.9	U	
DIELDRIN					3.6	U		3.7	U		3.7	U	
ENDOSULFAN I					1.9	U		1.9	U		1.9	UJ	E
ENDOSULFAN II					3.6	U		3.7	U		3.7	UJ	E
ENDOSULFAN SULFATE					3.6	U		3.7	U		3.7	U	
ENDRIN					3.6	U		3.7	U		3.7	UJ	E
ENDRIN ALDEHYDE					3.6	U		3.7	U		3.7	U	
ENDRIN KETONE					3.6	U		3.7	U		3.7	U	
GAMMA-BHC (LINDANE)					1.9	U		1.9	U		1.9	UJ	E
GAMMA-CHLORDANE					52			4.9			1.9	U	
HEPTACHLOR					4.7			1.1	J	P	1.9	U	
HEPTACHLOR EPOXIDE					1.9	U		1.9	U		1.9	U	
METHOXYCHLOR					19	U		19	U		19	U	
TOXAPHENE					36	U		37	U		37	U	

PROJ_NO: 02063	NSAMPLE	SB-17-142-0203			SB-17-143-0203			SB-17-144-0203			SB-17-144-0203DL		
SDG: CTO070-1	LAB_ID	SB5867-20			SB5867-16			SB5867-12			SB5867-12DLRA		
FRACTION: PEST/PCB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	89.9			90.5			87.6			87.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		3.7	UJ	C	3.6	U		3.8	U	A			
4,4'-DDE		3.7	U		3.6	UJ	E	13	J	E			
4,4'-DDT		3.7	U	A	3.6	U	A				82	J	C
ALDRIN		1.9	U		1.9	U		1.9	U				
ALPHA-BHC		1.9	U		1.9	U		1.9	U				
ALPHA-CHLORDANE		1.9	U		1.9	U		14					
BETA-BHC		1.9	U		1.9	U		1.9	U				
DELTA-BHC		1.9	U		1.9	U		1.9	U				
DIELDRIN		3.7	U		3.6	U		3.8	U				
ENDOSULFAN I		1.9	U		1.9	UJ	E	1.9	UJ	E			
ENDOSULFAN II		3.7	U		3.6	UJ	E	3.8	UJ	E			
ENDOSULFAN SULFATE		3.7	U		3.6	U		3.8	U				
ENDRIN		3.7	U		3.6	UJ	E	3.8	UJ	E			
ENDRIN ALDEHYDE		3.7	U		3.6	U		3.8	U				
ENDRIN KETONE		3.7	U		3.6	U		3.8	U				
GAMMA-BHC (LINDANE)		1.9	U		1.9	UJ	E	1.9	UJ	E			
GAMMA-CHLORDANE		1.9	U		1.9	U		17					
HEPTACHLOR		1.9	U		1.9	U		1.9	U				
HEPTACHLOR EPOXIDE		1.9	U		1.9	U		1.9	U				
METHOXYCHLOR		19	U		19	U		19	U				
TOXAPHENE		37	U		36	U		38	U				

PROJ_NO: 02063	NSAMPLE	SB-17-145-0203			SB-17-DUP01			SB-17-DUP02			SB-17-DUP03		
SDG: CTO070-1	LAB_ID	SB5867-11			SB5867-6RA			SB5867-21			SB5867-14		
FRACTION: PEST/PCB	SAMP_DATE	10/15/2008			10/14/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			FD			FD			FD		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	90.5			78.1			90.8			91.1		
	DUP_OF				SB-17-132-0104			SB-17-142-0203			SB-17-134-0203		
PARAMETER	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	
4,4'-DDD	3.6	U	A	4.2	U	A	3.6	UJ	C	3.6	U		
4,4'-DDE	8.9	J	E	9.9			3.6	U		0.95	J	EP	
4,4'-DDT	64			15	U	A	3.6	U	A	7.5	U	A	
ALDRIN	1.9	U		2.2	U		1.9	U		1.9	U		
ALPHA-BHC	1.9	U		2.2	U		1.9	U		1.9	U		
ALPHA-CHLORDANE	11			2.2	U		1.9	U		4.9			
BETA-BHC	1.9	U		2.2	U		1.9	U		1.9	U		
DELTA-BHC	1.9	U		2.2	U		1.9	U		1.9	U		
DIELDRIN	3.6	U		4.2	U		3.6	U		3.6	U		
ENDOSULFAN I	1.9	UJ	E	2.2	U		1.9	U		1.9	UJ	E	
ENDOSULFAN II	3.6	UJ	E	4.2	U		3.6	U		3.6	UJ	E	
ENDOSULFAN SULFATE	3.6	U		4.2	U		3.6	U		3.6	U		
ENDRIN	3.6	UJ	E	4.2	U		3.6	U		3.6	UJ	E	
ENDRIN ALDEHYDE	3.6	U		4.2	U		3.6	U		3.6	U		
ENDRIN KETONE	3.6	U		4.2	U		3.6	U		3.6	U		
GAMMA-BHC (LINDANE)	1.9	UJ	E	2.2	U		1.9	U		1.9	UJ	E	
GAMMA-CHLORDANE	10			2.2	U		1.9	U		7.2			
HEPTACHLOR	1.9	U		2.2	U		1.9	U		1.9	U		
HEPTACHLOR EPOXIDE	1.9	U		2.2	U		1.9	U		1.9	U		
METHOXYCHLOR	19	U		22	U		19	U		19	U		
TOXAPHENE	36	U		42	U		36	U		36	U		

PROJ_NO: 02063	NSAMPLE	SB-17-DUP04		
SDG: CTO070-1	LAB_ID	SB5867-33RA		
FRACTION: PEST/PCB	SAMP_DATE	10/15/2008		
MEDIA: SOIL	QC_TYPE	FD		
	UNITS	UG/KG		
	PCT_SOLIDS	60.3		
	DUP_OF	SB-17-129-0306		
PARAMETER		RESULT	VQL	QLCD
4,4'-DDD		5.5	U	
4,4'-DDE		5.5	U	
4,4'-DDT		5.5	U	A
ALDRIN		2.8	U	
ALPHA-BHC		2.8	U	
ALPHA-CHLORDANE		2.8	U	
BETA-BHC		2.8	U	
DELTA-BHC		2.8	U	
DIELDRIN		5.5	U	
ENDOSULFAN I		2.8	U	
ENDOSULFAN II		5.5	U	
ENDOSULFAN SULFATE		5.5	U	
ENDRIN		5.5	U	
ENDRIN ALDEHYDE		5.5	U	
ENDRIN KETONE		5.5	U	
GAMMA-BHC (LINDANE)		2.8	U	
GAMMA-CHLORDANE		2.8	U	
HEPTACHLOR		2.8	U	
HEPTACHLOR EPOXIDE		2.8	U	
METHOXYCHLOR		28	U	
TOXAPHENE		55	U	

PROJ_NO: 02063	NSAMPLE	SB-17-123-0001			SB-17-123-0104			SB-17-125-0001			SB-17-125-0104		
SDG: CTO070-1	LAB_ID	SB5867-34			SB5867-35			SB5867-30			SB5867-31		
FRACTION: HERB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	89.2			94.7			88.6			82.8		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		37	U		35	U		37	U		40	U	
2,4-D		37	U		35	U		37	U		40	U	

PROJ_NO: 02063	NSAMPLE	SB-17-125-0608			SB-17-126-0001			SB-17-126-0104			SB-17-127-0306		
SDG: CTO070-1	LAB_ID	SB5867-29			SB5867-25			SB5867-26			SB5867-23		
FRACTION: HERB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	89.0			94.4			90.5			84.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		37	U		35	U		36	U		39	U	
2,4-D		37	U		35	U		36	U		39	U	

PROJ_NO: 02063	NSAMPLE	SB-17-128-0506			SB-17-129-0306			SB-17-130-0001			SB-17-130-0104		
SDG: CTO070-1	LAB_ID	SB5867-24			SB5867-32			SB5867-27			SB5867-28		
FRACTION: HERB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	73.2			62.1			92.7			90.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		45	U		53	U		36	U		36	U	
2,4-D		45	U		53	U		36	U		36	U	

PROJ_NO: 02063	NSAMPLE	SB-17-131-0001			SB-17-131-0104			SB-17-132-0001			SB-17-132-0104		
SDG: CTO070-1	LAB_ID	SB5867-2			SB5867-3			SB5867-4			SB5867-5		
FRACTION: HERB	SAMP_DATE	10/14/2008			10/14/2008			10/14/2008			10/14/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	89.1			86.3			88.4			78.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		37	U		38	U		37	U		42	U	
2,4-D		37	U		38	U		37	U		42	U	

PROJ_NO: 02063	NSAMPLE	SB-17-133-0001			SB-17-133-0104			SB-17-DUP01			SB-17-DUP04		
SDG: CTO070-1	LAB_ID	SB5867-7			SB5867-8			SB5867-6			SB5867-33		
FRACTION: HERB	SAMP_DATE	10/14/2008			10/14/2008			10/14/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			FD			FD		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	82.0			79.8			78.1			60.3		
	DUP_OF							SB-17-132-0104			SB-17-129-0306		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		40	U		41	U		42	U		55	U	
2,4-D		40	U		41	U		42	U		55	U	

TETRA TECH

INTERNAL CORRESPONDENCE

C-NAVY-02-09-3073W

Date: February 27, 2009

c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Jennifer Cardinal (no copy) JC

Subject: Tier II Inorganic Data Validation, SDG CTO070-2
Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Arsenic/Lead/Zinc/Cyanide:

28/Soils/	SB-17-101-0001	SB-17-101-0104	SB-17-102-0001
	SB-17-102-0104	SB-17-103-0001	SB-17-103-0104
	SB-17-104-0001	SB-17-104-0104	SB-17-106-0001
	SB-17-106-0104	SB-17-109-0001	SB-17-109-0104
	SB-17-110-0104	SB-17-114-0001	SB-17-114-0104
	SB-17-115-0710	SB-17-116-0407	SB-17-117-0104
	SB-17-119-0104	SB-17-120-0205	SB-17-121-0205
	SB-17-121-0710	SB-17-121-1215	SB-17-122-0407
	SB-17-124-0001	SB-17-124-0104	SB-17-DUP05
	SB-17-DUP06		
	(Field Duplicate Pairs: SB-17-120-0205/SB-17-DUP05, SB-17-122-0407/SB-17-DUP06)		
1/Source Blank/	SWB-17-01		
4/Rinsate Blanks/	SB-17-RB01	SB-17-RB02	SB-17-RB03
	SB-17-RB04		

TOC:

3/Soils/	SB-17-115-0710	SB-17-120-0205	SB-17-DUP05
	(Field Duplicate Pair: SB-17-120-0205/SB-17-DUP05)		

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the arsenic, lead, zinc, cyanide, and total organic carbon (TOC) analytical data from the samples collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine from October 16-17, 2008. Sample collection and analysis was performed according to the requirements of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The metals (arsenic, lead, and zinc) analysis was performed according to USEPA SW-846 Method 6010B. The cyanide analysis was performed according to USEPA SW-846 Method 9012M. The TOC analysis was performed according to USEPA SW-846 Method 9060M. The Tier II data validation was performed in accordance with the Region I EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part IV, Inorganic Data Validation Functional Guidelines, November 2008.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The analytical data from this SDG were evaluated based on the following parameters:

- Data Completeness
- * Holding Times
- * Calibration Verification
- Laboratory Blank Analyses
- * ICP Interference Check Sample Results
- Matrix Spike/Matrix Spike Duplicate
- * Laboratory Duplicate Results
- * Laboratory Control Sample Results
- * Field Duplicate Precision
- * ICP Serial Dilution Results
- * Percent Solids
- Reporting Limits

* All quality control criteria were met for this parameter.

Data Completeness

The laboratory incorrectly transcribed the ID for sample SWB-17-01 as SB-17-01. The data summary tables have the correct ID for the affected sample.

Metals

On February 24, 2009 the laboratory resubmitted all metals QC summary forms to report only arsenic, lead, and zinc as requested in the Work Plan and to report all results to the method detection limits.

Laboratory Blank Analyses

The rinsate and source water blanks were not used to establish blank action levels for the samples in this SDG.

Metals

The following table summarizes the level of blank contamination detected in the laboratory blanks associated with the aqueous samples:

Analyte	Maximum Conc. (µg/L)	Action Level (µg/L)	Affected Samples
Lead	1.52	7.6	SWB-17-01

The positive lead result below the blank action level in sample SWB-17-01 was changed to a non-detected value (U) at an elevated reporting limit due to laboratory blank contamination.

Although lead was found in the laboratory blanks, the project sensitivity goals are not impacted since there are no regulatory limits established for the source water blank sample. The lead result in the affected sample is usable as a non-detected value.

Matrix Spike/Matrix Spike Duplicate

TOC

The following table summarizes the result in the matrix spike analysis of sample SB-17-115-0710 which was outside of the 75-125% recovery criteria:

Analyte	%Recovery	Action	
		(+)	NDs
TOC	139, 140	J	

The positive TOC results are estimated (J) in samples SB-17-115-0710, SB-17-120-0205, and SB-DUP05 due to high matrix spike recoveries.

Although the recovery of TOC was above the matrix spike recovery criterion, the project accuracy goals are not impacted since there are no regulatory limits established for TOC for the soil samples. The positive TOC results in the affected samples are usable as estimated values which may be biased high.

Reporting Limits

The positive results below than the laboratory's quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

Metals

The laboratory reported non-detected metals results down to the MDL.

The laboratory reporting limits met all project action limits with the following exception. The arsenic project action limit was not achieved for the aqueous samples. Data usability may be impacted.

A reporting limit was raised for lead in sample SWB-17-01 due to blank contamination. As discussed above in the Laboratory Blank Analyses section, the project sensitivity goals are not impacted.

Cyanide

The laboratory reported non-detected cyanide results down the QL.

The cyanide project action limit was not achieved for the aqueous samples. Data usability may be impacted.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity, and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Metals

The project goals with respect to sensitivity were met for the metals data set with the following exception. The arsenic project action limit was not achieved for the aqueous samples. Data usability may be impacted.

The project goals with respect to accuracy, precision, and completeness were met for the metals data set. Data usability is not impacted with regards to accuracy, precision, and completeness.

Cyanide

The project goals with respect to sensitivity were met for the cyanide data set with the following exception. The cyanide project action limit was not achieved for the aqueous samples. Data usability may be impacted.

The project goals with respect to accuracy, precision, and completeness were met for the cyanide data set. Data usability is not impacted with regards to accuracy, precision, and completeness.

TOC

The project goals with respect to accuracy were met for the TOC data set. TOC was qualified as estimated in select samples due high matrix spike recoveries. Although specific method criteria were not met in this instance, data usability is not impacted and the affected positive results are usable as estimated values.

The project goals with respect to precision, sensitivity, and completeness were met for the TOC data set. Data usability is not impacted with regards to precision, sensitivity, and completeness.

Tables: Data Validation Qualifiers and Codes
Data Summary Tables

Enclosures: Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	SB-17-101-0001			SB-17-101-0104			SB-17-102-0001			SB-17-102-0104		
SDG: CTO070-2	LAB_ID	SB5944-006			SB5944-007			SB5944-008			SB5944-009		
FRACTION: M	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	87.4			94.9			94.0			91.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		2			1.3			10.7			4.6		
LEAD		8.1			2.5			10			2.4		
ZINC		11.7			10.3			21.9			16.6		

PROJ_NO: 02063	NSAMPLE	SB-17-103-0001			SB-17-103-0104			SB-17-104-0001			SB-17-104-0104		
SDG: CTO070-2	LAB_ID	SB5944-010			SB5944-011			SB5944-012			SB5944-013		
FRACTION: M	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	93.6			89.8			91.0			88.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		18.2			6.1			9.4			8.1		
LEAD		11.1			5.1			11			3.4		
ZINC		25.8			17.8			26.7			17.9		

PROJ_NO: 02063	NSAMPLE	SB-17-106-0001			SB-17-106-0104			SB-17-109-0001			SB-17-109-0104		
SDG: CTO070-2	LAB_ID	SB5944-001			SB5944-002			SB5904-008			SB5904-009		
FRACTION: M	SAMP_DATE	10/17/2008			10/17/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	92.0			93.5			92.0			95.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		2.4			1.7			1.8			1.4		
LEAD		23.2			7.5			14.2			2.6		
ZINC		21.8			10.6			17.6			11.2		

PROJ_NO: 02063	NSAMPLE	SB-17-110-0104			SB-17-114-0001			SB-17-114-0104			SB-17-115-0710		
SDG: CTO070-2	LAB_ID	SB5904-005			SB5904-006			SB5904-007			SB5904-004		
FRACTION: M	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	91.6			91.6			95.0			81.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		2.2			1.8			1.8			1.1		
LEAD		3.7			17.8			3.4			2		
ZINC		11.7			17.6			13.4			12.4		

PROJ_NO: 02063	NSAMPLE	SB-17-116-0407			SB-17-117-0104			SB-17-119-0104			SB-17-120-0205		
SDG: CTO070-2	LAB_ID	SB5904-012			SB5944-005			SB5904-003			SB5904-010		
FRACTION: M	SAMP_DATE	10/16/2008			10/17/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	78.5			82.7			91.2			76.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		1.5			3			1.4			2.2		
LEAD		4.2			7.4			2.4			5.7		
ZINC		17			23.6			54.5			25.8		

PROJ_NO: 02063	NSAMPLE	SB-17-121-0205			SB-17-121-0710			SB-17-121-1215			SB-17-122-0407		
SDG: CTO070-2	LAB_ID	SB5904-013			SB5904-014			SB5904-015			SB5944-003		
FRACTION: M	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	74.8			80.7			79.1			66.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		1.6			1.1			5.2			1.5		
LEAD		5.9			2.3			4.9			3		
ZINC		35.5			14.2			33.9			15.2		

PROJ_NO: 02063	NSAMPLE	SB-17-124-0001			SB-17-124-0104			SB-17-DUP05			SB-17-DUP06		
SDG: CTO070-2	LAB_ID	SB5904-001			SB5904-002			SB5904-011			SB5944-004		
FRACTION: M	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			FD			FD		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	85.9			85.0			72.9			70.8		
	DUP_OF							SB-17-120-0205			SB-17-122-0407		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		8.6			4.2			1.8			1.3		
LEAD		6			4.4			5.6			2.9		
ZINC		36.4			16.6			31.7			14.5		

PROJ_NO: 02063	NSAMPLE	SB-17-RB01			SB-17-RB02			SB-17-RB03			SB-17-RB04		
SDG: CTO070-2	LAB_ID	SB5904-016			SB5904-017			SB5944-015			SB5944-016		
FRACTION: M	SAMP_DATE	10/16/2008			10/16/2008			10/17/2008			10/17/2008		
MEDIA: WATER	QC_TYPE	RB			RB			RB			RB		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		1.69	U		1.69	U		1.69	U		1.69	U	
LEAD		0.97	U		0.97	U		0.97	U		0.97	U	
ZINC		2.22	U		3	J	P	2.22	U		2.22	U	

PROJ_NO: 02063	NSAMPLE	SWB-17-01		
SDG: CTO070-2	LAB_ID	SB5944-014		
FRACTION: M	SAMP_DATE	10/17/2008		
MEDIA: WATER	QC_TYPE	SB		
	UNITS	UG/L		
	PCT_SOLIDS			
	DUP_OF			
PARAMETER		RESULT	VQL	QLCD
ARSENIC		1.69	U	
LEAD		2.6	U	A
ZINC		175		

PROJ_NO: 02063	NSAMPLE	SB-17-101-0001			SB-17-101-0104			SB-17-102-0001			SB-17-102-0104		
SDG: CTO070-2	LAB_ID	SB5944-6			SB5944-7			SB5944-8			SB5944-9		
FRACTION: MISC	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	87.4			94.9			94.0			91.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.55	U		0.5	U		0.5	U		0.55	U	
TOTAL ORGANIC CARBON													

PROJ_NO: 02063	NSAMPLE	SB-17-103-0001			SB-17-103-0104			SB-17-104-0001			SB-17-104-0104		
SDG: CTO070-2	LAB_ID	SB5944-10			SB5944-11			SB5944-12			SB5944-13		
FRACTION: MISC	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	93.6			89.8			91.0			88.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.55	U		0.55	U		0.55	U		0.55	U	
TOTAL ORGANIC CARBON													

PROJ_NO: 02063	NSAMPLE	SB-17-106-0001			SB-17-106-0104			SB-17-109-0001			SB-17-109-0104		
SDG: CTO070-2	LAB_ID	SB5944-1			SB5944-2			SB5904-8			SB5904-9		
FRACTION: MISC	SAMP_DATE	10/17/2008			10/17/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	92.0			93.5			92.0			95.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.5	U		0.55	U		0.55	U		0.5	U	
TOTAL ORGANIC CARBON													

PROJ_NO: 02063	NSAMPLE	SB-17-110-0104			SB-17-114-0001			SB-17-114-0104			SB-17-115-0710		
SDG: CTO070-2	LAB_ID	SB5904-5			SB5904-6			SB5904-7			SB5904-4		
FRACTION: MISC	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	91.6			91.6			95.0			81.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.55	U		0.55	U		0.5	U		0.6	U	
TOTAL ORGANIC CARBON											400	J	DP

PROJ_NO: 02063	NSAMPLE	SB-17-116-0407			SB-17-117-0104			SB-17-119-0104			SB-17-120-0205		
SDG: CTO070-2	LAB_ID	SB5904-12			SB5944-5			SB5904-3			SB5904-10		
FRACTION: MISC	SAMP_DATE	10/16/2008			10/17/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	78.5			82.7			91.2			76.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.6	U		0.6	U		0.55	U		0.65	U	
TOTAL ORGANIC CARBON											28000	J	D

PROJ_NO: 02063	NSAMPLE	SB-17-121-0205			SB-17-121-0710			SB-17-121-1215			SB-17-122-0407		
SDG: CTO070-2	LAB_ID	SB5904-13			SB5904-14			SB5904-15			SB5944-3		
FRACTION: MISC	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	74.8			80.7			79.1			66.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.7	U		0.6	U		0.65	U		0.7	U	
TOTAL ORGANIC CARBON													

PROJ_NO: 02063	NSAMPLE	SB-17-124-0001			SB-17-124-0104			SB-17-DUP05			SB-17-DUP06		
SDG: CTO070-2	LAB_ID	SB5904-1			SB5904-2			SB5904-11			SB5944-4		
FRACTION: MISC	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			FD			FD		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	85.9			85.0			72.9			70.8		
	DUP_OF							SB-17-120-0205			SB-17-122-0407		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.55	U		0.55	U		0.65	U		0.7	U	
TOTAL ORGANIC CARBON								24000	J	D			

PROJ_NO: 02063	NSAMPLE	SB-17-RB01			SB-17-RB02			SB-17-RB03			SB-17-RB04		
SDG: CTO070-2	LAB_ID	SB5904-16			SB5904-17			SB5944-15			SB5944-16		
FRACTION: MISC	SAMP_DATE	10/16/2008			10/16/2008			10/17/2008			10/17/2008		
MEDIA: WATER	QC_TYPE	RB			RB			RB			RB		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		10	U		10	U		10	U		10	U	

PROJ_NO: 02063	NSAMPLE	SWB-17-01		
SDG: CTO070-2	LAB_ID	SB5944-14		
FRACTION: MISC	SAMP_DATE	10/17/2008		
MEDIA: WATER	QC_TYPE	SB		
	UNITS	UG/L		
	PCT_SOLIDS			
	DUP_OF			
PARAMETER		RESULT	VQL	QLCD
CYANIDE		10	U	

TETRA TECH

INTERNAL CORRESPONDENCE

C-NAVY-02-09-3072W

Date: February 26, 2009

c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Jennifer Cardinal (no copy) JC

Subject: Tier II Organic Data Validation, SDG CTO070-2
Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Pesticides/Herbicides:

28/Soils/	SB-17-101-0001	SB-17-101-0104	SB-17-102-0001
	SB-17-102-0104	SB-17-103-0001	SB-17-103-0104
	SB-17-104-0001	SB-17-104-0104	SB-17-106-0001
	SB-17-106-0104	SB-17-109-0001	SB-17-109-0104
	SB-17-110-0104	SB-17-114-0001	SB-17-114-0104
	SB-17-115-0710	SB-17-116-0407	SB-17-117-0104
	SB-17-119-0104	SB-17-120-0205	SB-17-121-0205
	SB-17-121-0710	SB-17-121-1215	SB-17-122-0407
	SB-17-124-0001	SB-17-124-0104	SB-17-DUP05
	SB-17-DUP06		
	(Field Duplicate Pairs: SB-17-120-0205/SB-17-DUP05, SB-17-122-0407/SB-17-DUP06)		
1/Source Blank/	SWB-17-01		
4/Rinsate Blanks/	SB-17-RB01	SB-17-RB02	SB-17-RB03
	SB-17-RB04		

DRO:

6/Soils/	SB-17-115-0710	SB-17-121-0205	SB-17-121-0710
	SB-17-121-1215	SB-17-122-0407	SB-17-DUP06
	(Field Duplicate Pair: SB-17-122-0407/SB-17-DUP06)		
2/Rinsate Blanks/	SB-17-RB01	SB-17-RB02	

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the diesel range organic (DRO), pesticide, herbicide analytical data for the samples in this SDG. The samples were collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine from October 16-17, 2008. Sample collection and analysis was performed according to the requirements of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The DRO analysis was performed according to MEDEP 4.1.25. The pesticide and herbicide analyses were performed according to USEPA SW-846 Methods 8081 and 8151, respectively.

The DRO data validation was performed in accordance with the Region I EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996. The pesticides and herbicide validation was performed in accordance with the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Organic Analyses, Part III, February 2004.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The data were evaluated based on the following parameters:

- Data Completeness
- * Preservation and Technical Holding Times
- * Pesticide Degradation
- Initial and Continuing Calibrations
- Blanks
- Surrogate Compounds
- Matrix Spike/Matrix Spike Duplicate
- Laboratory Control Sample/Laboratory Control Sample Duplicate
- Field Duplicates
- Analyte Identification
- Reporting Limits

* All criteria were met for this parameter.

Data Completeness

The laboratory incorrectly transcribed the sample ID SWB-17-01 as SB-17-01. The data summary tables have the correct sample ID SWB-17-01.

The laboratory was contacted regarding the initial calibration verification (ICV) summary forms for the DRO, pesticides, and herbicides analyses. On February 19, 2009 the laboratory explained that the ICV results are reported with the calibration verification forms.

On February 26, 2009 the laboratory resubmitted the chromatograms for DRO samples SB-17-115-0710 and SB-17-121-0205. The additional chromatograms show the area integrated and reported as DRO using a lower attenuation so that DRO peaks are visible.

Initial and Continuing Calibrations

Pesticides

The following table summarizes the pesticide compounds that failed to meet the continuing calibration (CC) criterion of %D <25:

Compound	%D or %D Range	Action		Affected Samples
		(+)	NDs	
Delta-BHC	-35.20 to -31.80		UJ	SB-17-117-0104DL
4,4'-DDT	-51.20 to -26.80	J		SB-17-117-0104DL2, SB-17-114-0001DL, SB-17-114-0104, SB-17-106-0104, SB-17-122-0407
Endosulfan sulfate	-48.00 to -46.80		UJ	SB-17-117-0104DL
Methoxychlor	-52.40 to 54.00		UJ	SB-17-117-0104DL, SB-17-110-0104DL, SB-17-114-0001DL, SB-17-114-0104, SB-17-109-0001, SB-17-RB01, SB-17-RB02, SB-17-RB03, SB-17-RB04, SWB-17-01
Endosulfan I	86.00		UJ	SB-17-110-0104DL, SB-17-114-0001DL, SB-17-114-0104, SB-17-109-0001
4,4'-DDE	309.8	J		
Endrin	2364.4		UJ	

Although the %D was outside of the QC limits for 4,4'-DDT, methoxychlor, and 4,4'-DDE; the project accuracy goals were not impacted since the instrument calibration variability is below safety margin of greater than 100% allocated for these compounds in the soil samples. The positive and non-detected 4,4'-DDT, methoxychlor, and 4,4'-DDE results in the affected samples are usable as estimated values and estimated quantitation limits.

The %D was outside of the QC limits for delta-BHC, endosulfan sulfate, endosulfan I, and endrin; therefore, the project accuracy goals may be impacted. The non-detected delta-BHC, endosulfan sulfate, endosulfan I, and endrin results in the affected samples are usable as estimated quantitation limits.

Blanks

Pesticides

The following table summarizes the level of blank contamination detected in the laboratory blank associated with the samples.

Compound	Type of Blank	Maximum Conc. (µg/Kg)	Action Level (µg/Kg)	Affected Samples
4,4'-DDT	Method	10	50	SB-17-101-0001, SB-17-101-0104, SB-17-102-0001, SB-17-102-0104, SB-17-103-0001, SB-17-104-0001, SB-17-104-0104, SB-17-106-0104, SB-17-109-0104, SB-17-114-0104, SB-17-115-0710, SB-17-119-0104, SB-17-124-0001, SB-17-DUP06
4,4'-DDD	Method	1.1	5.5	SB-17-101-0001, SB-17-101-0104, SB-17-102-0001, SB-17-103-0001, SB-17-104-0001, SB-17-106-0104, SB-17-109-0104, SB-17-114-0104, SB-17-116-0407, SB-17-119-0104, SB-17-122-0407, SB-17-124-0104

Blank actions were applied to the affected samples due to 4,4'-DDT and 4,4'-DDD method blank contamination. The 5x rule applies for these pesticide compounds. The positive results for 4,4'-DDT and 4,4'-DDD in the affected samples were changed to non-detected values at the sample-specific project quantitation limit or at elevated quantitation limits.

Although 4,4'-DDT and 4,4'-DDD contamination was found in the laboratory method blank, the project sensitivity goals are not impacted since the non-detected values do not exceed the project action limits for these compounds. The 4,4'-DDT and 4,4'-DDD results in the affected samples are usable as non-detected values.

Surrogate Compounds

Pesticides

The following samples had surrogate spike recoveries outside of the recovery limits:

Sample	TCX %Rec. (QC Limits: 42-104)		Action	
	Column 1	Column 2	(+)	NDs
SB-17-109-0104	115	115	J	
SB-17-116-0407	36	37	J	UJ

Although the surrogate recovery QC criteria were not met for tetrachloro-m-xylene (TCX) for the samples listed above, the project accuracy goals are not impacted for SB-17-109-0104 since the only positive results are 4,4'-DDT and 4,4'-DDD and the project action limits for these compounds are much greater than the results in this sample. The project accuracy goals may be impacted for sample SB-17-116-0407. The positive pesticide results in sample SB-17-109-0104 are usable as estimated values which may be biased high. The positive and non-detected pesticide results in sample SB-17-116-0407 are usable as estimated value and estimated quantitation limits which may be biased low.

Matrix Spike/Matrix Spike Duplicates

Pesticides

The matrix spike/matrix spike duplicate (MS/MSD) results for sample SB-17-121-0205 recovered the majority of the pesticide compounds outside the compound-specific recovery limits. In addition, the MS/MSD results were above the 50% relative percent difference (RPD) QC limit for beta-BHC, alpha-chlordane, and endosulfan II. All positive and non-detected results (except for 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT) are estimated (J, UJ) in sample SB-17-121-0205 due to poor MS/MSD recoveries and poor MS/MSD precision. In addition, endosulfan sulfate did not recover in the MS and MSD; therefore, the non-detected endosulfan sulfate result in sample SB-17-121-0205 was rejected.

The MS/MSD recoveries for the majority of the pesticide compounds did not meet the QC limits; therefore, the project accuracy goals may be impacted. The affected positive and non-detected results in sample SB-17-121-0205 are usable as estimated values and estimated quantitation limits.

The MS/MSD RPDs for beta-BHC, alpha-chlordane, and endosulfan II did not meet the QC limits; therefore, the project precision goals may be impacted. The positive and non-detected results in

sample SB-17-121-0205 are usable as estimated values and estimated values and estimated quantitation limits for which the bias is indeterminate.

The non-detected endosulfan sulfate result in sample SB-17-121-0205 was rejected due to no recoveries in the MS/MSD. This result is not usable for project decisions and the data completeness goals may be impacted.

Laboratory Control Sample/Laboratory Control Sample Duplicates

Pesticides

The following table summarizes the pesticide compound that failed to meet the LCS recovery limits:

Compound	% Rec.	QC Limits	Action		Affected Samples
			(+)	NDs	
Alpha-BHC	47, 54	60-130		UJ	SB-17-RB01, SB-17-RB02, SB-17-RB03, SB-17-RB04, SWB-17-01
Beta-BHC	57	65-125		UJ	
Heptachlor epoxide	50	60-130		UJ	
Gamma-chlordane	48, 59	60-125		UJ	
Alpha-chlordane	47, 58	65-125		UJ	
Endosulfan I	33, 40	50-110		UJ	
Dieldrin	49, 57	60-130		UJ	
Endrin aldehyde	47	55-135		UJ	
Endrin ketone	48, 58	75-125		UJ	

Although the laboratory control sample recovery criteria were not met for the compounds listed above, the project accuracy goals are not impacted since these are rinsate and source water blank samples. The non-detected alpha-BHC, beta-BHC, heptachlor epoxide, gamma-chlordane, alpha-chlordane, endosulfan I, dieldrin, endrin aldehyde, and endrin ketone results in the affected samples are usable as estimated quantitation limits which may be biased low.

Field Duplicates

Pesticides

The field duplicate pair SB-17-120-0205/SB-17-DUP05 exceeded the relative percent difference QC criterion of 50% for the following compounds:

Analyte	RPD	Action	
		(+)	NDs
4,4'-DDD	73.4	J	
4,4'-DDE	58.8	J	
4,4'-DDT	83.0	J	

The field duplicate relative percent difference for 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT exceeded the QC criterion; therefore, the project precision goals may be impacted. The positive 4,4'-DDD, 4,4'-DDE, and

4,4'-DDT results in samples SB-17-120-0205 and SB-17-DUP05 are usable as estimated values for which the bias is indeterminate.

The field duplicate pair SB-17-122-0407/SB-17-DUP06 exceeded the relative percent difference QC criterion of 50% for the following compounds:

Analyte	RPD	Action	
		(+)	NDs
4,4'-DDT	172.5	J	

The field duplicate relative percent difference for 4,4'-DDT exceeded the QC criterion; therefore, the project precision goals may be impacted. The positive results in samples SB-17-122-0407 and SB-17-DUP06 are usable as estimated values for which the bias is indeterminate.

Analyte Identification/Quantitation

Pesticides

The relative percent difference (RPD) between the results of analytical columns 1 and 2 exceeded the 40% RPD QC criterion for the compounds in the following samples:

Sample	Analyte	RPD	Action
			(+)
SB-17-119-0104	Alpha-chlordane	49.2	J
SB-17-110-0104	4,4'-DDE	95.1	J
SB-17-114-0104	4,4'-DDE	53.4	J
SB-17-121-1215	Alpha-chlordane	42.2	J
SB-17-117-0104	Heptachlor epoxide	50.4	J
SB-17-101-0001	4,4'-DDD	55.6	J
SB-17-102-0001	4,4'-DDD	106.9	UJ* at 1.82
	4,4'-DDE	61.0	J
SB-17-103-0001	4,4'-DDD	96.2	J
SB-17-104-0001	4,4'-DDD	89.9	J

*Professional judgment was used to raise the result to the higher of the two results and qualify the result as estimated, non-detected (UJ).

The analyte quantitation relative percent differences exceeded the 40% RPD QC limit for the samples listed above; therefore, the project accuracy goals may be affected due to analytical interferences detected in the dual column analysis. The positive results for the affected compounds in the affected samples are usable as estimated values.

The analyte quantitation relative percent differences exceeded the 100% RPD QC limit for 4,4'-DDD in sample SB-17-102-0001. Professional judgment was applied to raise the reporting limit for the result in this sample due to analytical matrix interference. The project sensitivity goals are not impacted since the project action limit is not exceeded by the raised quantitation limit. The estimated, non-detected value limit for 4,4'-DDD in sample SB-17-102-0001 is usable as an estimated quantitation limits.

Reporting Limits

All positive results below the quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

Pesticides

Project action limits were not achievable for all pesticides except for 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, methoxychlor, and toxaphene as highlighted in SAP Worksheet 15a of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008. Data usability may be impacted.

The reporting limits were raised for 4,4'-DDT and 4,4'-DDD in select samples due to blank contamination. As discussed in the Blanks section, the project sensitivity goals are not impacted.

The reporting limit was raised for 4,4'-DDD in sample SB-17-102-0001 due to analytical interferences detected in the dual column analysis. As discussed in the Analyte Identification/Quantitation section, the project sensitivity goals are not impacted.

Herbicides

The project action limit for 2,4-D was not achieved due to the percent moisture of the samples. Data usability may be impacted.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Pesticides

The project goals with respect to accuracy were met for the pesticides data set with the following exceptions. Delta-BHC, endosulfan sulfate, endosulfan I, and endrin were qualified as estimated in select samples due to instrument calibration variability. The positive and non-detected pesticide results in sample SB-17-116-0407 were qualified as estimated due to low surrogate recoveries; the affected results may be biased low. The pesticide results (except 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT) in sample SB-17-121-0205 were qualified as estimated due to poor MS/MSD recoveries. Select compounds were qualified as estimated in some samples due to analytical interferences detected in the dual column analysis. Although specific method criteria were not met in these instances, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability. Additionally, 4,4'-DDT, methoxychlor, and 4,4'-DDE were qualified as estimated in select samples due to instrument calibration variability. The positive pesticide results in sample SB-17-109-0104 were qualified as estimated due to high surrogate recoveries; the affected results may be biased high. Alpha-BHC, beta-BHC, heptachlor epoxide, gamma-chlordane, alpha-chlordane, endosulfan I, dieldrin, endrin aldehyde, and endrin ketone were qualified as estimated in the rinsate and

source water blank samples due to low LCS recoveries. Although specific method criteria were not met in these instances, data usability is not impacted and the affected positive and non-detected results are usable as estimated values and estimated quantitation limits.

The project goals with respect to precision were met for the pesticides data set with the following exceptions. Beta-BHC, alpha-chlordane, and endosulfan II were qualified as estimated in sample SB-17-121-0205 due to poor MS/MSD precision. 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT were qualified as estimated in samples SB-17-120-0205 and SB-17-DUP05 due to poor field duplicate precision. 4,4'-DDT was qualified as estimated in samples SB-17-122-0407 and SB-17-DUP06 due to poor field duplicate precision. Although specific method criteria were not met in these instances, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to sensitivity were met for the pesticides data set with the following exception. Project action limits were not achievable for all pesticides except for 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, methoxychlor, and toxaphene. Data usability may be impacted.

The project goals with respect to completeness were met for the pesticides data set with the following exception. Endosulfan sulfate was rejected in sample SB-17-121-0205 due to no recoveries in the MS/MSD analysis. This result is not usable for project decisions.

Herbicides

The project goals with respect to sensitivity were met for the herbicides data set with the following exception. The project action limit for 2,4-D was not met due to the percent moisture of the samples. Data usability may be impacted.

The project goals with respect to accuracy, precision, and completeness were met for the herbicides data set. Data usability was not impacted with regards to accuracy, precision, and completeness.

DRO

The project goals with respect to accuracy, precision, sensitivity, and completeness were met for the DRO data set. Data usability was not impacted with regards to accuracy, precision, sensitivity, and completeness.

Tables: Data Validation Qualifiers and Codes
Data Summary Tables

Enclosures: Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	SB-17-101-0001			SB-17-101-0104			SB-17-102-0001			SB-17-102-0104		
SDG: CTO070-2	LAB_ID	SB5944-6			SB5944-7			SB5944-8			SB5944-9		
FRACTION: PEST/PCB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	87.4			94.9			94.0			91.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		3.8	UJ	AU	3.5	U	A	3.5	UJ	AU	3.6	U	
4,4'-DDE		13			1.3	J	P	0.7	J	PU	3.6	U	
4,4'-DDT		12	U	A	13	U	A	3.5	U	A	3.6	U	A
ALDRIN		1.9	U		1.8	U		1.8	U		1.9	U	
ALPHA-BHC		1.9	U		1.8	U		1.8	U		1.9	U	
ALPHA-CHLORDANE		1.9	U		1.8	U		1.8	U		1.9	U	
BETA-BHC		1.9	U		1.8	U		1.8	U		1.9	U	
DELTA-BHC		1.9	U		1.8	U		1.8	U		1.9	U	
DIELDRIN		3.8	U		3.5	U		3.5	U		3.6	U	
ENDOSULFAN I		1.9	U		1.8	U		1.8	U		1.9	U	
ENDOSULFAN II		3.8	U		3.5	U		3.5	U		3.6	U	
ENDOSULFAN SULFATE		3.8	U		3.5	U		3.5	U		3.6	U	
ENDRIN		3.8	U		3.5	U		3.5	U		3.6	U	
ENDRIN ALDEHYDE		3.8	U		3.5	U		3.5	U		3.6	U	
ENDRIN KETONE		3.8	U		3.5	U		3.5	U		3.6	U	
GAMMA-BHC (LINDANE)		1.9	U		1.8	U		1.8	U		1.9	U	
GAMMA-CHLORDANE		1.9	U		1.8	U		1.8	U		1.9	U	
HEPTACHLOR		1.9	U		1.8	U		1.8	U		1.9	U	
HEPTACHLOR EPOXIDE		1.9	U		1.8	U		1.8	U		1.9	U	
METHOXYCHLOR		19	U		18	U		18	U		19	U	
TOXAPHENE		38	U		35	U		35	U		36	U	

PROJ_NO: 02063	NSAMPLE	SB-17-103-0001			SB-17-103-0104			SB-17-104-0001			SB-17-104-0104		
SDG: CTO070-2	LAB_ID	SB5944-10			SB5944-11			SB5944-12			SB5944-13		
FRACTION: PEST/PCB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	93.6			89.8			91.0			88.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		3.5	UJ	AU	10			3.6	UJ	AU	6.5		
4,4'-DDE		0.88	J	P	3.6	J	P	0.8	J	P	1.7	J	P
4,4'-DDT		3.5	U	A	53			4.2	U	A	4	U	A
ALDRIN		1.8	U		1.9	U		1.9	U		1.9	U	
ALPHA-BHC		1.8	U		1.9	U		1.9	U		1.9	U	
ALPHA-CHLORDANE		1.8	U		1.9	U		1.9	U		1.9	U	
BETA-BHC		1.8	U		1.9	U		1.9	U		1.9	U	
DELTA-BHC		1.8	U		1.9	U		1.9	U		1.9	U	
DIELDRIN		3.5	U		3.7	U		3.6	U		3.7	U	
ENDOSULFAN I		1.8	U		1.9	U		1.9	U		1.9	U	
ENDOSULFAN II		3.5	U		3.7	U		3.6	U		3.7	U	
ENDOSULFAN SULFATE		3.5	U		3.7	U		3.6	U		3.7	U	
ENDRIN		3.5	U		3.7	U		3.6	U		3.7	U	
ENDRIN ALDEHYDE		3.5	U		3.7	U		3.6	U		3.7	U	
ENDRIN KETONE		3.5	U		3.7	U		3.6	U		3.7	U	
GAMMA-BHC (LINDANE)		1.8	U		1.9	U		1.9	U		1.9	U	
GAMMA-CHLORDANE		1.8	U		1.9	U		1.9	U		1.9	U	
HEPTACHLOR		1.8	U		1.9	U		1.9	U		1.9	U	
HEPTACHLOR EPOXIDE		1.8	U		1.9	U		1.9	U		1.9	U	
METHOXYCHLOR		18	U		19	U		19	U		19	U	
TOXAPHENE		35	U		37	U		36	U		37	U	

PROJ_NO: 02063	NSAMPLE	SB-17-106-0001			SB-17-106-0001DL2			SB-17-106-0104			SB-17-109-0001		
SDG: CTO070-2	LAB_ID	SB5944-1			SB5944-1DL2			SB5944-2			SB5904-8		
FRACTION: PEST/PCB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	92.0			92.0			93.5			92.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		10						3.5	U	A	11		
4,4'-DDE		8.3						3.5	U		9.3	J	C
4,4'-DDT					210			24	UJ	AC			
ALDRIN		1.8	U					1.8	U		1.8	U	
ALPHA-BHC		1.8	U					1.8	U		1.8	U	
ALPHA-CHLORDANE		1.8	U					1.8	U		1.8	U	
BETA-BHC		1.8	U					1.8	U		1.8	U	
DELTA-BHC		1.8	U					1.8	U		1.8	U	
DIELDRIN		3.6	U					3.5	U		3.6	U	
ENDOSULFAN I		1.8	U					1.8	U		1.8	UJ	C
ENDOSULFAN II		3.6	U					3.5	U		3.6	U	
ENDOSULFAN SULFATE		3.6	U					3.5	U		3.6	U	
ENDRIN		3.6	U					3.5	U		3.6	UJ	C
ENDRIN ALDEHYDE		3.6	U					3.5	U		3.6	U	
ENDRIN KETONE		3.6	U					3.5	U		3.6	U	
GAMMA-BHC (LINDANE)		1.8	U					1.8	U		1.8	U	
GAMMA-CHLORDANE		1.8	U					1.8	U		1.8	U	
HEPTACHLOR		1.8	U					1.8	U		1.8	U	
HEPTACHLOR EPOXIDE		1.8	U					1.8	U		1.8	U	
METHOXYCHLOR		18	U					18	U		18	UJ	C
TOXAPHENE		36	U					35	U		36	U	

PROJ_NO: 02063	NSAMPLE	SB-17-109-0001DL			SB-17-109-0104			SB-17-110-0104DL			SB-17-110-0104DL2		
SDG: CTO070-2	LAB_ID	SB5904-8DL			SB5904-9			SB5904-5DL			SB5904-5DL2		
FRACTION: PEST/PCB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	92.0			95.6			91.6			91.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD					3.4	UJ	AR	220					
4,4'-DDE					3.4	U		56	J	CU			
4,4'-DDT		180			3.4	UJ	AR				1000		
ALDRIN					1.8	U		18	U				
ALPHA-BHC					1.8	U		18	U				
ALPHA-CHLORDANE					1.8	U		18	U				
BETA-BHC					1.8	U		18	U				
DELTA-BHC					1.8	U		18	U				
DIELDRIN					3.4	U		36	U				
ENDOSULFAN I					1.8	U		18	UJ	C			
ENDOSULFAN II					3.4	U		36	U				
ENDOSULFAN SULFATE					3.4	U		36	U				
ENDRIN					3.4	U		36	UJ	C			
ENDRIN ALDEHYDE					3.4	U		36	U				
ENDRIN KETONE					3.4	U		36	U				
GAMMA-BHC (LINDANE)					1.8	U		18	U				
GAMMA-CHLORDANE					1.8	U		18	U				
HEPTACHLOR					1.8	U		18	U				
HEPTACHLOR EPOXIDE					1.8	U		18	U				
METHOXYCHLOR					18	U		180	UJ	C			
TOXAPHENE					34	U		360	U				

PROJ_NO: 02063	NSAMPLE	SB-17-114-0001			SB-17-114-0001DL			SB-17-114-0104			SB-17-115-0710		
SDG: CTO070-2	LAB_ID	SB5904-6			SB5904-6DL			SB5904-7			SB5904-4		
FRACTION: PEST/PCB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	91.6			91.6			95.0			81.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		17						3.5	U	A	4	U	
4,4'-DDE		22						0.51	J	CPU	4	U	
4,4'-DDT					380	J	C	16	UJ	AC	4	U	A
ALDRIN		1.8	U					1.8	U		2.1	U	
ALPHA-BHC		1.8	U					1.8	U		2.1	U	
ALPHA-CHLORDANE		1.8	U					1.8	U		2.1	U	
BETA-BHC		1.8	U					1.8	U		2.1	U	
DELTA-BHC		1.8	U					1.8	U		2.1	U	
DIELDRIN		3.6	U					3.5	U		4	U	
ENDOSULFAN I		1.8	U					1.8	UJ	C	2.1	U	
ENDOSULFAN II		3.6	U					3.5	U		4	U	
ENDOSULFAN SULFATE		3.6	U					3.5	U		4	U	
ENDRIN		3.6	U					3.5	UJ	C	4	U	
ENDRIN ALDEHYDE		3.6	U					3.5	U		4	U	
ENDRIN KETONE		3.6	U					3.5	U		4	U	
GAMMA-BHC (LINDANE)		1.8	U					1.8	U		2.1	U	
GAMMA-CHLORDANE		1.8	U					1.8	U		2.1	U	
HEPTACHLOR		1.8	U					1.8	U		2.1	U	
HEPTACHLOR EPOXIDE		1.8	U					1.8	U		2.1	U	
METHOXYCHLOR		18	U					18	UJ	C	21	U	
TOXAPHENE		36	U					35	U		40	U	

PROJ_NO: 02063	NSAMPLE	SB-17-116-0407			SB-17-117-0104DL			SB-17-117-0104DL2			SB-17-119-0104		
SDG: CTO070-2	LAB_ID	SB5904-12			SB5944-5DL			SB5944-5DL2			SB5904-3		
FRACTION: PEST/PCB	SAMP_DATE	10/16/2008			10/17/2008			10/17/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	78.5			82.7			82.7			91.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		4.2	UJ	AR	60						3.6	U	A
4,4'-DDE		19	J	R	160						2.7	J	P
4,4'-DDT		96	J	R				1100	J	C	9.7	U	A
ALDRIN		2.2	UJ	R	10	U					1.9	U	
ALPHA-BHC		2.2	UJ	R	10	U					1.9	U	
ALPHA-CHLORDANE		2.2	UJ	R	67						1.2	J	PU
BETA-BHC		2.2	UJ	R	10	U					1.9	U	
DELTA-BHC		2.2	UJ	R	10	U					1.9	U	
DIELDRIN		4.2	UJ	R	20	U					3.6	U	
ENDOSULFAN I		2.2	UJ	R	10	UJ	C				1.9	U	
ENDOSULFAN II		4.2	UJ	R	20	U					3.6	U	
ENDOSULFAN SULFATE		4.2	UJ	R	20	U					3.6	U	
ENDRIN		4.2	UJ	R	20	UJ	C				3.6	U	
ENDRIN ALDEHYDE		4.2	UJ	R	20	U					3.6	U	
ENDRIN KETONE		4.2	UJ	R	20	U					3.6	U	
GAMMA-BHC (LINDANE)		2.2	UJ	R	10	U					1.9	U	
GAMMA-CHLORDANE		2.2	UJ	R	70						1.2	J	P
HEPTACHLOR		2.2	UJ	R	10	U					1.9	U	
HEPTACHLOR EPOXIDE		2.2	UJ	R	11	J	U				1.9	U	
METHOXYCHLOR		22	UJ	R	100	UJ	C				19	U	
TOXAPHENE		42	UJ	R	200	U					36	U	

PROJ_NO: 02063	NSAMPLE	SB-17-120-0205			SB-17-120-0205DL			SB-17-121-0205DL2			SB-17-121-0205DL3		
SDG: CTO070-2	LAB_ID	SB5904-10			SB5904-10DL			SB5904-13DL2			SB5904-13DL3		
FRACTION: PEST/PCB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	76.2			76.2			74.8			74.8		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		25	J	G				54000					
4,4'-DDE		18	J	G				25000					
4,4'-DDT					910	J	G				1500000		
ALDRIN		2.2	U					1100	UJ	D			
ALPHA-BHC		2.2	U					1100	UJ	D			
ALPHA-CHLORDANE		19						1100	UJ	D			
BETA-BHC		2.2	U					1100	UJ	D			
DELTA-BHC		2.2	U					1100	UJ	D			
DIELDRIN		4.3	U					2200	UJ	D			
ENDOSULFAN I		2.2	U					1100	UJ	D			
ENDOSULFAN II		4.3	U					2200	UJ	D			
ENDOSULFAN SULFATE		4.3	U					2200	UR	D			
ENDRIN		4.3	U					2200	UJ	D			
ENDRIN ALDEHYDE		4.3	U					2200	UJ	D			
ENDRIN KETONE		4.3	U					2200	UJ	D			
GAMMA-BHC (LINDANE)		2.2	U					1100	UJ	D			
GAMMA-CHLORDANE		19						1100	UJ	D			
HEPTACHLOR		1.7	J	P				1100	UJ	D			
HEPTACHLOR EPOXIDE		2.2	U					1100	UJ	D			
METHOXYCHLOR		22	U					11000	UJ	D			
TOXAPHENE		43	U					22000	UJ	D			

PROJ_NO: 02063	NSAMPLE	SB-17-121-0710			SB-17-121-0710DL			SB-17-121-1215			SB-17-121-1215DL		
SDG: CTO070-2	LAB_ID	SB5904-14			SB5904-14DL			SB5904-15			SB5904-15DL		
FRACTION: PEST/PCB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	80.7			80.7			79.1			79.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		32						15					
4,4'-DDE		15						4.4					
4,4'-DDT					830						230		
ALDRIN		2.1	U					2.1	U				
ALPHA-BHC		2.1	U					2.1	U				
ALPHA-CHLORDANE		2.1	U					1.2	J	PU			
BETA-BHC		2.1	U					2.1	U				
DELTA-BHC		2.1	U					2.1	U				
DIELDRIN		4.1	U					4.2	U				
ENDOSULFAN I		2.1	U					2.1	U				
ENDOSULFAN II		4.1	U					4.2	U				
ENDOSULFAN SULFATE		4.1	U					4.2	U				
ENDRIN		4.1	U					4.2	U				
ENDRIN ALDEHYDE		4.1	U					4.2	U				
ENDRIN KETONE		4.1	U					4.2	U				
GAMMA-BHC (LINDANE)		2.1	U					2.1	U				
GAMMA-CHLORDANE		2.1	U					1.1	J	P			
HEPTACHLOR		2.1	U					2.1	U				
HEPTACHLOR EPOXIDE		2.1	U					2.1	U				
METHOXYCHLOR		21	U					21	U				
TOXAPHENE		41	U					42	U				

PROJ_NO: 02063	NSAMPLE	SB-17-122-0407			SB-17-124-0001			SB-17-124-0104			SB-17-DUP05		
SDG: CTO070-2	LAB_ID	SB5944-3			SB5904-1			SB5904-2			SB5904-11		
FRACTION: PEST/PCB	SAMP_DATE	10/17/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			FD		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	66.0			85.9			85.0			72.9		
	DUP_OF										SB-17-120-0205		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		5.2	U	A	3.8	U		3.9	U	A	54	J	G
4,4'-DDE		5	U		3.8	U		8.3			33	J	G
4,4'-DDT		65	J	CG	3.8	U	A	72					
ALDRIN		2.6	U		2	U		2	U		2.3	U	
ALPHA-BHC		2.6	U		2	U		2	U		2.3	U	
ALPHA-CHLORDANE		2.6	U		2	U		2	U		21		
BETA-BHC		2.6	U		2	U		2	U		2.3	U	
DELTA-BHC		2.6	U		2	U		2	U		2.3	U	
DIELDRIN		5	U		3.8	U		3.9	U		4.5	U	
ENDOSULFAN I		2.6	U		2	U		2	U		2.3	U	
ENDOSULFAN II		5	U		3.8	U		3.9	U		4.5	U	
ENDOSULFAN SULFATE		5	U		3.8	U		3.9	U		4.5	U	
ENDRIN		5	U		3.8	U		3.9	U		4.5	U	
ENDRIN ALDEHYDE		5	U		3.8	U		3.9	U		4.5	U	
ENDRIN KETONE		5	U		3.8	U		3.9	U		4.5	U	
GAMMA-BHC (LINDANE)		2.6	U		2	U		91			2.3	U	
GAMMA-CHLORDANE		2.6	U		2	U		2	U		21		
HEPTACHLOR		2.6	U		2	U		2	U		2.3	U	
HEPTACHLOR EPOXIDE		2.6	U		2	U		2	U		2.3	U	
METHOXYCHLOR		26	U		20	U		20	U		23	U	
TOXAPHENE		50	U		38	U		39	U		45	U	

PROJ_NO: 02063	NSAMPLE	SB-17-DUP05DL			SB-17-DUP06		
SDG: CTO070-2	LAB_ID	SB5904-11DL			SB5944-4		
FRACTION: PEST/PCB	SAMP_DATE	10/16/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	FD			FD		
	UNITS	UG/KG			UG/KG		
	PCT_SOLIDS	72.9			70.8		
	DUP_OF	SB-17-120-0205			SB-17-122-0407		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD					4.7	U	
4,4'-DDE					4.7	U	
4,4'-DDT		2200	J	G	4.8	UJ	AG
ALDRIN					2.4	U	
ALPHA-BHC					2.4	U	
ALPHA-CHLORDANE					2.4	U	
BETA-BHC					2.4	U	
DELTA-BHC					2.4	U	
DIELDRIN					4.7	U	
ENDOSULFAN I					2.4	U	
ENDOSULFAN II					4.7	U	
ENDOSULFAN SULFATE					4.7	U	
ENDRIN					4.7	U	
ENDRIN ALDEHYDE					4.7	U	
ENDRIN KETONE					4.7	U	
GAMMA-BHC (LINDANE)					2.4	U	
GAMMA-CHLORDANE					2.4	U	
HEPTACHLOR					2.4	U	
HEPTACHLOR EPOXIDE					2.4	U	
METHOXYCHLOR					24	U	
TOXAPHENE					47	U	

PROJ_NO: 02063	NSAMPLE	SB-17-RB01			SB-17-RB02			SB-17-RB03			SB-17-RB04		
SDG: CTO070-2	LAB_ID	SB5904-16			SB5904-17			SB5944-15			SB5944-16		
FRACTION: PEST/PCB	SAMP_DATE	10/16/2008			10/16/2008			10/17/2008			10/17/2008		
MEDIA: WATER	QC_TYPE	RB			RB			RB			RB		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		0.096	U		0.094	U		0.094	U		0.097	U	
4,4'-DDE		0.096	U		0.094	U		0.094	U		0.097	U	
4,4'-DDT		0.096	U		0.094	U		0.094	U		0.097	U	
ALDRIN		0.048	U		0.047	U		0.047	U		0.048	U	
ALPHA-BHC		0.048	UJ	E	0.047	UJ	E	0.047	UJ	E	0.048	UJ	E
ALPHA-CHLORDANE		0.048	UJ	E	0.047	UJ	E	0.047	UJ	E	0.048	UJ	E
BETA-BHC		0.048	UJ	E	0.047	UJ	E	0.047	UJ	E	0.048	UJ	E
DELTA-BHC		0.048	U		0.047	U		0.047	U		0.048	U	
DIELDRIN		0.096	UJ	E	0.094	UJ	E	0.094	UJ	E	0.097	UJ	E
ENDOSULFAN I		0.048	UJ	E	0.047	UJ	E	0.047	UJ	E	0.048	UJ	E
ENDOSULFAN II		0.096	U		0.094	U		0.094	U		0.097	U	
ENDOSULFAN SULFATE		0.096	U		0.094	U		0.094	U		0.097	U	
ENDRIN		0.096	U		0.094	U		0.094	U		0.097	U	
ENDRIN ALDEHYDE		0.096	UJ	E	0.094	UJ	E	0.094	UJ	E	0.097	UJ	E
ENDRIN KETONE		0.096	UJ	E	0.094	UJ	E	0.094	UJ	E	0.097	UJ	E
GAMMA-BHC (LINDANE)		0.048	U		0.047	U		0.047	U		0.048	U	
GAMMA-CHLORDANE		0.048	UJ	E	0.047	UJ	E	0.047	UJ	E	0.048	UJ	E
HEPTACHLOR		0.048	U		0.047	U		0.047	U		0.048	U	
HEPTACHLOR EPOXIDE		0.048	UJ	E	0.047	UJ	E	0.047	UJ	E	0.048	UJ	E
METHOXYCHLOR		0.48	UJ	C	0.47	UJ	C	0.47	UJ	C	0.48	UJ	C
TOXAPHENE		0.96	U		0.94	U		0.94	U		0.97	U	

PROJ_NO: 02063	NSAMPLE	SWB-17-01		
SDG: CTO070-2	LAB_ID	SB5944-14		
FRACTION: PEST/PCB	SAMP_DATE	10/17/2008		
MEDIA: WATER	QC_TYPE	SB		
	UNITS	UG/L		
	PCT_SOLIDS			
	DUP_OF			
PARAMETER		RESULT	VQL	QLCD
4,4'-DDD		0.094	U	
4,4'-DDE		0.094	U	
4,4'-DDT		0.094	U	
ALDRIN		0.047	U	
ALPHA-BHC		0.047	UJ	E
ALPHA-CHLORDANE		0.047	UJ	E
BETA-BHC		0.047	UJ	E
DELTA-BHC		0.047	U	
DIELDRIN		0.094	UJ	E
ENDOSULFAN I		0.047	UJ	E
ENDOSULFAN II		0.094	U	
ENDOSULFAN SULFATE		0.094	U	
ENDRIN		0.094	U	
ENDRIN ALDEHYDE		0.094	UJ	E
ENDRIN KETONE		0.094	UJ	E
GAMMA-BHC (LINDANE)		0.047	U	
GAMMA-CHLORDANE		0.047	UJ	E
HEPTACHLOR		0.047	U	
HEPTACHLOR EPOXIDE		0.047	UJ	E
METHOXYCHLOR		0.47	UJ	C
TOXAPHENE		0.94	U	

PROJ_NO: 02063	NSAMPLE	SB-17-101-0001			SB-17-101-0104			SB-17-102-0001			SB-17-102-0104		
SDG: CTO070-2	LAB_ID	SB5944-6			SB5944-7			SB5944-8			SB5944-9		
FRACTION: HERB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	87.4			94.9			94.0			91.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		38	U		35	U		35	U		36	U	
2,4-D		38	U		35	U		35	U		36	U	

PROJ_NO: 02063	NSAMPLE	SB-17-103-0001			SB-17-103-0104			SB-17-104-0001			SB-17-104-0104		
SDG: CTO070-2	LAB_ID	SB5944-10			SB5944-11			SB5944-12			SB5944-13		
FRACTION: HERB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	93.6			89.8			91.0			88.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		35	U		37	U		36	U		37	U	
2,4-D		35	U		37	U		36	U		37	U	

PROJ_NO: 02063	NSAMPLE	SB-17-106-0001			SB-17-106-0104			SB-17-109-0001			SB-17-109-0104		
SDG: CTO070-2	LAB_ID	SB5944-1RA			SB5944-2			SB5904-8RA2			SB5904-9RA2		
FRACTION: HERB	SAMP_DATE	10/17/2008			10/17/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	92.0			93.5			92.0			95.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		36	U		35	U		36	U		34	U	
2,4-D		36	U		35	U		36	U		34	U	

PROJ_NO: 02063	NSAMPLE	SB-17-110-0104			SB-17-114-0001			SB-17-114-0104			SB-17-115-0710		
SDG: CTO070-2	LAB_ID	SB5904-5			SB5904-6			SB5904-7RA2			SB5904-4		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	91.6			91.6			95.0			81.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		36	U		36	U		35	U		40	U	
2,4-D		36	U		36	U		35	U		40	U	

PROJ_NO: 02063	NSAMPLE	SB-17-116-0407			SB-17-117-0104			SB-17-119-0104			SB-17-120-0205		
SDG: CTO070-2	LAB_ID	SB5904-12RA2			SB5944-5			SB5904-3			SB5904-10RA2		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/17/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	78.5			82.7			91.2			76.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		42	U		40	U		36	U		43	U	
2,4-D		42	U		40	U		36	U		43	U	

PROJ_NO: 02063	NSAMPLE	SB-17-121-0205			SB-17-121-0710			SB-17-121-1215			SB-17-122-0407		
SDG: CTO070-2	LAB_ID	SB5904-13RA2			SB5904-14RA			SB5904-15RA			SB5944-3		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	74.8			80.7			79.1			66.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		44	U		41	U		42	U		50	U	
2,4-D		44	U		41	U		42	U		50	U	

PROJ_NO: 02063	NSAMPLE	SB-17-124-0001			SB-17-124-0104			SB-17-DUP05			SB-17-DUP06		
SDG: CTO070-2	LAB_ID	SB5904-1			SB5904-2			SB5904-11RA2			SB5944-4		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			FD			FD		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	85.9			85.0			72.9			70.8		
	DUP_OF							SB-17-120-0205			SB-17-122-0407		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		38	U		39	U		45	U		47	U	
2,4-D		38	U		39	U		45	U		47	U	

PROJ_NO: 02063	NSAMPLE	SB-17-RB01			SB-17-RB02			SB-17-RB03			SB-17-RB04		
SDG: CTO070-2	LAB_ID	SB5904-16			SB5904-17			SB5944-15			SB5944-16		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/17/2008			10/17/2008		
MEDIA: WATER	QC_TYPE	RB			RB			RB			RB		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		2.8	U		2.8	U		2.9	U		2.9	U	
2,4-D		2.8	U		2.8	U		2.9	U		2.9	U	

PROJ_NO: 02063	NSAMPLE	SWB-17-01		
SDG: CTO070-2	LAB_ID	SB5944-14		
FRACTION: HERB	SAMP_DATE	10/17/2008		
MEDIA: WATER	QC_TYPE	SB		
	UNITS	UG/L		
	PCT_SOLIDS			
	DUP_OF			
PARAMETER		RESULT	VQL	QLCD
2,4,5-T		3.2	U	
2,4-D		3.2	U	

PROJ_NO: 02063	NSAMPLE	SB-17-115-0710			SB-17-121-0205			SB-17-121-0710			SB-17-121-1215		
SDG: CTO070-2	LAB_ID	SB5904-4RA			SB5904-13DL			SB5904-14RA			SB5904-15		
FRACTION: PET	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	81.6			74.8			80.7			79.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
DIESEL RANGE ORGANICS		1.3	J	P	1700			6.2	U		13		

PROJ_NO: 02063	NSAMPLE	SB-17-122-0407			SB-17-DUP06		
SDG: CTO070-2	LAB_ID	SB5944-3DL			SB5944-4DL		
FRACTION: PET	SAMP_DATE	10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			FD		
	UNITS	MG/KG			MG/KG		
	PCT_SOLIDS	66.0			70.8		
	DUP_OF				SB-17-122-0407		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
DIESEL RANGE ORGANICS		200			120		

PROJ_NO: 02063	NSAMPLE	SB-17-RB01			SB-17-RB02		
SDG: CTO070-2	LAB_ID	SB5904-16			SB5904-17		
FRACTION: PET	SAMP_DATE	10/16/2008			10/16/2008		
MEDIA: WATER	QC_TYPE	RB			RB		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS						
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
DIESEL RANGE ORGANICS		44	J	P	48		

TETRA TECH

INTERNAL CORRESPONDENCE

C-NAVY-03-09-3076W

Date: March 2, 2009

c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Jennifer Cardinal (no copy) JC

Subject: Tier II Inorganic Data Validation, SDG CTO070-3
Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Arsenic/Lead/Zinc/Cyanide:

18/Soils/	SB-17-105-0001	SB-17-105-0104	SB-17-107-0001
	SB-17-107-0104	SB-17-107-0408	SB-17-108-0001
	SB-17-108-0104	SB-17-111-0104	SB-17-112-0001
	SB-17-112-0104	SB-17-113-0001	SB-17-113-0104
	SB-17-118-0001	SB-17-118-0104	SB-17-132-0408
	SB-17-141-0307	SB-17-DUP07	SB-17-DUP08

(Field Duplicate Pairs: SB-17-105-0001/SB-17-DUP07, SB-17-132-0408/SB-17-DUP08)

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the arsenic, lead, zinc, and cyanide analytical data from the samples collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine on October 20, 2008. Sample collection and analysis was performed according to the requirements of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The metals (arsenic, lead, and zinc) analysis was performed according to USEPA SW-846 Methods 6010B. The cyanide analysis was performed according to USEPA SW-846 9012M. The Tier II data validation was performed in accordance with the Region I EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part IV, Inorganic Data Validation Functional Guidelines, November 2008.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The analytical data in this SDG were evaluated based on the following parameters:

- Data Completeness
- * Holding Times
- * Calibration Verification
- * Laboratory Blank Analyses
- * ICP Interference Check Sample Results
- Matrix Spike/Matrix Spike Duplicate
- * Laboratory Duplicate Results
- * Laboratory Control Sample Results

* • Field Duplicate Precision
* • ICP Serial Dilution Results
* • Percent Solids
• Reporting Limits

* All quality control criteria were met for this parameter.

Data Completeness

The laboratory noted that one sample container for sample SB-17-113-0001 was labeled "17-113-0004". However, the sample container had the correct sample time of 10:20.

Metals

On February 24, 2009 the laboratory resubmitted all metals QC summary forms to report only arsenic, lead, and zinc as requested in the Work Plan and to report all results to the method detection limits.

Matrix Spike/Matrix Spike Duplicate

Cyanide

The following table summarizes the result in the matrix spike analysis of sample SB-17-108-0104 which was outside of the 75-125% recovery criteria:

Compound	%Recovery	Action	
		(+)	NDs
Cyanide	61		UJ

The non-detected cyanide results are estimated (UJ) in all soil samples due to a low matrix spike recovery.

The recovery for cyanide was below the matrix spike recovery criterion; therefore, the project accuracy may be impacted. The non-detected cyanide results in all samples are usable as estimated quantitation limits which may be biased low.

Reporting Limits

The positive results below than the laboratory's quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

Metals

The laboratory reported non-detected metals results down to the MDL.

The laboratory reporting limits met all project action limits with the following exception. The arsenic reporting limits for samples SB-17-132-0408, SB-17-DUP08, and SB-17-141-0307 did not meet the project action limit due to the high moisture content of the samples. Data usability is not impacted since all of these samples have positive arsenic results.

Cyanide

The laboratory reported non-detected cyanide results down to the QL.

The cyanide project action limit was not achieved for samples SB-17-132-0408 and SB-17-DUP08 due to the high moisture content of the samples. Data usability may be impacted.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity, and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Metals

The project goals with respect to accuracy, precision, sensitivity, and completeness were met for the metals data set. Data usability is not impacted with regards to accuracy, precision, sensitivity, and completeness.

Cyanide

The project goals with respect to accuracy were met for the cyanide data set with the following exception. Cyanide was qualified as estimated in all samples due a low matrix spike recovery; the affected results may be biased low. Although specific method criteria were not met in this instance, the affected non-detected results are usable as estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to sensitivity were met for the cyanide data set with the following exception. The cyanide project action limit was not achieved for samples SB-17-132-0408 and SB-17-DUP08 due to the high moisture content of the samples. Data usability may be impacted.

The project goals with respect to precision and completeness were met for the cyanide data set. Data usability is not impacted with regards to precision and completeness.

Tables: Data Validation Qualifiers and Codes
Data Summary Tables

Enclosures: Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	SB-17-105-0001			SB-17-105-0104			SB-17-107-0001			SB-17-107-0104		
SDG: CTO070-3	LAB_ID	SB6002-001			SB6002-002			SB6002-003			SB6002-004		
FRACTION: M	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	88.6			95.4			79.8			83.5		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		1.4			1.5			7.8			6.8		
LEAD		11.4			3			9			5.6		
ZINC		13.2			11.9			25			18.4		

PROJ_NO: 02063	NSAMPLE	SB-17-107-0408			SB-17-108-0001			SB-17-108-0104			SB-17-111-0104		
SDG: CTO070-3	LAB_ID	SB6002-005			SB6002-006			SB6002-007			SB6002-009		
FRACTION: M	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	79.2			86.4			77.0			91.3		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		1.5			5.2			3.1			3.4		
LEAD		2.5			6.2			6.2			7.7		
ZINC		11.9			23			19.9			23.7		

PROJ_NO: 02063	NSAMPLE	SB-17-112-0001			SB-17-112-0104			SB-17-113-0001			SB-17-113-0104		
SDG: CTO070-3	LAB_ID	SB6002-010			SB6002-011			SB6002-012			SB6002-013		
FRACTION: M	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	83.1			82.8			90.2			79.7		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		9.4			2.2			8.3			4.1		
LEAD		4.7			3.6			12.4			32.3		
ZINC		24.6			18.9			29			21		

PROJ_NO: 02063	NSAMPLE	SB-17-118-0001			SB-17-118-0104			SB-17-132-0408			SB-17-141-0307		
SDG: CTO070-3	LAB_ID	SB6002-014			SB6002-015			SB6002-016			SB6002-018		
FRACTION: M	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	94.1			85.5			39.2			66.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		6.8			3.2			4.4			1.9		
LEAD		9.1			6.1			6.3			3		
ZINC		25.1			18			33.4			15.6		

PROJ_NO: 02063	NSAMPLE	SB-17-DUP07			SB-17-DUP08		
SDG: CTO070-3	LAB_ID	SB6002-008			SB6002-017		
FRACTION: M	SAMP_DATE	10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	FD			FD		
	UNITS	MG/KG			MG/KG		
	PCT_SOLIDS	90.4			48.7		
	DUP_OF	SB-17-105-0001			SB-17-132-0408		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		1.6			3.6		
LEAD		7.8			5.2		
ZINC		10.9			25.7		

PROJ_NO: 02063	NSAMPLE	SB-17-105-0001			SB-17-105-0104			SB-17-107-0001			SB-17-107-0104		
SDG: CTO070-3	LAB_ID	SB6002-1			SB6002-2			SB6002-3			SB6002-4		
FRACTION: MISC	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	88.6			95.4			79.8			83.5		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.55	UJ	D	0.5	UJ	D	0.6	UJ	D	0.6	UJ	D

PROJ_NO: 02063	NSAMPLE	SB-17-107-0408			SB-17-108-0001			SB-17-108-0104			SB-17-111-0104		
SDG: CTO070-3	LAB_ID	SB6002-5			SB6002-6			SB6002-7			SB6002-9		
FRACTION: MISC	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	79.2			86.4			77.0			91.3		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.6	UJ	D	0.55	UJ	D	0.65	UJ	D	0.55	UJ	D

PROJ_NO: 02063	NSAMPLE	SB-17-112-0001			SB-17-112-0104			SB-17-113-0001			SB-17-113-0104		
SDG: CTO070-3	LAB_ID	SB6002-10			SB6002-11			SB6002-12			SB6002-13		
FRACTION: MISC	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	83.1			82.8			90.2			79.7		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.6	UJ	D	0.6	UJ	D	0.55	UJ	D	0.6	UJ	D

PROJ_NO: 02063	NSAMPLE	SB-17-118-0001			SB-17-118-0104			SB-17-132-0408			SB-17-141-0307		
SDG: CTO070-3	LAB_ID	SB6002-14			SB6002-15			SB6002-16			SB6002-18		
FRACTION: MISC	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	94.1			85.5			39.2			66.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.5	UJ	D	0.6	UJ	D	1.3	UJ	D	0.75	UJ	D

PROJ_NO: 02063	NSAMPLE	SB-17-DUP07			SB-17-DUP08		
SDG: CTO070-3	LAB_ID	SB6002-8			SB6002-17		
FRACTION: MISC	SAMP_DATE	10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	FD			FD		
	UNITS	MG/KG			MG/KG		
	PCT_SOLIDS	90.4			48.7		
	DUP_OF	SB-17-105-0001			SB-17-132-0408		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.55	UJ	D	1	UJ	D

TETRA TECH

INTERNAL CORRESPONDENCE

C-NAVY-02-09-3066W

Date: February 23, 2009

c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Jennifer Cardinal (no copy) JC

Subject: Tier II Organic Data Validation, SDG CTO070-3
Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Pesticides/Herbicides:

18/Soils/	SB-17-105-0001	SB-17-105-0104	SB-17-107-0001
	SB-17-107-0104	SB-17-107-0408	SB-17-108-0001
	SB-17-108-0104	SB-17-111-0104	SB-17-112-0001
	SB-17-112-0104	SB-17-113-0001	SB-17-113-0104
	SB-17-118-0001	SB-17-118-0104	SB-17-132-0408
	SB-17-141-0307	SB-17-DUP07	SB-17-DUP08

(Field Duplicate Pairs: SB-17-105-0001/SB-17-DUP07, SB-17-132-0408/SB-17-DUP08)

DRO:
1/Soil/ SB-17-111-0104

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the diesel range organic (DRO), pesticide, herbicide analytical data for the samples in this SDG. The samples were collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine on October 20, 2008. Sample collection and analysis was performed according to the requirements of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The DRO analysis was performed according to MEDEP 4.1.25. The pesticide and herbicide analyses were performed according to USEPA SW-846 Methods 8081 and 8151, respectively.

The DRO data validation was performed in accordance with the Region I EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996. The pesticides and herbicide validation was performed in accordance with the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Organic Analyses, Part III, February 2004.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The data were evaluated based on the following parameters:

- Data Completeness

*	•	Preservation and Technical Holding Times
NA	•	GC/MS Instrument Performance Check (Tuning)
*	•	Pesticide Degradation
	•	Initial and Continuing Calibrations
	•	Blanks
*	•	Surrogate Compounds
NA	•	Internal Standards
*	•	Matrix Spike/Matrix Spike Duplicate
	•	Laboratory Control Sample/Laboratory Control Sample Duplicate
*	•	Field Duplicates
	•	Analyte Identification
	•	Reporting Limits

* All criteria were met for this parameter.
NA Not applicable for this SDG.

Data Completeness

The laboratory noted that one sample container for sample SB-17-113-0001 was labeled "17-113-0004". However, the sample container had the correct sample time of 10:20 listed on the chain-of-custody form.

On February 16, 2009 the laboratory provided an explanation as to which results should be reported for sample SB-17-118-0001 since two pesticide Form Is were provided for this sample in the original data package.

The laboratory was contacted regarding the initial calibration verification (ICV) summary forms for the DRO, pesticides, and herbicides analyses. On February 19, 2009 the laboratory explained that the ICV results are reported with the calibration verification forms.

Initial and Continuing Calibrations

Pesticides

The following table summarizes the pesticide compounds that failed to meet the continuing calibration (CC) criterion of %D <25:

Compound	%D	Action		Affected Samples
		(+)	NDs	
4,4'-DDT	-37.20, -33.60	J	UJ	SB-17-113-0104DL, SB-17-118-0104, SB-17-132-0408, SB-17-DUP08, SB-17-141-0307
Methoxychlor	-37.40, -26.40		UJ	SB-17-118-0104, SB-17-132-0408, SB-17-DUP08, SB-17-141-0307

Although the %D was outside of the QC limits for 4,4'-DDT and methoxychlor; the project accuracy goals were not impacted since the instrument calibration variability is below safety margin of greater than 100% allocated for the compounds in the soil samples. The positive and non-detected results in the affected samples are usable as estimated values and estimated quantitation limits.

Blanks

Pesticides

The following table summarizes the level of blank contamination detected in the laboratory blank associated with the samples.

Compound	Type of Blank	Maximum Conc. (µg/Kg)	Action Level (µg/Kg)	Affected Samples
4,4'-DDE	Method	0.94	4.7	SB-17-105-0104, SB-17-107-0001, SB-17-107-0104, SB-17-107-0408, SB-17-108-0104, SB-17-132-0408, SB-17-141-0307
4,4'-DDT	Method	1.1	5.5	SB-17-105-0104, SB-17-107-0104, SB-17-107-0408, SB-17-108-0104, SB-17-132-0408
Heptachlor	Method	0.57	2.85	SB-17-113-0001
4,4'-DDD	Method	0.59	2.95	SB-17-107-0001, SB-17-107-0104, SB-17-108-0001, SB-17-111-0104, SB-17-118-0104, SB-17-141-0307, SB-17-DUP07

Blank actions were applied to the affected samples due to 4,4'-DDE, 4,4'-DDT, heptachlor, and 4,4'-DDD method blank contamination. The 5x rule applies for these pesticide compounds. The positive results for 4,4'-DDE, 4,4'-DDT, heptachlor, and 4,4'-DDD in the affected samples were changed to non-detected values at the sample-specific project quantitation limit or at elevated quantitation limits.

Heptachlor contamination was found in the laboratory method blank; therefore, the project sensitivity goals may be impacted since the non-detected value exceeds the project action limit for heptachlor. The heptachlor result in the affected sample is usable as a non-detected value.

Although 4,4'-DDE, 4,4'-DDT, and 4,4'-DDD contamination was found in the laboratory method blank, the project sensitivity goals are not impacted since the non-detected values do not exceed the project action limits for these compounds. The 4,4'-DDE, 4,4'-DDT, and 4,4'-DDD results in the affected samples are usable as non-detected values.

Laboratory Control Sample/Laboratory Control Sample Duplicates

Pesticides

The following table summarizes the pesticide compound that failed to meet the LCS recovery limits:

Compound	% Rec.	QC Limits	Action		Affected Samples
			(+)	NDs	
4,4'-DDT	257	45-110	J		All samples except SB-17-DUP08

The laboratory control sample recovery criterion was exceeded for 4,4'-DDT; therefore, the project accuracy goals may be impacted. The positive 4,4'-DDT results in the affected samples are usable as estimated values which may be biased high.

Analyte Identification/Quantitation

Pesticides

The relative percent difference (RPD) between the results of analytical columns 1 and 2 exceeded the 40% RPD QC criterion for the compounds in the following samples:

Sample	Analyte	RPD	Action
			(+)
SB-17-107-0001	Gamma-chlordane	45.4	J
SB-17-113-0001	Heptachlor	53.7	J
SB-17-113-0104	Alpha-chlordane	47.8	J

The analyte quantitation relative percent differences exceeded the 40% RPD QC limit for gamma-chlordane in sample SB-17-107-0001, heptachlor in sample SB-17-113-0001, and alpha-chlordane in sample SB-17-113-0104; therefore, the project accuracy goals may be impacted. The affected results in these samples are usable as estimated values.

Reporting Limits

All positive results below the quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

Herbicides

The project action limit for 2,4-D was not met due to the percent moisture of the samples. Data usability may be impacted.

Pesticides

Project action limits were not achievable for all pesticides except for 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, methoxychlor, and toxaphene as highlighted in SAP Worksheet 15a of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008. Data usability may be impacted.

The reporting limits were raised for 4,4'-DDE, 4,4'-DDT, heptachlor, and 4,4'-DDD in select samples due to blank contamination. As discussed in the Blanks section, the project sensitivity goals may be impacted for heptachlor.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Pesticides

The project goals with respect to accuracy were met for the pesticides data set with the following exceptions. 4,4'-DDT was qualified as estimated in select samples due to a high LCS recovery; the affected results may be biased high. Gamma-chlordane in sample SB-17-107-0001, heptachlor in sample SB-17-113-0001, and alpha-chlordane in sample SB-17-113-0104 were qualified as estimated in select samples due to analytical interferences detected in the dual column analysis. Although specific method criteria were not met in these instances, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability. Additionally, 4,4'-DDT and methoxychlor were qualified as estimated in select samples due to instrument calibration variability. Although specific method criteria were not met in these instances, data usability is not impacted and the affected positive and non-detected results are usable as estimated values and estimated quantitation limits.

The project goals with respect to sensitivity were met for the pesticides data set with the following exception. Project action limits were not achievable for all pesticides except for 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, methoxychlor, and toxaphene. Also, the reporting limit for heptachlor was raised in select samples due to blank contamination. The elevated quantitation limits exceed the project action limit. Data usability may be impacted.

The project goals with respect to precision and completeness were met for the pesticides data set. Data usability was not impacted with regards to precision and completeness.

Herbicides

The project goals with respect to sensitivity were met for 2,4,5-T, but not for 2,4-D due to the percent moisture of the samples. Data usability may be impacted.

The project goals with respect to accuracy, precision, and completeness were met for the herbicides data set. Data usability was not impacted with regards to accuracy, precision, and completeness.

DRO

The project goals with respect to accuracy, precision, sensitivity, and completeness were met for the DRO data set. Data usability was not impacted with regards to accuracy, precision, sensitivity, and completeness.

Tables:	Data Validation Qualifiers and Codes
	Data Summary Tables
Enclosures:	Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	SB-17-105-0001			SB-17-105-0104			SB-17-107-0001			SB-17-107-0104		
SDG: CTO070-3	LAB_ID	SB6002-1			SB6002-2			SB6002-3			SB6002-4		
FRACTION: PEST/PCB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	88.6			95.4			79.8			83.5		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		3.7	U		3.4	U		4.1	U	A	4	U	A
4,4'-DDE		17			3.4	U	A	4.1	U	A	4	U	A
4,4'-DDT		28	J	E	3.4	UJ	AE	19	J	E	5	UJ	AE
ALDRIN		1.9	U		1.8	U		2.1	U		2	U	
ALPHA-BHC		1.9	U		1.8	U		2.1	U		2	U	
ALPHA-CHLORDANE		1.9	U		1.8	U		1.1	J	P	2	U	
BETA-BHC		1.9	U		1.8	U		2.1	U		2	U	
DELTA-BHC		1.9	U		1.8	U		2.1	U		2	U	
DIELDRIN		3.7	U		3.4	U		4.1	U		4	U	
ENDOSULFAN I		1.9	U		1.8	U		2.1	U		2	U	
ENDOSULFAN II		3.7	U		3.4	U		4.1	U		4	U	
ENDOSULFAN SULFATE		3.7	U		3.4	U		4.1	U		4	U	
ENDRIN		3.7	U		3.4	U		4.1	U		4	U	
ENDRIN ALDEHYDE		3.7	U		3.4	U		4.1	U		4	U	
ENDRIN KETONE		3.7	U		3.4	U		4.1	U		4	U	
GAMMA-BHC (LINDANE)		1.9	U		1.8	U		2.1	U		2	U	
GAMMA-CHLORDANE		1.9	U		1.8	U		1	J	PU	2	U	
HEPTACHLOR		1.9	U		1.8	U		2.1	U		2	U	
HEPTACHLOR EPOXIDE		1.9	U		1.8	U		2.1	U		2	U	
METHOXYCHLOR		19	U		18	U		21	U		20	U	
TOXAPHENE		37	U		34	U		41	U		40	U	

PROJ_NO: 02063	NSAMPLE	SB-17-107-0408			SB-17-108-0001			SB-17-108-0104			SB-17-111-0104		
SDG: CTO070-3	LAB_ID	SB6002-5			SB6002-6			SB6002-7			SB6002-9		
FRACTION: PEST/PCB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	79.2			86.4			77.0			91.3		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		4.2	U		3.8	U	A	4.3	U		3.6	U	A
4,4'-DDE		4.2	U	A	12			4.3	U	A	12		
4,4'-DDT		4.2	UJ	AE	8.2	J	E	5	UJ	AE	28	J	E
ALDRIN		2.1	U		2	U		2.2	U		1.9	U	
ALPHA-BHC		2.1	U		2	U		2.2	U		1.9	U	
ALPHA-CHLORDANE		2.1	U		2	U		2.2	U		1.9	U	
BETA-BHC		2.1	U		2	U		2.2	U		1.9	U	
DELTA-BHC		2.1	U		2	U		2.2	U		1.9	U	
DIELDRIN		4.2	U		3.8	U		4.3	U		3.6	U	
ENDOSULFAN I		2.1	U		2	U		2.2	U		1.9	U	
ENDOSULFAN II		4.2	U		3.8	U		4.3	U		3.6	U	
ENDOSULFAN SULFATE		4.2	U		3.8	U		4.3	U		3.6	U	
ENDRIN		4.2	U		3.8	U		4.3	U		3.6	U	
ENDRIN ALDEHYDE		4.2	U		3.8	U		4.3	U		3.6	U	
ENDRIN KETONE		4.2	U		3.8	U		4.3	U		3.6	U	
GAMMA-BHC (LINDANE)		2.1	U		2	U		2.2	U		1.9	U	
GAMMA-CHLORDANE		2.1	U		2	U		2.2	U		1.9	U	
HEPTACHLOR		2.1	U		2	U		2.2	U		1.9	U	
HEPTACHLOR EPOXIDE		2.1	U		2	U		2.2	U		1.9	U	
METHOXYCHLOR		21	U		20	U		22	U		19	U	
TOXAPHENE		42	U		38	U		43	U		36	U	

PROJ_NO: 02063	NSAMPLE	SB-17-112-0001			SB-17-112-0001DL			SB-17-112-0104DL			SB-17-112-0104DL2		
SDG: CTO070-3	LAB_ID	SB6002-10			SB6002-10DL			SB6002-11DL			SB6002-11DL2		
FRACTION: PEST/PCB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	83.1			83.1			82.8			82.8		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD					100			520					
4,4'-DDE		46						80					
4,4'-DDT					1200	J	E				7200	J	CE
ALDRIN		2	U					20	U				
ALPHA-BHC		2	U					20	U				
ALPHA-CHLORDANE		7						20	U				
BETA-BHC		2	U					20	U				
DELTA-BHC		2	U					20	U				
DIELDRIN		4	U					40	U				
ENDOSULFAN I		2	U					20	U				
ENDOSULFAN II		4	U					40	U				
ENDOSULFAN SULFATE		4	U					40	U				
ENDRIN		4	U					40	U				
ENDRIN ALDEHYDE		4	U					40	U				
ENDRIN KETONE		4	U					40	U				
GAMMA-BHC (LINDANE)		2	U					20	U				
GAMMA-CHLORDANE		7.7						20	U				
HEPTACHLOR		2	U					20	U				
HEPTACHLOR EPOXIDE		2	U					20	U				
METHOXYCHLOR		20	U					200	U				
TOXAPHENE		40	U					400	U				

PROJ_NO: 02063	NSAMPLE	SB-17-113-0001			SB-17-113-0104			SB-17-113-0104DL			SB-17-118-0001		
SDG: CTO070-3	LAB_ID	SB6002-12			SB6002-13			SB6002-13DL			SB6002-14		
FRACTION: PEST/PCB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	90.2			79.7			79.7			94.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		8.7			84						7.6		
4,4'-DDE		15			84						52		
4,4'-DDT		45	J	E				580	J	CE			
ALDRIN		1.9	U		2.1	U					1.8	U	
ALPHA-BHC		1.9	U		2.1	U					1.8	U	
ALPHA-CHLORDANE		1.9	U		14	J	U				1.8	U	
BETA-BHC		1.9	U		2.1	U					1.8	U	
DELTA-BHC		1.9	U		2.1	U					1.8	U	
DIELDRIN		3.6	U		4.1	U					3.5	U	
ENDOSULFAN I		1.9	U		2.1	U					1.8	U	
ENDOSULFAN II		3.6	U		4.1	U					3.5	U	
ENDOSULFAN SULFATE		3.6	U		4.1	U					3.5	U	
ENDRIN		3.6	U		4.1	U					3.5	U	
ENDRIN ALDEHYDE		3.6	U		4.1	U					3.5	U	
ENDRIN KETONE		3.6	U		4.1	U					3.5	U	
GAMMA-BHC (LINDANE)		1.9	U		2.1	U					1.8	U	
GAMMA-CHLORDANE		1.9	U		14						1.8	U	
HEPTACHLOR		1.9	UJ	AU	2.1	U					1.8	U	
HEPTACHLOR EPOXIDE		1.9	U		2.1	U					1.8	U	
METHOXYCHLOR		19	U		21	U					18	U	
TOXAPHENE		36	U		41	U					35	U	

PROJ_NO: 02063	NSAMPLE	SB-17-118-0001DL			SB-17-118-0104			SB-17-132-0408			SB-17-141-0307		
SDG: CTO070-3	LAB_ID	SB6002-14DL			SB6002-15			SB6002-16			SB6002-18		
FRACTION: PEST/PCB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.1			85.5			39.2			66.0		
	DUP_OF												
PARAMETER	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD				3.8	U	A	8.4	U		5	U	A
4,4'-DDE				10			8.4	U	A	5	U	A
4,4'-DDT	210	J	E	22	J	CE	8.4	UJ	ACE	13	J	CE
ALDRIN				2	U		4.3	U		2.6	U	
ALPHA-BHC				2	U		4.3	U		2.6	U	
ALPHA-CHLORDANE				1.3	J	P	4.3	U		2.6	U	
BETA-BHC				2	U		4.3	U		2.6	U	
DELTA-BHC				2	U		4.3	U		2.6	U	
DIELDRIN				3.8	U		8.4	U		5	U	
ENDOSULFAN I				2	U		4.3	U		2.6	U	
ENDOSULFAN II				3.8	U		8.4	U		5	U	
ENDOSULFAN SULFATE				3.8	U		8.4	U		5	U	
ENDRIN				3.8	U		8.4	U		5	U	
ENDRIN ALDEHYDE				3.8	U		8.4	U		5	U	
ENDRIN KETONE				3.8	U		8.4	U		5	U	
GAMMA-BHC (LINDANE)				2	U		4.3	U		2.6	U	
GAMMA-CHLORDANE				1.1	J	P	4.3	U		2.6	U	
HEPTACHLOR				2	U		4.3	U		2.6	U	
HEPTACHLOR EPOXIDE				2	U		4.3	U		2.6	U	
METHOXYCHLOR				20	UJ	C	43	UJ	C	26	UJ	C
TOXAPHENE				38	U		84	U		50	U	

PROJ_NO: 02063	NSAMPLE	SB-17-DUP07			SB-17-DUP08		
SDG: CTO070-3	LAB_ID	SB6002-8			SB6002-17		
FRACTION: PEST/PCB	SAMP_DATE	10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	FD			FD		
	UNITS	UG/KG			UG/KG		
	PCT_SOLIDS	90.4			48.7		
	DUP_OF	SB-17-105-0001			SB-17-132-0408		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		3.6	U	A	6.8	U	
4,4'-DDE		14			6.8	U	
4,4'-DDT		28	J	E	6.8	UJ	C
ALDRIN		1.9	U		3.5	U	
ALPHA-BHC		1.9	U		3.5	U	
ALPHA-CHLORDANE		1.9	U		3.5	U	
BETA-BHC		1.9	U		3.5	U	
DELTA-BHC		1.9	U		3.5	U	
DIELDRIN		3.6	U		6.8	U	
ENDOSULFAN I		1.9	U		3.5	U	
ENDOSULFAN II		3.6	U		6.8	U	
ENDOSULFAN SULFATE		3.6	U		6.8	U	
ENDRIN		3.6	U		6.8	U	
ENDRIN ALDEHYDE		3.6	U		6.8	U	
ENDRIN KETONE		3.6	U		6.8	U	
GAMMA-BHC (LINDANE)		1.9	U		3.5	U	
GAMMA-CHLORDANE		1.9	U		3.5	U	
HEPTACHLOR		1.9	U		3.5	U	
HEPTACHLOR EPOXIDE		1.9	U		3.5	U	
METHOXYCHLOR		19	U		35	UJ	C
TOXAPHENE		36	U		68	U	

PROJ_NO: 02063	NSAMPLE	SB-17-111-0104		
SDG: CTO070-3	LAB_ID	SB6002-9		
FRACTION: PET	SAMP_DATE	10/20/2008		
MEDIA: SOIL	QC_TYPE	NM		
	UNITS	MG/KG		
	PCT_SOLIDS	91.3		
	DUP_OF			
PARAMETER		RESULT	VQL	QLCD
DIESEL RANGE ORGANICS		14		

PROJ_NO: 02063	NSAMPLE	SB-17-105-0001			SB-17-105-0104			SB-17-107-0001			SB-17-107-0104		
SDG: CTO070-3	LAB_ID	SB6002-1RA			SB6002-2RA			SB6002-3RA			SB6002-4RA		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	88.6			95.4			79.8			83.5		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		37	U		34	U		41	U		40	U	
2,4-D		37	U		34	U		41	U		40	U	

PROJ_NO: 02063	NSAMPLE	SB-17-107-0408			SB-17-108-0001			SB-17-108-0104			SB-17-111-0104		
SDG: CTO070-3	LAB_ID	SB6002-5RA			SB6002-6RA			SB6002-7			SB6002-9		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	79.2			86.4			77.0			91.3		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		42	U		38	U		43	U		36	U	
2,4-D		42	U		38	U		43	U		36	U	

PROJ_NO: 02063	NSAMPLE	SB-17-112-0001			SB-17-112-0104			SB-17-113-0001			SB-17-113-0104		
SDG: CTO070-3	LAB_ID	SB6002-10			SB6002-11			SB6002-12			SB6002-13		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	83.1			82.8			90.2			79.7		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		40	U		40	U		36	U		41	U	
2,4-D		40	U		40	U		36	U		41	U	

PROJ_NO: 02063	NSAMPLE	SB-17-118-0001			SB-17-118-0104			SB-17-132-0408			SB-17-141-0307		
SDG: CTO070-3	LAB_ID	SB6002-14			SB6002-15			SB6002-16			SB6002-18		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.1			85.5			39.2			66.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		35	U		38	U		84	U		50	U	
2,4-D		35	U		38	U		84	U		50	U	

PROJ_NO: 02063	NSAMPLE	SB-17-DUP07			SB-17-DUP08		
SDG: CTO070-3	LAB_ID	SB6002-8			SB6002-17		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	FD			FD		
	UNITS	UG/KG			UG/KG		
	PCT_SOLIDS	90.4			48.7		
	DUP_OF	SB-17-105-0001			SB-17-132-0408		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		36	U		68	U	
2,4-D		36	U		68	U	

INTERNAL CORRESPONDENCE

C-NAVY-03-09-3075W

Date: March 2, 2009 c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Jennifer Cardinal (no copy)

Subject: Tier II Inorganic Data Validation, SDG SB7090
Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Arsenic/Lead/Zinc/Cyanide:

9/Groundwaters/	S17-GW-DUP01	S17-GW-MW1701
	S17-GW-MW1702	S17-GW-MW1703
	S17-GW-MW1704	S17-GW-MWNASB65
	S17-GW-MWNASB66	S17-GW-MWNASB68
	S17-GW-MWNASB98	
	(Field Duplicate Pair: S17-GW-MW1703/S17-GW-DUP01)	
1/Rinsate Blank/	S17-GW-RB01	

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the arsenic, lead, zinc, and cyanide analytical data from the samples collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine from December 8 to 10, 2008. Sample collection and analysis was performed according to the requirements of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The metals (arsenic, lead, and zinc) analysis was performed according to USEPA SW-846 Methods 6010B. The cyanide analysis was performed according to USEPA SW-846 M9012. The Tier II data validation was performed in accordance with the Region I EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part IV, Inorganic Data Validation Functional Guidelines, November 2008.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The analytical data in this SDG were evaluated based on the following parameters:

- Data Completeness
* • Holding Times
* • Calibration Verification
- Laboratory Blank Analyses
* • ICP Interference Check Sample Results
- Matrix Spike
* • Laboratory Duplicate Results
* • Laboratory Control Sample Results

* • Field Duplicate Precision
* • ICP Serial Dilution Results
• Reporting Limits

* All quality control criteria were met for this parameter.

Data Completeness

Metals

On February 24, 2009 the laboratory resubmitted all metals QC summary forms to report only arsenic, lead, and zinc as requested in the Work Plan and to report all results to the method detection limits.

Laboratory Blank Analyses

The rinsate blank was not used to establish blank action levels for the samples in this SDG.

Metals

The following table summarizes the level of blank contamination detected in the laboratory blanks associated with the samples in this SDG:

Analyte	Maximum Conc. (µg/L)	Action Level (µg/L)	Affected Samples
Arsenic	1.31	6.55	S17-GW-MWNASB68

The positive arsenic result below the blank action level was changed to a non-detected value (U) at an elevated reporting limit due to laboratory blank contamination.

Arsenic contamination was found in the laboratory blanks; therefore, the project sensitivity goals may be impacted since the non-detected result in sample S17-GW-MWNASB68 exceeds the project action limit for arsenic. The arsenic result in sample S17-GW-MWNASB68 is usable as an elevated reporting limit.

Matrix Spike

Cyanide

The following table summarizes the result in the matrix spike analysis of sample S17-GW-MWNASB65 which was outside of the 75-125% recovery criteria:

Compound	%Recovery	Action	
		(+)	NDs
Cyanide	72		UJ

The non-detected cyanide results are estimated (UJ) in all groundwater samples due to a low matrix spike recovery.

The recovery for cyanide was below the matrix spike recovery criterion; therefore, the project accuracy may be impacted. The non-detected cyanide results in all samples are usable as estimated quantitation limits which may be biased low.

Reporting Limits

The positive results below than the laboratory's quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

Metals

The laboratory reported non-detected metals results down to the MDL.

All project action limits were achieved by the laboratory's reporting limits, except for arsenic. Data usability for arsenic may be impacted.

The reporting limit was raised for arsenic in sample S17-GW-MWNASB68 due to blank contamination. As discussed above in the Laboratory Blank Analyses section, the project sensitivity goals may be impacted.

Cyanide

The laboratory reported non-detected cyanide results down to the QL.

The cyanide project action limits was not achieved by the laboratory's quantitation limit. Data usability for cyanide may be impacted.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity, and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Metals

The project goals with respect to sensitivity were met for the metals data set with the following exceptions. The project action limit was not achieved for arsenic. Also, due to blank actions the arsenic result in sample S17-GW-MWNASB68 was changed to a non-detected value at an elevated reporting limit. The non-detected value exceeds the arsenic project action limit. Data usability may be impacted.

The project goals with respect to accuracy, precision, and completeness were met for the metals data set. Data usability is not impacted with regards to accuracy, precision, and completeness.

Cyanide

The project goals with respect to accuracy were met for the cyanide data set with the following exception. Cyanide was qualified as estimated in all samples due a low matrix spike recovery; the affected results may be biased low. Although specific method criteria were not met in this instance, the

affected non-detected results are usable as estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to sensitivity were met for the cyanide data set with the following exception. The project action limit was not achieved for cyanide. Data usability may be impacted.

The project goals with respect to precision and completeness were met for the cyanide data set. Data usability is not impacted with regards to precision and completeness.

Tables: Data Validation Qualifiers and Codes
Data Summary Tables

Enclosures: Data Validation Worksheets

PROJ_NO: 02063	NSAMPLE	S17-GW-DUP01			S17-GW-MW1701			S17-GW-MW1702			S17-GW-MW1703		
SDG: SB7090	LAB_ID	SB7090-003			SB7090-004			SB7090-001			SB7090-002		
FRACTION: M	SAMP_DATE	12/8/2008			12/9/2008			12/8/2008			12/8/2008		
MEDIA: WATER	QC_TYPE	FD			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF	S17-GW-MW1703											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		1.69	U		1.69	U		1.69	U		1.69	U	
LEAD		0.97	U		0.97	U		0.97	U		0.97	U	
ZINC		6	J	P	5.6	J	P	5.5	J	P	5.5	J	P

PROJ_NO: 02063	NSAMPLE	S17-GW-MW1704			S17-GW-MWNASB65			S17-GW-MWNASB66			S17-GW-MWNASB68		
SDG: SB7090	LAB_ID	SB7090-005			SB7090-006			SB7090-008			SB7090-007		
FRACTION: M	SAMP_DATE	12/9/2008			12/9/2008			12/9/2008			12/9/2008		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		1.69	U		1.69	U		1.69	U		4.5	U	A
LEAD		1.2	J	P	0.97	U		0.97	U		0.97	U	
ZINC		3.4	J	P	3.7	J	P	20.7	J	P	5.7	J	P

PROJ_NO: 02063	NSAMPLE	S17-GW-MWNASB98			S17-GW-RB01		
SDG: SB7090	LAB_ID	SB7090-009			SB7090-010		
FRACTION: M	SAMP_DATE	12/9/2008			12/10/2008		
MEDIA: WATER	QC_TYPE	NM			RB		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS						
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		1.69	U		1.69	U	
LEAD		0.97	U		0.97	U	
ZINC		2.22	U		2.22	U	

PROJ_NO: 02063	NSAMPLE	S17-GW-DUP01			S17-GW-MW1701			S17-GW-MW1702			S17-GW-MW1703		
SDG: SB7090	LAB_ID	SB7090-3			SB7090-4			SB7090-1			SB7090-2		
FRACTION: MISC	SAMP_DATE	12/8/2008			12/9/2008			12/8/2008			12/8/2008		
MEDIA: WATER	QC_TYPE	FD			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF	S17-GW-MW1703											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		10	UJ	D	10	UJ	D	10	UJ	D	10	UJ	D

PROJ_NO: 02063	NSAMPLE	S17-GW-MW1704			S17-GW-MWNASB65			S17-GW-MWNASB66			S17-GW-MWNASB68		
SDG: SB7090	LAB_ID	SB7090-5			SB7090-6			SB7090-8			SB7090-7		
FRACTION: MISC	SAMP_DATE	12/9/2008			12/9/2008			12/9/2008			12/9/2008		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		10	UJ	D	10	UJ	D	10	UJ	D	10	UJ	D

PROJ_NO: 02063	NSAMPLE	S17-GW-MWNASB98			S17-GW-RB01		
SDG: SB7090	LAB_ID	SB7090-9			SB7090-10		
FRACTION: MISC	SAMP_DATE	12/9/2008			12/10/2008		
MEDIA: WATER	QC_TYPE	NM			RB		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS						
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		10	UJ	D	10	UJ	D

TETRA TECH

INTERNAL CORRESPONDENCE

C-NAVY-02-09-3065W

Date: February 23, 2009

c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Jennifer Cardinal (no copy) JC

Subject: Tier II Organic Data Validation, SDG SB7090
Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

DRO/Pesticides/Herbicides:

5/Groundwaters/	S17-GW-DUP01	S17-GW-MW1701
	S17-GW-MW1702	S17-GW-MW1703
	S17-GW-MW1704	

(Field Duplicate Pair: S17-GW-MW1703/S17-GW-DUP01)

1/Rinsate Blank/	S17-GW-RB01	

Pesticides/Herbicides

4/Groundwaters/	S17-GW-MWNASB65	S17-GW-MWNASB66
	S17-GW-MWNASB68	S17-GW-MWNASB98

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the diesel range organic (DRO), pesticide, herbicide analytical data for the samples in this SDG. The samples were collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine from December 8 to 10, 2008. Sample collection and analysis was performed according to the requirements of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The DRO analysis was performed according to MEDEP 4.1.25. The pesticide and herbicide analyses were performed according to USEPA SW-846 Methods 8081 and 8151, respectively.

The DRO data validation was performed in accordance with the Region I EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996. The pesticides and herbicides validation was performed in accordance with the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Organic Analyses, Part III, February 2004.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The data were evaluated based on the following parameters:

* • Data Completeness
* • Preservation and Technical Holding Times

NA	•	GC/MS Instrument Performance Check (Tuning)
*	•	Pesticide Degradation
*	•	Initial and Continuing Calibrations
*	•	Blanks
*	•	Surrogate Compounds
NA	•	Internal Standards
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Laboratory Control Sample/Laboratory Control Sample Duplicate
*	•	Field Duplicates
	•	Analyte Identification
	•	Reporting Limits

* All criteria were met for this parameter.
NA Not applicable for this SDG.

Data Completeness

The laboratory was contacted regarding the initial calibration verification (ICV) summary forms for the DRO, pesticides, and herbicides analyses. On February 19, 2009 the laboratory explained that the ICV results are reported with the calibration verification forms.

Analyte Identification/Quantitation

Pesticides

The %RPD between the results of analytical columns 1 and 2 exceeded the 40% RPD QC criterion for the compound in the following sample:

Sample	Analyte	%RPD	Action (+)
S17-GW-RB01	Delta-BHC	122	UJ* at 0.227

*Professional judgment was used to raise the result to the higher of the two results and qualify the result as estimated, non-detected (UJ).

Although the sample reporting limit was raised due to analyte quantitation relative percent differences exceeding the 40% RPD QC limit for delta-BHC in sample S17-GW-RB01, the project sensitivity goals are not impacted since there are no regulatory limits established for delta-BHC for the groundwater samples. The delta-BHC result in S17-GW-RB01 is usable as an estimated, non-detected result.

Reporting Limits

All positive results below the quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

Pesticides

Project action limits (PALs) were not achievable for aldrin, dieldrin, heptachlor, heptachlor epoxide, and toxaphene as highlighted in SAP Worksheet 15b of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008. Data usability may be impacted.

The reporting limit was raised for delta-BHC in sample S17-GW-RB01 due to analytical interferences detected in the dual column analysis. As discussed in the Analyte Identification/Quantitation section, the project sensitivity goals are not impacted.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Pesticides

The project goals with respect to sensitivity were met for the pesticides data set with the following exception. Project action limits were not achievable for aldrin, dieldrin, heptachlor, heptachlor epoxide, and toxaphene. Data usability may be impacted.

The project goals with respect to accuracy, precision, and completeness were met for the pesticides data set. Data usability was not impacted with regards to accuracy, precision, and completeness.

DRO, Herbicides

The project goals with respect to accuracy, precision, sensitivity, and completeness were met for the DRO and herbicides data sets. Data usability was not impacted with regards to accuracy, precision, sensitivity, and completeness.

Tables: Data Validation Qualifiers and Codes
Data Summary Tables

Enclosures: Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	S17-GW-DUP01			S17-GW-MW1701			S17-GW-MW1702			S17-GW-MW1703		
SDG: SB7090	LAB_ID	SB7090-3			SB7090-4			SB7090-1			SB7090-2		
FRACTION: PET	SAMP_DATE	12/8/2008			12/9/2008			12/8/2008			12/8/2008		
MEDIA: WATER	QC_TYPE	FD			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF	S17-GW-MW1703											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
DIESEL RANGE ORGANICS		68			85			210			66		

PROJ_NO: 02063	NSAMPLE	S17-GW-MW1704			S17-GW-RB01		
SDG: SB7090	LAB_ID	SB7090-5			SB7090-10RA2		
FRACTION: PET	SAMP_DATE	12/9/2008			12/10/2008		
MEDIA: WATER	QC_TYPE	NM			RB		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS						
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
DIESEL RANGE ORGANICS		45	J		89		

PROJ_NO: 02063	NSAMPLE	S17-GW-DUP01			S17-GW-MW1701			S17-GW-MW1702			S17-GW-MW1702DL		
SDG: SB7090	LAB_ID	SB7090-3			SB7090-4			SB7090-1			SB7090-1DL		
FRACTION: PEST/PCB	SAMP_DATE	12/8/2008			12/9/2008			12/8/2008			12/8/2008		
MEDIA: WATER	QC_TYPE	FD			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF	S17-GW-MW1703											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		0.094	U		0.094	U					4.3		
4,4'-DDE		0.017	J	P	0.017	J	P	0.12					
4,4'-DDT		0.094	U		0.015	J	P	2.1					
ALDRIN		0.047	U		0.047	U		0.047	U				
ALPHA-BHC		0.047	U		0.047	U		0.047	U				
ALPHA-CHLORDANE		0.047	U		0.047	U		0.057					
BETA-BHC		0.047	U		0.047	U		0.047	U				
DELTA-BHC		0.047	U		0.047	U		0.047	U				
DIELDRIN		0.094	U		0.016	J	P	1.7					
ENDOSULFAN I		0.047	U		0.047	U		0.95					
ENDOSULFAN II		0.094	U		0.094	U		0.094	U				
ENDOSULFAN SULFATE		0.094	U		0.094	U		0.094	U				
ENDRIN		0.094	U		0.094	U		0.094	U				
ENDRIN ALDEHYDE		0.094	U		0.094	U		0.094	U				
ENDRIN KETONE		0.094	U		0.094	U		0.094	U				
GAMMA-BHC (LINDANE)		0.047	U		0.047	U		0.047	U				
GAMMA-CHLORDANE		0.047	U		0.047	U		0.11					
HEPTACHLOR		0.047	U		0.015	J	P	0.047	U				
HEPTACHLOR EPOXIDE		0.047	U		0.047	U		0.047	U				
METHOXYCHLOR		0.47	U		0.47	U		0.47	U				
TOXAPHENE		0.94	U		0.94	U		0.94	U				

PROJ_NO: 02063	NSAMPLE	S17-GW-MW1703			S17-GW-MW1704			S17-GW-MWNASB65			S17-GW-MWNASB66		
SDG: SB7090	LAB_ID	SB7090-2			SB7090-5			SB7090-6			SB7090-8		
FRACTION: PEST/PCB	SAMP_DATE	12/8/2008			12/9/2008			12/9/2008			12/9/2008		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		0.095	U		0.094	U		0.094	U		0.094	U	
4,4'-DDE		0.095	U		0.094	U		0.017	J	P	0.094	U	
4,4'-DDT		0.095	U		0.094	U		0.094	U		0.094	U	
ALDRIN		0.048	U		0.047	U		0.047	U		0.047	U	
ALPHA-BHC		0.048	U		0.047	U		0.047	U		0.047	U	
ALPHA-CHLORDANE		0.048	U		0.09			0.018	J	P	0.047	U	
BETA-BHC		0.048	U		0.047	U		0.047	U		0.047	U	
DELTA-BHC		0.048	U		0.047	U		0.047	U		0.047	U	
DIELDRIN		0.095	U		0.094	U		0.094	U		0.094	U	
ENDOSULFAN I		0.048	U		0.047	U		0.047	U		0.047	U	
ENDOSULFAN II		0.095	U		0.094	U		0.094	U		0.094	U	
ENDOSULFAN SULFATE		0.095	U		0.094	U		0.094	U		0.094	U	
ENDRIN		0.095	U		0.094	U		0.094	U		0.094	U	
ENDRIN ALDEHYDE		0.095	U		0.027	J	P	0.094	U		0.094	U	
ENDRIN KETONE		0.095	U		0.094	U		0.094	U		0.094	U	
GAMMA-BHC (LINDANE)		0.015	J	P	0.047	U		0.047	U		0.047	U	
GAMMA-CHLORDANE		0.048	U		0.1			0.018	J	P	0.047	U	
HEPTACHLOR		0.048	U		0.047	U		0.047	U		0.047	U	
HEPTACHLOR EPOXIDE		0.016	J	P	0.047	U		0.017	J	P	0.047	U	
METHOXYCHLOR		0.48	U		0.47	U		0.47	U		0.47	U	
TOXAPHENE		0.95	U		0.94	U		0.94	U		0.94	U	

PROJ_NO: 02063	NSAMPLE	S17-GW-MWNASB68			S17-GW-MWNASB98			S17-GW-RB01		
SDG: SB7090	LAB_ID	SB7090-7			SB7090-9			SB7090-10		
FRACTION: PEST/PCB	SAMP_DATE	12/9/2008			12/9/2008			12/10/2008		
MEDIA: WATER	QC_TYPE	NM			NM			RB		
	UNITS	UG/L			UG/L			UG/L		
	PCT_SOLIDS									
	DUP_OF									
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		0.094	U		0.094	U		0.094	U	
4,4'-DDE		0.017	J	P	0.017	J	P	0.094	U	
4,4'-DDT		0.094	U		0.094	U		0.094	U	
ALDRIN		0.047	U		0.047	U		0.047	U	
ALPHA-BHC		0.047	U		0.047	U		0.047	U	
ALPHA-CHLORDANE		0.047	U		0.047	U		0.047	U	
BETA-BHC		0.047	U		0.047	U		0.047	U	
DELTA-BHC		0.047	U		0.047	U		0.227	UJ	U
DIELDRIN		0.094	U		0.094	U		0.094	U	
ENDOSULFAN I		0.047	U		0.047	U		0.047	U	
ENDOSULFAN II		0.094	U		0.094	U		0.094	U	
ENDOSULFAN SULFATE		0.094	U		0.094	U		0.094	U	
ENDRIN		0.094	U		0.094	U		0.094	U	
ENDRIN ALDEHYDE		0.094	U		0.094	U		0.094	U	
ENDRIN KETONE		0.094	U		0.094	U		0.094	U	
GAMMA-BHC (LINDANE)		0.047	U		0.047	U		0.047	U	
GAMMA-CHLORDANE		0.047	U		0.047	U		0.047	U	
HEPTACHLOR		0.047	U		0.047	U		0.047	U	
HEPTACHLOR EPOXIDE		0.047	U		0.047	U		0.047	U	
METHOXYCHLOR		0.47	U		0.47	U		0.47	U	
TOXAPHENE		0.94	U		0.94	U		0.94	U	

PROJ_NO: 02063	NSAMPLE	S17-GW-DUP01			S17-GW-MW1701			S17-GW-MW1702			S17-GW-MW1703		
SDG: SB7090	LAB_ID	SB7090-3RA2			SB7090-4RA2			SB7090-1RA2			SB7090-2RA2		
FRACTION: HERB	SAMP_DATE	12/8/2008			12/9/2008			12/8/2008			12/8/2008		
MEDIA: WATER	QC_TYPE	FD			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF	S17-GW-MW1703											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		2.8	U		2.8	U		2.8	U		2.9	U	
2,4-D		2.8	U		2.8	U		2.8	U		2.9	U	

PROJ_NO: 02063	NSAMPLE	S17-GW-MW1704			S17-GW-MWNASB65			S17-GW-MWNASB66			S17-GW-MWNASB68		
SDG: SB7090	LAB_ID	SB7090-5RA2			SB7090-6RA2			SB7090-8RA2			SB7090-7RA2		
FRACTION: HERB	SAMP_DATE	12/9/2008			12/9/2008			12/9/2008			12/9/2008		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		2.8	U		2.8	U		2.8	U		2.8	U	
2,4-D		2.8	U		2.8	U		2.8	U		2.8	U	

PROJ_NO: 02063	NSAMPLE	S17-GW-MWNASB98			S17-GW-RB01		
SDG: SB7090	LAB_ID	SB7090-9RA2			SB7090-10RA2		
FRACTION: HERB	SAMP_DATE	12/9/2008			12/10/2008		
MEDIA: WATER	QC_TYPE	NM			RB		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS						
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		2.8	U		2.8	U	
2,4-D		2.8	U		2.8	U	

TETRA TECH

INTERNAL CORRESPONDENCE

C-NAVY-03-09-3094W

Date: March 12, 2009

c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Jennifer Cardinal (no copy) JC

Subject: Tier II Organic Data Validation, SDG 57291
APPL Inc, through Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Special Pesticides:

15/Soils/	SB-17-109-0001	SB-17-109-0104	SB-17-110-0104
	SB-17-114-0001	SB-17-114-0104	SB-17-115-0710
	SB-17-116-0407	SB-17-119-0104	SB-17-120-0205
	SB-17-121-0205	SB-17-121-0710	SB-17-121-1215
	SB-17-124-0001	SB-17-124-0104	SB-17-DUP05
	(Field Duplicate Pair: SB-17-120-0205/SB-17-DUP05)		
2/Rinsate Blanks/	SB-17-RB01	SB-17-RB02	

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the following special pesticide analytical data for the samples in this SDG.

Compound	Method of Analysis/ Instrumentation
Pyrethrins or Pyrethrum	SW-846 Method 8081A / GC/ECD
Resmethrin or Esmethrin	SW-846 Method 8081A / GC/MS
Avitrol or 4-Aminopyridine	SW-846 Method 8141A / GC/MS
Diazinon	SW-846 Method 8141A/ GC/NPD
Malathion	
Simazine or Simaz	
Maleic Hydrazide	SW-846 Method 8321A / LC/MS
Carbaryl or Sevin	SW-846 Method 8321A / LC/MS & LC/MS/MS
Diuron or Drexel	
Monuron	
Propoxur or Baygon	
Rotenone or Rotenon	

The samples in this SDG were collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine on October 16, 2008. Sample collection and analysis was performed according to the requirements of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The pesticides validation was performed in accordance with the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Organic Analyses, Part III, February 2004.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The data were evaluated based on the following parameters:

- Data Completeness
- * Preservation and Technical Holding Times
- * GC/ECD Instrument Performance Check (Retention Times)
- * Initial and Continuing Calibrations
- * Blanks
- Surrogate Compounds
- Internal Standards
- Matrix Spike/Matrix Spike Duplicate
- Laboratory Control Sample/Laboratory Control Sample Duplicate
- * Field Duplicates
- * Analyte Identification/Quantitation
- * Percent Solids
- * Reporting Limits

* All criteria were met for this parameter.

Data Completeness

Method 8081A Organochlorine Pesticides

On March 9, 2009 the laboratory provided the linear regression fit equations for the initial calibration; an explanation of how the MDLs were established; IC spectra for the resmethrin I and resmethrin II compounds; a resubmittal of the initial calibration summary Form 6 for both the surrogate compounds and the target pyrethrins including the concentration of the initial calibration standards; and an explanation of "Mix A" and "Mix B" surrogates. A second source calibration standard was not available.

Method 8141A Organophosphorus Pesticides

On March 9, 2009 the laboratory provided the linear regression fit equations for the initial calibration; an explanation of how the MDLs were established; IC spectra for avitrol (4-aminopyridine); a resubmittal of the initial calibration summary Form 6 including the response areas, the concentration of the initial calibration standards, and footnotes explaining calibration abbreviations used by the laboratory; and a resubmittal of the LCS/LCSD QC summary forms with separate simazine results to show that simazine was not spiked in the LCS associate with this SDG. (Simazine was not added to the original LCS due to analyst error. The simazine spike results reported are from the nearest LCS.) A second source calibration standard was not available.

Method 8321A Carbamate pesticides

On March 9, 2009 the laboratory provided the internal standard summary form since it was missing from the original data package.

Method 8321A Maleic Hydrazide

On March 9, 2009 the laboratory provided the linear regression fit equations for the initial calibration and the internal standard summary form since they were missing from the original data package. A second source calibration standard was not available.

Surrogate Spike Recoveries

Method 8321A Carbamate Pesticides

The following samples had surrogate spike recoveries outside of the recovery limits:

Sample	Tributylphosphate QC Limits 34-146%	Action	
		(+)	NDs
SB-17-124-0001	27.1	-	UJ
SB-17-124-0104	30.0	-	UJ
SB-17-109-0001	21.7	-	UJ
SB-17-120-0205	25.6	-	UJ
SB-17-DUP05	29.6	-	UJ
SB-17-121-0205	23.4	-	UJ

The surrogate tributylphosphate recovered below the QC criteria for samples listed above; therefore, the project accuracy goals may be impacted. The non-detected carbamate pesticide results in affected samples are usable as estimated quantitation limits which may be biased low.

Internal Standard Performance

Method 8321A Carbamate Pesticides

The area of the internal standard ridomil was below the QC limits (43596753.88 to 174287015.51) for the following samples:

Sample	Internal Standard (IS)	IS Area	Action
			(ND)
SB-17-124-0001	Ridomil	31684810.45	UJ
SB-17-124-0104	Ridomil	35292306.29	UJ
SB-17-115-0710	Ridomil	34847896.57	UJ
SB-17-110-0104	Ridomil	42740769.92	UJ
SB-17-114-0104	Ridomil	27712424.40	UJ
SB-17-109-0001	Ridomil	24223563.29	UJ
SB-17-109-0104	Ridomil	18709050.78	UJ

Sample	Internal Standard (IS)	IS Area	Action (ND)
SB-17-120-0205	Ridomil	28208904.75	UJ
SB-17-DUP05	Ridomil	27326758.70	UJ
SB-17-116-0407	Ridomil	29403123.63	UJ
SB-17-121-0205	Ridomil	25568707.16	UJ
SB-17-121-0710	Ridomil	22891753.88	UJ
SB-17-121-1215	Ridomil	34588382.45	UJ

The internal standard performance for ridomil was outside of the QC limits; therefore, the project accuracy goals may be impacted. The compounds quantitated against this internal standard are diuron and monuron. The non-detected diuron and monuron results in the affected samples are usable as estimated quantitation limits.

Matrix Spike/Matrix Spike Duplicate

Method 8081A Organochlorine Pesticides

Pyrethrum was not recovered in the matrix spike/matrix spike duplicate (MS/MSD) analysis of sample SB-17-121-0205. The non-detected pyrethrum result in sample SB-17-121-0205 was rejected (UR). This result is not usable for project decisions and the data completeness goals may be impacted.

Method 8141A Organophosphorus Pesticides

Simazine was not included in the matrix spike standard. In addition, this compound was not included in the laboratory control sample associated with the samples in this SDG. Professional judgment was applied to estimate all the sample results (all non-detected) due to lack of matrix spike accuracy and precision information for this compound. The non-detected results are usable as estimated quantitation limits.

Method 8321A Carbamate Pesticides

The following table summarizes the matrix spiking recoveries below the QC limits and the relative percent differences (RPDs) above the QC limit in the matrix spike and matrix spike duplicate (MS/MSD) analysis of sample SB-17-121-0205:

Compound	RPD	QC Limits RPD	MS %REC	MSD %REC	QC Limits %REC	Action (+)	Action ND
Carbaryl	127.1	25	14.2	3.2	31-191	-	UJ
Proxopur	-	-	51	64.5	67-122	J	-
Rotenone	140	25	7	1.2	70-130	-	UJ

- Criterion met

Carbaryl, proxopur, and rotenone recovered below QC criteria in the MS/MSD analysis of sample SB-17-121-0205; therefore, the project accuracy goals may be impacted. The positive and non-detected carbaryl, proxopur, and rotenone results in sample SB-17-121-0205 are usable as estimated values and estimated quantitation limits which may be biased low.

Carbaryl and rotenone has relative percent differences (RPD) above the QC criterion in the MS/MSD analysis of sample SB-17-121-0205; therefore, the project precision goals may be impacted. The non-detected carbaryl and rotenone results in sample SB-17-121-0205 are usable as estimated quantitation limits for which the bias is indeterminate.

Method 8321A Maleic Hydrazide

The following table summarizes the matrix spiking recovery below the QC limits in the matrix spike and matrix spike duplicate analysis of sample SB-17-121-0205:

Compound	MS %REC	MSD %REC	QC Limits %REC	Action (+)	Action ND
Maleic Hydrazide	-	66.3	70-130	J	-

- Criterion met

Maleic hydrazide recovered below QC criteria in the MSD analysis of sample SB-17-121-0205; therefore, the project accuracy goals may be impacted. The positive maleic hydrazide result in sample SB-17-121-0205 is usable as an estimated value which may be biased low.

Laboratory Control Sample/Laboratory Control Sample Duplicate

Method 8141A Organophosphorus Pesticides

Simazine was not included in the laboratory control sample standard. In addition, this compound was not included in the matrix spike associated with the samples in this SDG. Professional judgment was applied to estimate all the sample results (all non-detected) due to lack of laboratory control sample accuracy and precision information for this compound. The non-detected results are usable as estimated quantitation limits.

Method 8321A Carbamate Pesticides

The following table summarizes the recovery below the QC limits in the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analysis:

Compound	%REC	QC Limits %REC	Affected Samples	Action (+)	Action ND
Rotenone	64.0	70-130	All soil samples	-	UJ

Rotenone recovered below QC criteria in the LCS/LCSD analysis; therefore, the project accuracy goals may be impacted. The non-detected rotenone results in all soil samples are usable as estimated quantitation limits which may be biased low.

Method 8321A Maleic Hydrazide

The following table summarizes the recovery below the QC limits in the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analysis:

Compound	%REC	QC Limits %REC	Affected Samples	Action (+)	Action ND
Maleic hydrazide	324, 328	70-130	SB-17-121-0205, SB-17-121-1215	J	-

Maleic hydrazide recovered above QC criteria in the LCS/LCSD analysis; therefore, the project accuracy goals may be impacted. The positive maleic hydrazide results in samples SB-17-121-0205 and SB-17-121-1215 are usable as estimated values which may be biased high.

Reporting Limits

All positive results below the quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

The project action limits were achieved.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Method 8081A Organochlorine Pesticides

The project goals with respect to completeness were met for the Method 8081A Organochlorine Pesticides data set with the following exception. Pyrethrum was rejected in sample SB-17-121-0205 due to no MS/MSD recovery. This result is not usable for project decisions and the data completeness goals are impacted.

The project goals with respect to accuracy, precision, and sensitivity were met for the Method 8081A Organochlorine Pesticides data set. Data usability was not impacted with regards to accuracy, precision, and sensitivity.

Method 8141A Organophosphorus Pesticides

The project goals with respect to accuracy and precision were met for the Method 8141A Organophosphorus Pesticides data set with the following exception. Simazine was not included in the matrix spike standard. In addition, this compound was not included in the laboratory control sample associated with these SDG. Professional judgment was applied to estimate all the sample results (all non-detected) due to lack of matrix spike accuracy and precision information for this compound. Although specific method criteria were not met in this instance, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to sensitivity and completeness were met for the Method 8141A Organophosphorus Pesticides data set. Data usability was not impacted with regards to sensitivity and completeness.

Method 8321A Carbamate pesticides

The project goals with respect to accuracy were met for the Method 8321A Carbamate Pesticides data set with the following exceptions. The non-detected results in select soil samples were qualified as estimated due to low recoveries of the surrogate tributylphosphate; the affected results may be biased low. The non-detected diuron and monuron results in select soil samples were qualified as estimate due to the poor performance of the internal standard ridomil. Carbaryl, proxopur, and rotenone were qualified as estimated in sample SB-17-121-0205 due to low MS/MSD recoveries; the affected results may be biased low. The non-detected rotenone results were qualified as estimated in all soil samples due to low LCS/LCSD recoveries; the affected results may be biased low. Although specific method criteria were not met in these instances, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to precision were met for the Method 8321A Carbamate Pesticides data set with the following exception. The non-detected carbaryl and rotenone results were qualified as estimated in sample SB-17-121-0205 due to poor MS/MSD precision. Although specific method criteria were not met in this instance, the affected non-detected results are usable as estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to sensitivity and completeness were met for the Method 8321A Carbamate Pesticides data set. Data usability was not impacted with regards to sensitivity and completeness.

Method 8321A Maleic Hydrazide

The project goals with respect to accuracy were met for the Method 8321A Maleic Hydrazide data set with the following exceptions. The positive maleic hydrazide results were qualified as estimated in samples SB-17-121-0205 and SB-17-121-1215 due to high LCS/LCSD recoveries; the affected results may be biased high. However, the positive maleic hydrazide result was qualified as estimated in sample SB-17-121-0205 due to a low MSD recovery; the affected result may be biased low. Although specific method criteria were not met in these instances, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to precision, sensitivity, and completeness were met for the Method 8321A Maleic Hydrazide data set. Data usability was not impacted with regards to precision, sensitivity, and completeness.

Tables:	Data Validation Qualifiers and Codes Data Summary Tables
Enclosures:	Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	SB-17-109-0001			SB-17-109-0104			SB-17-110-0104			SB-17-114-0001		
SDG: 57291	LAB_ID	AX85916			AX85917			AX85913			AX85914		
FRACTION: PEST	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	90.8			95.1			92.7			90.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		880	U		840	U		860	U		880	U	
RESMETHRIN		440	U		420	U		430	U		440	U	

PROJ_NO: 02063	NSAMPLE	SB-17-114-0104			SB-17-115-0710			SB-17-116-0407			SB-17-119-0104		
SDG: 57291	LAB_ID	AX85915			AX85912			AX85920			AX85911		
FRACTION: PEST	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.8			81.6			77.5			87.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		840	U		980	U		1000	U		920	U	
RESMETHRIN		420	U		490	U		520	U		460	U	

PROJ_NO: 02063	NSAMPLE	SB-17-120-0205			SB-17-121-0205			SB-17-121-0710			SB-17-121-1215		
SDG: 57291	LAB_ID	AX85918			AX85921			AX85922			AX85923		
FRACTION: PEST	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	75.4			70.2			75.3			80.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		1100	U		110000	UR	D	1100	U		1000	U	
RESMETHRIN		530	U		57000	U		530	U		500	U	

PROJ_NO: 02063	NSAMPLE	SB-17-124-0001			SB-17-124-0104			SB-17-DUP05		
SDG: 57291	LAB_ID	AX85909			AX85910			AX85919		
FRACTION: PEST	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			FD		
	UNITS	UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	80.4			85.7			76.1		
	DUP_OF							SB-17-120-0205		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		1000	U		930	U		1100	U	
RESMETHRIN		500	U		470	U		530	U	

PROJ_NO: 02063	NSAMPLE	SB-17-RB01			SB-17-RB02		
SDG: 57291	LAB_ID	AX85924			AX85926		
FRACTION: PEST	SAMP_DATE	10/16/2008			10/16/2008		
MEDIA: WATER	QC_TYPE	RB			RB		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS						
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		1.2	U		1.2	U	
RESMETHRIN		0.5	U		0.5	U	

PROJ_NO: 02063	NSAMPLE	SB-17-109-0001			SB-17-109-0104			SB-17-110-0104			SB-17-114-0001		
SDG: 57291	LAB_ID	AX85916			AX85917			AX85913			AX85914		
FRACTION: OPEST	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	90.8			95.1			92.7			90.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		55	U		53	U		54	U		55	U	
DIAZINON		55	U		53	U		54	U		55	U	
MALATHION		55	U		53	U		54	U		55	U	
SIMAZINE		55	UJ	DE	53	UJ	DE	54	UJ	DE	55	UJ	DE

PROJ_NO: 02063	NSAMPLE	SB-17-114-0104			SB-17-115-0710			SB-17-116-0407			SB-17-119-0104		
SDG: 57291	LAB_ID	AX85915			AX85912			AX85920			AX85911		
FRACTION: OPEST	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.8			81.6			77.5			87.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		53	U		61	U		65	U		57	U	
DIAZINON		53	U		61	U		65	U		57	U	
MALATHION		53	U		61	U		65	U		57	U	
SIMAZINE		53	UJ	DE	61	UJ	DE	65	UJ	DE	57	UJ	DE

PROJ_NO: 02063	NSAMPLE	SB-17-120-0205			SB-17-121-0205			SB-17-121-0710			SB-17-121-1215		
SDG: 57291	LAB_ID	AX85918			AX85921			AX85922			AX85923		
FRACTION: OPEST	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	75.4			70.2			75.3			80.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		66	U		71	U		66	U		62	U	
DIAZINON		66	U		71	U		66	U		62	U	
MALATHION		66	U		31	J	P	66	U		62	U	
SIMAZINE		66	UJ	DE	71	UJ	DE	66	UJ	DE	62	UJ	DE

PROJ_NO: 02063	NSAMPLE	SB-17-124-0001			SB-17-124-0104			SB-17-DUP05		
SDG: 57291	LAB_ID	AX85909			AX85910			AX85919		
FRACTION: OPEST	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			FD		
	UNITS	UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	80.4			85.7			76.1		
	DUP_OF							SB-17-120-0205		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		62	U		58	U		66	U	
DIAZINON		62	U		58	U		66	U	
MALATHION		62	U		58	U		66	U	
SIMAZINE		62	UJ	DE	58	UJ	DE	66	UJ	DE

PROJ_NO: 02063	NSAMPLE	SB-17-RB01			SB-17-RB02		
SDG: 57291	LAB_ID	AX85924			AX85926		
FRACTION: OPEST	SAMP_DATE	10/16/2008			10/16/2008		
MEDIA: WATER	QC_TYPE	RB			RB		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS						
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		0.5	U		0.5	U	
DIAZINON		0.05	U		0.05	U	
MALATHION		0.1	U		0.1	U	
SIMAZINE		0.5	UJ	DE	0.5	UJ	DE

PROJ_NO: 02063	NSAMPLE	SB-17-109-0001			SB-17-109-0001RE			SB-17-109-0104			SB-17-109-0104RE		
SDG: 57291	LAB_ID	AX85916			AX85916			AX85917			AX85917		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	90.8			90.8			95.1			95.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		22	UJ	R				21	U				
DIURON		22	UJ	NR				21	UJ	N			
MALEIC HYDRAZIDE					22	U					21	U	
MONURON		22	UJ	NR				21	UJ	N			
PROPOXUR		22	UJ	R				21	U				
ROTENONE		22	UJ	ER				21	UJ	E			

PROJ_NO: 02063	NSAMPLE	SB-17-110-0104			SB-17-110-0104RE			SB-17-114-0001			SB-17-114-0001RE		
SDG: 57291	LAB_ID	AX85913			AX85913			AX85914			AX85914		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	92.7			92.7			90.9			90.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		22	U					110	U				
DIURON		22	UJ	N				110	UJ	N			
MALEIC HYDRAZIDE					22	U					22	U	
MONURON		22	UJ	N				110	UJ	N			
PROPOXUR		22	U					110	U				
ROTENONE		22	UJ	E				110	UJ	E			

PROJ_NO: 02063	NSAMPLE	SB-17-114-0104			SB-17-114-0104RE			SB-17-115-0710			SB-17-115-0710RE		
SDG: 57291	LAB_ID	AX85915			AX85915			AX85912			AX85912		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.8			94.8			81.6			81.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		21	U					25	U				
DIURON		21	U					25	UJ	N			
MALEIC HYDRAZIDE					21	U					25	U	
MONURON		21	U					25	UJ	N			
PROPOXUR		21	U					25	U				
ROTENONE		21	UJ	E				25	UJ	E			

PROJ_NO: 02063	NSAMPLE	SB-17-116-0407			SB-17-116-0407RE			SB-17-119-0104			SB-17-119-0104RE		
SDG: 57291	LAB_ID	AX85920			AX85920			AX85911			AX85911		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	77.5			77.5			87.1			87.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		26	U					23	U				
DIURON		26	UJ	N				23	U				
MALEIC HYDRAZIDE					26	U					23	U	
MONURON		26	UJ	N				23	U				
PROPOXUR		100						23	U				
ROTENONE		26	UJ	E				23	UJ	E			

PROJ_NO: 02063	NSAMPLE	SB-17-120-0205			SB-17-120-0205DL			SB-17-120-0205RE			SB-17-121-0205		
SDG: 57291	LAB_ID	AX85918			AX85918			AX85918			AX85921		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	75.4			75.4			75.4			70.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		27	UJ	R							28	UJ	DR
DIURON		27	UJ	NR							28	UJ	NR
MALEIC HYDRAZIDE								27	U				
MONURON		27	UJ	NR							28	UJ	NR
PROPOXUR					370						140	J	DR
ROTENONE		27	UJ	ER							28	UJ	DER

PROJ_NO: 02063	NSAMPLE	SB-17-121-0205RE			SB-17-121-0710			SB-17-121-0710RE			SB-17-121-1215		
SDG: 57291	LAB_ID	AX85921			AX85922			AX85922			AX85923		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	70.2			75.3			75.3			80.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL					27	U					25	U	
DIURON					27	UJ	N				25	UJ	N
MALEIC HYDRAZIDE		24	J	DEP				27	U				
MONURON					27	UJ	N				25	UJ	N
PROPOXUR					27	U					25	U	
ROTENONE					27	UJ	E				25	UJ	E

PROJ_NO: 02063	NSAMPLE	SB-17-121-1215RE			SB-17-124-0001			SB-17-124-0001RE			SB-17-124-0104		
SDG: 57291	LAB_ID	AX85923			AX85909			AX85909			AX85910		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	80.1			80.4			80.4			85.7		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL					25	UJ	R				23	UJ	R
DIURON					25	UJ	NR				23	UJ	NR
MALEIC HYDRAZIDE		12	J	EP				25	U				
MONURON					25	UJ	NR				23	UJ	NR
PROPOXUR					25	UJ	R				23	UJ	R
ROTENONE					25	UJ	ER				23	UJ	ER

PROJ_NO: 02063	NSAMPLE	SB-17-124-0104RE			SB-17-DUP05			SB-17-DUP05DL			SB-17-DUP05RE		
SDG: 57291	LAB_ID	AX85910			AX85919			AX85919			AX85919		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			FD			FD			FD		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	85.7			76.1			76.1			76.1		
	DUP_OF				SB-17-120-0205			SB-17-120-0205			SB-17-120-0205		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL					26	UJ	R						
DIURON					26	UJ	NR						
MALEIC HYDRAZIDE		23	U								26	U	
MONURON					26	UJ	NR						
PROPOXUR								470					
ROTENONE					26	UJ	ER						

PROJ_NO: 02063	NSAMPLE	SB-17-RB01			SB-17-RB01RE			SB-17-RB02			SB-17-RB02RE		
SDG: 57291	LAB_ID	AX85924			AX85924			AX85926			AX85926		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: WATER	QC_TYPE	RB			RB			RB			RB		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		1	U					1	U				
DIURON		1	U					1	U				
MALEIC HYDRAZIDE					2	U					2	U	
MONURON		1	U					1	U				
PROPOXUR		1	U					1	U				
ROTENONE		1	U					1	U				

TETRA TECH

INTERNAL CORRESPONDENCE

C-NAVY-03-09-3096W

Date: March 13, 2009

c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Jennifer Cardinal (no copy) JC

Subject: Tier II Organic Data Validation, SDG 57292
APPL Inc, through Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Special Pesticides:			
13/Soils/	SB-17-101-0001	SB-17-101-0104	SB-17-102-0001
	SB-17-102-0104	SB-17-103-0001	SB-17-103-0104
	SB-17-104-0001	SB-17-104-0104	SB-17-106-0001
	SB-17-106-0104	SB-17-117-0104	SB-17-122-0407
	SB-17-DUP06		
	(Field Duplicate Pair: SB-17-122-0407/SB-17-DUP06)		
1/Field Blank/	SWB-17-01		
2/Rinsate Blanks/	SB-17-RB03	SB-17-RB04	

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the following special pesticide analytical data for the samples in this SDG.

Compound	Method of Analysis/ Instrumentation
Pyrethrins or Pyrethrum	SW-846 Method 8081A / GC/ECD
Resmethrin or Esmethrin	SW-846 Method 8081A / GC/MS
Avitrol or 4-Aminopyridine	SW-846 Method 8141A / GC/MS
Diazinon	SW-846 Method 8141A/ GC/NPD
Malathion	
Simazine or Simaz	
Maleic Hydrazide	SW-846 Method 8321A / LC/MS
Carbaryl or Sevin	SW-846 Method 8321A / LC/MS & LC/MS/MS
Diuron or Drexel	
Monuron	
Propoxur or Baygon	
Rotenone or Rotenon	

The samples in this SDG were collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine on October 17, 2008. Sample collection and analysis was performed according to the requirements of

the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The pesticides validation was performed in accordance with the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Organic Analyses, Part III, February 2004.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The data were evaluated based on the following parameters:

	• Data Completeness
	• Preservation and Technical Holding Times
*	• GC/ECD Instrument Performance Check (Retention Times)
*	• Initial and Continuing Calibrations
*	• Blanks
	• Surrogate Compounds
	• Internal Standards
NA	• Matrix Spike/Matrix Spike Duplicate
	• Laboratory Control Sample/Laboratory Control Sample Duplicate
*	• Field Duplicates
*	• Analyte Identification/Quantitation
*	• Percent Solids
*	• Reporting Limits

* All criteria were met for this parameter.
NA Not applicable for this SDG.

Data Completeness

Method 8081A Organochlorine Pesticides

On March 10, 2009 the laboratory provided the linear regression fit equations for the initial calibration; an explanation of how the MDLs were established; IC spectra for the resmethrin I and resmethrin II compounds; a resubmittal of the initial calibration summary Form 6 for both the surrogate compounds and the target pyrethrins including the concentration of the initial calibration standards; and an explanation of "Mix A" and "Mix B" surrogates. A second source calibration standard was not available at the time of analysis.

Method 8141A Organophosphorus Pesticides

On March 10, 2009 the laboratory provided the linear regression fit equations for the initial calibration; IC spectrum for avitrol (4-aminopyridine); a resubmittal of the initial calibration summary Form 6 including the response areas, the concentration of the initial calibration standards, and footnotes explaining calibration abbreviations used by the laboratory; and a resubmittal of the LCS/LCSD QC summary forms with separate simazine results to show that simazine was not spiked in the LCS

associated with this SDG. (Simazine was not added to the original LCS due to analyst error. The simazine spike results reported are from the nearest LCS.) A second source calibration standard was not available at the time of analysis.

Method 8321A Carbamate Pesticides

On March 10, 2009 the laboratory provided the internal standard summary form since it was missing from the original data package.

Method 8321A Maleic Hydrazide

On March 10, 2009 the laboratory provided the linear regression fit equations for the initial calibration, a revised initial calibration summary Form 6, and the internal standard summary form. A second source calibration standard was not available at the time of analysis.

Preservation and Technical Holding Times

Method 8321A Carbamate Pesticides

The extraction holding time for samples SB-17-122-0407RE and SB-17-DUP06RE was exceeded by 21 days for both samples; therefore, the project accuracy goals may be impacted. The non-detected carbamate sample results in samples SB-17-122-0407RE and SB-17-DUP06RE are estimated (UJ). The affected non-detected results are usable as estimated quantitation limits which may be biased low.

Surrogate Spike Recoveries

Method 8321A Carbamate Pesticides

The following samples had surrogate spike recoveries outside of the recovery limits:

Sample	Tributylphosphate QC Limits (34-146%)	Action	
		(+)	NDs
SB-17-106-0001	27.6	-	UJ
SB-17-122-0407RE	19.8	-	UJ
SB-17-DUP06RE	10.3	-	UJ
SB-17-117-0104	23.6	-	UJ

The surrogate tributylphosphate recovered below the QC criteria for samples listed above; therefore, the project accuracy goals may be impacted. The non-detected carbamate pesticide results in affected samples are usable as estimated quantitation limits which may be biased low.

Method 8321A Maleic Hydrazide

The following samples had surrogate spike recoveries outside of the recovery limits:

Sample	Isoxaben QC Limits (10-125%)	Action	
		(+)	NDs
SB-17-122-0407	6.27	-	UJ
SB-17-101-0001	3.99	-	UJ
SB-17-103-0001	9.39	-	UJ

The surrogate isoxaben recovered below the QC criteria for samples listed above; therefore, the project accuracy goals may be impacted. The non-detected maleic hydrazide results in affected samples are usable as estimated quantitation limits which may be biased low.

Internal Standard Performance

Method 8321A Carbamate Pesticides

The area of the internal standard ridomil was below the QC limits for the following samples:

Sample	Internal Standard (IS)	IS Area	QC Limits	Action (ND)
SB-17-106-0001	Ridomil	24733218.63	43596753.88 – 174387015.51	UJ
SB-17-106-0104	Ridomil	34980108.17		UJ
SB-17-122-0407	Ridomil	16198513.80		UJ
SB-17-DUP06	Ridomil	13219364.52		UJ
SB-17-117-0104	Ridomil	24648080.22		UJ
SB-17-103-0001	Ridomil	11482936.78	12228944.71 – 48915778.83	UJ

The internal standard performance for ridomil was outside of the QC limits; therefore, the project accuracy goals may be impacted. The compounds quantitated against this internal standard are diuron and monuron. The non-detected diuron and monuron results in the affected samples are usable as estimated quantitation limits.

Laboratory Control Sample/Laboratory Control Sample Duplicate

Method 8141A Organophosphorus Pesticides

Simazine was not included in the laboratory control sample standard. Professional judgment was applied to estimate all the sample results (all non-detected) due to lack of laboratory control sample accuracy and precision information for this compound. The non-detected results are usable as estimated quantitation limits.

Method 8321A Carbamate Pesticides

The following table summarizes the recovery below the QC limits in the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analysis:

Compound	%REC	QC Limits %REC	Affected Samples	Action (+)	Action ND
Rotenone	64.0	70-130	SB-17-106-0001, SB-17-106-0104, SB-17-117-0104	-	UJ

Rotenone recovered below QC criteria in the LCS/LCSD analysis; therefore, the project accuracy goals may be impacted. The non-detected rotenone results in the affected soil samples are usable as estimated quantitation limits which may be biased low.

Reporting Limits

All positive results below the quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

The project action limits were achieved.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Method 8081A Organochlorine Pesticides

The project goals with respect to accuracy, precision, sensitivity, and completeness were met for the Method 8081A Organochlorine Pesticides data set. Data usability was not impacted with regards to accuracy, precision, sensitivity, and completeness.

Method 8141A Organophosphorus Pesticides

The project goals with respect to accuracy and precision were met for the Method 8141A Organophosphorus Pesticides data set with the following exception. Simazine was not included in the laboratory control sample standard. Professional judgment was applied to estimate all the sample results (all non-detected) due to lack of LCS accuracy and precision information for this compound. Although specific method criteria were not met in this instance, the affected non-detected results are usable as estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to sensitivity and completeness were met for the Method 8141A Organophosphorus Pesticides data set. Data usability was not impacted with regards to sensitivity and completeness.

Method 8321A Carbamate Pesticides

The project goals with respect to accuracy were met for the Method 8321A Carbamate Pesticides data set with the following exceptions. Samples SB-17-122-0407RE and SB-17-DUP06RE were qualified as estimated due to holding time exceedances; the affected results may be biased low. The carbamate results in select soil samples were qualified as estimated due to low surrogate recoveries; the affected results may be biased low. The non-detected diuron and monuron results in select soil samples were qualified as estimated due to the poor performance of the internal standard ridomil. Rotenone was qualified as estimated in select samples due to low LCS/LCSD recoveries; the affected results may be biased low. Although specific method criteria were not met in these instances, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to precision, sensitivity, and completeness were met for the Method 8321A Carbamate Pesticides data set. Data usability was not impacted with regards to precision, sensitivity, and completeness.

Method 8321A Maleic Hydrazide

The project goals with respect to accuracy were met for the Method 8321A Maleic Hydrazide data set with the following exceptions. The maleic hydrazide results in select soil samples were qualified as estimated due to low surrogate recoveries; the affected results may be biased low. Although specific method criteria were not met in these instances, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to precision, sensitivity, and completeness were met for the Method 8321A Maleic Hydrazide data set. Data usability was not impacted with regards to precision, sensitivity, and completeness.

Tables: Data Validation Qualifiers and Codes
Data Summary Tables

Enclosures: Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	SB-17-101-0001			SB-17-101-0104			SB-17-102-0001			SB-17-102-0104		
SDG: 57292	LAB_ID	AX85932			AX85933			AX85934			AX85935		
FRACTION: PEST	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	89.0			94.8			94.4			89.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		900	U		840	U		850	U		890	U	
RESMETHRIN		450	U		420	U		420	U		450	U	

PROJ_NO: 02063	NSAMPLE	SB-17-103-0001			SB-17-103-0104			SB-17-104-0001			SB-17-104-0104		
SDG: 57292	LAB_ID	AX85936			AX85937			AX85938			AX85939		
FRACTION: PEST	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.5			88.6			92.3			87.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		850	U		900	U		870	U		910	U	
RESMETHRIN		420	U		450	U		430	U		460	U	

PROJ_NO: 02063	NSAMPLE	SB-17-106-0001			SB-17-106-0104			SB-17-117-0104			SB-17-122-0407		
SDG: 57292	LAB_ID	AX85927			AX85928			AX85931			AX85929		
FRACTION: PEST	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	91.4			94.3			81.7			55.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		880	U		850	U		980	U		1500	U	
RESMETHRIN		440	U		420	U		490	U		730	U	

PROJ_NO: 02063	NSAMPLE	SB-17-DUP06		
SDG: 57292	LAB_ID	AX85930		
FRACTION: PEST	SAMP_DATE	10/17/2008		
MEDIA: SOIL	QC_TYPE	FD		
	UNITS	UG/KG		
	PCT_SOLIDS	73.4		
	DUP_OF	SB-17-122-0407		
PARAMETER		RESULT	VQL	QLCD
PYRETHRINS		1100	U	
RESMETHRIN		540	U	

PROJ_NO: 02063	NSAMPLE	SB-17-RB03			SB-17-RB04			SWB-17-01		
SDG: 57292	LAB_ID	AX85941			AX85942			AX85940		
FRACTION: PEST	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008		
MEDIA: WATER	QC_TYPE	RB			RB			FB		
	UNITS	UG/L			UG/L			UG/L		
	PCT_SOLIDS									
	DUP_OF									
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		1.2	U		1.2	U		1.2	U	
RESMETHRIN		0.5	U		0.5	U		0.5	U	

PROJ_NO: 02063	NSAMPLE	SB-17-101-0001			SB-17-101-0104			SB-17-102-0001			SB-17-102-0104		
SDG: 57292	LAB_ID	AX85932			AX85933			AX85934			AX85935		
FRACTION: OPEST	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	89.0			94.8			94.4			89.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		56	U		53	U		53	U		56	U	
DIAZINON		56	U		53	U		53	U		56	U	
MALATHION		56	U		53	U		53	U		56	U	
SIMAZINE		56	UJ	E	53	UJ	E	53	UJ	E	56	UJ	E

PROJ_NO: 02063	NSAMPLE	SB-17-103-0001			SB-17-103-0104			SB-17-104-0001			SB-17-104-0104		
SDG: 57292	LAB_ID	AX85936			AX85937			AX85938			AX85939		
FRACTION: OPEST	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.5			88.6			92.3			87.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		53	U		56	U		54	U		57	U	
DIAZINON		53	U		56	U		54	U		57	U	
MALATHION		53	U		56	U		54	U		57	U	
SIMAZINE		53	UJ	E	56	UJ	E	54	UJ	E	57	UJ	E

PROJ_NO: 02063	NSAMPLE	SB-17-106-0001			SB-17-106-0104			SB-17-117-0104			SB-17-122-0407		
SDG: 57292	LAB_ID	AX85927			AX85928			AX85931			AX85929		
FRACTION: OPEST	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	91.4			94.3			81.7			55.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		55	U		53	U		61	U		91	U	
DIAZINON		55	U		53	U		61	U		91	U	
MALATHION		55	U		53	U		61	U		91	U	
SIMAZINE		55	UJ	E	53	UJ	E	61	UJ	E	91	UJ	E

PROJ_NO: 02063	NSAMPLE	SB-17-DUP06		
SDG: 57292	LAB_ID	AX85930		
FRACTION: OPEST	SAMP_DATE	10/17/2008		
MEDIA: SOIL	QC_TYPE	FD		
	UNITS	UG/KG		
	PCT_SOLIDS	73.4		
	DUP_OF	SB-17-122-0407		
PARAMETER		RESULT	VQL	QLCD
4-AMINOPYRIDINE		68	U	
DIAZINON		68	U	
MALATHION		68	U	
SIMAZINE		68	UJ	E

PROJ_NO: 02063	NSAMPLE	SB-17-RB03			SB-17-RB04			SWB-17-01		
SDG: 57292	LAB_ID	AX85941			AX85942			AX85940		
FRACTION: OPEST	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008		
MEDIA: WATER	QC_TYPE	RB			RB			FB		
	UNITS	UG/L			UG/L			UG/L		
	PCT_SOLIDS									
	DUP_OF									
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		0.5	U		0.5	U		0.5	U	
DIAZINON		0.05	U		0.05	U		0.05	U	
MALATHION		0.1	U		0.1	U		0.1	U	
SIMAZINE		0.5	UJ	E	0.5	UJ	E	0.5	UJ	E

PROJ_NO: 02063	NSAMPLE	SB-17-101-0001			SB-17-101-0001RE			SB-17-101-0104			SB-17-101-0104RE		
SDG: 57292	LAB_ID	AX85932			AX85932			AX85933			AX85933		
FRACTION: HERB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	89.0			89.0			94.8			94.8		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		22	U					21	U				
DIURON		22	U					21	U				
MALEIC HYDRAZIDE					22	UJ	R				21	U	
MONURON		22	U					21	U				
PROPOXUR		22	U					21	U				
ROTENONE		22	U					21	U				

PROJ_NO: 02063	NSAMPLE	SB-17-102-0001			SB-17-102-0001RE			SB-17-102-0104			SB-17-102-0104RE		
SDG: 57292	LAB_ID	AX85934			AX85934			AX85935			AX85935		
FRACTION: HERB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.4			94.4			89.4			89.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		21	U					22	U				
DIURON		21	U					22	U				
MALEIC HYDRAZIDE					21	U					22	U	
MONURON		21	U					22	U				
PROPOXUR		21	U					22	U				
ROTENONE		21	U					22	U				

PROJ_NO: 02063	NSAMPLE	SB-17-103-0001			SB-17-103-0001RE			SB-17-103-0104			SB-17-103-0104RE		
SDG: 57292	LAB_ID	AX85936			AX85936			AX85937			AX85937		
FRACTION: HERB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.5			94.5			88.6			88.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		21	U					23	U				
DIURON		21	UJ	N				23	U				
MALEIC HYDRAZIDE					21	UJ	R				23	U	
MONURON		21	UJ	N				23	U				
PROPOXUR		21	U					23	U				
ROTENONE		21	U					23	U				

PROJ_NO: 02063	NSAMPLE	SB-17-104-0001			SB-17-104-0001RE			SB-17-104-0104			SB-17-104-0104RE		
SDG: 57292	LAB_ID	AX85938			AX85938			AX85939			AX85939		
FRACTION: HERB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	92.3			92.3			87.6			87.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		22	U					23	U				
DIURON		22	U					23	U				
MALEIC HYDRAZIDE					22	U					23	U	
MONURON		22	U					23	U				
PROPOXUR		22	U					23	U				
ROTENONE		22	U					23	U				

PROJ_NO: 02063	NSAMPLE	SB-17-106-0001			SB-17-106-0001RE			SB-17-106-0104			SB-17-106-0104RE		
SDG: 57292	LAB_ID	AX85927			AX85927			AX85928			AX85928		
FRACTION: HERB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	91.4			91.4			94.3			94.3		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		22	UJ	R				21	U				
DIURON		22	UJ	NR				21	UJ	N			
MALEIC HYDRAZIDE					22	U					21	U	
MONURON		22	UJ	NR				21	UJ	N			
PROPOXUR		22	UJ	R				21	U				
ROTENONE		22	UJ	ER				21	UJ	E			

PROJ_NO: 02063	NSAMPLE	SB-17-117-0104			SB-17-117-0104RE			SB-17-122-0407RE			SB-17-DUP06RE		
SDG: 57292	LAB_ID	AX85931			AX85931			AX85929			AX85930		
FRACTION: HERB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			FD		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	81.7			81.7			55.0			73.4		
	DUP_OF										SB-17-122-0407		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		24	UJ	R				36	UJ	HR	27	UJ	HR
DIURON		24	UJ	NR				36	UJ	HNR	27	UJ	HNR
MALEIC HYDRAZIDE					24	U		36	UJ	R	27	U	
MONURON		24	UJ	NR				36	UJ	HNR	27	UJ	HNR
PROPOXUR		24	UJ	R				36	UJ	HR	27	UJ	HR
ROTENONE		24	UJ	ER				36	UJ	HR	27	UJ	HR

PROJ_NO: 02063	NSAMPLE	SB-17-RB03			SB-17-RB03RE			SB-17-RB04			SB-17-RB04RE		
SDG: 57292	LAB_ID	AX85941			AX85941			AX85942			AX85942		
FRACTION: HERB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: WATER	QC_TYPE	RB			RB			RB			RB		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		1	U					1	U				
DIURON		1	U					1	U				
MALEIC HYDRAZIDE					2	U					2	U	
MONURON		1	U					1	U				
PROPOXUR		1	U					1	U				
ROTENONE		1	U					1	U				

PROJ_NO: 02063	NSAMPLE	SWB-17-01			SWB-17-01RE		
SDG: 57292	LAB_ID	AX85940			AX85940		
FRACTION: HERB	SAMP_DATE	10/17/2008			10/17/2008		
MEDIA: WATER	QC_TYPE	FB			FB		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS						
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		1	U				
DIURON		1	U				
MALEIC HYDRAZIDE					2	U	
MONURON		1	U				
PROPOXUR		1	U				
ROTENONE		1	U				

INTERNAL CORRESPONDENCE

C-NAVY-03-09-3085W

Date: March 10, 2009

c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Lucy Guzman (no copy)

Subject: Tier II Organic Data Validation, SDG 57333
APPL Inc, through Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Special Pesticides:

19/Soils/	SB-17-105-0001	SB-17-105-0104	SB-17-107-0001
	SB-17-107-0104	SB-17-107-0408	SB-17-108-0001
	SB-17-108-0104	SB-17-111-0104	SB-17-112-0001
	SB-17-112-0104	SB-17-113-0001	SB-17-113-0104
	SB-17-118-0001	SB-17-118-0104	SB-17-125-0608
	SB-17-132-0408	SB-17-141-0307	SB-17-DUP07
	SB-17-DUP08		

(Field Duplicate Pairs: SB-17-105-0001/SB-17-DUP07, SB-17-132-0408/SB-17-DUP08)

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the following special pesticides analytical data for the samples in this SDG.

Compound	Method of Analysis/ Instrumentation
Pyrethrins or Pyrethrum	SW-846 Method 8081A / GC/ECD
Resmethrin or Esmethrin	SW-846 Method 8081A / GC/MS
Avitrol or 4-Aminopyridine	SW-846 Method 8141A / GC/MS
Diazinon	SW-846 Method 8141A/ GC/NPD
Malathion	
Simazine or Simaz	
Maleic Hydrazide	SW-846 Method 8321A / LC/MS
Carbaryl or Sevin	SW-846 Method 8321A / LC/MS & LC/MS/MS
Diuron or Drexel	
Monuron	
Propoxur or Baygon	
Rotenone or Rotenon	

The samples were collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine on October 15 & 20, 2008. Sample collection and analysis was performed according to the requirements of the

Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The pesticides and herbicide validation was performed in accordance with the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Organic Analyses, Part III, February 2004.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The data were evaluated based on the following parameters:

- Data Completeness
- Preservation and Technical Holding Times
- * GC/ECD Instrument Performance Check (Retention Times)
- * Initial and Continuing Calibrations
- * Blanks
- Surrogate Compounds
- Internal Standards
- Matrix Spike/Matrix Spike Duplicate
- Laboratory Control Sample/Laboratory Control Sample Duplicate
- Field Duplicates
- * Analyte Identification/Quantitation
- * Reporting Limits

* All criteria were met for this parameter.

Data Completeness

Method 8081A

TtNUS requested the laboratory to submit the following items: MDL study for pyrethrin and resmethrin, instrument tune, spectra for the resmethrin I and resmethrin II compounds, and second source initial calibration verification standard. In addition, the laboratory was asked to resubmit the initial calibration summary Form 6 for both the surrogate compounds and the target pyrethrins and provide the concentration of the initial calibration standards. For the resmethrin analysis the laboratory was requested to provide the linear regression fit equation for the initial calibration. The requested information was received on February 19 and March 9 and 10, 2009.

Method 8141A

The laboratory was requested to re-submit quantitation raw data for the avitrol (4-aminopyridine) initial and continuing calibration standards showing the target analytes , areas and retention times missing in the original package and resubmit Form 6 to include standard concentration and a footnote explaining calibration abbreviations used by the laboratory. Also to delete pages 131 and 132 from the data package since these pages do not belong to this analysis. In addition the laboratory was requested to resubmit the case narrative to include explanation of method proficiency results for simazine from LCS

standards not analyze with the field samples from this SDG; and the continuing calibration summary Form 7 for the phosphorous pesticides including the "#2" suffix next to the target compounds to indicate these results belong to the second column, confirmation analysis. The requested information was received on February 26 and March 9, 2009.

Method 8321A, Maleic Hydrazide

The laboratory was requested to submit the missing first page of the extraction worksheet on 10/29/08 and an explanation of raised reporting limits because the first two-level initial calibration standards data points were eliminated. The requested information was received on February 26 and March 9, 2009.

Method 8321A Carbamate pesticides

The laboratory was request to submit the internal standard summary form missing from the original submittal and to correct the extraction date for sample SB-17-125-0608 in the worksheet page 279. The requested information was received on February 26 and March 9, 2009.

Preservation and Technical Holding Times

Method 8141A Organophosphorous Pesticides

The extraction holding time for sample SB-17-125-0608 was exceed by 1 day. The sample results, all non-detected are estimated (UJ); results may be biased low. The project accuracy goals may be impacted; non-detected results in the affected sample are usable as estimated quantitation limits which may be biased low.

Method 8321A Carbamate pesticides

The extraction holding time for sample SB-17-125-0608 was exceed by 9 days. The sample results, all non-detected are estimated (UJ), results may be biased low. The project accuracy goals may be impacted; non-detected results in the affected samples are usable as estimated quantitation limits which may be biased low.

Surrogate Spike Recoveries

Method 8321A Maleic Hydrazide

The following samples had surrogate spike recoveries outside of the recovery limits:

Sample	Isoxaben QC Limits 10-125%	Action	
		(+)	NDs
SB-17-125-0608	3.75	-	UJ
SB-17-105-0001	1.1	-	UJ
SB-17-107-0001	8.62	-	UJ
SB-17-107-0408	9.2	-	UJ
SB-17-108-0001	6.76	-	UJ

The surrogate isoxaben recovered below the QC criteria for samples listed above consequently, the project accuracy goals may be impacted. The non-detected maleic hydrazide results in affected samples are usable as estimated quantitation limits which may be biased low.

Method 8321A Carbamate Pesticides

The following samples had surrogate spike recoveries outside of the recovery limits:

Sample	Isoxaben QC Limits 32-145%	Tributyl Phosphate QC Limits 34-146	Action	
			(+)	NDs
SB-17-125-0608	-	26.2	-	UJ
SB-17-DUP07	-	25.9	-	UJ
SB-17-112-0001	-	28.8	-	UJ

- criteria met

The surrogate tributyl phosphate recovered below QC criteria for the samples listed above consequently, the project accuracy goals may be impacted. The non-detected pesticide results in the affected samples are usable as estimated quantitation limits which may be biased low.

Internal Standard Performance

Method 8321A Carbamate Pesticides

The area of the internal standard ridomil was below the QC limits (12228944.31 to 48915778.83) for the following samples:

Sample	Internal Standard (IS)	IS Area	Action
			(ND)
SB-17-125-0608	Ridomil	12007602.39	UJ
SB-17-DUP07	Ridomil	10701394.30	UJ
SB-17-112-0001	Ridomil	11478771.41	UJ

The compounds quantitated against this internal standard are diuron and monuron. These compounds in the affected samples are estimated (UJ). The project accuracy goals may be impacted for diuron and monuron in affected samples. The non-detected monuron and diuron results in the affected samples are usable as estimated quantitation limits.

Matrix Spike/Matrix Spike Duplicates

Method 8141A Organophosphorous Pesticides

Simazine was not included in the matrix spike standard. In addition, this compound was not included in the laboratory control samples associated with these SDG. Professional judgment was applied to estimate all the simazine sample results (all non-detected) due to lack of matrix spike accuracy and precision information for this compound. The non-detected results are usable as estimated quantitation limits.

Method 8321A Carbamate Pesticides

The following table summarizes the matrix spiking recovery below the QC limits in the matrix spike and matrix spike duplicate analysis of sample SB-17-112-0104:

Compound	MS %REC	MSD %REC	QC Limits	Action	
			%REC	(+)	ND
Propoxur	-	63	67-122	-	UJ

- criterion met

Propoxur recovered below QC criteria in the matrix spike duplicate analysis of sample SB-17-112-0104, consequently, the project accuracy goals may be impacted. The non-detected propuxur result in sample SB-17-112-0104 is usable as estimated quantitation limits which may be biased low.

Field Duplicates

Method 8321A Carbamate Pesticides

Professional judgment was applied to estimated the monuron results in the field duplicate pair SB-17-132-0408/SB-17-DUP08 since this compound was reported below the quantitation limit (at 20J ug/kg) for sample SB-17-132-0408 while it was reported above 2x the quantitation limit (at 140 ug/kg) in the field duplicate sample SB-17-DUP08. The project precision goals may be impacted. The positive monuron results in samples SB-17-132-0408 and SB-17-DUP08 are usable as estimated values for which the bias is indeterminate.

Reporting Limits

All positive results below the quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

The project required quantitation limits were not met for simazine, malathion, carbaryl, diuron, maleic hidrazide, monuron, propoxur, and rotenone due to the percent moisture of the samples. However the project action limits were not exceeded, consequently, the data usability is not impacted.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Method 8081A Pyrethrins/Resmethrin

The project goals with respect to accuracy, precision, sensitivity, and completeness were met for the organochloride pesticide data set.

Method 8141A Organophosphorous Pesticides

The project goals with respect to accuracy and precision were met for the organophosphorous pesticides data set with the following exception. The non-detected simazine results are estimated due to lack of matrix spike and LCS accuracy and precision information for this compound. The results for sample SB-17-125-0608 are estimated due to exceeded extraction holding time; values may be biased low. Although specific QC criteria were not met in this instance, data usability is not impacted and the affected non-detected results are usable as estimated values and estimated quantitation limits.

The project goals with respect to sensitivity and completeness were met for the organophosphorous pesticide data set.

Method 8321A Maleic Hydrazide

The project goals with respect to accuracy were met for this data set with the following exception. The surrogate recovered below the QC criteria for samples SB-17-125-0608, SB-17-105-0001, SB-17-107-0001, SB-17-107-0408, and SB-17-108-0001 consequently, the project accuracy goals may be impacted. Although specific method criteria were not met in these instances, the affected non-detected results are usable as estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to precision, sensitivity, and completeness were met for the organophosphorous pesticide data set.

Method 8321A Carbamate Pesticides

The project goals with respect to accuracy were met for this data set with the following exception. The results for sample SB-17-125-0608 are estimated due was exceeded by holding time; results may be biased low. Diuron and monuron are estimated in selected samples due to low internal standard areas. Results for selected samples are estimated due to low surrogate recovery; results may be biased low. Propoxur result in sample SB-17-112-0104 is estimated due to a low matrix spike recovery; result may be biased low. Although specific method criteria were not met in these instances, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to precision were met for this data set with the following exception. The positive monuron results in the field duplicate pair samples SB-17-132-0408 and SB-17-DUP08 due to poor field duplicate precision. Although specific QC criterion was not met in this instance, the affected positive results are usable as estimated values which may have a minor impact on data usability.

The project goals with respect to sensitivity and completeness were met for the carbamate pesticide data set.

Tables: Data Validation Qualifiers and Codes
Data Summary Tables
Enclosures: Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	SB-17-105-0001			SB-17-105-0104			SB-17-107-0001			SB-17-107-0104		
SDG: 57333	LAB_ID	AX86079			AX86080			AX86081			AX86082		
FRACTION: PEST	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	90.0			72.4			91.3			72.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		890	U		1100	U		880	U		1100	U	
RESMETHRIN		440	U		550	U		440	U		550	U	

PROJ_NO: 02063	NSAMPLE	SB-17-107-0408			SB-17-108-0001			SB-17-108-0104			SB-17-111-0104		
SDG: 57333	LAB_ID	AX86083			AX86084			AX86085			AX86087		
FRACTION: PEST	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	78.0			73.9			83.6			90.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		1000	U		1100	U		960	U		880	U	
RESMETHRIN		510	U		540	U		480	U		440	U	

PROJ_NO: 02063	NSAMPLE	SB-17-112-0001			SB-17-112-0104			SB-17-113-0001			SB-17-113-0104		
SDG: 57333	LAB_ID	AX86088			AX86089			AX86090			AX86091		
FRACTION: PEST	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	82.4			83.1			73.4			86.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		970	U		960	U		1100	U		930	U	
RESMETHRIN		490	U		480	U		540	U		460	U	

PROJ_NO: 02063	NSAMPLE	SB-17-118-0001			SB-17-118-0104			SB-17-125-0608			SB-17-132-0408		
SDG: 57333	LAB_ID	AX86092			AX86093			AX86078			AX86094		
FRACTION: PEST	SAMP_DATE	10/20/2008			10/20/2008			10/15/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	92.0			85.8			81.5			63.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		870	U		930	U		980	U		1300	U	
RESMETHRIN		430	U		470	U		490	U		630	U	

PROJ_NO: 02063	NSAMPLE	SB-17-141-0307			SB-17-DUP07			SB-17-DUP08		
SDG: 57333	LAB_ID	AX86096			AX86086			AX86095		
FRACTION: PEST	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			FD			FD		
	UNITS	UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	65.6			87.2			54.1		
	DUP_OF				SB-17-105-0001			SB-17-132-0408		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		1200	U		920	U		1500	U	
RESMETHRIN		610	U		460	U		740	U	

PROJ_NO: 02063	NSAMPLE	SB-17-105-0001			SB-17-105-0104			SB-17-107-0001			SB-17-107-0104		
SDG: 57333	LAB_ID	AX86079			AX86080			AX86081			AX86082		
FRACTION: OPEST	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	90.0			72.4			91.3			72.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		56	U		69	U		55	U		69	U	
DIAZINON		56	U		69	U		55	U		69	U	
MALATHION		56	U		69	U		55	U		69	U	
SIMAZINE		56	UJ	DE	69	UJ	DE	55	UJ	DE	69	UJ	DE

PROJ_NO: 02063	NSAMPLE	SB-17-107-0408			SB-17-108-0001			SB-17-108-0104			SB-17-111-0104		
SDG: 57333	LAB_ID	AX86083			AX86084			AX86085			AX86087		
FRACTION: OPEST	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	78.0			73.9			83.6			90.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		64	U		68	U		60	U		55	U	
DIAZINON		64	U		68	U		60	U		55	U	
MALATHION		64	U		68	U		60	U		55	U	
SIMAZINE		64	UJ	DE	68	UJ	DE	60	UJ	DE	55	UJ	DE

PROJ_NO: 02063	NSAMPLE	SB-17-112-0001			SB-17-112-0104			SB-17-113-0001			SB-17-113-0104		
SDG: 57333	LAB_ID	AX86088			AX86089			AX86090			AX86091		
FRACTION: OPEST	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	82.4			83.1			73.4			86.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		61	U		60	U		68	U		58	U	
DIAZINON		61	U		60	U		68	U		58	U	
MALATHION		61	U		60	U		68	U		58	U	
SIMAZINE		61	UJ	DE	60	UJ	DE	68	UJ	DE	58	UJ	DE

PROJ_NO: 02063	NSAMPLE	SB-17-118-0001			SB-17-118-0104			SB-17-125-0608RE			SB-17-132-0408		
SDG: 57333	LAB_ID	AX86092			AX86093			AX86078			AX86094		
FRACTION: OPEST	SAMP_DATE	10/20/2008			10/20/2008			10/15/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	92.0			85.8			81.5			63.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		54	U		58	U		61	UJ	H	78	U	
DIAZINON		54	U		58	U		61	UJ	H	78	U	
MALATHION		54	U		58	U		61	UJ	H	78	U	
SIMAZINE		54	UJ	DE	58	UJ	DE	61	UJ	DEH	78	UJ	DE

PROJ_NO: 02063	NSAMPLE	SB-17-141-0307			SB-17-DUP07			SB-17-DUP08		
SDG: 57333	LAB_ID	AX86096			AX86086			AX86095		
FRACTION: OPEST	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			FD			FD		
	UNITS	UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	65.6			87.2			54.1		
	DUP_OF				SB-17-105-0001			SB-17-132-0408		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		76	U		57	U		92	U	
DIAZINON		76	U		57	U		92	U	
MALATHION		76	U		57	U		92	U	
SIMAZINE		76	UJ	DE	57	UJ	DE	92	UJ	DE

PROJ_NO: 02063	NSAMPLE	SB-17-105-0001			SB-17-105-0001RE			SB-17-105-0104			SB-17-105-0104RE		
SDG: 57333	LAB_ID	AX86079			AX86079			AX86080			AX86080		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	90.0			90.0			72.4			72.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		22	U					28	U				
DIURON		22	UJ	N				28	U				
MALEIC HYDRAZIDE					22	UJ	R				28	U	
MONURON		22	UJ	N				28	U				
PROPOXUR		22	U					28	U				
ROTENONE		22	U					28	U				

PROJ_NO: 02063	NSAMPLE	SB-17-107-0001			SB-17-107-0001RE			SB-17-107-0104			SB-17-107-0104RE		
SDG: 57333	LAB_ID	AX86081			AX86081			AX86082			AX86082		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	91.3			91.3			72.1			72.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		22	U					28	U				
DIURON		22	U					28	U				
MALEIC HYDRAZIDE					22	UJ	R				28	U	
MONURON		22	U					28	U				
PROPOXUR		22	U					28	U				
ROTENONE		22	U					28	U				

PROJ_NO: 02063	NSAMPLE	SB-17-107-0408			SB-17-107-0408RE			SB-17-108-0001			SB-17-108-0001RE		
SDG: 57333	LAB_ID	AX86083			AX86083			AX86084			AX86084		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	78.0			78.0			73.9			73.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		26	U					27	U				
DIURON		26	U					27	U				
MALEIC HYDRAZIDE					26	UJ	R				27	UJ	R
MONURON		26	U					27	U				
PROPOXUR		26	U					27	U				
ROTENONE		26	U					27	U				

PROJ_NO: 02063	NSAMPLE	SB-17-108-0104			SB-17-108-0104RE			SB-17-111-0104			SB-17-111-0104RE		
SDG: 57333	LAB_ID	AX86085			AX86085			AX86087			AX86087		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	83.6			83.6			90.4			90.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		24	U					22	U				
DIURON		24	U					22	U				
MALEIC HYDRAZIDE					24	U					22	U	
MONURON		24	U					22	U				
PROPOXUR		24	U					22	U				
ROTENONE		24	U					22	U				

PROJ_NO: 02063	NSAMPLE	SB-17-112-0001			SB-17-112-0001RE			SB-17-112-0104			SB-17-112-0104RE		
SDG: 57333	LAB_ID	AX86088			AX86088			AX86089			AX86089		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	82.4			82.4			83.1			83.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		24	UJ	R				24	U				
DIURON		24	UJ	NR				24	U				
MALEIC HYDRAZIDE					24	U					24	U	
MONURON		24	UJ	NR				24	U				
PROPOXUR		24	UJ	R				24	UJ	D			
ROTENONE		24	UJ	R				24	U				

PROJ_NO: 02063	NSAMPLE	SB-17-113-0001			SB-17-113-0001RE			SB-17-113-0104			SB-17-113-0104RE		
SDG: 57333	LAB_ID	AX86090			AX86090			AX86091			AX86091		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	73.4			73.4			86.1			86.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		27	U					23	U				
DIURON		27	U					23	U				
MALEIC HYDRAZIDE					27	U					23	U	
MONURON		27	U					23	U				
PROPOXUR		27	U					23	U				
ROTENONE		27	U					23	U				

PROJ_NO: 02063	NSAMPLE	SB-17-118-0001			SB-17-118-0001RE			SB-17-118-0104			SB-17-118-0104RE		
SDG: 57333	LAB_ID	AX86092			AX86092			AX86093			AX86093		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	92.0			92.0			85.8			85.8		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		22	U					23	U				
DIURON		22	U					23	U				
MALEIC HYDRAZIDE					22	U					23	U	
MONURON		22	U					23	U				
PROPOXUR		22	U					23	U				
ROTENONE		22	U					23	U				

PROJ_NO: 02063	NSAMPLE	SB-17-125-0608			SB-17-125-0608RE			SB-17-132-0408			SB-17-132-0408RE		
SDG: 57333	LAB_ID	AX86078			AX86078			AX86094			AX86094		
FRACTION: HERB	SAMP_DATE	10/15/2008			10/15/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	81.5			81.5			63.9			63.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		25	UJ	HR				31	U				
DIURON		25	UJ	HNR				31	U				
MALEIC HYDRAZIDE					25	UJ	R				31	U	
MONURON		25	UJ	HNR				20	J	GP			
PROPOXUR		25	UJ	HR				31	U				
ROTENONE		25	UJ	HR				31	U				

PROJ_NO: 02063	NSAMPLE	SB-17-141-0307			SB-17-141-0307RE			SB-17-DUP07			SB-17-DUP07RE		
SDG: 57333	LAB_ID	AX86096			AX86096			AX86086			AX86086		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			FD			FD		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	65.6			65.6			87.2			87.2		
	DUP_OF							SB-17-105-0001			SB-17-105-0001		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		30	U					23	UJ	R			
DIURON		30	U					23	UJ	NR			
MALEIC HYDRAZIDE					30	U					23	U	
MONURON		100						23	UJ	NR			
PROPOXUR		30	U					23	UJ	R			
ROTENONE		30	U					23	UJ	R			

PROJ_NO: 02063	NSAMPLE	SB-17-DUP08			SB-17-DUP08RE		
SDG: 57333	LAB_ID	AX86095			AX86095		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	FD			FD		
	UNITS	UG/KG			UG/KG		
	PCT_SOLIDS	54.1			54.1		
	DUP_OF	SB-17-132-0408			SB-17-132-0408		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		37	U				
DIURON		37	U				
MALEIC HYDRAZIDE					37	U	
MONURON		140	J	G			
PROPOXUR		37	U				
ROTENONE		37	U				

TETRA TECH

INTERNAL CORRESPONDENCE

C-NAVY-03-09-3086W

Date: March 11, 2009

c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Jennifer Cardinal (no copy) JC

Subject: Tier II Organic Data Validation, SDG 57717
APPL Inc, through Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Special Pesticides:

9/Groundwaters/	S17-GW-DUP01	S17-GW-MW1701
	S17-GW-MW1702	S17-GW-MW1703
	S17-GW-MW1704	S17-GW-MWNASB65
	S17-GW-MWNASB66	S17-GW-MWNASB68
	S17-GW-MWNASB98	
	(Field Duplicate Pair: S17-GW-MW1703/S17-GW-DUP01)	
1/Rinsate Blank/	S17-GW-RB01	

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the following special pesticide analytical data for the samples in this SDG.

Compound	Method of Analysis/ Instrumentation
Pyrethrins or Pyrethrum	SW-846 Method 8081A / GC/ECD
Resmethrin or Esmethrin	SW-846 Method 8081A / GC/MS
Avitrol or 4-Aminopyridine	SW-846 Method 8141A / GC/MS
Diazinon	SW-846 Method 8141A/ GC/NPD
Malathion	
Simazine or Simaz	
Maleic Hydrazide	SW-846 Method 8321A / LC/MS
Carbaryl or Sevin	SW-846 Method 8321A / LC/MS & LC/MS/MS
Diuron or Drexel	
Monuron	
Propoxur or Baygon	
Rotenone or Rotenon	

The samples in this SDG were collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine from December 8 to 10, 2008. Sample collection and analysis was performed according to the requirements of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The pesticides validation was performed in accordance with the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Organic Analyses, Part III, February 2004.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The data were evaluated based on the following parameters:

- Data Completeness
- * Preservation and Technical Holding Times
- * GC/ECD Instrument Performance Check (Retention Times)
- * Initial and Continuing Calibrations
- * Blanks
- * Surrogate Compounds
- * Internal Standards
- * Matrix Spike/Matrix Spike Duplicate
- * Laboratory Control Sample/Laboratory Control Sample Duplicate
- * Field Duplicates
- * Analyte Identification/Quantitation
- * Reporting Limits

* All criteria were met for this parameter.

Data Completeness

Method 8081A Organochlorine Pesticides

On March 9, 2009 the laboratory provided the linear regression fit equations for the initial calibration; an explanation of how the MDLs were established; IC spectra for the resmethrin I and resmethrin II compounds; a resubmittal of the initial calibration summary Form 6 for both the surrogate compounds and the target pyrethrins including the concentration of the initial calibration standards; and an explanation of "Mix A" and "Mix B" surrogates. A second source calibration standard was not available.

Method 8141A Organophosphorus Pesticides

On March 9, 2009 the laboratory provided the linear regression fit equations for the initial calibration; an explanation of how the MDLs were established; IC spectra for avitrol (4-aminopyridine); and a resubmittal of the initial calibration summary Form 6 including the response areas, the concentrations of the initial calibration standards, and footnotes explaining calibration abbreviations used by the laboratory. A second source calibration standard was not available.

Method 8321A Carbamate Pesticides

On March 9, 2009 the laboratory provided the internal standard summary form since it was missing from the original data package.

Method 8321A Maleic Hydrazide

On March 9, 2009 the laboratory provided a resubmittal of the initial calibration summary Form 6 including the concentrations of the initial calibration standards and the internal standard summary form since they were missing from the original data package. A second source calibration standard was not available.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

The project goals with respect to accuracy, precision, sensitivity, and completeness were met for all analyses in this SDG. Data usability was not impacted with regards to accuracy, precision, sensitivity, and completeness.

Tables: Data Validation Qualifiers and Codes
Data Summary Tables

Enclosures: Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	S17-GW-DUP01			S17-GW-MW1701			S17-GW-MW1702			S17-GW-MW1703		
SDG: 57717	LAB_ID	AX88792			AX88793			AX88790			AX88791		
FRACTION: PEST	SAMP_DATE	12/8/2008			12/9/2008			12/8/2008			12/8/2008		
MEDIA: WATER	QC_TYPE	FD			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF	S17-GW-MW1703											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		1.2	U		1.2	U		120	U		1.2	U	
RESMETHRIN		0.5	U		0.5	U		0.5	U		0.5	U	

PROJ_NO: 02063	NSAMPLE	S17-GW-MW1704			S17-GW-MWNASB65			S17-GW-MWNASB66			S17-GW-MWNASB68		
SDG: 57717	LAB_ID	AX88794			AX88795			AX88797			AX88796		
FRACTION: PEST	SAMP_DATE	12/9/2008			12/9/2008			12/9/2008			12/9/2008		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		12	U		1.2	U		1.2	U		1.2	U	
RESMETHRIN		0.5	U		0.5	U		0.5	U		0.5	U	

PROJ_NO: 02063	NSAMPLE	S17-GW-MWNASB98			S17-GW-RB01		
SDG: 57717	LAB_ID	AX88798			AX88799		
FRACTION: PEST	SAMP_DATE	12/9/2008			12/10/2008		
MEDIA: WATER	QC_TYPE	NM			RB		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS						
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
PYRETHRINS		1.2	U		1.2	U	
RESMETHRIN		0.5	U		0.5	U	

PROJ_NO: 02063	NSAMPLE	S17-GW-DUP01			S17-GW-MW1701			S17-GW-MW1702			S17-GW-MW1703		
SDG: 57717	LAB_ID	AX88792			AX88793			AX88790			AX88791		
FRACTION: OPEST	SAMP_DATE	12/8/2008			12/9/2008			12/8/2008			12/8/2008		
MEDIA: WATER	QC_TYPE	FD			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF	S17-GW-MW1703											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		0.5	U		0.5	U		0.5	U		0.5	U	
DIAZINON		0.05	U		0.05	U		0.05	U		0.05	U	
MALATHION		0.1	U		0.1	U		0.1	U		0.1	U	
SIMAZINE		0.5	U		0.5	U		0.5	U		0.5	U	

PROJ_NO: 02063	NSAMPLE	S17-GW-MW1704			S17-GW-MWNASB65			S17-GW-MWNASB66			S17-GW-MWNASB68		
SDG: 57717	LAB_ID	AX88794			AX88795			AX88797			AX88796		
FRACTION: OPEST	SAMP_DATE	12/9/2008			12/9/2008			12/9/2008			12/9/2008		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		0.5	U		0.5	U		0.5	U		0.5	U	
DIAZINON		0.05	U		0.05	U		0.05	U		0.05	U	
MALATHION		0.1	U		0.1	U		0.1	U		0.1	U	
SIMAZINE		0.5	U		0.5	U		0.5	U		0.5	U	

PROJ_NO: 02063	NSAMPLE	S17-GW-MWNASB98			S17-GW-RB01		
SDG: 57717	LAB_ID	AX88798			AX88799		
FRACTION: OPEST	SAMP_DATE	12/9/2008			12/10/2008		
MEDIA: WATER	QC_TYPE	NM			RB		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS						
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
4-AMINOPYRIDINE		0.5	U		0.5	U	
DIAZINON		0.05	U		0.05	U	
MALATHION		0.1	U		0.1	U	
SIMAZINE		0.5	U		0.5	U	

PROJ_NO: 02063	NSAMPLE	S17-GW-DUP01			S17-GW-DUP01RE			S17-GW-MW1701			S17-GW-MW1701RE		
SDG: 57717	LAB_ID	AX88792			AX88792			AX88793			AX88793		
FRACTION: HERBA	SAMP_DATE	12/8/2008			12/8/2008			12/9/2008			12/9/2008		
MEDIA: WATER	QC_TYPE	FD			FD			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF	S17-GW-MW1703			S17-GW-MW1703								
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		1	U					1	U				
DIURON		1	U					1	U				
MALEIC HYDRAZIDE					2	U					1.3	J	P
MONURON		1	U					1	U				
PROPOXUR		1	U					1	U				
ROTENONE		1	U					1	U				

PROJ_NO: 02063	NSAMPLE	S17-GW-MW1702			S17-GW-MW1702RE			S17-GW-MW1703			S17-GW-MW1703RE		
SDG: 57717	LAB_ID	AX88790			AX88790			AX88791			AX88791		
FRACTION: HERBA	SAMP_DATE	12/8/2008			12/8/2008			12/8/2008			12/8/2008		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		1	U					1	U				
DIURON		1	U					1	U				
MALEIC HYDRAZIDE					1.8	J	P				1.5	J	P
MONURON		1	U					1	U				
PROPOXUR		0.43	J	P				1	U				
ROTENONE		1	U					1	U				

PROJ_NO: 02063	NSAMPLE	S17-GW-MW1704			S17-GW-MW1704RE			S17-GW-MWNASB65			S17-GW-MWNASB65RE		
SDG: 57717	LAB_ID	AX88794			AX88794			AX88795			AX88795		
FRACTION: HERBA	SAMP_DATE	12/9/2008			12/9/2008			12/9/2008			12/9/2008		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		1	U					1	U				
DIURON		1	U					1	U				
MALEIC HYDRAZIDE					2	U					1.3	J	P
MONURON		1	U					1	U				
PROPOXUR		1	U					1	U				
ROTENONE		1	U					1	U				

PROJ_NO: 02063	NSAMPLE	S17-GW-MWNASB66			S17-GW-MWNASB66RE			S17-GW-MWNASB68			S17-GW-MWNASB68RE		
SDG: 57717	LAB_ID	AX88797			AX88797			AX88796			AX88796		
FRACTION: HERBA	SAMP_DATE	12/9/2008			12/9/2008			12/9/2008			12/9/2008		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		1	U					1	U				
DIURON		1	U					1	U				
MALEIC HYDRAZIDE					2	U					2	U	
MONURON		1	U					1	U				
PROPOXUR		1	U					0.33	J	P			
ROTENONE		1	U					1	U				

PROJ_NO: 02063	NSAMPLE	S17-GW-MWNASB98			S17-GW-MWNASB98RE			S17-GW-RB01			S17-GW-RB01RE		
SDG: 57717	LAB_ID	AX88798			AX88798			AX88799			AX88799		
FRACTION: HERBA	SAMP_DATE	12/9/2008			12/9/2008			12/10/2008			12/10/2008		
MEDIA: WATER	QC_TYPE	NM			NM			RB			RB		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CARBARYL		1	U					1	U				
DIURON		1	U					1	U				
MALEIC HYDRAZIDE					1.9	J	P				2	U	
MONURON		0.36	J					1	U				
PROPOXUR		1	U					1	U				
ROTENONE		1	U					1	U				

TETRA TECH

INTERNAL CORRESPONDENCE

C-NAVY-03-09-3074W

Date: March 2, 2009

c: File G00646-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Jennifer Cardinal (no copy) JC

Subject: Tier II Inorganic Data Validation, SDG CTO070-1
Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Arsenic/Lead/Zinc/Cyanide:

20/Soils/	SB-17-123-0001	SB-17-123-0104	SB-17-125-0001
	SB-17-125-0104	SB-17-125-0608	SB-17-126-0001
	SB-17-126-0104	SB-17-127-0306	SB-17-128-0506
	SB-17-129-0306	SB-17-130-0001	SB-17-130-0104
	SB-17-131-0001	SB-17-131-0104	SB-17-132-0001
	SB-17-132-0104	SB-17-133-0001	SB-17-133-0104
	SB-17-DUP01	SB-17-DUP04	

(Field Duplicate Pairs: SB-17-132-0104/SB-17-DUP01, SB-17-129-0306/SB-17-DUP04)

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the arsenic, lead, zinc, and cyanide analytical data from the samples collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine from October 14-15, 2008. Sample collection and analysis was performed according to the requirements of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The metals (arsenic, lead, and zinc) analysis was performed according to USEPA SW-846 Methods 6010B. The cyanide analysis was performed according to USEPA SW-846 M9012. The Tier II data validation was performed in accordance with the Region I EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part IV, Inorganic Data Validation Functional Guidelines, November 2008.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The analytical data in this SDG were evaluated based on the following parameters:

- Data Completeness
- * Holding Times
- * Calibration Verification
- Laboratory Blank Analyses
- * ICP Interference Check Sample Results
- * Matrix Spike/Matrix Spike Duplicate
- * Laboratory Duplicate Results

* • Laboratory Control Sample Results
• Field Duplicate Precision
* • ICP Serial Dilution Results
* • Percent Solids
• Reporting Limits

* All quality control criteria were met for this parameter.

Data Completeness

Metals

On February 24, 2009 the laboratory resubmitted all metals QC summary forms to report only arsenic, lead, and zinc as requested in the Work Plan and to report all results to the method detection limits.

Laboratory Blank Analyses

Metals

The following table summarizes the level of blank contamination detected in the laboratory blanks associated with the soil samples:

Analyte	Maximum Conc.	Action Level	Affected Samples
Arsenic	2.17 µg/L	1.09 mg/kg	SB-17-125-0608, SB-17-127-0306

The positive arsenic results below the blank action level were changed to non-detected values (U) at elevated reporting limits due to laboratory blank contamination.

The action level in the table above is based on an assumption of 100 percent solids, 1 g of sample analyzed, and a dilution factor of 1. The action level for each sample is different, based on the actual percent solids, amount of soil sample analyzed, and the dilution factor.

Arsenic contamination was found in the laboratory blank; therefore, the project sensitivity goals may be impacted since the elevated detection limits exceed the project action limit for arsenic. The non-detected arsenic results in the affected samples are usable as estimated reporting limits.

Field Duplicate Precision

Metals

The following table summarizes the analyte that recovered outside of the 50% RPD QC limit in the analysis of the field duplicate pair SB-17-129-0306/SB-17-DUP04:

Analyte	Sample Result	Duplicate Result	RPD	Action	
				(+)	NDs
Arsenic	2 mg/kg	8.7 mg/kg	125	J	

Additionally, the absolute difference of the arsenic results below 5xQL exceeded 4xQL for the field duplicate analysis of SB-17-129-0306/SB-17-DUP04.

The positive arsenic results are estimated (J) in the soil samples due to poor field duplicate precision. The results of the field duplicate analysis exceeded the QC limits for arsenic; therefore, the project precision goals may be impacted. The positive arsenic results in the affected soil samples are usable as estimated values for which the bias is indeterminate.

Reporting Limits

The positive results below than the laboratory's quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

Metals

The laboratory reported non-detected metals results down to the MDL.

The laboratory reporting limits met all project action limits with the following exception. The arsenic reporting limit for sample SB-17-129-0306 did not meet the project action limit due to the high moisture content of the sample. Data usability is not impacted since this arsenic result is positive.

Reporting limits were raised for arsenic in select samples due to blank contamination. As discussed above in the Laboratory Blank Analyses section, the project sensitivity goals may be impacted arsenic in samples SB-17-125-0608 and SB-17-127-0306.

Cyanide

The laboratory reported non-detected cyanide results down to the QL.

The laboratory reporting limits met the project action limit for cyanide for all samples.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity, and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Metals

The project goals with respect to precision were met for the metals data set with the following exception. Arsenic was qualified as estimated in all soil samples due to poor field duplicate precision. Although specific method criteria were not met in this instance, the affected positive results are usable as estimated values which may have a minor impact on data usability.

The project goals with respect to sensitivity were met for the metals data set with the following exceptions. The arsenic reporting limits were elevated for samples SB-17-125-0608 and SB-17-127-0306 due to blank actions. The elevated detection limits exceed the arsenic project action limit. Data usability may be impacted.

The project goals with respect to accuracy and completeness were met for the metals data set. Data usability is not impacted with regards to accuracy and completeness.

Cyanide

The project goals with respect to accuracy, precision, sensitivity, and completeness were met for the cyanide data set. Data usability is not impacted with regards to accuracy, precision, sensitivity, and completeness.

Tables: Data Validation Qualifiers and Codes
Data Summary Tables

Enclosures: Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	SB-17-123-0001			SB-17-123-0104			SB-17-125-0001			SB-17-125-0104		
SDG: CTO070-1	LAB_ID	SB5867-034			SB5867-035			SB5867-030			SB5867-031		
FRACTION: M	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	89.2			94.7			88.6			82.8		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		9.1	J	G	1.4	J	G	5.6	J	G	2.7	J	G
LEAD		5.7			1.8			23			7		
ZINC		32.7			10			40.8			24.2		

PROJ_NO: 02063	NSAMPLE	SB-17-125-0608			SB-17-126-0001			SB-17-126-0104			SB-17-127-0306		
SDG: CTO070-1	LAB_ID	SB5867-029			SB5867-025			SB5867-026			SB5867-023		
FRACTION: M	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	89.0			94.4			90.5			84.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		0.89	UJ	AG	3	J	G	1.6	J	G	0.99	UJ	AG
LEAD		1.9			20.6			2.5			2.1		
ZINC		13.6			38			15			10.3		

PROJ_NO: 02063	NSAMPLE	SB-17-128-0506			SB-17-129-0306			SB-17-130-0001			SB-17-130-0104		
SDG: CTO070-1	LAB_ID	SB5867-024			SB5867-032			SB5867-027			SB5867-028		
FRACTION: M	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	73.2			62.1			92.7			90.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		1.4	J	G	2	J	G	5.9	J	G	1.7	J	G
LEAD		3.6			4.7			23.8			4.4		
ZINC		21.6			17.5			46			12.6		

PROJ_NO: 02063	NSAMPLE	SB-17-131-0001			SB-17-131-0104			SB-17-132-0001			SB-17-132-0104		
SDG: CTO070-1	LAB_ID	SB5867-002			SB5867-003			SB5867-004			SB5867-005		
FRACTION: M	SAMP_DATE	10/14/2008			10/14/2008			10/14/2008			10/14/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	89.1			86.3			88.4			78.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		6.8	J	G	6	J	G	6.9	J	G	3.4	J	G
LEAD		37.5			6.2			12.3			12.6		
ZINC		47.7			25.5			34.4			27.8		

PROJ_NO: 02063	NSAMPLE	SB-17-133-0001			SB-17-133-0104			SB-17-DUP01			SB-17-DUP04		
SDG: CTO070-1	LAB_ID	SB5867-007			SB5867-008			SB5867-006			SB5867-033		
FRACTION: M	SAMP_DATE	10/14/2008			10/14/2008			10/14/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			FD			FD		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	82.0			79.8			78.1			60.3		
	DUP_OF							SB-17-132-0104			SB-17-129-0306		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		7.9	J	G	2	J	G	3.6	J	G	8.7	J	G
LEAD		16.6			4.1			12.8			4.3		
ZINC		36.1			13.7			29.6			20.2		

PROJ_NO: 02063	NSAMPLE	SB-17-123-0001			SB-17-123-0104			SB-17-125-0001			SB-17-125-0104		
SDG: CTO070-1	LAB_ID	SB5867-34			SB5867-35			SB5867-30			SB5867-31		
FRACTION: MISC	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	89.2			94.7			88.6			82.8		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.5	U		0.5	U		0.34	J	P	0.55	U	

PROJ_NO: 02063	NSAMPLE	SB-17-125-0608			SB-17-126-0001			SB-17-126-0104			SB-17-127-0306		
SDG: CTO070-1	LAB_ID	SB5867-29			SB5867-25			SB5867-26			SB5867-23		
FRACTION: MISC	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	89.0			94.4			90.5			84.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.5	U		0.5	U		0.5	U		0.65	U	

PROJ_NO: 02063	NSAMPLE	SB-17-128-0506			SB-17-129-0306			SB-17-130-0001			SB-17-130-0104		
SDG: CTO070-1	LAB_ID	SB5867-24			SB5867-32			SB5867-27			SB5867-28		
FRACTION: MISC	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	73.2			62.1			92.7			90.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.65	U		0.7	U		0.5	U		0.6		

PROJ_NO: 02063	NSAMPLE	SB-17-131-0001			SB-17-131-0104			SB-17-132-0001			SB-17-132-0104		
SDG: CTO070-1	LAB_ID	SB5867-2			SB5867-3			SB5867-4			SB5867-5		
FRACTION: MISC	SAMP_DATE	10/14/2008			10/14/2008			10/14/2008			10/14/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	89.1			86.3			88.4			78.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.5	U		0.55	U		0.55	U		0.6	U	

PROJ_NO: 02063	NSAMPLE	SB-17-133-0001			SB-17-133-0104			SB-17-DUP01			SB-17-DUP04		
SDG: CTO070-1	LAB_ID	SB5867-7			SB5867-8			SB5867-6			SB5867-33		
FRACTION: MISC	SAMP_DATE	10/14/2008			10/14/2008			10/14/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			FD			FD		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	82.0			79.8			78.1			60.3		
	DUP_OF							SB-17-132-0104			SB-17-129-0306		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.6	U		0.6	U		0.6	U		0.8	U	

TETRA TECH

INTERNAL CORRESPONDENCE

C-NAVY-02-09-3069W

Date: February 23, 2009

c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Jennifer Cardinal (no copy) JC

Subject: Tier II Organic Data Validation, SDG CTO070-1
Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Pesticides/Herbicides:

20/Soils/	SB-17-123-0001	SB-17-123-0104	SB-17-125-0001
	SB-17-125-0104	SB-17-125-0608	SB-17-126-0001
	SB-17-126-0104	SB-17-127-0306	SB-17-128-0506
	SB-17-129-0306	SB-17-130-0001	SB-17-130-0104
	SB-17-131-0001	SB-17-131-0104	SB-17-132-0001
	SB-17-132-0104	SB-17-133-0001	SB-17-133-0104
	SB-17-DUP01	SB-17-DUP04	

(Field Duplicate Pairs: SB-17-132-0104/SB-17-DUP01, SB-17-129-0306/SB-17-DUP04)

Pesticides:

14/Soils/	SB-17-134-0203	SB-17-135-0203	SB-17-136-0203
	SB-17-137-0203	SB-17-138-0203	SB-17-139-0203
	SB-17-140-0203	SB-17-141-0203	SB-17-142-0203
	SB-17-143-0203	SB-17-144-0203	SB-17-145-0203
	SB-17-DUP02	SB-17-DUP03	

(Field Duplicate Pairs: SB-17-142-0203/SB-17-DUP02, SB-17-134-0203/SB-17-DUP03)

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the pesticide and herbicide analytical data for the samples in this SDG. The samples were collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine from October 14-15, 2008. Sample collection and analysis was performed according to the requirements of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The pesticide and herbicide analyses were performed according to USEPA SW-846 Methods 8081 and 8151, respectively. The pesticides and herbicide validation was performed in accordance with the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Organic Analyses, Part III, February 2004.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The data were evaluated based on the following parameters:

- Data Completeness
- * Preservation and Technical Holding Times
- * Pesticide Degradation
- Initial and Continuing Calibrations
- Blanks
- * Surrogate Compounds
- Matrix Spike/Matrix Spike Duplicate
- Laboratory Control Sample/Laboratory Control Sample Duplicate
- * Field Duplicates
- Analyte Identification
- Reporting Limits

* All criteria were met for this parameter.

Data Completeness

The laboratory noted that the sample container for sample SB-17-134-0203 was labeled with the sampling time 12:30 while the chain-of-custody was labeled with the sampling time 12:35. Per TtNUS field sampler, J. Traut, the correct sampling time is 12:35.

The laboratory noted that the sample container for sample SB-17-DUP03 was labeled with the sample time 12:35 while the chain-of-custody was labeled with the sample time 12:40. Per TtNUS field sampler, J. Traut, the correct sampling time is 12:40.

The herbicide analysis was canceled for select samples as noted by the TtNUS field sampler, J. Traut, on the chain-of-custody forms on October 16, 2008.

The laboratory was contacted regarding the initial calibration verification (ICV) summary forms for the DRO, pesticides, and herbicides analyses. On February 19, 2009 the laboratory explained that the ICV results are reported with the calibration verification forms.

Initial and Continuing Calibrations

Pesticides

The following table summarizes the pesticide compounds that failed to meet the continuing calibration (CC) criterion of %D <25:

Compound	%D Range	Action		Affected Samples
		(+)	NDs	
4,4'-DDT	-52.00 to -47.40	J		SB-17-138-0203(DL), SB-17-144-0203(DL)
4,4'-DDD	25.20 to 94.80	J	UJ	SB-17-140-0203, SB-17-142-0203, SB-17-DUP02, SB-17-139-0203, SB-17-127-0306, SB-17-128-0506, SB-17-126-0001, SB-17-126-0104, SB-17-130-0001

Although the %D was outside of the QC limits for 4,4'-DDT and 4,4'-DDD; the project accuracy goals were not impacted since the instrument calibration variability is below safety margin of greater than 100% allocated for these compounds in the soil samples. The positive and non-detected results in the affected samples are usable as estimated values and estimated quantitation limits.

Blanks

Pesticides

The following table summarizes the level of blank contamination detected in the laboratory blank associated with the samples.

Compound	Type of Blank	Maximum Conc. (µg/Kg)	Action Level (µg/Kg)	Affected Samples
4,4'-DDD	Method	1.7	8.5	SB-17-125-0608, SB-17-131-0104, SB-17-132-0104, SB-17-136-0203, SB-17-139-0203, SB-17-140-0203, SB-17-144-0203, SB-17-145-0203, SB-17-DUP01
4,4'-DDT	Method	9.4	47	SB-17-123-0001, SB-17-127-0306, SB-17-129-0306, SB-17-130-0104, SB-17-133-0104, SB-17-137-0203, SB-17-141-0203, SB-17-142-0203, SB-17-143-0203, SB-17-DUP02, SB-17-DUP04, SB-17-126-0004, SB-17-130-0001, SB-17-132-0001, SB-17-132-0104, SB-17-133-0001, SB-17-134-0203, SB-17-140-0203, SB-17-DUP01, SB-17-DUP03

Blank actions were applied to the affected samples due to 4,4'-DDT and 4,4'-DDD method blank contamination. The 5x rule applies for these pesticide compounds. The positive results for 4,4'-DDT and 4,4'-DDD in the affected samples were changed to non-detected values at the sample-specific project quantitation limit or at elevated quantitation limits.

Although 4,4'-DDT and 4,4'-DDD contamination was found in the laboratory method blank, the project sensitivity goals are not impacted since the non-detected values do not exceed the project action limits for these compounds. The 4,4'-DDT and 4,4'-DDD results in the affected samples are usable as non-detected values.

Matrix Spike/Matrix Spike Duplicates

Pesticides

The following table summarizes the results of the matrix spike and/or matrix spike duplicate (MS/MSD) analysis of sample SB-17-135-0203 that were outside of the QC limits:

Analyte	% Rec.	QC Limits	Action	
			(+)	NDs
Heptachlor	58	59-118	J	
4,4'-DDE	36	69-120	J	
Endosulfan I	56	58-108		UJ
4,4'-DDD	56, 36	61-127	J	

The percent recovery criteria were not met for heptachlor, 4,4'-DDE, endosulfan I, and 4,4'-DDD; therefore, the project accuracy goals may be impacted. The affected positive and non-detected results in sample SB-17-135-0203 are usable as estimated values and estimated quantitation limits which may be biased low

The following table summarizes the results of the matrix spike and/or matrix spike duplicate (MS/MSD) analysis of sample SB-17-125-0104 that were outside of the QC limits:

Analyte	% Rec.	QC Limits	Action	
			(+)	NDs
Alpha-chlordane	8, 36	64-121	J	
4,4'-DDD	20	61-127	J	

The percent recovery criteria were not met for alpha-chlordane and 4,4'-DDD; therefore, the project accuracy goals may be impacted. The affected positive results in sample SB-17-125-0104 are usable as estimated values which may be biased low

Laboratory Control Sample/Laboratory Control Sample Duplicates

Pesticides

The following table summarizes the pesticide compound that failed to meet the LCS recovery limits:

Compound	% Rec.	QC Limits	Action		Affected Samples
			(+)	NDs	
Gamma-BHC	65	67-116	J	UJ	SB-17-133-0001, SB-17-133-0104, SB-17-137-0203, SB-17-141-0203, SB-17-145-0203, SB-17-144-0203, SB-17-134-0203, SB-17-DUP03, SB-17-138-0203, SB-17-143-0203
4,4'-DDE	65	69-120	J	UJ	
Endosulfan I	43	58-108		UJ	
Endosulfan II	54	63-116		UJ	
Endrin	57	63-118		UJ	

The laboratory control sample recovery criteria were not met for gamma-BHC, 4,4'-DDE, endosulfan I, endosulfan II, and endrin; therefore, the project accuracy goals may be impacted. The positive and non-detected gamma-BHC, 4,4'-DDE, endosulfan I, endosulfan II results in the affected samples are usable as estimated values and estimated quantitation limits which may be biased low.

Analyte Identification/Quantitation

Pesticides

The relative percent difference (RPD) between the results of analytical columns 1 and 2 exceeded the 40% RPD QC criterion for the compounds in the following samples:

Sample	Analyte	RPD	Action (+)
SB-17-131-0001	Heptachlor	41.5	J
SB-17-131-0104	Gamma-chlordane	63.1	J
SB-17-138-0203	4,4'-DDD	79.3	J
	Alpha-chlordane	40.5	J
SB-17-136-0203	Alpha-chlordane	41.5	J
	4,4'-DDD	55.1	J
SB-17-135-0203	4,4'-DDD	48.4	J
SB-17-127-0306	Gamma-chlordane	44.3	J
SB-17-126-0001	Gamma-chlordane	50.4	J
	Alpha-chlordane	49.1	J
SB-17-125-0104	Alpha-chlordane	55.0	J
SB-17-123-0104	Alpha-chlordane	40.5	J

The analyte quantitation relative percent differences exceeded the 40% RPD QC limit for the compounds in the samples listed above; therefore, the project accuracy goals may be impacted. The affected results in these samples are usable as estimated values.

Reporting Limits

All positive results below the quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

Herbicides

The project action limit for 2,4-D was not met due to the percent moisture of the samples. Data usability may be impacted.

Pesticides

Project action limits were not achievable for all pesticides except for 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, methoxychlor, and toxaphene as highlighted in SAP Worksheet 15a of the Remedial Investigation Work

Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008. Data usability may be impacted.

The reporting limits were raised for 4,4'-DDT and 4,4'-DDD in select samples due to blank contamination. As discussed in the Blanks section, the project sensitivity goals are not impacted.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Pesticides

The project goals with respect to accuracy were met for the pesticides data set with the following exceptions. Heptachlor, 4,4'-DDE, endosulfan I, and 4,4'-DDD were qualified as estimated in sample SB-17-135-0203 due to low MS/MSD recoveries; the affected results may be biased low. Alpha-chlordane and 4,4'-DDD were qualified as estimated in sample SB-17-125-0104 due to low MS/MSD recoveries; the affected results may be biased low. Gamma-BHC, 4,4'-DDE, endosulfan I, endosulfan II, and endrin were qualified as estimated in select samples due to low LCS recoveries; the affected results may be biased low. Select compounds were qualified as estimated in some samples due to analytical interferences detected in the dual column analysis. Although specific method criteria were not met in these instances, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability. Additionally, 4,4'-DDT and 4,4'-DDD were qualified as estimated in select samples due to instrument calibration variability. Although specific method criteria were not met in these instances, data usability is not impacted and the affected positive and non-detected results are usable as estimated values and estimated quantitation limits.

The project goals with respect to sensitivity were met for the pesticides data set with the following exception. Project action limits were not achievable for all pesticides except for 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, methoxychlor, and toxaphene. Data usability may be impacted.

The project goals with respect to precision and completeness were met for the pesticides data set. Data usability was not impacted with regards to precision and completeness.

Herbicides

The project goals with respect to sensitivity were not met for 2,4-D was not met due to the percent moisture of the samples. Data usability may be impacted.

The project goals with respect to accuracy, precision, and completeness were met for the herbicides data set. Data usability was not impacted with regards to accuracy, precision, and completeness.

Tables: Data Validation Qualifiers and Codes
Data Summary Tables

Enclosures: Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	SB-17-123-0001			SB-17-123-0104			SB-17-123-0104DL			SB-17-125-0001		
SDG: CTO070-1	LAB_ID	SB5867-34RA3			SB5867-35DL2			SB5867-35DL			SB5867-30DL2		
FRACTION: PEST/PCB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	89.2			94.7			94.7			88.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		3.7	U		20						53		
4,4'-DDE		3.7	U		49						250		
4,4'-DDT		3.7	U	A				530					
ALDRIN		1.9	U		9	U					9.6	U	
ALPHA-BHC		1.9	U		9	U					9.6	U	
ALPHA-CHLORDANE		0.8	J	P	200	J	U				100		
BETA-BHC		1.9	U		9	U					9.6	U	
DELTA-BHC		1.9	U		9	U					9.6	U	
DIELDRIN		3.7	U		17	U					19	U	
ENDOSULFAN I		1.9	U		9	U					9.6	U	
ENDOSULFAN II		3.7	U		17	U					19	U	
ENDOSULFAN SULFATE		3.7	U		17	U					19	U	
ENDRIN		3.7	U		17	U					19	U	
ENDRIN ALDEHYDE		3.7	U		17	U					19	U	
ENDRIN KETONE		3.7	U		17	U					19	U	
GAMMA-BHC (LINDANE)		1.9	U		9	U					9.6	U	
GAMMA-CHLORDANE		1	J	P	280						130		
HEPTACHLOR		1.9	U		11						9.6	U	
HEPTACHLOR EPOXIDE		1.9	U		9	U					9.6	U	
METHOXYCHLOR		19	U		90	U					96	U	
TOXAPHENE		37	U		170	U					190	U	

PROJ_NO: 02063	NSAMPLE	SB-17-125-0001DL			SB-17-125-0104			SB-17-125-0104DL			SB-17-125-0608		
SDG: CTO070-1	LAB_ID	SB5867-30DL			SB5867-31RA			SB5867-31DL			SB5867-29RA		
FRACTION: PEST/PCB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	88.6			82.8			82.8			89.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD					39	J	D				3.7	U	A
4,4'-DDE					67						3.7	U	
4,4'-DDT		1200						390			52		
ALDRIN					2	U					1.9	U	
ALPHA-BHC					2	U					1.9	U	
ALPHA-CHLORDANE					32	J	DU				1.9	U	
BETA-BHC					2	U					1.9	U	
DELTA-BHC					2	U					1.9	U	
DIELDRIN					4	U					3.7	U	
ENDOSULFAN I					2	U					1.9	U	
ENDOSULFAN II					4	U					3.7	U	
ENDOSULFAN SULFATE					4	U					3.7	U	
ENDRIN					4	U					3.7	U	
ENDRIN ALDEHYDE					4	U					3.7	U	
ENDRIN KETONE					4	U					3.7	U	
GAMMA-BHC (LINDANE)					2	U					1.9	U	
GAMMA-CHLORDANE					2	U					1.9	U	
HEPTACHLOR					2	U					1.9	U	
HEPTACHLOR EPOXIDE					2	U					1.9	U	
METHOXYCHLOR					20	U					19	U	
TOXAPHENE					40	U					37	U	

PROJ_NO: 02063	NSAMPLE	SB-17-126-0001			SB-17-126-0001DL			SB-17-126-0104			SB-17-127-0306		
SDG: CTO070-1	LAB_ID	SB5867-25			SB5867-25DL			SB5867-26			SB5867-23		
FRACTION: PEST/PCB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.4			94.4			90.5			84.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		3.5	UJ	C				3.6	UJ	C	3.9	UJ	C
4,4'-DDE		19						3.6	U		3.9	U	
4,4'-DDT					110			4.8	U	A	3.9	U	A
ALDRIN		1.8	U					1.9	U		2	U	
ALPHA-BHC		1.8	U					1.9	U		2	U	
ALPHA-CHLORDANE		13	J	U				1.9	U		3.5		
BETA-BHC		1.8	U					1.9	U		2	U	
DELTA-BHC		1.8	U					1.9	U		2	U	
DIELDRIN		3.5	U					3.6	U		3.9	U	
ENDOSULFAN I		1.8	U					1.9	U		2	U	
ENDOSULFAN II		3.5	U					3.6	U		3.9	U	
ENDOSULFAN SULFATE		3.5	U					3.6	U		3.9	U	
ENDRIN		3.5	U					3.6	U		3.9	U	
ENDRIN ALDEHYDE		3.5	U					3.6	U		3.9	U	
ENDRIN KETONE		3.5	U					3.6	U		3.9	U	
GAMMA-BHC (LINDANE)		1.8	U					1.9	U		2	U	
GAMMA-CHLORDANE		17	J	U				1.9	U		3.8	J	U
HEPTACHLOR		1.8	U					1.9	U		2	U	
HEPTACHLOR EPOXIDE		1.8	U					1.9	U		2	U	
METHOXYCHLOR		18	U					19	U		20	U	
TOXAPHENE		35	U					36	U		39	U	

PROJ_NO: 02063	NSAMPLE	SB-17-128-0506			SB-17-129-0306			SB-17-130-0001			SB-17-130-0104		
SDG: CTO070-1	LAB_ID	SB5867-24			SB5867-32RA			SB5867-27			SB5867-28RA		
FRACTION: PEST/PCB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	73.2			62.1			92.7			90.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		4.5	UJ	C	5.3	U		3.6	UJ	C	3.6	U	
4,4'-DDE		4.5	U		5.3	U		4.6			3.6	U	
4,4'-DDT		4.5	U		5.3	U	A	26	U	A	3.6	U	A
ALDRIN		2.3	U		2.7	U		1.8	U		1.9	U	
ALPHA-BHC		2.3	U		2.7	U		1.8	U		1.9	U	
ALPHA-CHLORDANE		2.3	U		2.7	U		0.99	J	P	1.9	U	
BETA-BHC		2.3	U		2.7	U		1.8	U		1.9	U	
DELTA-BHC		2.3	U		2.7	U		1.8	U		1.9	U	
DIELDRIN		4.5	U		5.3	U		3.6	U		3.6	U	
ENDOSULFAN I		2.3	U		2.7	U		1.8	U		1.9	U	
ENDOSULFAN II		4.5	U		5.3	U		3.6	U		3.6	U	
ENDOSULFAN SULFATE		4.5	U		5.3	U		3.6	U		3.6	U	
ENDRIN		4.5	U		5.3	U		3.6	U		3.6	U	
ENDRIN ALDEHYDE		4.5	U		5.3	U		3.6	U		3.6	U	
ENDRIN KETONE		4.5	U		5.3	U		3.6	U		3.6	U	
GAMMA-BHC (LINDANE)		2.3	U		2.7	U		1.8	U		1.9	U	
GAMMA-CHLORDANE		1.1	J	P	2.7	U		1.8	U		1.9	U	
HEPTACHLOR		2.3	U		2.7	U		1.8	U		1.9	U	
HEPTACHLOR EPOXIDE		2.3	U		2.7	U		1.8	U		1.9	U	
METHOXYCHLOR		23	U		27	U		18	U		19	U	
TOXAPHENE		45	U		53	U		36	U		36	U	

PROJ_NO: 02063 SDG: CTO070-1 FRACTION: PEST/PCB MEDIA: SOIL	NSAMPLE	SB-17-131-0001			SB-17-131-0104			SB-17-132-0001			SB-17-132-0104		
	LAB_ID	SB5867-2RA2			SB5867-3RA			SB5867-4RA			SB5867-5RA		
	SAMP_DATE	10/14/2008			10/14/2008			10/14/2008			10/14/2008		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	89.1			86.3			88.4			78.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		3.7	U		3.8	U	A	3.7	U		4.2	U	A
4,4'-DDE		34			8.4			3.4	J	P	12		
4,4'-DDT		77			47			5.4	U	A	11	U	A
ALDRIN		1.9	U		2	U		1.9	U		2.2	U	
ALPHA-BHC		1.9	U		2	U		1.9	U		2.2	U	
ALPHA-CHLORDANE		1.9	U		0.78	J	P	1.9	U		2.2	U	
BETA-BHC		1.9	U		2	U		1.9	U		2.2	U	
DELTA-BHC		1.9	U		2	U		1.9	U		2.2	U	
DIELDRIN		3.7	U		3.8	U		3.7	U		4.2	U	
ENDOSULFAN I		1.9	U		2	U		1.9	U		2.2	U	
ENDOSULFAN II		3.7	U		3.8	U		3.7	U		4.2	U	
ENDOSULFAN SULFATE		3.7	U		3.8	U		3.7	U		4.2	U	
ENDRIN		3.7	U		3.8	U		3.7	U		4.2	U	
ENDRIN ALDEHYDE		3.7	U		3.8	U		3.7	U		4.2	U	
ENDRIN KETONE		3.7	U		3.8	U		3.7	U		4.2	U	
GAMMA-BHC (LINDANE)		1.9	U		2	U		1.9	U		2.2	U	
GAMMA-CHLORDANE		1.9	U		1	J	PU	1.9	U		2.2	U	
HEPTACHLOR		1	J	PU	2	U		1.9	U		2.2	U	
HEPTACHLOR EPOXIDE		1.9	U		2	U		1.9	U		2.2	U	
METHOXYCHLOR		19	U		20	U		19	U		22	U	
TOXAPHENE		37	U		38	U		37	U		42	U	

PROJ_NO: 02063	NSAMPLE	SB-17-133-0001			SB-17-133-0104			SB-17-134-0203			SB-17-135-0203		
SDG: CTO070-1	LAB_ID	SB5867-7			SB5867-8			SB5867-13			SB5867-18		
FRACTION: PEST/PCB	SAMP_DATE	10/14/2008			10/14/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	82.0			79.8			90.7			87.5		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		4	U		4.1	U		3.6	U		20	J	DU
4,4'-DDE		33	J	E	1.8	J	EP	0.96	J	EP	27	J	D
4,4'-DDT		31	U	A	4.1	U	A	7.6	U	A			
ALDRIN		2.1	U		2.1	U		1.9	U		1.9	U	
ALPHA-BHC		2.1	U		2.1	U		1.9	U		1.9	U	
ALPHA-CHLORDANE		2.1	U		2.1	U		4.3					
BETA-BHC		2.1	U		2.1	U		1.9	U		1.9	U	
DELTA-BHC		2.1	U		2.1	U		1.9	U		1.9	U	
DIELDRIN		4	U		4.1	U		3.6	U		3.8	U	
ENDOSULFAN I		2.1	UJ	E	2.1	UJ	E	1.9	UJ	E	1.9	UJ	D
ENDOSULFAN II		4	UJ	E	4.1	UJ	E	3.6	UJ	E	3.8	U	
ENDOSULFAN SULFATE		4	U		4.1	U		3.6	U		3.8	U	
ENDRIN		4	UJ	E	4.1	UJ	E	3.6	UJ	E	3.8	U	
ENDRIN ALDEHYDE		4	U		4.1	U		3.6	U		3.8	U	
ENDRIN KETONE		4	U		4.1	U		3.6	U		3.8	U	
GAMMA-BHC (LINDANE)		1.5	J	EP	2.1	UJ	E	1.9	UJ	E	1.9	U	
GAMMA-CHLORDANE		2.1	U		2.1	U		5.9					
HEPTACHLOR		2.1	U		2.1	U		1.9	U		12	J	D
HEPTACHLOR EPOXIDE		2.1	U		2.1	U		1.9	U		1.9	U	
METHOXYCHLOR		21	U		21	U		19	U		19	U	
TOXAPHENE		40	U		41	U		36	U		38	U	

PROJ_NO: 02063	NSAMPLE	SB-17-135-0203DL			SB-17-136-0203			SB-17-137-0203			SB-17-138-0203		
SDG: CTO070-1	LAB_ID	SB5867-18DL			SB5867-17			SB5867-9			SB5867-15		
FRACTION: PEST/PCB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	87.5			87.6			82.0			90.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD					3.8	UJ	AU	4	U		9.8	J	U
4,4'-DDE					11			4	UJ	E	50	J	E
4,4'-DDT		490			60			4	U	A			
ALDRIN					1.9	U		2.1	U		1.9	U	
ALPHA-BHC					1.9	U		2.1	U		1.9	U	
ALPHA-CHLORDANE		94			7.6	J	U	2.1	U		52	J	U
BETA-BHC					1.9	U		2.1	U		1.9	U	
DELTA-BHC					1.9	U		2.1	U		1.9	U	
DIELDRIN					3.8	U		4	U		3.6	U	
ENDOSULFAN I					1.9	U		2.1	UJ	E	1.9	UJ	E
ENDOSULFAN II					3.8	U		4	UJ	E	3.6	UJ	E
ENDOSULFAN SULFATE					3.8	U		4	U		3.6	U	
ENDRIN					3.8	U		4	UJ	E	3.6	UJ	E
ENDRIN ALDEHYDE					3.8	U		4	U		3.6	U	
ENDRIN KETONE					3.8	U		4	U		3.6	U	
GAMMA-BHC (LINDANE)					1.9	U		2.1	UJ	E	1.9	UJ	E
GAMMA-CHLORDANE		120			10			2.1	U		65		
HEPTACHLOR					1.9	U		2.1	U		1.9	U	
HEPTACHLOR EPOXIDE					1.9	U		2.1	U		1.9	U	
METHOXYCHLOR					19	U		21	U		19	U	
TOXAPHENE					38	U		40	U		36	U	

PROJ_NO: 02063	NSAMPLE	SB-17-138-0203DL			SB-17-139-0203			SB-17-140-0203			SB-17-141-0203		
SDG: CTO070-1	LAB_ID	SB5867-15DL			SB5867-22			SB5867-19			SB5867-10		
FRACTION: PEST/PCB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	90.2			90.2			89.0			88.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD					3.6	UJ	AC	3.7	UJ	AC	3.7	U	
4,4'-DDE					7.3			2.5	J	P	0.8	J	EP
4,4'-DDT		120	J	C	56			29	U	A	3.7	U	A
ALDRIN					1.9	U		1.9	U		1.9	U	
ALPHA-BHC					1.9	U		1.9	U		1.9	U	
ALPHA-CHLORDANE					44			3.9			1.9	U	
BETA-BHC					1.9	U		1.9	U		1.9	U	
DELTA-BHC					1.9	U		1.9	U		1.9	U	
DIELDRIN					3.6	U		3.7	U		3.7	U	
ENDOSULFAN I					1.9	U		1.9	U		1.9	UJ	E
ENDOSULFAN II					3.6	U		3.7	U		3.7	UJ	E
ENDOSULFAN SULFATE					3.6	U		3.7	U		3.7	U	
ENDRIN					3.6	U		3.7	U		3.7	UJ	E
ENDRIN ALDEHYDE					3.6	U		3.7	U		3.7	U	
ENDRIN KETONE					3.6	U		3.7	U		3.7	U	
GAMMA-BHC (LINDANE)					1.9	U		1.9	U		1.9	UJ	E
GAMMA-CHLORDANE					52			4.9			1.9	U	
HEPTACHLOR					4.7			1.1	J	P	1.9	U	
HEPTACHLOR EPOXIDE					1.9	U		1.9	U		1.9	U	
METHOXYCHLOR					19	U		19	U		19	U	
TOXAPHENE					36	U		37	U		37	U	

PROJ_NO: 02063	NSAMPLE	SB-17-142-0203			SB-17-143-0203			SB-17-144-0203			SB-17-144-0203DL		
SDG: CTO070-1	LAB_ID	SB5867-20			SB5867-16			SB5867-12			SB5867-12DLRA		
FRACTION: PEST/PCB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	89.9			90.5			87.6			87.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		3.7	UJ	C	3.6	U		3.8	U	A			
4,4'-DDE		3.7	U		3.6	UJ	E	13	J	E			
4,4'-DDT		3.7	U	A	3.6	U	A				82	J	C
ALDRIN		1.9	U		1.9	U		1.9	U				
ALPHA-BHC		1.9	U		1.9	U		1.9	U				
ALPHA-CHLORDANE		1.9	U		1.9	U		14					
BETA-BHC		1.9	U		1.9	U		1.9	U				
DELTA-BHC		1.9	U		1.9	U		1.9	U				
DIELDRIN		3.7	U		3.6	U		3.8	U				
ENDOSULFAN I		1.9	U		1.9	UJ	E	1.9	UJ	E			
ENDOSULFAN II		3.7	U		3.6	UJ	E	3.8	UJ	E			
ENDOSULFAN SULFATE		3.7	U		3.6	U		3.8	U				
ENDRIN		3.7	U		3.6	UJ	E	3.8	UJ	E			
ENDRIN ALDEHYDE		3.7	U		3.6	U		3.8	U				
ENDRIN KETONE		3.7	U		3.6	U		3.8	U				
GAMMA-BHC (LINDANE)		1.9	U		1.9	UJ	E	1.9	UJ	E			
GAMMA-CHLORDANE		1.9	U		1.9	U		17					
HEPTACHLOR		1.9	U		1.9	U		1.9	U				
HEPTACHLOR EPOXIDE		1.9	U		1.9	U		1.9	U				
METHOXYCHLOR		19	U		19	U		19	U				
TOXAPHENE		37	U		36	U		38	U				

PROJ_NO: 02063	NSAMPLE	SB-17-145-0203			SB-17-DUP01			SB-17-DUP02			SB-17-DUP03		
SDG: CTO070-1	LAB_ID	SB5867-11			SB5867-6RA			SB5867-21			SB5867-14		
FRACTION: PEST/PCB	SAMP_DATE	10/15/2008			10/14/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			FD			FD			FD		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	90.5			78.1			90.8			91.1		
	DUP_OF				SB-17-132-0104			SB-17-142-0203			SB-17-134-0203		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		3.6	U	A	4.2	U	A	3.6	UJ	C	3.6	U	
4,4'-DDE		8.9	J	E	9.9			3.6	U		0.95	J	EP
4,4'-DDT		64			15	U	A	3.6	U	A	7.5	U	A
ALDRIN		1.9	U		2.2	U		1.9	U		1.9	U	
ALPHA-BHC		1.9	U		2.2	U		1.9	U		1.9	U	
ALPHA-CHLORDANE		11			2.2	U		1.9	U		4.9		
BETA-BHC		1.9	U		2.2	U		1.9	U		1.9	U	
DELTA-BHC		1.9	U		2.2	U		1.9	U		1.9	U	
DIELDRIN		3.6	U		4.2	U		3.6	U		3.6	U	
ENDOSULFAN I		1.9	UJ	E	2.2	U		1.9	U		1.9	UJ	E
ENDOSULFAN II		3.6	UJ	E	4.2	U		3.6	U		3.6	UJ	E
ENDOSULFAN SULFATE		3.6	U		4.2	U		3.6	U		3.6	U	
ENDRIN		3.6	UJ	E	4.2	U		3.6	U		3.6	UJ	E
ENDRIN ALDEHYDE		3.6	U		4.2	U		3.6	U		3.6	U	
ENDRIN KETONE		3.6	U		4.2	U		3.6	U		3.6	U	
GAMMA-BHC (LINDANE)		1.9	UJ	E	2.2	U		1.9	U		1.9	UJ	E
GAMMA-CHLORDANE		10			2.2	U		1.9	U		7.2		
HEPTACHLOR		1.9	U		2.2	U		1.9	U		1.9	U	
HEPTACHLOR EPOXIDE		1.9	U		2.2	U		1.9	U		1.9	U	
METHOXYCHLOR		19	U		22	U		19	U		19	U	
TOXAPHENE		36	U		42	U		36	U		36	U	

PROJ_NO: 02063	NSAMPLE	SB-17-DUP04		
SDG: CTO070-1	LAB_ID	SB5867-33RA		
FRACTION: PEST/PCB	SAMP_DATE	10/15/2008		
MEDIA: SOIL	QC_TYPE	FD		
	UNITS	UG/KG		
	PCT_SOLIDS	60.3		
	DUP_OF	SB-17-129-0306		
PARAMETER		RESULT	VQL	QLCD
4,4'-DDD		5.5	U	
4,4'-DDE		5.5	U	
4,4'-DDT		5.5	U	A
ALDRIN		2.8	U	
ALPHA-BHC		2.8	U	
ALPHA-CHLORDANE		2.8	U	
BETA-BHC		2.8	U	
DELTA-BHC		2.8	U	
DIELDRIN		5.5	U	
ENDOSULFAN I		2.8	U	
ENDOSULFAN II		5.5	U	
ENDOSULFAN SULFATE		5.5	U	
ENDRIN		5.5	U	
ENDRIN ALDEHYDE		5.5	U	
ENDRIN KETONE		5.5	U	
GAMMA-BHC (LINDANE)		2.8	U	
GAMMA-CHLORDANE		2.8	U	
HEPTACHLOR		2.8	U	
HEPTACHLOR EPOXIDE		2.8	U	
METHOXYCHLOR		28	U	
TOXAPHENE		55	U	

PROJ_NO: 02063	NSAMPLE	SB-17-123-0001			SB-17-123-0104			SB-17-125-0001			SB-17-125-0104		
SDG: CTO070-1	LAB_ID	SB5867-34			SB5867-35			SB5867-30			SB5867-31		
FRACTION: HERB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	89.2			94.7			88.6			82.8		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		37	U		35	U		37	U		40	U	
2,4-D		37	U		35	U		37	U		40	U	

PROJ_NO: 02063	NSAMPLE	SB-17-125-0608			SB-17-126-0001			SB-17-126-0104			SB-17-127-0306		
SDG: CTO070-1	LAB_ID	SB5867-29			SB5867-25			SB5867-26			SB5867-23		
FRACTION: HERB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	89.0			94.4			90.5			84.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		37	U		35	U		36	U		39	U	
2,4-D		37	U		35	U		36	U		39	U	

PROJ_NO: 02063	NSAMPLE	SB-17-128-0506			SB-17-129-0306			SB-17-130-0001			SB-17-130-0104		
SDG: CTO070-1	LAB_ID	SB5867-24			SB5867-32			SB5867-27			SB5867-28		
FRACTION: HERB	SAMP_DATE	10/15/2008			10/15/2008			10/15/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	73.2			62.1			92.7			90.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		45	U		53	U		36	U		36	U	
2,4-D		45	U		53	U		36	U		36	U	

PROJ_NO: 02063	NSAMPLE	SB-17-131-0001			SB-17-131-0104			SB-17-132-0001			SB-17-132-0104		
SDG: CTO070-1	LAB_ID	SB5867-2			SB5867-3			SB5867-4			SB5867-5		
FRACTION: HERB	SAMP_DATE	10/14/2008			10/14/2008			10/14/2008			10/14/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	89.1			86.3			88.4			78.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		37	U		38	U		37	U		42	U	
2,4-D		37	U		38	U		37	U		42	U	

PROJ_NO: 02063	NSAMPLE	SB-17-133-0001			SB-17-133-0104			SB-17-DUP01			SB-17-DUP04		
SDG: CTO070-1	LAB_ID	SB5867-7			SB5867-8			SB5867-6			SB5867-33		
FRACTION: HERB	SAMP_DATE	10/14/2008			10/14/2008			10/14/2008			10/15/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			FD			FD		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	82.0			79.8			78.1			60.3		
	DUP_OF							SB-17-132-0104			SB-17-129-0306		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		40	U		41	U		42	U		55	U	
2,4-D		40	U		41	U		42	U		55	U	

TETRA TECH

INTERNAL CORRESPONDENCE

C-NAVY-02-09-3073W

Date: February 27, 2009

c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Jennifer Cardinal (no copy) JC

Subject: Tier II Inorganic Data Validation, SDG CTO070-2
Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Arsenic/Lead/Zinc/Cyanide:

28/Soils/	SB-17-101-0001	SB-17-101-0104	SB-17-102-0001
	SB-17-102-0104	SB-17-103-0001	SB-17-103-0104
	SB-17-104-0001	SB-17-104-0104	SB-17-106-0001
	SB-17-106-0104	SB-17-109-0001	SB-17-109-0104
	SB-17-110-0104	SB-17-114-0001	SB-17-114-0104
	SB-17-115-0710	SB-17-116-0407	SB-17-117-0104
	SB-17-119-0104	SB-17-120-0205	SB-17-121-0205
	SB-17-121-0710	SB-17-121-1215	SB-17-122-0407
	SB-17-124-0001	SB-17-124-0104	SB-17-DUP05
	SB-17-DUP06		
	(Field Duplicate Pairs: SB-17-120-0205/SB-17-DUP05, SB-17-122-0407/SB-17-DUP06)		
1/Source Blank/	SWB-17-01		
4/Rinsate Blanks/	SB-17-RB01	SB-17-RB02	SB-17-RB03
	SB-17-RB04		

TOC:

3/Soils/	SB-17-115-0710	SB-17-120-0205	SB-17-DUP05
	(Field Duplicate Pair: SB-17-120-0205/SB-17-DUP05)		

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the arsenic, lead, zinc, cyanide, and total organic carbon (TOC) analytical data from the samples collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine from October 16-17, 2008. Sample collection and analysis was performed according to the requirements of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The metals (arsenic, lead, and zinc) analysis was performed according to USEPA SW-846 Method 6010B. The cyanide analysis was performed according to USEPA SW-846 Method 9012M. The TOC analysis was performed according to USEPA SW-846 Method 9060M. The Tier II data validation was performed in accordance with the Region I EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part IV, Inorganic Data Validation Functional Guidelines, November 2008.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The analytical data from this SDG were evaluated based on the following parameters:

- Data Completeness
- * Holding Times
- * Calibration Verification
- Laboratory Blank Analyses
- * ICP Interference Check Sample Results
- Matrix Spike/Matrix Spike Duplicate
- * Laboratory Duplicate Results
- * Laboratory Control Sample Results
- * Field Duplicate Precision
- * ICP Serial Dilution Results
- * Percent Solids
- Reporting Limits

* All quality control criteria were met for this parameter.

Data Completeness

The laboratory incorrectly transcribed the ID for sample SWB-17-01 as SB-17-01. The data summary tables have the correct ID for the affected sample.

Metals

On February 24, 2009 the laboratory resubmitted all metals QC summary forms to report only arsenic, lead, and zinc as requested in the Work Plan and to report all results to the method detection limits.

Laboratory Blank Analyses

The rinsate and source water blanks were not used to establish blank action levels for the samples in this SDG.

Metals

The following table summarizes the level of blank contamination detected in the laboratory blanks associated with the aqueous samples:

Analyte	Maximum Conc. (µg/L)	Action Level (µg/L)	Affected Samples
Lead	1.52	7.6	SWB-17-01

The positive lead result below the blank action level in sample SWB-17-01 was changed to a non-detected value (U) at an elevated reporting limit due to laboratory blank contamination.

Although lead was found in the laboratory blanks, the project sensitivity goals are not impacted since there are no regulatory limits established for the source water blank sample. The lead result in the affected sample is usable as a non-detected value.

Matrix Spike/Matrix Spike Duplicate

TOC

The following table summarizes the result in the matrix spike analysis of sample SB-17-115-0710 which was outside of the 75-125% recovery criteria:

Analyte	%Recovery	Action	
		(+)	NDs
TOC	139, 140	J	

The positive TOC results are estimated (J) in samples SB-17-115-0710, SB-17-120-0205, and SB-DUP05 due to high matrix spike recoveries.

Although the recovery of TOC was above the matrix spike recovery criterion, the project accuracy goals are not impacted since there are no regulatory limits established for TOC for the soil samples. The positive TOC results in the affected samples are usable as estimated values which may be biased high.

Reporting Limits

The positive results below than the laboratory's quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

Metals

The laboratory reported non-detected metals results down to the MDL.

The laboratory reporting limits met all project action limits with the following exception. The arsenic project action limit was not achieved for the aqueous samples. Data usability may be impacted.

A reporting limit was raised for lead in sample SWB-17-01 due to blank contamination. As discussed above in the Laboratory Blank Analyses section, the project sensitivity goals are not impacted.

Cyanide

The laboratory reported non-detected cyanide results down the QL.

The cyanide project action limit was not achieved for the aqueous samples. Data usability may be impacted.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity, and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Metals

The project goals with respect to sensitivity were met for the metals data set with the following exception. The arsenic project action limit was not achieved for the aqueous samples. Data usability may be impacted.

The project goals with respect to accuracy, precision, and completeness were met for the metals data set. Data usability is not impacted with regards to accuracy, precision, and completeness.

Cyanide

The project goals with respect to sensitivity were met for the cyanide data set with the following exception. The cyanide project action limit was not achieved for the aqueous samples. Data usability may be impacted.

The project goals with respect to accuracy, precision, and completeness were met for the cyanide data set. Data usability is not impacted with regards to accuracy, precision, and completeness.

TOC

The project goals with respect to accuracy were met for the TOC data set. TOC was qualified as estimated in select samples due high matrix spike recoveries. Although specific method criteria were not met in this instance, data usability is not impacted and the affected positive results are usable as estimated values.

The project goals with respect to precision, sensitivity, and completeness were met for the TOC data set. Data usability is not impacted with regards to precision, sensitivity, and completeness.

Tables: Data Validation Qualifiers and Codes
Data Summary Tables

Enclosures: Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	SB-17-101-0001			SB-17-101-0104			SB-17-102-0001			SB-17-102-0104		
SDG: CTO070-2	LAB_ID	SB5944-006			SB5944-007			SB5944-008			SB5944-009		
FRACTION: M	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	87.4			94.9			94.0			91.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		2			1.3			10.7			4.6		
LEAD		8.1			2.5			10			2.4		
ZINC		11.7			10.3			21.9			16.6		

PROJ_NO: 02063	NSAMPLE	SB-17-103-0001			SB-17-103-0104			SB-17-104-0001			SB-17-104-0104		
SDG: CTO070-2	LAB_ID	SB5944-010			SB5944-011			SB5944-012			SB5944-013		
FRACTION: M	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	93.6			89.8			91.0			88.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		18.2			6.1			9.4			8.1		
LEAD		11.1			5.1			11			3.4		
ZINC		25.8			17.8			26.7			17.9		

PROJ_NO: 02063	NSAMPLE	SB-17-106-0001			SB-17-106-0104			SB-17-109-0001			SB-17-109-0104		
SDG: CTO070-2	LAB_ID	SB5944-001			SB5944-002			SB5904-008			SB5904-009		
FRACTION: M	SAMP_DATE	10/17/2008			10/17/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	92.0			93.5			92.0			95.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		2.4			1.7			1.8			1.4		
LEAD		23.2			7.5			14.2			2.6		
ZINC		21.8			10.6			17.6			11.2		

PROJ_NO: 02063	NSAMPLE	SB-17-110-0104			SB-17-114-0001			SB-17-114-0104			SB-17-115-0710		
SDG: CTO070-2	LAB_ID	SB5904-005			SB5904-006			SB5904-007			SB5904-004		
FRACTION: M	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	91.6			91.6			95.0			81.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		2.2			1.8			1.8			1.1		
LEAD		3.7			17.8			3.4			2		
ZINC		11.7			17.6			13.4			12.4		

PROJ_NO: 02063	NSAMPLE	SB-17-116-0407			SB-17-117-0104			SB-17-119-0104			SB-17-120-0205		
SDG: CTO070-2	LAB_ID	SB5904-012			SB5944-005			SB5904-003			SB5904-010		
FRACTION: M	SAMP_DATE	10/16/2008			10/17/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	78.5			82.7			91.2			76.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		1.5			3			1.4			2.2		
LEAD		4.2			7.4			2.4			5.7		
ZINC		17			23.6			54.5			25.8		

PROJ_NO: 02063	NSAMPLE	SB-17-121-0205			SB-17-121-0710			SB-17-121-1215			SB-17-122-0407		
SDG: CTO070-2	LAB_ID	SB5904-013			SB5904-014			SB5904-015			SB5944-003		
FRACTION: M	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	74.8			80.7			79.1			66.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		1.6			1.1			5.2			1.5		
LEAD		5.9			2.3			4.9			3		
ZINC		35.5			14.2			33.9			15.2		

PROJ_NO: 02063	NSAMPLE	SB-17-124-0001			SB-17-124-0104			SB-17-DUP05			SB-17-DUP06		
SDG: CTO070-2	LAB_ID	SB5904-001			SB5904-002			SB5904-011			SB5944-004		
FRACTION: M	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			FD			FD		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	85.9			85.0			72.9			70.8		
	DUP_OF							SB-17-120-0205			SB-17-122-0407		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		8.6			4.2			1.8			1.3		
LEAD		6			4.4			5.6			2.9		
ZINC		36.4			16.6			31.7			14.5		

PROJ_NO: 02063	NSAMPLE	SB-17-RB01			SB-17-RB02			SB-17-RB03			SB-17-RB04		
SDG: CTO070-2	LAB_ID	SB5904-016			SB5904-017			SB5944-015			SB5944-016		
FRACTION: M	SAMP_DATE	10/16/2008			10/16/2008			10/17/2008			10/17/2008		
MEDIA: WATER	QC_TYPE	RB			RB			RB			RB		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		1.69	U		1.69	U		1.69	U		1.69	U	
LEAD		0.97	U		0.97	U		0.97	U		0.97	U	
ZINC		2.22	U		3	J	P	2.22	U		2.22	U	

PROJ_NO: 02063	NSAMPLE	SWB-17-01		
SDG: CTO070-2	LAB_ID	SB5944-014		
FRACTION: M	SAMP_DATE	10/17/2008		
MEDIA: WATER	QC_TYPE	SB		
	UNITS	UG/L		
	PCT_SOLIDS			
	DUP_OF			
PARAMETER		RESULT	VQL	QLCD
ARSENIC		1.69	U	
LEAD		2.6	U	A
ZINC		175		

PROJ_NO: 02063	NSAMPLE	SB-17-101-0001			SB-17-101-0104			SB-17-102-0001			SB-17-102-0104		
SDG: CTO070-2	LAB_ID	SB5944-6			SB5944-7			SB5944-8			SB5944-9		
FRACTION: MISC	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	87.4			94.9			94.0			91.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.55	U		0.5	U		0.5	U		0.55	U	
TOTAL ORGANIC CARBON													

PROJ_NO: 02063	NSAMPLE	SB-17-103-0001			SB-17-103-0104			SB-17-104-0001			SB-17-104-0104		
SDG: CTO070-2	LAB_ID	SB5944-10			SB5944-11			SB5944-12			SB5944-13		
FRACTION: MISC	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	93.6			89.8			91.0			88.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.55	U		0.55	U		0.55	U		0.55	U	
TOTAL ORGANIC CARBON													

PROJ_NO: 02063	NSAMPLE	SB-17-106-0001			SB-17-106-0104			SB-17-109-0001			SB-17-109-0104		
SDG: CTO070-2	LAB_ID	SB5944-1			SB5944-2			SB5904-8			SB5904-9		
FRACTION: MISC	SAMP_DATE	10/17/2008			10/17/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	92.0			93.5			92.0			95.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.5	U		0.55	U		0.55	U		0.5	U	
TOTAL ORGANIC CARBON													

PROJ_NO: 02063	NSAMPLE	SB-17-110-0104			SB-17-114-0001			SB-17-114-0104			SB-17-115-0710		
SDG: CTO070-2	LAB_ID	SB5904-5			SB5904-6			SB5904-7			SB5904-4		
FRACTION: MISC	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	91.6			91.6			95.0			81.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.55	U		0.55	U		0.5	U		0.6	U	
TOTAL ORGANIC CARBON											400	J	DP

PROJ_NO: 02063	NSAMPLE	SB-17-116-0407			SB-17-117-0104			SB-17-119-0104			SB-17-120-0205		
SDG: CTO070-2	LAB_ID	SB5904-12			SB5944-5			SB5904-3			SB5904-10		
FRACTION: MISC	SAMP_DATE	10/16/2008			10/17/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	78.5			82.7			91.2			76.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.6	U		0.6	U		0.55	U		0.65	U	
TOTAL ORGANIC CARBON											28000	J	D

PROJ_NO: 02063	NSAMPLE	SB-17-121-0205			SB-17-121-0710			SB-17-121-1215			SB-17-122-0407		
SDG: CTO070-2	LAB_ID	SB5904-13			SB5904-14			SB5904-15			SB5944-3		
FRACTION: MISC	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	74.8			80.7			79.1			66.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.7	U		0.6	U		0.65	U		0.7	U	
TOTAL ORGANIC CARBON													

PROJ_NO: 02063	NSAMPLE	SB-17-124-0001			SB-17-124-0104			SB-17-DUP05			SB-17-DUP06		
SDG: CTO070-2	LAB_ID	SB5904-1			SB5904-2			SB5904-11			SB5944-4		
FRACTION: MISC	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			FD			FD		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	85.9			85.0			72.9			70.8		
	DUP_OF							SB-17-120-0205			SB-17-122-0407		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.55	U		0.55	U		0.65	U		0.7	U	
TOTAL ORGANIC CARBON								24000	J	D			

PROJ_NO: 02063	NSAMPLE	SB-17-RB01			SB-17-RB02			SB-17-RB03			SB-17-RB04		
SDG: CTO070-2	LAB_ID	SB5904-16			SB5904-17			SB5944-15			SB5944-16		
FRACTION: MISC	SAMP_DATE	10/16/2008			10/16/2008			10/17/2008			10/17/2008		
MEDIA: WATER	QC_TYPE	RB			RB			RB			RB		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		10	U		10	U		10	U		10	U	

PROJ_NO: 02063	NSAMPLE	SWB-17-01		
SDG: CTO070-2	LAB_ID	SB5944-14		
FRACTION: MISC	SAMP_DATE	10/17/2008		
MEDIA: WATER	QC_TYPE	SB		
	UNITS	UG/L		
	PCT_SOLIDS			
	DUP_OF			
PARAMETER		RESULT	VQL	QLCD
CYANIDE		10	U	

TETRA TECH

INTERNAL CORRESPONDENCE

C-NAVY-02-09-3072W

Date: February 26, 2009

c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Jennifer Cardinal (no copy) JC

Subject: Tier II Organic Data Validation, SDG CTO070-2
Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Pesticides/Herbicides:

28/Soils/	SB-17-101-0001	SB-17-101-0104	SB-17-102-0001
	SB-17-102-0104	SB-17-103-0001	SB-17-103-0104
	SB-17-104-0001	SB-17-104-0104	SB-17-106-0001
	SB-17-106-0104	SB-17-109-0001	SB-17-109-0104
	SB-17-110-0104	SB-17-114-0001	SB-17-114-0104
	SB-17-115-0710	SB-17-116-0407	SB-17-117-0104
	SB-17-119-0104	SB-17-120-0205	SB-17-121-0205
	SB-17-121-0710	SB-17-121-1215	SB-17-122-0407
	SB-17-124-0001	SB-17-124-0104	SB-17-DUP05
	SB-17-DUP06		
	(Field Duplicate Pairs: SB-17-120-0205/SB-17-DUP05, SB-17-122-0407/SB-17-DUP06)		
1/Source Blank/	SWB-17-01		
4/Rinsate Blanks/	SB-17-RB01	SB-17-RB02	SB-17-RB03
	SB-17-RB04		

DRO:

6/Soils/	SB-17-115-0710	SB-17-121-0205	SB-17-121-0710
	SB-17-121-1215	SB-17-122-0407	SB-17-DUP06
	(Field Duplicate Pair: SB-17-122-0407/SB-17-DUP06)		
2/Rinsate Blanks/	SB-17-RB01	SB-17-RB02	

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the diesel range organic (DRO), pesticide, herbicide analytical data for the samples in this SDG. The samples were collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine from October 16-17, 2008. Sample collection and analysis was performed according to the requirements of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The DRO analysis was performed according to MEDEP 4.1.25. The pesticide and herbicide analyses were performed according to USEPA SW-846 Methods 8081 and 8151, respectively.

The DRO data validation was performed in accordance with the Region I EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996. The pesticides and herbicide validation was performed in accordance with the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Organic Analyses, Part III, February 2004.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The data were evaluated based on the following parameters:

- Data Completeness
* • Preservation and Technical Holding Times
* • Pesticide Degradation
- Initial and Continuing Calibrations
- Blanks
- Surrogate Compounds
- Matrix Spike/Matrix Spike Duplicate
- Laboratory Control Sample/Laboratory Control Sample Duplicate
- Field Duplicates
- Analyte Identification
- Reporting Limits

* All criteria were met for this parameter.

Data Completeness

The laboratory incorrectly transcribed the sample ID SWB-17-01 as SB-17-01. The data summary tables have the correct sample ID SWB-17-01.

The laboratory was contacted regarding the initial calibration verification (ICV) summary forms for the DRO, pesticides, and herbicides analyses. On February 19, 2009 the laboratory explained that the ICV results are reported with the calibration verification forms.

On February 26, 2009 the laboratory resubmitted the chromatograms for DRO samples SB-17-115-0710 and SB-17-121-0205. The additional chromatograms show the area integrated and reported as DRO using a lower attenuation so that DRO peaks are visible.

Initial and Continuing Calibrations

Pesticides

The following table summarizes the pesticide compounds that failed to meet the continuing calibration (CC) criterion of %D <25:

Compound	%D or %D Range	Action		Affected Samples
		(+)	NDs	
Delta-BHC	-35.20 to -31.80		UJ	SB-17-117-0104DL
4,4'-DDT	-51.20 to -26.80	J		SB-17-117-0104DL2, SB-17-114-0001DL, SB-17-114-0104, SB-17-106-0104, SB-17-122-0407
Endosulfan sulfate	-48.00 to -46.80		UJ	SB-17-117-0104DL
Methoxychlor	-52.40 to 54.00		UJ	SB-17-117-0104DL, SB-17-110-0104DL, SB-17-114-0001DL, SB-17-114-0104, SB-17-109-0001, SB-17-RB01, SB-17-RB02, SB-17-RB03, SB-17-RB04, SWB-17-01
Endosulfan I	86.00		UJ	SB-17-110-0104DL, SB-17-114-0001DL, SB-17-114-0104, SB-17-109-0001
4,4'-DDE	309.8	J		
Endrin	2364.4		UJ	

Although the %D was outside of the QC limits for 4,4'-DDT, methoxychlor, and 4,4'-DDE; the project accuracy goals were not impacted since the instrument calibration variability is below safety margin of greater than 100% allocated for these compounds in the soil samples. The positive and non-detected 4,4'-DDT, methoxychlor, and 4,4'-DDE results in the affected samples are usable as estimated values and estimated quantitation limits.

The %D was outside of the QC limits for delta-BHC, endosulfan sulfate, endosulfan I, and endrin; therefore, the project accuracy goals may be impacted. The non-detected delta-BHC, endosulfan sulfate, endosulfan I, and endrin results in the affected samples are usable as estimated quantitation limits.

Blanks

Pesticides

The following table summarizes the level of blank contamination detected in the laboratory blank associated with the samples.

Compound	Type of Blank	Maximum Conc. (µg/Kg)	Action Level (µg/Kg)	Affected Samples
4,4'-DDT	Method	10	50	SB-17-101-0001, SB-17-101-0104, SB-17-102-0001, SB-17-102-0104, SB-17-103-0001, SB-17-104-0001, SB-17-104-0104, SB-17-106-0104, SB-17-109-0104, SB-17-114-0104, SB-17-115-0710, SB-17-119-0104, SB-17-124-0001, SB-17-DUP06
4,4'-DDD	Method	1.1	5.5	SB-17-101-0001, SB-17-101-0104, SB-17-102-0001, SB-17-103-0001, SB-17-104-0001, SB-17-106-0104, SB-17-109-0104, SB-17-114-0104, SB-17-116-0407, SB-17-119-0104, SB-17-122-0407, SB-17-124-0104

Blank actions were applied to the affected samples due to 4,4'-DDT and 4,4'-DDD method blank contamination. The 5x rule applies for these pesticide compounds. The positive results for 4,4'-DDT and 4,4'-DDD in the affected samples were changed to non-detected values at the sample-specific project quantitation limit or at elevated quantitation limits.

Although 4,4'-DDT and 4,4'-DDD contamination was found in the laboratory method blank, the project sensitivity goals are not impacted since the non-detected values do not exceed the project action limits for these compounds. The 4,4'-DDT and 4,4'-DDD results in the affected samples are usable as non-detected values.

Surrogate Compounds

Pesticides

The following samples had surrogate spike recoveries outside of the recovery limits:

Sample	TCX %Rec. (QC Limits: 42-104)		Action	
	Column 1	Column 2	(+)	NDs
SB-17-109-0104	115	115	J	
SB-17-116-0407	36	37	J	UJ

Although the surrogate recovery QC criteria were not met for tetrachloro-m-xylene (TCX) for the samples listed above, the project accuracy goals are not impacted for SB-17-109-0104 since the only positive results are 4,4'-DDT and 4,4'-DDD and the project action limits for these compounds are much greater than the results in this sample. The project accuracy goals may be impacted for sample SB-17-116-0407. The positive pesticide results in sample SB-17-109-0104 are usable as estimated values which may be biased high. The positive and non-detected pesticide results in sample SB-17-116-0407 are usable as estimated value and estimated quantitation limits which may be biased low.

Matrix Spike/Matrix Spike Duplicates

Pesticides

The matrix spike/matrix spike duplicate (MS/MSD) results for sample SB-17-121-0205 recovered the majority of the pesticide compounds outside the compound-specific recovery limits. In addition, the MS/MSD results were above the 50% relative percent difference (RPD) QC limit for beta-BHC, alpha-chlordane, and endosulfan II. All positive and non-detected results (except for 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT) are estimated (J, UJ) in sample SB-17-121-0205 due to poor MS/MSD recoveries and poor MS/MSD precision. In addition, endosulfan sulfate did not recover in the MS and MSD; therefore, the non-detected endosulfan sulfate result in sample SB-17-121-0205 was rejected.

The MS/MSD recoveries for the majority of the pesticide compounds did not meet the QC limits; therefore, the project accuracy goals may be impacted. The affected positive and non-detected results in sample SB-17-121-0205 are usable as estimated values and estimated quantitation limits.

The MS/MSD RPDs for beta-BHC, alpha-chlordane, and endosulfan II did not meet the QC limits; therefore, the project precision goals may be impacted. The positive and non-detected results in

sample SB-17-121-0205 are usable as estimated values and estimated values and estimated quantitation limits for which the bias is indeterminate.

The non-detected endosulfan sulfate result in sample SB-17-121-0205 was rejected due to no recoveries in the MS/MSD. This result is not usable for project decisions and the data completeness goals may be impacted.

Laboratory Control Sample/Laboratory Control Sample Duplicates

Pesticides

The following table summarizes the pesticide compound that failed to meet the LCS recovery limits:

Compound	% Rec.	QC Limits	Action		Affected Samples
			(+)	NDs	
Alpha-BHC	47, 54	60-130		UJ	SB-17-RB01, SB-17-RB02, SB-17-RB03, SB-17-RB04, SWB-17-01
Beta-BHC	57	65-125		UJ	
Heptachlor epoxide	50	60-130		UJ	
Gamma-chlordane	48, 59	60-125		UJ	
Alpha-chlordane	47, 58	65-125		UJ	
Endosulfan I	33, 40	50-110		UJ	
Dieldrin	49, 57	60-130		UJ	
Endrin aldehyde	47	55-135		UJ	
Endrin ketone	48, 58	75-125		UJ	

Although the laboratory control sample recovery criteria were not met for the compounds listed above, the project accuracy goals are not impacted since these are rinsate and source water blank samples. The non-detected alpha-BHC, beta-BHC, heptachlor epoxide, gamma-chlordane, alpha-chlordane, endosulfan I, dieldrin, endrin aldehyde, and endrin ketone results in the affected samples are usable as estimated quantitation limits which may be biased low.

Field Duplicates

Pesticides

The field duplicate pair SB-17-120-0205/SB-17-DUP05 exceeded the relative percent difference QC criterion of 50% for the following compounds:

Analyte	RPD	Action	
		(+)	NDs
4,4'-DDD	73.4	J	
4,4'-DDE	58.8	J	
4,4'-DDT	83.0	J	

The field duplicate relative percent difference for 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT exceeded the QC criterion; therefore, the project precision goals may be impacted. The positive 4,4'-DDD, 4,4'-DDE, and

4,4'-DDT results in samples SB-17-120-0205 and SB-17-DUP05 are usable as estimated values for which the bias is indeterminate.

The field duplicate pair SB-17-122-0407/SB-17-DUP06 exceeded the relative percent difference QC criterion of 50% for the following compounds:

Analyte	RPD	Action	
		(+)	NDs
4,4'-DDT	172.5	J	

The field duplicate relative percent difference for 4,4'-DDT exceeded the QC criterion; therefore, the project precision goals may be impacted. The positive results in samples SB-17-122-0407 and SB-17-DUP06 are usable as estimated values for which the bias is indeterminate.

Analyte Identification/Quantitation

Pesticides

The relative percent difference (RPD) between the results of analytical columns 1 and 2 exceeded the 40% RPD QC criterion for the compounds in the following samples:

Sample	Analyte	RPD	Action
			(+)
SB-17-119-0104	Alpha-chlordane	49.2	J
SB-17-110-0104	4,4'-DDE	95.1	J
SB-17-114-0104	4,4'-DDE	53.4	J
SB-17-121-1215	Alpha-chlordane	42.2	J
SB-17-117-0104	Heptachlor epoxide	50.4	J
SB-17-101-0001	4,4'-DDD	55.6	J
SB-17-102-0001	4,4'-DDD	106.9	UJ* at 1.82
	4,4'-DDE	61.0	J
SB-17-103-0001	4,4'-DDD	96.2	J
SB-17-104-0001	4,4'-DDD	89.9	J

*Professional judgment was used to raise the result to the higher of the two results and qualify the result as estimated, non-detected (UJ).

The analyte quantitation relative percent differences exceeded the 40% RPD QC limit for the samples listed above; therefore, the project accuracy goals may be affected due to analytical interferences detected in the dual column analysis. The positive results for the affected compounds in the affected samples are usable as estimated values.

The analyte quantitation relative percent differences exceeded the 100% RPD QC limit for 4,4'-DDD in sample SB-17-102-0001. Professional judgment was applied to raise the reporting limit for the result in this sample due to analytical matrix interference. The project sensitivity goals are not impacted since the project action limit is not exceeded by the raised quantitation limit. The estimated, non-detected value limit for 4,4'-DDD in sample SB-17-102-0001 is usable as an estimated quantitation limits.

Reporting Limits

All positive results below the quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

Pesticides

Project action limits were not achievable for all pesticides except for 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, methoxychlor, and toxaphene as highlighted in SAP Worksheet 15a of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008. Data usability may be impacted.

The reporting limits were raised for 4,4'-DDT and 4,4'-DDD in select samples due to blank contamination. As discussed in the Blanks section, the project sensitivity goals are not impacted.

The reporting limit was raised for 4,4'-DDD in sample SB-17-102-0001 due to analytical interferences detected in the dual column analysis. As discussed in the Analyte Identification/Quantitation section, the project sensitivity goals are not impacted.

Herbicides

The project action limit for 2,4-D was not achieved due to the percent moisture of the samples. Data usability may be impacted.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Pesticides

The project goals with respect to accuracy were met for the pesticides data set with the following exceptions. Delta-BHC, endosulfan sulfate, endosulfan I, and endrin were qualified as estimated in select samples due to instrument calibration variability. The positive and non-detected pesticide results in sample SB-17-116-0407 were qualified as estimated due to low surrogate recoveries; the affected results may be biased low. The pesticide results (except 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT) in sample SB-17-121-0205 were qualified as estimated due to poor MS/MSD recoveries. Select compounds were qualified as estimated in some samples due to analytical interferences detected in the dual column analysis. Although specific method criteria were not met in these instances, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability. Additionally, 4,4'-DDT, methoxychlor, and 4,4'-DDE were qualified as estimated in select samples due to instrument calibration variability. The positive pesticide results in sample SB-17-109-0104 were qualified as estimated due to high surrogate recoveries; the affected results may be biased high. Alpha-BHC, beta-BHC, heptachlor epoxide, gamma-chlordane, alpha-chlordane, endosulfan I, dieldrin, endrin aldehyde, and endrin ketone were qualified as estimated in the rinsate and

source water blank samples due to low LCS recoveries. Although specific method criteria were not met in these instances, data usability is not impacted and the affected positive and non-detected results are usable as estimated values and estimated quantitation limits.

The project goals with respect to precision were met for the pesticides data set with the following exceptions. Beta-BHC, alpha-chlordane, and endosulfan II were qualified as estimated in sample SB-17-121-0205 due to poor MS/MSD precision. 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT were qualified as estimated in samples SB-17-120-0205 and SB-17-DUP05 due to poor field duplicate precision. 4,4'-DDT was qualified as estimated in samples SB-17-122-0407 and SB-17-DUP06 due to poor field duplicate precision. Although specific method criteria were not met in these instances, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to sensitivity were met for the pesticides data set with the following exception. Project action limits were not achievable for all pesticides except for 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, methoxychlor, and toxaphene. Data usability may be impacted.

The project goals with respect to completeness were met for the pesticides data set with the following exception. Endosulfan sulfate was rejected in sample SB-17-121-0205 due to no recoveries in the MS/MSD analysis. This result is not usable for project decisions.

Herbicides

The project goals with respect to sensitivity were met for the herbicides data set with the following exception. The project action limit for 2,4-D was not met due to the percent moisture of the samples. Data usability may be impacted.

The project goals with respect to accuracy, precision, and completeness were met for the herbicides data set. Data usability was not impacted with regards to accuracy, precision, and completeness.

DRO

The project goals with respect to accuracy, precision, sensitivity, and completeness were met for the DRO data set. Data usability was not impacted with regards to accuracy, precision, sensitivity, and completeness.

Tables: Data Validation Qualifiers and Codes
Data Summary Tables

Enclosures: Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	SB-17-101-0001			SB-17-101-0104			SB-17-102-0001			SB-17-102-0104		
SDG: CTO070-2	LAB_ID	SB5944-6			SB5944-7			SB5944-8			SB5944-9		
FRACTION: PEST/PCB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	87.4			94.9			94.0			91.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		3.8	UJ	AU	3.5	U	A	3.5	UJ	AU	3.6	U	
4,4'-DDE		13			1.3	J	P	0.7	J	PU	3.6	U	
4,4'-DDT		12	U	A	13	U	A	3.5	U	A	3.6	U	A
ALDRIN		1.9	U		1.8	U		1.8	U		1.9	U	
ALPHA-BHC		1.9	U		1.8	U		1.8	U		1.9	U	
ALPHA-CHLORDANE		1.9	U		1.8	U		1.8	U		1.9	U	
BETA-BHC		1.9	U		1.8	U		1.8	U		1.9	U	
DELTA-BHC		1.9	U		1.8	U		1.8	U		1.9	U	
DIELDRIN		3.8	U		3.5	U		3.5	U		3.6	U	
ENDOSULFAN I		1.9	U		1.8	U		1.8	U		1.9	U	
ENDOSULFAN II		3.8	U		3.5	U		3.5	U		3.6	U	
ENDOSULFAN SULFATE		3.8	U		3.5	U		3.5	U		3.6	U	
ENDRIN		3.8	U		3.5	U		3.5	U		3.6	U	
ENDRIN ALDEHYDE		3.8	U		3.5	U		3.5	U		3.6	U	
ENDRIN KETONE		3.8	U		3.5	U		3.5	U		3.6	U	
GAMMA-BHC (LINDANE)		1.9	U		1.8	U		1.8	U		1.9	U	
GAMMA-CHLORDANE		1.9	U		1.8	U		1.8	U		1.9	U	
HEPTACHLOR		1.9	U		1.8	U		1.8	U		1.9	U	
HEPTACHLOR EPOXIDE		1.9	U		1.8	U		1.8	U		1.9	U	
METHOXYCHLOR		19	U		18	U		18	U		19	U	
TOXAPHENE		38	U		35	U		35	U		36	U	

PROJ_NO: 02063	NSAMPLE	SB-17-103-0001			SB-17-103-0104			SB-17-104-0001			SB-17-104-0104		
SDG: CTO070-2	LAB_ID	SB5944-10			SB5944-11			SB5944-12			SB5944-13		
FRACTION: PEST/PCB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	93.6			89.8			91.0			88.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		3.5	UJ	AU	10			3.6	UJ	AU	6.5		
4,4'-DDE		0.88	J	P	3.6	J	P	0.8	J	P	1.7	J	P
4,4'-DDT		3.5	U	A	53			4.2	U	A	4	U	A
ALDRIN		1.8	U		1.9	U		1.9	U		1.9	U	
ALPHA-BHC		1.8	U		1.9	U		1.9	U		1.9	U	
ALPHA-CHLORDANE		1.8	U		1.9	U		1.9	U		1.9	U	
BETA-BHC		1.8	U		1.9	U		1.9	U		1.9	U	
DELTA-BHC		1.8	U		1.9	U		1.9	U		1.9	U	
DIELDRIN		3.5	U		3.7	U		3.6	U		3.7	U	
ENDOSULFAN I		1.8	U		1.9	U		1.9	U		1.9	U	
ENDOSULFAN II		3.5	U		3.7	U		3.6	U		3.7	U	
ENDOSULFAN SULFATE		3.5	U		3.7	U		3.6	U		3.7	U	
ENDRIN		3.5	U		3.7	U		3.6	U		3.7	U	
ENDRIN ALDEHYDE		3.5	U		3.7	U		3.6	U		3.7	U	
ENDRIN KETONE		3.5	U		3.7	U		3.6	U		3.7	U	
GAMMA-BHC (LINDANE)		1.8	U		1.9	U		1.9	U		1.9	U	
GAMMA-CHLORDANE		1.8	U		1.9	U		1.9	U		1.9	U	
HEPTACHLOR		1.8	U		1.9	U		1.9	U		1.9	U	
HEPTACHLOR EPOXIDE		1.8	U		1.9	U		1.9	U		1.9	U	
METHOXYCHLOR		18	U		19	U		19	U		19	U	
TOXAPHENE		35	U		37	U		36	U		37	U	

PROJ_NO: 02063	NSAMPLE	SB-17-106-0001			SB-17-106-0001DL2			SB-17-106-0104			SB-17-109-0001		
SDG: CTO070-2	LAB_ID	SB5944-1			SB5944-1DL2			SB5944-2			SB5904-8		
FRACTION: PEST/PCB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	92.0			92.0			93.5			92.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		10						3.5	U	A	11		
4,4'-DDE		8.3						3.5	U		9.3	J	C
4,4'-DDT					210			24	UJ	AC			
ALDRIN		1.8	U					1.8	U		1.8	U	
ALPHA-BHC		1.8	U					1.8	U		1.8	U	
ALPHA-CHLORDANE		1.8	U					1.8	U		1.8	U	
BETA-BHC		1.8	U					1.8	U		1.8	U	
DELTA-BHC		1.8	U					1.8	U		1.8	U	
DIELDRIN		3.6	U					3.5	U		3.6	U	
ENDOSULFAN I		1.8	U					1.8	U		1.8	UJ	C
ENDOSULFAN II		3.6	U					3.5	U		3.6	U	
ENDOSULFAN SULFATE		3.6	U					3.5	U		3.6	U	
ENDRIN		3.6	U					3.5	U		3.6	UJ	C
ENDRIN ALDEHYDE		3.6	U					3.5	U		3.6	U	
ENDRIN KETONE		3.6	U					3.5	U		3.6	U	
GAMMA-BHC (LINDANE)		1.8	U					1.8	U		1.8	U	
GAMMA-CHLORDANE		1.8	U					1.8	U		1.8	U	
HEPTACHLOR		1.8	U					1.8	U		1.8	U	
HEPTACHLOR EPOXIDE		1.8	U					1.8	U		1.8	U	
METHOXYCHLOR		18	U					18	U		18	UJ	C
TOXAPHENE		36	U					35	U		36	U	

PROJ_NO: 02063	NSAMPLE	SB-17-109-0001DL			SB-17-109-0104			SB-17-110-0104DL			SB-17-110-0104DL2		
SDG: CTO070-2	LAB_ID	SB5904-8DL			SB5904-9			SB5904-5DL			SB5904-5DL2		
FRACTION: PEST/PCB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	92.0			95.6			91.6			91.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD					3.4	UJ	AR	220					
4,4'-DDE					3.4	U		56	J	CU			
4,4'-DDT		180			3.4	UJ	AR				1000		
ALDRIN					1.8	U		18	U				
ALPHA-BHC					1.8	U		18	U				
ALPHA-CHLORDANE					1.8	U		18	U				
BETA-BHC					1.8	U		18	U				
DELTA-BHC					1.8	U		18	U				
DIELDRIN					3.4	U		36	U				
ENDOSULFAN I					1.8	U		18	UJ	C			
ENDOSULFAN II					3.4	U		36	U				
ENDOSULFAN SULFATE					3.4	U		36	U				
ENDRIN					3.4	U		36	UJ	C			
ENDRIN ALDEHYDE					3.4	U		36	U				
ENDRIN KETONE					3.4	U		36	U				
GAMMA-BHC (LINDANE)					1.8	U		18	U				
GAMMA-CHLORDANE					1.8	U		18	U				
HEPTACHLOR					1.8	U		18	U				
HEPTACHLOR EPOXIDE					1.8	U		18	U				
METHOXYCHLOR					18	U		180	UJ	C			
TOXAPHENE					34	U		360	U				

PROJ_NO: 02063	NSAMPLE	SB-17-114-0001			SB-17-114-0001DL			SB-17-114-0104			SB-17-115-0710		
SDG: CTO070-2	LAB_ID	SB5904-6			SB5904-6DL			SB5904-7			SB5904-4		
FRACTION: PEST/PCB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	91.6			91.6			95.0			81.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		17						3.5	U	A	4	U	
4,4'-DDE		22						0.51	J	CPU	4	U	
4,4'-DDT					380	J	C	16	UJ	AC	4	U	A
ALDRIN		1.8	U					1.8	U		2.1	U	
ALPHA-BHC		1.8	U					1.8	U		2.1	U	
ALPHA-CHLORDANE		1.8	U					1.8	U		2.1	U	
BETA-BHC		1.8	U					1.8	U		2.1	U	
DELTA-BHC		1.8	U					1.8	U		2.1	U	
DIELDRIN		3.6	U					3.5	U		4	U	
ENDOSULFAN I		1.8	U					1.8	UJ	C	2.1	U	
ENDOSULFAN II		3.6	U					3.5	U		4	U	
ENDOSULFAN SULFATE		3.6	U					3.5	U		4	U	
ENDRIN		3.6	U					3.5	UJ	C	4	U	
ENDRIN ALDEHYDE		3.6	U					3.5	U		4	U	
ENDRIN KETONE		3.6	U					3.5	U		4	U	
GAMMA-BHC (LINDANE)		1.8	U					1.8	U		2.1	U	
GAMMA-CHLORDANE		1.8	U					1.8	U		2.1	U	
HEPTACHLOR		1.8	U					1.8	U		2.1	U	
HEPTACHLOR EPOXIDE		1.8	U					1.8	U		2.1	U	
METHOXYCHLOR		18	U					18	UJ	C	21	U	
TOXAPHENE		36	U					35	U		40	U	

PROJ_NO: 02063	NSAMPLE	SB-17-116-0407			SB-17-117-0104DL			SB-17-117-0104DL2			SB-17-119-0104		
SDG: CTO070-2	LAB_ID	SB5904-12			SB5944-5DL			SB5944-5DL2			SB5904-3		
FRACTION: PEST/PCB	SAMP_DATE	10/16/2008			10/17/2008			10/17/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	78.5			82.7			82.7			91.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		4.2	UJ	AR	60						3.6	U	A
4,4'-DDE		19	J	R	160						2.7	J	P
4,4'-DDT		96	J	R				1100	J	C	9.7	U	A
ALDRIN		2.2	UJ	R	10	U					1.9	U	
ALPHA-BHC		2.2	UJ	R	10	U					1.9	U	
ALPHA-CHLORDANE		2.2	UJ	R	67						1.2	J	PU
BETA-BHC		2.2	UJ	R	10	U					1.9	U	
DELTA-BHC		2.2	UJ	R	10	U					1.9	U	
DIELDRIN		4.2	UJ	R	20	U					3.6	U	
ENDOSULFAN I		2.2	UJ	R	10	UJ	C				1.9	U	
ENDOSULFAN II		4.2	UJ	R	20	U					3.6	U	
ENDOSULFAN SULFATE		4.2	UJ	R	20	U					3.6	U	
ENDRIN		4.2	UJ	R	20	UJ	C				3.6	U	
ENDRIN ALDEHYDE		4.2	UJ	R	20	U					3.6	U	
ENDRIN KETONE		4.2	UJ	R	20	U					3.6	U	
GAMMA-BHC (LINDANE)		2.2	UJ	R	10	U					1.9	U	
GAMMA-CHLORDANE		2.2	UJ	R	70						1.2	J	P
HEPTACHLOR		2.2	UJ	R	10	U					1.9	U	
HEPTACHLOR EPOXIDE		2.2	UJ	R	11	J	U				1.9	U	
METHOXYCHLOR		22	UJ	R	100	UJ	C				19	U	
TOXAPHENE		42	UJ	R	200	U					36	U	

PROJ_NO: 02063	NSAMPLE	SB-17-120-0205			SB-17-120-0205DL			SB-17-121-0205DL2			SB-17-121-0205DL3		
SDG: CTO070-2	LAB_ID	SB5904-10			SB5904-10DL			SB5904-13DL2			SB5904-13DL3		
FRACTION: PEST/PCB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	76.2			76.2			74.8			74.8		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		25	J	G				54000					
4,4'-DDE		18	J	G				25000					
4,4'-DDT					910	J	G				1500000		
ALDRIN		2.2	U					1100	UJ	D			
ALPHA-BHC		2.2	U					1100	UJ	D			
ALPHA-CHLORDANE		19						1100	UJ	D			
BETA-BHC		2.2	U					1100	UJ	D			
DELTA-BHC		2.2	U					1100	UJ	D			
DIELDRIN		4.3	U					2200	UJ	D			
ENDOSULFAN I		2.2	U					1100	UJ	D			
ENDOSULFAN II		4.3	U					2200	UJ	D			
ENDOSULFAN SULFATE		4.3	U					2200	UR	D			
ENDRIN		4.3	U					2200	UJ	D			
ENDRIN ALDEHYDE		4.3	U					2200	UJ	D			
ENDRIN KETONE		4.3	U					2200	UJ	D			
GAMMA-BHC (LINDANE)		2.2	U					1100	UJ	D			
GAMMA-CHLORDANE		19						1100	UJ	D			
HEPTACHLOR		1.7	J	P				1100	UJ	D			
HEPTACHLOR EPOXIDE		2.2	U					1100	UJ	D			
METHOXYCHLOR		22	U					11000	UJ	D			
TOXAPHENE		43	U					22000	UJ	D			

PROJ_NO: 02063 SDG: CTO070-2 FRACTION: PEST/PCB MEDIA: SOIL	NSAMPLE	SB-17-121-0710			SB-17-121-0710DL			SB-17-121-1215			SB-17-121-1215DL		
	LAB_ID	SB5904-14			SB5904-14DL			SB5904-15			SB5904-15DL		
	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	80.7			80.7			79.1			79.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		32						15					
4,4'-DDE		15						4.4					
4,4'-DDT					830						230		
ALDRIN		2.1	U					2.1	U				
ALPHA-BHC		2.1	U					2.1	U				
ALPHA-CHLORDANE		2.1	U					1.2	J	PU			
BETA-BHC		2.1	U					2.1	U				
DELTA-BHC		2.1	U					2.1	U				
DIELDRIN		4.1	U					4.2	U				
ENDOSULFAN I		2.1	U					2.1	U				
ENDOSULFAN II		4.1	U					4.2	U				
ENDOSULFAN SULFATE		4.1	U					4.2	U				
ENDRIN		4.1	U					4.2	U				
ENDRIN ALDEHYDE		4.1	U					4.2	U				
ENDRIN KETONE		4.1	U					4.2	U				
GAMMA-BHC (LINDANE)		2.1	U					2.1	U				
GAMMA-CHLORDANE		2.1	U					1.1	J	P			
HEPTACHLOR		2.1	U					2.1	U				
HEPTACHLOR EPOXIDE		2.1	U					2.1	U				
METHOXYCHLOR		21	U					21	U				
TOXAPHENE		41	U					42	U				

PROJ_NO: 02063	NSAMPLE	SB-17-122-0407			SB-17-124-0001			SB-17-124-0104			SB-17-DUP05		
SDG: CTO070-2	LAB_ID	SB5944-3			SB5904-1			SB5904-2			SB5904-11		
FRACTION: PEST/PCB	SAMP_DATE	10/17/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			FD		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	66.0			85.9			85.0			72.9		
	DUP_OF										SB-17-120-0205		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		5.2	U	A	3.8	U		3.9	U	A	54	J	G
4,4'-DDE		5	U		3.8	U		8.3			33	J	G
4,4'-DDT		65	J	CG	3.8	U	A	72					
ALDRIN		2.6	U		2	U		2	U		2.3	U	
ALPHA-BHC		2.6	U		2	U		2	U		2.3	U	
ALPHA-CHLORDANE		2.6	U		2	U		2	U		21		
BETA-BHC		2.6	U		2	U		2	U		2.3	U	
DELTA-BHC		2.6	U		2	U		2	U		2.3	U	
DIELDRIN		5	U		3.8	U		3.9	U		4.5	U	
ENDOSULFAN I		2.6	U		2	U		2	U		2.3	U	
ENDOSULFAN II		5	U		3.8	U		3.9	U		4.5	U	
ENDOSULFAN SULFATE		5	U		3.8	U		3.9	U		4.5	U	
ENDRIN		5	U		3.8	U		3.9	U		4.5	U	
ENDRIN ALDEHYDE		5	U		3.8	U		3.9	U		4.5	U	
ENDRIN KETONE		5	U		3.8	U		3.9	U		4.5	U	
GAMMA-BHC (LINDANE)		2.6	U		2	U		91			2.3	U	
GAMMA-CHLORDANE		2.6	U		2	U		2	U		21		
HEPTACHLOR		2.6	U		2	U		2	U		2.3	U	
HEPTACHLOR EPOXIDE		2.6	U		2	U		2	U		2.3	U	
METHOXYCHLOR		26	U		20	U		20	U		23	U	
TOXAPHENE		50	U		38	U		39	U		45	U	

PROJ_NO: 02063 SDG: CTO070-2 FRACTION: PEST/PCB MEDIA: SOIL	NSAMPLE	SB-17-DUP05DL			SB-17-DUP06		
	LAB_ID	SB5904-11DL			SB5944-4		
	SAMP_DATE	10/16/2008			10/17/2008		
	QC_TYPE	FD			FD		
	UNITS	UG/KG			UG/KG		
	PCT_SOLIDS	72.9			70.8		
	DUP_OF	SB-17-120-0205			SB-17-122-0407		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD					4.7	U	
4,4'-DDE					4.7	U	
4,4'-DDT		2200	J	G	4.8	UJ	AG
ALDRIN					2.4	U	
ALPHA-BHC					2.4	U	
ALPHA-CHLORDANE					2.4	U	
BETA-BHC					2.4	U	
DELTA-BHC					2.4	U	
DIELDRIN					4.7	U	
ENDOSULFAN I					2.4	U	
ENDOSULFAN II					4.7	U	
ENDOSULFAN SULFATE					4.7	U	
ENDRIN					4.7	U	
ENDRIN ALDEHYDE					4.7	U	
ENDRIN KETONE					4.7	U	
GAMMA-BHC (LINDANE)					2.4	U	
GAMMA-CHLORDANE					2.4	U	
HEPTACHLOR					2.4	U	
HEPTACHLOR EPOXIDE					2.4	U	
METHOXYCHLOR					24	U	
TOXAPHENE					47	U	

PROJ_NO: 02063	NSAMPLE	SB-17-RB01			SB-17-RB02			SB-17-RB03			SB-17-RB04		
SDG: CTO070-2	LAB_ID	SB5904-16			SB5904-17			SB5944-15			SB5944-16		
FRACTION: PEST/PCB	SAMP_DATE	10/16/2008			10/16/2008			10/17/2008			10/17/2008		
MEDIA: WATER	QC_TYPE	RB			RB			RB			RB		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		0.096	U		0.094	U		0.094	U		0.097	U	
4,4'-DDE		0.096	U		0.094	U		0.094	U		0.097	U	
4,4'-DDT		0.096	U		0.094	U		0.094	U		0.097	U	
ALDRIN		0.048	U		0.047	U		0.047	U		0.048	U	
ALPHA-BHC		0.048	UJ	E	0.047	UJ	E	0.047	UJ	E	0.048	UJ	E
ALPHA-CHLORDANE		0.048	UJ	E	0.047	UJ	E	0.047	UJ	E	0.048	UJ	E
BETA-BHC		0.048	UJ	E	0.047	UJ	E	0.047	UJ	E	0.048	UJ	E
DELTA-BHC		0.048	U		0.047	U		0.047	U		0.048	U	
DIELDRIN		0.096	UJ	E	0.094	UJ	E	0.094	UJ	E	0.097	UJ	E
ENDOSULFAN I		0.048	UJ	E	0.047	UJ	E	0.047	UJ	E	0.048	UJ	E
ENDOSULFAN II		0.096	U		0.094	U		0.094	U		0.097	U	
ENDOSULFAN SULFATE		0.096	U		0.094	U		0.094	U		0.097	U	
ENDRIN		0.096	U		0.094	U		0.094	U		0.097	U	
ENDRIN ALDEHYDE		0.096	UJ	E	0.094	UJ	E	0.094	UJ	E	0.097	UJ	E
ENDRIN KETONE		0.096	UJ	E	0.094	UJ	E	0.094	UJ	E	0.097	UJ	E
GAMMA-BHC (LINDANE)		0.048	U		0.047	U		0.047	U		0.048	U	
GAMMA-CHLORDANE		0.048	UJ	E	0.047	UJ	E	0.047	UJ	E	0.048	UJ	E
HEPTACHLOR		0.048	U		0.047	U		0.047	U		0.048	U	
HEPTACHLOR EPOXIDE		0.048	UJ	E	0.047	UJ	E	0.047	UJ	E	0.048	UJ	E
METHOXYCHLOR		0.48	UJ	C	0.47	UJ	C	0.47	UJ	C	0.48	UJ	C
TOXAPHENE		0.96	U		0.94	U		0.94	U		0.97	U	

PROJ_NO: 02063	NSAMPLE	SWB-17-01
SDG: CTO070-2	LAB_ID	SB5944-14
FRACTION: PEST/PCB	SAMP_DATE	10/17/2008
MEDIA: WATER	QC_TYPE	SB
	UNITS	UG/L
	PCT_SOLIDS	
	DUP_OF	

PARAMETER	RESULT	VQL	QLCD
4,4'-DDD	0.094	U	
4,4'-DDE	0.094	U	
4,4'-DDT	0.094	U	
ALDRIN	0.047	U	
ALPHA-BHC	0.047	UJ	E
ALPHA-CHLORDANE	0.047	UJ	E
BETA-BHC	0.047	UJ	E
DELTA-BHC	0.047	U	
DIELDRIN	0.094	UJ	E
ENDOSULFAN I	0.047	UJ	E
ENDOSULFAN II	0.094	U	
ENDOSULFAN SULFATE	0.094	U	
ENDRIN	0.094	U	
ENDRIN ALDEHYDE	0.094	UJ	E
ENDRIN KETONE	0.094	UJ	E
GAMMA-BHC (LINDANE)	0.047	U	
GAMMA-CHLORDANE	0.047	UJ	E
HEPTACHLOR	0.047	U	
HEPTACHLOR EPOXIDE	0.047	UJ	E
METHOXYCHLOR	0.47	UJ	C
TOXAPHENE	0.94	U	

PROJ_NO: 02063	NSAMPLE	SB-17-101-0001			SB-17-101-0104			SB-17-102-0001			SB-17-102-0104		
SDG: CTO070-2	LAB_ID	SB5944-6			SB5944-7			SB5944-8			SB5944-9		
FRACTION: HERB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	87.4			94.9			94.0			91.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		38	U		35	U		35	U		36	U	
2,4-D		38	U		35	U		35	U		36	U	

PROJ_NO: 02063	NSAMPLE	SB-17-103-0001			SB-17-103-0104			SB-17-104-0001			SB-17-104-0104		
SDG: CTO070-2	LAB_ID	SB5944-10			SB5944-11			SB5944-12			SB5944-13		
FRACTION: HERB	SAMP_DATE	10/17/2008			10/17/2008			10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	93.6			89.8			91.0			88.4		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		35	U		37	U		36	U		37	U	
2,4-D		35	U		37	U		36	U		37	U	

PROJ_NO: 02063	NSAMPLE	SB-17-106-0001			SB-17-106-0104			SB-17-109-0001			SB-17-109-0104		
SDG: CTO070-2	LAB_ID	SB5944-1RA			SB5944-2			SB5904-8RA2			SB5904-9RA2		
FRACTION: HERB	SAMP_DATE	10/17/2008			10/17/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	92.0			93.5			92.0			95.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		36	U		35	U		36	U		34	U	
2,4-D		36	U		35	U		36	U		34	U	

PROJ_NO: 02063	NSAMPLE	SB-17-110-0104			SB-17-114-0001			SB-17-114-0104			SB-17-115-0710		
SDG: CTO070-2	LAB_ID	SB5904-5			SB5904-6			SB5904-7RA2			SB5904-4		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	91.6			91.6			95.0			81.6		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		36	U		36	U		35	U		40	U	
2,4-D		36	U		36	U		35	U		40	U	

PROJ_NO: 02063	NSAMPLE	SB-17-116-0407			SB-17-117-0104			SB-17-119-0104			SB-17-120-0205		
SDG: CTO070-2	LAB_ID	SB5904-12RA2			SB5944-5			SB5904-3			SB5904-10RA2		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/17/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	78.5			82.7			91.2			76.2		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		42	U		40	U		36	U		43	U	
2,4-D		42	U		40	U		36	U		43	U	

PROJ_NO: 02063	NSAMPLE	SB-17-121-0205			SB-17-121-0710			SB-17-121-1215			SB-17-122-0407		
SDG: CTO070-2	LAB_ID	SB5904-13RA2			SB5904-14RA			SB5904-15RA			SB5944-3		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	74.8			80.7			79.1			66.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		44	U		41	U		42	U		50	U	
2,4-D		44	U		41	U		42	U		50	U	

PROJ_NO: 02063	NSAMPLE	SB-17-124-0001			SB-17-124-0104			SB-17-DUP05			SB-17-DUP06		
SDG: CTO070-2	LAB_ID	SB5904-1			SB5904-2			SB5904-11RA2			SB5944-4		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			FD			FD		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	85.9			85.0			72.9			70.8		
	DUP_OF							SB-17-120-0205			SB-17-122-0407		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		38	U		39	U		45	U		47	U	
2,4-D		38	U		39	U		45	U		47	U	

PROJ_NO: 02063	NSAMPLE	SB-17-RB01			SB-17-RB02			SB-17-RB03			SB-17-RB04		
SDG: CTO070-2	LAB_ID	SB5904-16			SB5904-17			SB5944-15			SB5944-16		
FRACTION: HERB	SAMP_DATE	10/16/2008			10/16/2008			10/17/2008			10/17/2008		
MEDIA: WATER	QC_TYPE	RB			RB			RB			RB		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		2.8	U		2.8	U		2.9	U		2.9	U	
2,4-D		2.8	U		2.8	U		2.9	U		2.9	U	

PROJ_NO: 02063	NSAMPLE	SWB-17-01		
SDG: CTO070-2	LAB_ID	SB5944-14		
FRACTION: HERB	SAMP_DATE	10/17/2008		
MEDIA: WATER	QC_TYPE	SB		
	UNITS	UG/L		
	PCT_SOLIDS			
	DUP_OF			
PARAMETER		RESULT	VQL	QLCD
2,4,5-T		3.2	U	
2,4-D		3.2	U	

PROJ_NO: 02063	NSAMPLE	SB-17-115-0710			SB-17-121-0205			SB-17-121-0710			SB-17-121-1215		
SDG: CTO070-2	LAB_ID	SB5904-4RA			SB5904-13DL			SB5904-14RA			SB5904-15		
FRACTION: PET	SAMP_DATE	10/16/2008			10/16/2008			10/16/2008			10/16/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	81.6			74.8			80.7			79.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
DIESEL RANGE ORGANICS		1.3	J	P	1700			6.2	U		13		

PROJ_NO: 02063	NSAMPLE	SB-17-122-0407			SB-17-DUP06		
SDG: CTO070-2	LAB_ID	SB5944-3DL			SB5944-4DL		
FRACTION: PET	SAMP_DATE	10/17/2008			10/17/2008		
MEDIA: SOIL	QC_TYPE	NM			FD		
	UNITS	MG/KG			MG/KG		
	PCT_SOLIDS	66.0			70.8		
	DUP_OF				SB-17-122-0407		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
DIESEL RANGE ORGANICS		200			120		

PROJ_NO: 02063 SDG: CTO070-2 FRACTION: PET MEDIA: WATER	NSAMPLE	SB-17-RB01			SB-17-RB02		
	LAB_ID	SB5904-16			SB5904-17		
	SAMP_DATE	10/16/2008			10/16/2008		
	QC_TYPE	RB			RB		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS						
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
DIESEL RANGE ORGANICS		44	J	P	48		

TETRA TECH

INTERNAL CORRESPONDENCE

C-NAVY-03-09-3076W

Date: March 2, 2009

c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Jennifer Cardinal (no copy) JC

Subject: Tier II Inorganic Data Validation, SDG CTO070-3
Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Arsenic/Lead/Zinc/Cyanide:

18/Soils/	SB-17-105-0001	SB-17-105-0104	SB-17-107-0001
	SB-17-107-0104	SB-17-107-0408	SB-17-108-0001
	SB-17-108-0104	SB-17-111-0104	SB-17-112-0001
	SB-17-112-0104	SB-17-113-0001	SB-17-113-0104
	SB-17-118-0001	SB-17-118-0104	SB-17-132-0408
	SB-17-141-0307	SB-17-DUP07	SB-17-DUP08

(Field Duplicate Pairs: SB-17-105-0001/SB-17-DUP07, SB-17-132-0408/SB-17-DUP08)

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the arsenic, lead, zinc, and cyanide analytical data from the samples collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine on October 20, 2008. Sample collection and analysis was performed according to the requirements of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The metals (arsenic, lead, and zinc) analysis was performed according to USEPA SW-846 Methods 6010B. The cyanide analysis was performed according to USEPA SW-846 9012M. The Tier II data validation was performed in accordance with the Region I EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part IV, Inorganic Data Validation Functional Guidelines, November 2008.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The analytical data in this SDG were evaluated based on the following parameters:

- Data Completeness
- * Holding Times
- * Calibration Verification
- * Laboratory Blank Analyses
- * ICP Interference Check Sample Results
- Matrix Spike/Matrix Spike Duplicate
- * Laboratory Duplicate Results
- * Laboratory Control Sample Results

* • Field Duplicate Precision
* • ICP Serial Dilution Results
* • Percent Solids
• Reporting Limits

* All quality control criteria were met for this parameter.

Data Completeness

The laboratory noted that one sample container for sample SB-17-113-0001 was labeled "17-113-0004". However, the sample container had the correct sample time of 10:20.

Metals

On February 24, 2009 the laboratory resubmitted all metals QC summary forms to report only arsenic, lead, and zinc as requested in the Work Plan and to report all results to the method detection limits.

Matrix Spike/Matrix Spike Duplicate

Cyanide

The following table summarizes the result in the matrix spike analysis of sample SB-17-108-0104 which was outside of the 75-125% recovery criteria:

Compound	%Recovery	Action	
		(+)	NDs
Cyanide	61		UJ

The non-detected cyanide results are estimated (UJ) in all soil samples due to a low matrix spike recovery.

The recovery for cyanide was below the matrix spike recovery criterion; therefore, the project accuracy may be impacted. The non-detected cyanide results in all samples are usable as estimated quantitation limits which may be biased low.

Reporting Limits

The positive results below than the laboratory's quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

Metals

The laboratory reported non-detected metals results down to the MDL.

The laboratory reporting limits met all project action limits with the following exception. The arsenic reporting limits for samples SB-17-132-0408, SB-17-DUP08, and SB-17-141-0307 did not meet the project action limit due to the high moisture content of the samples. Data usability is not impacted since all of these samples have positive arsenic results.

Cyanide

The laboratory reported non-detected cyanide results down to the QL.

The cyanide project action limit was not achieved for samples SB-17-132-0408 and SB-17-DUP08 due to the high moisture content of the samples. Data usability may be impacted.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity, and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Metals

The project goals with respect to accuracy, precision, sensitivity, and completeness were met for the metals data set. Data usability is not impacted with regards to accuracy, precision, sensitivity, and completeness.

Cyanide

The project goals with respect to accuracy were met for the cyanide data set with the following exception. Cyanide was qualified as estimated in all samples due a low matrix spike recovery; the affected results may be biased low. Although specific method criteria were not met in this instance, the affected non-detected results are usable as estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to sensitivity were met for the cyanide data set with the following exception. The cyanide project action limit was not achieved for samples SB-17-132-0408 and SB-17-DUP08 due to the high moisture content of the samples. Data usability may be impacted.

The project goals with respect to precision and completeness were met for the cyanide data set. Data usability is not impacted with regards to precision and completeness.

Tables: Data Validation Qualifiers and Codes
Data Summary Tables

Enclosures: Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	SB-17-105-0001			SB-17-105-0104			SB-17-107-0001			SB-17-107-0104		
SDG: CTO070-3	LAB_ID	SB6002-001			SB6002-002			SB6002-003			SB6002-004		
FRACTION: M	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	88.6			95.4			79.8			83.5		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		1.4			1.5			7.8			6.8		
LEAD		11.4			3			9			5.6		
ZINC		13.2			11.9			25			18.4		

PROJ_NO: 02063	NSAMPLE	SB-17-107-0408			SB-17-108-0001			SB-17-108-0104			SB-17-111-0104		
SDG: CTO070-3	LAB_ID	SB6002-005			SB6002-006			SB6002-007			SB6002-009		
FRACTION: M	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	79.2			86.4			77.0			91.3		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		1.5			5.2			3.1			3.4		
LEAD		2.5			6.2			6.2			7.7		
ZINC		11.9			23			19.9			23.7		

PROJ_NO: 02063	NSAMPLE	SB-17-112-0001			SB-17-112-0104			SB-17-113-0001			SB-17-113-0104		
SDG: CTO070-3	LAB_ID	SB6002-010			SB6002-011			SB6002-012			SB6002-013		
FRACTION: M	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	83.1			82.8			90.2			79.7		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		9.4			2.2			8.3			4.1		
LEAD		4.7			3.6			12.4			32.3		
ZINC		24.6			18.9			29			21		

PROJ_NO: 02063	NSAMPLE	SB-17-118-0001			SB-17-118-0104			SB-17-132-0408			SB-17-141-0307		
SDG: CTO070-3	LAB_ID	SB6002-014			SB6002-015			SB6002-016			SB6002-018		
FRACTION: M	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	94.1			85.5			39.2			66.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		6.8			3.2			4.4			1.9		
LEAD		9.1			6.1			6.3			3		
ZINC		25.1			18			33.4			15.6		

PROJ_NO: 02063	NSAMPLE	SB-17-DUP07			SB-17-DUP08		
SDG: CTO070-3	LAB_ID	SB6002-008			SB6002-017		
FRACTION: M	SAMP_DATE	10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	FD			FD		
	UNITS	MG/KG			MG/KG		
	PCT_SOLIDS	90.4			48.7		
	DUP_OF	SB-17-105-0001			SB-17-132-0408		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		1.6			3.6		
LEAD		7.8			5.2		
ZINC		10.9			25.7		

PROJ_NO: 02063	NSAMPLE	SB-17-105-0001			SB-17-105-0104			SB-17-107-0001			SB-17-107-0104		
SDG: CTO070-3	LAB_ID	SB6002-1			SB6002-2			SB6002-3			SB6002-4		
FRACTION: MISC	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	88.6			95.4			79.8			83.5		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.55	UJ	D	0.5	UJ	D	0.6	UJ	D	0.6	UJ	D

PROJ_NO: 02063	NSAMPLE	SB-17-107-0408			SB-17-108-0001			SB-17-108-0104			SB-17-111-0104		
SDG: CTO070-3	LAB_ID	SB6002-5			SB6002-6			SB6002-7			SB6002-9		
FRACTION: MISC	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	79.2			86.4			77.0			91.3		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.6	UJ	D	0.55	UJ	D	0.65	UJ	D	0.55	UJ	D

PROJ_NO: 02063	NSAMPLE	SB-17-112-0001			SB-17-112-0104			SB-17-113-0001			SB-17-113-0104		
SDG: CTO070-3	LAB_ID	SB6002-10			SB6002-11			SB6002-12			SB6002-13		
FRACTION: MISC	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	83.1			82.8			90.2			79.7		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.6	UJ	D	0.6	UJ	D	0.55	UJ	D	0.6	UJ	D

PROJ_NO: 02063	NSAMPLE	SB-17-118-0001			SB-17-118-0104			SB-17-132-0408			SB-17-141-0307		
SDG: CTO070-3	LAB_ID	SB6002-14			SB6002-15			SB6002-16			SB6002-18		
FRACTION: MISC	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	94.1			85.5			39.2			66.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.5	UJ	D	0.6	UJ	D	1.3	UJ	D	0.75	UJ	D

PROJ_NO: 02063	NSAMPLE	SB-17-DUP07			SB-17-DUP08		
SDG: CTO070-3	LAB_ID	SB6002-8			SB6002-17		
FRACTION: MISC	SAMP_DATE	10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	FD			FD		
	UNITS	MG/KG			MG/KG		
	PCT_SOLIDS	90.4			48.7		
	DUP_OF	SB-17-105-0001			SB-17-132-0408		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		0.55	UJ	D	1	UJ	D

TETRA TECH

INTERNAL CORRESPONDENCE

C-NAVY-02-09-3066W

Date: February 23, 2009

c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Jennifer Cardinal (no copy) JC

Subject: Tier II Organic Data Validation, SDG CTO070-3
Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Pesticides/Herbicides:

18/Soils/	SB-17-105-0001	SB-17-105-0104	SB-17-107-0001
	SB-17-107-0104	SB-17-107-0408	SB-17-108-0001
	SB-17-108-0104	SB-17-111-0104	SB-17-112-0001
	SB-17-112-0104	SB-17-113-0001	SB-17-113-0104
	SB-17-118-0001	SB-17-118-0104	SB-17-132-0408
	SB-17-141-0307	SB-17-DUP07	SB-17-DUP08

(Field Duplicate Pairs: SB-17-105-0001/SB-17-DUP07, SB-17-132-0408/SB-17-DUP08)

DRO:
1/Soil/ SB-17-111-0104

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the diesel range organic (DRO), pesticide, herbicide analytical data for the samples in this SDG. The samples were collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine on October 20, 2008. Sample collection and analysis was performed according to the requirements of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The DRO analysis was performed according to MEDEP 4.1.25. The pesticide and herbicide analyses were performed according to USEPA SW-846 Methods 8081 and 8151, respectively.

The DRO data validation was performed in accordance with the Region I EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996. The pesticides and herbicide validation was performed in accordance with the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Organic Analyses, Part III, February 2004.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The data were evaluated based on the following parameters:

- Data Completeness

*	•	Preservation and Technical Holding Times
NA	•	GC/MS Instrument Performance Check (Tuning)
*	•	Pesticide Degradation
	•	Initial and Continuing Calibrations
	•	Blanks
*	•	Surrogate Compounds
NA	•	Internal Standards
*	•	Matrix Spike/Matrix Spike Duplicate
	•	Laboratory Control Sample/Laboratory Control Sample Duplicate
*	•	Field Duplicates
	•	Analyte Identification
	•	Reporting Limits

* All criteria were met for this parameter.
NA Not applicable for this SDG.

Data Completeness

The laboratory noted that one sample container for sample SB-17-113-0001 was labeled "17-113-0004". However, the sample container had the correct sample time of 10:20 listed on the chain-of-custody form.

On February 16, 2009 the laboratory provided an explanation as to which results should be reported for sample SB-17-118-0001 since two pesticide Form Is were provided for this sample in the original data package.

The laboratory was contacted regarding the initial calibration verification (ICV) summary forms for the DRO, pesticides, and herbicides analyses. On February 19, 2009 the laboratory explained that the ICV results are reported with the calibration verification forms.

Initial and Continuing Calibrations

Pesticides

The following table summarizes the pesticide compounds that failed to meet the continuing calibration (CC) criterion of %D <25:

Compound	%D	Action		Affected Samples
		(+)	NDs	
4,4'-DDT	-37.20, -33.60	J	UJ	SB-17-113-0104DL, SB-17-118-0104, SB-17-132-0408, SB-17-DUP08, SB-17-141-0307
Methoxychlor	-37.40, -26.40		UJ	SB-17-118-0104, SB-17-132-0408, SB-17-DUP08, SB-17-141-0307

Although the %D was outside of the QC limits for 4,4'-DDT and methoxychlor; the project accuracy goals were not impacted since the instrument calibration variability is below safety margin of greater than 100% allocated for the compounds in the soil samples. The positive and non-detected results in the affected samples are usable as estimated values and estimated quantitation limits.

Blanks

Pesticides

The following table summarizes the level of blank contamination detected in the laboratory blank associated with the samples.

Compound	Type of Blank	Maximum Conc. (µg/Kg)	Action Level (µg/Kg)	Affected Samples
4,4'-DDE	Method	0.94	4.7	SB-17-105-0104, SB-17-107-0001, SB-17-107-0104, SB-17-107-0408, SB-17-108-0104, SB-17-132-0408, SB-17-141-0307
4,4'-DDT	Method	1.1	5.5	SB-17-105-0104, SB-17-107-0104, SB-17-107-0408, SB-17-108-0104, SB-17-132-0408
Heptachlor	Method	0.57	2.85	SB-17-113-0001
4,4'-DDD	Method	0.59	2.95	SB-17-107-0001, SB-17-107-0104, SB-17-108-0001, SB-17-111-0104, SB-17-118-0104, SB-17-141-0307, SB-17-DUP07

Blank actions were applied to the affected samples due to 4,4'-DDE, 4,4'-DDT, heptachlor, and 4,4'-DDD method blank contamination. The 5x rule applies for these pesticide compounds. The positive results for 4,4'-DDE, 4,4'-DDT, heptachlor, and 4,4'-DDD in the affected samples were changed to non-detected values at the sample-specific project quantitation limit or at elevated quantitation limits.

Heptachlor contamination was found in the laboratory method blank; therefore, the project sensitivity goals may be impacted since the non-detected value exceeds the project action limit for heptachlor. The heptachlor result in the affected sample is usable as a non-detected value.

Although 4,4'-DDE, 4,4'-DDT, and 4,4'-DDD contamination was found in the laboratory method blank, the project sensitivity goals are not impacted since the non-detected values do not exceed the project action limits for these compounds. The 4,4'-DDE, 4,4'-DDT, and 4,4'-DDD results in the affected samples are usable as non-detected values.

Laboratory Control Sample/Laboratory Control Sample Duplicates

Pesticides

The following table summarizes the pesticide compound that failed to meet the LCS recovery limits:

Compound	% Rec.	QC Limits	Action		Affected Samples
			(+)	NDs	
4,4'-DDT	257	45-110	J		All samples except SB-17-DUP08

The laboratory control sample recovery criterion was exceeded for 4,4'-DDT; therefore, the project accuracy goals may be impacted. The positive 4,4'-DDT results in the affected samples are usable as estimated values which may be biased high.

Analyte Identification/Quantitation

Pesticides

The relative percent difference (RPD) between the results of analytical columns 1 and 2 exceeded the 40% RPD QC criterion for the compounds in the following samples:

Sample	Analyte	RPD	Action
			(+)
SB-17-107-0001	Gamma-chlordane	45.4	J
SB-17-113-0001	Heptachlor	53.7	J
SB-17-113-0104	Alpha-chlordane	47.8	J

The analyte quantitation relative percent differences exceeded the 40% RPD QC limit for gamma-chlordane in sample SB-17-107-0001, heptachlor in sample SB-17-113-0001, and alpha-chlordane in sample SB-17-113-0104; therefore, the project accuracy goals may be impacted. The affected results in these samples are usable as estimated values.

Reporting Limits

All positive results below the quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

Herbicides

The project action limit for 2,4-D was not met due to the percent moisture of the samples. Data usability may be impacted.

Pesticides

Project action limits were not achievable for all pesticides except for 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, methoxychlor, and toxaphene as highlighted in SAP Worksheet 15a of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008. Data usability may be impacted.

The reporting limits were raised for 4,4'-DDE, 4,4'-DDT, heptachlor, and 4,4'-DDD in select samples due to blank contamination. As discussed in the Blanks section, the project sensitivity goals may be impacted for heptachlor.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Pesticides

The project goals with respect to accuracy were met for the pesticides data set with the following exceptions. 4,4'-DDT was qualified as estimated in select samples due to a high LCS recovery; the affected results may be biased high. Gamma-chlordane in sample SB-17-107-0001, heptachlor in sample SB-17-113-0001, and alpha-chlordane in sample SB-17-113-0104 were qualified as estimated in select samples due to analytical interferences detected in the dual column analysis. Although specific method criteria were not met in these instances, the affected positive and non-detected results are usable as estimated values and estimated quantitation limits which may have a minor impact on data usability. Additionally, 4,4'-DDT and methoxychlor were qualified as estimated in select samples due to instrument calibration variability. Although specific method criteria were not met in these instances, data usability is not impacted and the affected positive and non-detected results are usable as estimated values and estimated quantitation limits.

The project goals with respect to sensitivity were met for the pesticides data set with the following exception. Project action limits were not achievable for all pesticides except for 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, methoxychlor, and toxaphene. Also, the reporting limit for heptachlor was raised in select samples due to blank contamination. The elevated quantitation limits exceed the project action limit. Data usability may be impacted.

The project goals with respect to precision and completeness were met for the pesticides data set. Data usability was not impacted with regards to precision and completeness.

Herbicides

The project goals with respect to sensitivity were met for 2,4,5-T, but not for 2,4-D due to the percent moisture of the samples. Data usability may be impacted.

The project goals with respect to accuracy, precision, and completeness were met for the herbicides data set. Data usability was not impacted with regards to accuracy, precision, and completeness.

DRO

The project goals with respect to accuracy, precision, sensitivity, and completeness were met for the DRO data set. Data usability was not impacted with regards to accuracy, precision, sensitivity, and completeness.

Tables:	Data Validation Qualifiers and Codes
	Data Summary Tables
Enclosures:	Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	SB-17-105-0001			SB-17-105-0104			SB-17-107-0001			SB-17-107-0104		
SDG: CTO070-3	LAB_ID	SB6002-1			SB6002-2			SB6002-3			SB6002-4		
FRACTION: PEST/PCB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	88.6			95.4			79.8			83.5		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		3.7	U		3.4	U		4.1	U	A	4	U	A
4,4'-DDE		17			3.4	U	A	4.1	U	A	4	U	A
4,4'-DDT		28	J	E	3.4	UJ	AE	19	J	E	5	UJ	AE
ALDRIN		1.9	U		1.8	U		2.1	U		2	U	
ALPHA-BHC		1.9	U		1.8	U		2.1	U		2	U	
ALPHA-CHLORDANE		1.9	U		1.8	U		1.1	J	P	2	U	
BETA-BHC		1.9	U		1.8	U		2.1	U		2	U	
DELTA-BHC		1.9	U		1.8	U		2.1	U		2	U	
DIELDRIN		3.7	U		3.4	U		4.1	U		4	U	
ENDOSULFAN I		1.9	U		1.8	U		2.1	U		2	U	
ENDOSULFAN II		3.7	U		3.4	U		4.1	U		4	U	
ENDOSULFAN SULFATE		3.7	U		3.4	U		4.1	U		4	U	
ENDRIN		3.7	U		3.4	U		4.1	U		4	U	
ENDRIN ALDEHYDE		3.7	U		3.4	U		4.1	U		4	U	
ENDRIN KETONE		3.7	U		3.4	U		4.1	U		4	U	
GAMMA-BHC (LINDANE)		1.9	U		1.8	U		2.1	U		2	U	
GAMMA-CHLORDANE		1.9	U		1.8	U		1	J	PU	2	U	
HEPTACHLOR		1.9	U		1.8	U		2.1	U		2	U	
HEPTACHLOR EPOXIDE		1.9	U		1.8	U		2.1	U		2	U	
METHOXYCHLOR		19	U		18	U		21	U		20	U	
TOXAPHENE		37	U		34	U		41	U		40	U	

PROJ_NO: 02063	NSAMPLE	SB-17-107-0408			SB-17-108-0001			SB-17-108-0104			SB-17-111-0104		
SDG: CTO070-3	LAB_ID	SB6002-5			SB6002-6			SB6002-7			SB6002-9		
FRACTION: PEST/PCB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	79.2			86.4			77.0			91.3		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		4.2	U		3.8	U	A	4.3	U		3.6	U	A
4,4'-DDE		4.2	U	A	12			4.3	U	A	12		
4,4'-DDT		4.2	UJ	AE	8.2	J	E	5	UJ	AE	28	J	E
ALDRIN		2.1	U		2	U		2.2	U		1.9	U	
ALPHA-BHC		2.1	U		2	U		2.2	U		1.9	U	
ALPHA-CHLORDANE		2.1	U		2	U		2.2	U		1.9	U	
BETA-BHC		2.1	U		2	U		2.2	U		1.9	U	
DELTA-BHC		2.1	U		2	U		2.2	U		1.9	U	
DIELDRIN		4.2	U		3.8	U		4.3	U		3.6	U	
ENDOSULFAN I		2.1	U		2	U		2.2	U		1.9	U	
ENDOSULFAN II		4.2	U		3.8	U		4.3	U		3.6	U	
ENDOSULFAN SULFATE		4.2	U		3.8	U		4.3	U		3.6	U	
ENDRIN		4.2	U		3.8	U		4.3	U		3.6	U	
ENDRIN ALDEHYDE		4.2	U		3.8	U		4.3	U		3.6	U	
ENDRIN KETONE		4.2	U		3.8	U		4.3	U		3.6	U	
GAMMA-BHC (LINDANE)		2.1	U		2	U		2.2	U		1.9	U	
GAMMA-CHLORDANE		2.1	U		2	U		2.2	U		1.9	U	
HEPTACHLOR		2.1	U		2	U		2.2	U		1.9	U	
HEPTACHLOR EPOXIDE		2.1	U		2	U		2.2	U		1.9	U	
METHOXYCHLOR		21	U		20	U		22	U		19	U	
TOXAPHENE		42	U		38	U		43	U		36	U	

PROJ_NO: 02063	NSAMPLE	SB-17-112-0001			SB-17-112-0001DL			SB-17-112-0104DL			SB-17-112-0104DL2		
SDG: CTO070-3	LAB_ID	SB6002-10			SB6002-10DL			SB6002-11DL			SB6002-11DL2		
FRACTION: PEST/PCB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	83.1			83.1			82.8			82.8		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD					100			520					
4,4'-DDE		46						80					
4,4'-DDT					1200	J	E				7200	J	CE
ALDRIN		2	U					20	U				
ALPHA-BHC		2	U					20	U				
ALPHA-CHLORDANE		7						20	U				
BETA-BHC		2	U					20	U				
DELTA-BHC		2	U					20	U				
DIELDRIN		4	U					40	U				
ENDOSULFAN I		2	U					20	U				
ENDOSULFAN II		4	U					40	U				
ENDOSULFAN SULFATE		4	U					40	U				
ENDRIN		4	U					40	U				
ENDRIN ALDEHYDE		4	U					40	U				
ENDRIN KETONE		4	U					40	U				
GAMMA-BHC (LINDANE)		2	U					20	U				
GAMMA-CHLORDANE		7.7						20	U				
HEPTACHLOR		2	U					20	U				
HEPTACHLOR EPOXIDE		2	U					20	U				
METHOXYCHLOR		20	U					200	U				
TOXAPHENE		40	U					400	U				

PROJ_NO: 02063	NSAMPLE	SB-17-113-0001			SB-17-113-0104			SB-17-113-0104DL			SB-17-118-0001		
SDG: CTO070-3	LAB_ID	SB6002-12			SB6002-13			SB6002-13DL			SB6002-14		
FRACTION: PEST/PCB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	90.2			79.7			79.7			94.1		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		8.7			84						7.6		
4,4'-DDE		15			84						52		
4,4'-DDT		45	J	E				580	J	CE			
ALDRIN		1.9	U		2.1	U					1.8	U	
ALPHA-BHC		1.9	U		2.1	U					1.8	U	
ALPHA-CHLORDANE		1.9	U		14	J	U				1.8	U	
BETA-BHC		1.9	U		2.1	U					1.8	U	
DELTA-BHC		1.9	U		2.1	U					1.8	U	
DIELDRIN		3.6	U		4.1	U					3.5	U	
ENDOSULFAN I		1.9	U		2.1	U					1.8	U	
ENDOSULFAN II		3.6	U		4.1	U					3.5	U	
ENDOSULFAN SULFATE		3.6	U		4.1	U					3.5	U	
ENDRIN		3.6	U		4.1	U					3.5	U	
ENDRIN ALDEHYDE		3.6	U		4.1	U					3.5	U	
ENDRIN KETONE		3.6	U		4.1	U					3.5	U	
GAMMA-BHC (LINDANE)		1.9	U		2.1	U					1.8	U	
GAMMA-CHLORDANE		1.9	U		14						1.8	U	
HEPTACHLOR		1.9	UJ	AU	2.1	U					1.8	U	
HEPTACHLOR EPOXIDE		1.9	U		2.1	U					1.8	U	
METHOXYCHLOR		19	U		21	U					18	U	
TOXAPHENE		36	U		41	U					35	U	

PROJ_NO: 02063	NSAMPLE	SB-17-118-0001DL			SB-17-118-0104			SB-17-132-0408			SB-17-141-0307		
SDG: CTO070-3	LAB_ID	SB6002-14DL			SB6002-15			SB6002-16			SB6002-18		
FRACTION: PEST/PCB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.1			85.5			39.2			66.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD					3.8	U	A	8.4	U		5	U	A
4,4'-DDE					10			8.4	U	A	5	U	A
4,4'-DDT		210	J	E	22	J	CE	8.4	UJ	ACE	13	J	CE
ALDRIN					2	U		4.3	U		2.6	U	
ALPHA-BHC					2	U		4.3	U		2.6	U	
ALPHA-CHLORDANE					1.3	J	P	4.3	U		2.6	U	
BETA-BHC					2	U		4.3	U		2.6	U	
DELTA-BHC					2	U		4.3	U		2.6	U	
DIELDRIN					3.8	U		8.4	U		5	U	
ENDOSULFAN I					2	U		4.3	U		2.6	U	
ENDOSULFAN II					3.8	U		8.4	U		5	U	
ENDOSULFAN SULFATE					3.8	U		8.4	U		5	U	
ENDRIN					3.8	U		8.4	U		5	U	
ENDRIN ALDEHYDE					3.8	U		8.4	U		5	U	
ENDRIN KETONE					3.8	U		8.4	U		5	U	
GAMMA-BHC (LINDANE)					2	U		4.3	U		2.6	U	
GAMMA-CHLORDANE					1.1	J	P	4.3	U		2.6	U	
HEPTACHLOR					2	U		4.3	U		2.6	U	
HEPTACHLOR EPOXIDE					2	U		4.3	U		2.6	U	
METHOXYCHLOR					20	UJ	C	43	UJ	C	26	UJ	C
TOXAPHENE					38	U		84	U		50	U	

PROJ_NO: 02063	NSAMPLE	SB-17-DUP07			SB-17-DUP08		
SDG: CTO070-3	LAB_ID	SB6002-8			SB6002-17		
FRACTION: PEST/PCB	SAMP_DATE	10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	FD			FD		
	UNITS	UG/KG			UG/KG		
	PCT_SOLIDS	90.4			48.7		
	DUP_OF	SB-17-105-0001			SB-17-132-0408		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		3.6	U	A	6.8	U	
4,4'-DDE		14			6.8	U	
4,4'-DDT		28	J	E	6.8	UJ	C
ALDRIN		1.9	U		3.5	U	
ALPHA-BHC		1.9	U		3.5	U	
ALPHA-CHLORDANE		1.9	U		3.5	U	
BETA-BHC		1.9	U		3.5	U	
DELTA-BHC		1.9	U		3.5	U	
DIELDRIN		3.6	U		6.8	U	
ENDOSULFAN I		1.9	U		3.5	U	
ENDOSULFAN II		3.6	U		6.8	U	
ENDOSULFAN SULFATE		3.6	U		6.8	U	
ENDRIN		3.6	U		6.8	U	
ENDRIN ALDEHYDE		3.6	U		6.8	U	
ENDRIN KETONE		3.6	U		6.8	U	
GAMMA-BHC (LINDANE)		1.9	U		3.5	U	
GAMMA-CHLORDANE		1.9	U		3.5	U	
HEPTACHLOR		1.9	U		3.5	U	
HEPTACHLOR EPOXIDE		1.9	U		3.5	U	
METHOXYCHLOR		19	U		35	UJ	C
TOXAPHENE		36	U		68	U	

PROJ_NO: 02063	NSAMPLE	SB-17-111-0104		
SDG: CTO070-3	LAB_ID	SB6002-9		
FRACTION: PET	SAMP_DATE	10/20/2008		
MEDIA: SOIL	QC_TYPE	NM		
	UNITS	MG/KG		
	PCT_SOLIDS	91.3		
	DUP_OF			
PARAMETER		RESULT	VQL	QLCD
DIESEL RANGE ORGANICS		14		

PROJ_NO: 02063	NSAMPLE	SB-17-105-0001			SB-17-105-0104			SB-17-107-0001			SB-17-107-0104		
SDG: CTO070-3	LAB_ID	SB6002-1RA			SB6002-2RA			SB6002-3RA			SB6002-4RA		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	88.6			95.4			79.8			83.5		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		37	U		34	U		41	U		40	U	
2,4-D		37	U		34	U		41	U		40	U	

PROJ_NO: 02063	NSAMPLE	SB-17-107-0408			SB-17-108-0001			SB-17-108-0104			SB-17-111-0104		
SDG: CTO070-3	LAB_ID	SB6002-5RA			SB6002-6RA			SB6002-7			SB6002-9		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	79.2			86.4			77.0			91.3		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		42	U		38	U		43	U		36	U	
2,4-D		42	U		38	U		43	U		36	U	

PROJ_NO: 02063	NSAMPLE	SB-17-112-0001			SB-17-112-0104			SB-17-113-0001			SB-17-113-0104		
SDG: CTO070-3	LAB_ID	SB6002-10			SB6002-11			SB6002-12			SB6002-13		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	83.1			82.8			90.2			79.7		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		40	U		40	U		36	U		41	U	
2,4-D		40	U		40	U		36	U		41	U	

PROJ_NO: 02063	NSAMPLE	SB-17-118-0001			SB-17-118-0104			SB-17-132-0408			SB-17-141-0307		
SDG: CTO070-3	LAB_ID	SB6002-14			SB6002-15			SB6002-16			SB6002-18		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008			10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/KG			UG/KG			UG/KG			UG/KG		
	PCT_SOLIDS	94.1			85.5			39.2			66.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		35	U		38	U		84	U		50	U	
2,4-D		35	U		38	U		84	U		50	U	

PROJ_NO: 02063	NSAMPLE	SB-17-DUP07			SB-17-DUP08		
SDG: CTO070-3	LAB_ID	SB6002-8			SB6002-17		
FRACTION: HERB	SAMP_DATE	10/20/2008			10/20/2008		
MEDIA: SOIL	QC_TYPE	FD			FD		
	UNITS	UG/KG			UG/KG		
	PCT_SOLIDS	90.4			48.7		
	DUP_OF	SB-17-105-0001			SB-17-132-0408		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		36	U		68	U	
2,4-D		36	U		68	U	

INTERNAL CORRESPONDENCE

C-NAVY-03-09-3075W

Date: March 2, 2009 c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Jennifer Cardinal (no copy)

Subject: Tier II Inorganic Data Validation, SDG SB7090
Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

Arsenic/Lead/Zinc/Cyanide:

9/Groundwaters/	S17-GW-DUP01	S17-GW-MW1701
	S17-GW-MW1702	S17-GW-MW1703
	S17-GW-MW1704	S17-GW-MWNASB65
	S17-GW-MWNASB66	S17-GW-MWNASB68
	S17-GW-MWNASB98	
	(Field Duplicate Pair: S17-GW-MW1703/S17-GW-DUP01)	
1/Rinsate Blank/	S17-GW-RB01	

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the arsenic, lead, zinc, and cyanide analytical data from the samples collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine from December 8 to 10, 2008. Sample collection and analysis was performed according to the requirements of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The metals (arsenic, lead, and zinc) analysis was performed according to USEPA SW-846 Methods 6010B. The cyanide analysis was performed according to USEPA SW-846 M9012. The Tier II data validation was performed in accordance with the Region I EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part IV, Inorganic Data Validation Functional Guidelines, November 2008.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The analytical data in this SDG were evaluated based on the following parameters:

- Data Completeness
* • Holding Times
* • Calibration Verification
- Laboratory Blank Analyses
* • ICP Interference Check Sample Results
- Matrix Spike
* • Laboratory Duplicate Results
* • Laboratory Control Sample Results

* • Field Duplicate Precision
* • ICP Serial Dilution Results
• Reporting Limits

* All quality control criteria were met for this parameter.

Data Completeness

Metals

On February 24, 2009 the laboratory resubmitted all metals QC summary forms to report only arsenic, lead, and zinc as requested in the Work Plan and to report all results to the method detection limits.

Laboratory Blank Analyses

The rinsate blank was not used to establish blank action levels for the samples in this SDG.

Metals

The following table summarizes the level of blank contamination detected in the laboratory blanks associated with the samples in this SDG:

Analyte	Maximum Conc. (µg/L)	Action Level (µg/L)	Affected Samples
Arsenic	1.31	6.55	S17-GW-MWNASB68

The positive arsenic result below the blank action level was changed to a non-detected value (U) at an elevated reporting limit due to laboratory blank contamination.

Arsenic contamination was found in the laboratory blanks; therefore, the project sensitivity goals may be impacted since the non-detected result in sample S17-GW-MWNASB68 exceeds the project action limit for arsenic. The arsenic result in sample S17-GW-MWNASB68 is usable as an elevated reporting limit.

Matrix Spike

Cyanide

The following table summarizes the result in the matrix spike analysis of sample S17-GW-MWNASB65 which was outside of the 75-125% recovery criteria:

Compound	%Recovery	Action	
		(+)	NDs
Cyanide	72		UJ

The non-detected cyanide results are estimated (UJ) in all groundwater samples due to a low matrix spike recovery.

The recovery for cyanide was below the matrix spike recovery criterion; therefore, the project accuracy may be impacted. The non-detected cyanide results in all samples are usable as estimated quantitation limits which may be biased low.

Reporting Limits

The positive results below than the laboratory's quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

Metals

The laboratory reported non-detected metals results down to the MDL.

All project action limits were achieved by the laboratory's reporting limits, except for arsenic. Data usability for arsenic may be impacted.

The reporting limit was raised for arsenic in sample S17-GW-MWNASB68 due to blank contamination. As discussed above in the Laboratory Blank Analyses section, the project sensitivity goals may be impacted.

Cyanide

The laboratory reported non-detected cyanide results down to the QL.

The cyanide project action limits was not achieved by the laboratory's quantitation limit. Data usability for cyanide may be impacted.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity, and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Metals

The project goals with respect to sensitivity were met for the metals data set with the following exceptions. The project action limit was not achieved for arsenic. Also, due to blank actions the arsenic result in sample S17-GW-MWNASB68 was changed to a non-detected value at an elevated reporting limit. The non-detected value exceeds the arsenic project action limit. Data usability may be impacted.

The project goals with respect to accuracy, precision, and completeness were met for the metals data set. Data usability is not impacted with regards to accuracy, precision, and completeness.

Cyanide

The project goals with respect to accuracy were met for the cyanide data set with the following exception. Cyanide was qualified as estimated in all samples due a low matrix spike recovery; the affected results may be biased low. Although specific method criteria were not met in this instance, the

affected non-detected results are usable as estimated quantitation limits which may have a minor impact on data usability.

The project goals with respect to sensitivity were met for the cyanide data set with the following exception. The project action limit was not achieved for cyanide. Data usability may be impacted.

The project goals with respect to precision and completeness were met for the cyanide data set. Data usability is not impacted with regards to precision and completeness.

Tables: Data Validation Qualifiers and Codes
Data Summary Tables

Enclosures: Data Validation Worksheets

PROJ_NO: 02063	NSAMPLE	S17-GW-DUP01			S17-GW-MW1701			S17-GW-MW1702			S17-GW-MW1703		
SDG: SB7090	LAB_ID	SB7090-003			SB7090-004			SB7090-001			SB7090-002		
FRACTION: M	SAMP_DATE	12/8/2008			12/9/2008			12/8/2008			12/8/2008		
MEDIA: WATER	QC_TYPE	FD			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF	S17-GW-MW1703											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		1.69	U		1.69	U		1.69	U		1.69	U	
LEAD		0.97	U		0.97	U		0.97	U		0.97	U	
ZINC		6	J	P	5.6	J	P	5.5	J	P	5.5	J	P

PROJ_NO: 02063	NSAMPLE	S17-GW-MW1704			S17-GW-MWNASB65			S17-GW-MWNASB66			S17-GW-MWNASB68		
SDG: SB7090	LAB_ID	SB7090-005			SB7090-006			SB7090-008			SB7090-007		
FRACTION: M	SAMP_DATE	12/9/2008			12/9/2008			12/9/2008			12/9/2008		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		1.69	U		1.69	U		1.69	U		4.5	U	A
LEAD		1.2	J	P	0.97	U		0.97	U		0.97	U	
ZINC		3.4	J	P	3.7	J	P	20.7	J	P	5.7	J	P

PROJ_NO: 02063	NSAMPLE	S17-GW-MWNASB98			S17-GW-RB01		
SDG: SB7090	LAB_ID	SB7090-009			SB7090-010		
FRACTION: M	SAMP_DATE	12/9/2008			12/10/2008		
MEDIA: WATER	QC_TYPE	NM			RB		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS						
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
ARSENIC		1.69	U		1.69	U	
LEAD		0.97	U		0.97	U	
ZINC		2.22	U		2.22	U	

PROJ_NO: 02063	NSAMPLE	S17-GW-DUP01			S17-GW-MW1701			S17-GW-MW1702			S17-GW-MW1703		
SDG: SB7090	LAB_ID	SB7090-3			SB7090-4			SB7090-1			SB7090-2		
FRACTION: MISC	SAMP_DATE	12/8/2008			12/9/2008			12/8/2008			12/8/2008		
MEDIA: WATER	QC_TYPE	FD			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF	S17-GW-MW1703											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		10	UJ	D	10	UJ	D	10	UJ	D	10	UJ	D

PROJ_NO: 02063	NSAMPLE	S17-GW-MW1704			S17-GW-MWNASB65			S17-GW-MWNASB66			S17-GW-MWNASB68		
SDG: SB7090	LAB_ID	SB7090-5			SB7090-6			SB7090-8			SB7090-7		
FRACTION: MISC	SAMP_DATE	12/9/2008			12/9/2008			12/9/2008			12/9/2008		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		10	UJ	D	10	UJ	D	10	UJ	D	10	UJ	D

PROJ_NO: 02063	NSAMPLE	S17-GW-MWNASB98			S17-GW-RB01		
SDG: SB7090	LAB_ID	SB7090-9			SB7090-10		
FRACTION: MISC	SAMP_DATE	12/9/2008			12/10/2008		
MEDIA: WATER	QC_TYPE	NM			RB		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS						
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
CYANIDE		10	UJ	D	10	UJ	D

TETRA TECH

INTERNAL CORRESPONDENCE

C-NAVY-02-09-3065W

Date: February 23, 2009

c: File G02063-4.10 (w/enc.-original)

To: Chuck Race (no copy)

From: Jennifer Cardinal (no copy) JC

Subject: Tier II Organic Data Validation, SDG SB7090
Katahdin Analytical Services, Inc.
CTO WE09, Site 17, Naval Air Station Brunswick, Brunswick, Maine

DRO/Pesticides/Herbicides:

5/Groundwaters/	S17-GW-DUP01	S17-GW-MW1701
	S17-GW-MW1702	S17-GW-MW1703
	S17-GW-MW1704	

(Field Duplicate Pair: S17-GW-MW1703/S17-GW-DUP01)

1/Rinsate Blank/	S17-GW-RB01	

Pesticides/Herbicides

4/Groundwaters/	S17-GW-MWNASB65	S17-GW-MWNASB66
	S17-GW-MWNASB68	S17-GW-MWNASB98

Tetra Tech NUS, Inc. (TtNUS) performed a Tier II data validation on the diesel range organic (DRO), pesticide, herbicide analytical data for the samples in this SDG. The samples were collected at the Site 17 at Naval Air Station Brunswick, Brunswick, Maine from December 8 to 10, 2008. Sample collection and analysis was performed according to the requirements of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008.

The DRO analysis was performed according to MEDEP 4.1.25. The pesticide and herbicide analyses were performed according to USEPA SW-846 Methods 8081 and 8151, respectively.

The DRO data validation was performed in accordance with the Region I EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996. The pesticides and herbicides validation was performed in accordance with the Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Organic Analyses, Part III, February 2004.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The data were evaluated based on the following parameters:

* • Data Completeness
* • Preservation and Technical Holding Times

NA	•	GC/MS Instrument Performance Check (Tuning)
*	•	Pesticide Degradation
*	•	Initial and Continuing Calibrations
*	•	Blanks
*	•	Surrogate Compounds
NA	•	Internal Standards
*	•	Matrix Spike/Matrix Spike Duplicate
*	•	Laboratory Control Sample/Laboratory Control Sample Duplicate
*	•	Field Duplicates
	•	Analyte Identification
	•	Reporting Limits

* All criteria were met for this parameter.
NA Not applicable for this SDG.

Data Completeness

The laboratory was contacted regarding the initial calibration verification (ICV) summary forms for the DRO, pesticides, and herbicides analyses. On February 19, 2009 the laboratory explained that the ICV results are reported with the calibration verification forms.

Analyte Identification/Quantitation

Pesticides

The %RPD between the results of analytical columns 1 and 2 exceeded the 40% RPD QC criterion for the compound in the following sample:

Sample	Analyte	%RPD	Action (+)
S17-GW-RB01	Delta-BHC	122	UJ* at 0.227

*Professional judgment was used to raise the result to the higher of the two results and qualify the result as estimated, non-detected (UJ).

Although the sample reporting limit was raised due to analyte quantitation relative percent differences exceeding the 40% RPD QC limit for delta-BHC in sample S17-GW-RB01, the project sensitivity goals are not impacted since there are no regulatory limits established for delta-BHC for the groundwater samples. The delta-BHC result in S17-GW-RB01 is usable as an estimated, non-detected result.

Reporting Limits

All positive results below the quantitation limit (QL) and above the method detection limit (MDL) are estimated (J) due to uncertainty below the QL.

Pesticides

Project action limits (PALs) were not achievable for aldrin, dieldrin, heptachlor, heptachlor epoxide, and toxaphene as highlighted in SAP Worksheet 15b of the Remedial Investigation Work Plan for Site 17, Naval Air Station Brunswick, Brunswick, Maine, dated September 2008. Data usability may be impacted.

The reporting limit was raised for delta-BHC in sample S17-GW-RB01 due to analytical interferences detected in the dual column analysis. As discussed in the Analyte Identification/Quantitation section, the project sensitivity goals are not impacted.

Data Usability Assessment

The data usability assessment was performed to determine if the data met the project data quality objectives for acceptable accuracy, precision, sensitivity and completeness; and to determine and define the impact of the exceeded quality control indicators on the technical usability of the data. Please refer to the specific sections in the above validation report for further details.

Pesticides

The project goals with respect to sensitivity were met for the pesticides data set with the following exception. Project action limits were not achievable for aldrin, dieldrin, heptachlor, heptachlor epoxide, and toxaphene. Data usability may be impacted.

The project goals with respect to accuracy, precision, and completeness were met for the pesticides data set. Data usability was not impacted with regards to accuracy, precision, and completeness.

DRO, Herbicides

The project goals with respect to accuracy, precision, sensitivity, and completeness were met for the DRO and herbicides data sets. Data usability was not impacted with regards to accuracy, precision, sensitivity, and completeness.

Tables: Data Validation Qualifiers and Codes
Data Summary Tables

Enclosures: Data Validation Worksheets

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02063	NSAMPLE	S17-GW-DUP01			S17-GW-MW1701			S17-GW-MW1702			S17-GW-MW1703		
SDG: SB7090	LAB_ID	SB7090-3			SB7090-4			SB7090-1			SB7090-2		
FRACTION: PET	SAMP_DATE	12/8/2008			12/9/2008			12/8/2008			12/8/2008		
MEDIA: WATER	QC_TYPE	FD			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF	S17-GW-MW1703											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
DIESEL RANGE ORGANICS		68			85			210			66		

PROJ_NO: 02063	NSAMPLE	S17-GW-MW1704			S17-GW-RB01		
SDG: SB7090	LAB_ID	SB7090-5			SB7090-10RA2		
FRACTION: PET	SAMP_DATE	12/9/2008			12/10/2008		
MEDIA: WATER	QC_TYPE	NM			RB		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS						
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
DIESEL RANGE ORGANICS		45	J		89		

PROJ_NO: 02063	NSAMPLE	S17-GW-DUP01			S17-GW-MW1701			S17-GW-MW1702			S17-GW-MW1702DL		
SDG: SB7090	LAB_ID	SB7090-3			SB7090-4			SB7090-1			SB7090-1DL		
FRACTION: PEST/PCB	SAMP_DATE	12/8/2008			12/9/2008			12/8/2008			12/8/2008		
MEDIA: WATER	QC_TYPE	FD			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF	S17-GW-MW1703											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		0.094	U		0.094	U					4.3		
4,4'-DDE		0.017	J	P	0.017	J	P	0.12					
4,4'-DDT		0.094	U		0.015	J	P	2.1					
ALDRIN		0.047	U		0.047	U		0.047	U				
ALPHA-BHC		0.047	U		0.047	U		0.047	U				
ALPHA-CHLORDANE		0.047	U		0.047	U		0.057					
BETA-BHC		0.047	U		0.047	U		0.047	U				
DELTA-BHC		0.047	U		0.047	U		0.047	U				
DIELDRIN		0.094	U		0.016	J	P	1.7					
ENDOSULFAN I		0.047	U		0.047	U		0.95					
ENDOSULFAN II		0.094	U		0.094	U		0.094	U				
ENDOSULFAN SULFATE		0.094	U		0.094	U		0.094	U				
ENDRIN		0.094	U		0.094	U		0.094	U				
ENDRIN ALDEHYDE		0.094	U		0.094	U		0.094	U				
ENDRIN KETONE		0.094	U		0.094	U		0.094	U				
GAMMA-BHC (LINDANE)		0.047	U		0.047	U		0.047	U				
GAMMA-CHLORDANE		0.047	U		0.047	U		0.11					
HEPTACHLOR		0.047	U		0.015	J	P	0.047	U				
HEPTACHLOR EPOXIDE		0.047	U		0.047	U		0.047	U				
METHOXYCHLOR		0.47	U		0.47	U		0.47	U				
TOXAPHENE		0.94	U		0.94	U		0.94	U				

PROJ_NO: 02063	NSAMPLE	S17-GW-MW1703			S17-GW-MW1704			S17-GW-MWNASB65			S17-GW-MWNASB66		
SDG: SB7090	LAB_ID	SB7090-2			SB7090-5			SB7090-6			SB7090-8		
FRACTION: PEST/PCB	SAMP_DATE	12/8/2008			12/9/2008			12/9/2008			12/9/2008		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		0.095	U		0.094	U		0.094	U		0.094	U	
4,4'-DDE		0.095	U		0.094	U		0.017	J	P	0.094	U	
4,4'-DDT		0.095	U		0.094	U		0.094	U		0.094	U	
ALDRIN		0.048	U		0.047	U		0.047	U		0.047	U	
ALPHA-BHC		0.048	U		0.047	U		0.047	U		0.047	U	
ALPHA-CHLORDANE		0.048	U		0.09			0.018	J	P	0.047	U	
BETA-BHC		0.048	U		0.047	U		0.047	U		0.047	U	
DELTA-BHC		0.048	U		0.047	U		0.047	U		0.047	U	
DIELDRIN		0.095	U		0.094	U		0.094	U		0.094	U	
ENDOSULFAN I		0.048	U		0.047	U		0.047	U		0.047	U	
ENDOSULFAN II		0.095	U		0.094	U		0.094	U		0.094	U	
ENDOSULFAN SULFATE		0.095	U		0.094	U		0.094	U		0.094	U	
ENDRIN		0.095	U		0.094	U		0.094	U		0.094	U	
ENDRIN ALDEHYDE		0.095	U		0.027	J	P	0.094	U		0.094	U	
ENDRIN KETONE		0.095	U		0.094	U		0.094	U		0.094	U	
GAMMA-BHC (LINDANE)		0.015	J	P	0.047	U		0.047	U		0.047	U	
GAMMA-CHLORDANE		0.048	U		0.1			0.018	J	P	0.047	U	
HEPTACHLOR		0.048	U		0.047	U		0.047	U		0.047	U	
HEPTACHLOR EPOXIDE		0.016	J	P	0.047	U		0.017	J	P	0.047	U	
METHOXYCHLOR		0.48	U		0.47	U		0.47	U		0.47	U	
TOXAPHENE		0.95	U		0.94	U		0.94	U		0.94	U	

PROJ_NO: 02063	NSAMPLE	S17-GW-MWNASB68			S17-GW-MWNASB98			S17-GW-RB01		
SDG: SB7090	LAB_ID	SB7090-7			SB7090-9			SB7090-10		
FRACTION: PEST/PCB	SAMP_DATE	12/9/2008			12/9/2008			12/10/2008		
MEDIA: WATER	QC_TYPE	NM			NM			RB		
	UNITS	UG/L			UG/L			UG/L		
	PCT_SOLIDS									
	DUP_OF									
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
4,4'-DDD		0.094	U		0.094	U		0.094	U	
4,4'-DDE		0.017	J	P	0.017	J	P	0.094	U	
4,4'-DDT		0.094	U		0.094	U		0.094	U	
ALDRIN		0.047	U		0.047	U		0.047	U	
ALPHA-BHC		0.047	U		0.047	U		0.047	U	
ALPHA-CHLORDANE		0.047	U		0.047	U		0.047	U	
BETA-BHC		0.047	U		0.047	U		0.047	U	
DELTA-BHC		0.047	U		0.047	U		0.227	UJ	U
DIELDRIN		0.094	U		0.094	U		0.094	U	
ENDOSULFAN I		0.047	U		0.047	U		0.047	U	
ENDOSULFAN II		0.094	U		0.094	U		0.094	U	
ENDOSULFAN SULFATE		0.094	U		0.094	U		0.094	U	
ENDRIN		0.094	U		0.094	U		0.094	U	
ENDRIN ALDEHYDE		0.094	U		0.094	U		0.094	U	
ENDRIN KETONE		0.094	U		0.094	U		0.094	U	
GAMMA-BHC (LINDANE)		0.047	U		0.047	U		0.047	U	
GAMMA-CHLORDANE		0.047	U		0.047	U		0.047	U	
HEPTACHLOR		0.047	U		0.047	U		0.047	U	
HEPTACHLOR EPOXIDE		0.047	U		0.047	U		0.047	U	
METHOXYCHLOR		0.47	U		0.47	U		0.47	U	
TOXAPHENE		0.94	U		0.94	U		0.94	U	

PROJ_NO: 02063	NSAMPLE	S17-GW-DUP01			S17-GW-MW1701			S17-GW-MW1702			S17-GW-MW1703		
SDG: SB7090	LAB_ID	SB7090-3RA2			SB7090-4RA2			SB7090-1RA2			SB7090-2RA2		
FRACTION: HERB	SAMP_DATE	12/8/2008			12/9/2008			12/8/2008			12/8/2008		
MEDIA: WATER	QC_TYPE	FD			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF	S17-GW-MW1703											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		2.8	U		2.8	U		2.8	U		2.9	U	
2,4-D		2.8	U		2.8	U		2.8	U		2.9	U	

PROJ_NO: 02063	NSAMPLE	S17-GW-MW1704			S17-GW-MWNASB65			S17-GW-MWNASB66			S17-GW-MWNASB68		
SDG: SB7090	LAB_ID	SB7090-5RA2			SB7090-6RA2			SB7090-8RA2			SB7090-7RA2		
FRACTION: HERB	SAMP_DATE	12/9/2008			12/9/2008			12/9/2008			12/9/2008		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		2.8	U		2.8	U		2.8	U		2.8	U	
2,4-D		2.8	U		2.8	U		2.8	U		2.8	U	

PROJ_NO: 02063	NSAMPLE	S17-GW-MWNASB98			S17-GW-RB01		
SDG: SB7090	LAB_ID	SB7090-9RA2			SB7090-10RA2		
FRACTION: HERB	SAMP_DATE	12/9/2008			12/10/2008		
MEDIA: WATER	QC_TYPE	NM			RB		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS						
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
2,4,5-T		2.8	U		2.8	U	
2,4-D		2.8	U		2.8	U	

APPENDIX E

SUPPORTING INFORMATION

E.1 SITE 17 SUPPLEMENTAL SOIL SAMPLING

E.2 FINAL COMPLETION REPORT INVESTIGATION AND REMOVAL OF RELOCATED SOILS SITE 17

E.3 SITE 17 SUPPLEMENTAL SOIL SAMPLING SUMMARY MEMO, SEPTEMBER 2010

E.4 DECISION SUMMARY FROM JUNE 17, 2010 RISK ASSESSMENT CONFERENCE CALL

E.5 STATISTICAL EVALUATION OF DATA SETS FOR THE AREAS NORTH AND SOUTH of AVENUE B

E.6 TECHNICAL MEMORANDUM SITE 17 BACKGROUND DATASET DETERMINATION

E.7 PROPOSED PATH FORWARD WHITE PAPER

E.1 SITE 17 SUPPLEMENTAL SOIL SAMPLING

TECHNICAL MEMORANDUM
SITE 17 SUPPLEMENTAL SOIL SAMPLING
NAS BRUNSWICK, MAINE
AUGUST 26, 2009

1.0 BACKGROUND

Site 17 is located in the north-central area of the Base, one block north of Fitch Avenue at the corner of Pegasus Avenue and Avenue B. The Site (approximately 0.7 acres) is bounded to the northeast by the former Old Navy Fuel Farm, to the north by the security guard dog kennel, to the southwest and northwest by Pegasus Avenue, and to the southeast by the former railroad track bed. Site 17 housed pest control operations that included storage, mixing, and disposal of pesticides and herbicides from the 1940's until 1985. In 1985, pest control operations moved from Building 95 to Building 647.

Several investigations were performed at Site 17 by the Navy over the early 1990s. Soils at the site were found to be impacted with pesticides at concentrations that posed potential risks to human and ecological receptors. In early 1994, Buildings 31 and 95, the storage shed, septic tank, and railroad lines were demolished and removed from Site 17. A total of 1,260 cubic yards of impacted soil were excavated from the site at that time. Confirmatory soil samples collected at the limits of the excavation indicated the presence of site contaminants at concentrations exceeding the established PRGs.

In late 1994, additional site excavation was conducted in four areas north of Avenue B targeted for further soil removal. An additional 100 cubic yards of material were excavated from the site. In addition, an area immediately south of Avenue B was found with soil concentrations exceeding the surface soil PRGs, but not the subsurface soil PRGs. The soil from this area was excavated and placed in a 6-inch layer within the area of previously excavated material south of Avenue B. This 6-inch layer of soil was then covered with 2 feet of clean fill during site restoration.

During the Site 17 Remedial Investigation fieldwork conducted in the fall of 2008, exceedances of screening criteria for pesticides (DDD, DDE, and DDT) were found in shallow soil samples (1-5 feet in depth) from three borings (SB-17-112, SB-17-120, and SB-17-121), as indicated in the RI soil sampling summary table provided in Attachment A. Boring SB-17- 112 is located in the northern part of the area of investigation, while SB-17-120 and SB-17-121 are adjacent borings located in the central part of the Site as shown on Figure 1.

2.0 SUPPLEMENTAL SOIL SAMPLING PROGRAM

In order to support the potential focused excavation of impacted soils from the areas of the three RI borings with screening criteria exceedances, a supplemental soil sampling program was implemented. Ten soil borings were advanced on April 23, 2009 using direct push technology (DPT) to collect soil samples. A TtNUS geologist directed the soil boring activities and documented findings. Soil boring locations are shown on Figure 1. Soil samples (primarily fine to medium sand and silty sand) were described according to the Unified Soil Classification System and recorded on soil boring logs to provide a lithologic record of the subsurface materials (Attachment B).

Borings were advanced using a GeoProbe® Model 6620 DT direct push rig. Soil samples were collected with a GeoProbe® Macro-Core® soil sampling system. The Macro-Core® samplers consisted of 1.5-inch inside diameter (ID), 5-foot long core barrel with a clear acetate liner. As each sample was opened an aliquot was collected for screening with a flame-ionization detector (FID) and a photo-ionization detector (PID) equipped with a 10.2 eV lamp. Screening results are provided on the boring logs in Attachment B.

A total of 11 soil samples (10 field samples and 1 duplicate) were collected and submitted for laboratory analysis from soil borings SB-17-146 through SB-17-155. Soil samples were collected from two areas on the Site. Four borings were drilled/samples collected (SB-17-146 through SB-17-149) in the area surrounding SB-17-112. Six borings were drilled/samples collected (SB-17-150 through SB-17-155) in the area surrounding SB-17-120 and SB-17-121. These supplemental borings were positioned approximately 20 feet from the three RI soil borings that had screening criteria exceedances for pesticides, with the exception of SB-17-149 that was stepped out an additional 20 feet south-southwest from boring SB-17-112, and SB-17-155 that was stepped out an additional 20 feet west southwest from borings SB-17-120 and SB-17-121. Samples were collected from the 1 to 4 foot depth range from the supplemental borings surrounding SB-17-112 and from the 2 to 5 foot depth range from the supplemental borings surrounding SB-17-120 and SB-17-121, as these were the sample depth ranges where screening criteria exceedances were observed in the RI borings.

Soil samples collected for laboratory analysis were homogenized in dedicated aluminum pans, and aliquots were transferred into appropriate laboratory-supplied bottleware. The samples were placed in laboratory-supplied containers and shipped to the analytical laboratory under proper chain of custody. Soil samples from the soil borings were analyzed for TCL Chlorinated Pesticides by EPA Method 8081A by Katahdin Analytical. Per the work plan, no data validation was required or performed as the

supplemental soils data was collected for delineation purposes rather than for use in recalculating/requantifying risks posed by the site.

3.0 SAMPLING RESULTS

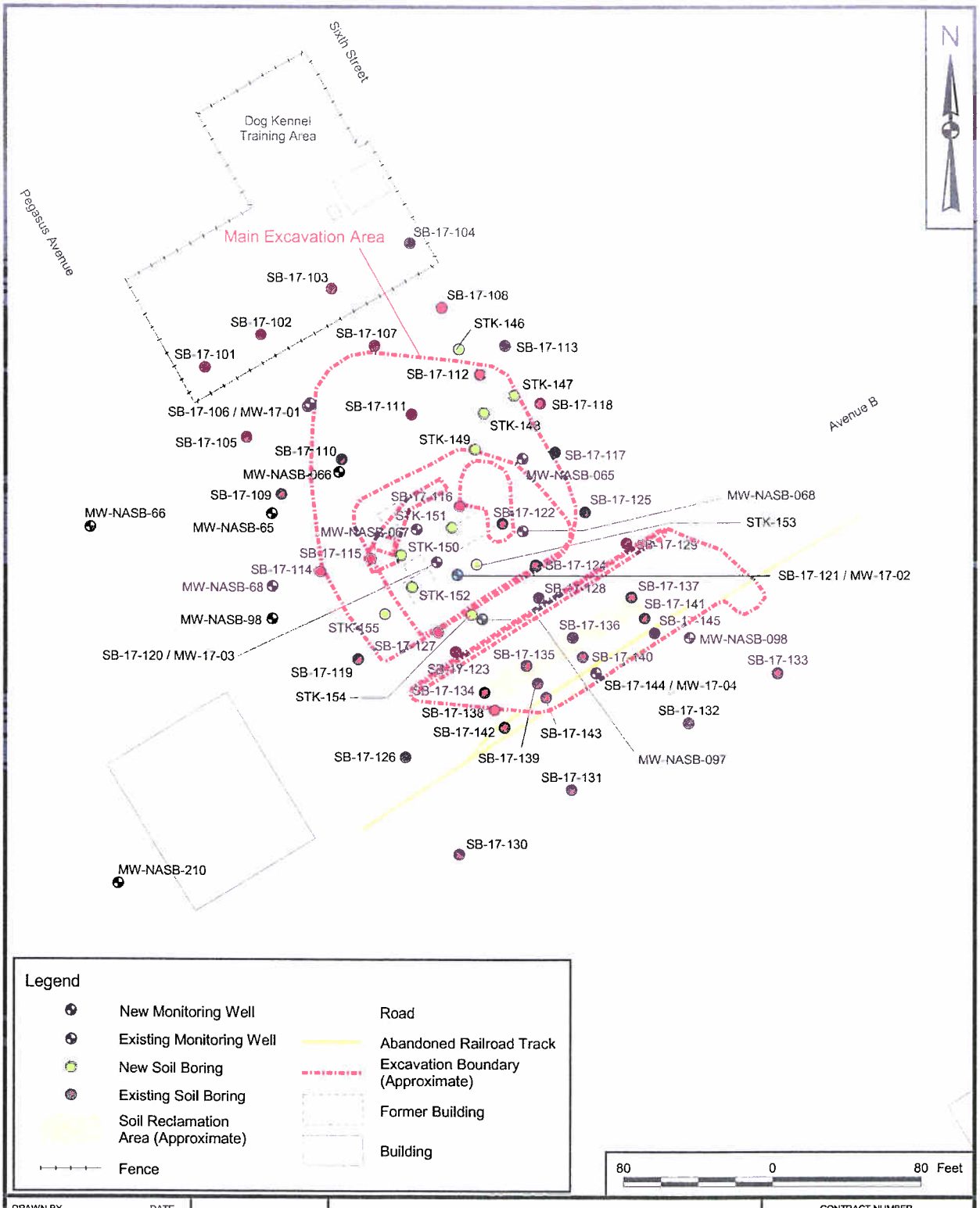
Sampling results for the supplemental borings are provided in Table 1. Exceedances of screening criteria were limited to dieldrin (borings 147, 148, 149, 152, and 153) and heptachlor (boring 152). No exceedances of the compounds found at levels above screening criteria in the RI borings (DDD, DDE, and DDT) were found in the supplemental boring samples. Figure 2 shows the approximate extent of soils with pesticide concentrations above screening levels based on a combination of the RI and supplemental soil sampling results.

The dieldrin exceedances in the supplemental borings are primarily due to exceedance of the Maine RAGs soil to groundwater screening criteria, although one of the exceedances also exceeds the ORNL residential screening criteria (but is well below the Maine RAGs residential screening level). It should be noted that a trace level of dieldrin has been detected in groundwater from one Site 17 well (1.7 ug/L in well MW-17-02). Although very low, it was a risk driver for hypothetical groundwater use at the site.

The heptachlor detection in boring 152 (270 ug/kg) was well above the maximum level detected in the RI borings (12 ug/kg in SB-17-135). The carcinogenic risks calculated for heptachlor in the RI were very low ($<10^{-7}$), therefore using a qualitative risk-ratio approach the cancer risk related to the higher concentration found in the supplemental boring would still be very low.

4.0 SUMMARY AND CONCLUSIONS

Two localized areas of pesticide screening criteria exceedances in subsurface soil have been delineated based on a combination of the RI and supplemental soil sampling activities. RI soils data exceedances were for DDD, DDE, and DDT, while the supplemental sampling data had exceedances for dieldrin and heptachlor. Risks posed by contaminated soil (and groundwater) at Site 17, as presented in the Site 17 RI Report, are within EPA's target risk range under the current land use of the site and the expected future land use scenario (non-residential). These calculated risks would not be expected to change substantively based on the supplemental soils data Given the limited risk posed by current site conditions it is recommended that the Navy not proceed with a removal action at this time; instead it is recommended that a feasibility study be performed for the Site, with decisions on the long-term remedial approach to take made by the Navy based on FS results and with input from other project stakeholders.



DRAWN BY: J. ENGLISH	DATE: 05/26/09	2008 - 2009 SOIL SAMPLING LOCATIONS SITE 17 NAVAL AIR STATION BRUNSWICK, MAINE	CONTRACT NUMBER: CTO WE09
CHECKED BY: J. ORIENT	DATE: 08/26/09		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE: AS NOTED			DRAWING NO.: FIGURE 1 / REV: 0

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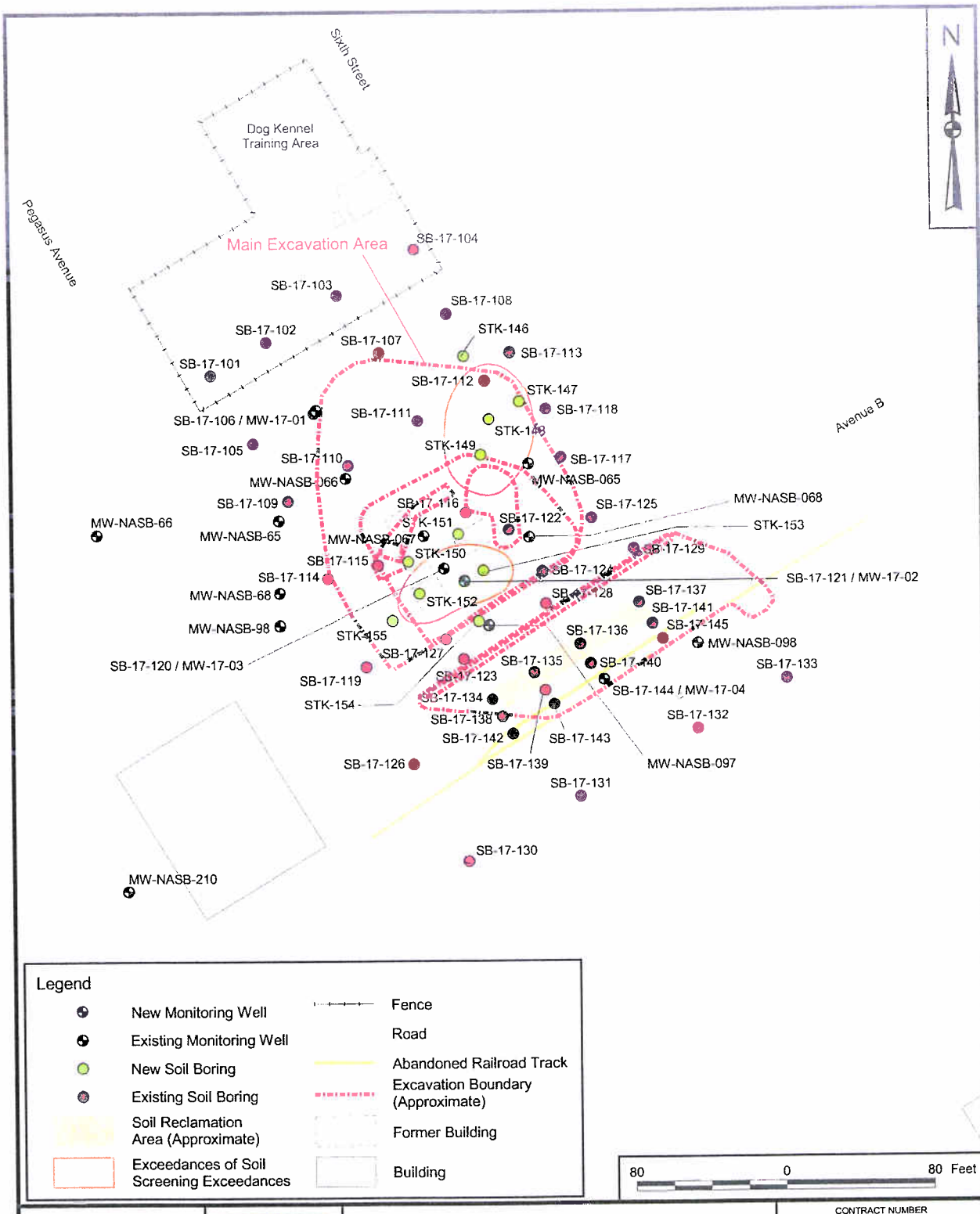

DRAWN BY J. ENGLISH	DATE 08/26/09	AREAS OF SOIL SCREENING CRITERIA EXCEEDANCES SITE 17 NAVAL AIR STATION BRUNSWICK, MAINE	CONTRACT NUMBER CTO WE09
CHECKED BY J. ORIENT	DATE 08/26/09		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 2 REV 0

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TABLE 1
SOIL SAMPLING RESULTS
Site 17 SUPPLEMENTAL SOIL SAMPLING
NAS BRUNSWICK, MAINE
1 of 2

LOCATION	ORNL	Maine RAGs	Maine RAGs		SB-17-146	SB-17-147	SB-17-148	SB-17-149	SB-17-150	SB-17-151	SB-17-152
MATRIX	Residential	Residential	Soil to GW	Minimum	SO	SO	SO	SO	SO	SO	SO
DEPTH INTERVAL (FT)	Screening	Screening	Screening	Screening	1-4	1-4	1-4	1-4	2-5	2-5	2-5
SAMPLE DATE	Level	Level	Level	Criteria	20090423	20090423	20090423	20090423	20090423	20090423	20090423
PEST/PCBs (UG/KG)											
4,4'-DDD	2000	NC	NC	2000	**5.3**	**41**	**84**	**88**	**1.2 J**	**2.2 J**	3.9 U
4,4'-DDE	1400	NC	NC	1400	**33**	**63**	**20**	**36**	**2.9 J**	**13**	**43**
4,4'-DDT	1700	50000	32000	1700	**34**	**820**	**750**	**120**	**10**	**120**	**330**
ALDRIN	29	NC	NC	29	2.1 U	2.1 U	2.1 U	2.1 U	2 U	2.1 U	2 U
ALPHA-CHLORDANE	1600	NC	10000	1600	**0.87 J**	**1.1 J**	**2.1**	**5.9**	**0.81 J**	**0.96 J**	**700**
BETA-BHC	270	NC	NC	270	2.1 U	2.1 U	2.1 U	2.1 U	2 U	2.1 U	8.9
DELTA-BHC	77	NC	NC	77	2.1 U	2.1 U	2.1 U	2.1 U	2 U	2.1 U	2 U
DIELDRIN	30	300	4	4	**1.4 J**	**9.6**	**43**	**25**	**0.75 J**	**0.68 J**	**23**
ENDOSULFAN I	370000	NC	18000	18000	2.1 U	**5.9**	**4.3**	2.1 U	2 U	2.1 U	2 U
ENDOSULFAN SULFATE	370000	NC	NC	370000	4.1 U	4.2 U	4 U	4 U	3.9 U	4.1 U	3.9 U
ENDRIN ALDEHYDE	18000	NC	NC	18000	4.1 U	4.2 U	4 U	4 U	3.9 U	4.1 U	3.9 U
GAMMA-BHC (LINDANE)	520	NC	NC	520	2.1 U	2.1 U	2.1 U	2.1 U	2 U	2.1 U	2 U
GAMMA-CHLORDANE	1600	NC	NC	1600	**0.81 J**	**1.1 J**	**2.2**	**4.1**	**0.87 J**	**0.93 J**	**760**
HEPTACHLOR	110	4000	23000	110	2.1 U	2.1 U	2.1 U	2.1 U	2 U	2.1 U	**270**
HEPTACHLOR EPOXIDE	53	NC	NC	53	2.1 U	2.1 U	2.1 U	2.1 U	**0.61 J**	**0.62 J**	2 U
MISCELLANEOUS PARAMETERS											
TOTAL SOLIDS (%)	NC	NC	NC	NC	80	79	82	82	85	80	84

TABLE 1
SOIL SAMPLING RESULTS
Site 17 SUPPLEMENTAL SOIL SAMPLING
NAS BRUNSWICK, MAINE
2 of 2

LOCATION MATRIX DEPTH INTERVAL (FT) SAMPLE DATE	ORNL Residential Screening Level	Maine RAGs Residential Screening Level	Maine RAGs Soil to GW Screening Level	Minimum Screening Criteria	SB-17-153 SO 2-5 20090423	SB-17-154 SO 2-5 20090423	SB-17-154 SO 2-5 20090423	SB-17-155 SO 2-5 20090423
PEST/PCBs (UG/KG)								
4,4'-DDD	2000	NC	NC	2000	**89**	**3.6 J**	**9.5**	3.5 U
4,4'-DDE	1400	NC	NC	1400	**270**	**12**	**18**	**0.84 J**
4,4'-DDT	1700	50000	32000	1700	**1200**	**150**	**210**	**1.4 J**
ALDRIN	29	NC	NC	29	**0.93 J**	2.3 U	2.3 U	1.8 U
ALPHA-CHLORDANE	1600	NC	10000	1600	**14**	**58**	**96**	**1.8**
BETA-BHC	270	NC	NC	270	2.1 U	2.3 U	2.3 U	1.8 U
DELTA-BHC	77	NC	NC	77	**0.62 J**	2.3 U	2.3 U	1.8 U
DIELDRIN	30	300	4	4	**28**	**0.99 J**	**2.5 J**	3.5 U
ENDOSULFAN I	370000	NC	18000	18000	2.1 U	2.3 U	2.3 U	1.8 U
ENDOSULFAN SULFATE	370000	NC	NC	370000	**1.9 J**	4.6 U	4.5 U	3.5 U
ENDRIN ALDEHYDE	18000	NC	NC	18000	**1.6 J**	4.6 U	4.5 U	3.5 U
GAMMA-BHC (LINDANE)	520	NC	NC	520	2.1 U	2.3 U	**1 J**	1.8 U
GAMMA-CHLORDANE	1600	NC	NC	1600	**15**	**62**	**100**	**1.9**
HEPTACHLOR	110	4000	23000	110	**1.1 J**	**7.6**	**12**	1.8 U
HEPTACHLOR EPOXIDE	53	NC	NC	53	2.1 U	2.3 U	2.3 U	**0.95 J**
MISCELLANEOUS PARAMETERS								
TOTAL SOLIDS (%)	NC	NC	NC	NC	82	72	73	94

ATTACHMENT A

2008 REMEDIAL INVESTIGATION SOIL SAMPLING RESULTS

TABLE A1
SOIL SAMPLING RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE
1 of 11

Location Depth Interval depth_unit submatrix	ORNL Residential Screening Level	Maine RAGs-Residential Screening Level	Maine RAGs-Soil to GW Screening Level	Minimum Screening Criteria	SB-17-101-0001 0-1 FT SS	SB-17-101-0104 1-4 FT SB	SB-17-102-0001 0-1 FT SS	SB-17-102-0104 1-4 FT SB	SB-17-103-0001 0-1 FT SS	SB-17-103-0104 1-4 FT SB	SB-17-104-0001 0-1 FT SS	SB-17-104-0104 1-4 FT SB
Pesticides/PCBs (ug/kg)												
4,4'-DDD	2000	NC	NC	2000	3.8 UJ	3.5 U	3.5 UJ	3.6 U	3.5 UJ	10	3.6 UJ	6.5
4,4'-DDE	1400	NC	NC	1400	13	1.3 J	0.7 J	3.6 U	0.88 J	3.6 J	0.8 J	1.7 J
4,4'-DDT	1700	50000	32000	1700	12 U	13 U	3.5 U	3.6 U	3.5 U	53	4.2 U	4 U
ALPHA-CHLORDANE	1600	NC	10000	1600	1.9 U	1.8 U	1.8 U	1.9 U	1.8 U	1.9 U	1.9 U	1.9 U
GAMMA-BHC (LINDANE)	520	NC	NC	520	1.9 U	1.8 U	1.8 U	1.9 U	1.8 U	1.9 U	1.9 U	1.9 U
GAMMA-CHLORDANE	1600	NC	NC	1600	1.9 U	1.8 U	1.8 U	1.9 U	1.8 U	1.9 U	1.9 U	1.9 U
HEPTACHLOR	110	4000	23000	110	1.9 U	1.8 U	1.8 U	1.9 U	1.8 U	1.9 U	1.9 U	1.9 U
HEPTACHLOR EPOXIDE	53	NC	NC	53	1.9 U	1.8 U	1.8 U	1.9 U	1.8 U	1.9 U	1.9 U	1.9 U
Petroleum Hydrocarbons (mg/kg)												
DIESEL RANGE ORGANICS	NC	NC	NC	10								
Organophosphorous Pesticides (ug/kg)												
MALATHION	1200000	3800000	NC	1200000	56 U	53 U	53 U	56 U	53 U	56 U	54 U	57 U
Herbicides (ug/kg)												
MALEIC HYDRAZIDE	31000000	NC	NC	31000000	22 UJ	21 U	21 U	22 U	21 UJ	23 U	22 U	23 U
MONURON	NC	NC	NC	NC	22 U	21 U	21 U	22 U	21 UJ	23 U	22 U	23 U
PROPOXUR	240000	NC	NC	240000	22 U	21 U	21 U	22 U	21 U	23 U	22 U	23 U
Inorganics (mg/kg)												
ARSENIC	0.39	10	29	0.39	2	1.3	10.7	4.6	18.2	6.1	9.4	8.1
CYANIDE	1600	3800	40	40	0.55 U	0.5 U	0.5 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
LEAD	400	375	NC	375	8.1	2.5	10	2.4	11.1	5.1	11	3.4
ZINC	23000	1500	12000	1500	11.7	10.3	21.9	16.6	25.8	17.8	26.7	17.9
Miscellaneous Parameters (mg/kg)												
TOTAL ORGANIC CARBON	NC	NC	NC	NC								

The value listed as the minimum screening criteria for diesel range organics is the stringent soil remediation goal for oil contaminated soil as presented in the document titled, "Procedural Guidelines for Establishing and Implementing Action Levels and Remediation Goals f

TABLE A1
SOIL SAMPLING RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE
2 of 11

Location Depth Interval depth_unit submatrix	ORNL Residential Screening Level	Maine RAGs-Residential Screening Level	Maine RAGs-Soil to GW Screening Level	Minimum Screening Criteria	SB-17-105-0001 0-1 FT SS	SB-17-105-0001-AVG 0-1 FT SS	SB-17-105-0001-D 0-1 FT SS	SB-17-105-0104 1-4 FT SB	SB-17-106-0001 0-1 FT SS	SB-17-106-0104 1-4 FT SB	SB-17-107-0001 0-1 FT SS	SB-17-107-0104 1-4 FT SB
Pesticides/PCBs (ug/kg)												
4,4'-DDD	2000	NC	NC	2000	3.7 U	3.65 U	3.6 U	3.4 U	**10**	3.5 U	4.1 U	4 U
4,4'-DDE	1400	NC	NC	1400	**17**	**15.5**	**14**	3.4 U	**8.3**	3.5 U	4.1 U	4 U
4,4'-DDT	1700	50000	32000	1700	**28** J	**28** J	**28** J	3.4 UJ	**210**	24 UJ	**19** J	5 UJ
ALPHA-CHLORDANE	1600	NC	10000	1600	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	**1.1** J	2 U
GAMMA-BHC (LINDANE)	520	NC	NC	520	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	2.1 U	2 U
GAMMA-CHLORDANE	1600	NC	NC	1600	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	**1** J	2 U
HEPTACHLOR	110	4000	23000	110	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	2.1 U	2 U
HEPTACHLOR EPOXIDE	53	NC	NC	53	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	2.1 U	2 U
Petroleum Hydrocarbons (mg/kg)												
DIESEL RANGE ORGANICS	NC	NC	NC	10								
Organophosphorous Pesticides (ug/kg)												
MALATHION	1200000	3800000	NC	1200000	56 U	56.5 U	57 U	69 U	55 U	53 U	55 U	69 U
Herbicides (ug/kg)												
MALEIC HYDRAZIDE	31000000	NC	NC	31000000	22 UJ	22.5 UJ	23 U	28 U	22 U	21 U	22 UJ	28 U
MONURON	NC	NC	NC	NC	22 UJ	22.5 UJ	23 UJ	28 U	22 UJ	21 UJ	22 U	28 U
PROPOXUR	240000	NC	NC	240000	22 U	22.5 UJ	23 UJ	28 U	22 UJ	21 U	22 U	28 U
Inorganics (mg/kg)												
ARSENIC	0.39	10	29	0.39	**1.4**	**1.5**	**1.6**	**1.5**	**2.4**	**1.7**	**7.8**	**6.2**
CYANIDE	1600	3800	40	40	0.55 UJ	0.55 UJ	0.55 UJ	0.5 UJ	0.5 U	0.55 U	0.6 UJ	0.6 UJ
LEAD	400	375	NC	375	11.4	**9.6**	**7.8**	**3**	**23.2**	**7.5**	9	**5.6**
ZINC	23000	1500	12000	1500	13.2	**12.05**	**10.9**	**11.9**	**21.8**	**10.6**	25	**18.4**
Miscellaneous Parameters (mg/kg)												
TOTAL ORGANIC CARBON	NC	NC	NC	NC								

The value listed as the minimum screening criteria for diesel range organics is the stringent sdor the Remediation of Oil Contaminated Soil and Groundwater in Maine" (MEDEP, January 1, 2009)

TABLE A1
SOIL SAMPLING RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE
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Location Depth interval depth_unit submatrix	ORNL Residential Screening Level	Maine RAGs-Residential Screening Level	Maine RAGs-Soil to GW Screening Level	Minimum Screening Criteria	SB-17-107-0408 4-8 FT SB	SB-17-108-0001 0-1 FT SS	SB-17-108-0104 1-4 FT SB	SB-17-109-0001 0-1 FT SS	SB-17-109-0104 1-4 FT SB	SB-17-110-0104 1-4 FT SB	SB-17-111-0104 1-4 FT SB	SB-17-112-0001 0-1 FT SS
Pesticides/PCBs (ug/kg)												
4,4'-DDD	2000	NC	NC	2000	4.2 U	3.8 U	4.3 U	11	3.4 UJ	220	3.6 U	100
4,4'-DDE	1400	NC	NC	1400	4.2 U	12	4.3 U	9.3 J	3.4 U	56 J	12	46
4,4'-DDT	1700	50000	32000	1700	4.2 UJ	8.2 J	5 UJ	180	3.4 UJ	1000	28 J	1200 J
ALPHA-CHLORDANE	1600	NC	10000	1600	2.1 U	2 U	2.2 U	1.8 U	1.8 U	18 U	1.9 U	7
GAMMA-BHC (LINDANE)	520	NC	NC	520	2.1 U	2 U	2.2 U	1.8 U	1.8 U	18 U	1.9 U	2 U
GAMMA-CHLORDANE	1600	NC	NC	1600	2.1 U	2 U	2.2 U	1.8 U	1.8 U	18 U	1.9 U	7.7
HEPTACHLOR	110	4000	23000	110	2.1 U	2 U	2.2 U	1.8 U	1.8 U	18 U	1.9 U	2 U
HEPTACHLOR EPOXIDE	53	NC	NC	53	2.1 U	2 U	2.2 U	1.8 U	1.8 U	18 U	1.9 U	2 U
Petroleum Hydrocarbons (mg/kg)												
DIESEL RANGE ORGANICS	NC	NC	NC	10							14	
Organophosphorous Pesticides (ug/kg)												
MALATHION	1200000	3800000	NC	1200000	64 U	68 U	60 U	55 U	53 U	54 U	55 U	61 U
Herbicides (ug/kg)												
MALEIC HYDRAZIDE	31000000	NC	NC	31000000	26 UJ	27 UJ	24 U	22 U	21 U	22 U	22 U	24 U
MONURON	NC	NC	NC	NC	26 U	27 U	24 U	22 UJ	21 UJ	22 UJ	22 U	24 UJ
PROPOXUR	240000	NC	NC	240000	26 U	27 U	24 U	22 UJ	21 U	22 U	22 U	24 UJ
Inorganics (mg/kg)												
ARSENIC	0.39	10	29	0.39	1.5	5.2	3.1	1.6	1.4	2.2	3.4	9.4
CYANIDE	1600	3800	40	40	0.6 UJ	0.55 UJ	0.65 UJ	0.55 U	0.5 U	0.55 U	0.55 UJ	0.6 UJ
LEAD	400	375	NC	375	2.5	6.2	6.2	14.2	2.6	3.7	7.7	4.7
ZINC	23000	1500	12000	1500	11.9	23	19.9	17.6	11.2	11.7	23.7	24.6
Miscellaneous Parameters (mg/kg)												
TOTAL ORGANIC CARBON	NC	NC	NC	NC								

The value listed as the minimum screening criteria for diesel range organics is the stringent so

TABLE A1
SOIL SAMPLING RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE
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Location Depth Interval depth_unit submatrix	ORNL Residential Screening Level	Maine RAGs-Residential Screening Level	Maine RAGs-Soil to GW Screening Level	Minimum Screening Criteria	SB-17-112-0104 1-4 FT SB	SB-17-113-0001 0-1 FT SS	SB-17-113-0104 1-4 FT SB	SB-17-114-0001 0-1 FT SS	SB-17-114-0104 1-4 FT SB	SB-17-115-0710 7-10 FT SB	SB-17-116-0407 4-7 FT SB	SB-17-117-0104 1-4 FT SB
Pesticides/PCBs (ug/kg)												
4,4'-DDD	2000	NC	NC	2000	520	8.7	84	17	3.5 U	4 U	4.2 UJ	60
4,4'-DDE	1400	NC	NC	1400	80	15	84	22	0.51 J	4 U	19 J	160
4,4'-DDT	1700	50000	32000	1700	7200 J	45 J	580 J	380 J	16 UJ	4 U	96 J	1100 J
ALPHA-CHLORDANE	1600	NC	10000	1600	20 U	1.9 U	14 J	1.8 U	1.8 U	2.1 U	2.2 UJ	67
GAMMA-BHC (LINDANE)	520	NC	NC	520	20 U	1.9 U	2.1 U	1.8 U	1.8 U	2.1 U	2.2 UJ	10 U
GAMMA-CHLORDANE	1600	NC	NC	1600	20 U	1.9 U	14	1.8 U	1.8 U	2.1 U	2.2 UJ	70
HEPTACHLOR	110	4000	23000	110	20 U	1.9 UJ	2.1 U	1.8 U	1.8 U	2.1 U	2.2 UJ	10 U
HEPTACHLOR EPOXIDE	53	NC	NC	53	20 U	1.9 U	2.1 U	1.8 U	1.8 U	2.1 U	2.2 UJ	11 J
Petroleum Hydrocarbons (mg/kg)												
DIESEL RANGE ORGANICS	NC	NC	NC	10						1.3 J		
Organophosphorous Pesticides (ug/kg)												
MALATHION	1200000	3800000	NC	1200000	60 U	68 U	58 U	55 U	53 U	61 U	62 U	61 U
Herbicides (ug/kg)												
MALEIC HYDRAZIDE	31000000	NC	NC	31000000	24 U	27 U	23 U	22 U	21 U	25 U	26 U	24 U
MONURON	NC	NC	NC	NC	24 U	27 U	23 U	110 UJ	21 U	25 UJ	26 UJ	24 UJ
PROPOXUR	240000	NC	NC	240000	24 UJ	27 U	23 U	110 U	21 U	25 U	100	24 UJ
Inorganics (mg/kg)												
ARSENIC	0.39	10	29	0.39	2.2	8.3	4.1	1.8	1.8	1.1	1.5	3
CYANIDE	1600	3800	40	40	0.6 UJ	0.55 UJ	0.6 UJ	0.55 U	0.5 U	0.6 U	0.6 U	0.6 U
LEAD	400	375	NC	375	3.6	12.4	32.3	17.8	3.4	2	4.2	7.4
ZINC	23000	1500	12000	1500	18.9	29	21	17.6	13.4	12.4	17	23.6
Miscellaneous Parameters (mg/kg)												
TOTAL ORGANIC CARBON	NC	NC	NC	NC						400 J		

The value listed as the minimum screening criteria for diesel range organics is the stringent so

TABLE A1
SOIL SAMPLING RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE
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Location Depth Interval depth_unit submatrix	ORNL Residential Screening Level	Maine RAGs-Residential Screening Level	Maine RAGs-Soil to GW Screening Level	Minimum Screening Criteria	SB-17-118-0001 0-1 FT SS	SB-17-118-0104 1-4 FT SB	SB-17-119-0104 1-4 FT SB	SB-17-120-0205 2-5 FT SB	SB-17-120-0205-AVG 2-5 FT SB	SB-17-120-0205-D 2-5 FT SB	SB-17-121-0205 2-5 FT SB	SB-17-121-0710 7-10 FT SB
Pesticides/PCBs (ug/kg)												
4,4'-DDD	2000	NC	NC	2000	7.6	3.8 U	3.6 U	25 J	39.5 J	54 J	54000	32
4,4'-DDE	1400	NC	NC	1400	52	10	2.7 J	18 J	25.5 J	33 J	25000	15
4,4'-DDT	1700	50000	32000	1700	210 J	22 J	9.7 U	910 J	1555 J	2200 J	1500000	830
ALPHA-CHLORDANE	1600	NC	10000	1600	1.8 U	1.3 J	1.2 J	19	20	21	1100 UJ	2.1 U
GAMMA-BHC (LINDANE)	520	NC	NC	520	1.8 U	2 U	1.9 U	2.2 U	2.25 U	2.3 U	1100 UJ	2.1 U
GAMMA-CHLORDANE	1600	NC	NC	1600	1.8 U	1.1 J	1.2 J	19	20	21	1100 UJ	2.1 U
HEPTACHLOR	110	4000	23000	110	1.8 U	2 U	1.9 U	1.7 J	1.7 J	2.3 U	1100 UJ	2.1 U
HEPTACHLOR EPOXIDE	53	NC	NC	53	1.8 U	2 U	1.9 U	2.2 U	2.25 U	2.3 U	1100 UJ	2.1 U
Petroleum Hydrocarbons (mg/kg)												
DIESEL RANGE ORGANICS	NC	NC	NC	10							1700	6.2 U
Organophosphorous Pesticides (ug/kg)												
MALATHION	1200000	3800000	NC	1200000	54 U	58 U	57 U	66 U	66 U	66 U	31 J	66 U
Herbicides (ug/kg)												
MALEIC HYDRAZIDE	31000000	NC	NC	31000000	22 U	23 U	23 U	27 U	26.5 U	26 U	24 J	27 U
MONURON	NC	NC	NC	NC	22 U	23 U	23 U	27 UJ	26.5 UJ	26 UJ	28 UJ	27 UJ
PROPOXUR	240000	NC	NC	240000	22 U	23 U	23 U	370	420	470	140 J	27 U
Inorganics (mg/kg)												
ARSENIC	0.39	10	29	0.39	6.8	3.2	1.4	2.2	2	1.8	1.6	1.1
CYANIDE	1600	3800	40	40	0.5 UJ	0.6 UJ	0.55 U	0.65 U	0.65 U	0.65 U	0.7 U	0.6 U
LEAD	400	375	NC	375	9.1	6.1	2.4	5.7	5.65	5.6	5.9	2.3
ZINC	23000	1500	12000	1500	25.1	18	54.5	25.8	28.75	31.7	35.5	14.2
Miscellaneous Parameters (mg/kg)												
TOTAL ORGANIC CARBON	NC	NC	NC	NC				28000 J	26000 J	24000 J		

The value listed as the minimum screening criteria for diesel range organics is the stringent so

TABLE A1
SOIL SAMPLING RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE
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Location Depth Interval depth_unit submatrix	ORNL Residential Screening Level	Maine RAGs-Residential Screening Level	Maine RAGs-Soil to GW Screening Level	Minimum Screening Criteria	SB-17-121-1215 12-15 FT SB	SB-17-122-0407 4-7 FT SB	SB-17-122-0407-AVG 4-7 FT SB	SB-17-122-0407-D 4-7 FT SB	SB-17-123-0001 0-1 FT SS	SB-17-123-0104 1-4 FT SB	SB-17-124-0001 0-1 FT SS	SB-17-124-0104 1-4 FT SB
Pesticides/PCBs (ug/kg)												
4,4'-DDD	2000	NC	NC	2000	**15**	5.2 U	4.95 U	4.7 U	3.7 U	**20**	3.8 U	3.9 U
4,4'-DDE	1400	NC	NC	1400	**4.4**	5 U	4.85 U	4.7 U	3.7 U	**49**	3.8 U	**8.3**
4,4'-DDT	1700	50000	32000	1700	**230**	**65 J**	**33.7 J**	4.8 UJ	3.7 U	**530**	3.8 U	**72**
ALPHA-CHLORDANE	1600	NC	10000	1600	**1.2 J**	2.6 U	2.5 U	2.4 U	**0.8 J**	**200 J**	2 U	2 U
GAMMA-BHC (LINDANE)	520	NC	NC	520	2.1 U	2.6 U	2.5 U	2.4 U	1.9 U	9 U	2 U	**91**
GAMMA-CHLORDANE	1600	NC	NC	1600	**1.1 J**	2.6 U	2.5 U	2.4 U	**1 J**	**280**	2 U	2 U
HEPTACHLOR	110	4000	23000	110	2.1 U	2.6 U	2.5 U	2.4 U	1.9 U	**11**	2 U	2 U
HEPTACHLOR EPOXIDE	53	NC	NC	53	2.1 U	2.6 U	2.5 U	2.4 U	1.9 U	9 U	2 U	2 U
Petroleum Hydrocarbons (mg/kg)												
DIESEL RANGE ORGANICS	NC	NC	NC	10	**13**	**200**	**160**	**120**				
Organophosphorous Pesticides (ug/kg)												
MALATHION	1200000	3800000	NC	1200000	62 U	91 U	79.5 U	68 U	60 U	59 U	62 U	58 U
Herbicides (ug/kg)												
MALEIC HYDRAZIDE	31000000	NC	NC	31000000	**12 J**	36 UJ	31.5 UJ	27 U	24 U	24 U	25 U	23 U
MONURON	NC	NC	NC	NC	25 UJ	36 UJ	31.5 UJ	27 UJ	24 U	24 U	25 UJ	23 UJ
PROPOXUR	240000	NC	NC	240000	25 U	36 UJ	31.5 UJ	27 UJ	24 U	24 U	25 UJ	23 UJ
Inorganics (mg/kg)												
ARSENIC	0.39	10	29	0.39	**5.2**	**1.5**	**1.4**	**1.3**	**9.1 J**	**1.4 J**	**8.6**	**4.2**
CYANIDE	1600	3800	40	40	0.65 U	0.7 U	0.7 U	0.7 U	0.5 U	0.5 U	0.55 U	0.55 U
LEAD	400	375	NC	375	**4.9**	**3**	**2.95**	**2.9**	**5.7**	**1.8**	**6**	**4.4**
ZINC	23000	1500	12000	1500	**33.9**	**15.2**	**14.85**	**14.5**	**32.7**	**10**	**36.4**	**16.6**
Miscellaneous Parameters (mg/kg)												
TOTAL ORGANIC CARBON	NC	NC	NC	NC								

The value listed as the minimum screening criteria for diesel range organics is the stringent so

TABLE A1
SOIL SAMPLING RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

Location Depth Interval depth_unit submatrix	ORNL Residential Screening Level	Maine RAGs-Residential Screening Level	Maine RAGs-Soil to GW Screening Level	Minimum Screening Criteria	SB-17-125-0001 0-1 FT SS	SB-17-125-0104 1-4 FT SB	SB-17-125-0608 6-8 FT SB	SB-17-126-0001 0-1 FT SS	SB-17-126-0104 1-4 FT SB	SB-17-127-0306 3-6 FT SB	SB-17-128-0506 5-6 FT SB	SB-17-129-0306 3-6 FT SB
Pesticides/PCBs (ug/kg)												
4,4'-DDD	2000	NC	NC	2000	53	39 J	3.7 U	3.5 UJ	3.6 UJ	3.9 UJ	4.5 UJ	5.3 U
4,4'-DDE	1400	NC	NC	1400	250	67	3.7 U	19	3.6 U	3.9 U	4.5 U	5.3 U
4,4'-DDT	1700	50000	32000	1700	1200	390	52	110	4.8 U	3.9 U	4.5 U	5.3 U
ALPHA-CHLORDANE	1600	NC	10000	1600	100	32 J	1.9 U	13 J	1.9 U	3.5	2.3 U	2.7 U
GAMMA-BHC (LINDANE)	520	NC	NC	520	9.6 U	2 U	1.9 U	1.8 U	1.9 U	2 U	2.3 U	2.7 U
GAMMA-CHLORDANE	1600	NC	NC	1600	130	2 U	1.9 U	17 J	1.9 U	3.8 J	1.1 J	2.7 U
HEPTACHLOR	110	4000	23000	110	9.6 U	2 U	1.9 U	1.8 U	1.9 U	2 U	2.3 U	2.7 U
HEPTACHLOR EPOXIDE	53	NC	NC	53	9.6 U	2 U	1.9 U	1.8 U	1.9 U	2 U	2.3 U	2.7 U
Petroleum Hydrocarbons (mg/kg)												
DIESEL RANGE ORGANICS	NC	NC	NC	10								
Organophosphorous Pesticides (ug/kg)												
MALATHION	1200000	3800000	NC	1200000	56 U	58 U	61 UJ	53 U	55 U	59 U	63 U	63 U
Herbicides (ug/kg)												
MALEIC HYDRAZIDE	31000000	NC	NC	31000000	22 U	23 UJ	25 UJ	21 U	22 U	24 U	25 UJ	25 UJ
MONURON	NC	NC	NC	NC	22 UJ	23 UJ	25 UJ	21 UJ	22 U	24 U	61 J	550 J
PROPOXUR	240000	NC	NC	240000	22 UJ	23 UJ	25 UJ	21 UJ	22 U	24 U	15 J	94 J
Inorganics (mg/kg)												
ARSENIC	0.39	10	29	0.39	5.6 J	2.7 J	0.89 UJ	2 J	1.6 J	0.99 UJ	1.4 J	2 J
CYANIDE	1600	3800	40	40	0.34 J	0.55 U	0.5 U	0.5 U	0.5 U	0.65 U	0.65 U	0.7 U
LEAD	400	375	NC	375	23	7	1.9	20.6	2.5	2.1	3.6	4.7
ZINC	23000	1500	12000	1500	40.8	24.2	13.6	38	15	10.3	21.6	17.5
Miscellaneous Parameters (mg/kg)												
TOTAL ORGANIC CARBON	NC	NC	NC	NC								

The value listed as the minimum screening criteria for diesel range organics is the stringent so

TABLE A1
SOIL SAMPLING RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE
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Location Depth Interval depth_unit submatrix	ORNL Residential Screening Level	Maine RAGs-Residential Screening Level	Maine RAGs-Soil to GW Screening Level	Minimum Screening Criteria	SB-17-129-0306-AVG 3-6 FT SB	SB-17-129-0306-D 3-6 FT SB	SB-17-130-0001 0-1 FT SS	SB-17-130-0104 1-4 FT SB	SB-17-131-0001 0-1 FT SS	SB-17-131-0104 1-4 FT SB	SB-17-132-0001 0-1 FT SS	SB-17-132-0104 1-4 FT SB
Pesticides/PCBs (ug/kg)												
4,4'-DDD	2000	NC	NC	2000	5.4 U	5.5 U	3.6 UJ	3.6 U	3.7 U	3.8 U	3.7 U	4.2 U
4,4'-DDE	1400	NC	NC	1400	5.4 U	5.5 U	**4.6**	3.6 U	**34**	**8.4**	**3.4 J**	**12**
4,4'-DDT	1700	50000	32000	1700	5.4 U	5.5 U	26 U	3.6 U	**77**	**47**	5.4 U	11 U
ALPHA-CHLORDANE	1600	NC	10000	1600	2.75 U	2.8 U	**0.99 J**	1.9 U	1.9 U	**0.78 J**	1.9 U	2.2 U
GAMMA-BHC (LINDANE)	520	NC	NC	520	2.75 U	2.8 U	1.8 U	1.9 U	1.9 U	2 U	1.9 U	2.2 U
GAMMA-CHLORDANE	1600	NC	NC	1600	2.75 U	2.8 U	1.8 U	1.9 U	1.9 U	**1 J**	1.9 U	2.2 U
HEPTACHLOR	110	4000	23000	110	2.75 U	2.8 U	1.8 U	1.9 U	**1 J**	2 U	1.9 U	2.2 U
HEPTACHLOR EPOXIDE	53	NC	NC	53	2.75 U	2.8 U	1.8 U	1.9 U	1.9 U	2 U	1.9 U	2.2 U
Petroleum Hydrocarbons (mg/kg)												
DIESEL RANGE ORGANICS	NC	NC	NC	10								
Organophosphorous Pesticides (ug/kg)												
MALATHION	1200000	3800000	NC	1200000	86.5 UJ	110 UJ	53 U	55 U	56 U	58 UJ	55 UJ	64 UR
Herbicides (ug/kg)												
MALEIC HYDRAZIDE	31000000	NC	NC	31000000	33.5 UJ	42 UJ	21 U	22 U	22 UJ	23 U	22 UJ	26 UJ
MONURON	NC	NC	NC	NC	**380 J**	**210 J**	21 UJ	22 U	22 U	23 U	22 UJ	26 UJ
PROPOXUR	240000	NC	NC	240000	**94 J**	210 UJ	21 UJ	22 U	22 U	23 U	22 UJ	26 UJ
Inorganics (mg/kg)												
ARSENIC	0.39	10	29	0.39	**5.35 J**	**8.7 J**	**5.9 J**	**1.7 J**	**6.8 J**	**6 J**	**6.9 J**	**3.4 J**
CYANIDE	1600	3800	40	40	0.75 U	0.8 U	0.5 U	**0.6**	0.5 U	0.55 U	0.55 U	0.6 U
LEAD	400	375	NC	375	4.5	4.3	23.8	**4.4**	**37.5**	**6.2**	**12.3**	**12.6**
ZINC	23000	1500	12000	1500	18.85	20.2	46	12.6	**47.7**	**25.5**	**34.4**	**27.8**
Miscellaneous Parameters (mg/kg)												
TOTAL ORGANIC CARBON	NC	NC	NC	NC								

The value listed as the minimum screening criteria for diesel range organics is the stringent so

TABLE A1
SOIL SAMPLING RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE

Location Depth Interval depth_unit submatrix	ORNL Residential Screening Level	Maine RAGs-Residential Screening Level	Maine RAGs-Soil to GW Screening Level	Minimum Screening Criteria	SB-17-132-0104-AVG 1-4 FT SB		SB-17-132-0104-D 1-4 FT SB		SB-17-132-0408 4-8 FT SB		SB-17-132-0408-AVG 4-8 FT SB		SB-17-132-0408-D 4-8 FT SB		SB-17-133-0001 0-1 FT SS		SB-17-133-0104 1-4 FT SB		SB-17-134-0203 2-3 FT SB	
Pesticides/PCBs (ug/kg)																				
4,4'-DDD	2000	NC	NC	2000	4.2	U	4.2	U	8.4	U	7.6	U	6.8	U	4	U	4.1	U	3.6	U
4,4'-DDE	1400	NC	NC	1400	10.95		9.9		8.4	U	7.6	U	6.8	U	33	J	1.8	J	0.96	J
4,4'-DDT	1700	50000	32000	1700	13	U	15	U	8.4	UJ	7.6	UJ	6.8	UJ	31	U	4.1	U	7.6	U
ALPHA-CHLORDANE	1600	NC	10000	1600	2.2	U	2.2	U	4.3	U	3.9	U	3.5	U	2.1	U	2.1	U	4.3	
GAMMA-BHC (LINDANE)	520	NC	NC	520	2.2	U	2.2	U	4.3	U	3.9	U	3.5	U	1.5	J	2.1	UJ	1.9	UJ
GAMMA-CHLORDANE	1600	NC	NC	1600	2.2	U	2.2	U	4.3	U	3.9	U	3.5	U	2.1	U	2.1	U	5.9	
HEPTACHLOR	110	4000	23000	110	2.2	U	2.2	U	4.3	U	3.9	U	3.5	U	2.1	U	2.1	U	1.9	U
HEPTACHLOR EPOXIDE	53	NC	NC	53	2.2	U	2.2	U	4.3	U	3.9	U	3.5	U	2.1	U	2.1	U	1.9	U
Petroleum Hydrocarbons (mg/kg)																				
DIESEL RANGE ORGANICS	NC	NC	NC	10																
Organophosphorous Pesticides (ug/kg)																				
MALATHION	1200000	3800000	NC	1200000	63	UJ	63	UJ	78	U	85	U	92	U	61	UJ	67	UJ		
Herbicides (ug/kg)																				
MALEIC HYDRAZIDE	31000000	NC	NC	31000000	25.5	UJ	25	UJ	31	U	34	U	37	U	24	UJ	27	U		
MONURON	NC	NC	NC	NC	78	UJ	130	U	20	J	80	J	140	J	24	U	17	J		
PROPOXUR	240000	NC	NC	240000	78	UJ	130	U	31	U	34	U	37	U	24	U	27	U		
Inorganics (mg/kg)																				
ARSENIC	0.39	10	29	0.39	3.5	J	3.6	J	4.4		4		3.6		7.9	J	2	J		
CYANIDE	1600	3800	40	40	0.6	U	0.6	U	1.3	UJ	1.15	UJ	1	UJ	0.6	U	0.6	U		
LEAD	400	375	NC	375	12.7		12.8		6.3		5.75		5.2		16.6		4.1			
ZINC	23000	1500	12000	1500	28.7		29.6		33.4		29.55		25.7		36.1		13.7			
Miscellaneous Parameters (mg/kg)																				
TOTAL ORGANIC CARBON	NC	NC	NC	NC																

The value listed as the minimum screening criteria for diesel range organics is the stringent so

TABLE A1
SOIL SAMPLING RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE
10 of 11

Location Depth Interval depth_unit submatrix	ORNL Residential Screening Level	Maine RAGs-Residential Screening Level	Maine RAGs-Soil to GW Screening Level	Minimum Screening Criteria	SB-17-134-0203-AV3 2-3 FT SB	SB-17-134-0203-D 2-3 FT SB	SB-17-135-0203 2-3 FT SB	SB-17-136-0203 2-3 FT SB	SB-17-137-0203 2-3 FT SB	SB-17-138-0203 2-3 FT SB	SB-17-139-0203 2-3 FT SB	SB-17-140-0203 2-3 FT SB
Pesticides/PCBs (ug/kg)												
4,4'-DDD	2000	NC	NC	2000	3.6 U	3.6 U	**20** J	3.8 UJ	4 U	**9.8** J	3.6 UJ	3.7 UJ
4,4'-DDE	1400	NC	NC	1400	**0.955** J	**0.95** J	**27** J	**11**	4 UJ	**50** J	**7.3**	**2.5** J
4,4'-DDT	1700	50000	32000	1700	7.55 U	7.5 U	**490**	**60**	4 U	**120** J	**56**	29 U
ALPHA-CHLORDANE	1600	NC	10000	1600	**4.6**	**4.9**	**94**	**7.6** J	2.1 U	**52** J	**44**	**3.9**
GAMMA-BHC (LINDANE)	520	NC	NC	520	1.9 UJ	1.9 UJ	1.9 U	1.9 U	2.1 UJ	1.9 UJ	1.9 U	1.9 U
GAMMA-CHLORDANE	1600	NC	NC	1600	**6.55**	**7.2**	**120**	**10**	2.1 U	**65**	**52**	**4.9**
HEPTACHLOR	110	4000	23000	110	1.9 U	1.9 U	**12** J	1.9 U	2.1 U	1.9 U	**4.7**	**1.1** J
HEPTACHLOR EPOXIDE	53	NC	NC	53	1.9 U	1.9 U	1.9 U	1.9 U	2.1 U	1.9 U	1.9 U	1.9 U
Petroleum Hydrocarbons (mg/kg)												
DIESEL RANGE ORGANICS	NC	NC	NC	10								
Organophosphorous Pesticides (ug/kg)												
MALATHION	1200000	3800000	NC	1200000								
Herbicides (ug/kg)												
MALEIC HYDRAZIDE	31000000	NC	NC	31000000								
MONURON	NC	NC	NC	NC								
PROPOXUR	240000	NC	NC	240000								
Inorganics (mg/kg)												
ARSENIC	0.39	10	29	0.39								
CYANIDE	1600	3800	40	40								
LEAD	400	375	NC	375								
ZINC	23000	1500	12000	1500								
Miscellaneous Parameters (mg/kg)												
TOTAL ORGANIC CARBON	NC	NC	NC	NC								

The value listed as the minimum screening criteria for diesel range organics is the stringent so

TABLE A1
SOIL SAMPLING RESULTS
SITE 17 REMEDIAL INVESTIGATION
NAS BRUNSWICK, MAINE
11 of 11

Location Depth Interval depth_unit submatrix	ORNL Residential Screening Level	Maine RAGs-Residential Screening Level	Maine RAGs-Soil to GW Screening Level	Minimum Screening Criteria	SB-17-141-0203 2-3 FT SB		SB-17-141-0307 3-7 FT SB		SB-17-142-0203 2-3 FT SB		SB-17-142-0203-AVG 2-3 FT SB		SB-17-142-0203-D 2-3 FT SB		SB-17-143-0203 2-3 FT SB		SB-17-144-0203 2-3 FT SB		SB-17-145-0203 2-3 FT SB	
Pesticides/PCBs (ug/kg)																				
4,4'-DDD	2000	NC	NC	2000	3.7	U	5	U	3.7	UJ	3.65	UJ	3.6	UJ	3.6	U	3.8	U	3.6	U
4,4'-DDE	1400	NC	NC	1400	0.8	J	5	U	3.7	U	3.65	U	3.6	U	3.6	UJ	13	J	8.9	J
4,4'-DDT	1700	50000	32000	1700	3.7	U	13	J	3.7	U	3.65	U	3.6	U	3.6	U	82	J	64	
ALPHA-CHLORDANE	1600	NC	10000	1600	1.9	U	2.6	U	1.9	U	1.9	U	1.9	U	1.9	U	14		11	
GAMMA-BHC (LINDANE)	520	NC	NC	520	1.9	UJ	2.6	U	1.9	U	1.9	U	1.9	U	1.9	UJ	1.9	UJ	1.9	UJ
GAMMA-CHLORDANE	1600	NC	NC	1600	1.9	U	2.6	U	1.9	U	1.9	U	1.9	U	1.9	U	17		10	
HEPTACHLOR	110	4000	23000	110	1.9	U	2.6	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U
HEPTACHLOR EPOXIDE	53	NC	NC	53	1.9	U	2.6	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U
Petroleum Hydrocarbons (mg/kg)																				
DIESEL RANGE ORGANICS	NC	NC	NC	10																
Organophosphorous Pesticides (ug/kg)																				
MALATHION	1200000	3800000	NC	1200000			76	U												
Herbicides (ug/kg)																				
MALEIC HYDRAZIDE	31000000	NC	NC	31000000			30	U												
MONURON	NC	NC	NC	NC			100													
PROPOXUR	240000	NC	NC	240000			30	U												
Inorganics (mg/kg)																				
ARSENIC	0.39	10	29	0.39			1.9													
CYANIDE	1600	3800	40	40			0.75	UJ												
LEAD	400	375	NC	375			3													
ZINC	23000	1500	12000	1500			15.6													
Miscellaneous Parameters (mg/kg)																				
TOTAL ORGANIC CARBON	NC	NC	NC	NC																

The value listed as the minimum screening criteria for diesel range organics is the stringent so

ATTACHMENT B

BORING LOGS

BORING LOG FOR: Site 17, NAS Brunswick
PROJECT NO.: 112G02063-0620
LOGGED BY: J. Traut
DRILLED BY (Company/Driller): MAI/ S. Brown
GRD. SURFACE ELEVATION:

TRANSCRIBED BY: _____

ELEVATION FROM:

BORING NO.: SB-17-146
START DATE: 4/23/09
COMPLETION: DATE: 4/23/09
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	HEADSPACE SCREENING DATA *METHOD* = [FID, (PPM)]
0							Grass			
		0.8 / 1.0	1355		Medium Dense	Tan	0.0'-0.8' SILTY SAND (fine to medium)	SM	Moist – Wet	PID 0.0 FID 0.0
2						Black	0.0'-2.0' SAND (fine to medium) Cobble at 2.4'-2.5'	SP		PID 0.0 FID 0.0
		2.0 / 3.0	SB-17-SB17146-0104			Brown Tan			Moist - Wet	
4			1400			Black Tan				
				E.O.B.						

TYPE OF DRILLING RIG: Geoprobe 6620 DT
METHOD OF ADVANCING BORING: DPT
METHOD OF SOIL SAMPLING: Macro-Core with Acetate Liner
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NAS Brunswick
PROJECT NO.: 112G02063-0620
LOGGED BY: J. Traut
DRILLED BY (Company/Driller): MAI/ S. Brown
GRD. SURFACE ELEVATION:

TRANSCRIBED BY: _____
ELEVATION FROM:

BORING NO.: SB-17-147
START DATE: 4/23/09
COMPLETION: DATE: 4/23/09
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	HEADSPACE SCREENING DATA *METHOD* = [FID, (PPM)]
0		0.7 / 1.0	1320		Loose	Tan	0.0'-0.3' SILTY SAND (fine to medium) - saturated 0.3'-0.7' SAND (fine to medium)	SP	Moist	PID 0.0 FID 0.0
2					Medium Dense	↓	0.0'-1.6' SAND (fine to medium)	↓	Wet	PID 0.0 FID 0.0
		2.4 / 3.0	SB-17-SB17147-0104 Lab QC 1325		↓	Dk Brown Tan	1.6'-2.4' SAND (fine to medium) some fine gravel	↓	Wet	
4					↓	↓	↓	↓		
				E.O.B.						

TYPE OF DRILLING RIG: Geoprobe 6620 DT
METHOD OF ADVANCING BORING: DPT
METHOD OF SOIL SAMPLING: Macro-Core with Acetate Liner
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS: Standing water around boring areas – heavy rains 4/21/09

BORING NO.: SB-17-147

Tetra Tech NUS, Inc.

TtNUS Form 0018

BORING LOG FOR: Site 17, NAS Brunswick
PROJECT NO.: 112G02063-0620
LOGGED BY: J. Traut
DRILLED BY (Company/Driller): MAI/ S. Brown
GRD. SURFACE ELEVATION:

TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: SB-17-148
START DATE: 4/23/09
COMPLETION: DATE: 4/23/09
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	HEADSPACE SCREENING DATA *METHOD* = [FID, (PPM)]
0		0.6 / 1.0	1345		Loose	Tan	0.0'-0.3' SILTY SAND (fine to medium) 0.3'-0.6' SAND (fine to medium)	SP	Wet	PID 5.9 FID 0.6
2					Medium Dense	↓	0.0'-0.6' SAND (fine to medium) some coarse sand 0.6'-1.4'- SAND (fine to medium)	↓	Moist	PID 2.3 FID 33.9
		2.6 / 3.0	SB-17-SB17148-0104		↓	Black Grey/tan	1.4'-1.5' SILTY organic material (peat?) 1.5'-2.0' SAND (fine)	SM SP	Moist	
4			1350		Dense	↓	2.0'-2.6' SAND (fine to medium)	↓		
				E.O.B.						

TYPE OF DRILLING RIG: Geoprobe 6620 DT
METHOD OF ADVANCING BORING: DPT
METHOD OF SOIL SAMPLING: Macro-Core with Acetate Liner
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS: Standing water surrounding borings – heavy rains on 4/21/09

BORING NO.: SB-17-148

Tetra Tech NUS, Inc.

TtNUS Form 0018

BORING LOG FOR: Site 17, NAS Brunswick
PROJECT NO.: 112G02063-0620
LOGGED BY: J. Traut
DRILLED BY (Company/Driller): MAI/ S. Brown
GRD. SURFACE ELEVATION:

TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: SB-17-149
START DATE: 4/23/09
COMPLETION: DATE: 4/23/09
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET) 0	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF' L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	HEADSPACE SCREENING DATA *METHOD* = [FID, (PPM)]
		1.2 / 1.2	1405		Slightly Dense	Tan	0.0'-1.0' SILTY SAND (fine to medium) 1.0'-1.2' SAND (fine to medium)	SM	Moist –Wet Geotextile liner noted ~ 2 ft bgs	PID 44.1 FID 17.8
2					Dense		0.0'-2.4' SAND (fine to medium) 0.5'-0.7' and 0.9'-1.1' layers of silty fine sand	SP		PID 0.0 FID 25.0
		2.4 / 3.0	SB-17—SB17149-0104						Moist	
4			1410							
				E.O.B.						

TYPE OF DRILLING RIG:	Geoprobe 6620 DT
METHOD OF ADVANCING BORING:	DPT
METHOD OF SOIL SAMPLING:	Macro-Core with Acetate Liner
METHOD OF ROCK CORING:	N/A
GROUNDWATER LEVELS:	
OTHER OBSERVATIONS:	Standing water surrounding borings – heavy rains on 4/21/09

BORING NO.: SB-17-149

Tetra Tech NUS, Inc.

TtNUS Form 0018

BORING LOG FOR: Site 17, NAS Brunswick
PROJECT NO.: 112G02063-0620
LOGGED BY: J. Traut
DRILLED BY (Company/Driller): MAI/ S. Brown
GRD. SURFACE ELEVATION:

TRANSCRIBED BY: _____
ELEVATION FROM:

BORING NO.: SB-17-150
START DATE: 4/23/09
COMPLETION: DATE: 4/23/09
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	HEADSPACE SCREENING DATA *METHOD* = [FID, (PPM)]
0										
		1.6 / 2.0			Dense	Tan	0.0'-0.6' SILTY SAND (fine) 0.6'-1.6' SAND (fine to medium)	SM SP	Moist	PID 0.0 FID 0.0
2			1520		Loose	↓	↓	↓		PID 0.0 FID 0.0
		3.0 / 3.0	SB-17-SB17-150-0205		Dense	Brown/ Tan Orange/ Tan	0.0'-3.0' SAND (fine to medium) Trace coarse sand 0.0'-1.0'	↓	Moist	
4					↓	↓	↓	↓		
5			1525		↓	Tan	↓	↓		
				E.O.B.						

TYPE OF DRILLING RIG: Geoprobe 6620 DT
METHOD OF ADVANCING BORING: DPT
METHOD OF SOIL SAMPLING: Macro-Core with Acetate Liner
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NAS Brunswick
PROJECT NO.: 112G02063-0620
LOGGED BY: J. Traut
DRILLED BY (Company/Driller): MAI/ S. Brown
GRD. SURFACE ELEVATION:

TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: SB-17-151
START DATE: 4/23/09
COMPLETION: DATE: 4/23/09
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	HEADSPACE SCREENING DATA *METHOD* = [FID, (PPM)]
0										
		1.5 / 2.0	1430		Dense Loose	Tan	0.0'-0.6' SILT some sand (fine) 0.6'-1.5' SAND (fine to medium)	SM SP	Moist - damp	PID 0.0 FID 0.0
2					↓	↓	↓			PID 0.0 FID 0.0
		3.0 / 3.0	SB-17-SB17151-0205		Medium Dense	Brown	0.0'-0.5' SAND (fine to coarse) 0.5'-2.5' SAND (fine to medium)		Wet	
4					↓	↓				
5			1435		↓	Black	2.5'-3.0' SAND (fine to medium) some silt	↓		
				E.O.B.						

TYPE OF DRILLING RIG: Geoprobe 6620 DT
METHOD OF ADVANCING BORING: DPT
METHOD OF SOIL SAMPLING: Macro-Core with Acetate Liner
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NAS Brunswick
PROJECT NO.: 112G02063-0620
LOGGED BY: J. Traut
DRILLED BY (Company/Driller): MAI/ S. Brown
GRD. SURFACE ELEVATION:

TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: SB-17-152
START DATE: 4/23/09
COMPLETION: DATE: 4/23/09
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	HEADSPACE SCREENING DATA *METHOD* = [FID, (PPM)]
0										
		1.9 / 2.0			Dense	Brown	0.0'-0.8' SILTY SAND (fine)	SM	Moist	PID 0.0 FID 0.0
2			1500		Slightly Dense	Tan	0.8'-1.9' SAND (fine to medium)	SP	Geotextile liner ~ 2 ft bgs	PID 0.4 FID 0.0
		2.9 / 3.0	SB-17-SB17152-0205		Dense	Orange/ Tan	0.0'-2.9' SAND (fine to medium)		Moist	
4										
5			1510							
				E.O.B.						

TYPE OF DRILLING RIG: Geoprobe 6620 DT
METHOD OF ADVANCING BORING: DPT
METHOD OF SOIL SAMPLING: Macro-Core with Acetate Liner
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:

Tetra Tech NUS, Inc.

BORING LOG FOR: Site 17, NAS Brunswick
PROJECT NO.: 112G02063-0620
LOGGED BY: J. Traut
DRILLED BY (Company/Driller): MAI/ S. Brown
GRD. SURFACE ELEVATION:

TRANSCRIBED BY: _____
ELEVATION FROM:

BORING NO.: SB-17-153
START DATE: 4/23/09
COMPLETION: DATE: 4/23/09
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	HEADSPACE SCREENING DATA *METHOD* = [FID, (PPM)]
0										
		1.4 / 2.0			Loose	Tan	0.0'-0.6' SILTY SAND (fine)	SM	Moist- damp	PID 0.0
					↓	↓	0.6'-1.4' SAND (fine to medium)	SP		FID 0.0
2			1420		↓	↓	↓	↓		PID 0.0
										FID 0.0
					Dense	Tan/ Brown	0.0'-0.5' SAND (fine to medium) some coarse		Wet	
		2.6 / 3.0	SB-17-SB17153-0205		↓	↓	0.5' 1.8' SAND (fine to medium) trace fine gravel			
4					↓					
5			1425		↓	Dk. Brown	1.8'-2.6' SAND (fine to medium)	↓		
				E.O.B.						

TYPE OF DRILLING RIG: Geoprobe 6620 DT
METHOD OF ADVANCING BORING: DPT
METHOD OF SOIL SAMPLING: Macro-Core with Acetate Liner
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:

BORING NO.: SB-17-153

Tetra Tech NUS, Inc.

TtNUS Form 0018

BORING LOG FOR: Site 17, NAS Brunswick
PROJECT NO:: 112G02063-0620
LOGGED BY: J. Traut
DRILLED BY (Company/Driller): MAI/ S. Brown
GRD. SURFACE ELEVATION:

TRANSCRIBED BY: _____
ELEVATION FROM:

BORING NO.: SB-17-154
START DATE: 4/23/09
COMPLETION: DATE: 4/23/09
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET) 0	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	HEADSPACE SCREENING DATA *METHOD* = [FID, (PPM)]
		1.7 / 2.0			Loose	Tan	0.0'-0.4' SILTY SAND (fine to medium)	SM	Moist- Damp	PID 0.8
					↓	↓	0.4'-1.7' SAND (fine to medium)	SP		FID 0.0
2			1515		↓	↓	↓	↓		PID 0.0 FID 0.0
					Dense	Or. Tan Gray	0.0'-1.7' SAND (fine to medium)	↓	Wet	
		3.0 / 3.0	SB-17-SB17154-0205 DUP01 @ 1525		↓	Or. Tan Black	1.7'-2.2' SAND (fine to medium) some silt	↓	↓	
4					↓	↓	2.2'-2.5' SAND (fine to medium)	↓	↓	
5			1520		↓	Tan	2.5'-2.7' SILTY SAND	↓	↓	
				E.O.B.			2.7'-3.0' SAND (fine to medium)			

TYPE OF DRILLING RIG: Geoprobe 6620 DT
METHOD OF ADVANCING BORING: DPT
METHOD OF SOIL SAMPLING: Macro-Core with Acetate Liner
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:

BORING NO.: SB-17-154

Tetra Tech NUS, Inc.

TtNUS Form 0018

BORING LOG FOR: Site 17, NAS Brunswick
PROJECT NO.: 112G02063-0620
LOGGED BY: J. Traut
DRILLED BY (Company/Driller): MAI/ S. Brown
GRD. SURFACE ELEVATION:

TRANSCRIBED BY: _____
ELEVATION FROM:

BORING NO.: SB-17-155
START DATE: 4/23/09
COMPLETION: DATE: 4/23/09
MON. WELL NO.: N/A
CHECKED BY:

DEPTH (FEET) 0	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	HEADSPACE SCREENING DATA *METHOD* = [FID, (PPM)]
		1.9 / 2.0			Sl. Dense/ Loose	Tan/ Brown	0.0'-0.6' SILTY SAND (fine) 0.6'-1.9' SAND (fine to medium)	SM SP	Moist Geotextile liner at ~ 1.2 ft bgs	PID 0.0 FID 0.0
2			1450			Orange Tan				PID 0.0 FID 0.0
		2.6 / 3.0	SB-17-SB17155-0205				0.0'-2.6' SAND (fine to medium)		Moist	
4										
5			1455		Medium Dense					
				E.O.B.						

TYPE OF DRILLING RIG: Geoprobe 6620 DT
METHOD OF ADVANCING BORING: DPT
METHOD OF SOIL SAMPLING: Macro-Core with Acetate Liner
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS:
OTHER OBSERVATIONS:

BORING NO.: SB-17-155

Tetra Tech NUS, Inc.

TtNUS Form 0018

E.2 FINAL COMPLETION REPORT INVESTIGATION AND REMOVAL OF RELOCATED SOILS SITE 17

LETTER OF TRANSMITTAL

ECC
33 Boston Post Road West
Suite 340
Marlborough, MA 01752
Tel: (508) 229-2270
Fax: (508) 229-7737

TO: U.S. Department of Navy

BRAC PMO Northeast

4911 South Broad Street

Philiadephia, PA 19112-1303

DATE: 15 JANUARY 2010	JOB NO.: 5700.007
ATTENTION: Todd Bober, RPM and Paul Burgio, BEC	
RE: Final Completion Report Investigation and Removal	
Of Relocated Soils, Site 17	
Naval Air Station Brunswick, Maine	

WE ARE SENDING YOU [X] Attached [ ] Under separate cover via _____ the following items:

[ ] Shop drawings [ ] Prints [ ] Plans [ ] Samples [ ] Specifications

[ ] Copy of letter [ ] Change order [ ] _____

COPIES	DATE	DESCRIPTION
1	January 2010	FINAL COMPLETION REPORT INVESTIGATION AND REMOVAL OF RELOCATED SOILS, SITE 17 NAVAL AIR STATION BRUNSWICK, MAINE

THESE ARE TRANSMITTED as checked below:

[ ] For approval [ ] Approved as submitted [ ] Resubmit _____ copies for approval

[X] For your use [ ] Approved as noted [ ] Submit _____ copies for distribution

[ ] As requested [ ] Returned for corrections [ ] Return _____ corrected prints

[ ] For review and comment [ ] _____

[ ] FOR BIDS DUE _____ [ ] PRINTS RETURNED AFTER LOAN TO US

REMARKS: For your reference/use.

COPY TO: C. Sait and C. Evans, MEDEP (2)
M. Daly, EPA (1)
C. Lepage, Lepage Environmental (1)
D. McTigue, Gannet Flemming (1)
L. Joy and M. Fagan, NASB (1)
J. Wright, B. Capito, NAVFAC (2)
L. Klink, J. Orient, TtNUS (2)
C. Race, TtNUS (1)
C. Guido, R. Phinney, ECC (2)
J. Fullerton, Curtis Memorial Library (1)

SIGNED Gina Calderone CPG, PG
Titles Project Manager/Hydrogeologist

Al Easterday, PG
Sr. Project Manager

If enclosures are not as noted, kindly notify us at once.

FINAL
COMPLETION REPORT
INVESTIGATION AND
REMOVAL OF RELOCATED SOILS
SITE 17

Naval Air Station
Brunswick, Maine

Prepared for

Department of the Navy
Naval Facilities Engineering Command
BRAC Program Management Office - Northeast
4911 South Broad Street
Philadelphia, Pennsylvania 19112-1303

Contract No. N62472-02-D-0810
Contract Task Order No. 017

January 2010

Prepared by

ECC
33 Boston Post Road West, Suite 340
Marlborough, MA 01752

FINAL

COMPLETION REPORT INVESTIGATION AND REMOVAL OF RELOCATED SOILS SITE 17

Naval Air Station
Brunswick, Maine

Prepared for

Department of the Navy
Naval Facilities Engineering Command
BRAC Program Management Office - Northeast
4911 South Broad Street
Philadelphia, Pennsylvania 19112-1303

Alexander Easterday P.G.
Senior Project Manager

1/14/10
Date

Gina M. Calderone P.G., C.P.G.
Project Manager/Hydrogeologist

1/14/10
Date

QUALITY REVIEW STATEMENT

Contract No. N62472-02-D-0810 ECC Project No.: 5700.017
Contract Task Order No. 017
Activity: Naval Air Station Brunswick, Maine

Description of Report/Deliverable:

Completion Report Investigation and Removal of Relocated Soils, Site 17, January 2010, Naval Air Station Brunswick, Maine

ECC CTO Manager: Alexander C. Easterday, P.G.

As per State of Maine Department of Professional and Financial Regulations, Title 32 Chapter 73, Law, the sections of this document related to geology and geologic data interpretation have been reviewed for its technical content by the undersigned State of Maine Certified Geologist.

This document has been reviewed by the undersigned for their geological interpretive content. This statement is based upon the review of the undersigned conducted during the preparation of this report, as dated below.

Certified Professional Geologist Reviewer

Gina M. Calderone

1/14/10

Gina M. Calderone, P.G., C.P.G. Date
State of Maine Certified Professional Geologist (No. GE442)

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1.0 INTRODUCTION

Under Contract No. N62472-02-D-0810, Naval Facilities Engineering Command issued Contract Task Order No. 017 to ECC to conduct investigation and soil removal tasks at Site 17, the Former Pesticide Shop, Building 95, at Naval Air Station (NAS) Brunswick, Maine (Figure 1). This completion report has been generated to document the results of the field activities associated with these tasks. Work performed for this project was conducted in accordance with the Final Site 17 Work Plan to Investigate and Remove Relocated Soils (ECC 2008b), the Addendum Work Plan to Investigate and Remove Relocated Soils Site 17 (ECC 2009), and safety protocols specified in the Site Safety and Health Plan for NAS Brunswick (ECC 2008a). Fixed laboratory quality control activities were conducted in accordance with applicable sections of the Final Base-Wide Quality Assurance Project Plan for the Long-Term Monitoring Program (ECC/EA 2006), the Quality Assurance Project Plan included in the Remedial Investigation Work Plan for Site 17 (Tetra Tech NUS 2008), Final Site 17 Work Plan to Investigate and Remove Relocated Soils (ECC 2008b), and in accordance with Applicable or Relevant and Appropriate Requirements (ARAR) as described in the Building 95 Action Memorandum (ABB Environmental Services, Inc. 1993a). Comment letters, responses to comment letters, and concurrence letters submitted by and to the Maine Department of Environmental Protection (MEDEP) and the United States Environmental Protection Agency (USEPA), are provided in Appendix A; site photos taken during the excavation, sampling and geotextile fabric placement phases of the project are provided in Appendix B; transportation and disposal waste manifests and weight slips are provided in Appendix C; laboratory analytical data is provided in Appendix D; survey data is provided in Appendix E; field forms are provided in Appendix F; data validation reports are provided in Appendix G; MEDEP formatted EDDs (electronic data deliverable) of the laboratory data are provided in Appendix H.

1.1 SITE DESCRIPTION

Site 17 is located in the north-central area of the base, one block north of Fitch Avenue at the corner of Pegasus Street and Avenue B. The site is bounded to the northeast by the former Old Navy Fuel Farm and to the southwest to northwest by Pegasus Street. The southern boundary extends south of the former railroad tracks approximately 65 feet from Avenue B. South of Avenue B there were abandoned railroad tracks which ran parallel to Avenue B that were removed in 1994. Building 95 was used for storage, mixing, and disposal of pesticides and herbicides from the late 1940's until 1985. In 1985, pest control operations moved from Building 95 to Building 647. The location of Site 17 within NAS Brunswick is shown on Figure 2.

1.2 SITE HISTORY

Three (3) buildings were once located on the site; Building 95, Building 31, and a storage shed. Building 95 was constructed in the late 1940s. It was a 1-story building and had approximate dimensions of 15 ft × 20 ft. At a later date, a heated storage shed was added to the north side of

Building 95 that measured approximately 8 ft × 11 ft. A drum storage rack was located outside of the building along the eastern side. Subsurface utilities consisted of potable water and steam lines that provided heat for the building. The building was served by a 500-gal, stainless steel septic tank and associated tile overflow pipe. The building and septic tank were removed from the site between January and February 1994. Building 31 was located east of Building 95 and had approximate dimensions of 12 ft × 25 ft. The date of construction of Building 31 is unknown. This building was used by NAS Brunswick workers conducting asbestos abatement for changing and showering. Reportedly, shower and lavatory facilities were connected to and shared the septic system that served Building 95. Subsurface utilities consisted of potable water and steam lines that provided heat, while electricity for Building 31 was provided by overhead wires. Building 31 was removed from the site between January and February 1994.

The 8 ft × 10 ft storage shed was located north of Building 95. The storage shed was used to store asbestos abatement equipment. The storage shed was not used to store asbestos-contaminated materials. The storage shed was removed from the property between January and February 1994.

Currently, the ground surface at the site is grass covered and has small trees and shrubs also located within the site boundary. The site topography slopes gently downward from the west and north to the east and southeast and has no distinct surface water drainage features.

During a 1994 Removal Action (Harding Larson Associates [HLA] 1998), surface soils containing total pyrethrins at a concentration greater than the Preliminary Remediation Goal (PRG) for total pyrethrins (10,000 µg/kg) were identified during confirmation sampling. Instead of off-site removal of this material, the soil from this area was excavated and relocated to the center of the excavation area south of Avenue B. This material was placed in a 6-in. layer within the area of previously excavated material south of Avenue B, covered with a geotextile fabric to delineate the soils, and then covered with 2 ft of common fill during site restoration. The approximate area of relocated soils is shown on Figure 2.

1.3 PREVIOUS REMEDIAL ACTIONS

The Navy has previously completed Remedial Actions at Site 17. Between January and February 1994, Buildings 31 and 95, the storage shed, septic tank, and railroad lines were demolished and removed from the site. Prior to demolition, an asbestos abatement contractor removed all asbestos-containing materials from these structures and transported 64 bags of asbestos-containing material to a disposal facility in Michigan. After the asbestos abatement was complete, the buildings were demolished and the debris transported as hazardous waste for disposal in Michigan. The septic tank was removed, cleaned, cut into pieces, and disposed of as hazardous debris. The septic tank was found to contain a black, "cake-type" sludge, which was removed and stockpiled with the excavated soil for transport and disposal. Railroad ties were removed from approximately 150 ft of abandoned rail line south of Avenue B and disposed of as hazardous debris at a disposal facility in Michigan.

Between 2 February and 2 March 1994, the Navy completed the initial excavation of soils which exceeded established PRGs. A total of 1,260 yd^3 of soil was excavated from the site and transported to the Aptus, Inc. incineration facility in Aragonite, Utah for proper disposal. Confirmatory soil sampling was completed at the limits of the excavation and identified the presence of site contaminants at concentrations exceeding the established PRGs.

On 17 October 1994, an additional site excavation was conducted based on the results of the confirmatory soil samples collected in February 1994. Four areas north of Avenue B were targeted for additional excavation based on the February 1994 sample data. An additional 45 yd^3 of material was excavated from the site. In addition, an area immediately south of Avenue B was found exceeding the surface soil PRG for total pyrethrins but below the subsurface PRG. It is unknown whether these soils also contained other contaminants such as 4,4'-DDT (dichlorophenyltrichloroethane). The soil from this area was excavated and placed in a 6-in. layer within the area of previously excavated material south of Avenue B. According to the Draft Final Closure Report (HLA 1998) this 6-in. layer of soil was then covered with a geotextile fabric and then backfilled with 2 ft of common fill during site restoration. The identification and removal of this 6-in. layer of soil is the subject of this Completion Report.

In December 1994, an additional excavation was conducted based on sample results from confirmatory sampling conducted after the October 1994 excavation event. Two areas, around the former septic tank and leach bed, were found exceeding the PRGs. A total of 5 yd^3 was removed during December 1994 and transported to the Aptus Incineration Facility for disposal. According to the Draft Final Closure Report (HLA 1998), site restoration was completed during the spring of 1995. The excavated area was covered with a geotextile fabric to provide a visible and physical separation between native soil and common backfill. After placement of the geotextile fabric, the site was backfilled to the approximate original grade with common borrow backfill and a 6-inch layer of topsoil.

2.0 FIELD ACTIVITIES

Field activities were performed in support of the removal of relocated soils included the following pre-excavation activities to determine and mark the location of the relocated soils; excavation of test pits and preliminary delineation soil sampling of the previously excavated soil to obtain current soil contaminant concentration data; and the collection of soil samples for waste characterization. Field activities performed in support of the excavation and removal of relocated soils include the following; excavation, transport and disposal of the relocated soils; and confirmatory soil sampling. Determination and marking of the location of the relocated soils, test pitting, and preliminary delineation soil sampling was conducted on 14 October 2008. Excavation, transport and disposal of relocated soils, and confirmatory soil samples was conducted 6 through 9 July 2009, and on 30 July 2009. Details of these activities are summarized in the following subsections.

2.1 LOCATING AREA OF RELOCATED SOILS

The approximate location of the relocated soils was determined using information obtained in the Draft Final Closure Report, Building 95 Site (HLA 1998). Based on this information, the area of relocated soils measured approximately 16 ft by 90 feet by 6 inches. This equates to approximately 720 cubic feet or approximately 27 cubic yards of soil.

2.2 TEST PITS EXCAVATION AND PRELIMINARY SOIL SAMPLING

Test pits were excavated in October 2008 to confirm the presence of a geotextile fabric reportedly placed over the relocated soils following the initial placement of the soils in 1995. Test pits were also excavated to facilitate preliminary soil sampling to obtain current soil contaminant concentration data for disposal and delineation purposes. Three test pits (TP-1, TP-2, and TP-3) were excavated on 14 October 2008. TP-1 was located at the western end of the area of relocated soils, TP-2 was in the middle, and TP-3 was located at the eastern end of the relocated soils area. The test pits were excavated to approximately 2 ft below ground surface (bgs), where the geotextile fabric was visible. The geotextile fabric was observed at a slightly shallower depth (approximately 16 to 18 inches bgs) along the northern side (along Avenue B) of the relocated soils area. The excavated material was placed on plastic sheeting to be re-used as backfill material once the soil sampling was completed.

Following the excavation of the test pits, a total of nine composite soil samples were collected from beneath the geotextile fabric to obtain current contaminant concentrations. At each sample location, an approximate 1 ft x 1 ft square of the geotextile fabric was removed. The soil at each sample location was placed in a stainless steel bowl and homogenized. The soil was then placed in the appropriate sample containers, placed in a cooler with ice, and submitted under chain of custody (COC) protocol to APPL Laboratories of Fresno, CA, for pesticide analysis by USEPA modified Method 8081. APPL Laboratory is a Navy certified laboratory. The sample locations

were recorded using a tape measure and swing ties from existing structures located within Site 17. Test pit locations and preliminary soil sampling locations are shown on Figure 3. The analytical results of the soil samples collected during the test pit phase of this project are discussed in Section 3.1 of this report, and are summarized in Table 1.

Following the completion of the soil sampling, the test pits were backfilled with the previously excavated material and compacted with the excavating machine.

2.3 WASTE CHARACTERIZATION SAMPLING

A total of two waste characterization samples (BNAS-01 and BNAS-02) were collected on 6 April 2009. The samples were collected by William Eaton of Bennett Environmental, of Oakville, Ontario Canada (subcontractor to ER LLC, see Section 2.4) as required by the disposal facility. As these samples were required by the disposal facility to determine if the contaminant concentrations were within their acceptable levels for disposal purposes, the results from these samples are not included in this report. The samples were collected from the approximate location of test pit samples SS-07 and SS-08 collected from TP-1, which contained the highest concentrations of 4,4'-DDT reported in the preliminary soil sampling results, see Figure 3. A 1 ft x 1 ft hole was dug using a shovel until the geotextile fabric was uncovered (approximately 24 inches bgs) with the spoil being placed on plastic sheeting. The geotextile fabric was then cut, pulled back, and the soil samples collected from beneath the fabric horizon. The geotextile fabric was then replaced, and the hole backfilled with the native material. The signed Material Profile and a waste characterization summary table (provided by the disposal facility Recupere Sol, Inc.) are provided in Appendix C.

2.4 EXCAVATION AND DISPOSAL OF RELOCATED SOILS

The excavation, transportation, and disposal of the relocated soils was conducted over a 3 day period, from 6 July through 8 July 2009, and completed on 30 July 2009. These activities were conducted by Environmental Restoration (ER) LLC of Glastonberry, CT, under subcontract to ECC. Transportation and disposal of the soils was coordinated by Bennett Environmental Inc., of Oakville, Ontario Canada, under subcontract to ER LLC. Transportation of the soils was conducted by Ameritech Environmental Services Inc. and New England Disposal Technologies. The soils were transported under hazardous waste manifest to Recupere Sol, Inc., located in Saint Ambrose, Quebec, Canada, for treatment by thermal incineration. Digital photographs of the excavation of the relocated soils are provided in Appendix B.

The four corners of the area to be excavated were located using measurements taken during the test pitting activities and from Global Positioning Satellite (GPS) coordinates. The original area to be excavated measured approximately 90 ft by 16 ft by 6 inches (approximately 27 cubic yards of soil). However, at the request of the MEDEP (Response to MEDEP Comment No. 6, Final Addendum Work Plan to Investigate and Remove Relocated Soils Site 17 [ECC 2009]), the area to be excavated was expanded to include the locations of the preliminary soil samples (SS07

and SS08) collected during the test pitting activities. Therefore, the area to be excavated was expanded by 9 ft 9 inches in overall length and 3 ft in overall width. Due to an underground natural gas utility line, which runs along the south side of Avenue B (which corresponds to the north side of the area to be excavated), 1 ft in width was added to the north side and 2 ft were added to the south side of the area to be excavated. In addition, 3 inches of depth was added to the reported 6 inches of relocated soils, bringing the total area to be excavated and removed to 99 ft 9 inches by 19 ft by 9 inches (approximately 60 cubic yards of soil). The areal extent of the removed soils, including the additional areas that were excavated, is shown on Figure 4.

The excavation began with the complete removal of the top 2 ft of clean material, which was initially placed over the geotextile fabric during the removal action in 1995. This material was placed on plastic sheeting along the south side of the excavation to be used as backfill material. Once the geotextile fabric was exposed over the full extent of the area of relocated soils, the fabric was cut along the edges of the excavation and removed to the west end of the excavation. To ensure that the required 9 inches of relocated soil was removed, 3 ft wooden grade stakes were placed around the perimeter of the excavation and in a line down the middle of the excavation. The stakes had previously been marked with two lines of orange paint, one line at 3 inches above the bottom end of the stake and one line 12 inches above the bottom of the stake. The stakes were then hammered into the ground until the top orange line was at equal depth with the geotextile fabric. The 3 inches of wooden stake protruding below the bottom orange line was needed to keep the stake upright and in place following the removal of 9 inches of supporting soil above it. When the relocated soils were excavated down to the bottom orange line, the 9 inches of soil had been removed. The relocated soils were direct loaded from the excavation into the transport trucks. The original geotextile fabric from 1995 was also disposed of with the soils. Plastic sheeting was placed on the ground around the disposal trucks and the excavator to capture any loose contaminated soil during loading operations.

Under the hazardous waste import/export agreement with the Canadian government and the USEPA, the total amount of soil that could be transported to Canada for disposal was 100 tons. On 8 July 2009, the 100 ton limit had been reached; however, there remained an approximately 9 ft by 19 ft by 9 inch area of relocated soils at the west end of the excavation to be excavated and removed. The remaining relocated soils (9 ft by 19 ft area) were left in place until an amendment to the original import/export agreement to transport the additional soils was granted by the Canadian government. A new geotextile fabric was placed in the bottom of the excavation outside of the 9 ft by 19 ft area of remaining relocated soil. The excavation was then backfilled with clean material (previously stockpiled material and additional clean material obtained from Ray Labbe and Sons, Topsham, Maine) up to the level of the original geotextile fabric (approximately 24 inches bgs). A second, new geotextile fabric was then placed on top of the backfill material and brought to grade with clean material. The area was then compacted with the excavator.

The remaining relocated soils (9 ft by 19 ft area) were covered with plastic sheeting (for delineation purposes and to keep the contaminated soils from contacting clean backfill material)

and covered with at thin layer of clean backfill material pending approval of the amendment to the import/export agreement. The amendment to the import/export agreement was granted on 29 July 2009. On 30 July 2009, the remaining relocated soils (approximately 18.07 tons) were excavated and transported off site under hazardous waste manifest to Recupere Sol, Inc. for treatment by thermal incineration. The remaining area was then backfilled with clean material, compacted, and covered with approximately 4 to 6 inches of clean loam and seeded.

2.5 QUANTITIES OF SOIL EXCAVATED AND DISPOSED OF OFF SITE

A total of 117.61 tons of soil was excavated and removed from Site 17. A total of 99.54 tons was excavated and removed on 7 and 8 July 2009. A total of 18.07 tons was excavated and removed on 30 July 2009. The disposal trucks were equipped with a waterproof liner and a retractable top cover. Security seals were placed on the top covers to ensure that the covers were not retracted prior to arrival at the disposal facility.

2.6 CONFIRMATORY SOIL SAMPLING

Following the excavation of the relocated soils and prior to backfilling, a total of 24 confirmatory composite soil samples were collected to gauge the effectiveness of the soil removal. Quality Assurance/Quality Control (QA/AC) samples were also collected. Eighteen samples (S17-PB-01 through S17-PB-18) were collected from the bottom of the excavation. Six samples (S17-SW-01 through S17-SW-06) were collected from sidewall locations within 6 inches of the bottom of the excavation. At each sample location, soil was placed in a stainless steel bowl and homogenized. The soil was then placed in the appropriate sample containers, placed in a cooler with ice, and submitted under chain of custody (COC) protocol to APPL Laboratories of Fresno, CA, for pesticide analysis by USEPA modified Method 8081. All soil samples were collected on 7 July and 8 July 2009 with the exception of samples S17-PB-01, S17-PB-02, S17-PB-03, and S17-SW-01, which were collected on 30 July 2009 following the amendment approval for transportation of the additional soils. In addition to the planned 24 confirmatory soil samples collected, one additional characterization soil sample (S17-00) was collected from the bottom of the excavation. This additional sample was collected after an area of black-stained soil was observed in the bottom of the excavation approximately 22 feet northeast of sample location S17-PB-02 (see Figure 6). This black-stained material measured approximately 2 to 3 feet in width and extended in a north south direction across the excavation. The sample was analyzed for volatile organic compounds (VOCs), by USEPA Method 5035/8260, semi-volatile organic compounds (SVOCs) by USEPA Method 8270, and pesticides by USEPA modified Method 8081. The VOC and SVOC factions were submitted to Accutest Laboratories of Marlborough, MA, a Navy certified laboratory, for analysis. The pesticide faction was submitted to APPL Laboratories of Fresno, CA. Confirmatory sample locations are shown on Figure 5 and the analytical results from these locations are summarized in Table 2. The analytical results from the additional soil sample collected to characterize the observed condition of black-stained soil are summarized in Table 3.

2.7 SURVEYING

All sample locations and the four corners of the excavation were surveyed using a Trimble® PRO-XRS Global Positioning System (GPS) with sub-meter accuracy. Horizontal coordinates were established using NAD 1983 UTM Zone 19 North Coordinate System datum in meters. Ground surface elevations were not recorded. All survey data is presented in Appendix E.

2.8 SITE RESTORATION

Following the excavation and off-site removal of the excavated relocated soils, the area of excavation was backfilled to grade with the previously excavated (top 2 ft of clean topsoil) material. Additional clean material was obtained from a local contractor (Ray Labbe and Sons, Topsham, Maine) as needed. Backfill material was compacted using the excavating machinery. The area was then covered with approximately 4 to 6 inches of topsoil and re-seeded. Site restoration activities were conducted on 7 July through 9 July and completed on 30 July 2009. Digital photographs are shown of the project area following the completion of the site restoration activities in Appendix B.

2.9 INVESTIGATION DERIVED WASTE

Investigation derived waste (IDW) generated during this project consisted of the original geotextile fabric, personal protection equipment (PPE), and equipment de-contamination liquids and solids. All IDW generated during this project was placed in the disposal transport trucks and disposed of with the relocated soils at Recupere Sol, Inc. located in Saint Ambrose, Quebec, Canada.

3.0 SOIL SAMPLING RESULTS

This section provides a summary of the results of the soil sampling conducted as part of the investigation and removal of relocated soils south of Avenue B at Site 17.

3.1 PRELIMINARY SOIL SAMPLING – TEST PITTING SAMPLING RESULTS

Of the 9 pre-excavation soil samples collected during the test pitting phase, detections of pesticides were reported in all samples. The pesticide 4,4'-DDT was reported in 6 of the samples at concentrations which exceed the PRG for surface soil (500 µg/kg). Concentrations ranged from a low of 570 µg/kg reported in SS04, to a high of 6,300 µg/kg reported in SS08. It is noted, however, that these samples were collected below a depth of 2 ft bgs and are significantly below the subsurface PRG (135,000 µg/kg). Table 1 provides the soil sample results for the test pit sampling and the reported concentrations above (500 µg/kg) are bolded and shaded. The data collected from the 3 test pit areas (Test Pits 1, 2, and 3) were used as rationale for defining the limits of excavation.

3.2 POST-EXCAVATION SOIL SAMPLING – CONFIRMATORY SAMPLING RESULTS

Of the 24 confirmatory soil samples collected, detections of pesticides were reported in 18 of the samples. The pesticide 4,4'-DDT was reported in 8 of the confirmatory samples collected at concentrations which exceed the PRG for surface soil (500 µg/kg). Concentrations of surface soil PRG exceedences ranged from a low of 600 µg/kg reported in S17-PB-08 and S17-SW-02, to a high of 4,400 µg/kg reported in S17-SW-01. Table 2 provides the soil sample results for the confirmatory samples collected. It is noted that the reported soil concentrations above the surface soil PRG of 500 µg/kg are bolded and shaded in Table 2. These soils have since been covered with approximately 3 feet of clean fill as planned as per the site restoration requirements of the Work Plan (ECC 2008b). One additional soil characterization sample (S17-00) was collected from the bottom of the excavation in an area where black-stained soil was observed in the western extent of the area to be excavated. Detections of 4,4'-DDT were reported for this sample at a concentration of 1,000 µg/kg which exceeds the PRG for surface soil (500 µg/kg). Also in this sample, one VOC, tetrachloroethene (PCE), was detected at a concentration of 140 µg/kg, which exceeds the proposed 2009 MEDEP RAG (40 µg/kg) for soils leaching to groundwater. It should be noted, however, that the Navy will follow the existing RAGs until the revised guidelines have been finalized by MEDEP. The analytical results from the additional soil sample collected to characterize the observed condition of black-stained soil are summarized in Table 3.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Based on an evaluation of the post-excavation confirmation soil sampling results of the July 2009 relocated soil removal activities at Site 17, the following conclusions are provided:

- Analytical results indicate that elevated concentrations of pesticide contaminated soils remain beneath the ground surface (approximately 3 feet bgs) at 7 areas located within the excavation limits and at the one location where blackened soil was observed (S17-00). The reported concentrations at these 7 locations exceed the surface soil PRG for 4,4'-DDT; however, all of the pesticide concentrations reported in the post-excavation soil samples collected are significantly below the PRG for 4,4'-DDT for subsurface soils (135,000 µg/kg).

- During the excavation activities a blackened soil area, approximately 2 to 3 feet in width, was discovered to extend in a north-south direction across the excavation area. The additional sampling results from this soil-material (sample S17-00) reported elevated concentrations of pesticides, notably 4,4'-DDT which was reported at a concentration of 1,000µg/kg, which exceeds the surface soil 4,4'-DDT PRG of 500 µg/kg but is below the subsurface soil 4,4'-DDT PRG of 135,000 µg/kg. During the 1990's removal action PRGs were only established for Total Pyrethrins and 4,4'-DDT. Estimated concentrations of semi-volatile organic compounds (SVOCs) were also detected in the sample collected from the black-stained soil; however, these reported values represent tentatively identified compounds (TIC), which were reported to provide additional characterization information. Also in this sample, one VOC, tetrachloroethene (PCE), was detected at a concentration of 170 µg/kg, which exceeds the proposed 2009 MEDEP RAG (40 µg/kg) for soils leaching to groundwater. It should be noted, however, that the Navy will follow the existing RAGs until the revised guidelines have been finalized by MEDEP.

- A total of 117.61 tons of pesticide impacted soils were removed from the area located across Avenue B where pesticide-impacted soils were once buried during previous site activities conducted in 1994. Although the confirmatory sampling results indicate pesticide contaminated soils still remain in place at approximately 3 feet below grade at 8 locations, it is believed that, due to the over-excavation of the original area of re-located soils, that all of the re-located soils were removed during this removal action. It is also believed that any remaining soils that exceed the original removal action PRGs are not associated with the original soils and will be addressed as part of the on-going RI process in collaboration with the project stakeholders.

- Total pyrethrins, which were once a contaminant of concern at Site 17 during the 1994 removal action, were not detected in any of the preliminary or confirmation soil samples collected during this 2009 removal action.

It is recommended that the Navy and project stakeholders determine what risk, if any, the remaining impacted soil at the 8 sampling locations within the excavation poses to human health and the environment. It is further recommended that the findings of this soil removal action be assessed for risk in conjunction with the findings of the remedial investigation that was conducted at the site, as reported in the Draft Remedial Investigation (RI) Report for Site 17 prepared by Tetra Tech NUS, July 2009. The risk assessment conducted for Site 17 as part of the July 2009 RI can be used to further evaluate the analytical results reported from this soil removal action to determine if the reported pesticide concentrations in the remaining soil are within the range of acceptable risk for the site and for the planned future land use at the site.

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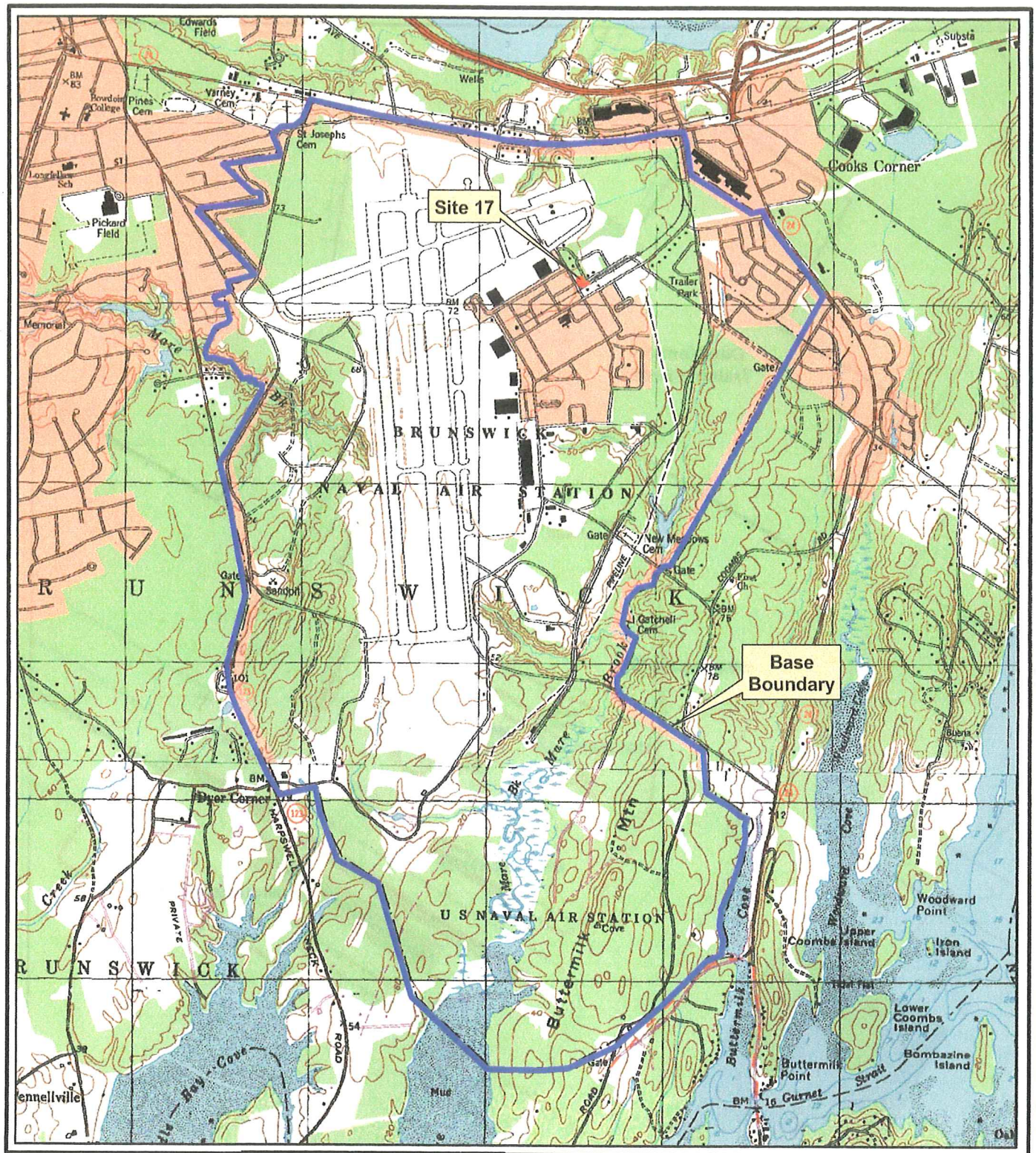
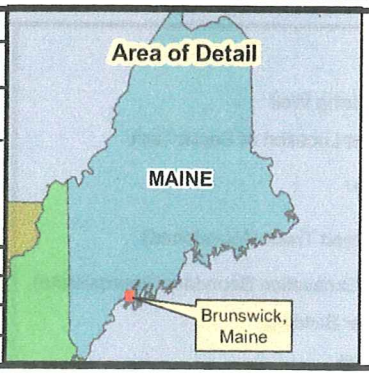
FIGURES



Contract No.	N62472-02-D-0810
Description	Site 17 Site Location
Coordinate system	NAD 1983, UTM, Zone 19 N in meter
Sources	Naval Base Boundary provided by Navy. Orrs Island (1978) and Brunswick (1980) 7.5 minute quadrangles provided by USGS.

Date	22-SEP-2009	Rev.	Date	App. By
DB	C. Guido			
CB	J. Donovan			
AB				



Legend

- NAS Brunswick Boundary
- Site 17 Site Location

Figure 1

Site 17
Site Location Map

Naval Air Station
Brunswick, Maine

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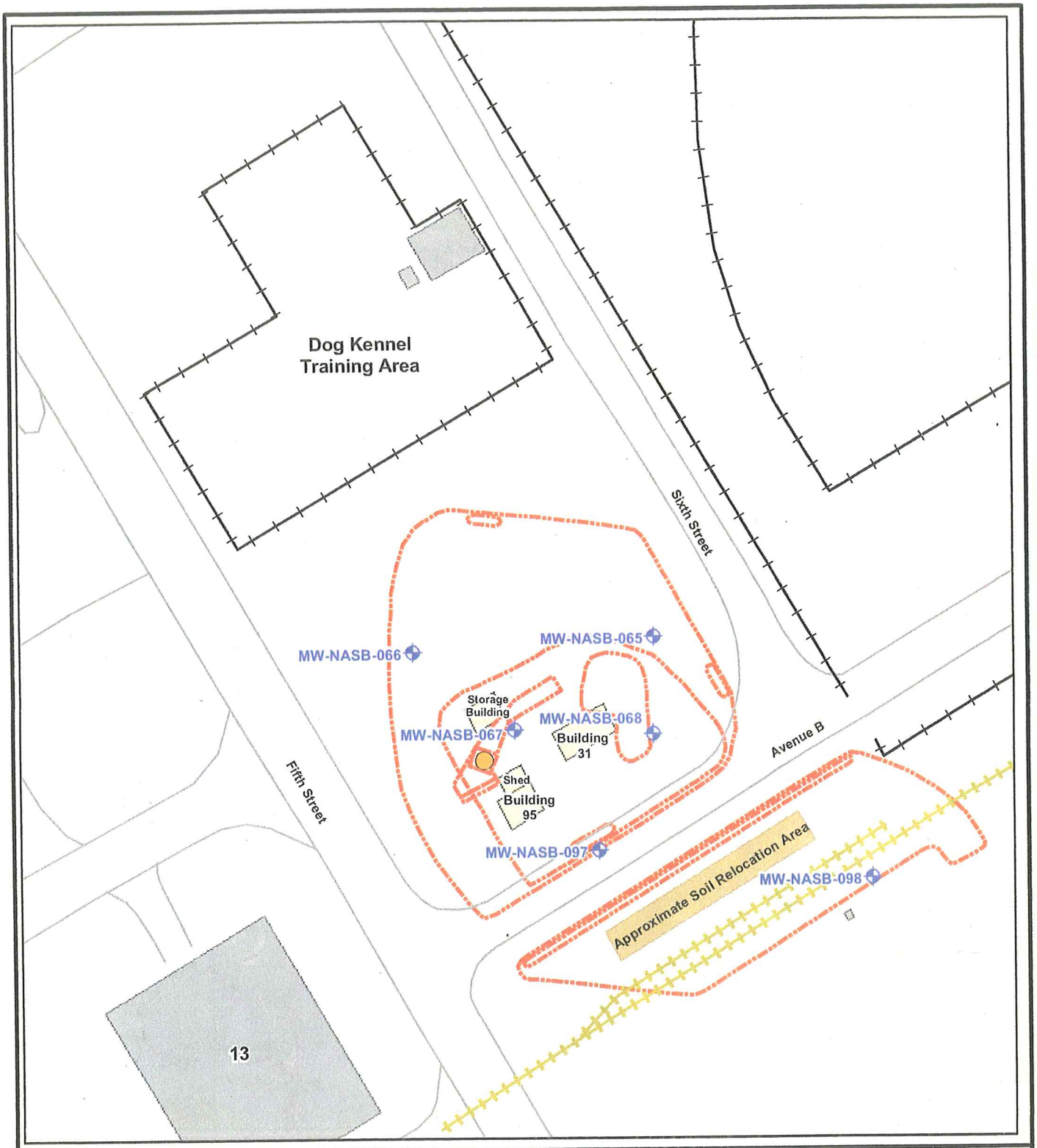
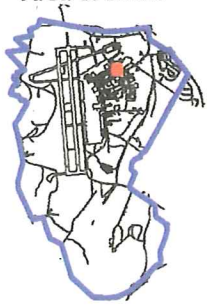


Contract No.	N62472-02-D-0810
Description	Site 17 Site Map
Coordinate system	NAD 1983, UTM, Zone 19 N in meter
Sources	Naval base boundary provided by Navy.

Date	22-SEP-2009	Rev.	Date	App. By
DB	C. Guido			
CB	J. Donovan			
AB				

Area of Detail



Legend

- Monitoring Well
- Former Location of Septic Tank
- Fence
- Rail Road Track (Abandoned)
- 1994 Excavation Boundary (Approximate)
- Former Building
- Building

Figure 2

Site 17
Site Plan

Naval Air Station
Brunswick, Maine

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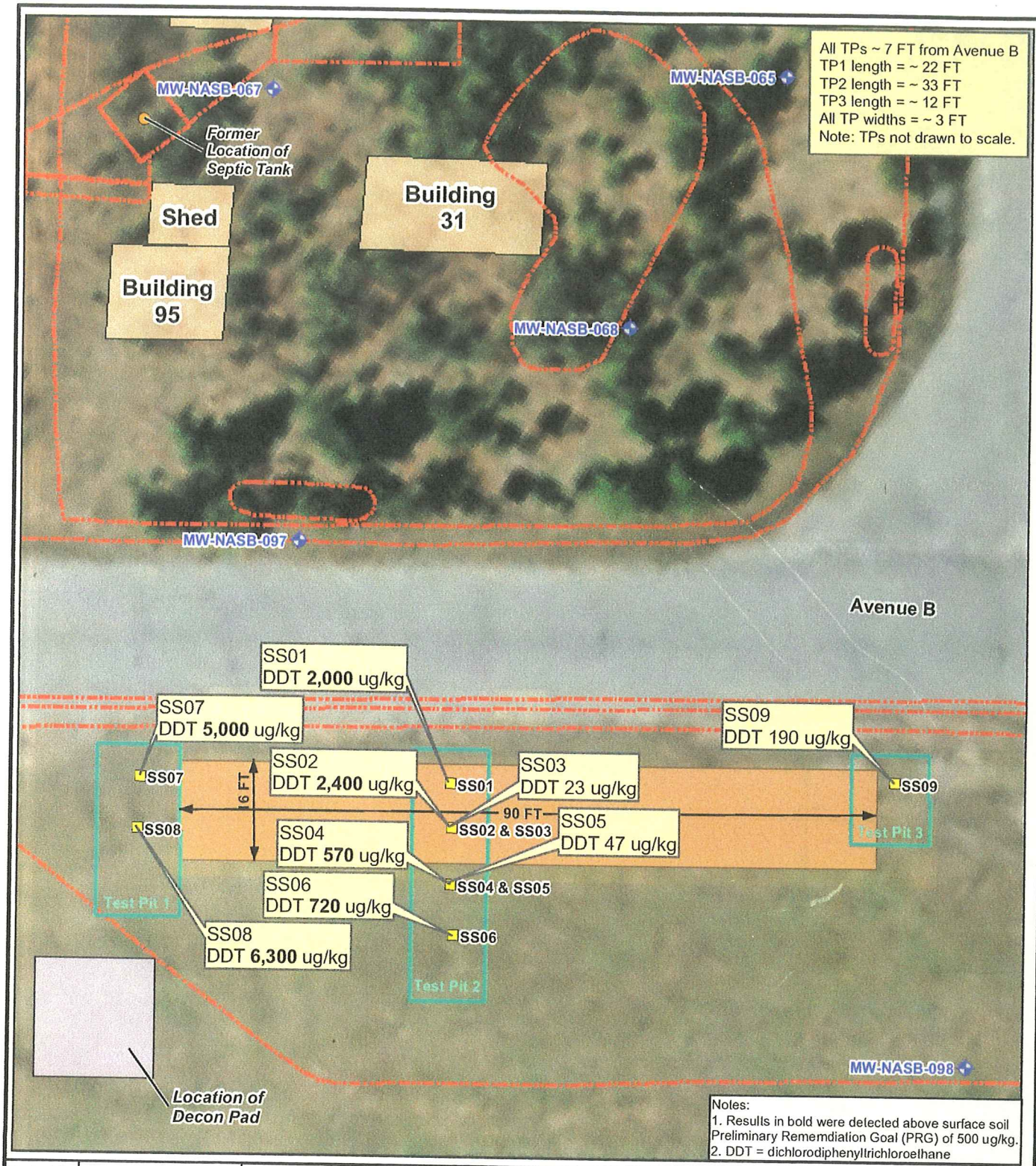
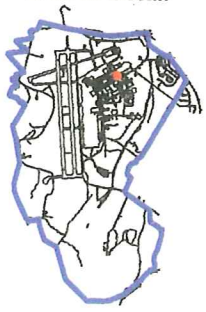


Contract No.	N62472-02-D-0810
Description	Site 17 Site Map
Coordinate system	NAD 1983, UTM, Zone 19 N in meter
Sources	Naval base boundary provided by Navy.

Date	5-JAN2010	Rev.	Date	App. By
DB	C. Guido			
CB	J. Donovan			
AB				

Area of Detail



Legend

- Test Pit Soil Sample Locations
- Former Location of Septic Tank
- Monitoring Well
- Location of Decon Pad
- Test Pits
- 1994 Excavation Boundary (Approximate)
- Former Building
- Soil Relocation Area (Approximate)

Figure 3

Site 17 Test Pits and Sample Locations

Naval Air Station
Brunswick, Maine

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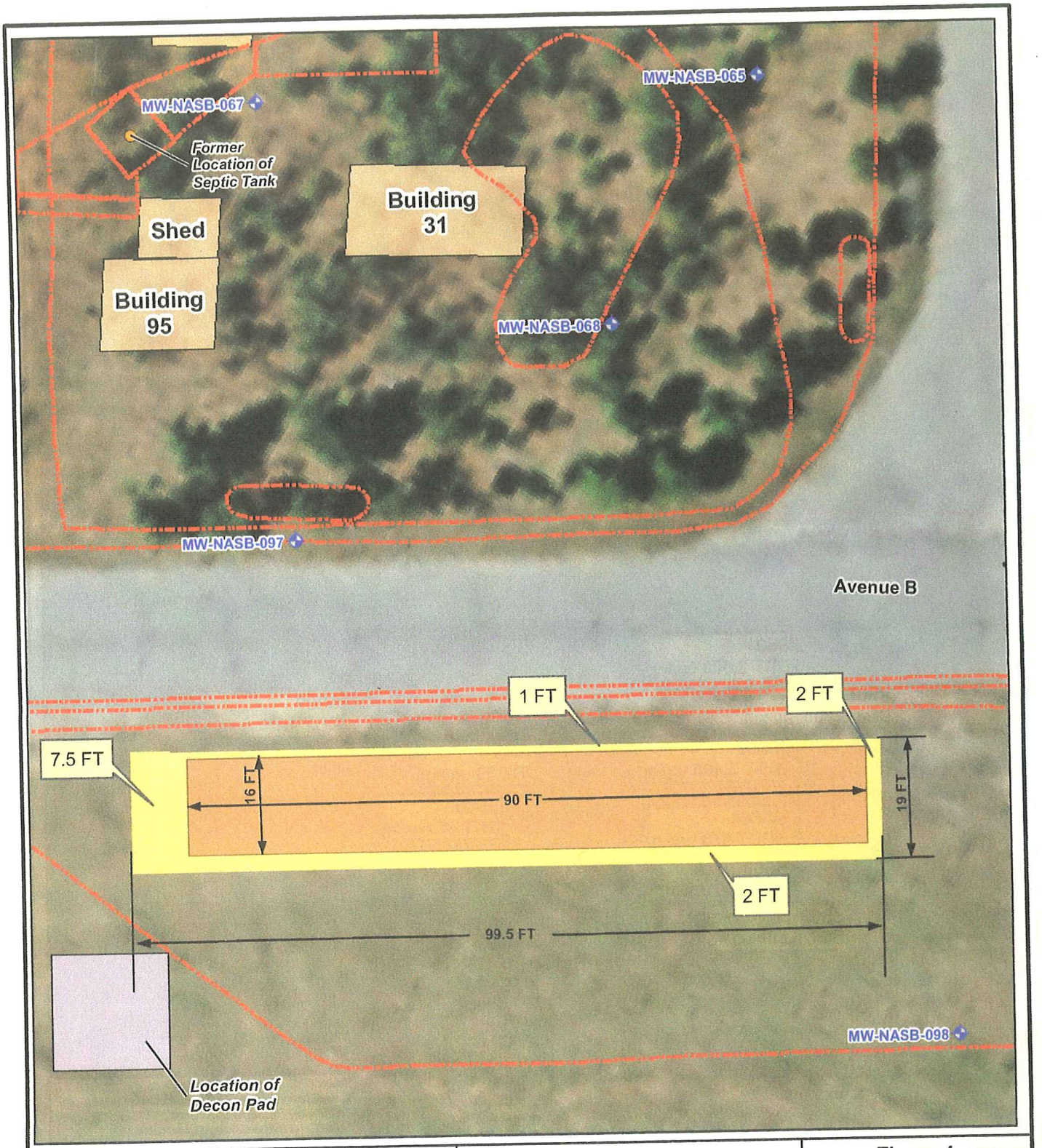
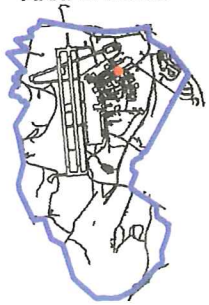


Contract No.	N62472-02-D-0810
Description	Site 17 Site Map
Coordinate system	NAD 1983, UTM, Zone 19 N in meter
Sources	Naval base boundary provided by Navy.

Date	22-SEP-2009	Rev.	Date	App. By
DB	C. Guido			
CB	J. Donovan			
AB				

Area of Detail



Legend

- Former Location of Septic Tank
- Monitoring Well
- Location of Decon Pad
- 1994 Excavation Boundary (Approximate)
- Former Building
- Soil Relocation Area (Approximate)
- Area of Excavated Soil

Figure 4

Site 17 Extent of Removed Soil

Naval Air Station
Brunswick, Maine

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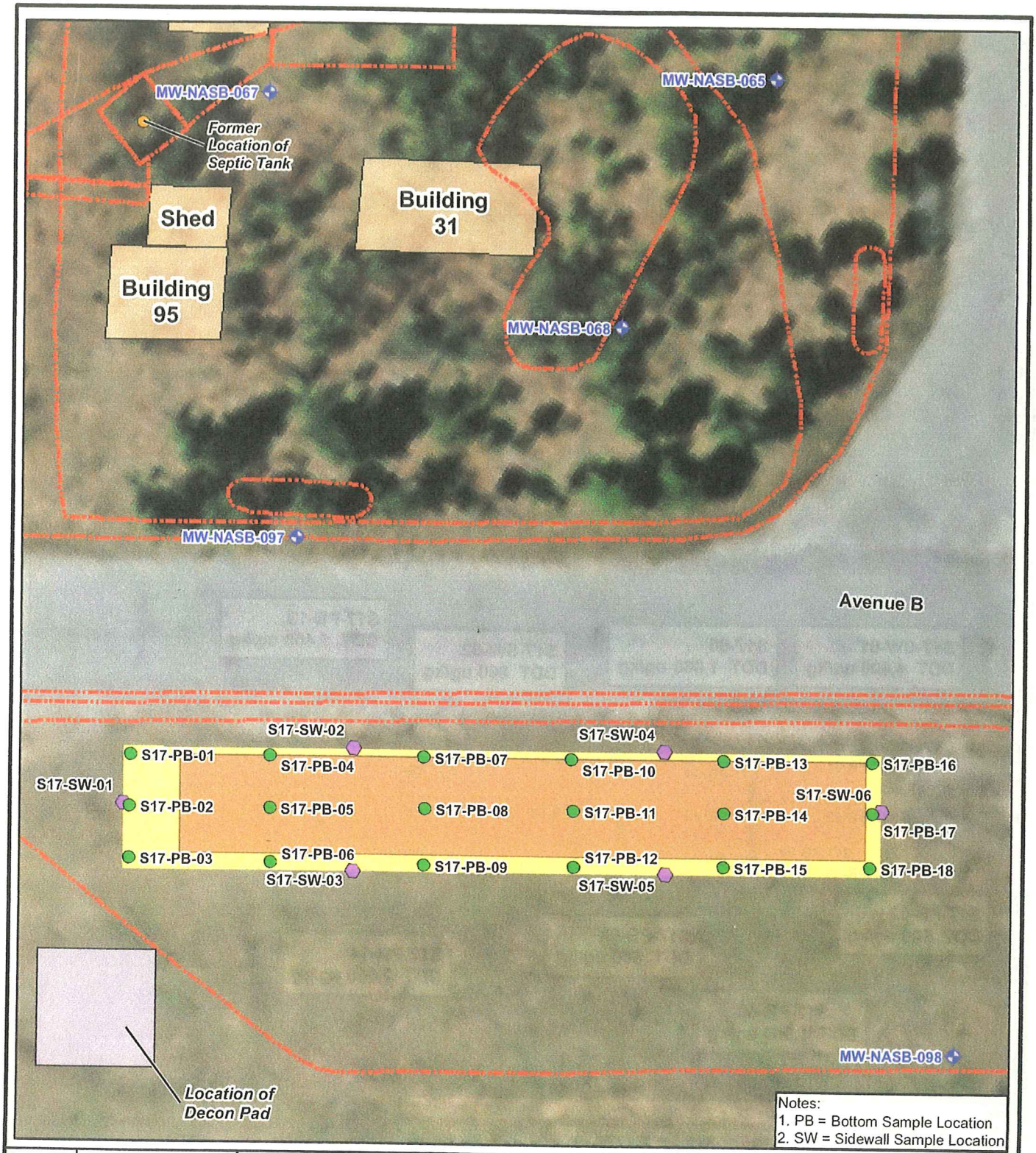
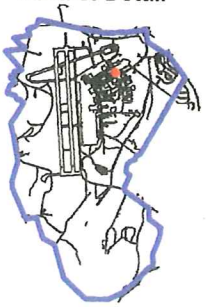


Contract No.	N62472-02-D-0810
Description	Site 17 Site Map
Coordinate system	NAD 1983, UTM, Zone 19 N in meter
Sources	Naval base boundary provided by Navy

Date	22-SEP-2009	Rev.	Date	App. By
DB	C. Guido			
CB	J. Donovan			
AB				

Area of Detail



Legend

- Confirmation Soil Sampling Location (Bottom)
- Confirmation Soil Sampling Location (Sidewall)
- Former Location of Septic Tank
- Monitoring Well
- Location of Decon Pad
- 1994 Excavation Boundary (Approximate)
- Former Building
- Soil Relocation Area (Approximate)
- Area of Excavated Soil

Figure 5

Site 17 Confirmatory Sampling Locations

Naval Air Station
Brunswick, Maine

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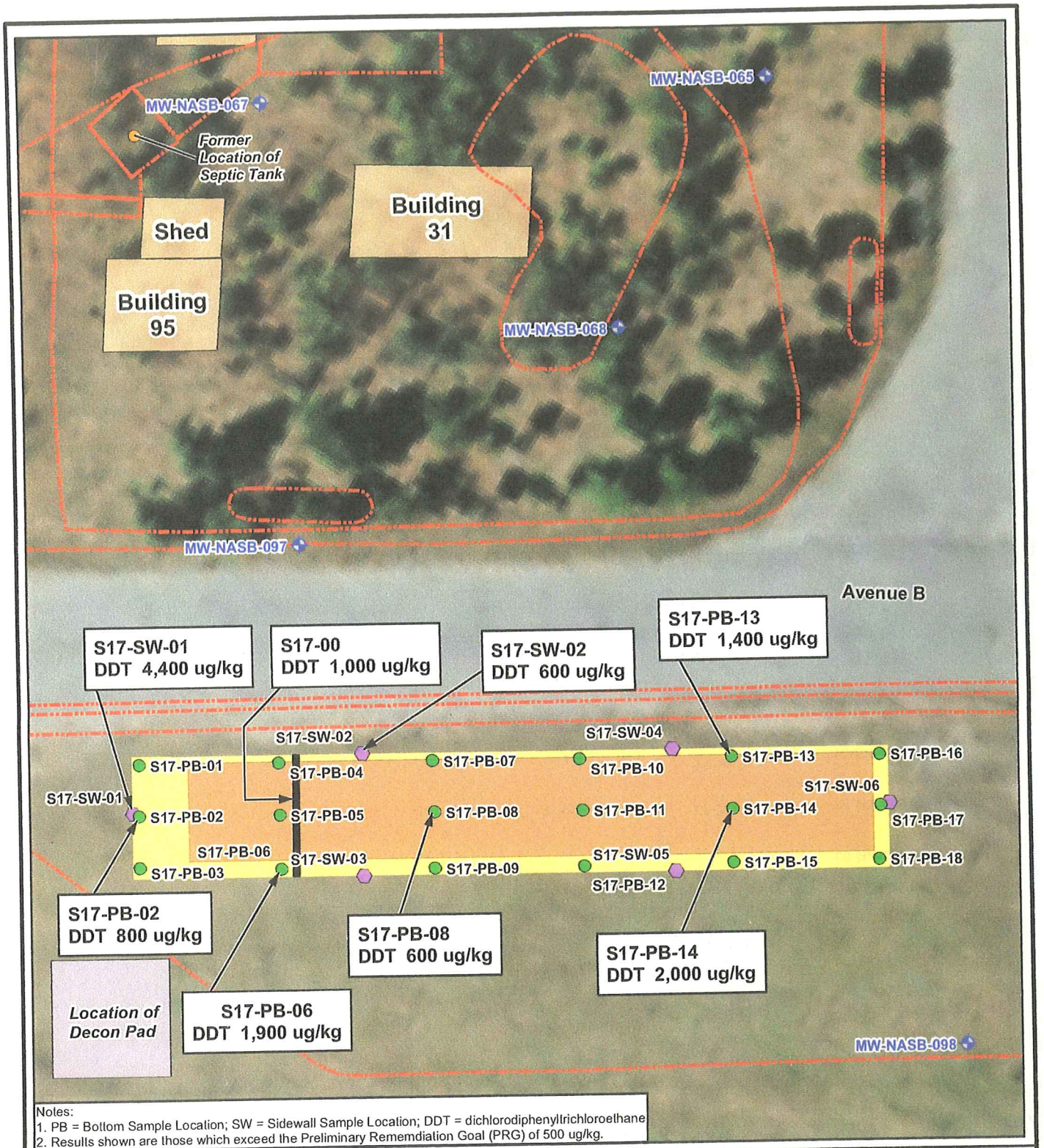
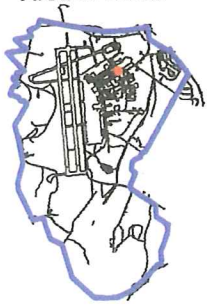


Notes:
1. PB = Bottom Sample Location; SW = Sidewall Sample Location; DDT = dichlorodiphenyltrichloroethane
2. Results shown are those which exceed the Preliminary Rememdiation Goal (PRG) of 500 ug/kg.

Contract No.	N62472-02-D-0810
Description	Site 17 Site Map
Coordinate system	NAD 1983, UTM. Zone 19 N in meter
Sources	Naval base boundary provided by Navy.

Date	22-SEP-2009	Rev.	Date	App. By
DB	C. Guido			
CB	J. Donovan			
AB				

Area of Detail



Legend

- Location of Black-Stained Soil (Approximate)
- Confirmation Soil Sampling Location (Bottom)
- Confirmation Soil Sampling Location (Sidewall)
- Former Location of Septic Tank
- Monitoring Well
- Location of Decon Pad
- 1994 Excavation Boundary (Approximate)
- Former Building
- Soil Relocation Area (Approximate)
- Area of Excavated Soils

Figure 6

Site 17 Confirmatory Soil Sampling Results

Naval Air Station
Brunswick, Maine

ECC:GIS, C:\NAVY_GIS:TO07_Brunswick\Bldg95\MapDocuments\Soil\Removal\CompRpt\Fig6_Site17_ConfirmResults.mxd

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TABLES

Table 1
Summary of Pre-Excavation Test Pit Soil Sample Analytical Results (October 2008)
Site 17 Soil Removal Action
Naval Air Station Brunswick, Maine

Pesticide	Units	PRG[a] Surface Soil	PRG[b] Subsurface Soil	Test Pit 1		Test Pit 2							Test Pit 3
				SS07 (24-27in. bgs)	SS08 (24-27 in. bgs)	SS01 (26-29 in. bgs)	SS02 (25-29 in. bgs)	SS02 DUP (25-29 in. bgs)	SS03 (35-40 in.bgs)	SS04 (29-32 in. bgs)	SS05 (42-45 in. bgs)	SS06 (26-29 in. bgs)	SS09 (24-27 in. bgs)
4,4'-DDE	ug/kg	NA	NA	**160**	**400**	**310**	**320**	**340**	< 6.6 U	**100**	**6**	**110**	**59**
4,4'-DDT	ug/kg	500	135,000	**5,000**	**6,300**	**2,000**	**2,400**	**2,400**	**23**	**570**	**47**	**720**	**190**
4,4'-DDD	ug/kg	NA	NA	**360**	**270**	**130**	**130**	**120**	< 6.6 U	**34**	< 6.4 U	< 30.0 U	< 30.0 U
a-Chlordane	ug/kg	NA	NA	**1,700**	**830**	**250**	**320**	**290**	< 6.6 U	**110**	**10**	**280**	< 30.0 U
Endosulfan I	ug/kg	NA	NA	**840**	**520**	**200**	**230**	**190**	< 6.6 U	**66**	< 6.4 U	**190**	< 30.0 U
Endrin	ug/kg	NA	NA	**540**	**1,300**	**560**	**540**	**550**	< 6.6 U	**150**	**13**	**220**	**37**
g-Chlordane	ug/kg	NA	NA	**2,000**	**1,100**	**330**	**440**	**370**	< 6.6 U	**140**	**12**	**350**	< 30.0 U
Heptachlor	ug/kg	NA	NA	**360**	**94**	< 33.0 U	**30 J**	< 28.0 U	< 6.6 U	**16**	< 6.4 U	< 30.0 U	< 30.0 U
Heptachlor epoxide	ug/kg	NA	NA	< 53.0 U	< 55.0 U	< 33.0 U	< 27.0 U	< 28.0 U	< 6.6 U	**34**	< 6.4 U	< 30.0 U	< 30.0 U
Methoxychlor	ug/kg	NA	NA	< 53.0 U	< 55.0 U	< 33.0 U	< 27.0 U	< 28.0 U	< 6.6 U	**9**	< 6.4 U	< 30.0 U	< 30.0 U
Total Pyrethrins[c]	ug/kg	10,000	NA	< 4,200 U	< 4,400 U	< 2,700 U	< 2,200 U	< 2,200 U	< 530 U	< 470 U	< 510 U	< 2,400 U	< 2,400 U

Notes:
Soil samples collected on 14 October 2008 from test pits at Site 17. Soils were submitted for laboratory analysis by modified EPA Method 8081.
Geomembrane was found at approximately 16 inches to 24 inches bgs in each test pit. All soil samples were collected from below the geomembrane.
PRG - Preliminary Remediation Goal - Draft Final Closure Report, Building 95 Site, Harding Lawson Assoc. August 1998
a - PRG for Surface Soils (0-2 ft)
b - PRG for Subsurface Soils (> 2 ft)
c - Includes Pyrethrin I, Pyrethrin II, Jasmolin I, Jasmolin II, Cinerin I, and Cinerin II. Pyrethrum MRL used for reporting Total Pyrethrin non-detects.
U - Non-detect at MRL (Method Reporting Limit)
J - Estimated Value
bgs - below ground surface
ug/kg - micrograms per kilogram
NA - Not Applicable
Bold = Compound was detected in sample.
Bold and Shaded = Compound was detected above surface soil PRG.
Analytical results were compared to both surface and subsurface PRGs. However, these test pit samples were collected below 2 ft bgs.

Table 2
Summary of Post-Excavation Confirmatory Soil Sample Analytical Results (July 2009)
Site 17 Soil Removal Action
Naval Air Station Brunswick, Maine

Pesticide	Units	PRG[a] Surface Soil	PRG[b] Subsurface Soil	S17-PB-01	S17-PB-02	S17-PB-03	S17-PB-04	S17-PB-05	S17-PB-XD1[d]	S17-PB-06	S17-PB-07	S17-PB-08	S17-PB-09
4,4'-DDE	ug/kg	NA	NA	**24**	**60**	< 6.2 U	**23**	< 6.9 U	< 6.5 U	**140**	**6.1**	**72**	**19**
4,4'-DDT	ug/kg	500	135,000	**420**	**800**	< 6.2 U	**290**	**33**	**31**	**1,900**	**43**	**600 J**	**79**
4,4'-DDD	ug/kg	NA	NA	< 5.6 U	< 6.1 U	< 6.2 U	**18**	< 6.9 U	< 6.5 U	**53**	< 6.1 U	**14**	**2.3 J**
a-Chlordane	ug/kg	NA	NA	**140**	**180**	< 6.2 U	**240**	**12**	**11**	**660**	**8.4**	**22**	**9.2**
Endosulfan I	ug/kg	NA	NA	< 5.6 U	< 6.1 U	< 6.2 U	**50**	< 6.9 U	< 6.5 U	< 31.0 U	< 6.1 U	< 6.4 U	< 5.9 U
Endrin	ug/kg	NA	NA	**120**	**150**	< 6.2 U	**58**	**6.1 J**	**6.8**	**410**	**8.9**	**95**	**21**
g-Chlordane	ug/kg	NA	NA	**160**	**190**	< 6.2 U	**240**	**12**	**11**	**690**	**9**	**23**	**10.0**
Heptachlor	ug/kg	NA	NA	**23**	**27**	< 6.2 U	**220**	< 6.9 U	< 6.5 U	**57**	< 6.1 U	**2.6 J**	**2.5 J**
Heptachlor epoxide	ug/kg	NA	NA	**50**	< 6.1 U	< 6.2 U	**130**	< 6.9 U	< 6.5 U	< 31.0 U	< 6.1 U	< 6.4 U	< 5.9 U
Methoxychlor	ug/kg	NA	NA	< 5.6 U	< 6.1 U	< 6.2 U	< 6.4 U	< 6.9 U	< 6.5 U	< 31.0 U	< 6.1 U	< 6.4 U	< 5.9 U
Total Pyrethrins[c]	ug/kg	10,000	NA	< 450 U	< 490 U	< 500 U	< 510 U	< 560 U	< 520 U	< 2,500 U	< 490 U	< 510 U	< 470 U

Notes:

PRG - Preliminary Remediation Goal - Draft Final Closure Report, Building 95 Site, Harding Lawson Assoc. August 1998

a - PRG for Surface Soils (0-2 ft)

b - PRG for Subsurface Soils (> 2 ft)

c - Includes Pyrethrin I, Pyrethrin II, Jasmolin I, Jasmolin II, Cinerin I, and Cinerin II. Pyrethrum MRL used for reporting Total Pyrethrin non-detects.

e - Duplicate sample of S17-PB-14

U - Non-detect at MRL (Method Reporting Limit)

J - Estimated Value

NA - Not Applicable

Bold – Compound was detected in sample.

Bold and Shaded – Compund was detected above surface soil PRG.

Analytical results were compared to both surface and subsurface PRGs. However, these confimatory sample locations are from the excavation area which has been covered with approximately 3 feet of clean fill.

Table 2
Summary of Post-Excavation Confirmatory Soil Sample Analytical Results (July 2009)
Site 17 Soil Removal Action
Naval Air Station Brunswick, Maine

Pesticide	Units	PRG[a] Surface Soil	PRG[b] Subsurface Soil	S17-PB-10	S17-PB-11	S17-PB-12	S17-PB-13	S17-PB-14	S17-PB-XD3[c]	S17-PB-15	S17-PB-16	S17-PB-17	S17-PB-18
4,4'-DDE	ug/kg	NA	NA	< 6.1 U	< 6.3 U	< 6.4 U	**370**	**79**	**90**	< 6.4 U	< 6.1 U	< 6.1 U	< 6.8 U
4,4'-DDT	ug/kg	500	135,000	< 6.1 U	< 6.3 U	**2.9 J**	**1,400**	**1,400**	**2,000**	**3.4 J**	< 6.1 U	< 6.1 U	< 6.8 U
4,4'-DDD	ug/kg	NA	NA	< 6.1 U	< 6.3 U	< 6.4 U	**52**	**51**	**64**	< 6.4 U	< 6.1 U	< 6.1 U	< 6.8 U
a-Chlordane	ug/kg	NA	NA	< 6.1 U	< 6.3 U	**5.2 J**	**83**	**270**	**300**	< 6.4 U	< 6.1 U	< 6.1 U	< 6.8 U
Endosulfan I	ug/kg	NA	NA	< 6.1 U	< 6.3 U	< 6.4 U	< 29.0 U	< 30.0 U	< 31.0 U	< 6.4 U	< 6.1 U	< 6.1 U	< 6.8 U
Endrin	ug/kg	NA	NA	< 6.1 U	< 6.3 U	< 6.4 U	**200**	**290**	**350**	< 6.4 U	< 6.1 U	< 6.1 U	< 6.8 U
g-Chlordane	ug/kg	NA	NA	< 6.1 U	< 6.3 U	**2.8 J**	**85**	**280**	**300**	< 6.4 U	< 6.1 U	< 6.1 U	< 6.8 U
Heptachlor	ug/kg	NA	NA	< 6.1 U	< 6.3 U	< 6.4 U	< 29.0 U	**40**	**39**	< 6.4 U	< 6.1 U	< 6.1 U	< 6.8 U
Heptachlor epoxide	ug/kg	NA	NA	< 6.1 U	< 6.3 U	< 6.4 U	< 29.0 U	< 30.0 U	< 31.0 U	< 6.4 U	< 6.1 U	< 6.1 U	< 6.8 U
Methoxychlor	ug/kg	NA	NA	< 6.1 U	< 6.3 U	< 6.4 U	< 29.0 U	< 30.0 U	< 31.0 U	< 6.4 U	< 6.1 U	< 6.1 U	< 6.8 U
Total Pyrethrins[c]	ug/kg	10,000	NA	< 490 U	< 510 U	< 520 U	< 2,300 U	< 2,400 U	< 2,500 U	< 500 U	< 490 U	< 480 U	< 550 U

Notes:

PRG - Preliminary Remediation Goal - Draft Final Closure Report, Building 95 Site, Harding Lawson Assoc. August 1998

a - PRG for Surface Soils (0-2 ft)

b - PRG for Subsurface Soils (> 2 ft)

c - Includes Pyrethrin I, Pyrethrin II, Jasmolin I, Jasmolin II, Cinerin I, and Cinerin II. Pyrethrum MRL used for reporting Total Pyrethrin non-detects.

e - Duplicate sample of S17-PB-14

U - Non-detect at MRL (Method Reporting Limit)

J - Estimated Value

NA - Not Applicable

Bold = Compound was detected in sample.

Bold and Shaded = Compund was detected above surfrace soil PRG.

Analytical results were compared to both surface and subsurface PRGs. However, these confirmatory sample locations are from the excavation area which has been covered with approximately 3 feet of clean fill.

Table 2
Summary of Post-Excavation Confirmatory Soil Sample Analytical Results (July 2009)
Site 17 Soil Removal Action
Naval Air Station Brunswick, Maine

Pesticide	Units	PRG[a] Surface Soil	PRG[b] Subsurface Soil	S17-SW-01	S17-SW-02	S17-SW-03	S17-SW-04	S17-SW-05	S17-SW-XD2[f]	S17-SW-06
4,4'-DDE	ug/kg	NA	NA	**320**	**39**	**14**	< 6.2 U	< 6.4 U	< 6.4 U	**11**
4,4'-DDT	ug/kg	500	135,000	**4,400**	**600**	**43**	**3.1 J**	< 6.4 U	< 6.4 U	**63**
4,4'-DDD	ug/kg	NA	NA	< 28.0 U	**12**	< 6.4 U	< 6.2 U	< 6.4 U	< 6.4 U	< 6.1 U
a-Chlordane	ug/kg	NA	NA	**940**	**44**	**16**	< 6.2 U	< 6.4 U	< 6.4 U	**4.5 J**
Endosulfan I	ug/kg	NA	NA	< 28.0 U	< 5.9 U	**6.4**	< 6.2 U	< 6.4 U	< 6.4 U	< 6.1 U
Endrin	ug/kg	NA	NA	**840**	**32**	**9**	< 6.2 U	< 6.4 U	< 6.4 U	**11**
g-Chlordane	ug/kg	NA	NA	**960**	**42**	**17**	< 6.2 U	< 6.4 U	< 6.4 U	**5.0 J**
Heptachlor	ug/kg	NA	NA	**130**	**6.4**	**6.0 J**	< 6.2 U	< 6.4 U	< 6.4 U	< 6.1 U
Heptachlor epoxide	ug/kg	NA	NA	< 28.0 U	< 5.9 U	**12**	< 6.2 U	< 6.4 U	< 6.4 U	< 6.1 U
Methoxychlor	ug/kg	NA	NA	< 28.0 U	< 5.9 U	< 6.4 U	< 6.2 U	< 6.4 U	< 6.4 U	< 6.1 U
Total Pyrethrins[c]	ug/kg	10,000	NA	< 2,200 U	< 470 U	< 510 U	< 490 U	< 510 U	< 520 U	< 490 U

Notes:

PRG - Preliminary Remediation Goal - Draft Final Closure Report, Building 95 Site, Harding Lawson Assoc. August 1998

a - PRG for Surface Soils (0-2 ft)

b - PRG for Subsurface Soils (> 2 ft)

c - Includes Pyrethrin I, Pyrethrin II, Jasmolin I, Jasmolin II, Cinerin I, and Cinerin II. Pyrethrum MRL used for reporting Total Pyrethrin non-detects.

e - Duplicate sample of S17-PB-14

U - Non-detect at MRL (Method Reporting Limit)

J - Estimated Value

NA - Not Applicable

Bold = Compound was detected in sample.

Bold and Shaded = Compund was detected above surface soil PRG.

Analytical results were compared to both surface and subsurface PRGs. However, these confirmatory sample locations are from the excavation area which has been

Table 3
Summary of Soil Sample Analytical Results (July 2009)
Additional Sample Collected (S17-00) to Characterize Black-Stained Soil
Site 17 Soil Removal Action
Naval Air Station Brunswick, Maine

Semi-Volatile Organic Compounds [a]	PRG [b] Surface Soil	PRG [c] Subsurface Soil	Result	Units
2.3.5-trimethyl-hexane	NA	NA	**430 J**	ug/kg
Nonanamide (Total)	NA	NA	**2,150 J**	ug/kg
Dodecanoic acid	NA	NA	**1,100 J**	ug/kg
9-Octadecenamide, (Z)- (Total)	NA	NA	**11,100 J**	ug/kg
1-Naphthalenepropanol, .alpha.-eth	NA	NA	**450 J**	ug/kg
Volatile Organic Compounds	**PRG Surface Soil**	**PRG Subsurface Soil**	**Result**	**Units**
Tetrachloroethene	NA	NA	**170**	ug/kg
Pesticides	**PRG Surface Soil**	**PRG Subsurface Soil**	**Result**	**Units**
4.4'-DDE	NA	NA	**98**	ug/kg
4.4'-DDT	500	135,000	**1,000**	ug/kg
4.4'-DDD	NA	NA	**40**	ug/kg
a-Chlordane	NA	NA	**550**	ug/kg
Endosulfan I	NA	NA	< 6.7 U	ug/kg
Endrin	NA	NA	**200**	ug/kg
g-Chlordane	NA	NA	**550**	ug/kg
Heptachlor	NA	NA	**100**	ug/kg
Heptachlor epoxide	NA	NA	< 6.7 U	ug/kg
Methoxychlor	NA	NA	< 6.7 U	ug/kg
Aldrin	NA	NA	**18**	ug/kg
Total Pyrethrins [d]	10,000	NA	< 530 U	ug/kg

Notes:

PRG - Preliminary Remediation Goal - Draft Final Closure Report, Building 95 Site, Harding Lawson Assoc. August 1998

a - These semi-volatile organic compounds have been reported as tentatively identified compounds (TIC). These concentrations are estimated values.

b - PRG for Surface Soils (0-2 ft)

c - PRG for Subsurface Soils (> 2 ft)

d - Includes Pyrethrin I, Pyrethrin II, Jasmolin I, Jasmolin II, Cinerin I, and Cinerin II. Pyrethrum MRL used for reporting Total Pyrethrin non-detects.

U - Non-detect at MRL (Method Reporting Limit)

J - Estimated Value

NA - Not Applicable

Bold = Compound was detected in sample.

Bold and Shaded = Compound was detected above surface soil PRG.

E.3 SITE 17 SUPPLEMENTAL SOIL SAMPLING SUMMARY MEMORANDUM, SEPTEMBER 2010

TECHNICAL MEMORANDUM
SITE 17 SUPPLEMENTAL SOIL SAMPLING SUMMARY
NAVAL AIR STATION, BRUNSWICK, MAINE
September 22, 2010

INTRODUCTION

Supplemental soil sampling was completed in July 2010 at Site 17 Naval Air Station Brunswick (NASB) by Tetra Tech NUS on behalf of the Navy. The sampling was performed to more accurately delineate areas potentially requiring excavation due to pesticides levels in soil. The scope of work performed included utility clearance, collection of soil samples from the vicinity of the planned soil excavation area north of Avenue B and from the utility corridor located along the south side of Avenue B, and analysis of the samples. The supplemental sampling was performed in accordance with the Tetra Tech NUS Site 17 Supplemental Soil Sampling Work Plan (Revision 1), dated July 1, 2010.

UTILITY CLEARANCE

Prior to beginning sampling activities, the boring locations were identified and staked in the field by Tetra Tech personnel. DigSafe and NASB base personnel were notified of the Site 17 supplemental soil boring locations. Underground utilities at Site 17 were marked by DigSafe and Digsmart on or before Wednesday July 7, 2010. A gas line in the utility corridor was flagged and marked with spray paint due to the close proximity of soil sample locations (SB-17-206 through SB-17-210). Digsmart noted that the gas line was approximately 3.5 feet below ground surface (bgs), 6 inches in width, and constructed of medium density plastic. The marked gas line was approximately 6 inches south of the staked sample locations along the utility corridor.

SOIL SAMPLING

On July 8, 2010, soil samples were collected from 10 boring locations for the Site 17 supplemental soil sampling. Five locations surrounded the SB-17-121 boring and five locations were spaced approximately 30 feet apart along the utility corridor south of Avenue B (Figure 1). All soil boring locations were recorded using a GPS Trimble Geo XH (sub-foot accuracy).

Composite samples were collected from the 2-5 foot depth interval from each of the five supplemental borings surrounding SB-17-121. A black geotextile membrane was observed at approximately 2 feet at SB-17-201, SB-17-202, and SB-17-205. A black peat layer was observed at SB-17-203, SB-17-204, and SB-17-205. Composite soil samples along the utility corridor were collected from the 0-1 and 1-3 foot depth interval. Pieces of black geotextile membrane were observed at SB-17-207 from the 1-3 foot depth interval. All soil boring information was recorded on boring logs. Table 1 summarizes the sampling and analysis program.

Soil borings were advanced using hand augers and the soil from each boring location was collected in steam cleaned aluminum pans. All soil was initially screened with a PID (Ionscience Photocheck+) and

FID (MicroFID I/S). An aliquot of soil from each targeted soil interval was collected and placed in a plastic bag for bag headspace screening. Soil was allowed to equilibrate in the bag for at least fifteen minutes before screened with the PID/FID. PID/FID screenings were noted on the boring logs and PID/FID bag headspace readings for each sample interval were noted on the soil sample logs. There was one FID reading of 68 ppm at SB-17-205-0205 but all other PID/FID screenings and headspace readings were less than 1.0 ppm.

Soil from targeted intervals was homogenized and any large particles such as gravel were removed. Photographs were taken of each soil sample or soil boring location. Sample bottles were filled with soil from the selected sample interval and labeled appropriately. All soil sample information was recorded on soil sample log sheets. All samples were placed in a cooler for laboratory delivery and accompanied by the appropriate chain-of-custody documentation.

SOIL SAMPLE ANALYSIS

All soil samples were analyzed for pesticides using Method SW-868 8081A. In addition to the pesticides analysis, the samples collected along the utility corridor south of Avenue B were analyzed for metals (arsenic, lead, zinc) using Method SW-846 6010C and Total Cyanide using Method Sw-846 9012B. Quick-turnaround (72-hour) analyses was requested for all samples. Soil samples were hand delivered to Katahdin Analytical in Scarborough, Maine on Thursday July 8, 2010.

RESULTS

Analytical results from the supplemental soil sampling are provided in Table 2. EPA residential screening RSLs and MEDEP Residential RAGs screening levels are also provided as generic points of comparison. Specific to the planned removal action, the COCs identified for soil and their PRGs have been established as follows:

- 4,4' DDD – 22 mg/kg
- 4,4' DDE – 15 mg/kg
- 4,4' DDT – 15 mg/kg

There were some exceedances of the generic screening criteria for the pesticides in general, however none of the samples had COC concentrations that met or exceeded the respective PRG concentrations and of the COCs only DDT exceeded any screening levels. Of the inorganics, only arsenic exceeded screening levels, with low-concentration detections (maximum 7.5 mg/kg) in each sample collected from south of Avenue B.

Based on the results, the new borings surrounding SB-17-121 north of Avenue B can be used to delineate the limits of excavation for the upcoming removal action (along with previously sampled locations in the vicinity of SB-17-121 that previously had COC concentrations below the PRGs), as shown on Figure 1. South of Avenue B, all COC concentrations are well below the PRGs and no excavation is required. Pesticides and metals results from this supplemental investigation should be incorporated into the Site 17 RI Report as appropriate.

TABLE 1
SITE 17 SUPPLEMENTAL SOIL SAMPLING
SOIL SAMPLE SUMMARY
NAS BRUNSWICK, MAINE

Sample ID	Location	Sample Interval (ft)	Pesticides	Arsenic	Lead	Cyanide	Zinc
SB-17-201-0205	Area North of Ave. B	2-5	X				
SB-17-202-0205	Area North of Ave. B	2-5	X				
SB-17-203-0205	Area North of Ave. B	2-5	X				
SB-17-204-0205	Area North of Ave. B	2-5	X				
SB-17-205-0205	Area North of Ave. B	2-5	X				
SB-17-206-0001	Utility Corridor	0-1	X	X	X	X	X
SB-17-206-0103	Utility Corridor	1-3	X	X	X	X	X
SB-17-207-0001	Utility Corridor	0-1	X	X	X	X	X
SB-17-207-0103	Utility Corridor	1-3	X	X	X	X	X
SB-17-208-0001	Utility Corridor	0-1	X	X	X	X	X
SB-17-208-0103	Utility Corridor	1-3	X	X	X	X	X
SB-17-209-0001	Utility Corridor	0-1	X	X	X	X	X
SB-17-209-0103	Utility Corridor	1-3	X	X	X	X	X
SB-17-210-0001	Utility Corridor	0-1	X	X	X	X	X
SB-17-210-0103	Utility Corridor	1-3	X	X	X	X	X

TABLE 2
SITE 17 SUPPLEMENTAL SOIL SAMPLING
PRELIMARY ANALYTICAL RESULTS
NAS BRUNSWICK, MAINE
PAGE 1 of 4

NSAMPLE SAMPLE DATE DUP OF	USEPA Residential Soil RSLs[1]	Maine Residential RAGs[2]	SB-17-201-0205 07/08/2010	SB-17-201-0205DL2 07/08/2010	SB-17-201-0205DL3 07/08/2010	SB-17-202-0205 07/08/2010	SB-17-202-0205DL 07/08/2010	SB-17-202-0205DL3 07/08/2010	SB-17-203-0205 07/08/2010	SB-17-203-0205DL 07/08/2010	SB-17-203-0205DL4 07/08/2010	SB-17-204-0205 07/08/2010
M (MG/KG)												
ARSENIC	0.39	0.14										
LEAD	400	170										
ZINC	2300	10000										
MISC (%)												
TOTAL SOLIDS	--	--	82			83			89			77
MISC (MG/KG)												
CYANIDE	160	680										
PEST (UG/KG)												
4,4'-DDD	2000	4500	46 E	36	59 J	0.38 U	190	210 J	0.35 U	200 J	270 J	0.48 J
4,4'-DDE	1400	3200	20	24	52 J	42 J	280	290 J	0.35 U	1000	1000	0.64 J
4,4'-DDT	1700	3800	0.4 U	4 U	2700	0.38 U	3200 E	8600	0.35 U	1900 JE	10000	5.1
ALDRIN	29	64	0.2 U	2 U	41 U	0.2 U	20 U	99 U	0.18 U	18 U	180 U	0.26 JJ
ALPHA-BHC	77	170	0.2 U	2 U	41 U	0.2 U	20 U	99 U	0.18 U	18 U	180 U	0.22 U
ALPHA-CHLORDANE[3]	1600	3600	26 E	32	42 J	0.2 U	520	520	0.18 U	2600 E	2900	1.4
BETA-BHC	270	600	0.2 U	2 U	41 U	0.2 U	20 U	99 U	0.18 U	18 U	180 U	0.22 U
DELTA-BHC[4]	77	170	0.2 U	2 U	41 U	0.2 U	20 U	99 U	0.18 U	18 U	180 U	0.22 U
DIELDRIN	30	68	0.4 U	4 U	80 U	0.38 U	38 U	190 U	0.35 U	35 U	350 U	0.42 U
ENDOSULFAN I[5]	37000	160000	0.2 U	2 U	41 U	0.2 U	20 U	99 U	0.18 U	18 U	180 U	0.22 U
ENDOSULFAN II[5]	37000	160000	0.4 U	4 U	80 U	0.38 U	38 U	190 U	0.35 U	35 U	350 U	0.42 U
ENDOSULFAN SULFATE[5]	37000	160000	0.4 U	4 U	80 U	0.38 U	38 U	190 U	0.35 U	35 U	350 U	0.42 U
ENDRIN	1800	8000	0.4 U	4 U	80 U	0.38 U	38 U	190 U	0.35 U	35 U	350 U	0.42 U
ENDRIN ALDEHYDE[6]	1800	8000	0.4 U	4 U	80 U	0.38 U	38 U	190 U	0.35 U	35 U	350 U	0.42 U
ENDRIN KETONE[6]	1800	8000	0.4 U	4 U	80 U	0.38 U	38 U	190 U	0.35 U	35 U	350 U	0.42 U
GAMMA-BHC (LINDANE)	520	120	0.2 U	2 U	41 U	0.2 U	20 U	99 U	0.18 U	18 U	180 U	0.42 JJ
GAMMA-CHLORDANE[3]	1600	3600	23 E	24	38 J	0.2 U	460	430	0.18 U	2300 E	2600	0.94
HEPTACHLOR	110	240	3.6	3.9 J	24 J	31 E	38 J	80 J	84 JE	200	270 J	0.22 U
HEPTACHLOR EPOXIDE	53	120	6.1 J	6 J	41 U	63 JE	100 J	130 JJ	57 JE	580 J	590 J	0.22 U
METHOXYCHLOR	31000	130000	2 U	20 U	410 U	2 U	200 U	990 U	1.8 U	180 U	1800 U	2.2 U
TOXAPHENE	440	--	3.9 U	39 U	770 U	3.7 U	370 U	1900 U	3.4 U	340 U	3400 U	4.1 U

TABLE 2
SITE 17 SUPPLEMENTAL SOIL SAMPLING
PRELIMARY ANALYTICAL RESULTS
NAS BRUNSWICK, MAINE
PAGE 2 of 4

NSAMPLE SAMPLE DATE DUP OF	USEPA Residential Soil RSLs[1]	Maine Residential RAGs[2]	SB-17-205-0205 07/08/2010	SB-17-205-0205DL 07/08/2010	SB-17-205-0205DL2 07/08/2010	SB-17-206-0001 07/08/2010	SB-17-206-0001DL 07/08/2010	SB-17-206-0103 07/08/2010	SB-17-206-0103DL 07/08/2010	SB-17-206-0103DL2 07/08/2010	SB-17-207-0001 07/08/2010	SB-17-207-0001DL 07/08/2010
M (MG/KG)												
ARSENIC	0.39	0.14				3.9		2.9			6.4	
LEAD	400	170				14.4		15.9			6.8	
ZINC	2300	10000				28.9		28.1			24.5	
MISC (%)												
TOTAL SOLIDS	--	--	78			97		94			90	
MISC (MG/KG)												
CYANIDE	160	680				0.4 U		0.4 U			0.44 U	
PEST (UG/KG)												
4,4'-DDD	2000	4500	0.4 U	91	120 J	24 JE	24 J	35 E	63 J	73 J	33 E	28 J
4,4'-DDE	1400	3200	44 E	85	100 J	29 E	34 J	46 E	72 J	80 JJ	53 E	89
4,4'-DDT	1700	3800	0.4 U	3400 E	4000	0.34 U	220	0.35 U	650	560	0.36 U	920
ALDRIN	29	64	0.21 U	21 U	42 U	0.17 U	17 U	0.18 U	18 U	36 U	0.19 U	19 U
ALPHA-BHC	77	170	0.21 U	21 U	42 U	0.17 U	17 U	0.18 U	18 U	36 U	0.19 U	19 U
ALPHA-CHLORDANE[3]	1600	3600	66 E	160	160	0.17 U	840	0.18 U	2800 E	3100	52 E	240
BETA-BHC	270	600	0.21 U	21 U	42 U	0.17 U	17 U	0.18 U	18 U	36 U	0.19 U	19 U
DELTA-BHC[4]	77	170	0.21 U	21 U	42 U	0.17 U	17 U	0.18 U	18 U	36 U	0.19 U	19 U
DIELDRIN	30	68	0.4 U	40 U	81 U	0.34 U	34 U	0.35 U	35 U	70 U	0.36 U	36 U
ENDOSULFAN I[5]	37000	160000	0.21 U	21 U	42 U	0.17 U	17 U	0.18 U	18 U	36 U	0.19 U	19 U
ENDOSULFAN II[5]	37000	160000	0.4 U	40 U	81 U	0.34 U	34 U	0.35 U	35 U	70 U	0.36 U	36 U
ENDOSULFAN SULFATE[5]	37000	160000	0.4 U	40 U	81 U	0.34 U	34 U	0.35 U	35 U	70 U	0.36 U	36 U
ENDRIN	1800	8000	0.4 U	40 U	81 U	0.34 U	34 U	0.35 U	35 U	70 U	0.36 U	36 U
ENDRIN ALDEHYDE[6]	1800	8000	0.4 U	40 U	81 U	0.34 U	34 U	0.35 U	35 U	70 U	0.36 U	36 U
ENDRIN KETONE[6]	1800	8000	0.4 U	40 U	81 U	0.34 U	34 U	0.35 U	35 U	70 U	0.36 U	36 U
GAMMA-BHC (LINDANE)	520	120	0.21 U	21 U	42 U	0.17 U	17 U	0.18 U	18 U	36 U	0.19 U	19 U
GAMMA-CHLORDANE[3]	1600	3600	65 E	160	160	0.17 U	760	0.18 U	2500 E	2700	57 E	180
HEPTACHLOR	110	240	36 JE	45	52 J	49 E	69	85 E	390	370	21 E	28 J
HEPTACHLOR EPOXIDE	53	120	78 E	180 J	180 J	62 JE	130 J	44 JE	530 J	520 J	45 JE	63 J
METHOXYCHLOR	31000	130000	2.1 U	210 U	420 U	1.7 U	170 U	1.8 U	180 U	360 U	1.9 U	190 U
TOXAPHENE	440	--	3.9 U	390 U	780 U	3.3 U	330 U	3.4 U	340 U	670 U	3.5 U	350 U

TABLE 2
SITE 17 SUPPLEMENTAL SOIL SAMPLING
PRELIMARY ANALYTICAL RESULTS
NAS BRUNSWICK, MAINE

NSAMPLE SAMPLE DATE DUP OF	USEPA Residential Soil RSLs[1]	Maine Residential RAGs[2]	SB-17-207-0103 07/08/2010	SB-17-207-0103DL 07/08/2010	SB-17-208-0001 07/08/2010	SB-17-208-0001DL 07/08/2010	SB-17-208-0001DL2 07/08/2010	SB-17-208-0103 07/08/2010	SB-17-208-0103DL 07/08/2010	SB-17-209-0001 07/08/2010	SB-17-209-0001DL 07/08/2010	SB-17-209-0103 07/08/2010
M (MG/KG)												
ARSENIC	0.39	0.14	6		7.5			5		6.3		6.2
LEAD	400	170	3.8		5.9			5		5.6		5.3
ZINC	2300	10000	19		24.3			17.3		20.3		19.3
MISC (%)												
TOTAL SOLIDS	--	--	94		94			94		94		93
MISC (MG/KG)												
CYANIDE	160	680	0.4 U		0.4 U			0.4 U		0.44 U		0.44 U
PEST (UG/KG)												
4,4'-DDD	2000	4500	26 E	21 J	13	7.9	8	3	1.2 J	7.7	4	6.7
4,4'-DDE	1400	3200	36 E	44 J	25 E	26	26	5.4	4.9	22 E	22	16
4,4'-DDT	1700	3800	0.35 U	590	24 JE	95 E	97	28 E	36	35 E	62	32 E
ALDRIN	29	64	0.18 U	18 U	0.18 U	0.89 U	1.8 U	0.18 U	0.88 U	0.18 U	0.91 U	0.18 U
ALPHA-BHC	77	170	0.18 U	18 U	0.18 U	0.89 U	1.8 U	0.18 U	0.88 U	0.18 U	0.91 U	0.18 U
ALPHA-CHLORDANE[3]	1600	3600	57 E	170	28 E	32	33	7.6	7.7	13	14	8.2
BETA-BHC	270	600	0.18 U	18 U	0.18 U	0.89 U	1.8 U	0.18 U	0.88 U	0.18 U	0.91 U	0.18 U
DELTA-BHC[4]	77	170	0.18 U	18 U	0.18 U	0.89 U	1.8 U	0.18 U	0.88 U	0.18 U	0.91 U	0.18 U
DIELDRIN	30	68	0.35 U	35 U	0.34 U	1.7 U	3.4 U	0.34 U	1.7 U	0.35 U	1.8 U	0.35 U
ENDOSULFAN I[5]	37000	160000	0.18 U	18 U	0.18 U	0.89 U	1.8 U	0.18 U	0.88 U	0.18 U	0.91 U	0.18 U
ENDOSULFAN II[5]	37000	160000	0.35 U	35 U	0.34 U	1.7 U	3.4 U	0.34 U	1.7 U	0.35 U	1.8 U	0.35 U
ENDOSULFAN SULFATE[5]	37000	160000	0.35 U	35 U	0.34 U	1.7 U	3.4 U	0.34 U	1.7 U	0.35 U	1.8 U	0.35 U
ENDRIN	1800	8000	0.35 U	35 U	0.34 U	1.7 U	3.4 U	0.34 U	1.7 U	0.35 U	1.8 U	0.35 U
ENDRIN ALDEHYDE[6]	1800	8000	0.35 U	35 U	0.34 U	1.7 U	3.4 U	0.34 U	1.7 U	0.35 U	1.8 U	0.35 U
ENDRIN KETONE[6]	1800	8000	0.35 U	35 U	0.34 U	1.7 U	3.4 U	0.34 U	1.7 U	0.35 U	1.8 U	0.35 U
GAMMA-BHC (LINDANE)	520	120	0.18 U	18 U	0.18 U	0.89 U	1.8 U	0.18 U	0.88 U	0.18 U	0.91 U	0.18 U
GAMMA-CHLORDANE[3]	1600	3600	55 E	140	19 E	19	18	6.3	6.1	7.6	7.6	6.7
HEPTACHLOR	110	240	20 E	26 J	0.66	0.99 J	1.5 J	0.21 J	0.57 J	0.38 J	0.73 J	0.18 U
HEPTACHLOR EPOXIDE	53	120	35 JE	45 J	5.6 J	5.6 J	5.9 J	1.7 J	1.9 J	1.7 J	1.9 J	0.81 J
METHOXYCHLOR	31000	130000	1.8 U	180 U	1.8 U	8.9 U	18 U	1.8 U	8.8 U	1.8 U	9.1 U	1.8 U
TOXAPHENE	440	--	3.4 U	340 U	3.4 U	17 U	34 U	3.3 U	17 U	3.4 U	17 U	3.4 U

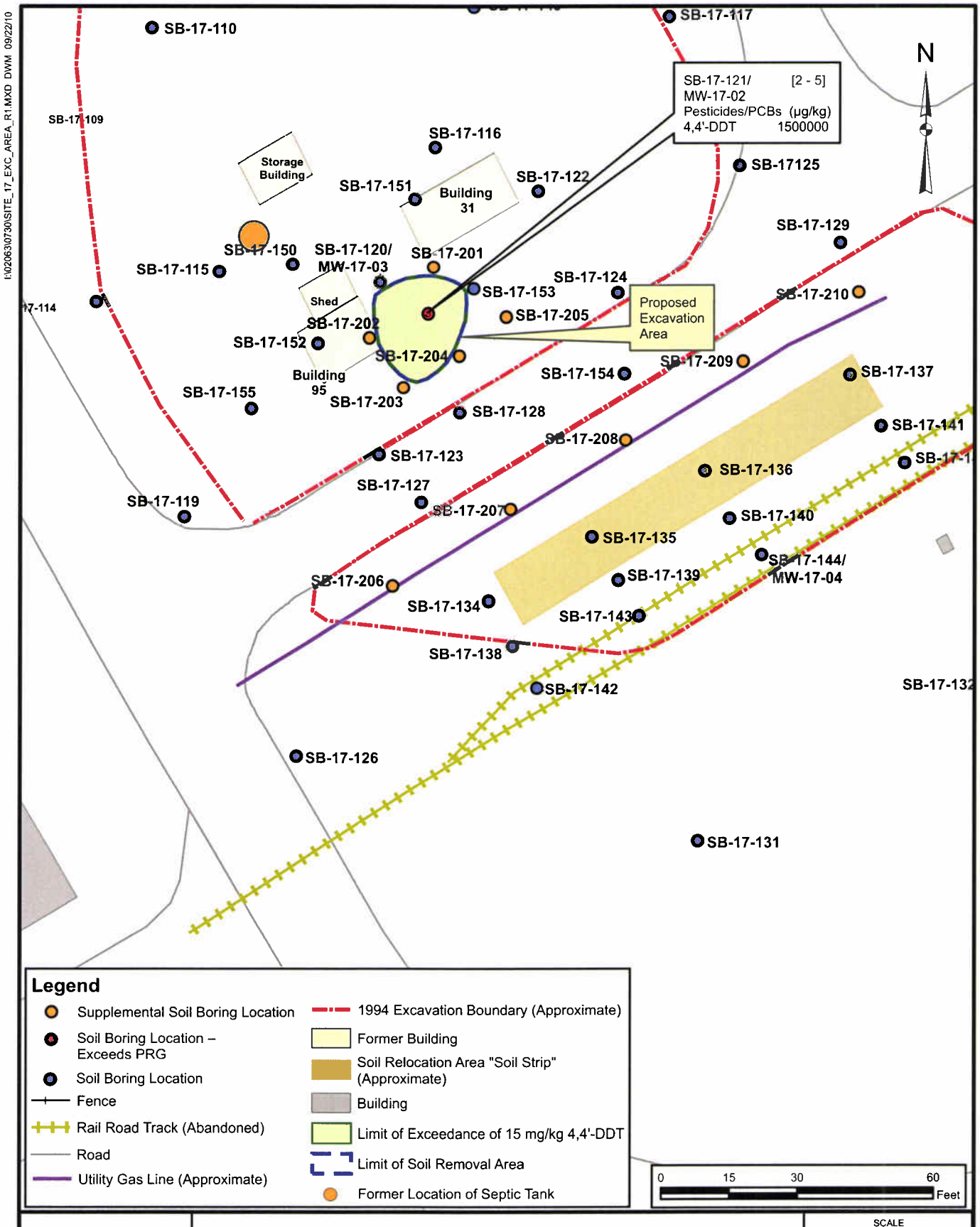
TABLE 2
SITE 17 SUPPLEMENTAL SOIL SAMPLING
PRELIMARY ANALYTICAL RESULTS
NAS BRUNSWICK, MAINE
PAGE 4 of 4

NSAMPLE SAMPLE DATE DUP OF	USEPA Residential Soil RSLs[1]	Maine Residential RAGs[2]	SB-17-209-0103DL 07/08/2010	SB-17-210-0001 07/08/2010	SB-17-210-0001DL 07/08/2010	SB-17-210-0103 07/08/2010	SB-17-DUP01-070810 07/08/2010	SB-17-DUP02-070810 07/08/2010	SB-17-DUP02-070810DL 07/08/2010	SB-17-DUP02-070810DL2 07/08/2010	SB-17-DUP03-070810 07/08/2010
M (MG/KG)											
ARSENIC	0.39	0.14		7.1		3.6					7.4
LEAD	400	170		8		11.8					6.3
ZINC	2300	10000		26.9		21.5					24
MISC (%)											
TOTAL SOLIDS	--	--		93		91	81	80			94
MISC (MG/KG)											
CYANIDE	160	680		0.44 U		0.44 U					0.4 U
PEST (UG/KG)											
4,4'-DDD	2000	4500	2.2 J	3.2	1.7 J	1.1	0.7 J	32 JE	110	120 J	
4,4'-DDE	1400	3200	15	21 E	21	5.9	0.75 J	45 E	73 J	85 J	
4,4'-DDT	1700	3800	81	34 E	57	14	7.8	0.4 U	3100 E	3400	
ALDRIN	29	64	0.91 U	0.18 U	0.9 U	0.18 U	0.18 J	0.21 U	21 U	42 U	
ALPHA-BHC	77	170	0.91 U	0.18 U	0.9 U	0.18 U	0.21 U	0.21 U	21 U	42 U	
ALPHA-CHLORDANE[3]	1600	3600	8.2	11	11	2.8	1.4	67 E	170 J	180 J	
BETA-BHC	270	600	0.91 U	0.18 U	0.9 U	0.18 U	0.21 U	0.21 U	21 U	42 U	
DELTA-BHC[4]	77	170	0.91 U	0.18 U	0.9 U	0.18 U	0.21 U	0.21 U	21 U	42 U	
DIELDRIN	30	68	1.8 U	0.35 U	1.7 U	0.35 U	0.41 U	0.4 U	40 U	81 U	
ENDOSULFAN I[5]	37000	160000	0.91 U	0.18 U	0.9 U	0.18 U	0.21 U	0.21 U	21 U	42 U	
ENDOSULFAN II[5]	37000	160000	1.8 U	0.35 U	1.7 U	0.35 U	0.41 U	0.4 U	40 U	81 U	
ENDOSULFAN SULFATE[5]	37000	160000	1.8 U	0.35 U	1.7 U	0.35 U	0.41 U	0.4 U	40 U	81 U	
ENDRIN	1800	8000	1.8 U	0.35 U	1.7 U	0.35 U	0.41 U	0.4 U	40 U	81 U	
ENDRIN ALDEHYDE[6]	1800	8000	1.8 U	0.35 U	1.7 U	0.35 U	0.41 U	0.4 U	40 U	81 U	
ENDRIN KETONE[6]	1800	8000	1.8 U	0.35 U	1.7 U	0.35 U	0.41 U	0.4 U	40 U	81 U	
GAMMA-BHC (LINDANE)	520	120	0.91 U	0.18 U	0.9 U	0.18 U	0.21 U	0.21 U	21 U	42 U	
GAMMA-CHLORDANE[3]	1600	3600	6.5	6.7	6.7	2	0.9	65 E	190 J	190 J	
HEPTACHLOR	110	240	0.91 U	0.25 J	0.61 J	0.24 JJ	0.21 U	38 JE	45	54 J	
HEPTACHLOR EPOXIDE	53	120	1.1 JJ	1.5 J	1.7 JJ	0.18 U	0.42 J	81 E	250 J	250 J	
METHOXYCHLOR	31000	130000	9.1 U	1.8 U	9 U	1.8 U	2.1 U	2.1 U	210 U	420 U	
TOXAPHENE	440	--	17 U	3.4 U	17 U	3.4 U	3.9 U	3.9 U	390 U	790 U	

Black cells with white values indicate that the positive detection exceeds the corresponding USEPA Residential Soil RSL value.
Gray cells with black values indicate that the positive detection exceeds the corresponding USEPA Residential Soil RSL and Maine Residential RAG values.

Footnotes

1. United States Environmental Protection Agency Regions 3,6, and 9. (Accessed August 10, 2010). Regional Screening Levels for Chemical Contaminants at Superfund http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm. (HQ = 0.1, ILCR = 10-6)
2. Maine Department of Environmental Protection. Maine Remedial Action Guidelines (RAGs) for Soil Contaminated with Hazardous Substances. Appendix 2: Multiple Contaminants by pathway (HQ = 0.2; ILCR = 10-6).
3. Chlordane value used as a surrogate for RSL and RAGs values.
4. Alpha-BHC value used as a surrogate for delta-BHC RSL and RAGs values.
5. Endosulfan value used as a surrogate for RSL and RAGs values.
6. Endrin value used as a surrogate for RSL and RAGs values .



Tetra Tech NUS, Inc.

SITE 17
SOIL EXCAVATION AREA
NAVAL AIR STATION
BRUNSWICK, MAINE

SCALE	AS NOTED
FILE	/../SITE_17_EXC_AREA_R1.MXD
REV	1
DATE	09/22/10
FIGURE NUMBER	1

E.4 RISK ASSESSMENT CONFERENCE CALL SUMMARY, JUNE 17, 2010

Site 17 – Risk Assessment Conference Call, June 17, 2010
Decision Summary

Participants
Chau Vu
Diane Silverman,
Dave Barclift
Matt Kraus

Result

Consensus was reached on how to move forward regarding the Site 17 removal PRGs and how to complete the Final Site 17 Human Health Risk Assessment. Agreements on specific issues and MEDEP comments are documented below.

COPC Selection Process, Background, and MEDEP Comment #1

Consistent with the methodology used at other Federal Facility Sites in EPA Region I, all COPCs, including site-related and background, will be carried through the human health risk assessment process and documented in the RAGS Part D tables.

RAGS Part D Table 10 will include a footnote identifying those chemicals which are considered background or not site-related. The footnote will reference the specific sections of the RI that discuss the background analysis and site-related and total risk characterizations.

Total risk and site-related risk will be discussed in the Risk Characterization section of human health risk assessment text in the Final RI.

Only site-related risks and COCs will be discussed in the Conclusion section of the Final RI.

Exposure Units MEDEP Comment #2

No further evaluation of exposure units is required at this time.

Once additional data have been collected (i.e., additional delineation sampling and confirmation sampling), data north and south of Avenue B will be segregated and evaluated to determine whether chemical concentrations are comparable between those data sets. If the evaluation concludes that the data sets are comparable, then risk for the entire site will be evaluated as one exposure unit; if not comparable, then risk will be evaluated for two exposure units (Avenue B area and north; and the area south of Avenue B).

PRG Methodology MEDEP Comment #3

All parties are in general agreement with the methodology used for calculating PRGs for the removal action, due to specified intent to re-calculate the total site risks following the removal action.

Data resulting from additional delineation sampling and confirmation sampling will be incorporated into the Final RI and HHRA. If new data indicate that the current conceptual site model is not accurate (e.g., new COPCs identified, or arsenic determined to be site-related), then revised PRGs will be calculated and presented in the final RI for Site 17.

Other Discussions

EPA requested a proposed path forward and recommended that the arsenic background issue be discussed promptly.

The general consensus among the risk assessors was that the Proposed Path Forward Site 17 White Paper be finalized to document the decision and consensus reached during the conference call. Also, this paper could potentially include the background evaluation for arsenic; however, there was consensus that the arsenic background issue does not necessarily need to be resolved prior to the removal action being initiated. Everyone agreed that this decision requires RPM input.

E.5 STATISTICAL EVALUATION OF DATA SETS FOR THE AREAS NORTH AND SOUTH AVENUE B

APPENDIX E.5
STATISTICAL EVALUATIONS FOR THE AREA NORTH AND SOUTH OF AVENUE B
NAVAL AIR STATION BRUNSWICK, BRUNSWICK MAINE

1. INTRODUCTION

A comparative statistical method was used to compare soil data from the Area South of Avenue B and the Area North of Avenue B. The comparison involved a graphical evaluation and a hypothesis test comparing the central tendency (mean/median) concentrations. The graphical evaluation consisted of visual inspection of boxplots, normal probability plots, and histograms. The graphical displays are presented at the end of Appendix E. The statistical package R version 2.9.2 was used to conduct the statistical evaluations. One-half the detection limit was used for non-detected concentrations for the graphical displays and statistical hypothesis tests. The average of the original and duplicate sample was used for all statistical analyses presented in this appendix.

2. STATISTICAL METHODLOGY

This section describes the graphical displays and hypothesis tests used to compare the South and North data sets.

2.1 Graphical Displays

Boxplots show the central tendency, degree of symmetry, range of variation, and potential outliers of a data set. The data set is shown as a rectangular box that represents the middle 50 percent of the data. The upper value of the box represents the 75th percentile and the lower value of the box represents the 25th percentile. The median is represented by the middle line in the box. Box plots for the same analyte were plotted on the same graph. The plots were visually inspected to see which data sets look similar and which ones differed. Particular attention was paid to see if the median from one data set fell within the 75th and 25th percentile range of the other data sets.

Probability plots are a useful first step for visually comparing two data sets in a single graph. If the North and South distributions were exactly identical, the plotted values would lie on a straight line through the origin. Deviations from this line show the differences between the two distributions. If the North and South distributions are similar the scattering of the two data sets will be mixed. If there is grouping of the two data sets then data sets are most likely different.

Histograms are a visual representation of the data collected into groups. The data range is divided into several bins or classes and the data are sorted into the bins. The x-axis displays the chemical concentration range for the bin and the y-axis shows the number of observations that fall within the bin. The histograms of the South and North data sets were plotted on top of each other to be able to compare the shapes of the two distributions, overall concentration ranges, and ranges of concentrations that have the most samples.

2.2 Hypothesis Tests

A hypothesis comparing the central tendency of the data sets was done using the Wilcoxon Rank Sum (WRS) test or the Two Sample Proportion Test. All hypothesis tests were conducted using a five percent significance level meaning that if the p-value associated with the hypothesis test is less than 0.05 there is statistically significant evidence that the null hypothesis (H_o or assumed hypothesis) is false. The p-value of a test can be thought of as the credibility of the null hypothesis; p-values greater than 0.05 indicate that the null hypothesis is credible whereas p-values less than 0.05 indicate otherwise. Tables E-1 and E-2 present the results of the surface soil and subsurface soil hypothesis tests, respectively.

The WRS nonparametric test is used to test for a difference between median concentrations between two independent populations. The WRS test was used when the data were not normally distributed. The null and alternative hypotheses were:

H_o: South Median = North Media
H_A: South Median ≠ North Median

The two sample proportion test was used to determine if the proportion of South detected concentrations are greater than the proportion of North detected concentrations. The proportion test was used when there were more than 50 percent non-detects. The null and alternative hypotheses were:

H_o: Proportion South Non-detect = Proportion North Non-detect
H_A: Proportion South Non-detect ≠ Proportion North Non-detect

3. RESULTS OF COMPARISONS

This section summarizes the results of the statistical evaluations discussed in Section 2. For surface soil, ten chemicals were detected in the surface soil. Based on the graphical presentations and hypothesis tests zinc, alpha-chlordane, and gamma-chlordane were found to be statistically different. Because only three out of ten chemicals were found to be statistically different for practical purposes the concentrations in the North and South area represent the same population. For subsurface soil, 12 chemicals were detected in both the North and South areas. Based on the graphical and hypothesis tests 4,4-DDD, alpha chlordane, and gamma chlordane were found to be statistically different. Because only three of 12 chemicals was found to be statistically different between the North and South areas for practical purposes it can be concluded that the two areas represent the same population.

TABLE E.5-1
STATISTICAL COMPARISON CONCENTRATIONS IN SURFACE SOIL
SITE 17
NAVAL AIR STATION BRUNSWICK, BRUNSWICK, MAINE

Parameter	South FOD	North FOD	Total FOD	South Maximum Detected Concentration[(1)]	North Maximum Detected Concentration[(1)]	South Distribution	North Distribution	Hypothesis Test	p-value	Conclusion
Inorganics										
ARSENIC	11 / 11	15 / 15	26 / 26	9.1	18.2	Normal	Normal	T-Test	0.879654	Equal
LEAD	11 / 11	15 / 15	26 / 26	37.5	23.2	Nonparametric	Nonparametric	WRS	0.878479	Equal
ZINC	11 / 11	15 / 15	26 / 26	47.7	40.8	Normal	Normal	T-Test	0.016431	Not Equal
Pesticides										
4,4'-DDD	5 / 11	7 / 15	12 / 26	28	100	Nonparametric	Nonparametric	Proportion	1	Equal
4,4'-DDE	10 / 11	13 / 15	23 / 26	89	250	Nonparametric	Nonparametric	WRS	0.185536	Equal
4,4'-DDT	7 / 11	10 / 15	17 / 26	920	1200	Nonparametric	Nonparametric	WRS	0.795147	Equal
ALPHA-CHLORDANE	8 / 11	3 / 15	11 / 26	840	100	Nonparametric	Nonparametric	Proportion	0.01494	Not Equal
GAMMA-CHLORDANE	7 / 11	3 / 15	10 / 26	760	130	Nonparametric	Nonparametric	Proportion	0.04264	Not Equal
TOTAL DDT HALFND	11 / 11	15 / 15	26 / 26	1040	1503	Nonparametric	Nonparametric	WRS	0.474227	Equal
TOTAL DDT POS	10 / 11	14 / 15	24 / 26	1040	1503	Nonparametric	Nonparametric	WRS	0.585724	Equal

(1) Units for inorganics are mg/kg and units for pesticides are µg/kg.

FOD = Frequency of Detection
WRS = Wilcoxon Rank Sum Test

Surface Soil North Area Samples	Surface Soil South Area Samples
SB-17-101-0001	SB-17-126-0001
SB-17-102-0001	SB-17-130-0001
SB-17-103-0001	SB-17-131-0001
SB-17-104-0001	SB-17-132-0001
SB-17-105-0001-AVG	SB-17-133-0001
SB-17-106-0001	SB-17-208-0001
SB-17-107-0001	SB-17-206-0001
SB-17-108-0001	SB-17-207-0001
SB-17-109-0001	SB-17-209-0001
SB-17-112-0001	SB-17-210-0001
SB-17-113-0001	SB-17-123-0001
SB-17-114-0001	
SB-17-118-0001	
SB-17-124-0001	
SB-17-125-0001	

TABLE E.5-2
STATISTICAL COMPARISON CONCENTRATIONS IN SUBSURFACE SOIL
SITE 17
NAVAL AIR STATION BRUNSWICK, BRUNSWICK, MAINE

Parameter	South FOD	North FOD	Total FOD	South Maximum Detected Concentration(1,2)	North Maximum Detected Concentration(1,2)	South Distribution	North Distribution	Hypothesis Test	p-value	Conclusion
Inorganics										
ARSENIC	15 / 15	26 / 28	41 / 43	6.2	8.1	Nonparametric	Nonparametric	WRS	0.13559188	Equal
LEAD	15 / 15	28 / 28	43 / 43	15.9	32.3	Nonparametric	Nonparametric	WRS	0.22107994	Equal
ZINC	15 / 15	28 / 28	43 / 43	29.55	54.5	Normal	Nonparametric	WRS	0.14989105	Equal
Herbicides										
MONURON	5 / 10	0 / 28	5 / 38	380	--	Nonparametric	Assumed Nonparametric	No Hypothesis Test	NA	NA
PROPOXUR	2 / 10	2 / 28	4 / 38	94	420	Assumed Nonparametric	Assumed Nonparametric	Proportion	0.2788	Equal
ROTENONE	0 / 10	0 / 28	0 / 38	--	--	Assumed Nonparametric	Assumed Nonparametric	No Hypothesis Test	NA	NA
Pesticides										
4,4'-DDD	15 / 48	29 / 50	44 / 98	63	520	Nonparametric	Nonparametric	Proportion	0.009008	Not Equal
4,4'-DDE	29 / 48	36 / 50	65 / 98	370	1000	Nonparametric	Nonparametric	WRS	0.14806488	Equal
4,4'-DDT	33 / 48	37 / 50	70 / 98	4400	15200	Nonparametric	Nonparametric	WRS	0.28800367	Equal
ALPHA-CHLORDANE	28 / 48	24 / 50	52 / 98	3100	2900	Nonparametric	Nonparametric	WRS	0.00027187	Not Equal
ENDOSULFAN I	4 / 48	2 / 50	6 / 98	190	5.9	Nonparametric	Assumed Nonparametric	Proportion	0.4312	Equal
GAMMA-CHLORDANE	29 / 48	22 / 50	51 / 98	2700	2600	Nonparametric	Nonparametric	WRS	0.0000958	Not Equal
HEPTACHLOR	17 / 48	9 / 50	26 / 98	390	270	Nonparametric	Nonparametric	Proportion	0.06758	Equal
HEPTACHLOR EPOXIDE	8 / 48	8 / 50	16 / 98	530	580	Nonparametric	Nonparametric	Proportion	1	Equal

(1) Units for inorganics are mg/kg and units for herbicides and pesticides are µg/kg.
(2) Average concentration was used for all duplicate pairs.

FOD = Frequency of Detection
WRS = Wilcoxon Rank Sum Test

Subsurface Soil North Area Samples

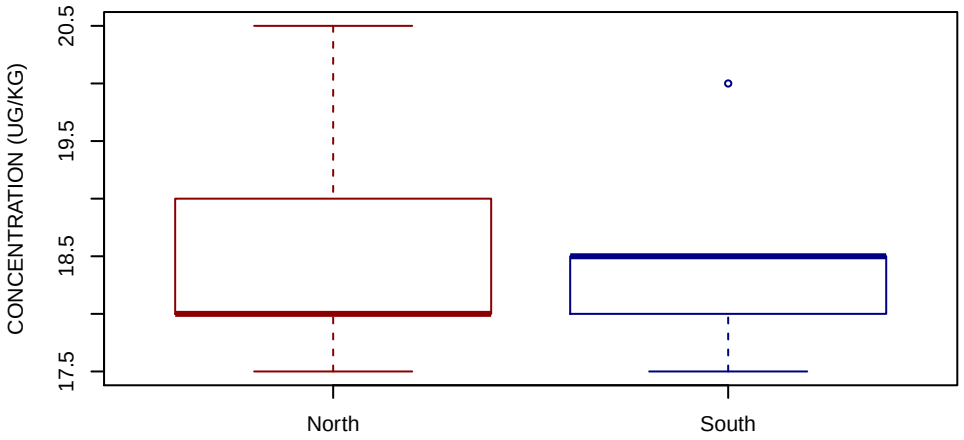
GRID A BOTTOM	SB-17-112-0104	SB-17-155-0205
GRID A NORTH SIDEWALL	SB-17-113-0104	SB-17-202-0205
GRID A SOUTH SIDEWALL	SB-17-114-0104	SB-17-203-0205
GRID A WEST SIDEWALL A	SB-17-115-0710	SB-17-205-0205
GRID A WEST SIDEWALL B	SB-17-116-0407	SB-17-127-0306
GRID B BOTTOM	SB-17-117-0104	SB-17-154-0205-AVG
GRID B EAST SIDEWALL A	SB-17-118-0104	
GRID B EAST SIDEWALL B	SB-17-119-0104	
Grid B North Sidewall #2	SB-17-120-0205-AVG	
GRID B SOUTH SIDEWALL	SB-17-121-0710	
SB-17-101-0104	SB-17-121-1215	
SB-17-102-0104	SB-17-122-0407-AVG	
SB-17-103-0104	SB-17-124-0104	
SB-17-104-0104	SB-17-125-0104	
SB-17-105-0104	SB-17-125-0608	
SB-17-106-0104	SB-17-146-0104	
SB-17-107-0104	SB-17-147-0104	
SB-17-107-0408	SB-17-148-0104	
SB-17-108-0104	SB-17-149-0104	
SB-17-109-0104	SB-17-150-0205	
SB-17-110-0104	SB-17-151-0205	
SB-17-111-0104	SB-17-152-0205	

Subsurface Soil South Area Samples

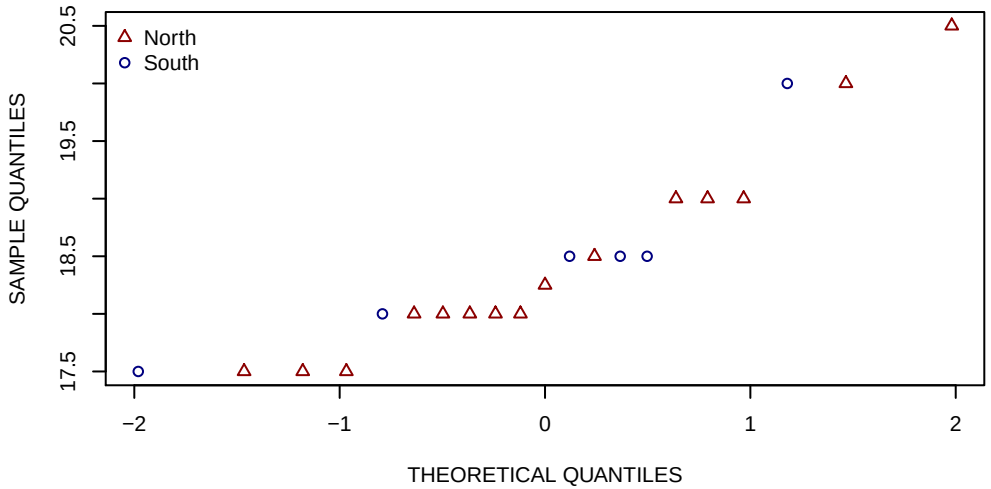
S17-00	S17-SS-09	SB-17-130-0104
S17-PB-01	S17-SW-01	S17-SW-05-AVG
S17-PB-02	S17-SW-02	S17-SW-06
S17-PB-03	S17-SW-03	SB-17-210-0103
S17-PB-04	S17-SW-04	
S17-PB-05-AVG	SB-17-131-0104	
S17-PB-06	SB-17-132-0104-AVG	
S17-PB-07	SB-17-132-0408-AVG	
S17-PB-08	SB-17-133-0104	
S17-PB-09	SB-17-141-0307	
S17-PB-10	SB-17-142-0203-AVG	
S17-PB-11	SB-17-143-0203	
S17-PB-12	SB-17-144-0203	
S17-PB-13	SB-17-145-0203	
S17-PB-14-AVG	SB-17-206-0103	
S17-PB-15	SB-17-207-0103	
S17-PB-16	SB-17-208-0103-AVG	
S17-PB-17	SB-17-209-0103	
S17-PB-18	SB-17-123-0104	
S17-SS-04	SB-17-126-0104	
S17-SS-05	SB-17-128-0506	
S17-SS-06	SB-17-129-0306-AVG	

2,4−D SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 1 OF 41

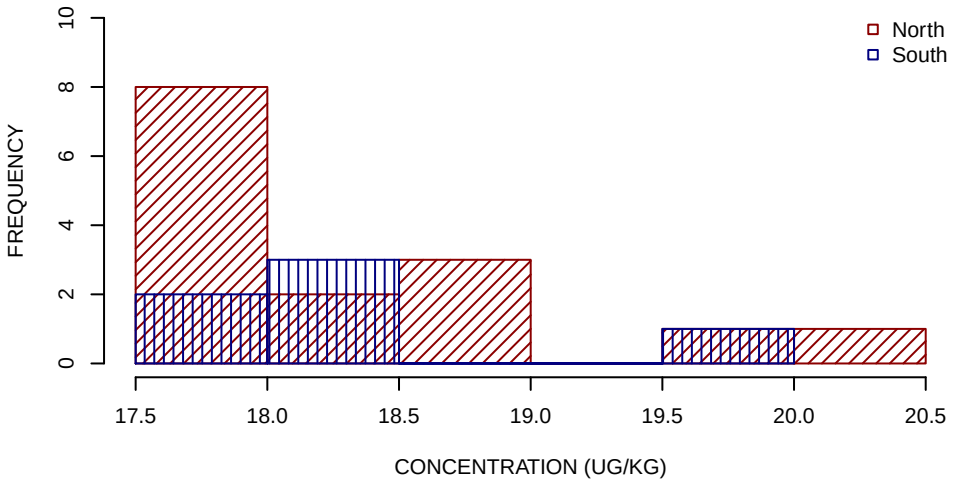
BOXPLOTS



NORMAL Q−Q PLOT



HISTOGRAMS



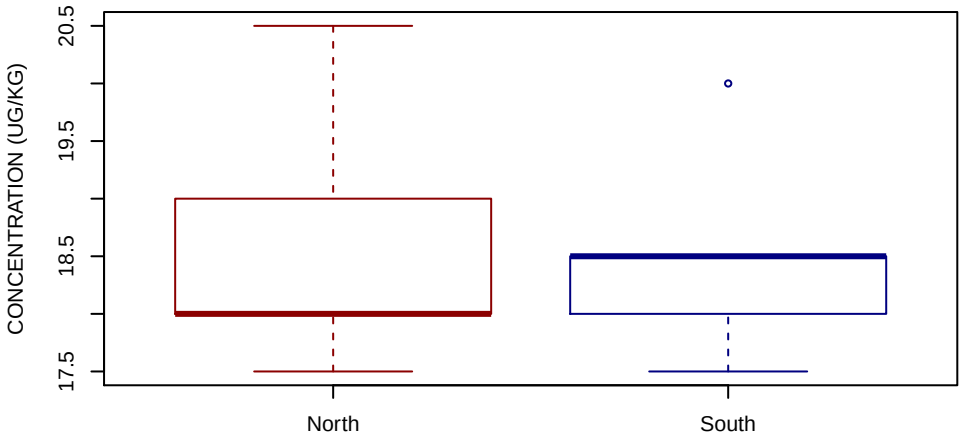
SUMMARY STATISTICS

	North	South
MINIMUM	18	18
25TH PERCENTILE	18	18
MEDIAN	18	18
MEAN	18	18
75TH PERCENTILE	19	18
MAXIMUM	20	20

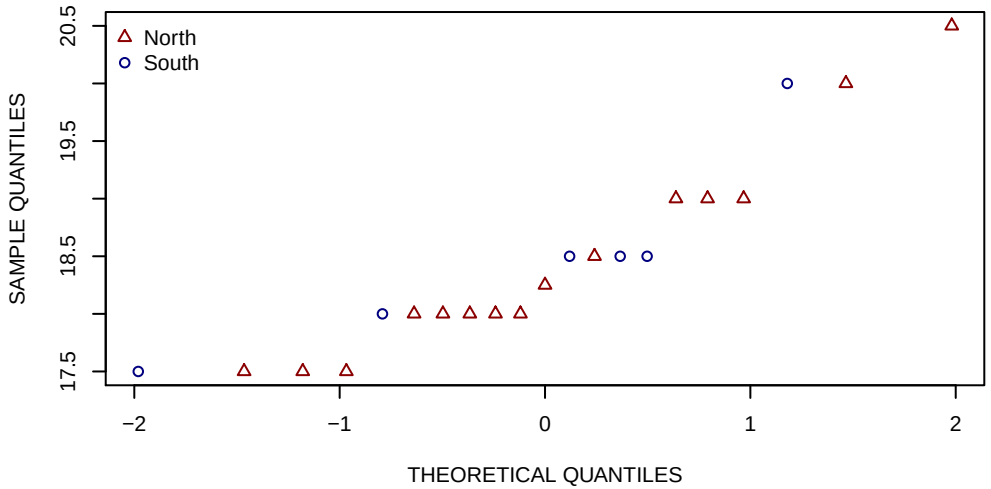
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

2,4,5−T SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 2 OF 41

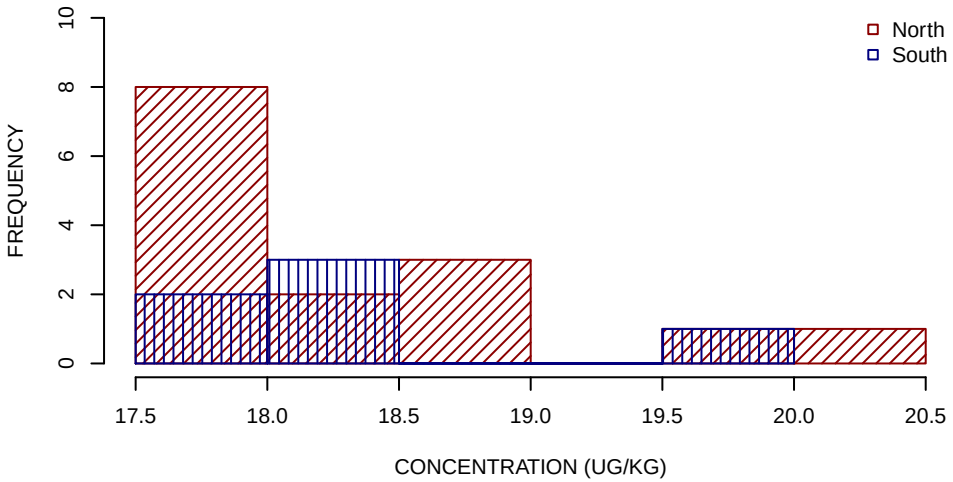
BOXPLOTS



NORMAL Q−Q PLOT



HISTOGRAMS



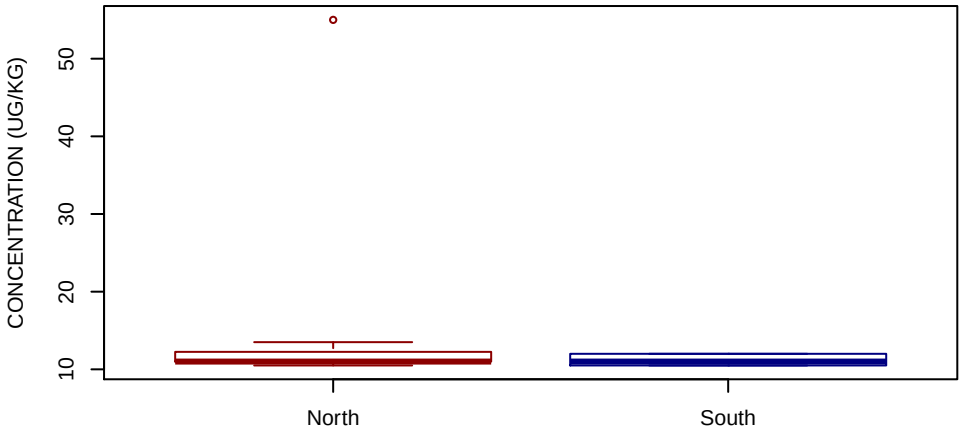
SUMMARY STATISTICS

	North	South
MINIMUM	18	18
25TH PERCENTILE	18	18
MEDIAN	18	18
MEAN	18	18
75TH PERCENTILE	19	18
MAXIMUM	20	20

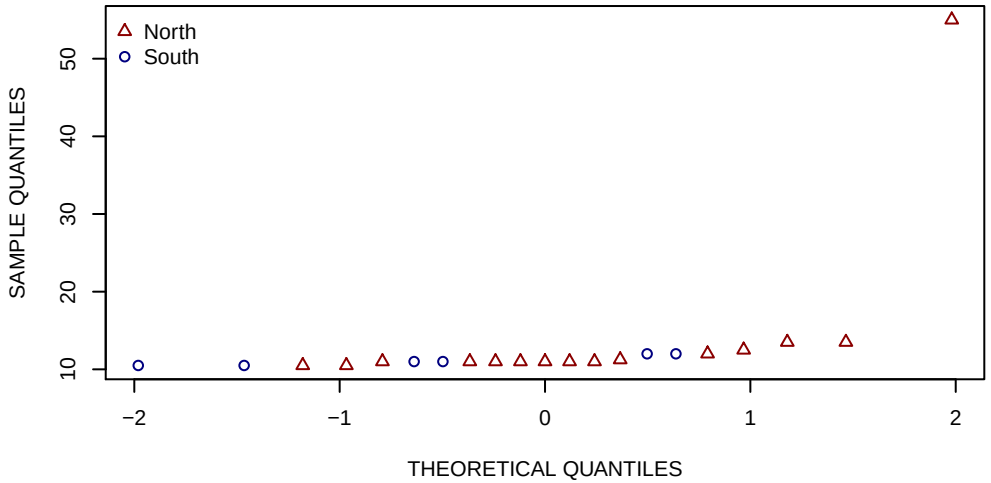
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

CARBARYL SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 3 OF 41

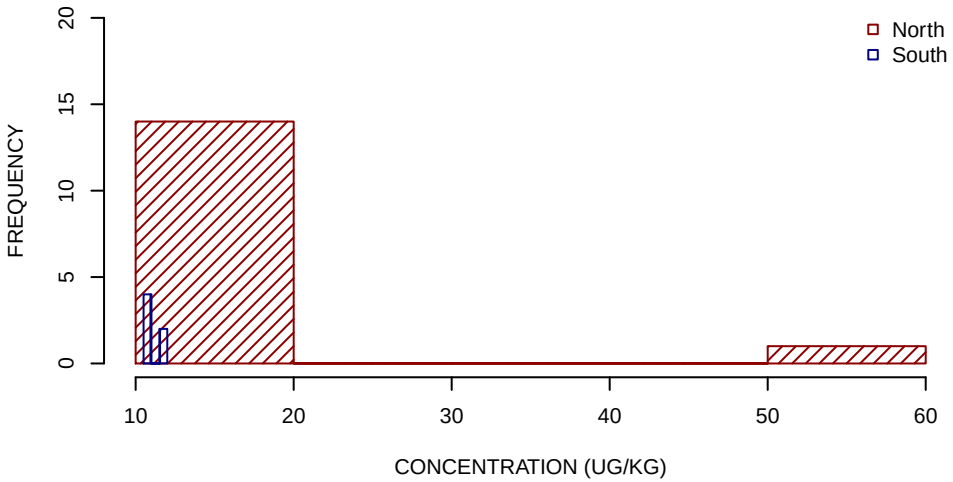
BOXPLOTS



NORMAL Q−Q PLOT



HISTOGRAMS



SUMMARY STATISTICS

	North	South
MINIMUM	10	10
25TH PERCENTILE	11	11
MEDIAN	11	11
MEAN	14	11
75TH PERCENTILE	12	12
MAXIMUM	55	12

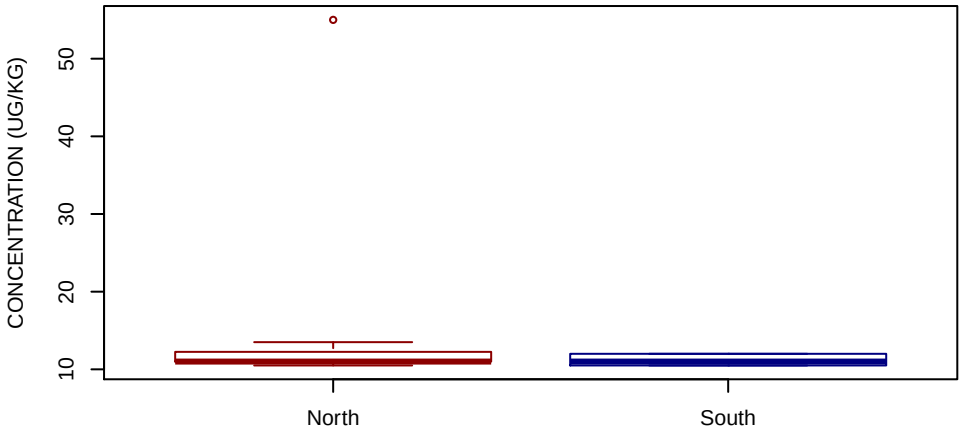
UNITS ARE UG/KG

1/2 DETECTION LIMIT USED FOR NON−DETECTS

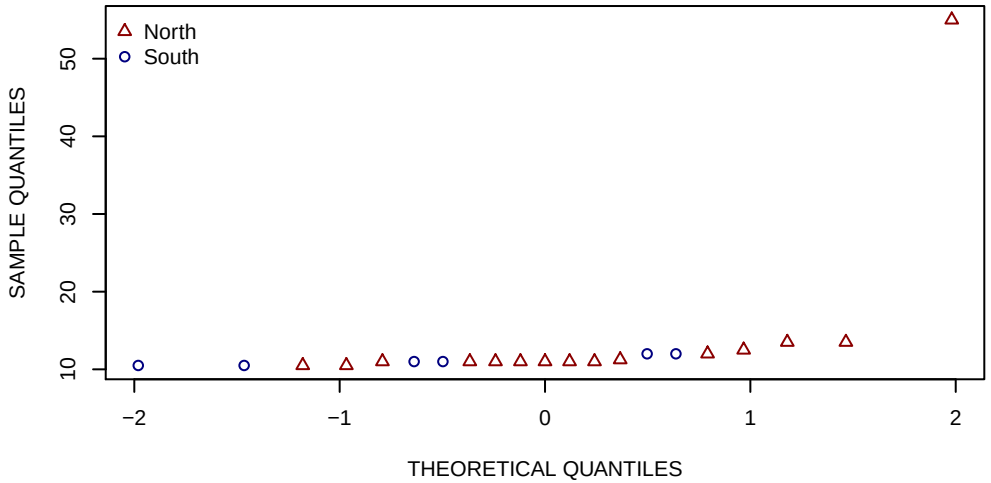
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

DIURON SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 4 OF 41

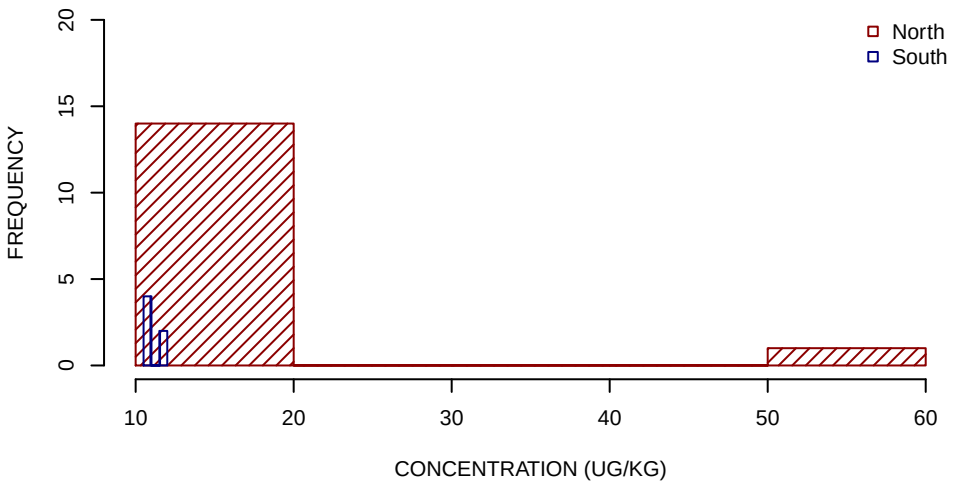
BOXPLOTS



NORMAL Q−Q PLOT



HISTOGRAMS



SUMMARY STATISTICS

	North	South
MINIMUM	10	10
25TH PERCENTILE	11	11
MEDIAN	11	11
MEAN	14	11
75TH PERCENTILE	12	12
MAXIMUM	55	12

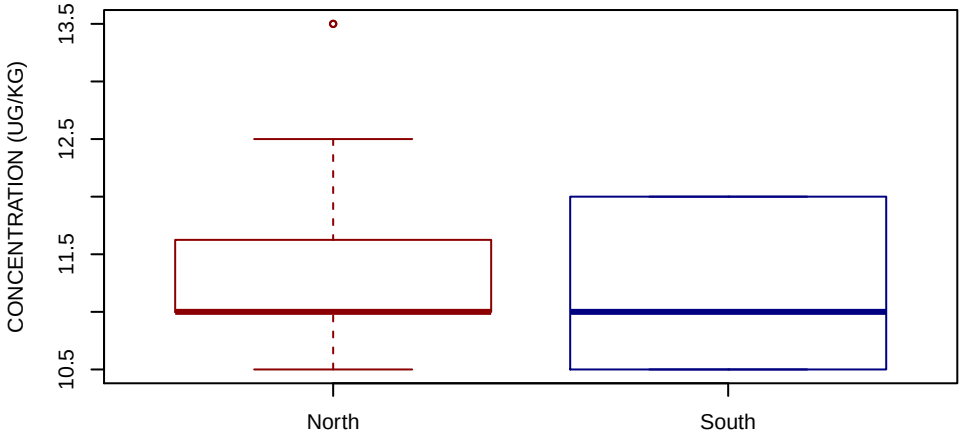
UNITS ARE UG/KG

1/2 DETECTION LIMIT USED FOR NON−DETECTS

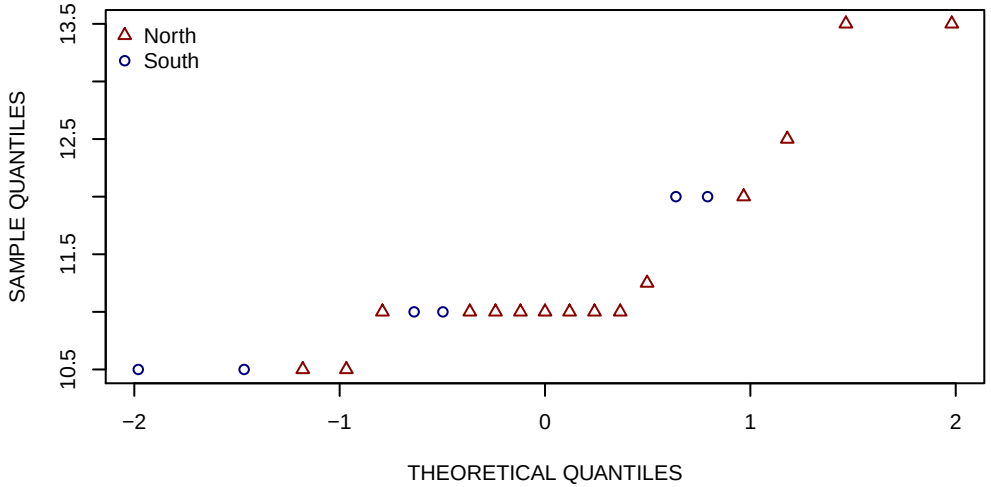
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

MALEIC HYDRAZIDE SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 5 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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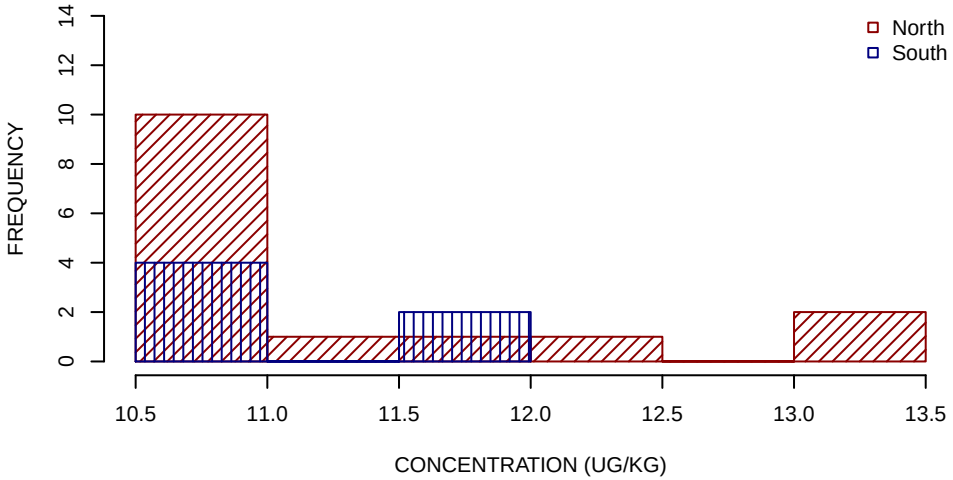


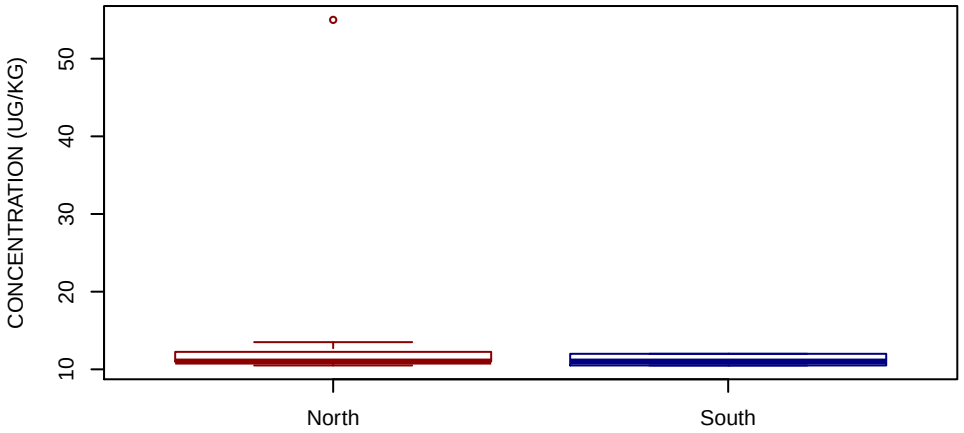
SUMMARY STATISTICS

	North	South
MINIMUM	10	10
25TH PERCENTILE	11	11
MEDIAN	11	11
MEAN	11	11
75TH PERCENTILE	12	12
MAXIMUM	14	12

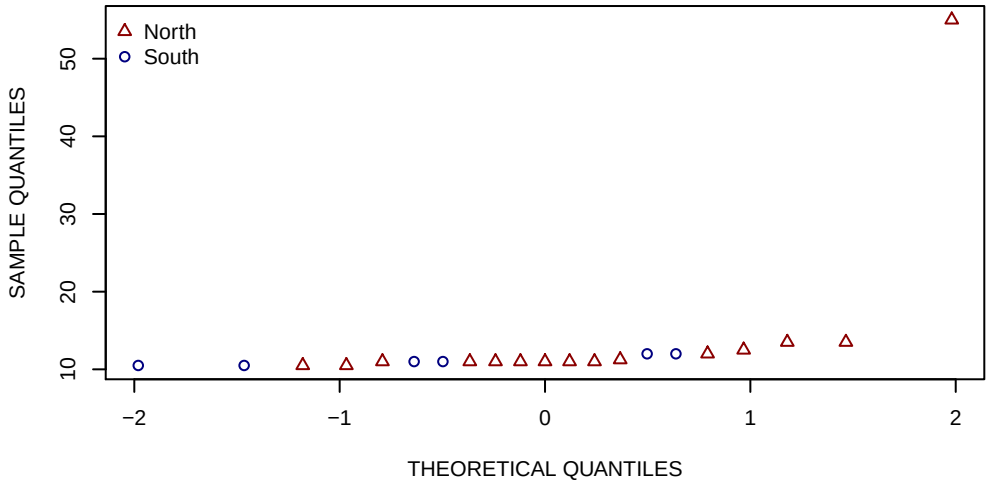
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

MONURON SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 6 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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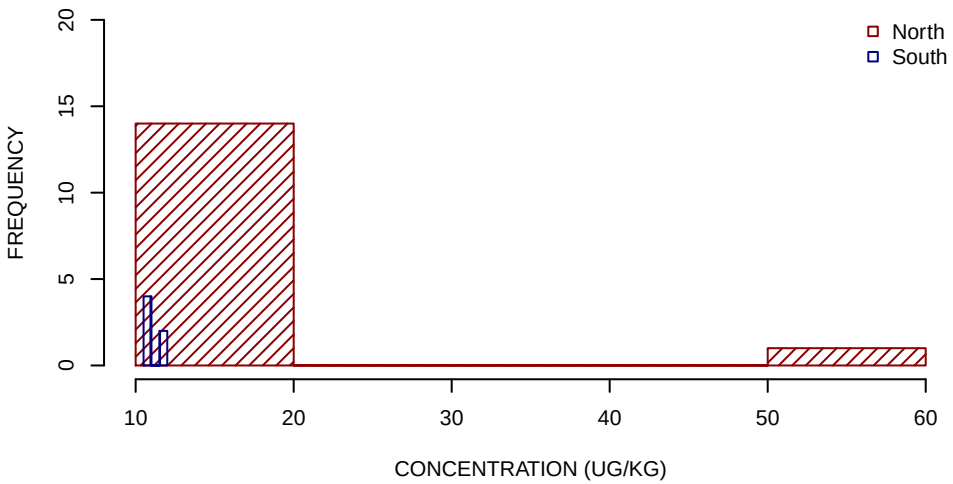


SUMMARY STATISTICS

	North	South
MINIMUM	10	10
25TH PERCENTILE	11	11
MEDIAN	11	11
MEAN	14	11
75TH PERCENTILE	12	12
MAXIMUM	55	12

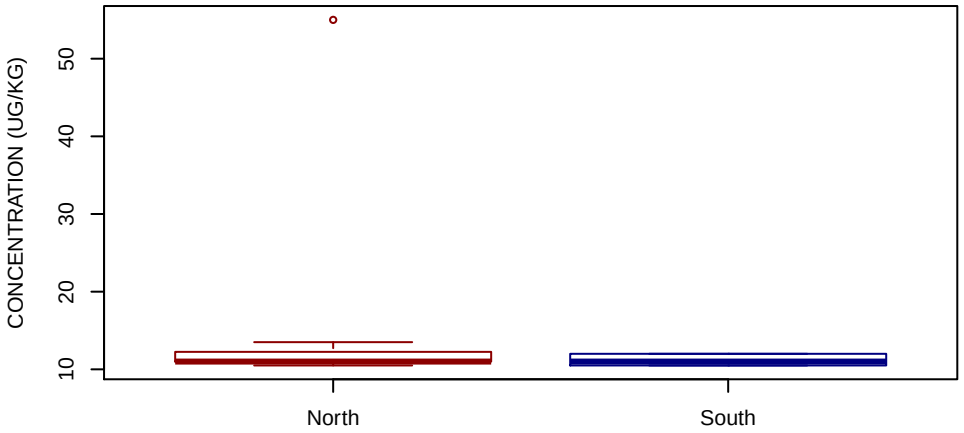
UNITS ARE UG/KG

1/2 DETECTION LIMIT USED FOR NON−DETECTS

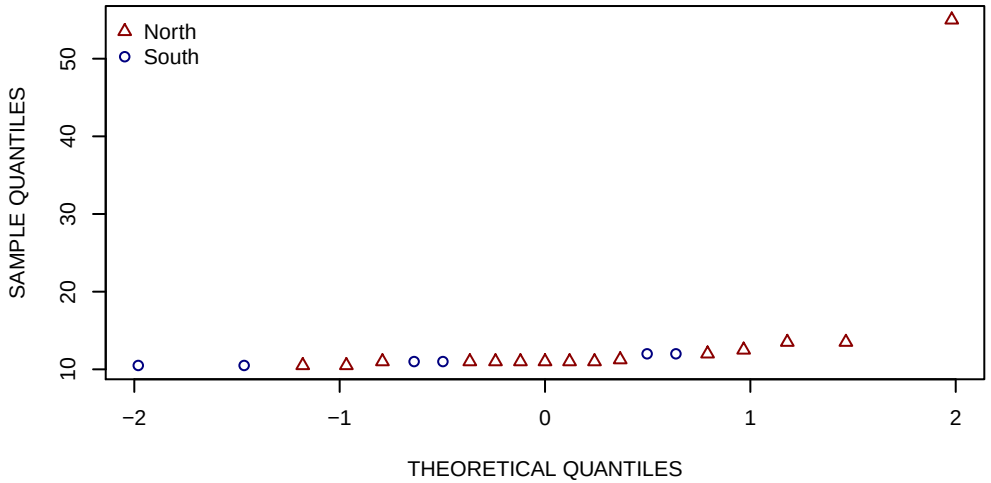
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

PROPOXUR SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 7 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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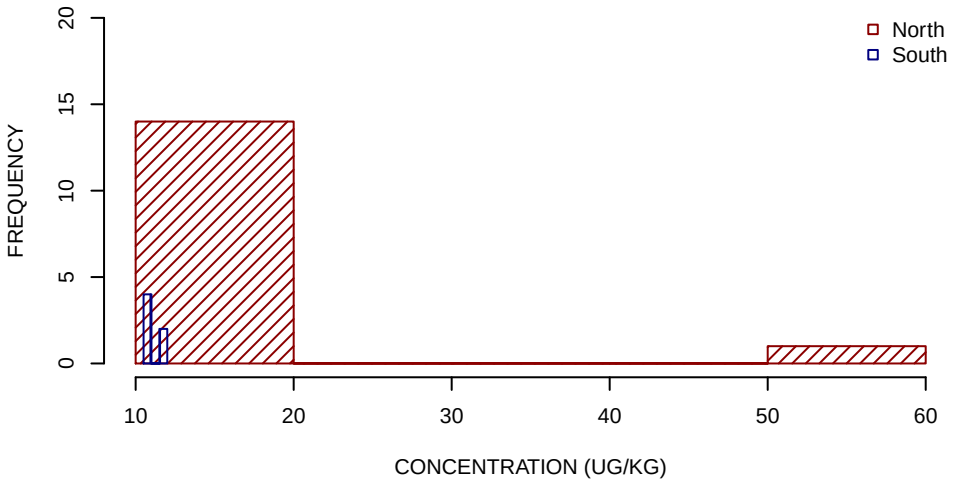


SUMMARY STATISTICS

	North	South
MINIMUM	10	10
25TH PERCENTILE	11	11
MEDIAN	11	11
MEAN	14	11
75TH PERCENTILE	12	12
MAXIMUM	55	12

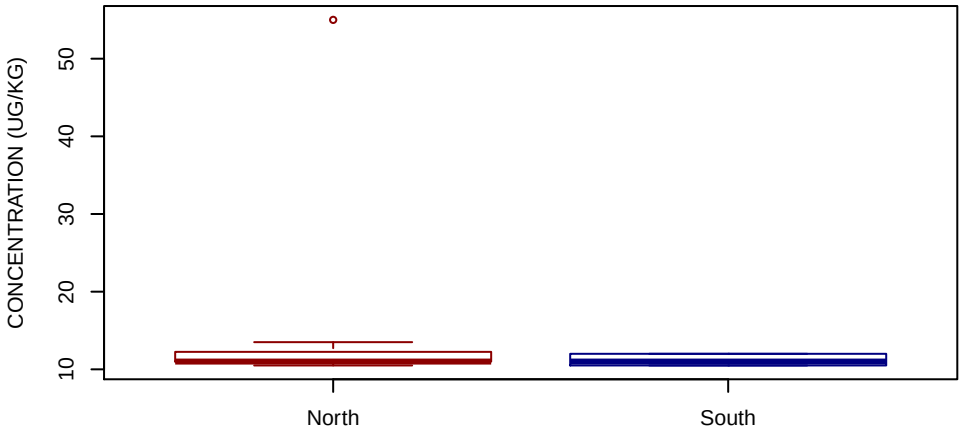
UNITS ARE UG/KG

1/2 DETECTION LIMIT USED FOR NON−DETECTS

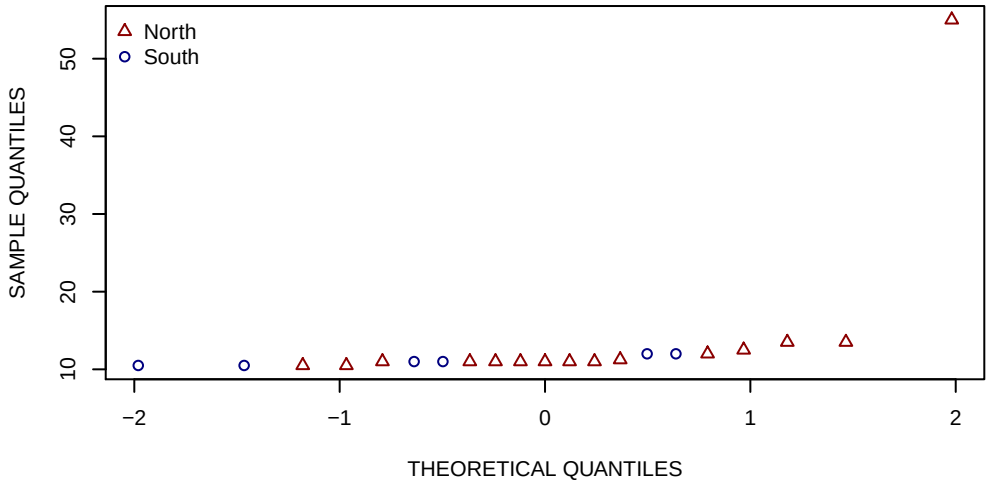
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ROTENONE SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 8 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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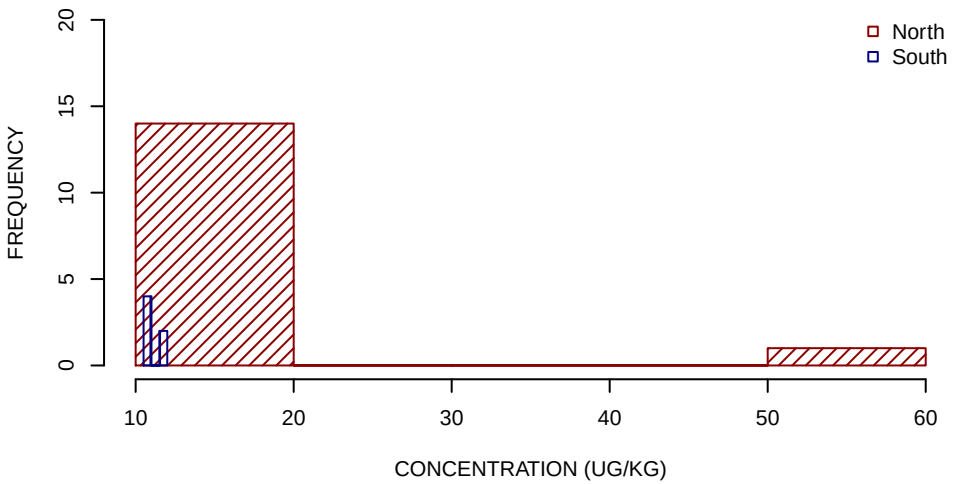


SUMMARY STATISTICS

	North	South
MINIMUM	10	10
25TH PERCENTILE	11	11
MEDIAN	11	11
MEAN	14	11
75TH PERCENTILE	12	12
MAXIMUM	55	12

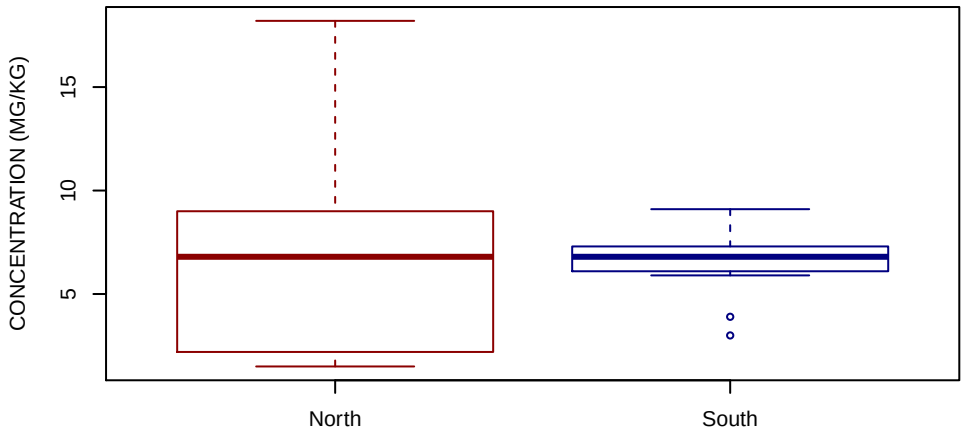
UNITS ARE UG/KG

1/2 DETECTION LIMIT USED FOR NON−DETECTS

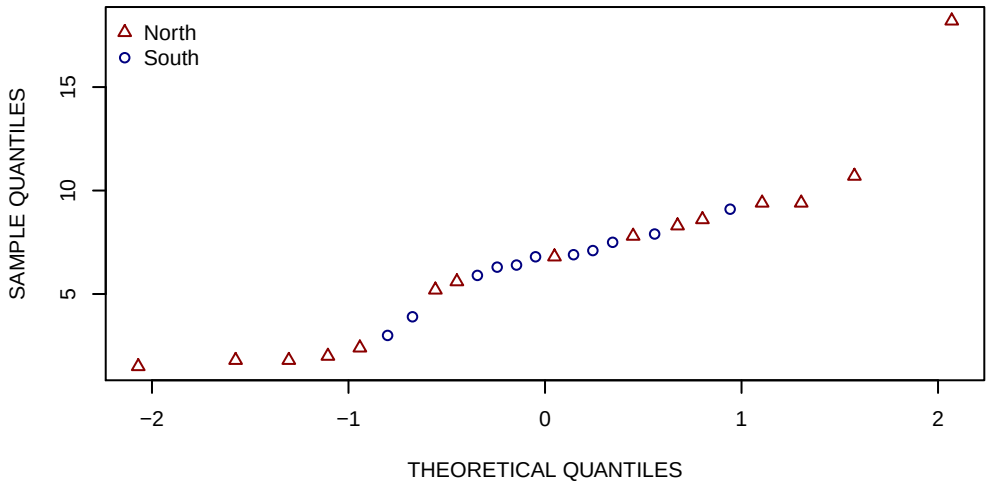
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ARSENIC SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 9 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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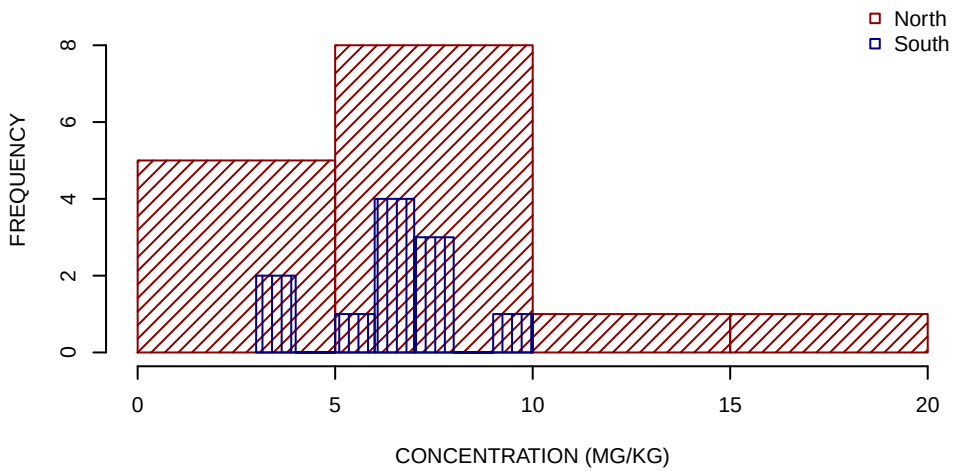


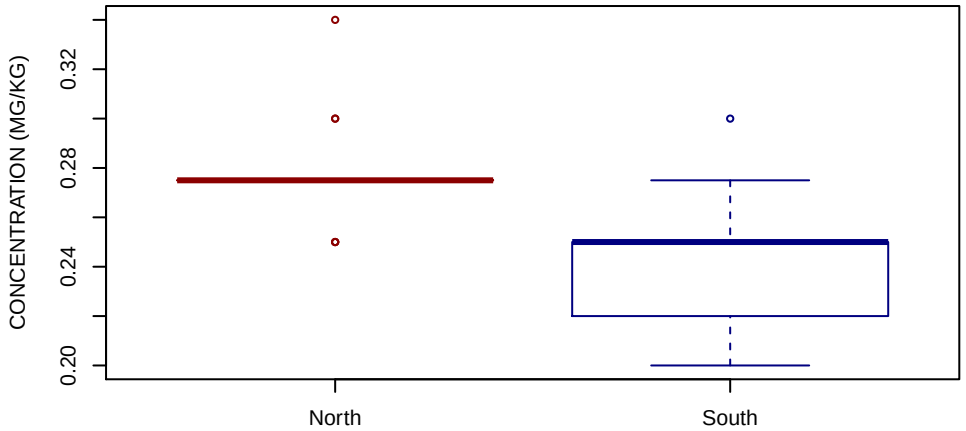
SUMMARY STATISTICS

	North	South
MINIMUM	1.5	3
25TH PERCENTILE	2.2	6.1
MEDIAN	6.8	6.8
MEAN	6.6	6.4
75TH PERCENTILE	9	7.3
MAXIMUM	18	9.1

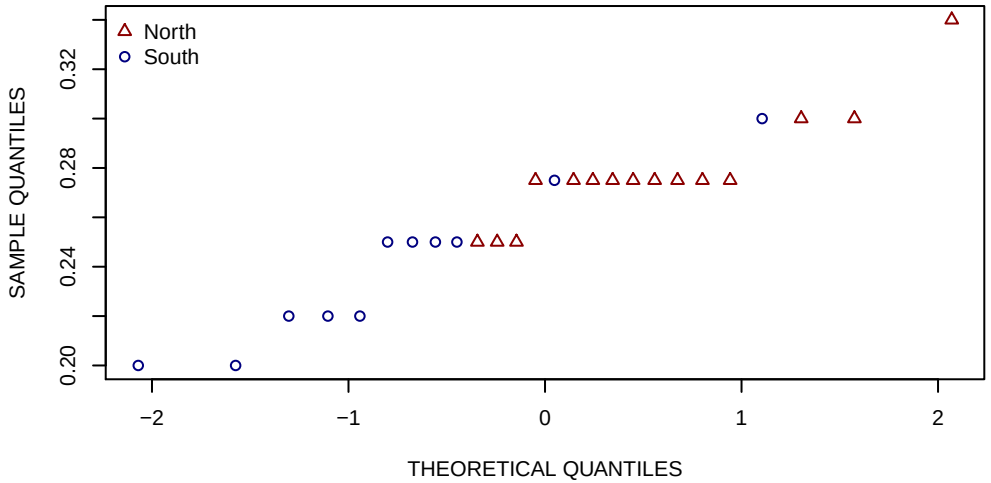
UNITS ARE MG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

CYANIDE SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 10 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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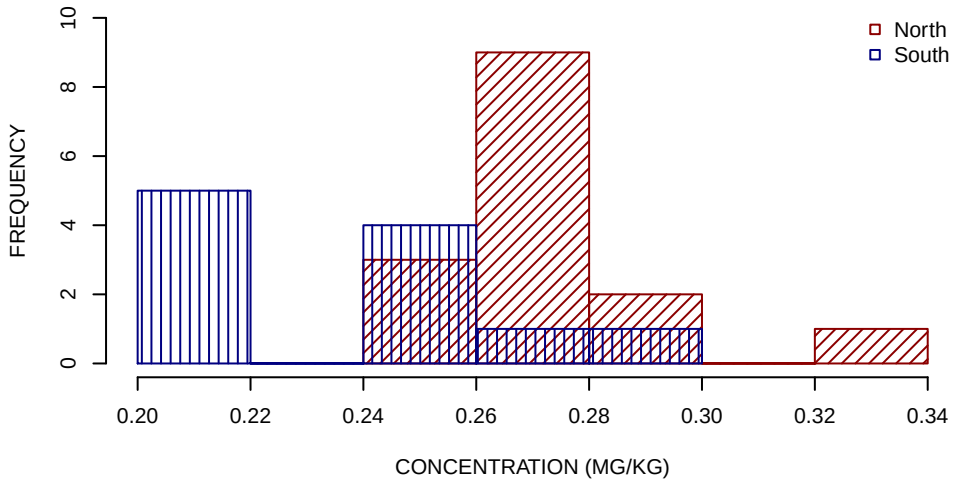


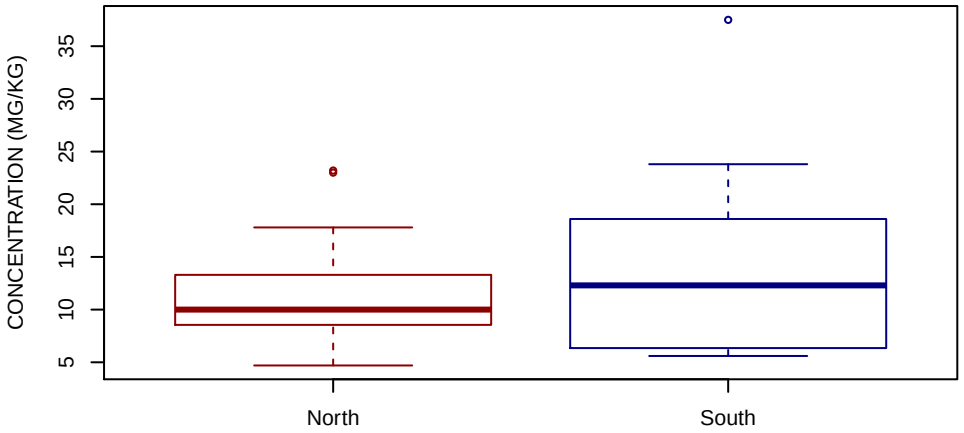
SUMMARY STATISTICS

	North	South
MINIMUM	0.25	0.2
25TH PERCENTILE	0.28	0.22
MEDIAN	0.28	0.25
MEAN	0.28	0.24
75TH PERCENTILE	0.28	0.25
MAXIMUM	0.34	0.3

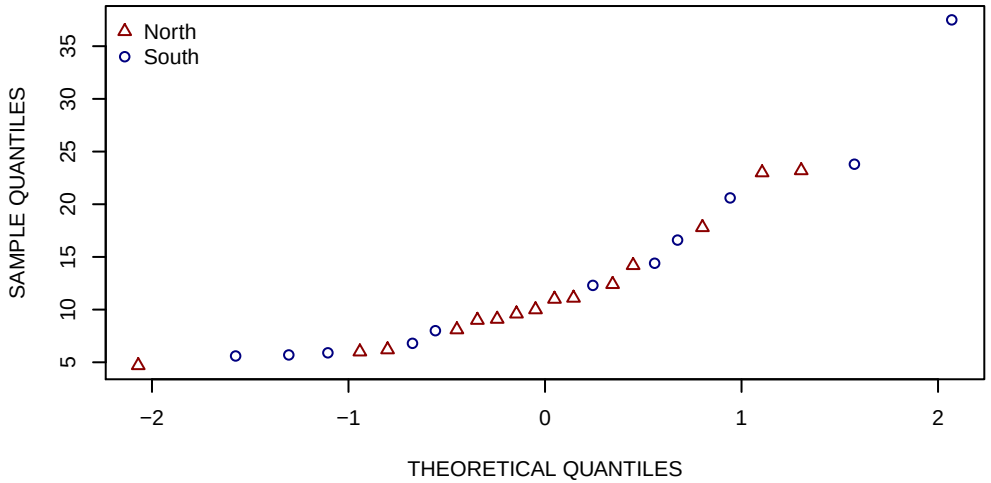
UNITS ARE MG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

LEAD SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 11 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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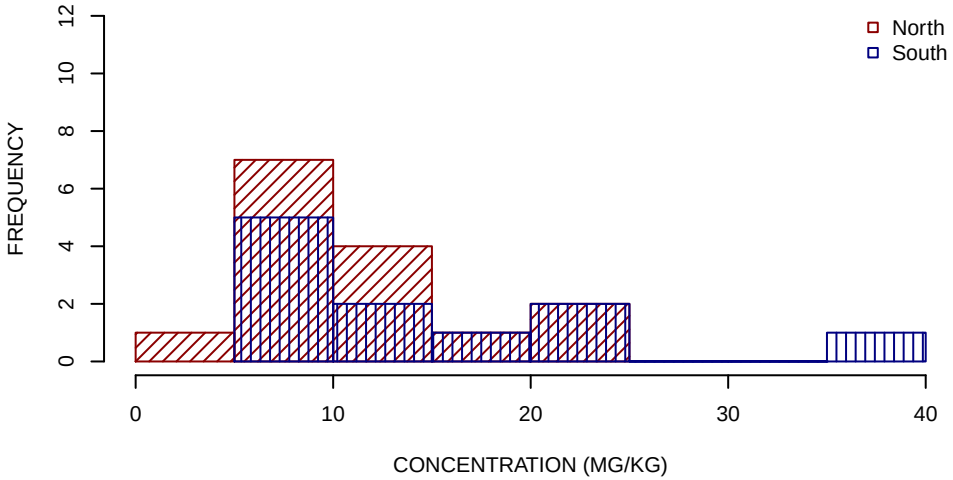


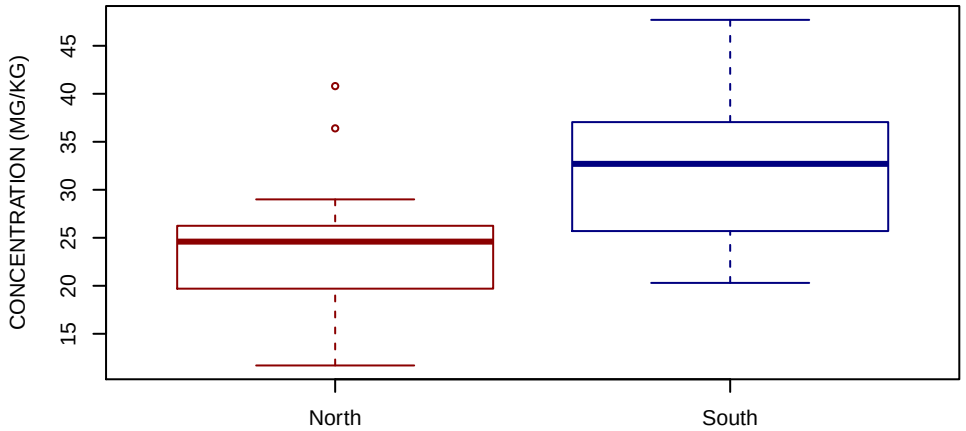
SUMMARY STATISTICS

	North	South
MINIMUM	4.7	5.6
25TH PERCENTILE	8.6	6.4
MEDIAN	10	12
MEAN	12	14
75TH PERCENTILE	13	19
MAXIMUM	23	38

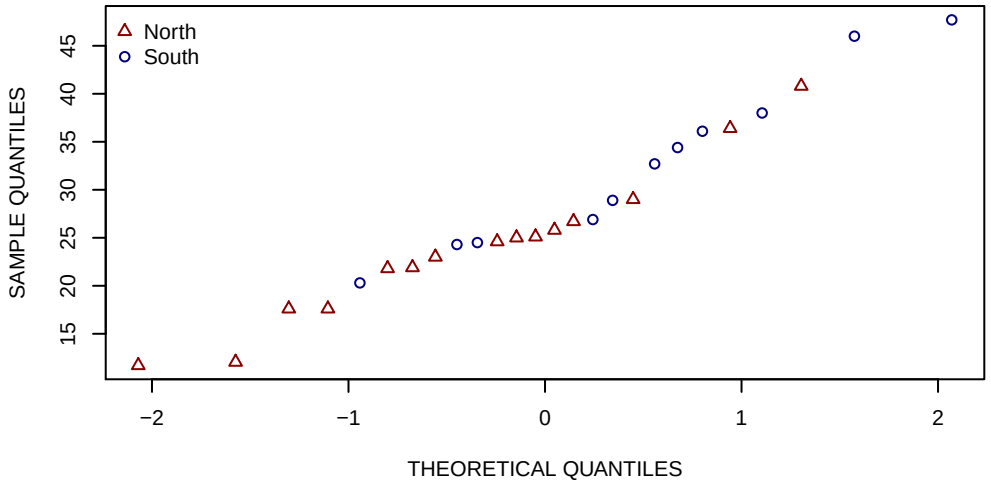
UNITS ARE MG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ZINC SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 12 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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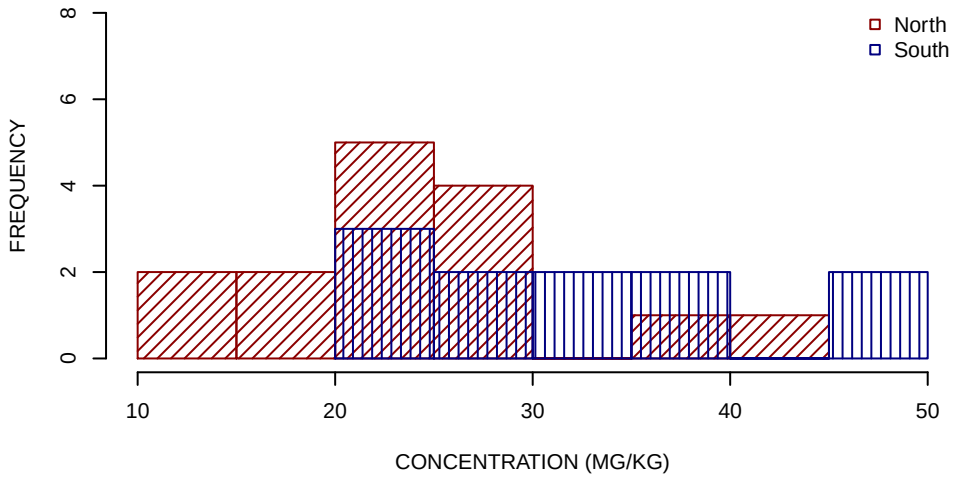


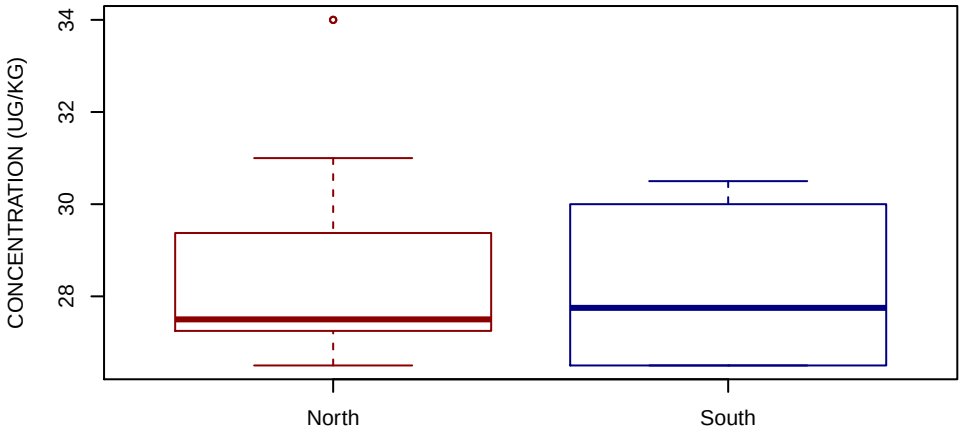
SUMMARY STATISTICS

	North	South
MINIMUM	12	20
25TH PERCENTILE	20	26
MEDIAN	25	33
MEAN	24	33
75TH PERCENTILE	26	37
MAXIMUM	41	48

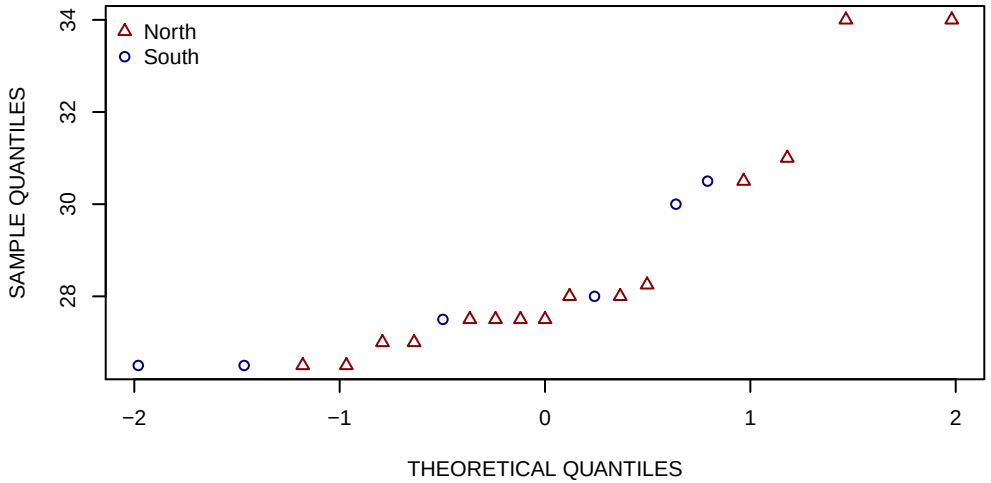
UNITS ARE MG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

4−AMINOPYRIDINE SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 13 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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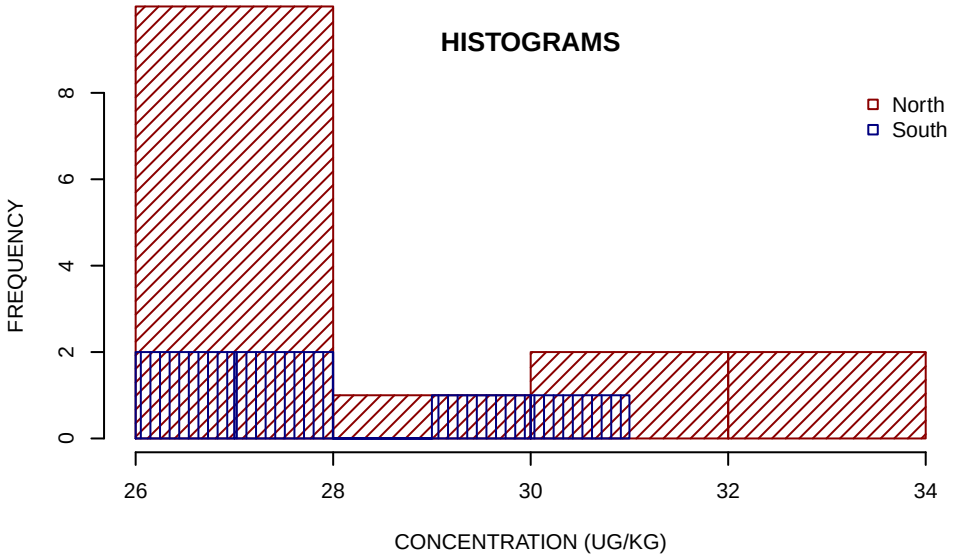


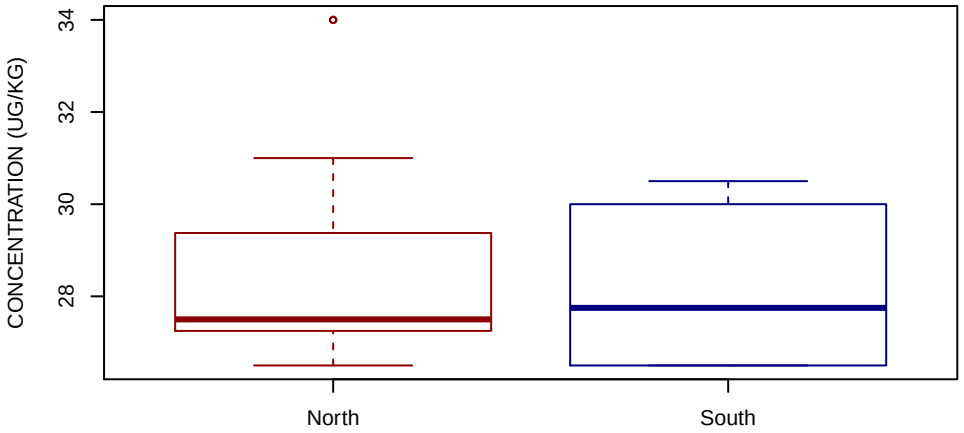
SUMMARY STATISTICS

	North	South
MINIMUM	26	26
25TH PERCENTILE	27	27
MEDIAN	28	28
MEAN	29	28
75TH PERCENTILE	29	30
MAXIMUM	34	30

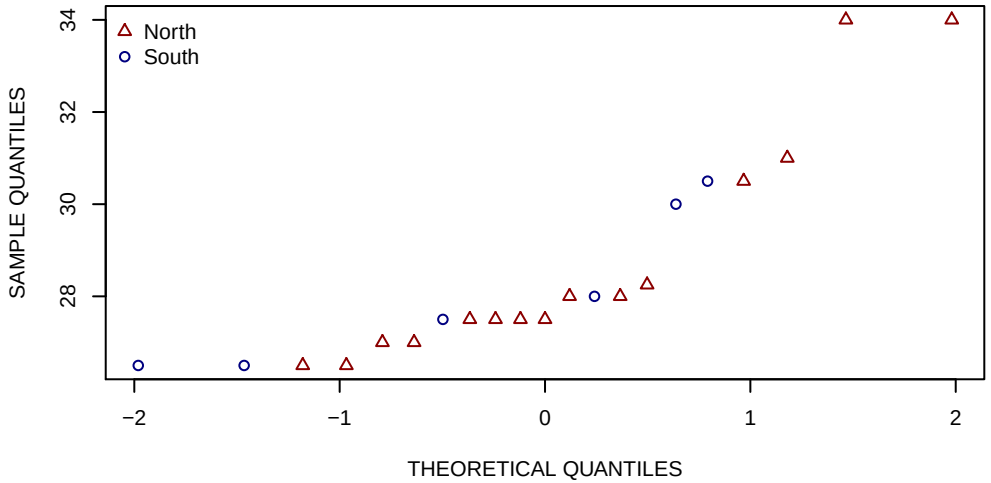
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

DIAZINON SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 14 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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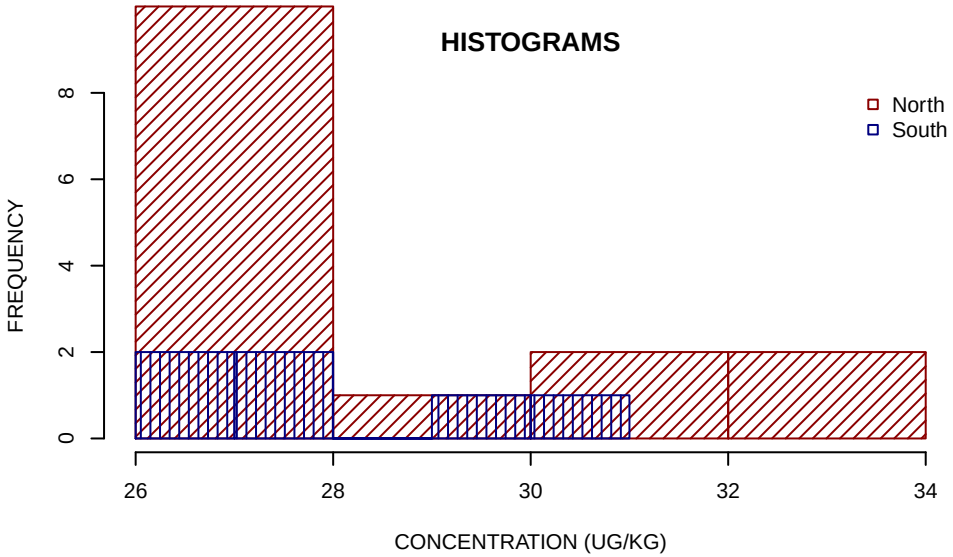


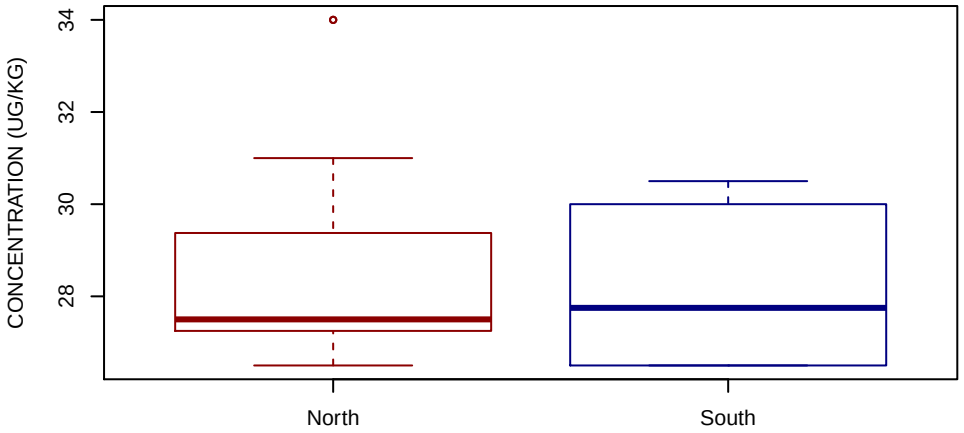
SUMMARY STATISTICS

	North	South
MINIMUM	26	26
25TH PERCENTILE	27	27
MEDIAN	28	28
MEAN	29	28
75TH PERCENTILE	29	30
MAXIMUM	34	30

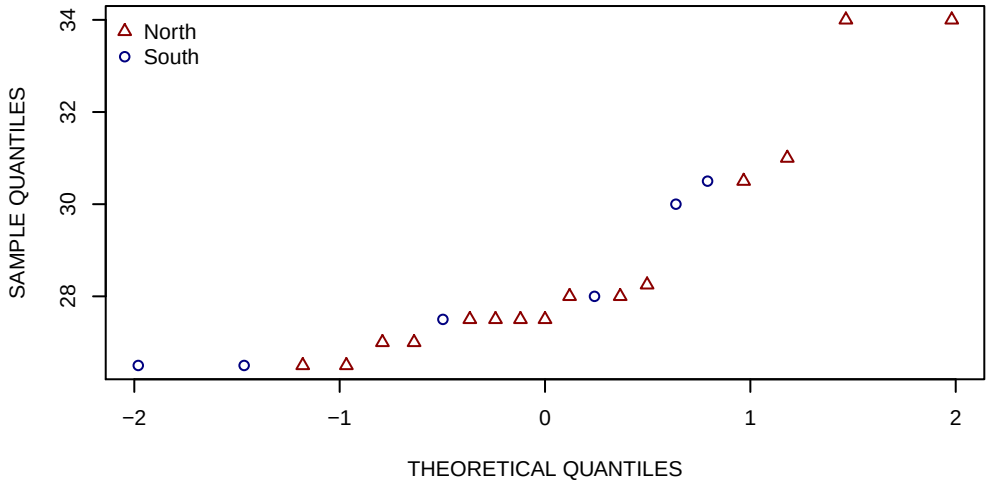
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

MALATHION SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 15 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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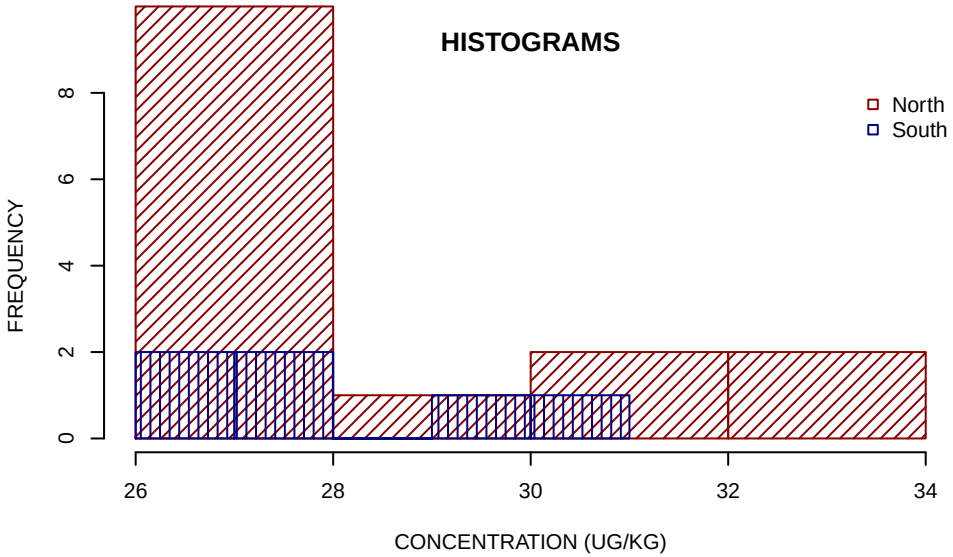


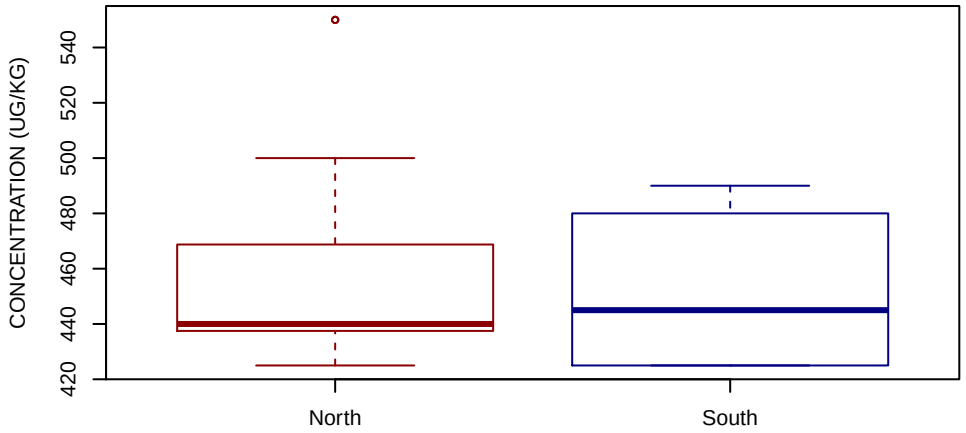
SUMMARY STATISTICS

	North	South
MINIMUM	26	26
25TH PERCENTILE	27	27
MEDIAN	28	28
MEAN	29	28
75TH PERCENTILE	29	30
MAXIMUM	34	30

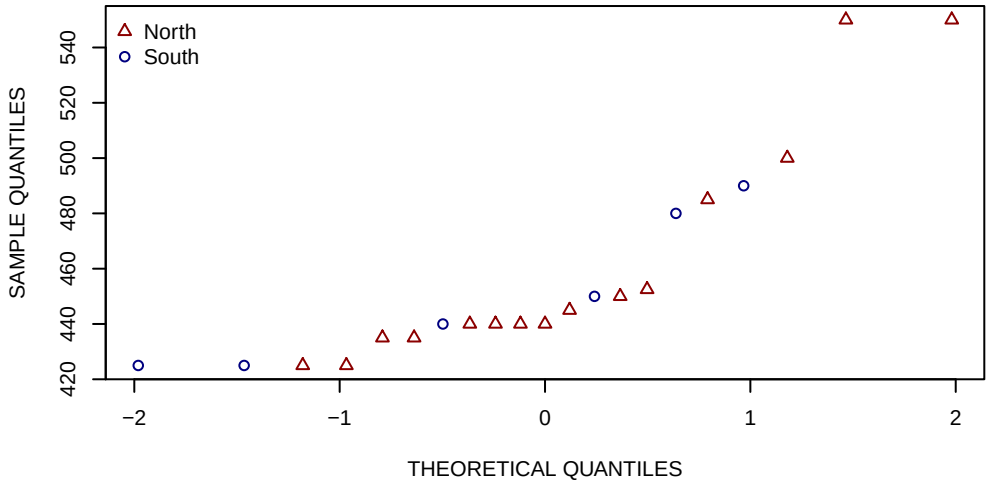
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

PYRETHRINS SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 16 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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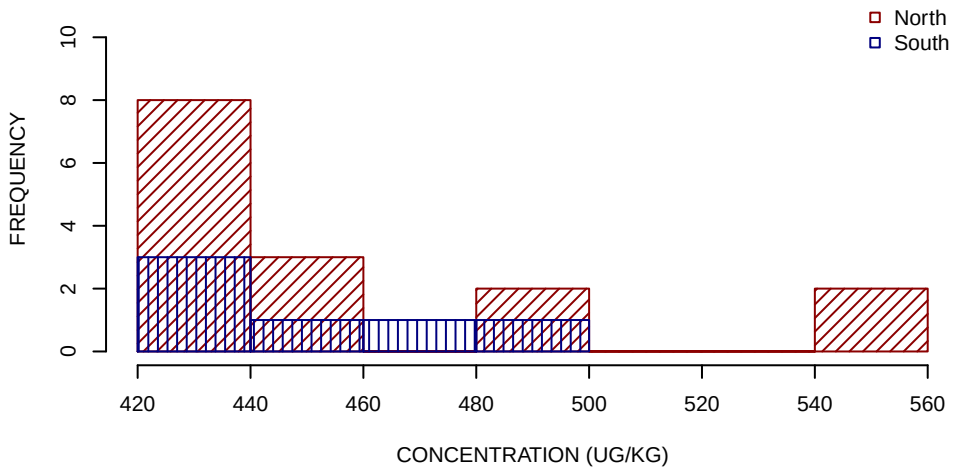


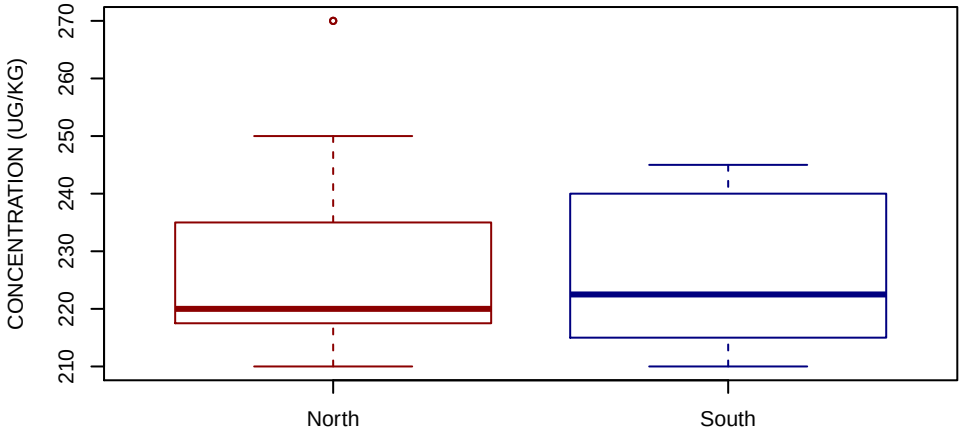
SUMMARY STATISTICS

	North	South
MINIMUM	420	420
25TH PERCENTILE	440	430
MEDIAN	440	440
MEAN	460	450
75TH PERCENTILE	470	470
MAXIMUM	550	490

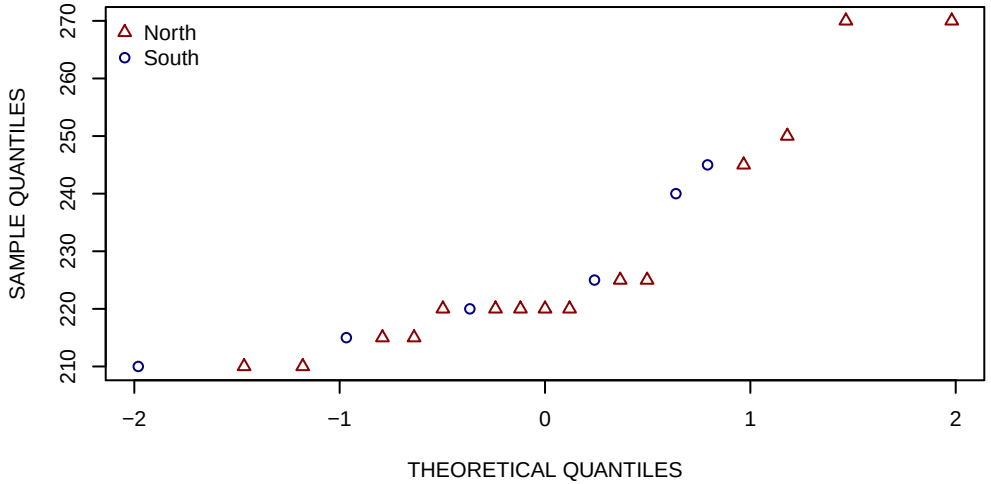
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

RESMETHRIN SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 17 OF 41

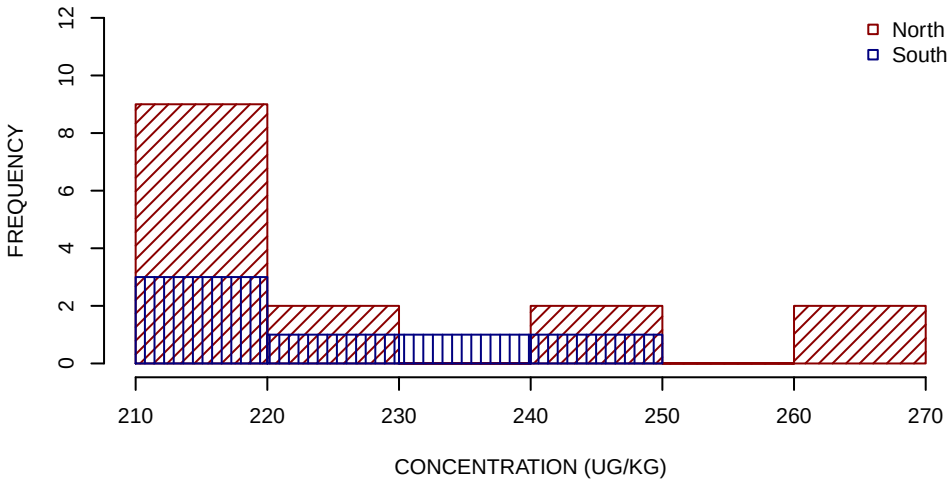
BOXPLOTS



NORMAL Q−Q PLOT



HISTOGRAMS



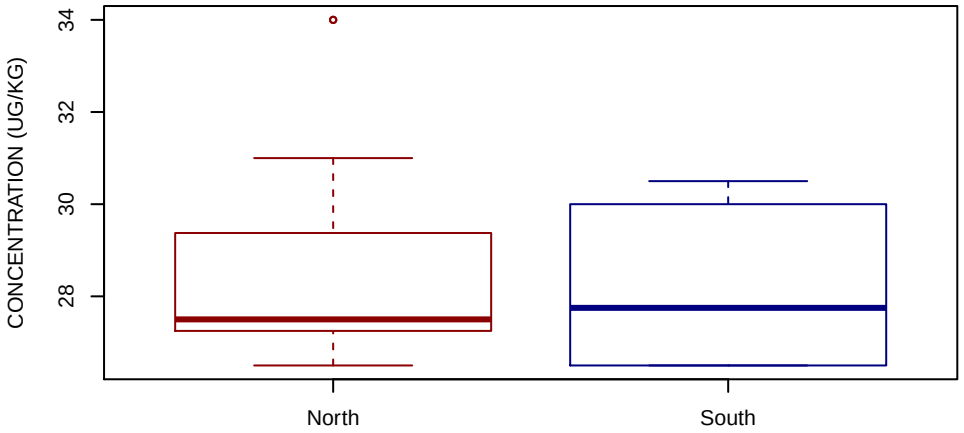
SUMMARY STATISTICS

	North	South
MINIMUM	210	210
25TH PERCENTILE	220	220
MEDIAN	220	220
MEAN	230	230
75TH PERCENTILE	240	240
MAXIMUM	270	240

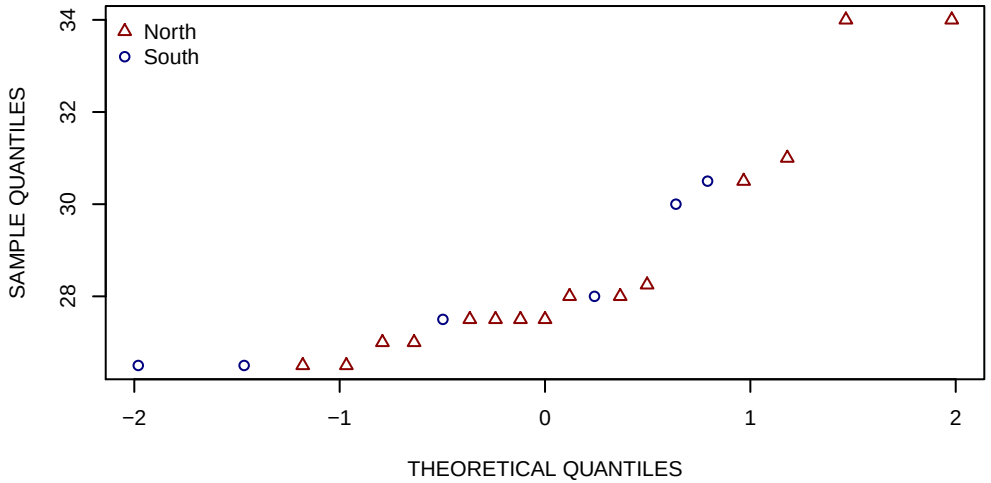
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

SIMAZINE SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 18 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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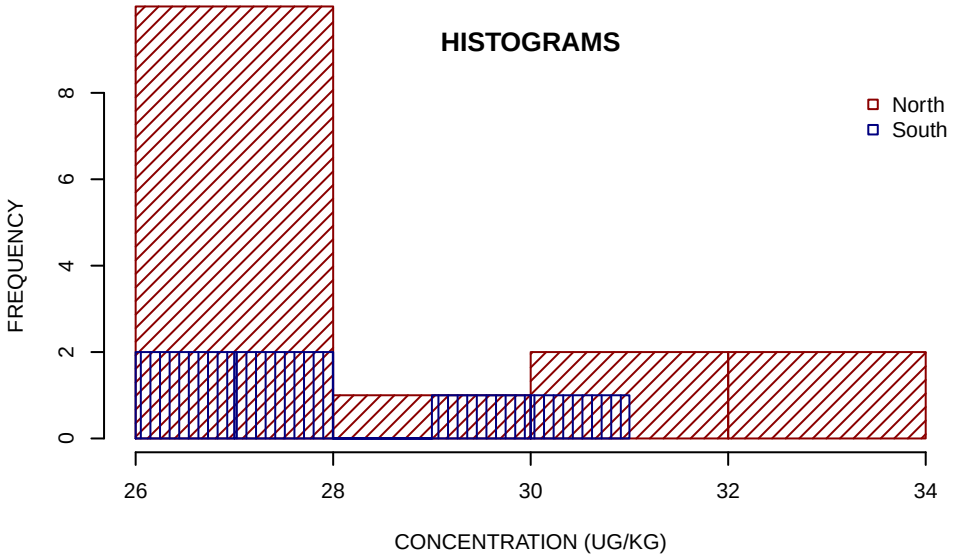


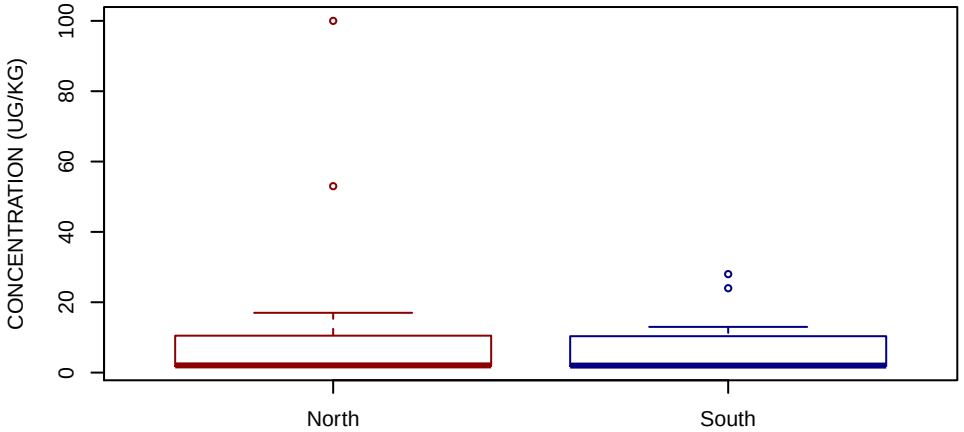
SUMMARY STATISTICS

	North	South
MINIMUM	26	26
25TH PERCENTILE	27	27
MEDIAN	28	28
MEAN	29	28
75TH PERCENTILE	29	30
MAXIMUM	34	30

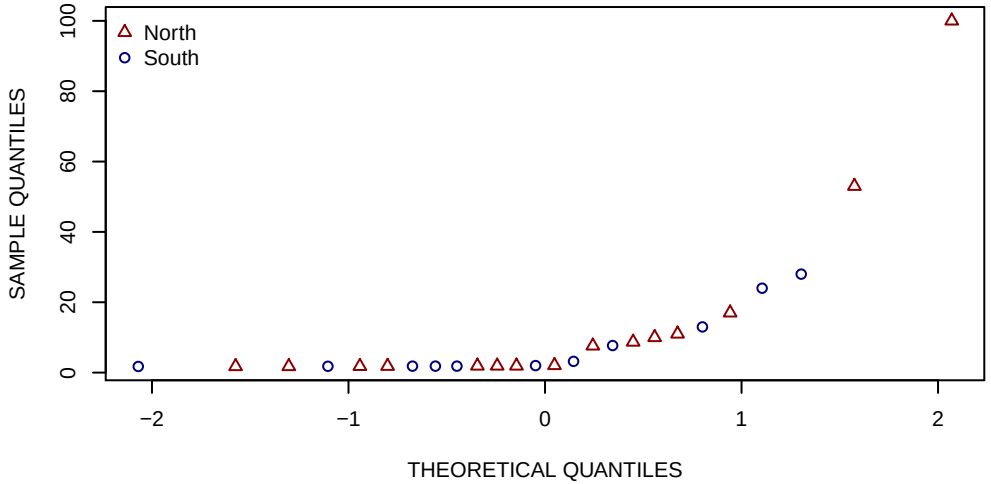
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

4,4'−DDD SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 19 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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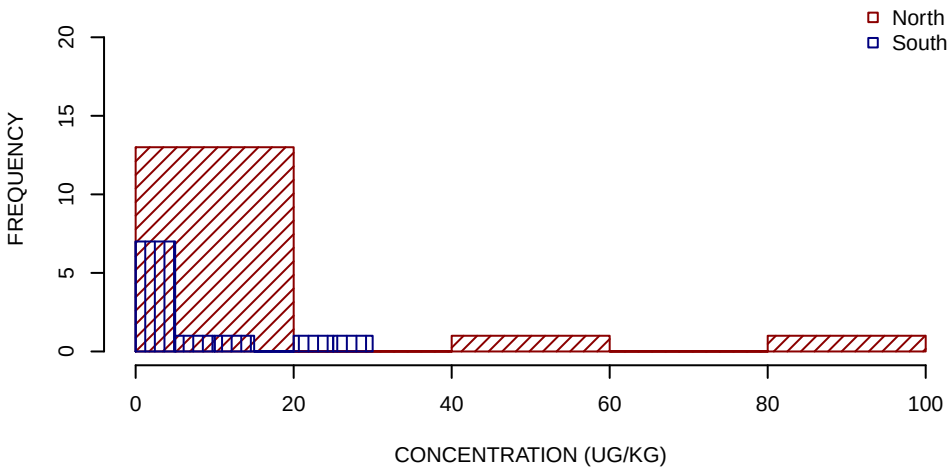


SUMMARY STATISTICS

	North	South
MINIMUM	1.8	1.8
25TH PERCENTILE	1.9	1.8
MEDIAN	2	2
MEAN	15	7.9
75TH PERCENTILE	10	10
MAXIMUM	100	28

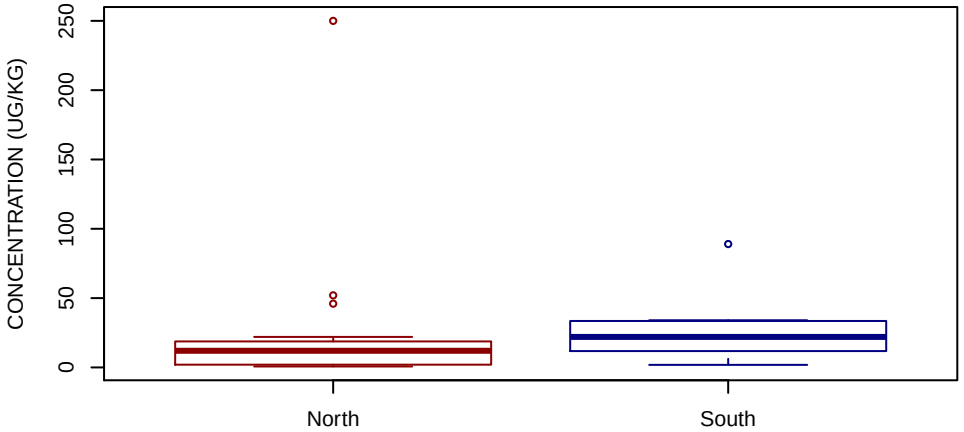
UNITS ARE UG/KG

1/2 DETECTION LIMIT USED FOR NON−DETECTS

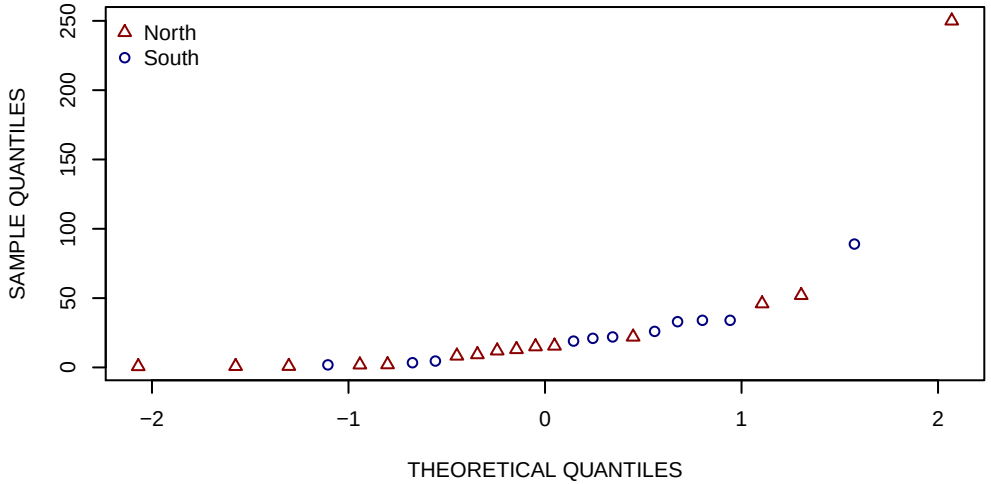
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

4,4'−DDE SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 20 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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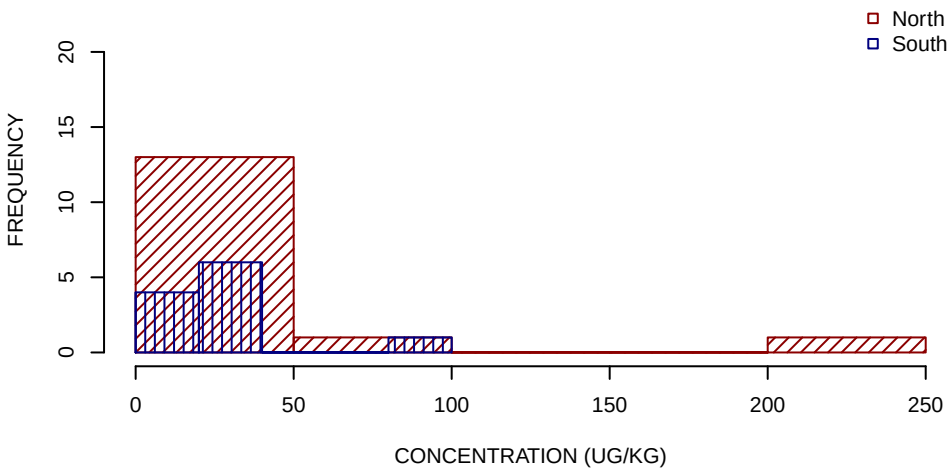


SUMMARY STATISTICS

	North	South
MINIMUM	0.7	1.8
25TH PERCENTILE	2	12
MEDIAN	12	22
MEAN	30	26
75TH PERCENTILE	19	34
MAXIMUM	250	89

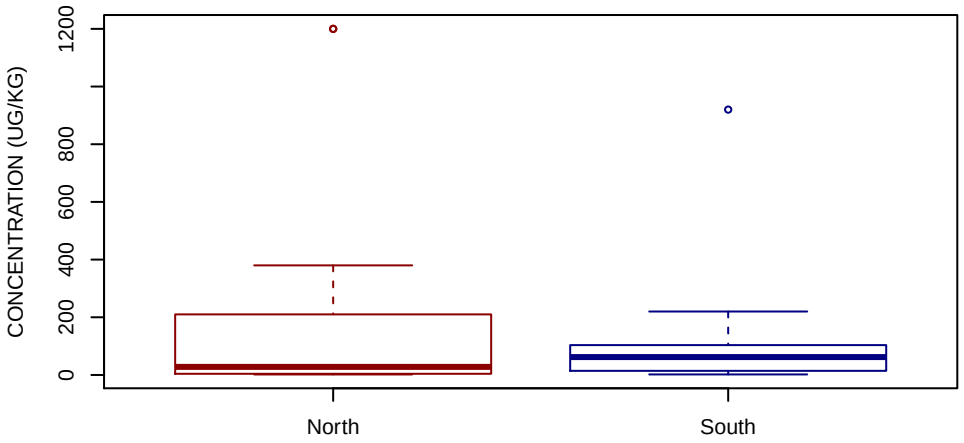
UNITS ARE UG/KG

1/2 DETECTION LIMIT USED FOR NON−DETECTS

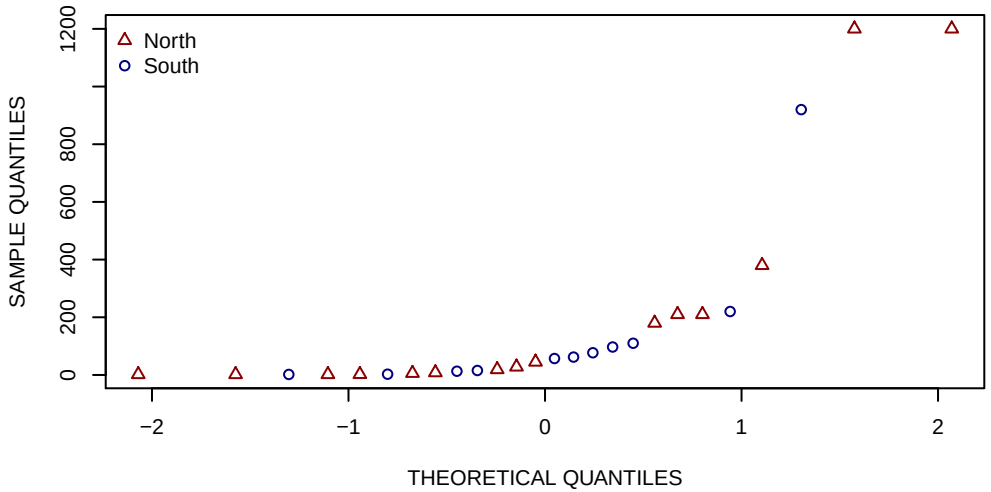
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

4,4'−DDT SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 21 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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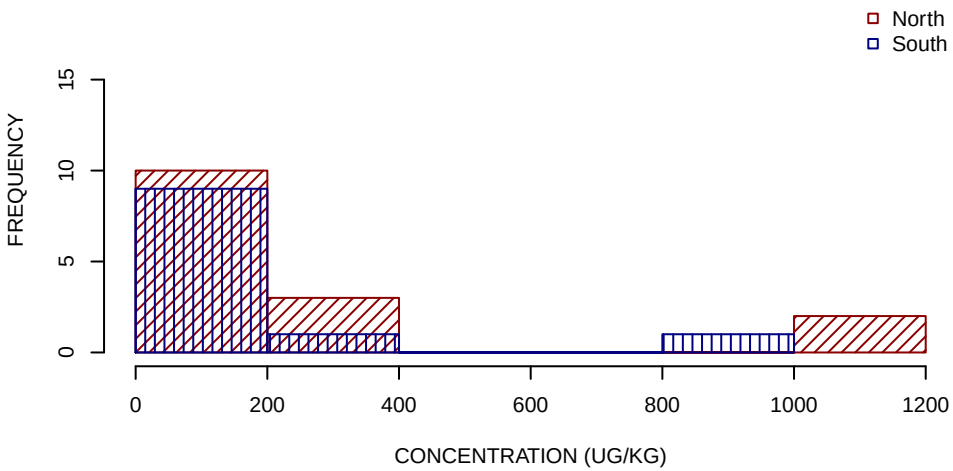


SUMMARY STATISTICS

	North	South
MINIMUM	1.8	1.8
25TH PERCENTILE	4	14
MEDIAN	28	62
MEAN	230	140
75TH PERCENTILE	210	100
MAXIMUM	1200	920

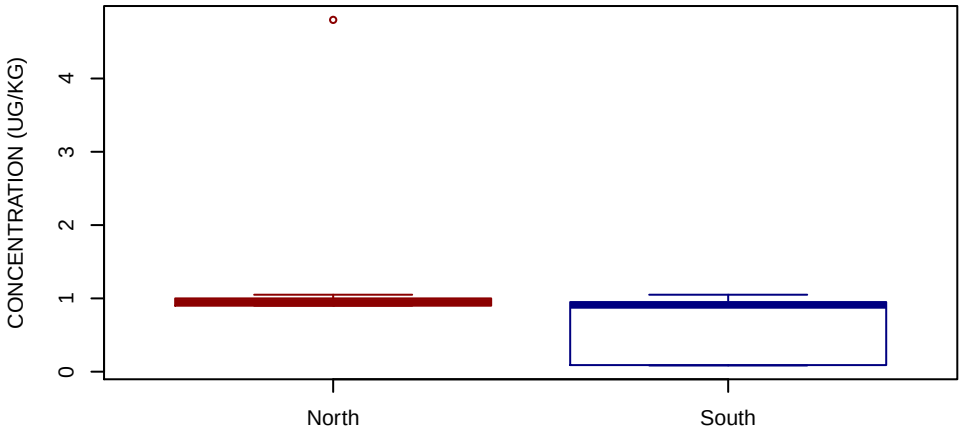
UNITS ARE UG/KG

1/2 DETECTION LIMIT USED FOR NON−DETECTS

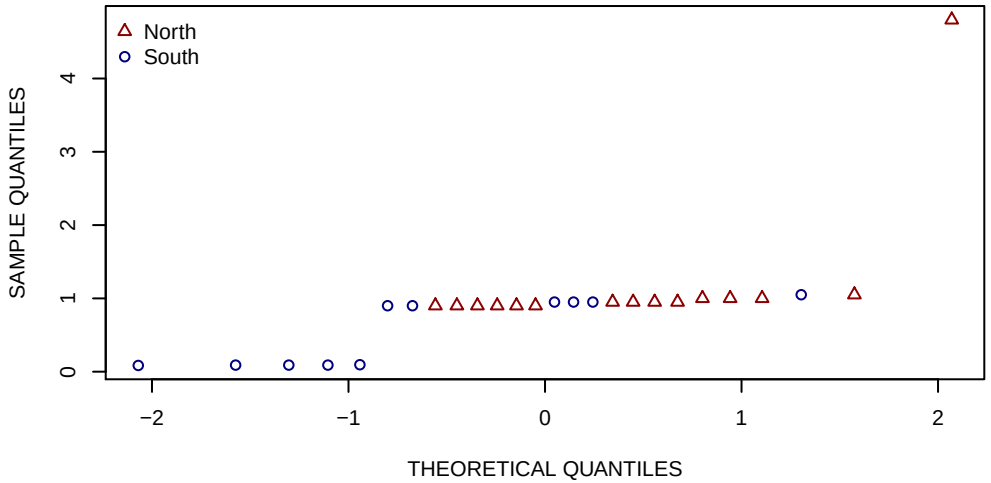
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ALDRIN SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 22 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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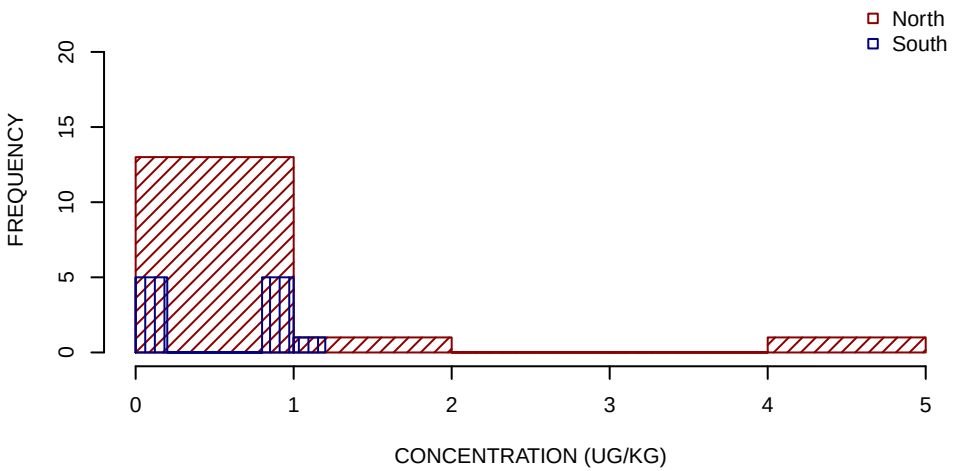


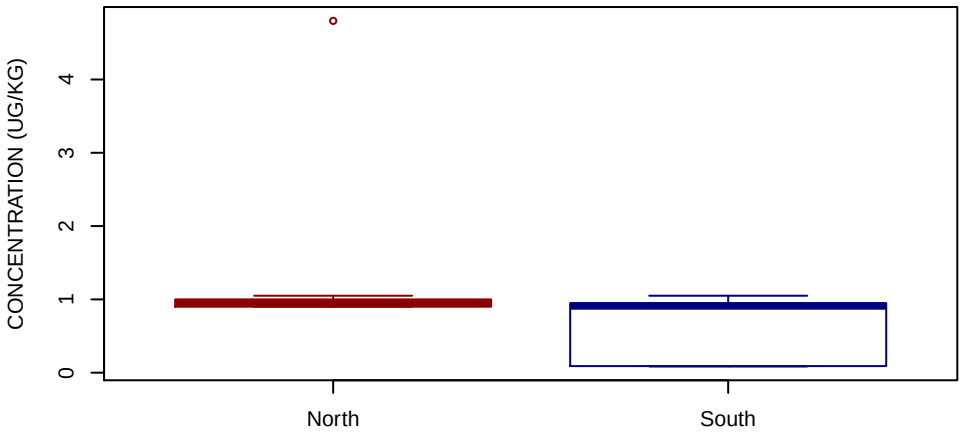
SUMMARY STATISTICS

	North	South
MINIMUM	0.9	0.085
25TH PERCENTILE	0.9	0.09
MEDIAN	0.95	0.9
MEAN	1.2	0.56
75TH PERCENTILE	1	0.95
MAXIMUM	4.8	1

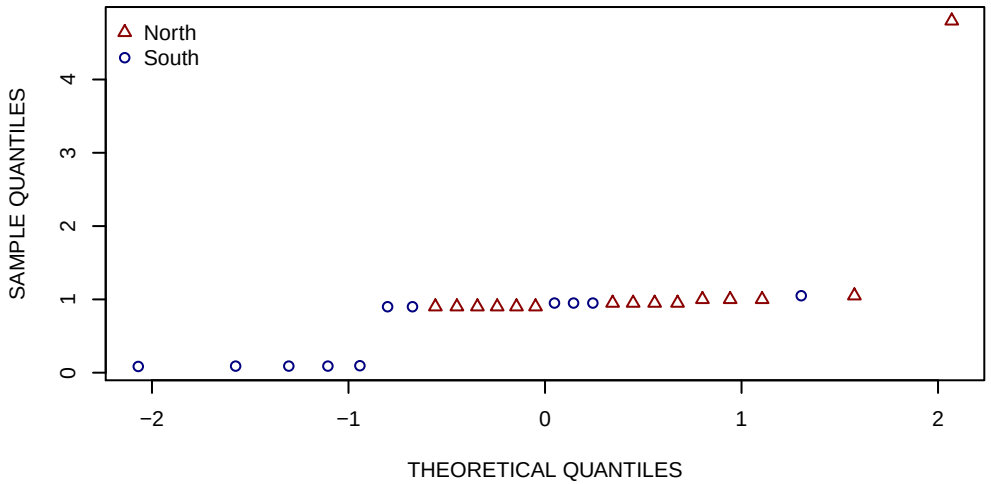
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ALPHA−BHC SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 23 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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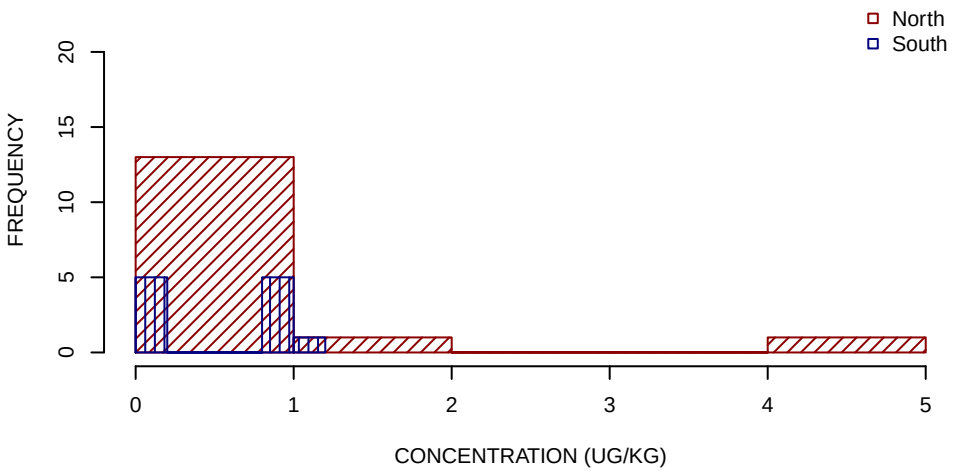


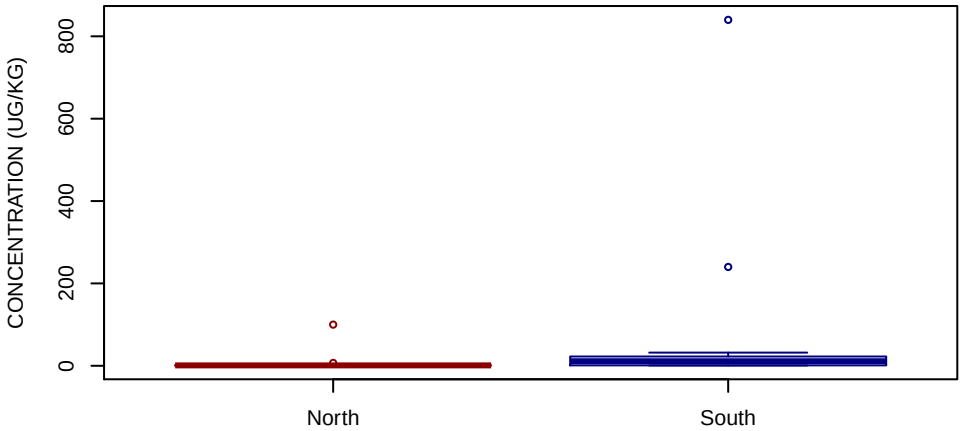
SUMMARY STATISTICS

	North	South
MINIMUM	0.9	0.085
25TH PERCENTILE	0.9	0.09
MEDIAN	0.95	0.9
MEAN	1.2	0.56
75TH PERCENTILE	1	0.95
MAXIMUM	4.8	1

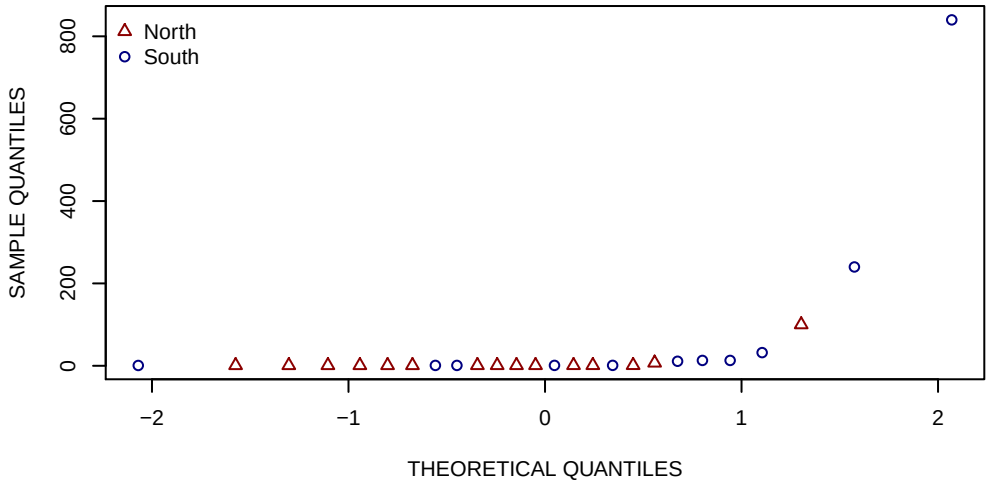
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ALPHA−CHLORDANE SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 24 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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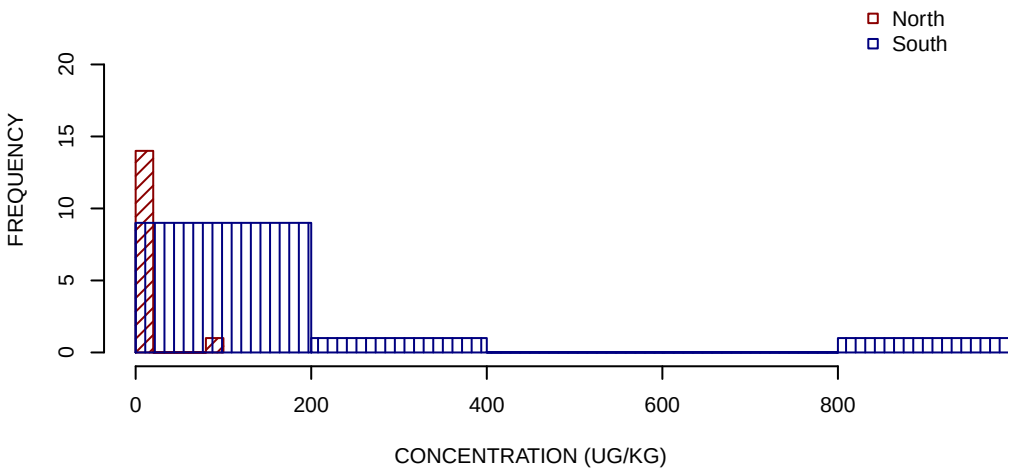


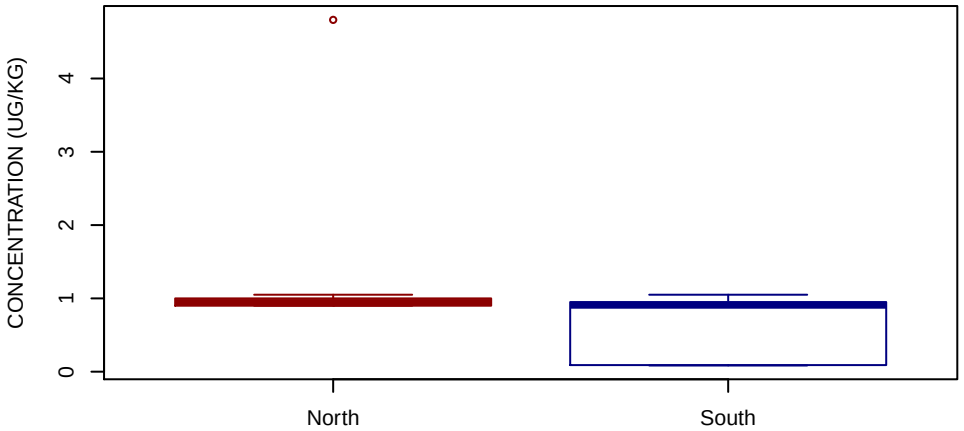
SUMMARY STATISTICS

	North	South
MINIMUM	0.9	0.8
25TH PERCENTILE	0.9	0.97
MEDIAN	0.95	11
MEAN	8	100
75TH PERCENTILE	1	22
MAXIMUM	100	840

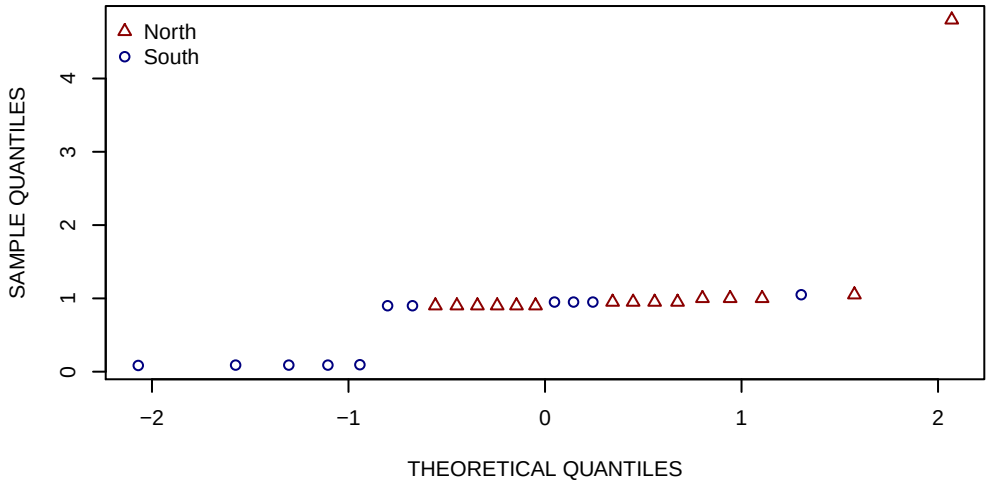
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

BETA−BHC SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 25 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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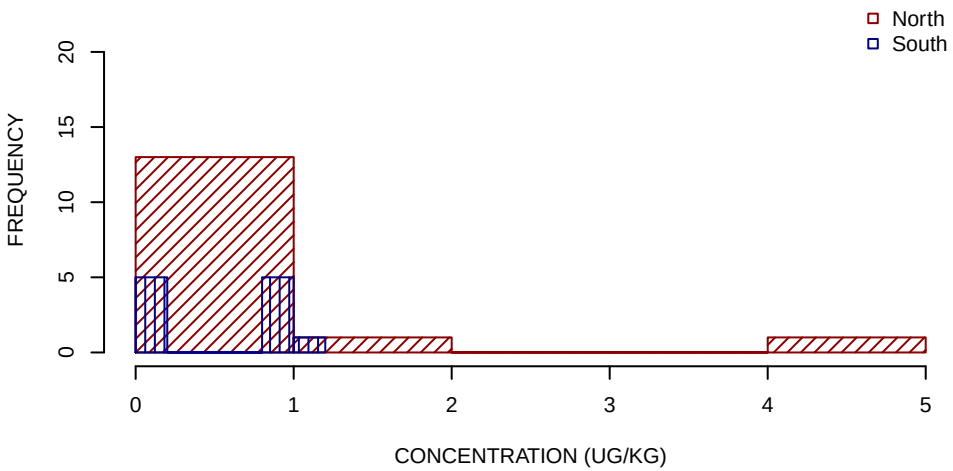


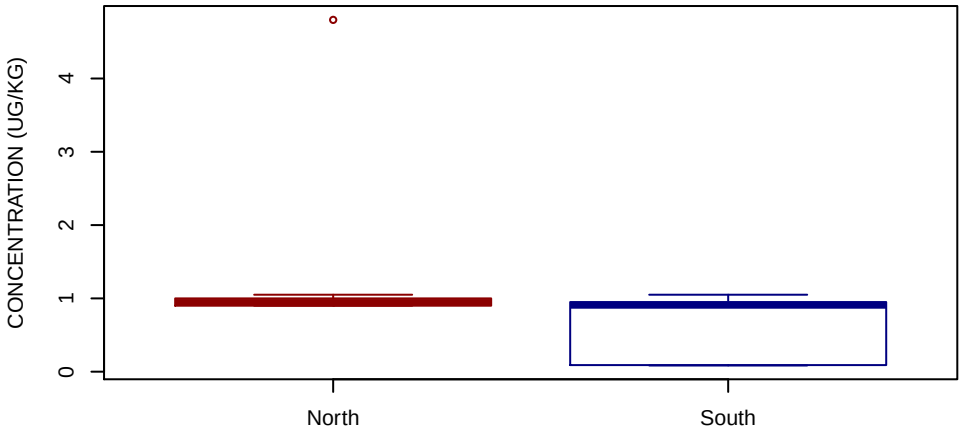
SUMMARY STATISTICS

	North	South
MINIMUM	0.9	0.085
25TH PERCENTILE	0.9	0.09
MEDIAN	0.95	0.9
MEAN	1.2	0.56
75TH PERCENTILE	1	0.95
MAXIMUM	4.8	1

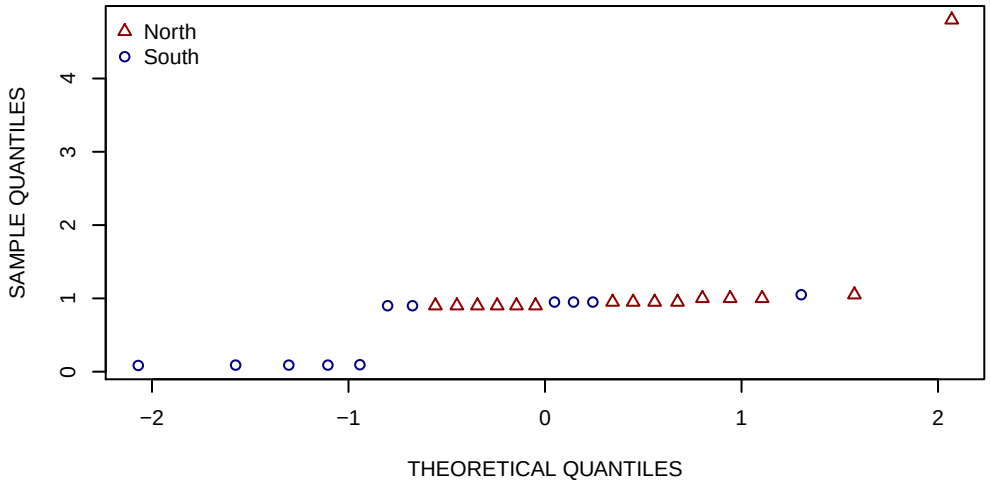
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

DELTA−BHC SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 26 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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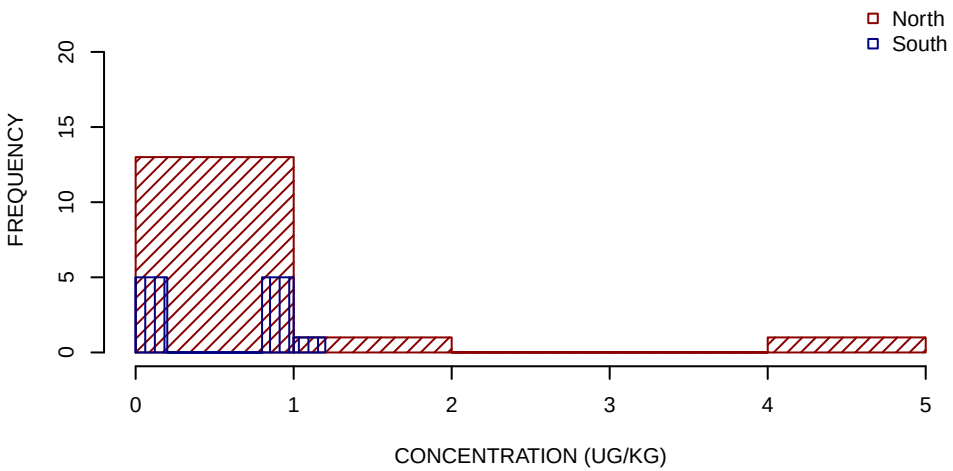


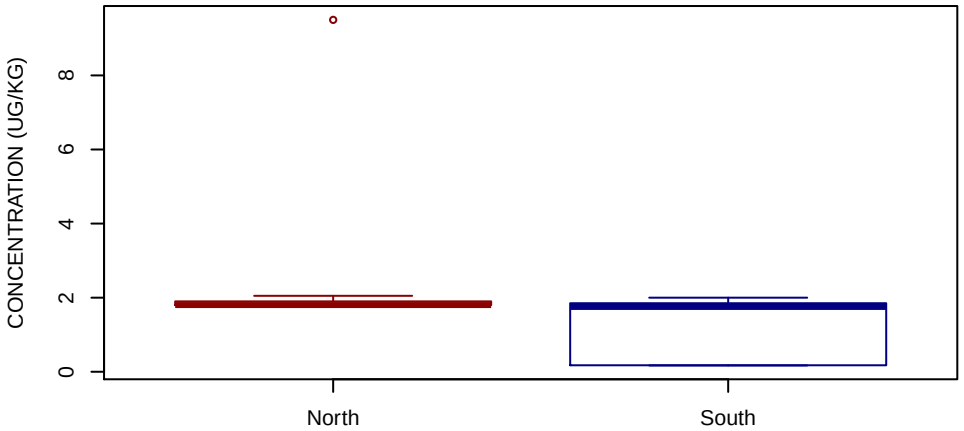
SUMMARY STATISTICS

	North	South
MINIMUM	0.9	0.085
25TH PERCENTILE	0.9	0.09
MEDIAN	0.95	0.9
MEAN	1.2	0.56
75TH PERCENTILE	1	0.95
MAXIMUM	4.8	1

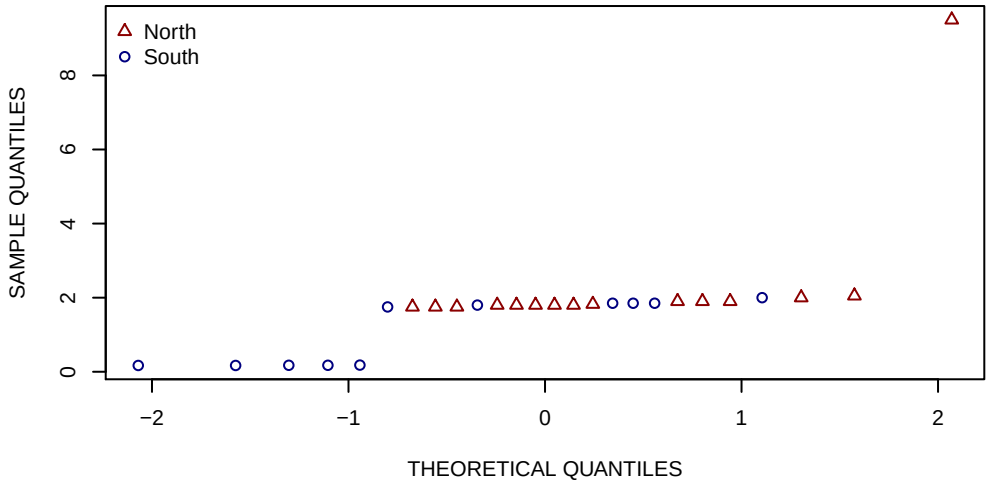
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

DIELDRIN SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 27 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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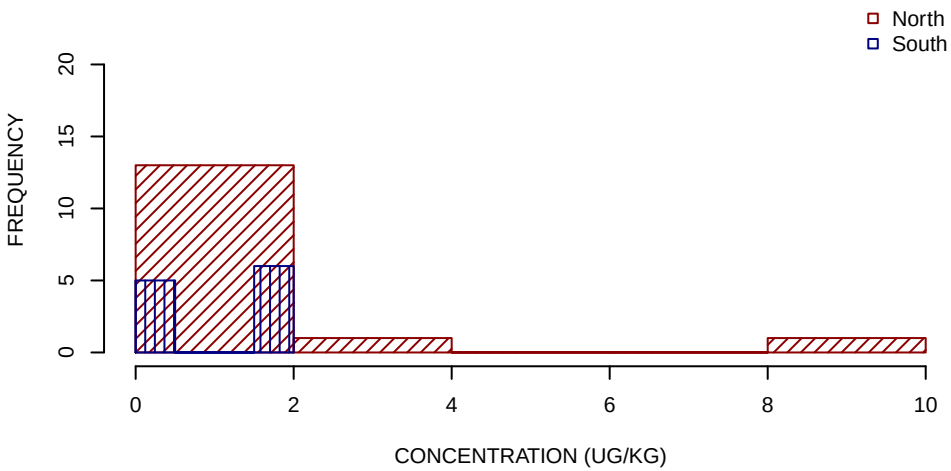


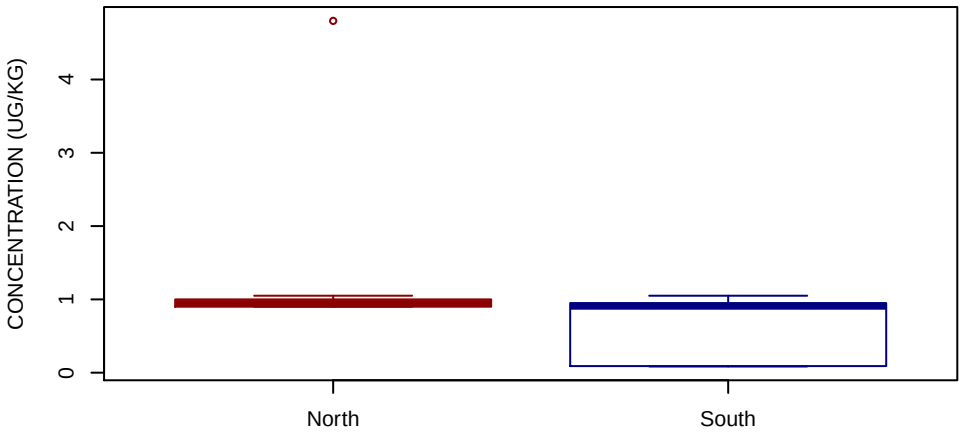
SUMMARY STATISTICS

	North	South
MINIMUM	1.8	0.17
25TH PERCENTILE	1.8	0.18
MEDIAN	1.8	1.8
MEAN	2.4	1.1
75TH PERCENTILE	1.9	1.8
MAXIMUM	9.5	2

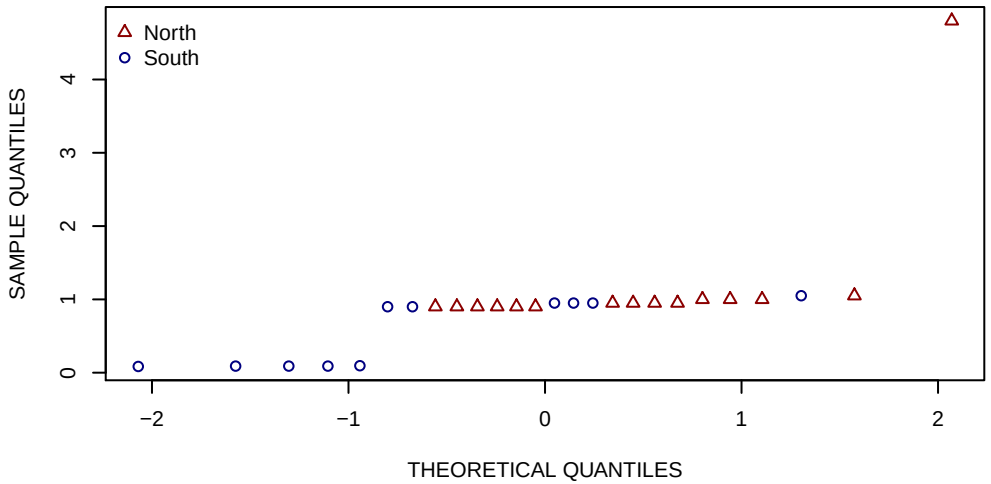
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ENDOSULFAN I SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 28 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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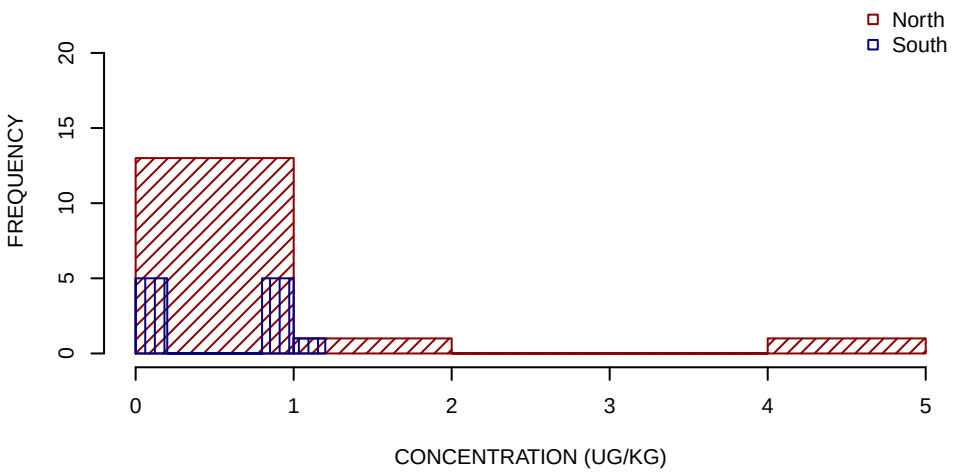


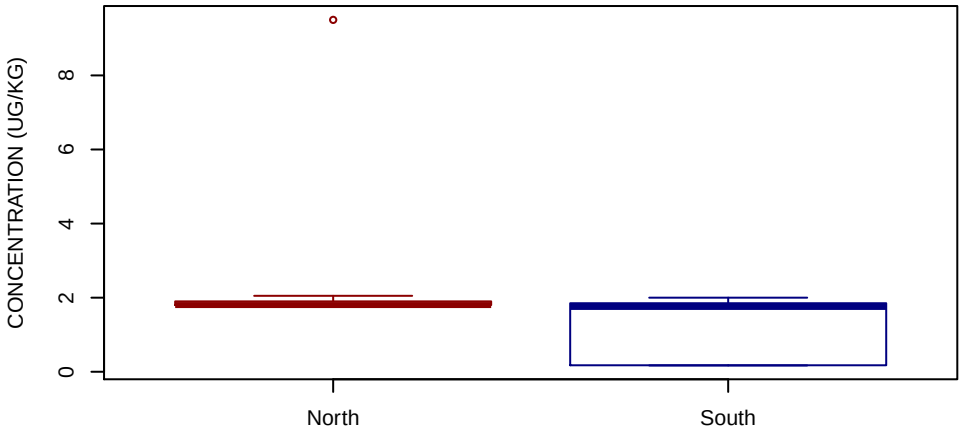
SUMMARY STATISTICS

	North	South
MINIMUM	0.9	0.085
25TH PERCENTILE	0.9	0.09
MEDIAN	0.95	0.9
MEAN	1.2	0.56
75TH PERCENTILE	1	0.95
MAXIMUM	4.8	1

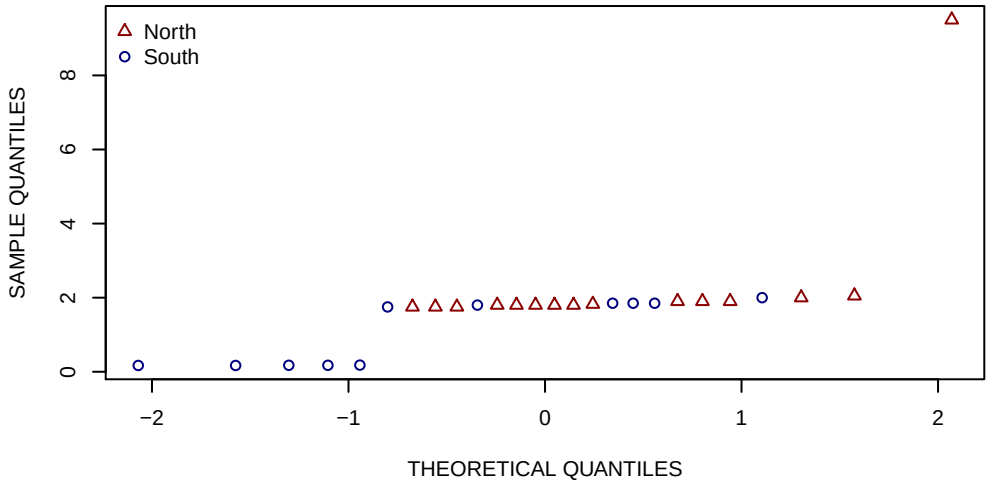
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ENDOSULFAN II SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 29 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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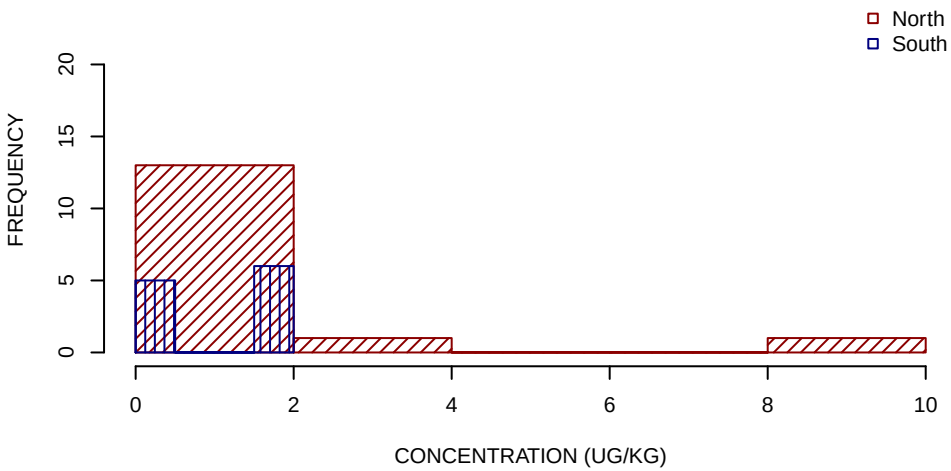


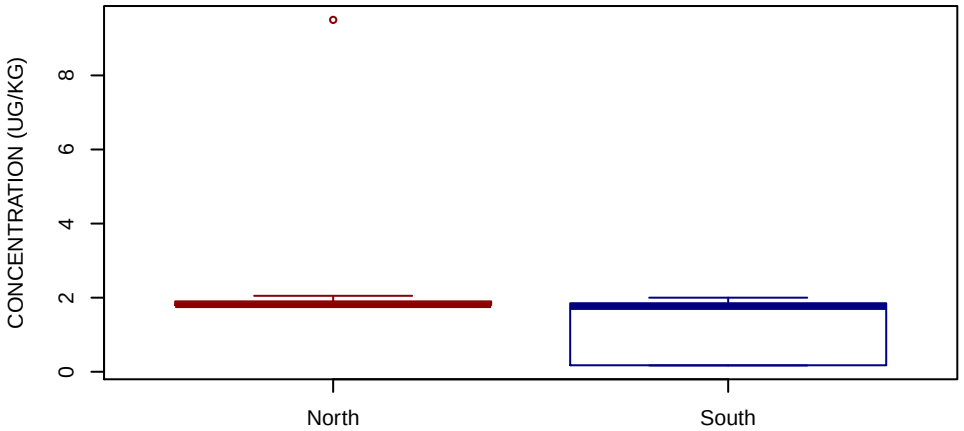
SUMMARY STATISTICS

	North	South
MINIMUM	1.8	0.17
25TH PERCENTILE	1.8	0.18
MEDIAN	1.8	1.8
MEAN	2.4	1.1
75TH PERCENTILE	1.9	1.8
MAXIMUM	9.5	2

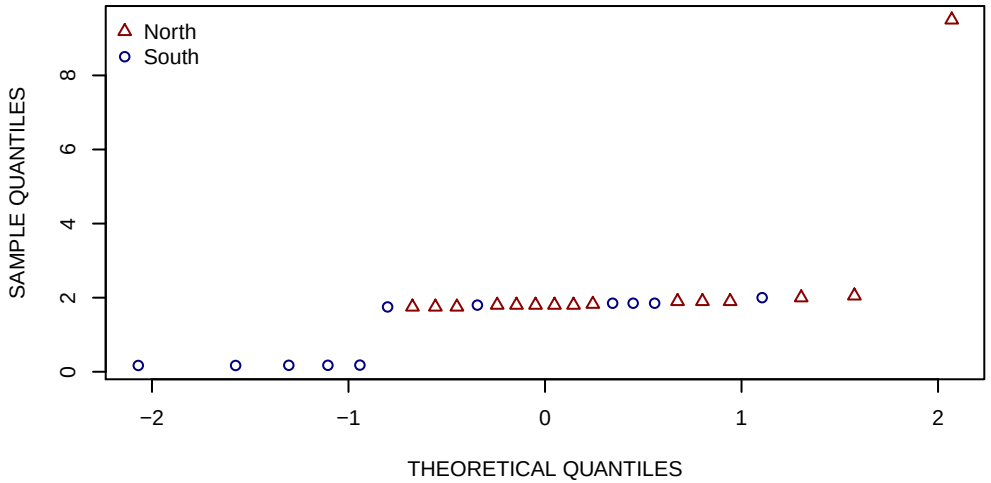
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ENDOSULFAN SULFATE SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 30 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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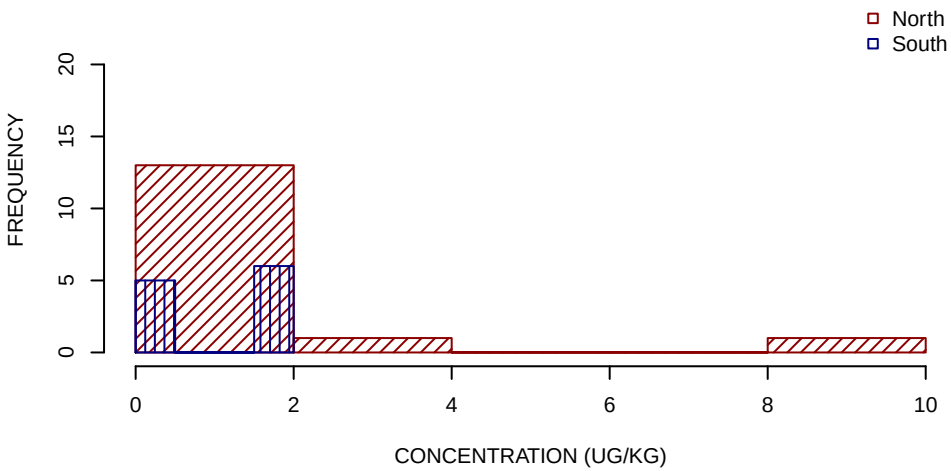


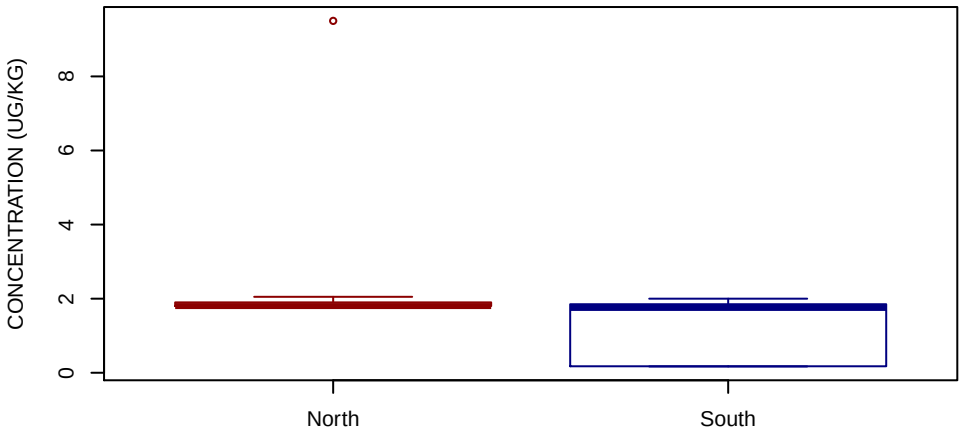
SUMMARY STATISTICS

	North	South
MINIMUM	1.8	0.17
25TH PERCENTILE	1.8	0.18
MEDIAN	1.8	1.8
MEAN	2.4	1.1
75TH PERCENTILE	1.9	1.8
MAXIMUM	9.5	2

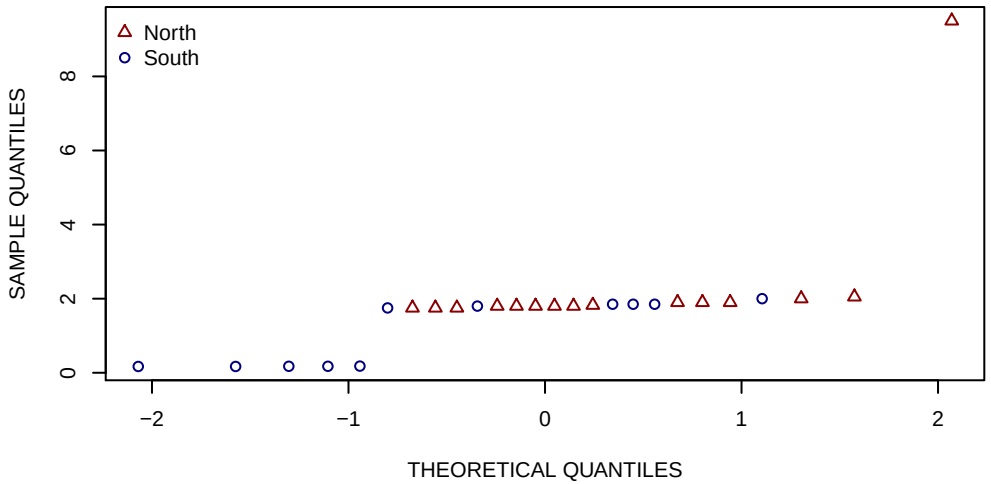
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ENDRIN SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 31 OF 41

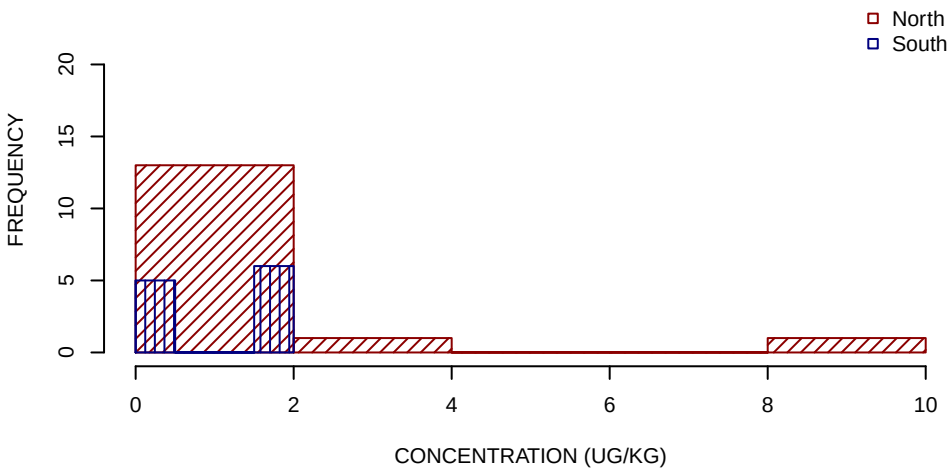
BOXPLOTS



NORMAL Q−Q PLOT



HISTOGRAMS



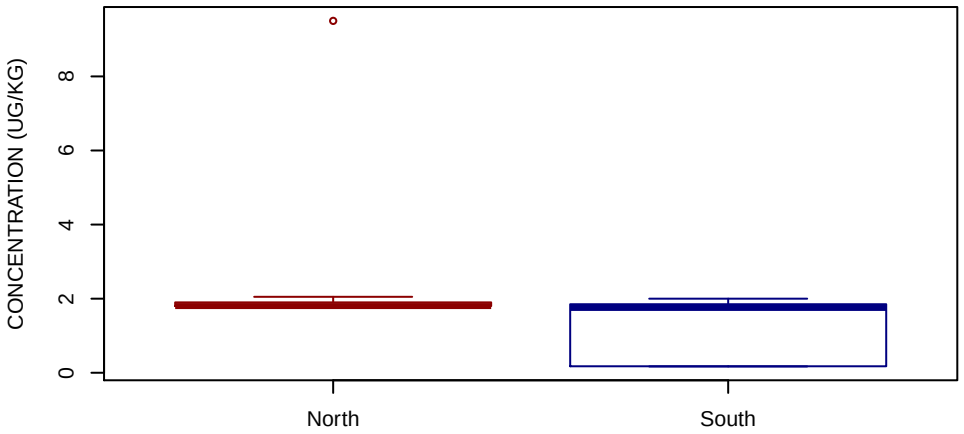
SUMMARY STATISTICS

	North	South
MINIMUM	1.8	0.17
25TH PERCENTILE	1.8	0.18
MEDIAN	1.8	1.8
MEAN	2.4	1.1
75TH PERCENTILE	1.9	1.8
MAXIMUM	9.5	2

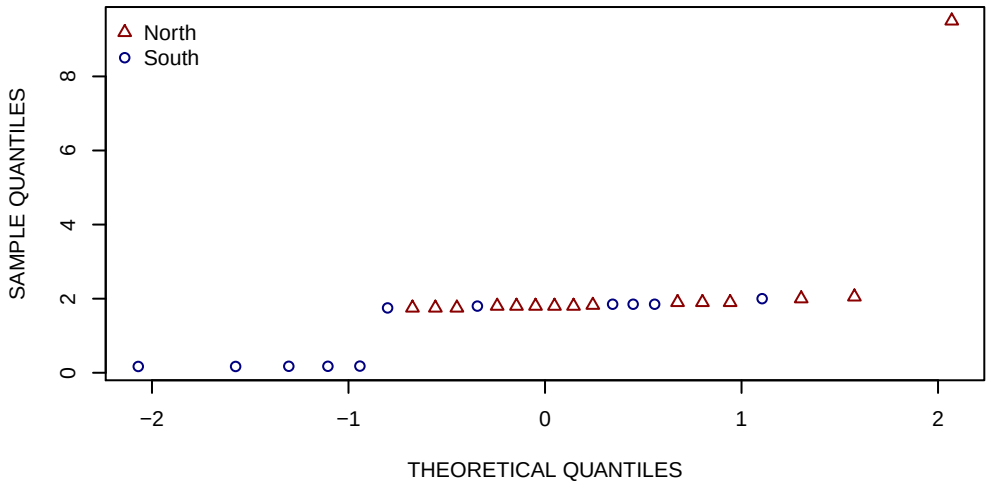
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ENDRIN ALDEHYDE SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 32 OF 41

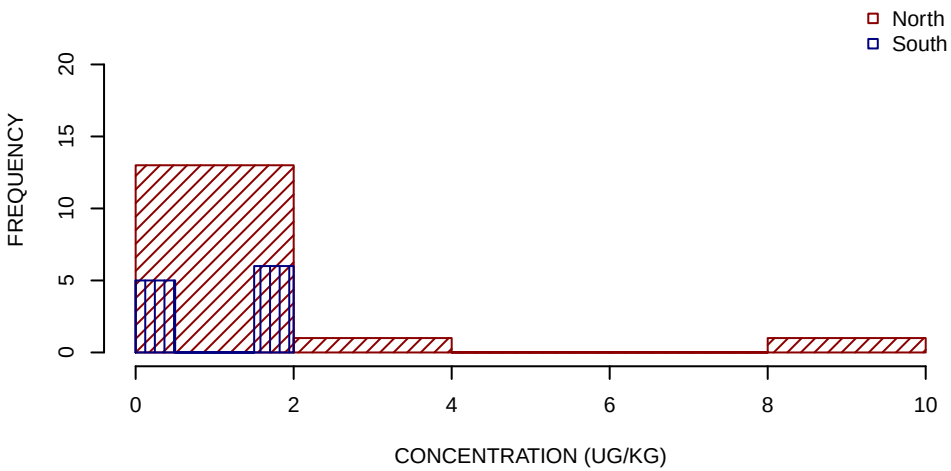
BOXPLOTS



NORMAL Q−Q PLOT



HISTOGRAMS



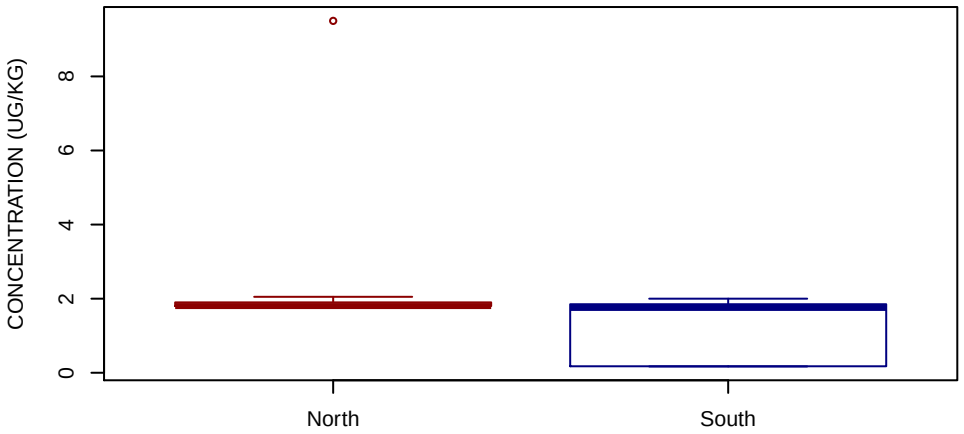
SUMMARY STATISTICS

	North	South
MINIMUM	1.8	0.17
25TH PERCENTILE	1.8	0.18
MEDIAN	1.8	1.8
MEAN	2.4	1.1
75TH PERCENTILE	1.9	1.8
MAXIMUM	9.5	2

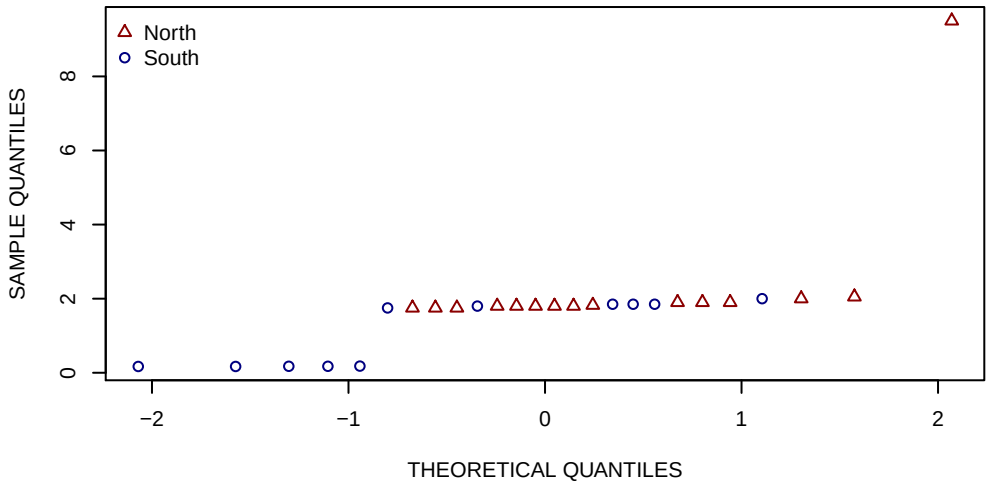
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ENDRIN KETONE SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 33 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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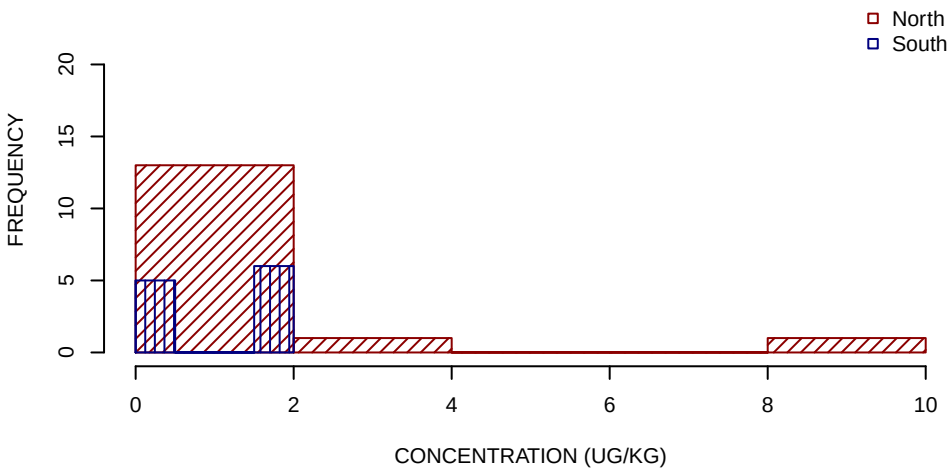


SUMMARY STATISTICS

	North	South
MINIMUM	1.8	0.17
25TH PERCENTILE	1.8	0.18
MEDIAN	1.8	1.8
MEAN	2.4	1.1
75TH PERCENTILE	1.9	1.8
MAXIMUM	9.5	2

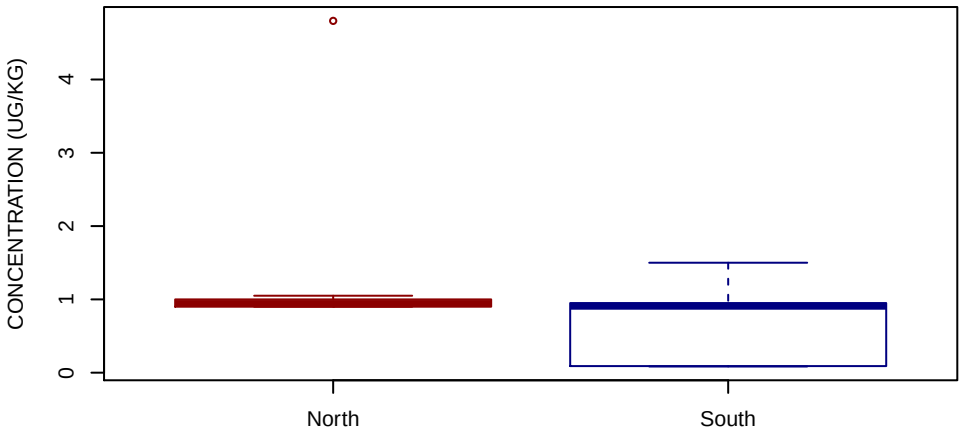
UNITS ARE UG/KG

1/2 DETECTION LIMIT USED FOR NON−DETECTS

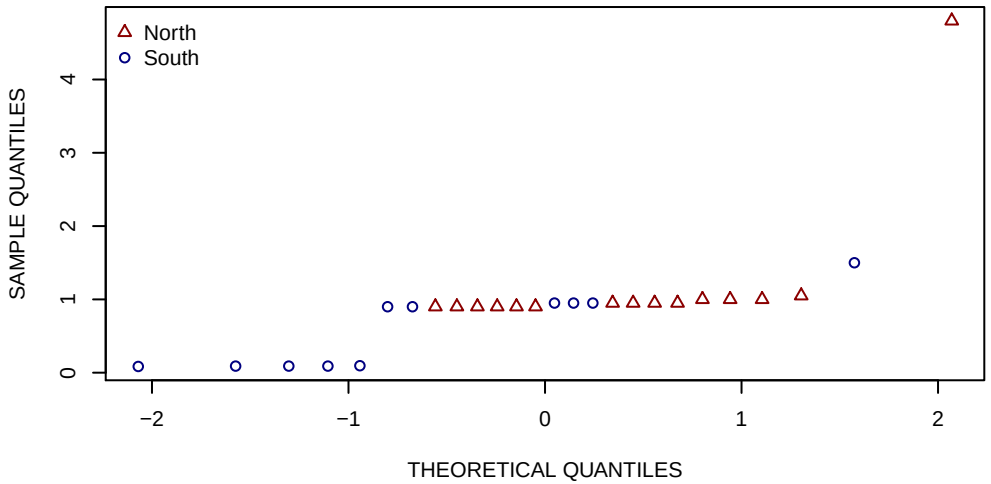
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

GAMMA−BHC (LINDANE) SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 34 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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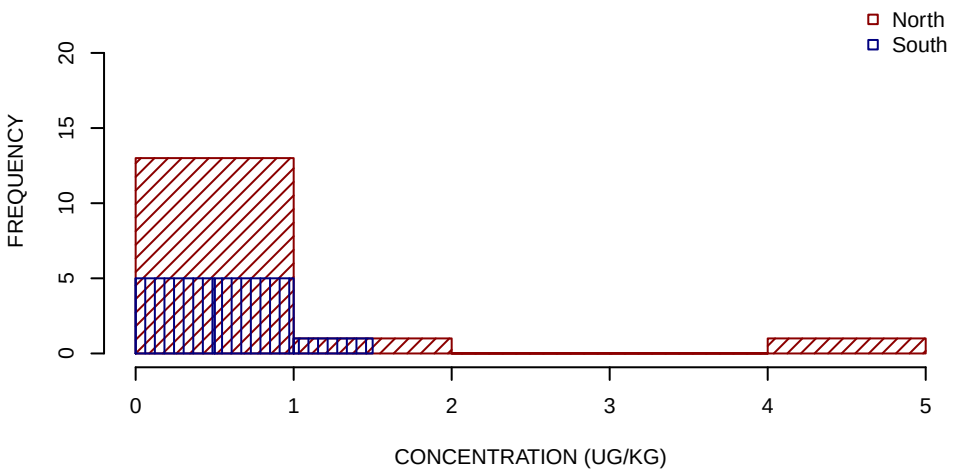


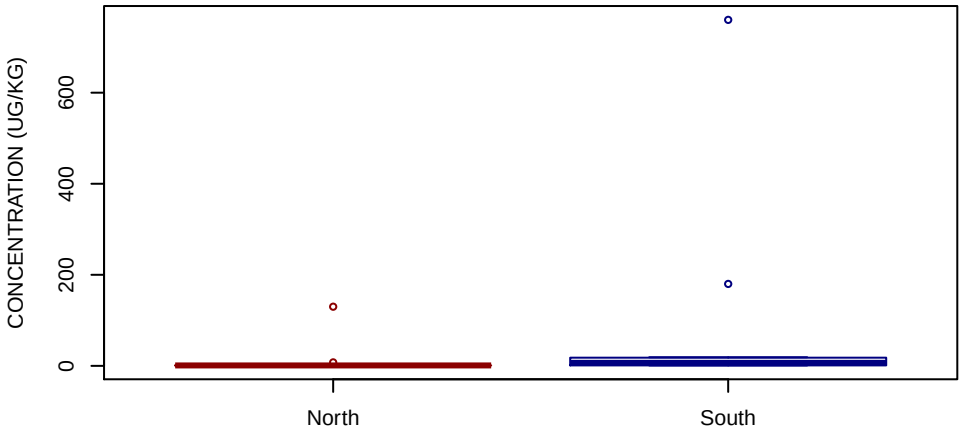
SUMMARY STATISTICS

	North	South
MINIMUM	0.9	0.085
25TH PERCENTILE	0.9	0.09
MEDIAN	0.95	0.9
MEAN	1.2	0.6
75TH PERCENTILE	1	0.95
MAXIMUM	4.8	1.5

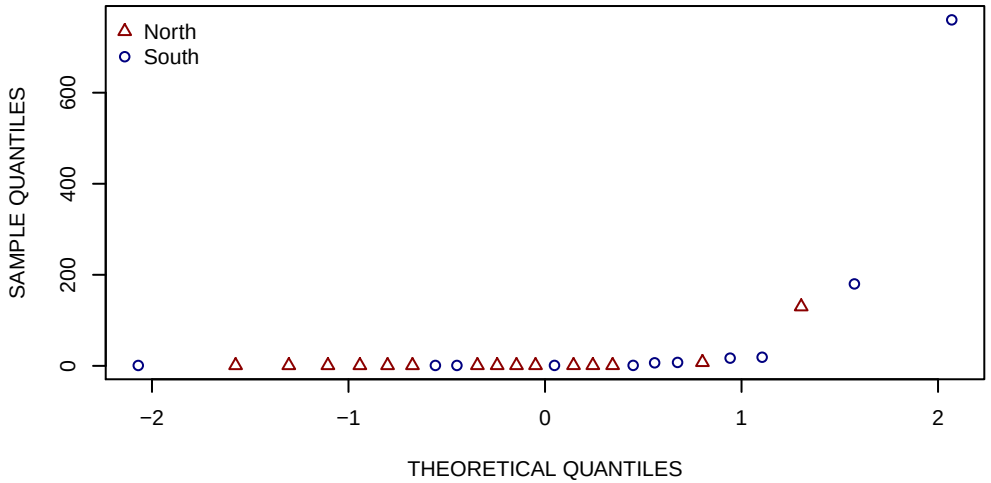
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

GAMMA−CHLORDANE SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 35 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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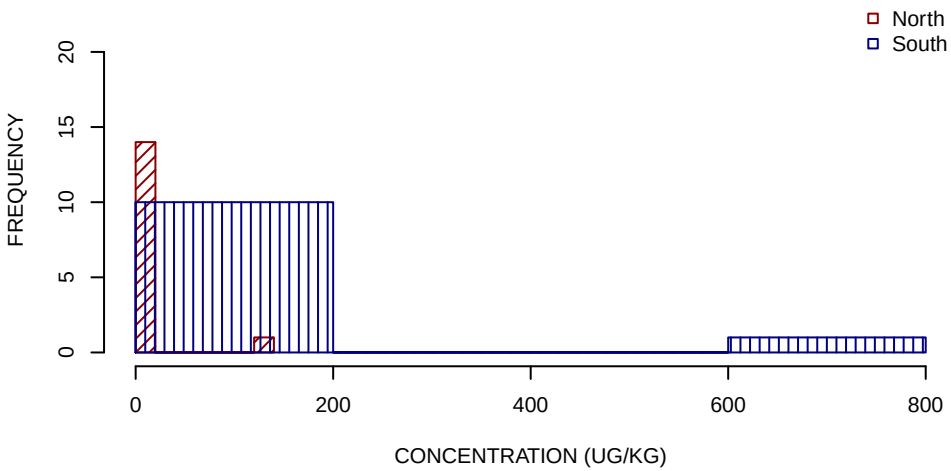


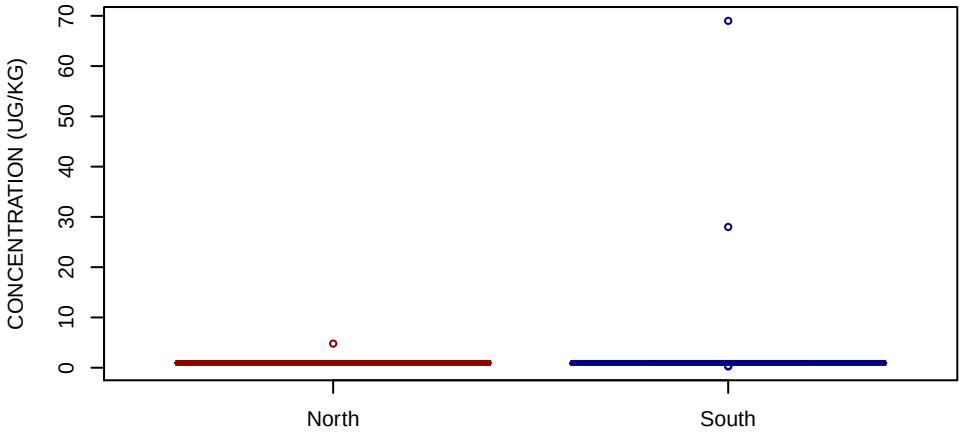
SUMMARY STATISTICS

	North	South
MINIMUM	0.9	0.9
25TH PERCENTILE	0.9	0.98
MEDIAN	0.95	6.7
MEAN	10	90
75TH PERCENTILE	1	18
MAXIMUM	130	760

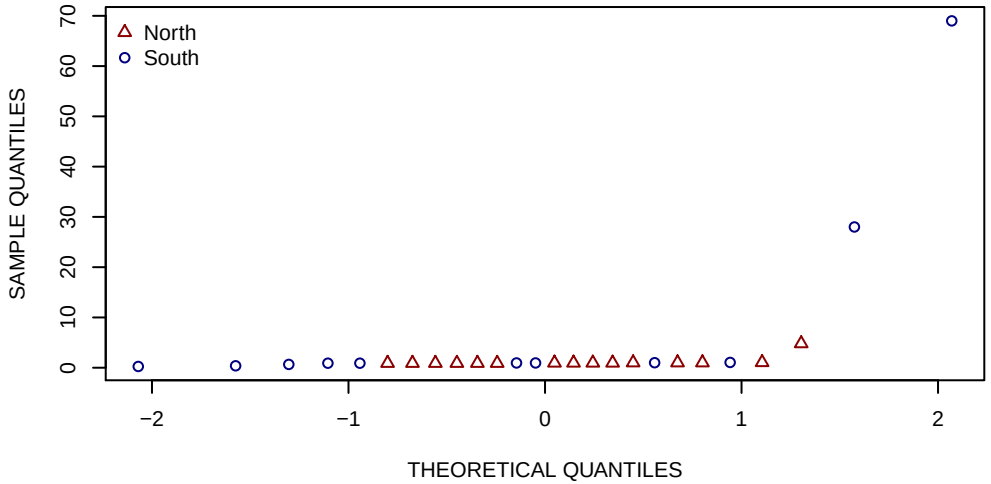
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

HEPTACHLOR SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 36 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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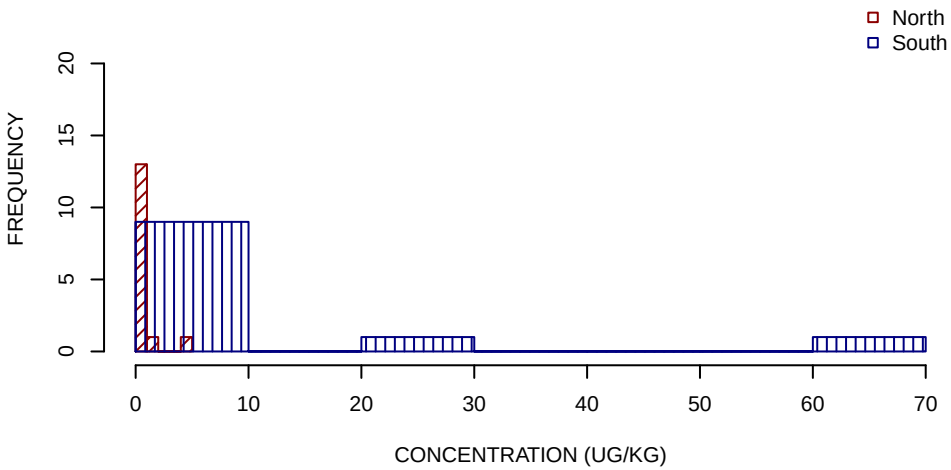


SUMMARY STATISTICS

	North	South
MINIMUM	0.9	0.25
25TH PERCENTILE	0.9	0.78
MEDIAN	0.95	0.95
MEAN	1.2	9.5
75TH PERCENTILE	1	1
MAXIMUM	4.8	69

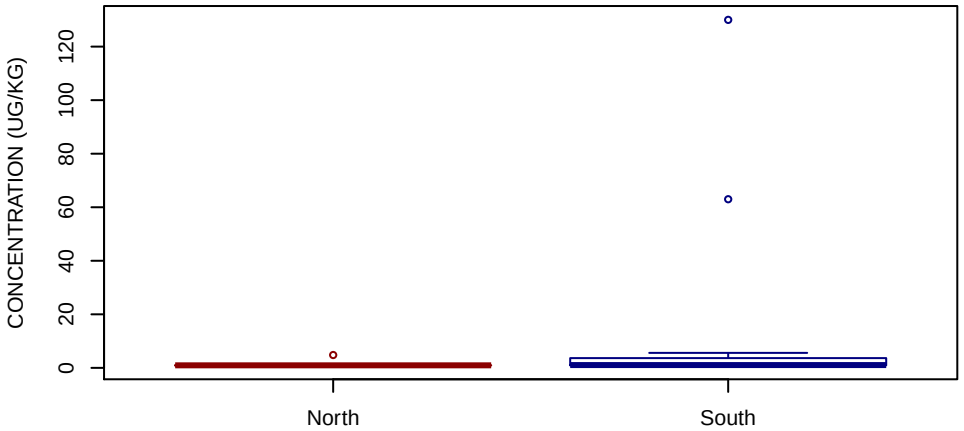
UNITS ARE UG/KG

1/2 DETECTION LIMIT USED FOR NON−DETECTS

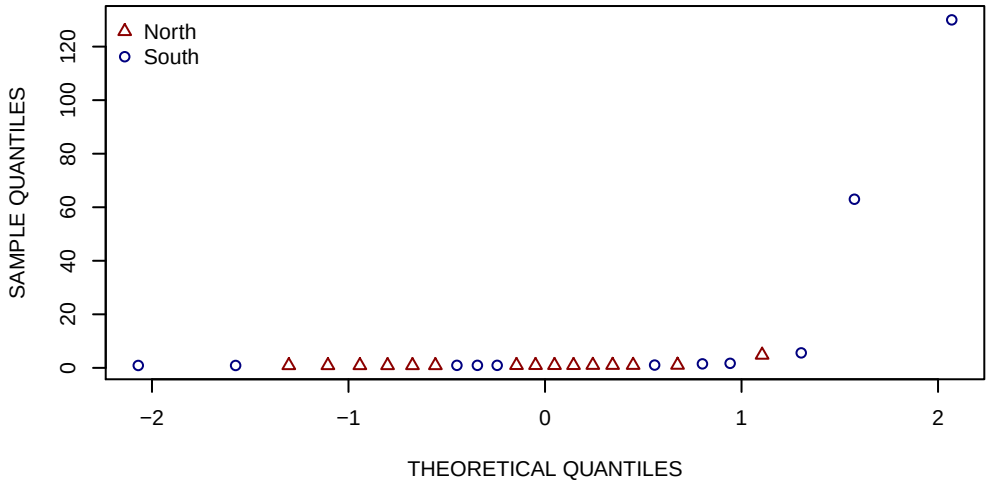
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

HEPTACHLOR EPOXIDE SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 37 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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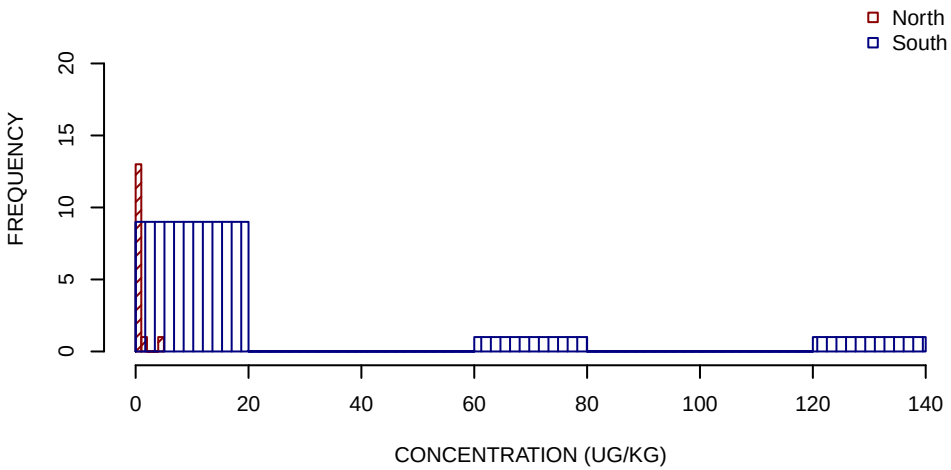


SUMMARY STATISTICS

	North	South
MINIMUM	0.9	0.9
25TH PERCENTILE	0.9	0.95
MEDIAN	0.95	1
MEAN	1.2	19
75TH PERCENTILE	1	3.6
MAXIMUM	4.8	130

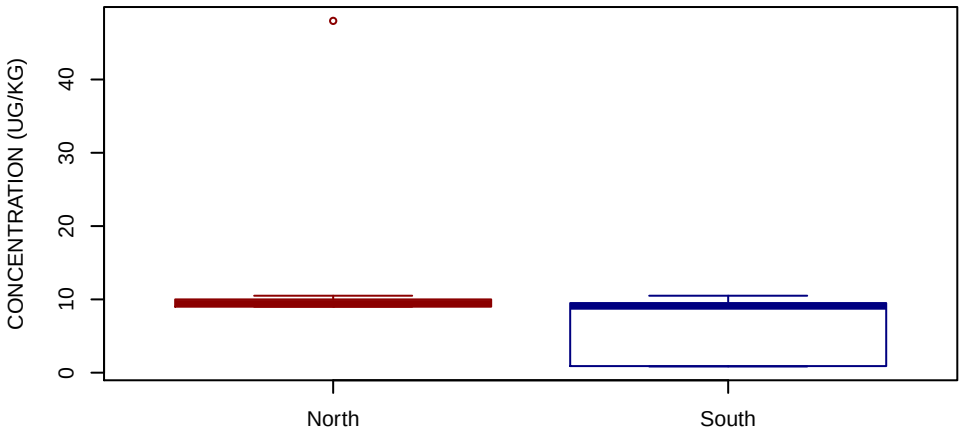
UNITS ARE UG/KG

1/2 DETECTION LIMIT USED FOR NON−DETECTS

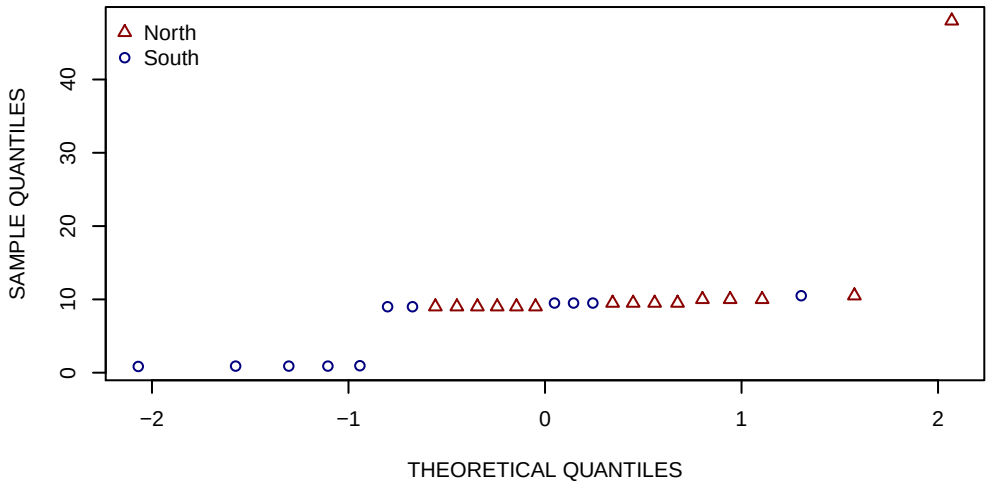
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

METHOXYCHLOR SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 38 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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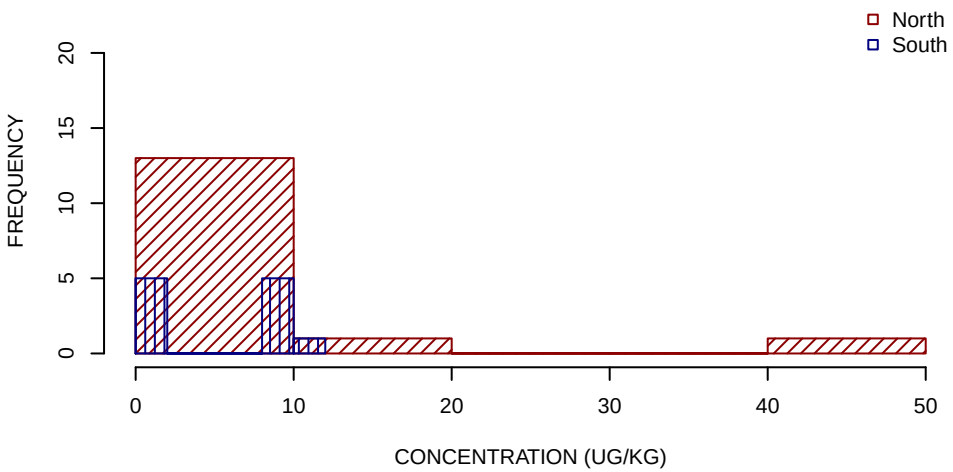


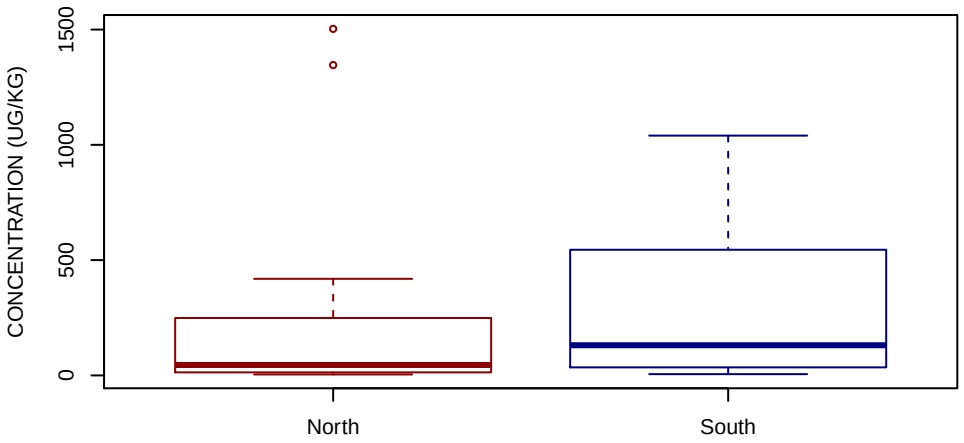
SUMMARY STATISTICS

	North	South
MINIMUM	9	0.85
25TH PERCENTILE	9	0.9
MEDIAN	9.5	9
MEAN	12	5.6
75TH PERCENTILE	10	9.5
MAXIMUM	48	10

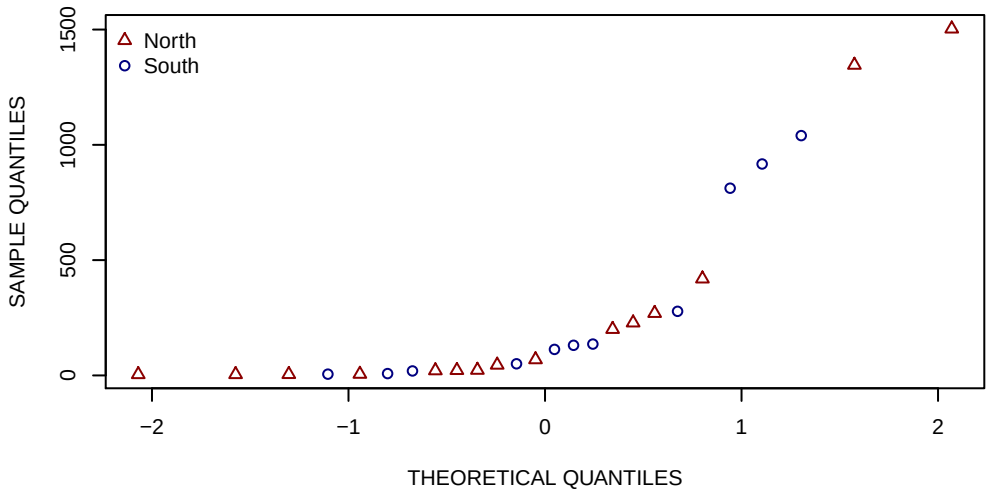
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

TOTAL DDT HALFND SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 39 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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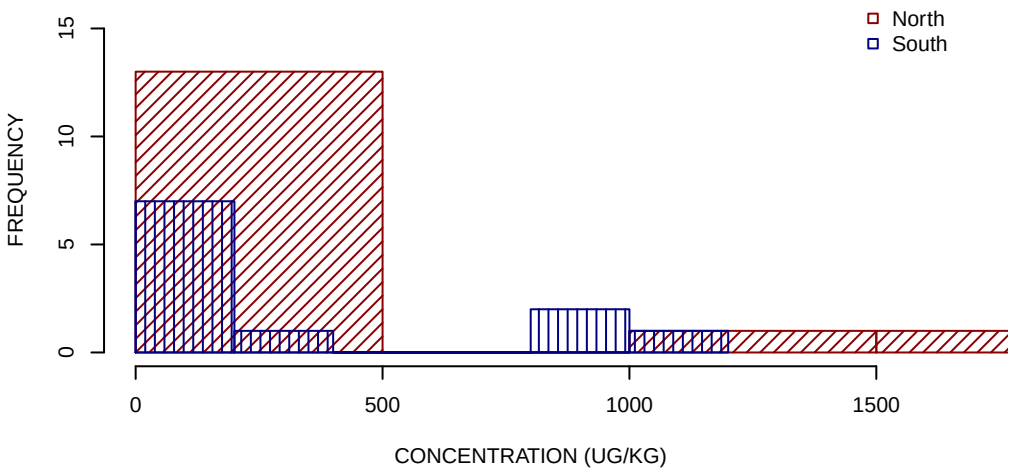


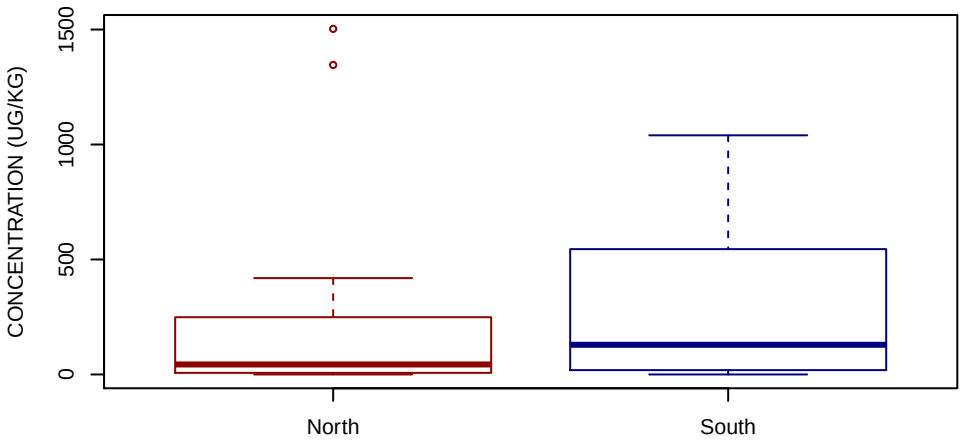
SUMMARY STATISTICS

	North	South
MINIMUM	4.2	5.6
25TH PERCENTILE	13	35
MEDIAN	45	130
MEAN	280	320
75TH PERCENTILE	250	540
MAXIMUM	1500	1000

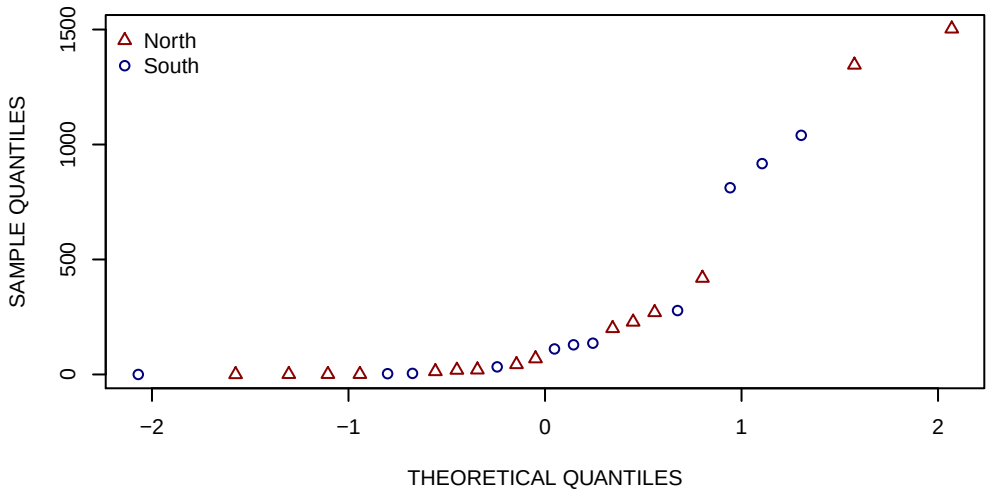
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

TOTAL DDT POS SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 40 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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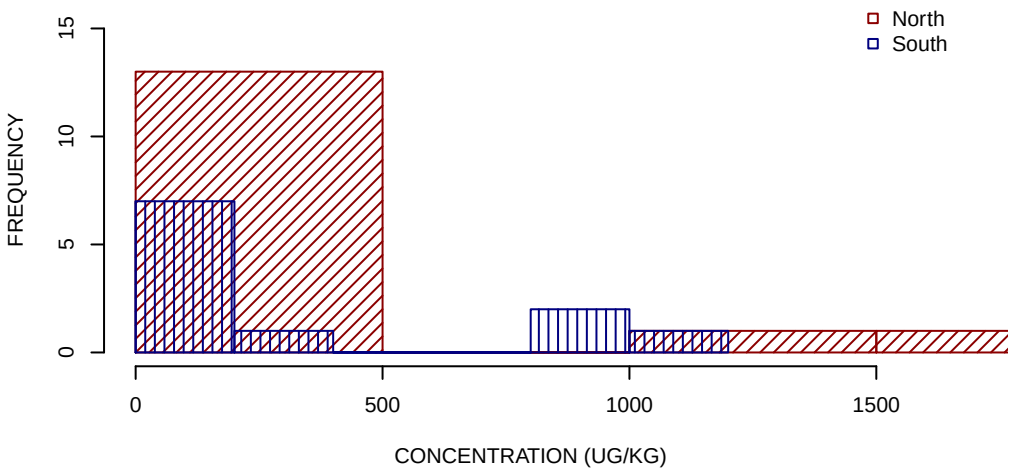


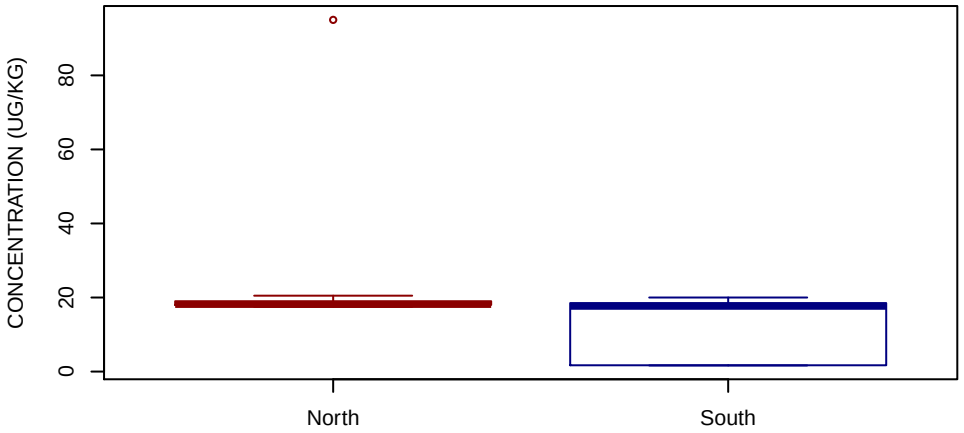
SUMMARY STATISTICS

	North	South
MINIMUM	0	0
25TH PERCENTILE	6.9	19
MEDIAN	44	130
MEAN	280	310
75TH PERCENTILE	250	540
MAXIMUM	1500	1000

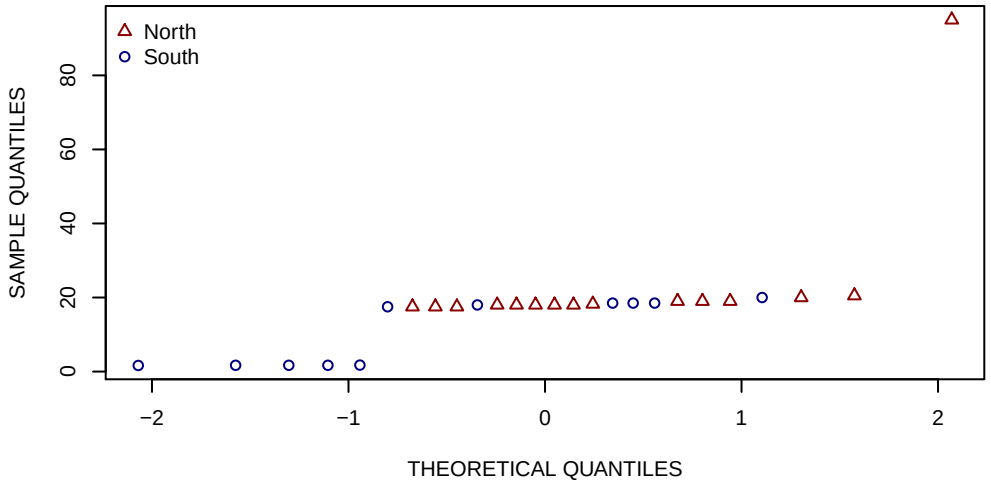
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

TOXAPHENE SURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 41 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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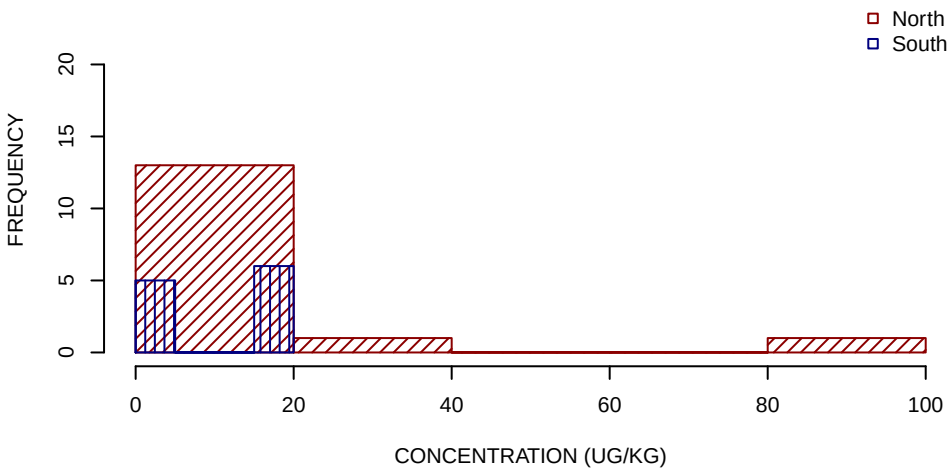


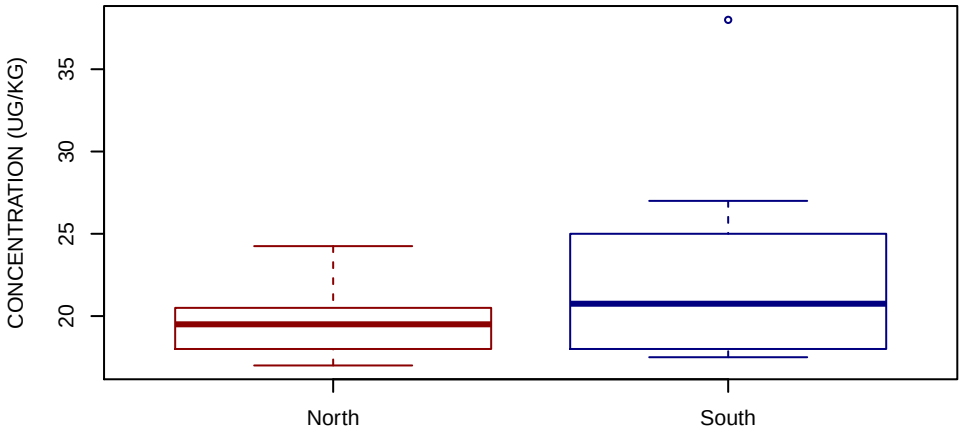
SUMMARY STATISTICS

	North	South
MINIMUM	18	1.6
25TH PERCENTILE	18	1.7
MEDIAN	18	18
MEAN	24	11
75TH PERCENTILE	19	18
MAXIMUM	95	20

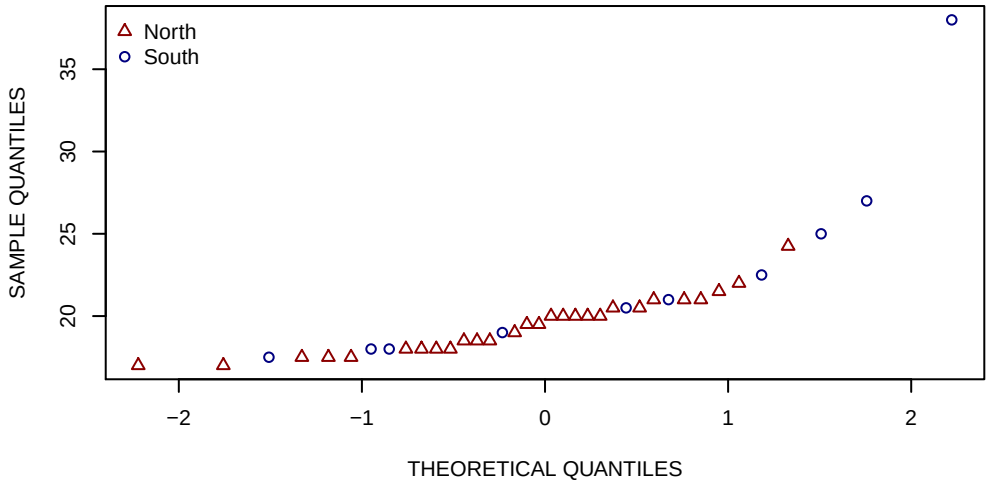
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

2,4−D SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 1 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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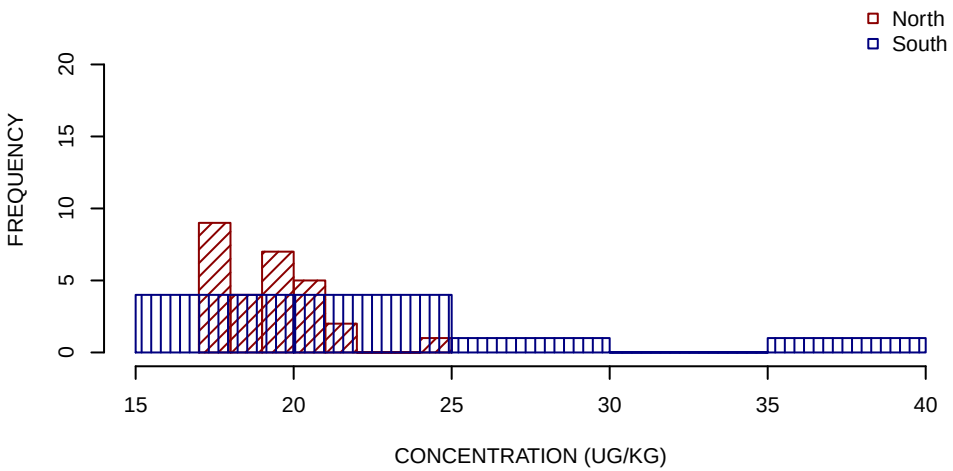


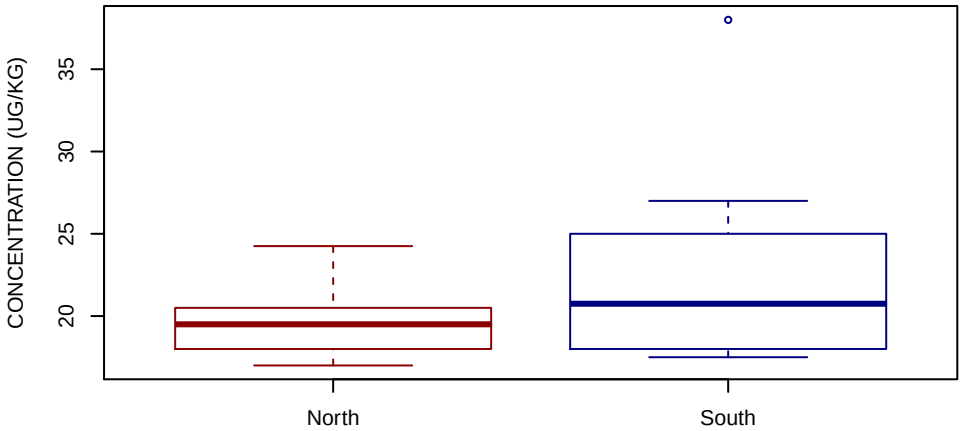
SUMMARY STATISTICS

	North	South
MINIMUM	17	18
25TH PERCENTILE	18	18
MEDIAN	20	21
MEAN	19	23
75TH PERCENTILE	20	24
MAXIMUM	24	38

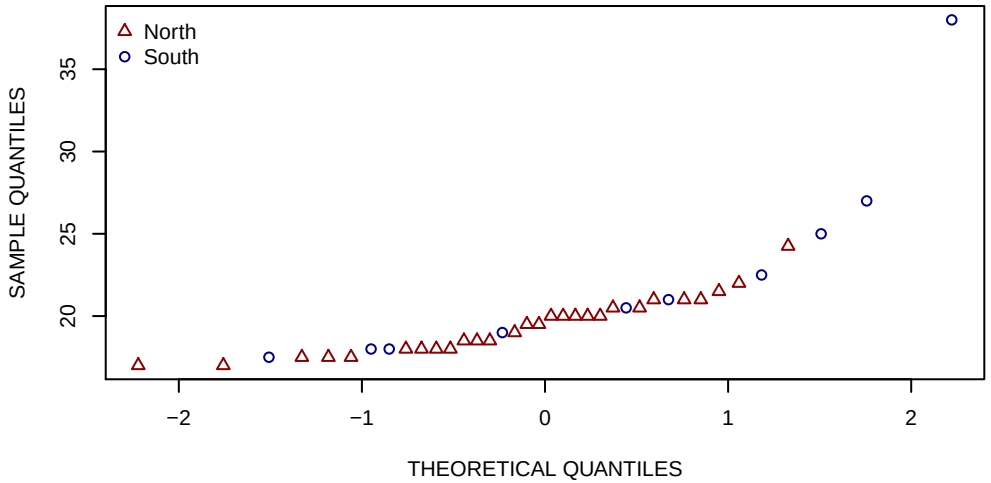
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

2,4,5−T SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 2 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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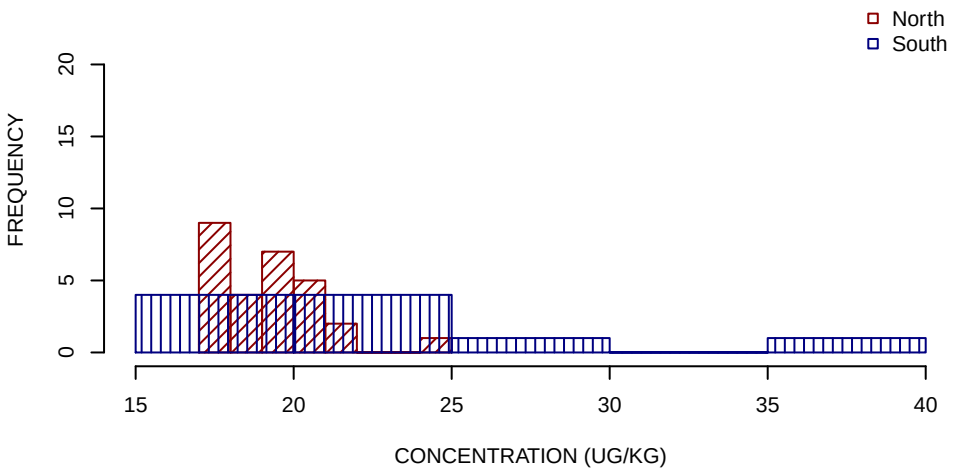


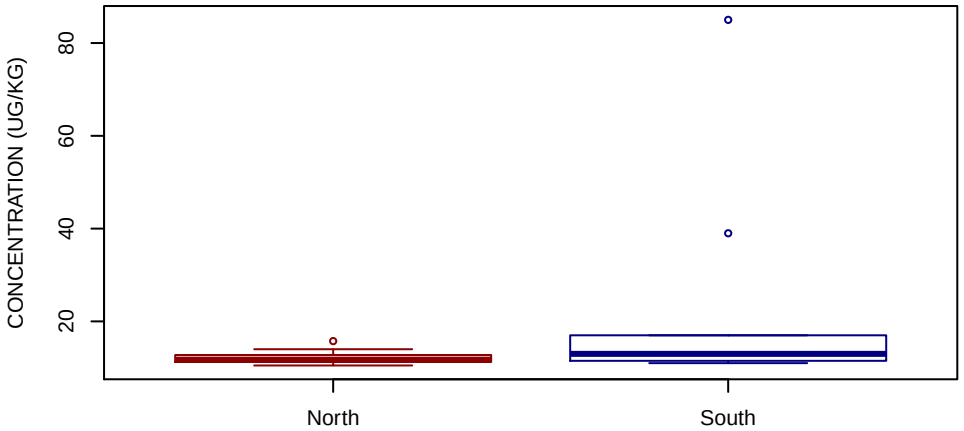
SUMMARY STATISTICS

	North	South
MINIMUM	17	18
25TH PERCENTILE	18	18
MEDIAN	20	21
MEAN	19	23
75TH PERCENTILE	20	24
MAXIMUM	24	38

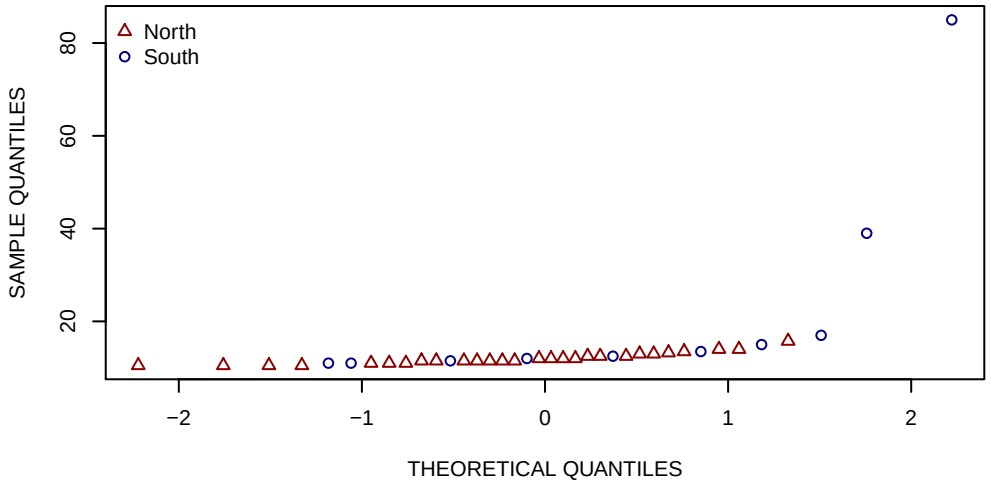
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

CARBARYL SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 3 OF 41

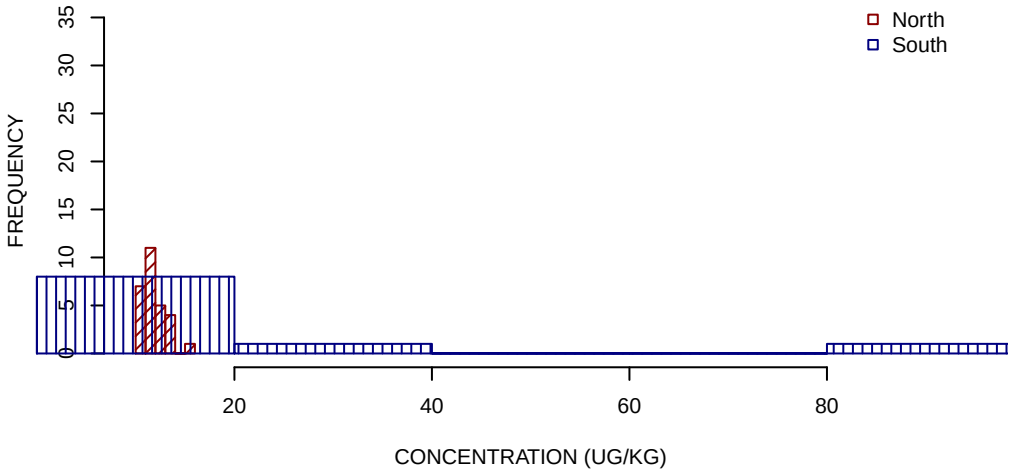
BOXPLOTS



NORMAL Q−Q PLOT



HISTOGRAMS



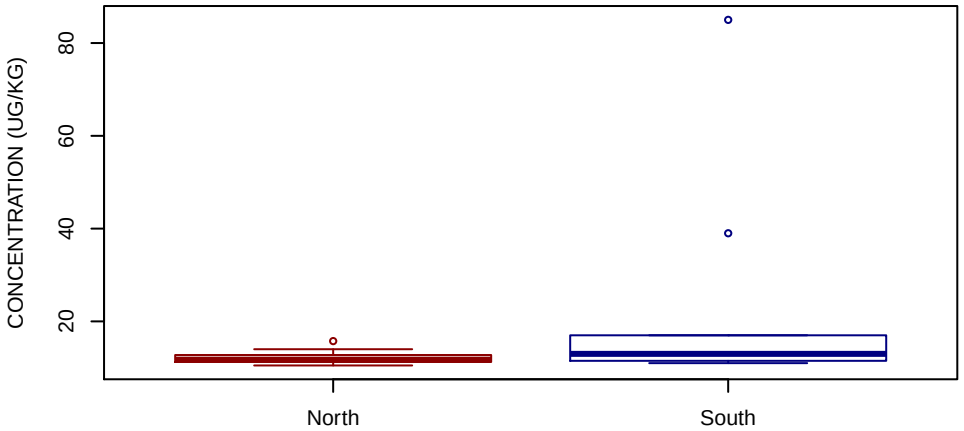
SUMMARY STATISTICS

	North	South
MINIMUM	10	11
25TH PERCENTILE	11	12
MEDIAN	12	13
MEAN	12	23
75TH PERCENTILE	13	16
MAXIMUM	16	85

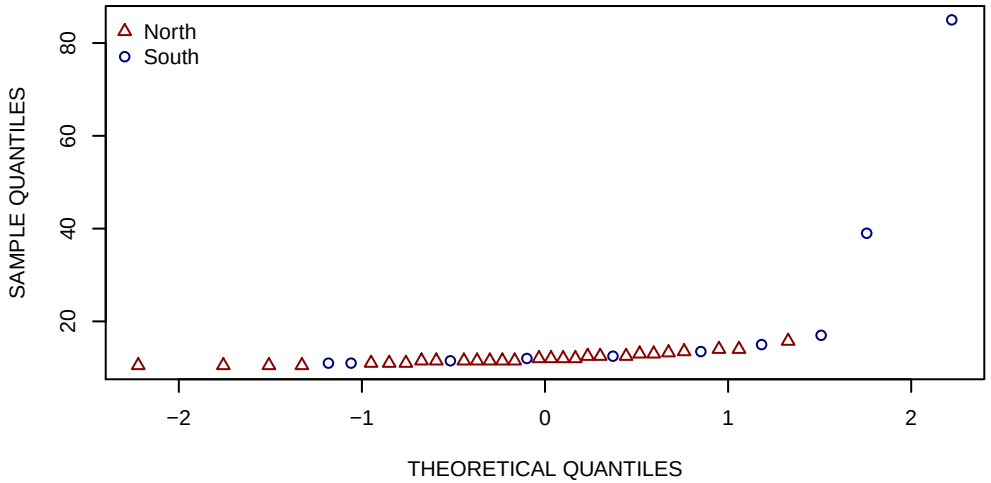
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

DIURON SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 4 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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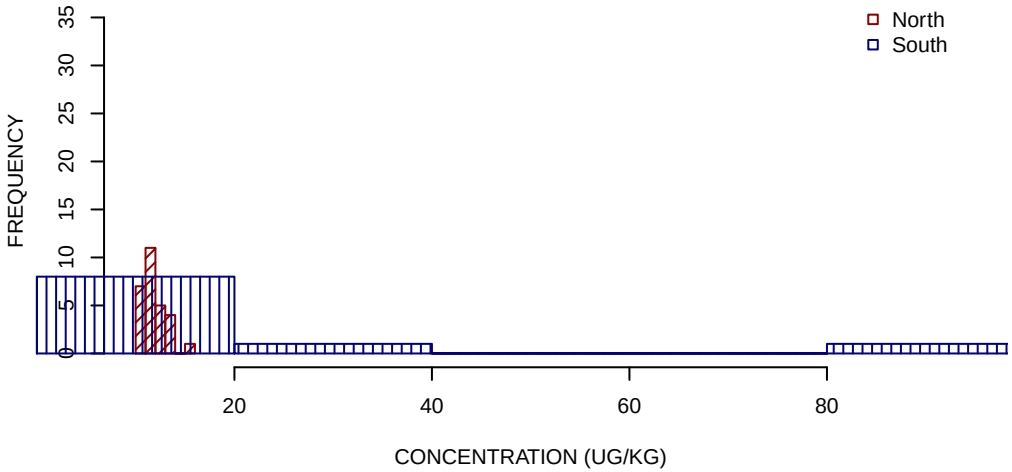


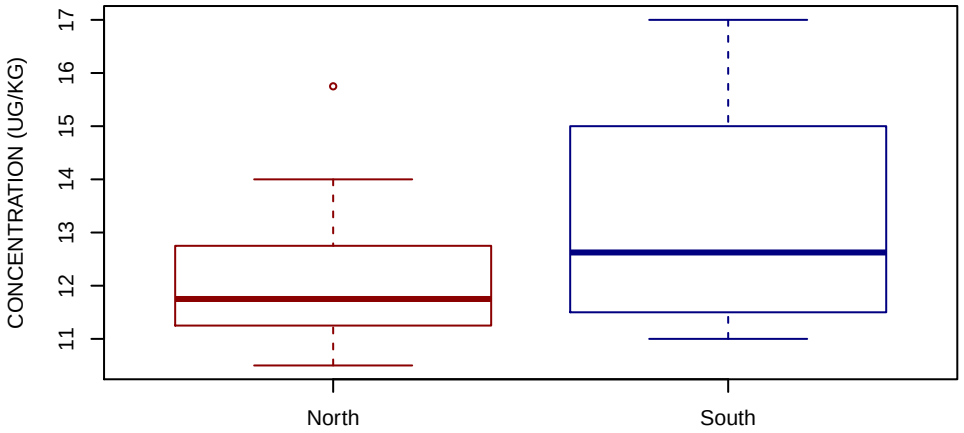
SUMMARY STATISTICS

	North	South
MINIMUM	10	11
25TH PERCENTILE	11	12
MEDIAN	12	13
MEAN	12	23
75TH PERCENTILE	13	16
MAXIMUM	16	85

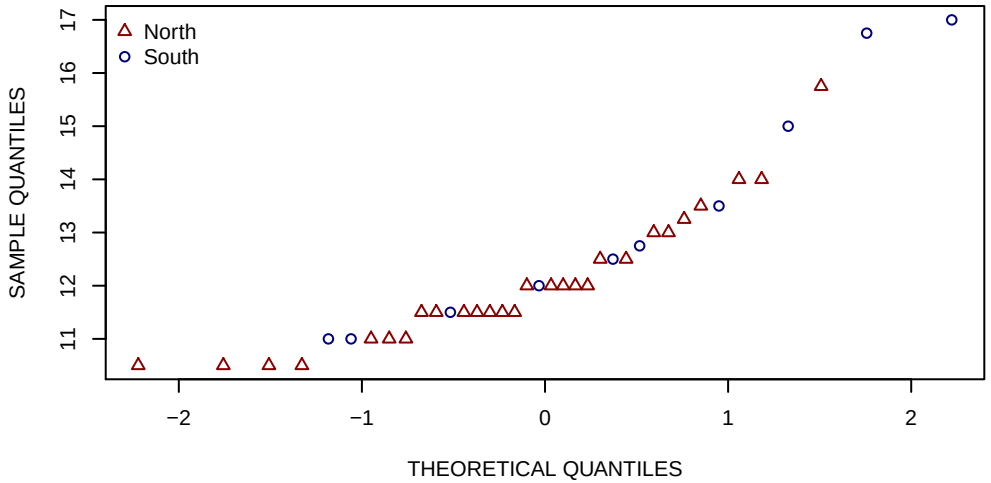
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

MALEIC HYDRAZIDE SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 5 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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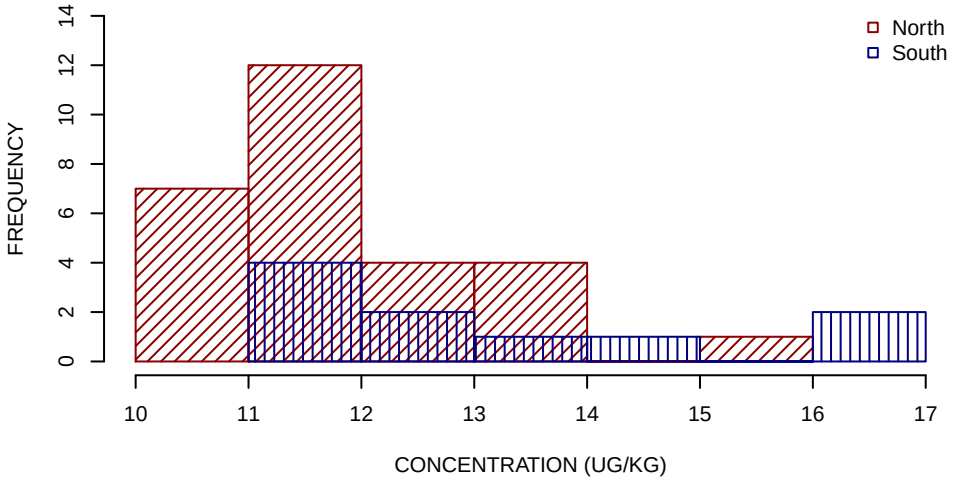


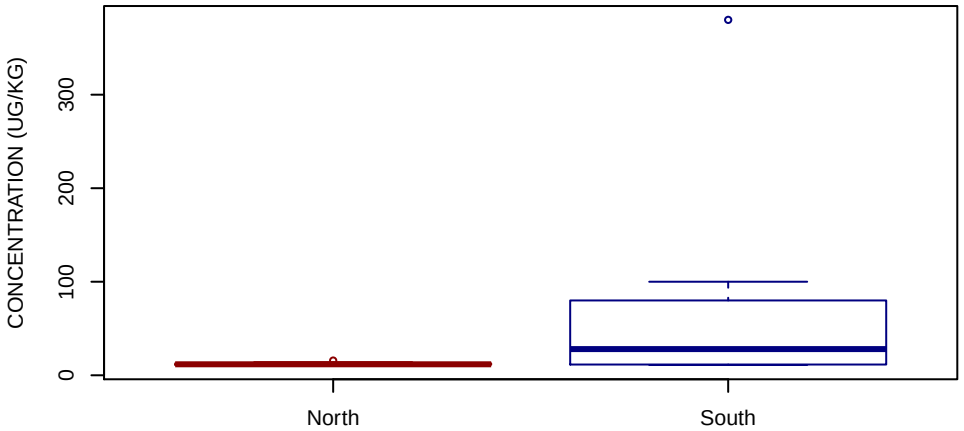
SUMMARY STATISTICS

	North	South
MINIMUM	10	11
25TH PERCENTILE	11	12
MEDIAN	12	13
MEAN	12	13
75TH PERCENTILE	13	15
MAXIMUM	16	17

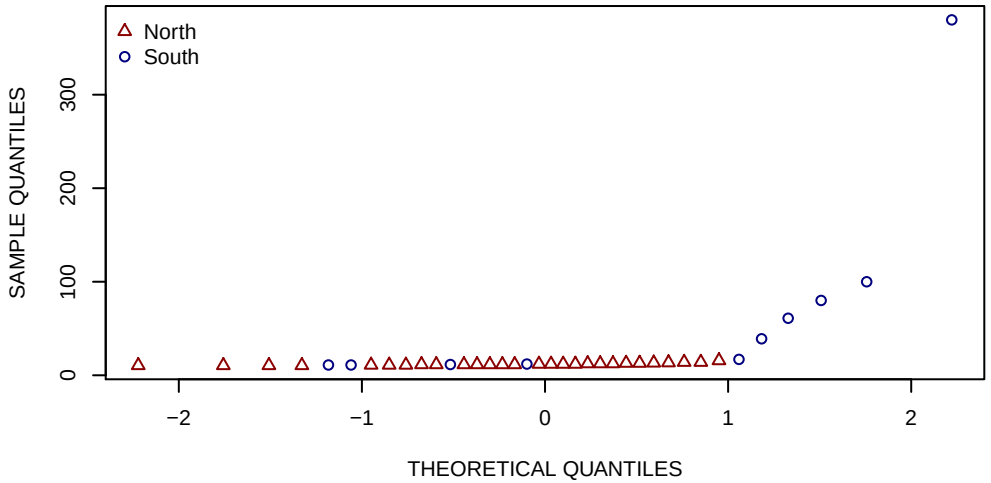
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

MONURON SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 6 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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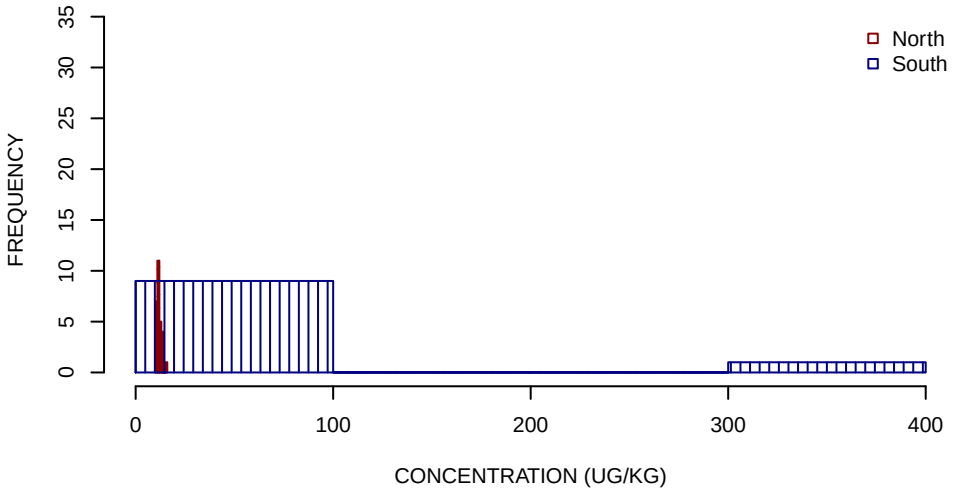


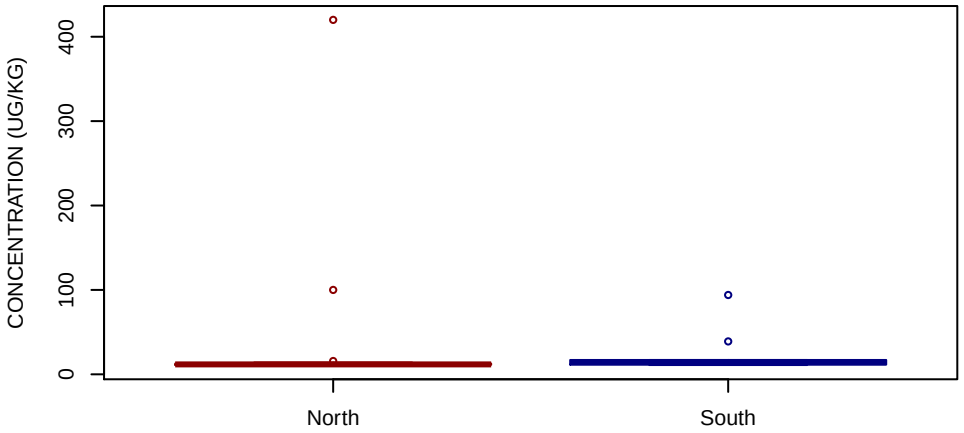
SUMMARY STATISTICS

	North	South
MINIMUM	10	11
25TH PERCENTILE	11	12
MEDIAN	12	28
MEAN	12	72
75TH PERCENTILE	13	75
MAXIMUM	16	380

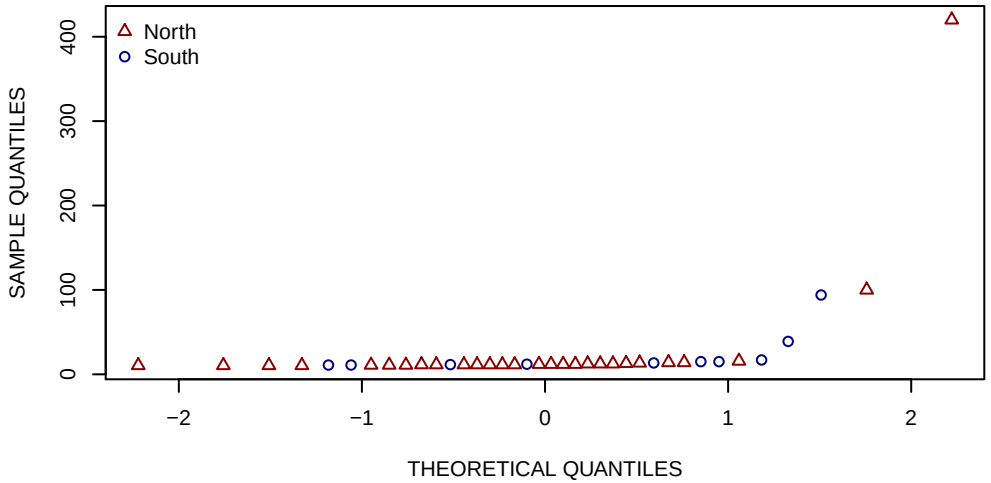
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

PROPOXUR SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 7 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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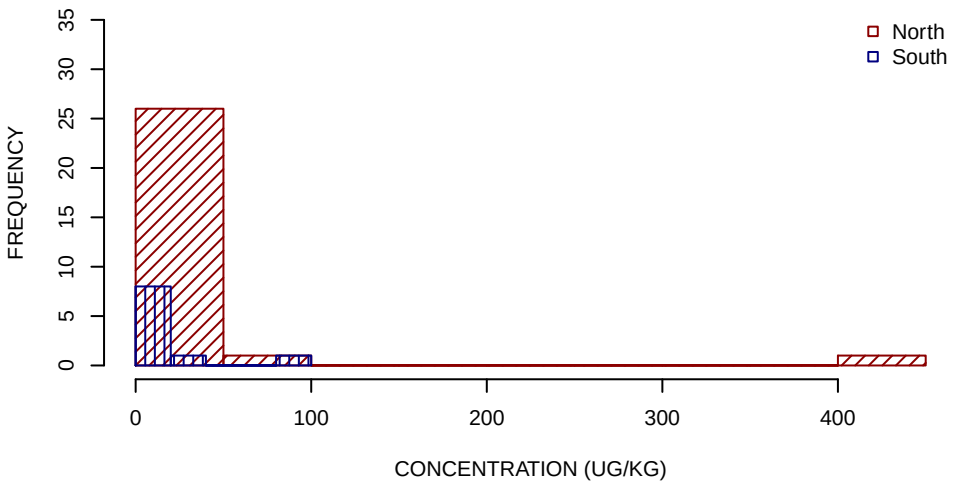


SUMMARY STATISTICS

	North	South
MINIMUM	10	11
25TH PERCENTILE	11	12
MEDIAN	12	14
MEAN	30	24
75TH PERCENTILE	13	16
MAXIMUM	420	94

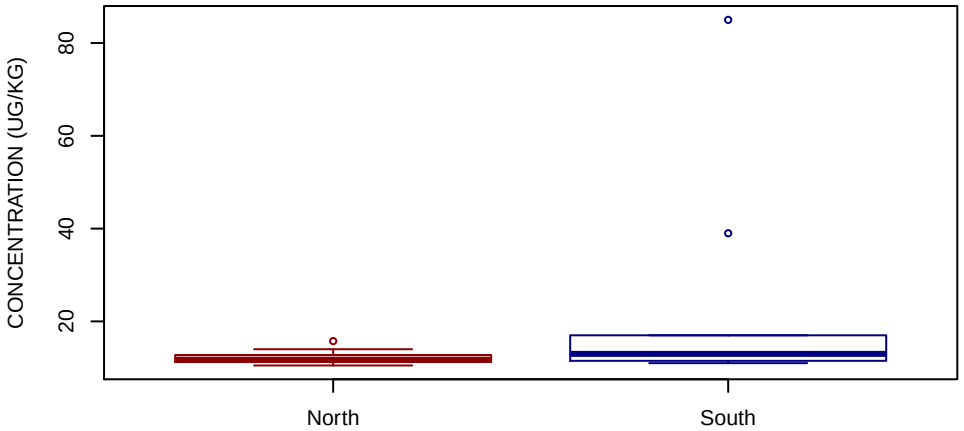
UNITS ARE UG/KG

1/2 DETECTION LIMIT USED FOR NON−DETECTS

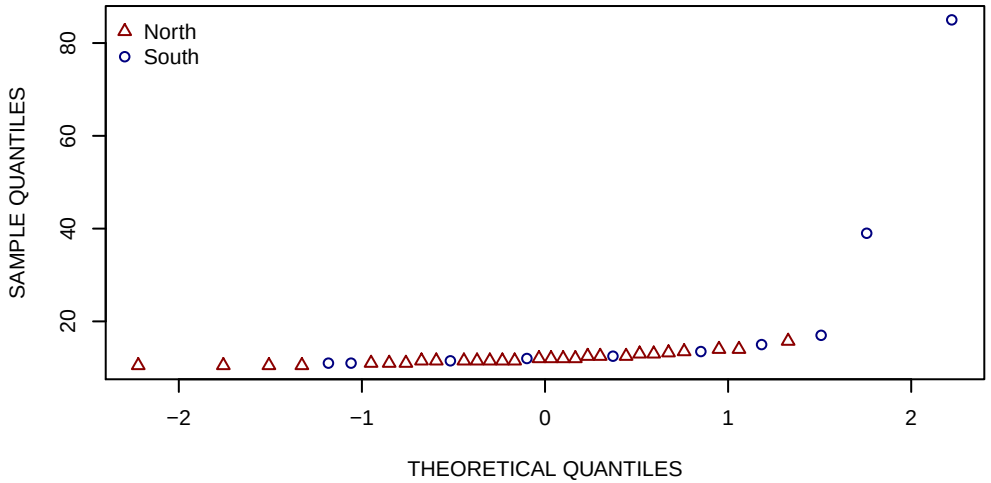
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ROTENONE SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 8 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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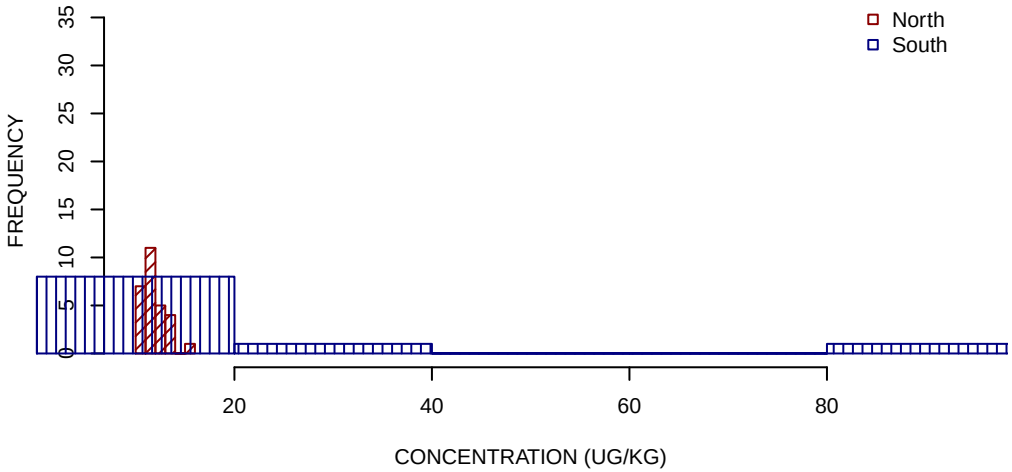


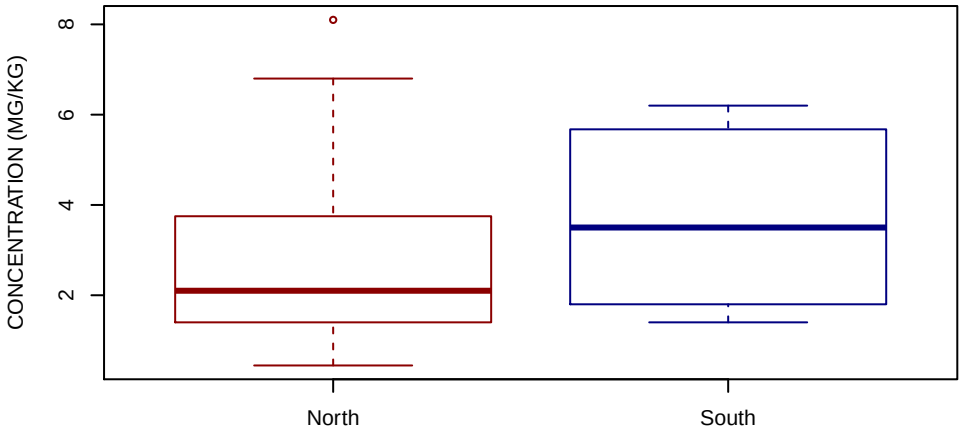
SUMMARY STATISTICS

	North	South
MINIMUM	10	11
25TH PERCENTILE	11	12
MEDIAN	12	13
MEAN	12	23
75TH PERCENTILE	13	16
MAXIMUM	16	85

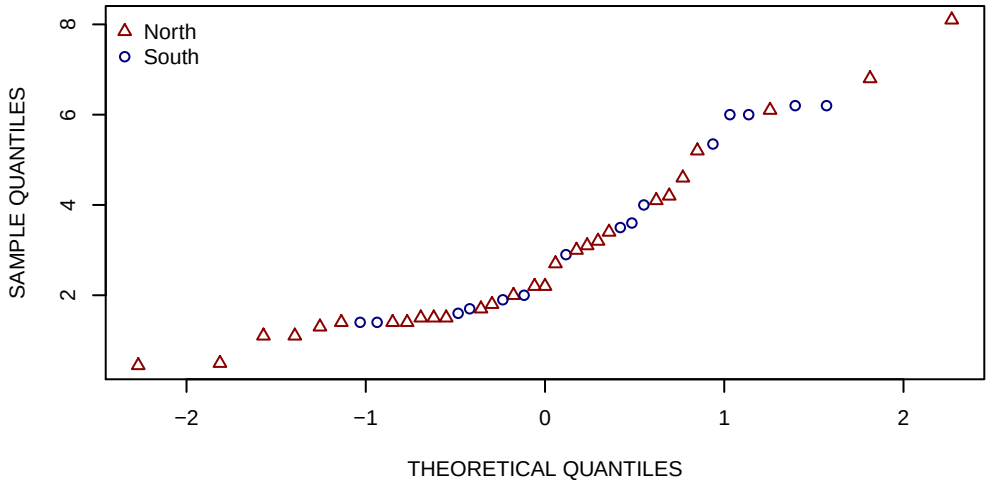
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ARSENIC SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 9 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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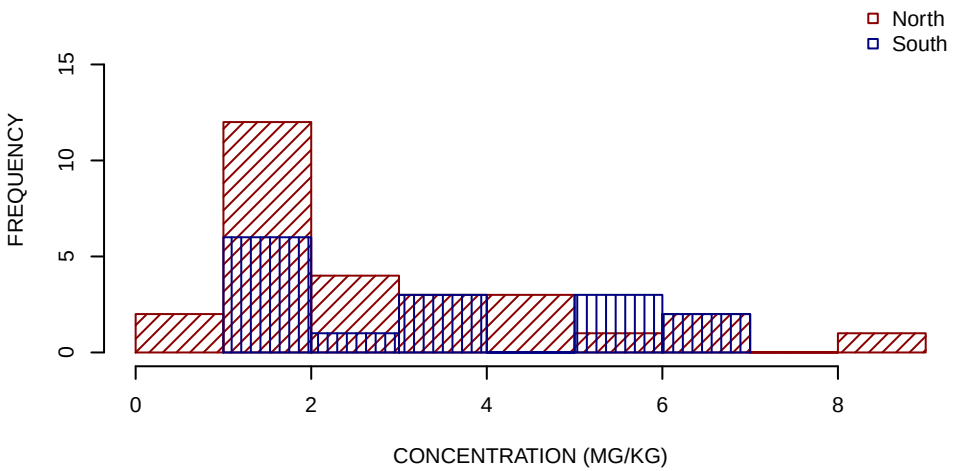


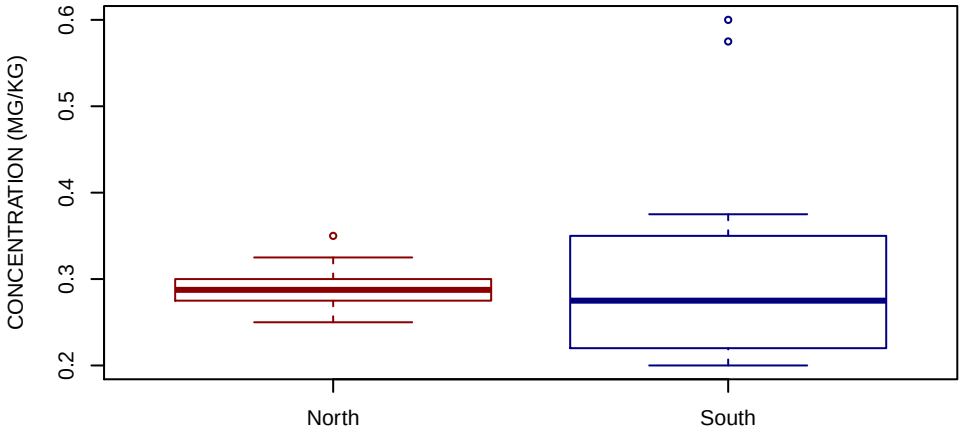
SUMMARY STATISTICS

	North	South
MINIMUM	0.44	1.4
25TH PERCENTILE	1.4	1.8
MEDIAN	2.1	3.5
MEAN	2.8	3.6
75TH PERCENTILE	3.6	5.7
MAXIMUM	8.1	6.2

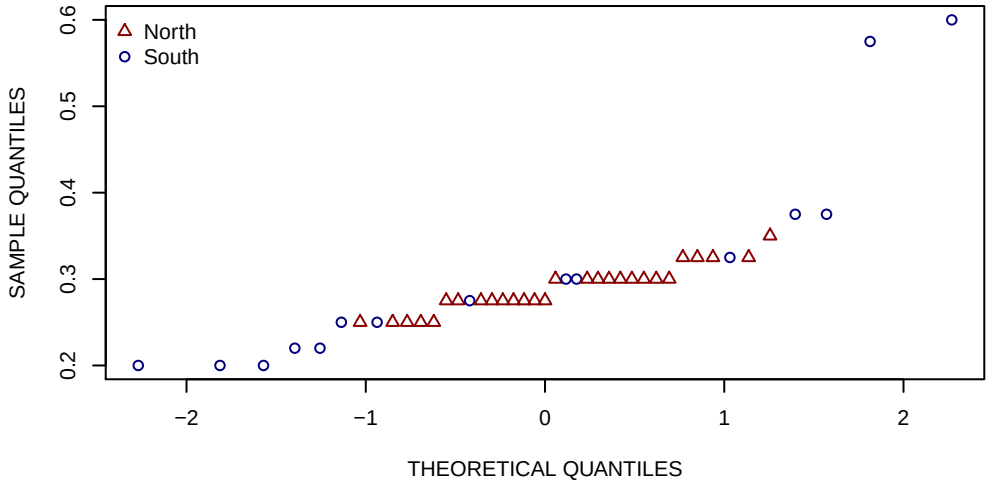
UNITS ARE MG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

CYANIDE SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 10 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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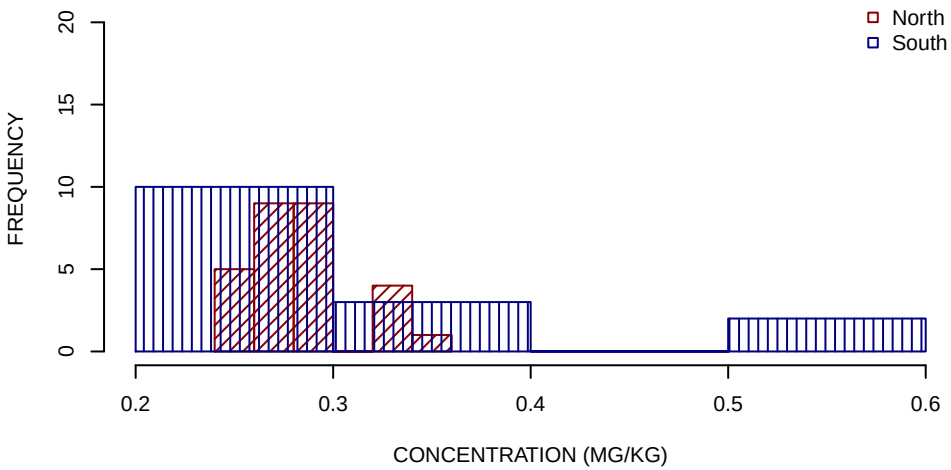


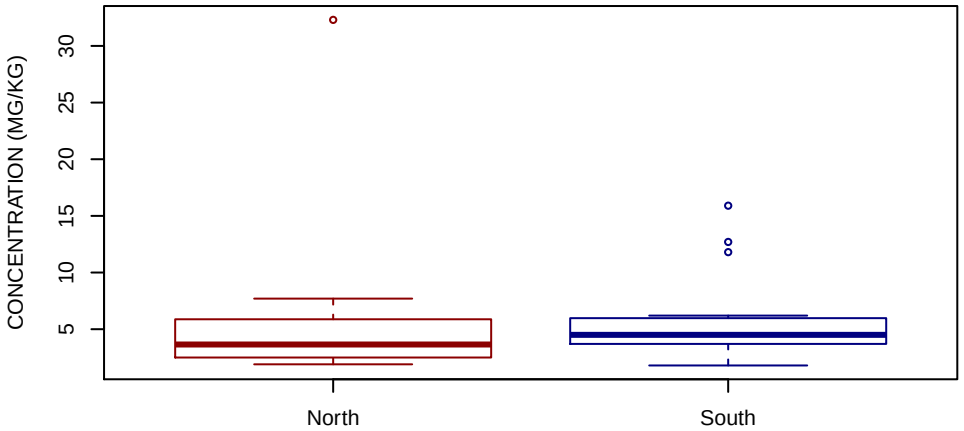
SUMMARY STATISTICS

	North	South
MINIMUM	0.25	0.2
25TH PERCENTILE	0.28	0.22
MEDIAN	0.29	0.28
MEAN	0.29	0.31
75TH PERCENTILE	0.3	0.35
MAXIMUM	0.35	0.6

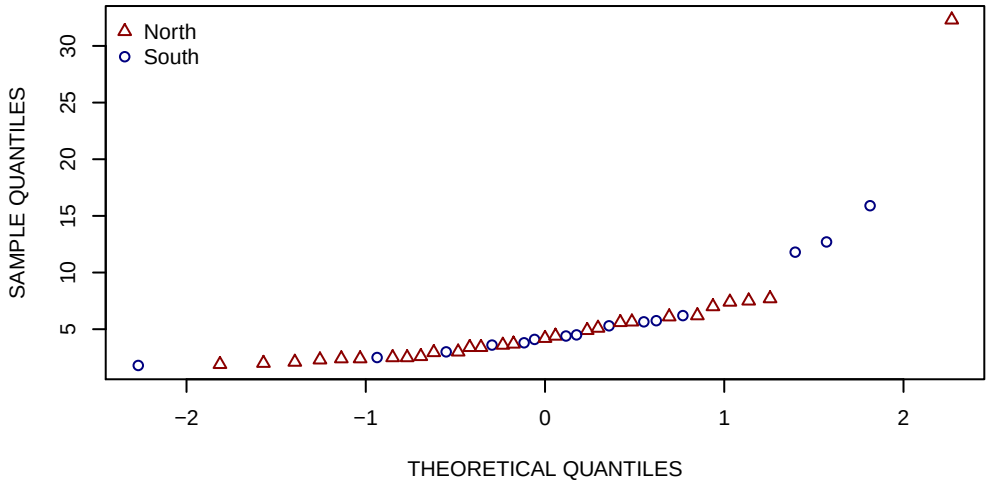
UNITS ARE MG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

LEAD SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 11 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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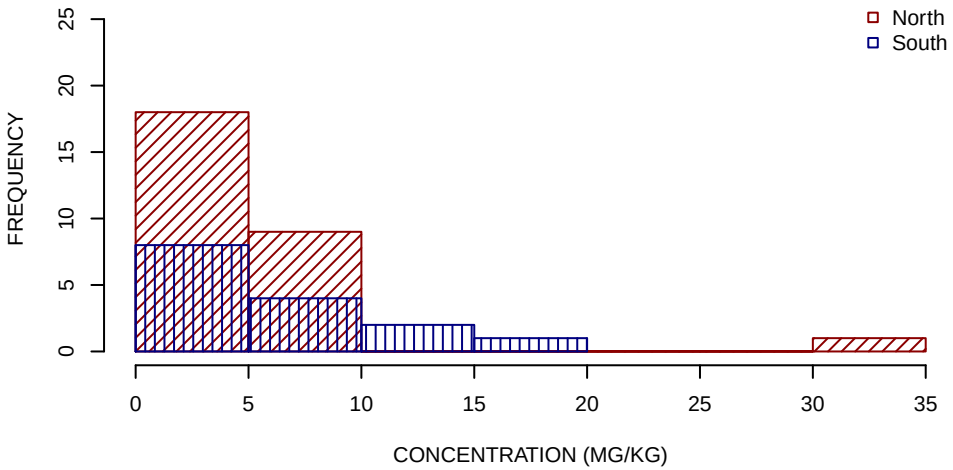


SUMMARY STATISTICS

	North	South
MINIMUM	1.9	1.8
25TH PERCENTILE	2.5	3.7
MEDIAN	3.6	4.5
MEAN	5.2	6.1
75TH PERCENTILE	5.8	6
MAXIMUM	32	16

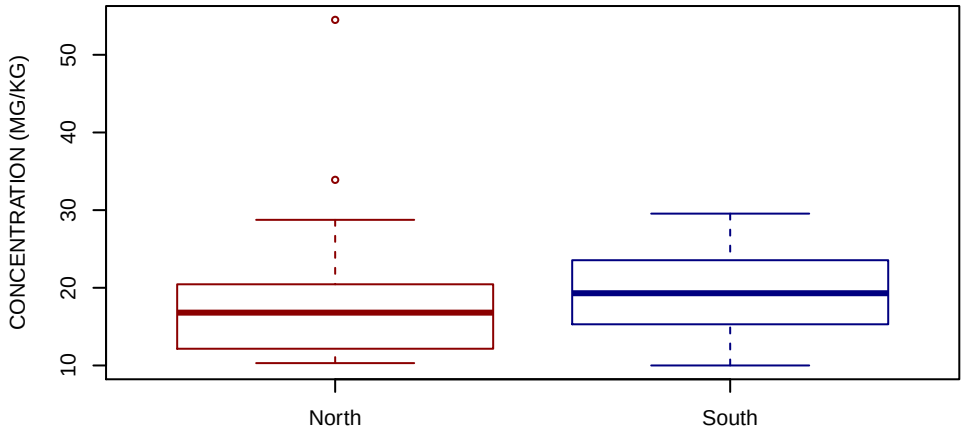
UNITS ARE MG/KG

1/2 DETECTION LIMIT USED FOR NON−DETECTS

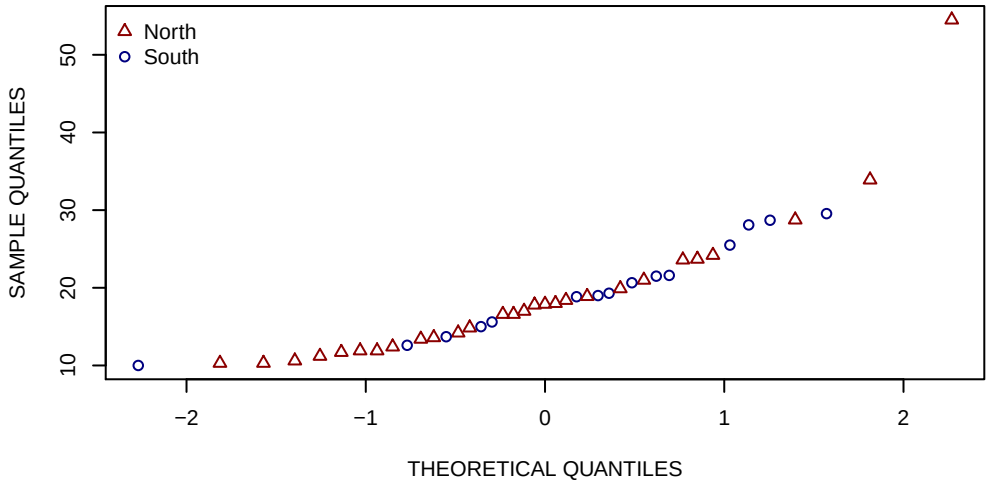
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ZINC SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 12 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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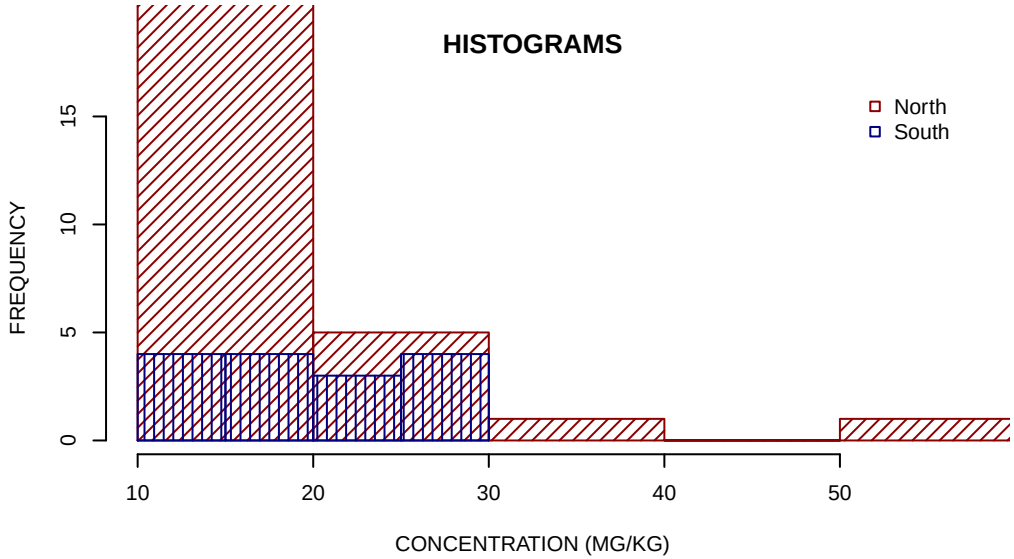


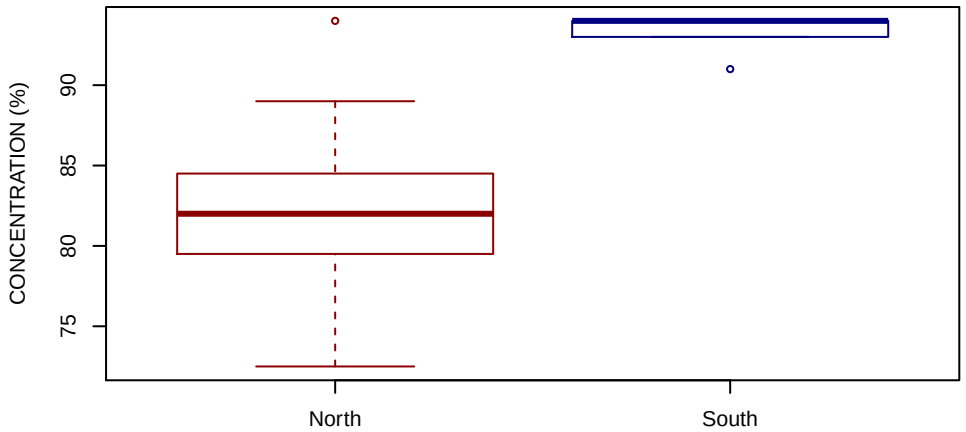
SUMMARY STATISTICS

	North	South
MINIMUM	10	10
25TH PERCENTILE	12	15
MEDIAN	17	19
MEAN	18	20
75TH PERCENTILE	20	24
MAXIMUM	54	30

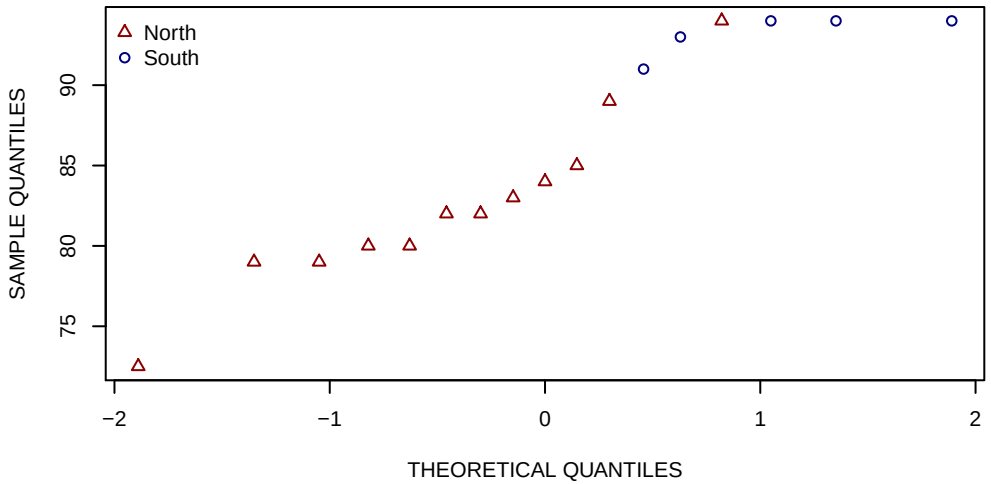
UNITS ARE MG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

TOTAL SOLIDS SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 13 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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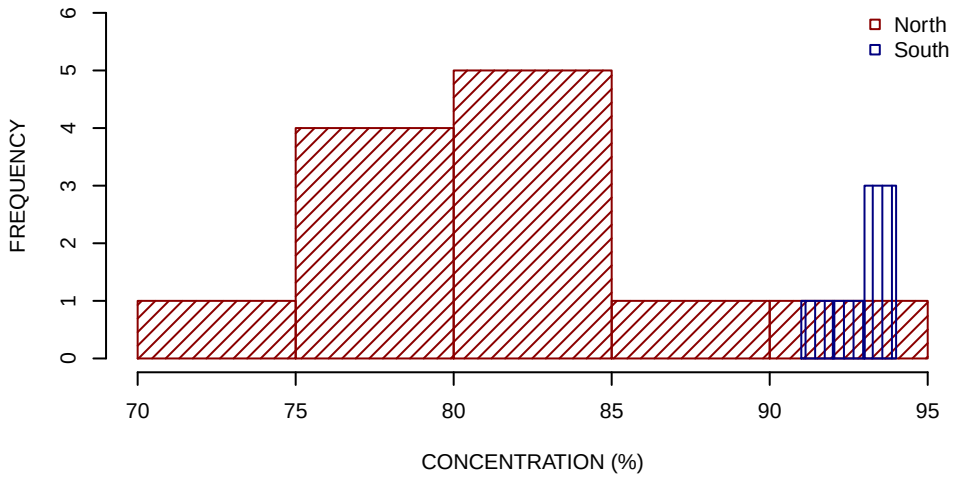


SUMMARY STATISTICS

	North	South
MINIMUM	72	91
25TH PERCENTILE	80	93
MEDIAN	82	94
MEAN	82	93
75TH PERCENTILE	84	94
MAXIMUM	94	94

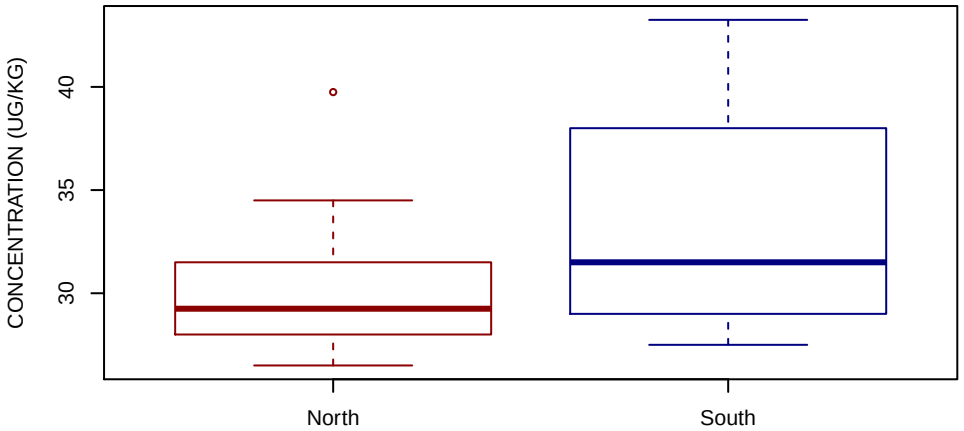
UNITS ARE %

1/2 DETECTION LIMIT USED FOR NON−DETECTS

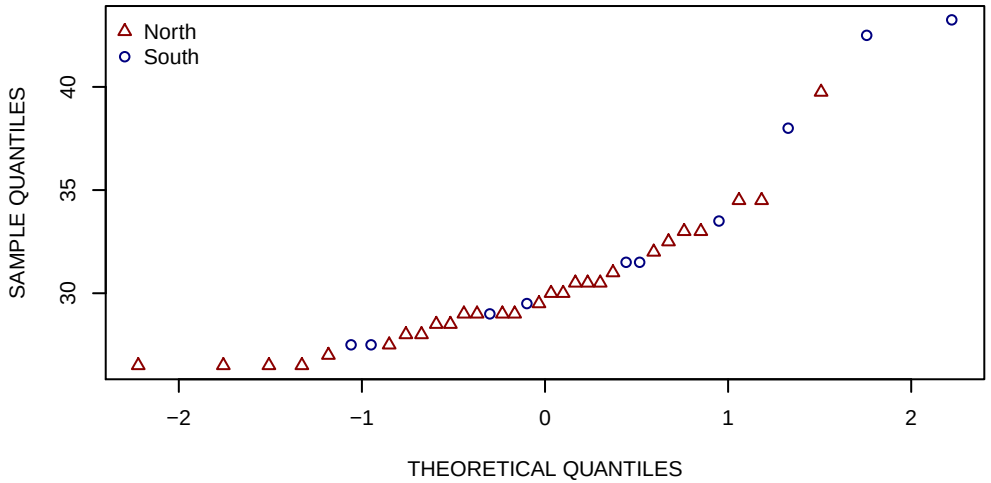
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

4−AMINOPYRIDINE SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 14 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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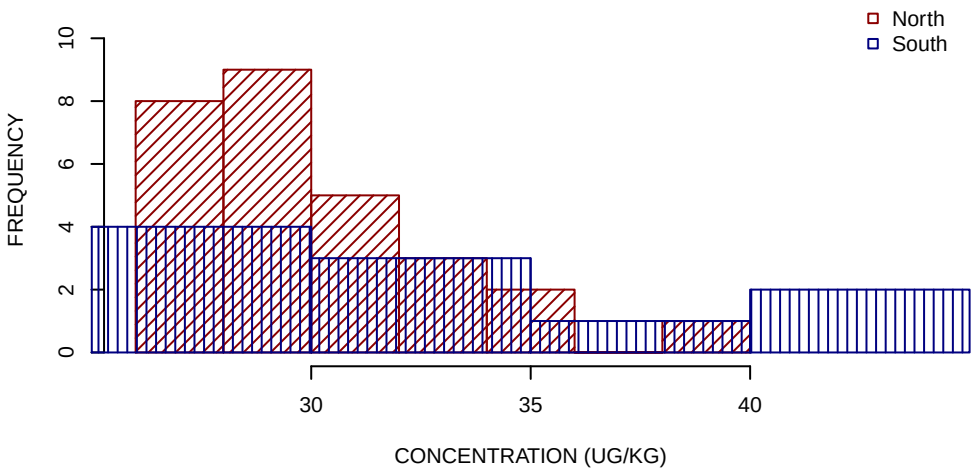


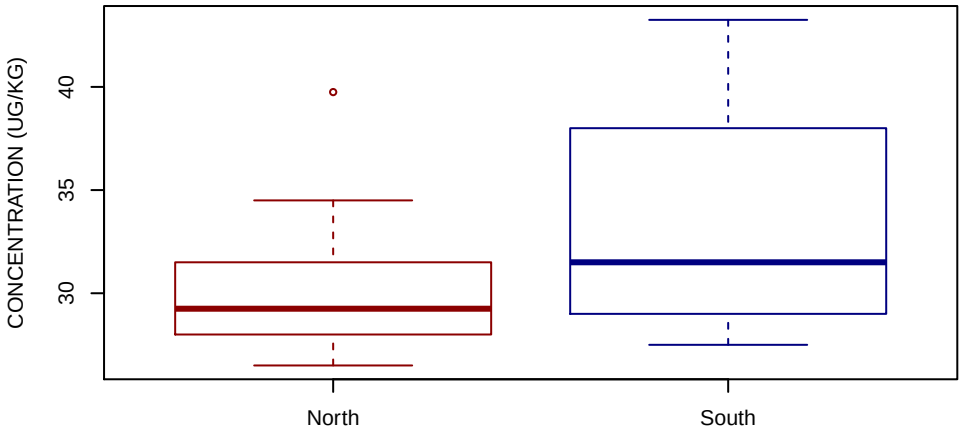
SUMMARY STATISTICS

	North	South
MINIMUM	26	28
25TH PERCENTILE	28	29
MEDIAN	29	32
MEAN	30	33
75TH PERCENTILE	31	37
MAXIMUM	40	43

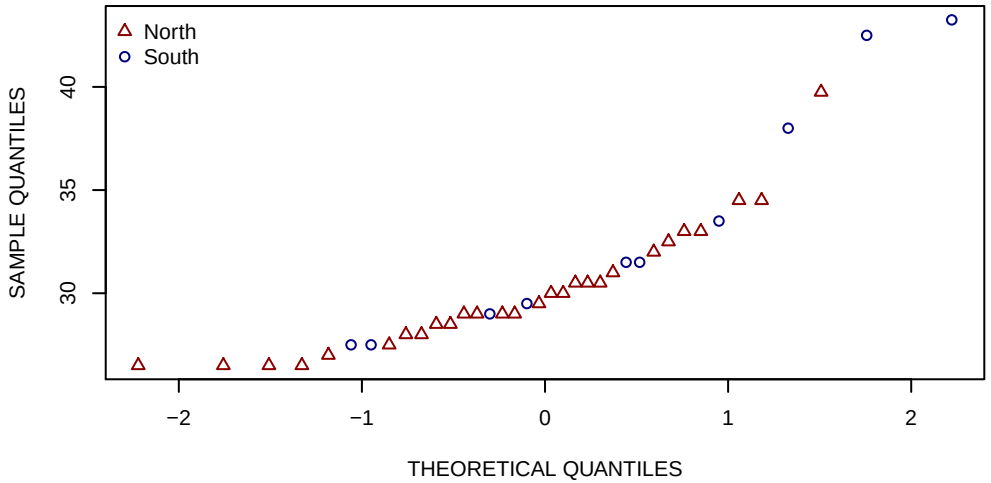
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

DIAZINON SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 15 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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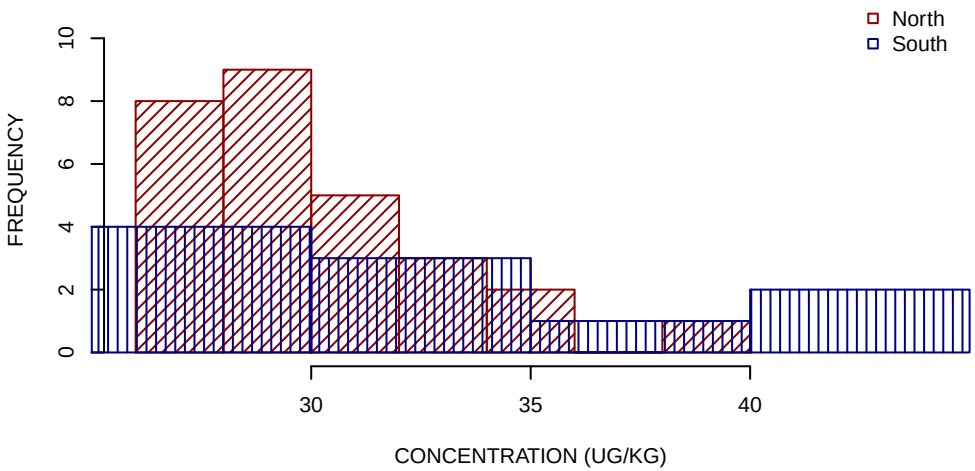


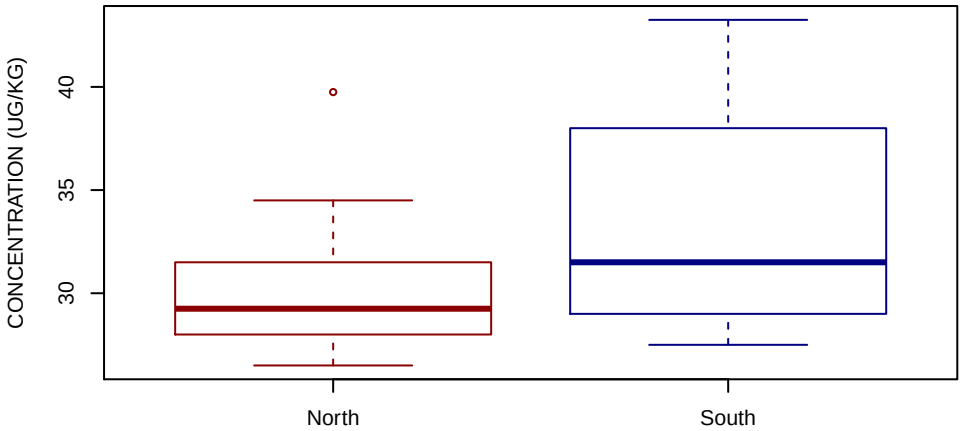
SUMMARY STATISTICS

	North	South
MINIMUM	26	28
25TH PERCENTILE	28	29
MEDIAN	29	32
MEAN	30	33
75TH PERCENTILE	31	37
MAXIMUM	40	43

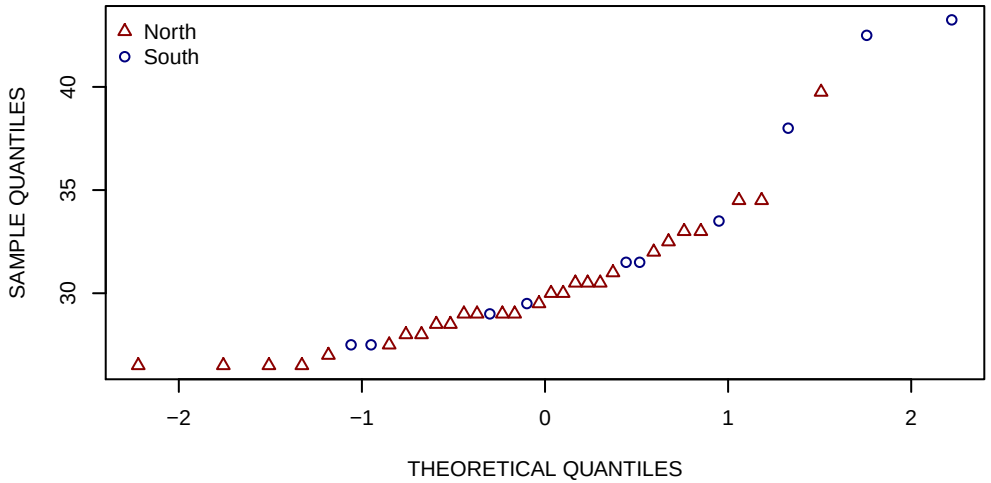
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

MALATHION SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 16 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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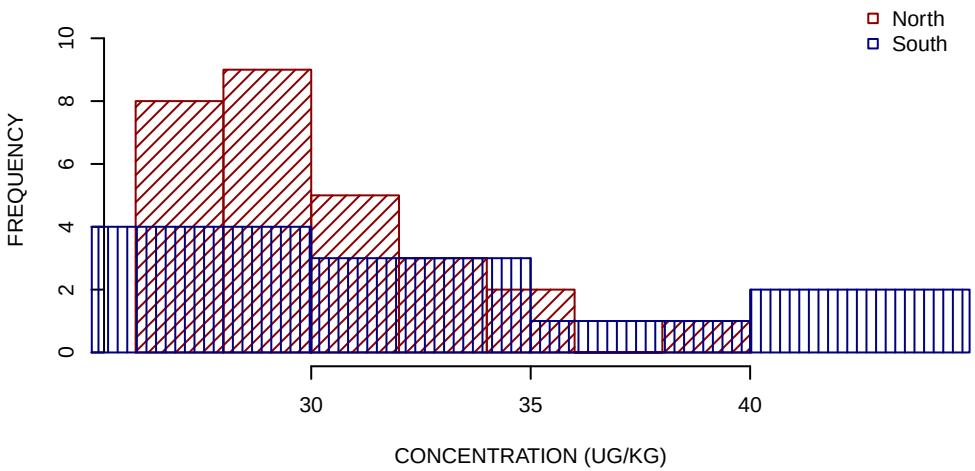


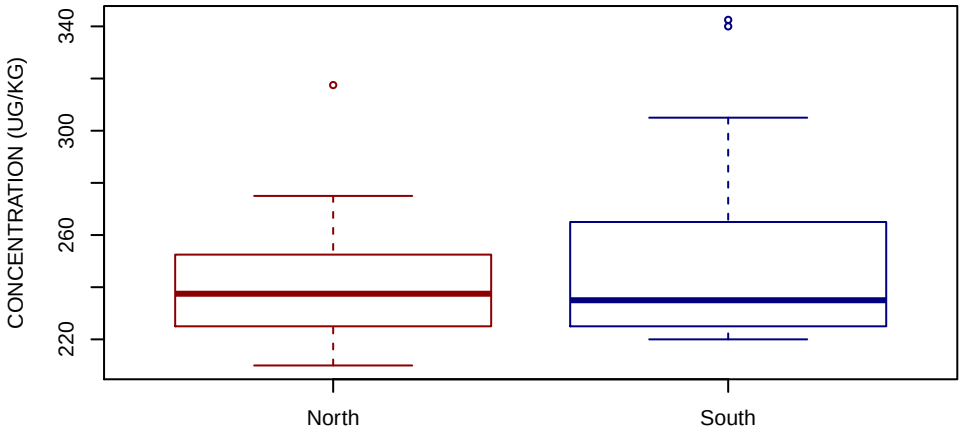
SUMMARY STATISTICS

	North	South
MINIMUM	26	28
25TH PERCENTILE	28	29
MEDIAN	29	32
MEAN	30	33
75TH PERCENTILE	31	37
MAXIMUM	40	43

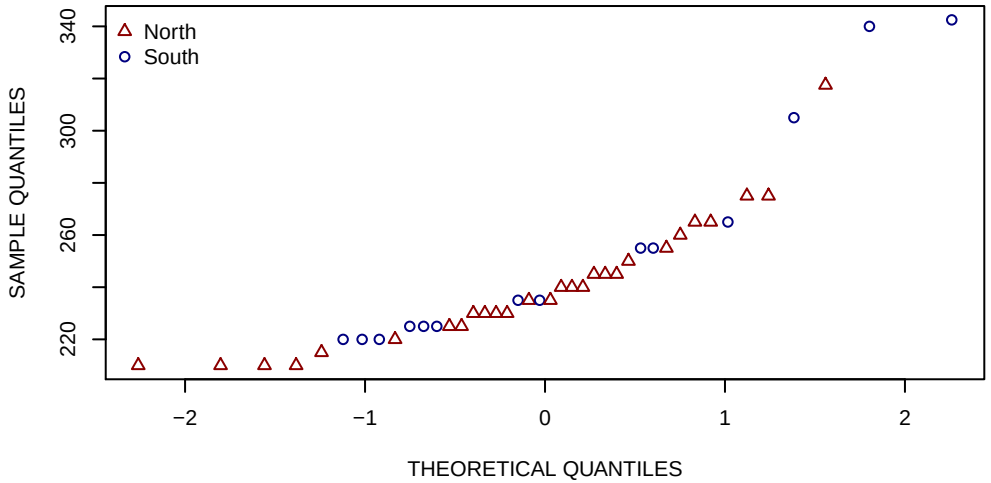
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

RESMETHRIN SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 17 OF 41

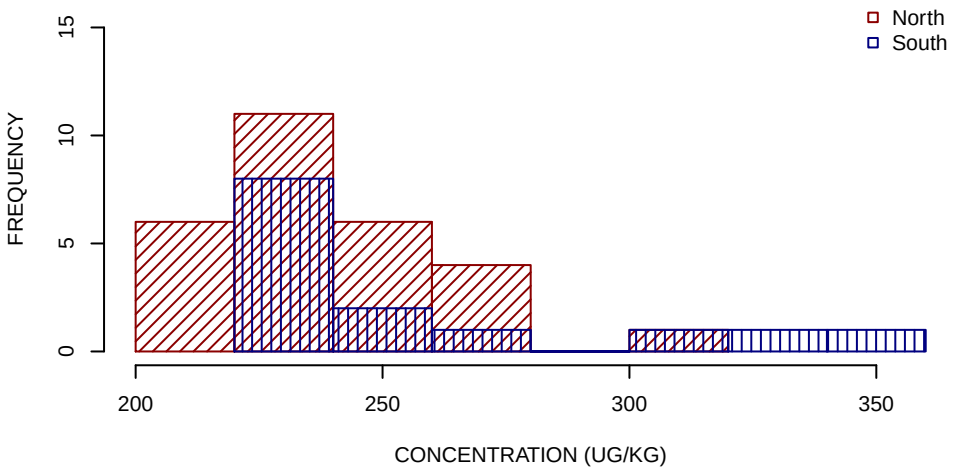
BOXPLOTS



NORMAL Q−Q PLOT



HISTOGRAMS



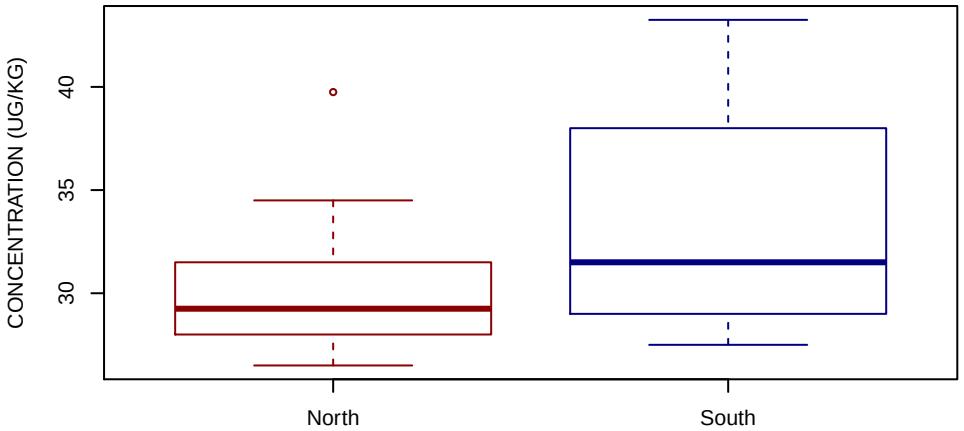
SUMMARY STATISTICS

	North	South
MINIMUM	210	220
25TH PERCENTILE	220	220
MEDIAN	240	240
MEAN	240	250
75TH PERCENTILE	250	260
MAXIMUM	320	340

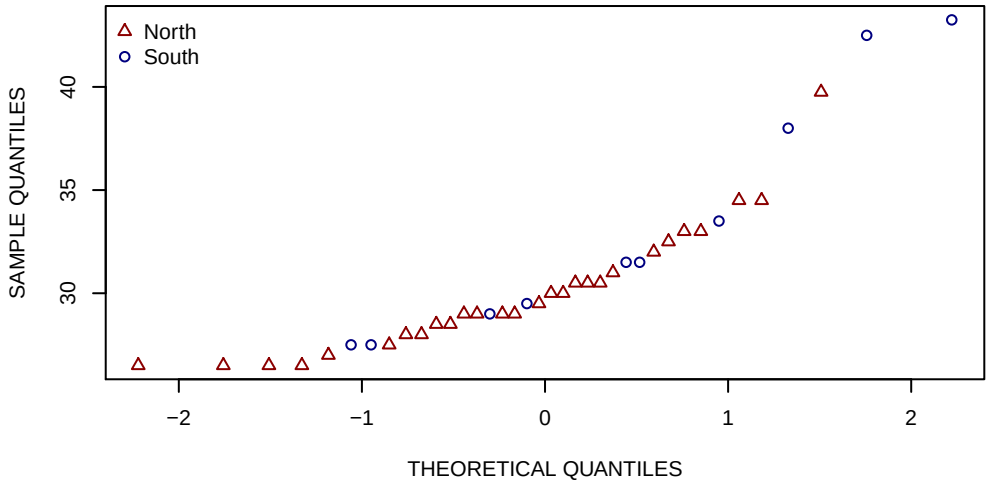
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

SIMAZINE SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 18 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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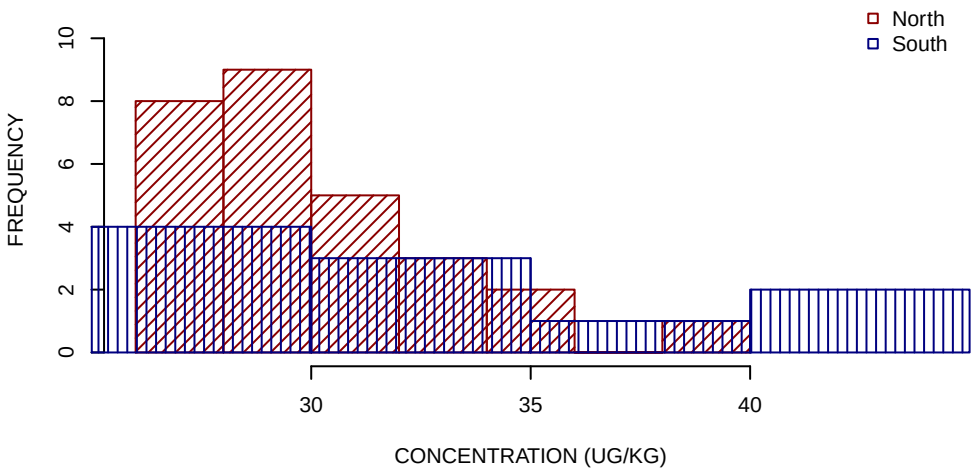


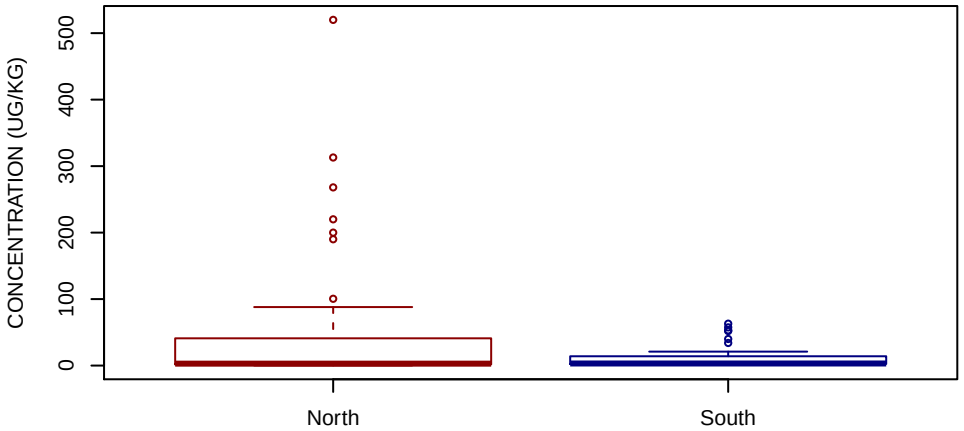
SUMMARY STATISTICS

	North	South
MINIMUM	26	28
25TH PERCENTILE	28	29
MEDIAN	29	32
MEAN	30	33
75TH PERCENTILE	31	37
MAXIMUM	40	43

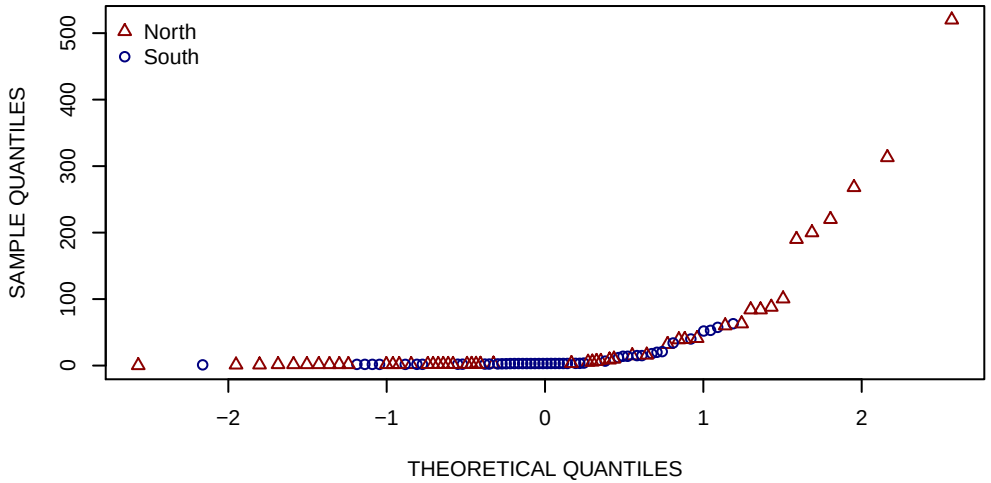
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

4,4'−DDD SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 19 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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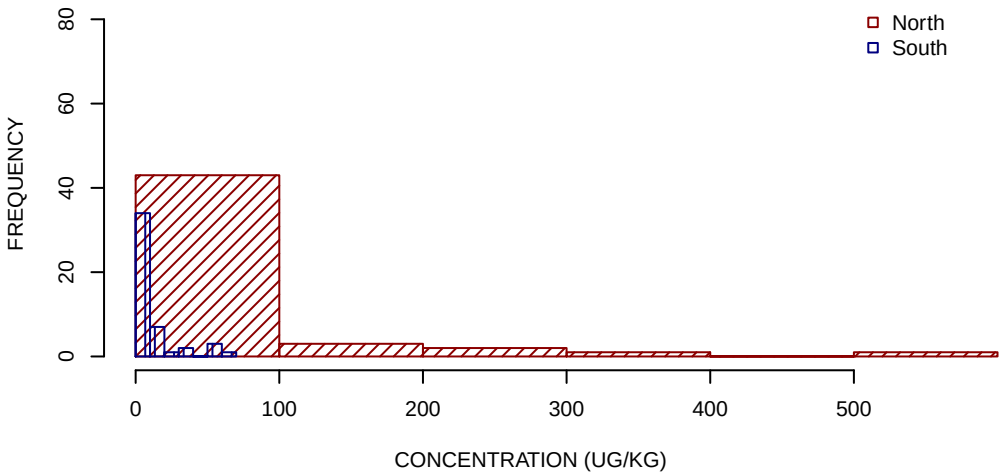


SUMMARY STATISTICS

	North	South
MINIMUM	0.18	1.1
25TH PERCENTILE	1.8	2.4
MEDIAN	2.9	3.1
MEAN	49	11
75TH PERCENTILE	41	14
MAXIMUM	520	63

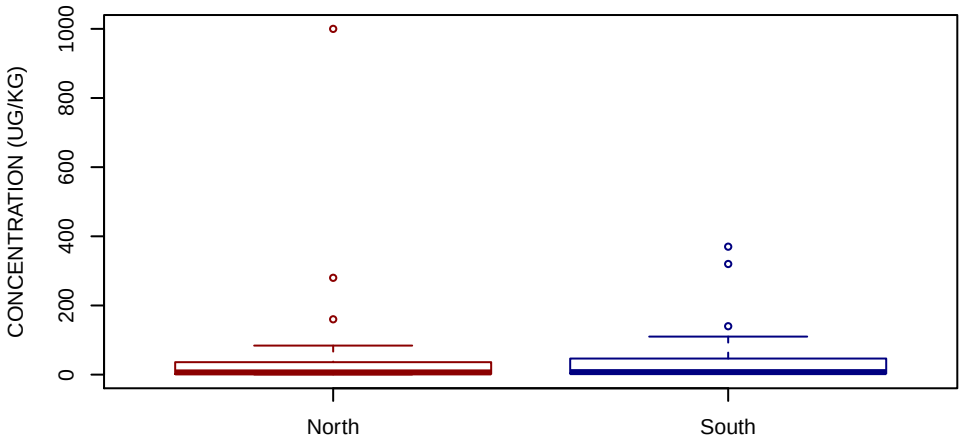
UNITS ARE UG/KG

1/2 DETECTION LIMIT USED FOR NON−DETECTS

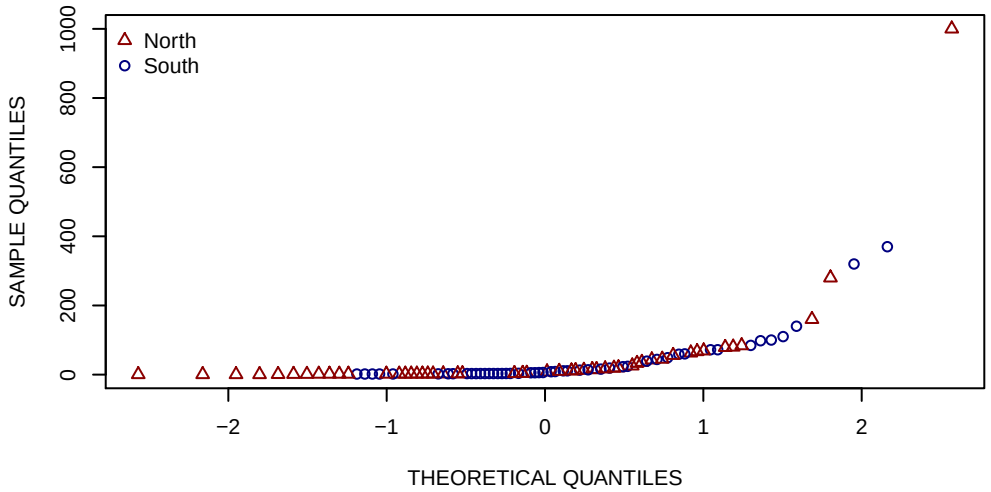
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

4,4'−DDE SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 20 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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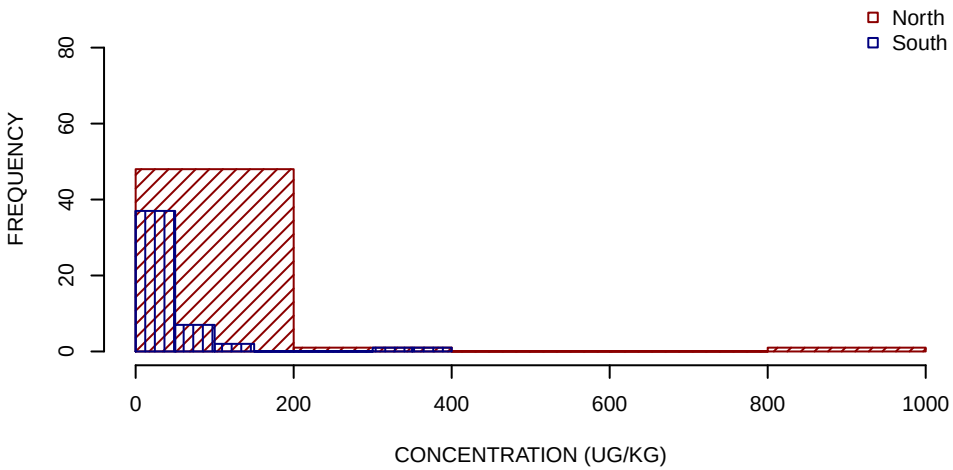


SUMMARY STATISTICS

	North	South
MINIMUM	0.48	1.8
25TH PERCENTILE	1.9	3.1
MEDIAN	6.4	7.2
MEAN	46	38
75TH PERCENTILE	35	45
MAXIMUM	1000	370

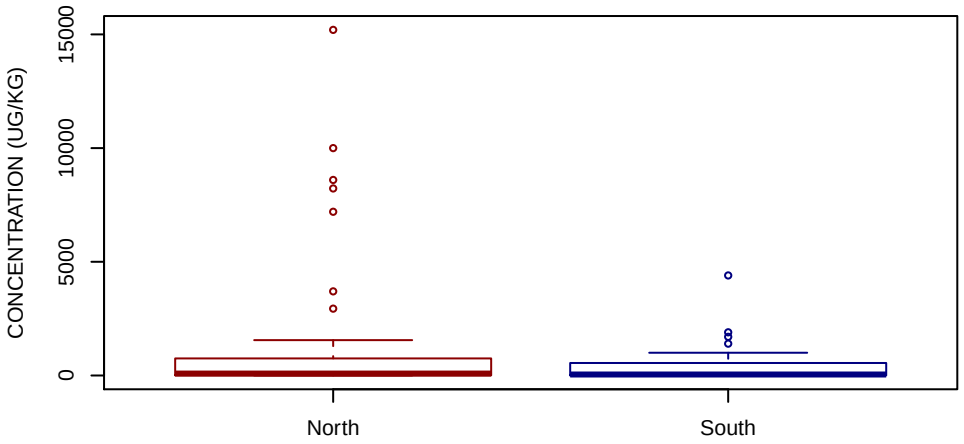
UNITS ARE UG/KG

1/2 DETECTION LIMIT USED FOR NON−DETECTS

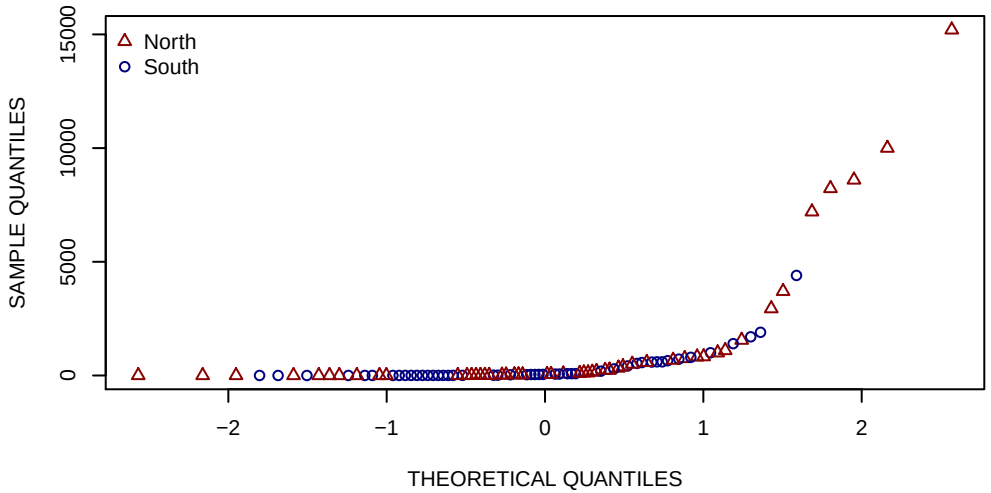
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

4,4'−DDT SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 21 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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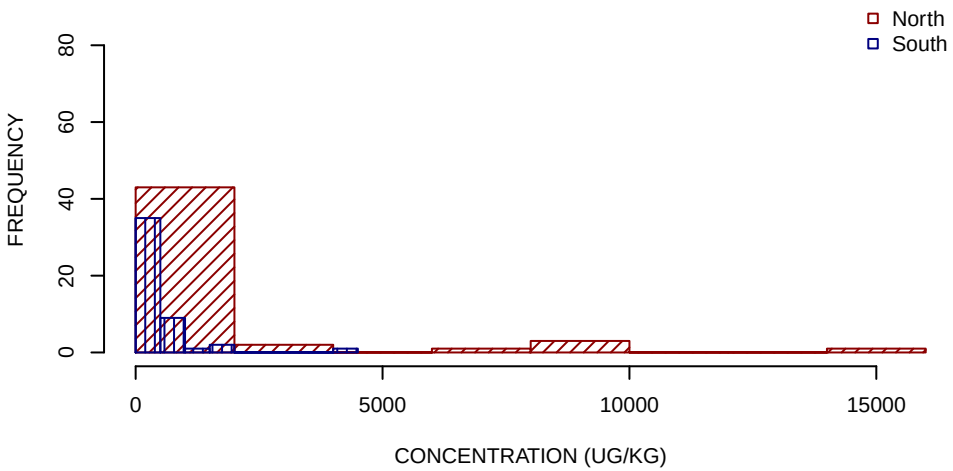


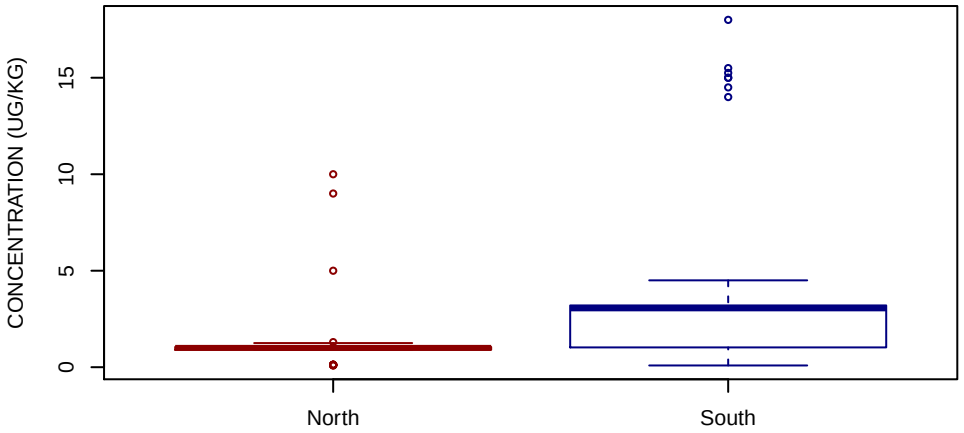
SUMMARY STATISTICS

	North	South
MINIMUM	1.4	1.8
25TH PERCENTILE	8.2	3.1
MEDIAN	84	43
MEAN	1300	360
75TH PERCENTILE	730	540
MAXIMUM	15000	4400

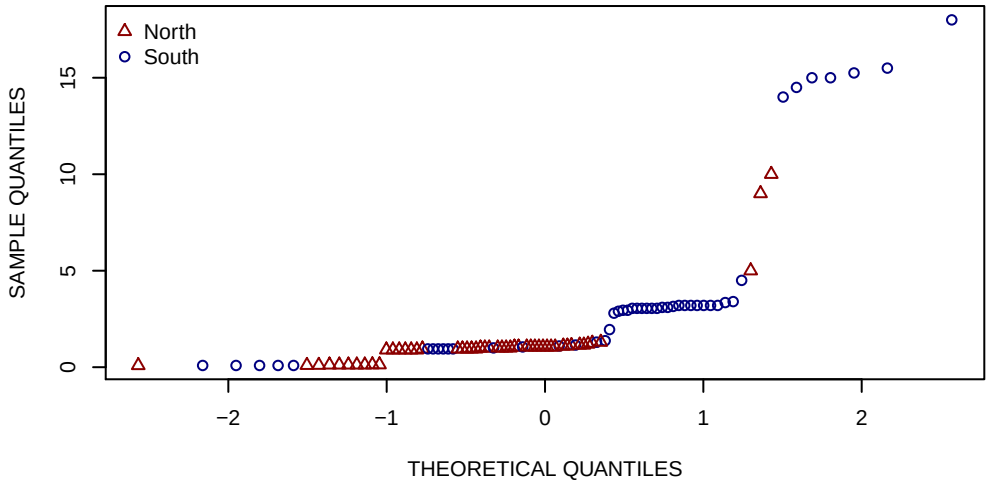
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ALDRIN SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 22 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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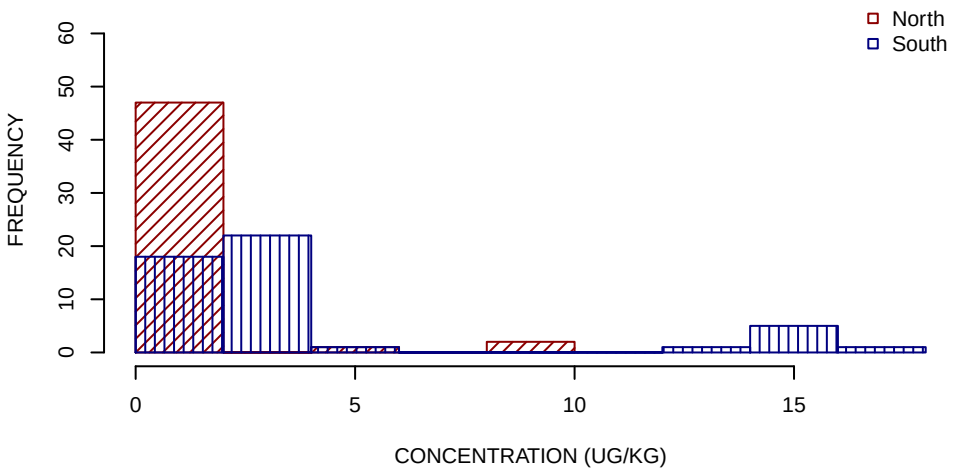


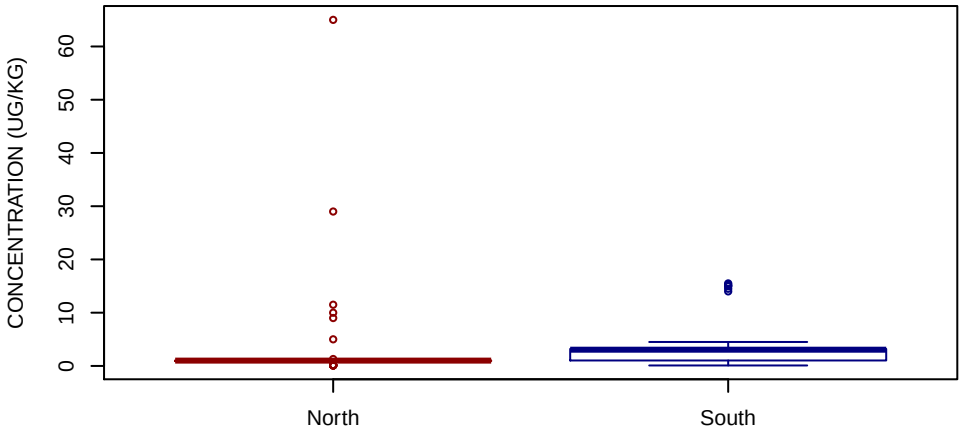
SUMMARY STATISTICS

	North	South
MINIMUM	0.09	0.09
25TH PERCENTILE	0.9	1
MEDIAN	1	3
MEAN	1.3	4.1
75TH PERCENTILE	1	3.2
MAXIMUM	10	18

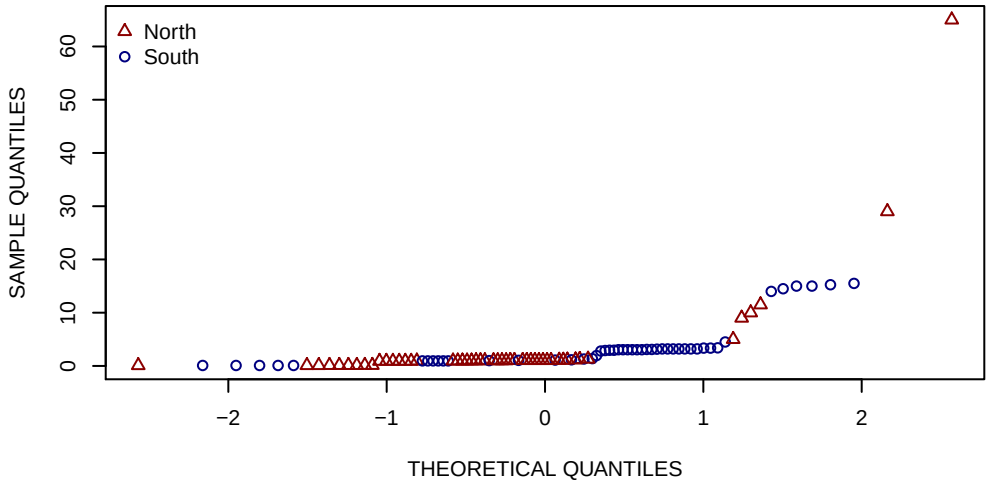
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ALPHA−BHC SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 23 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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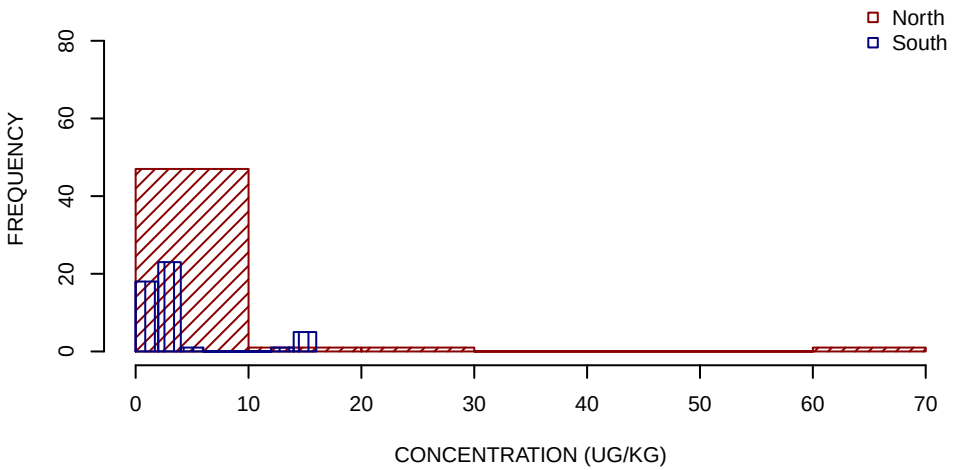


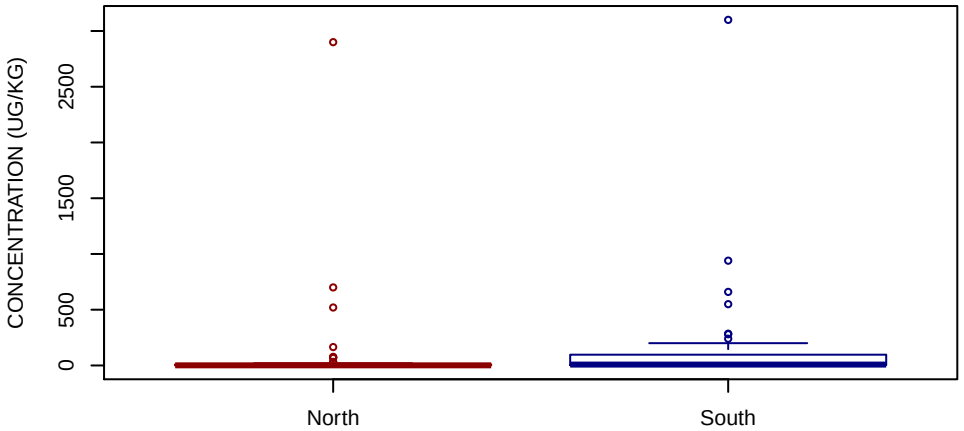
SUMMARY STATISTICS

	North	South
MINIMUM	0.09	0.09
25TH PERCENTILE	0.9	1
MEDIAN	1	3
MEAN	3.3	3.8
75TH PERCENTILE	1	3.2
MAXIMUM	65	16

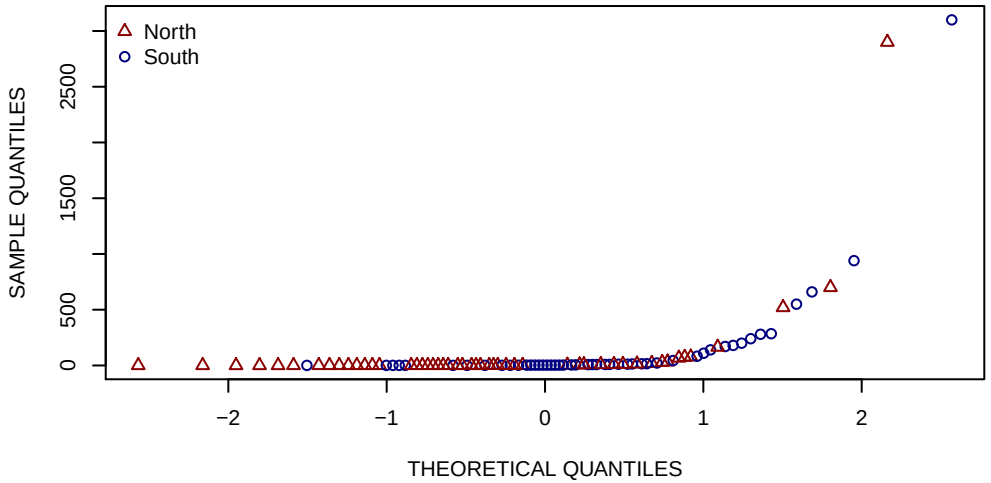
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ALPHA−CHLORDANE SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 24 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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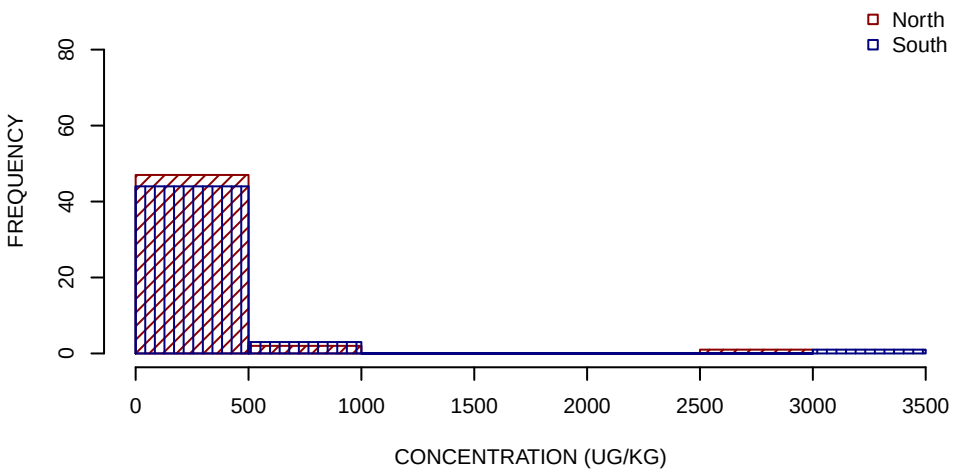


SUMMARY STATISTICS

	North	South
MINIMUM	0.06	0.78
25TH PERCENTILE	0.91	3
MEDIAN	1.1	7.9
MEAN	93	150
75TH PERCENTILE	9.8	90
MAXIMUM	2900	3100

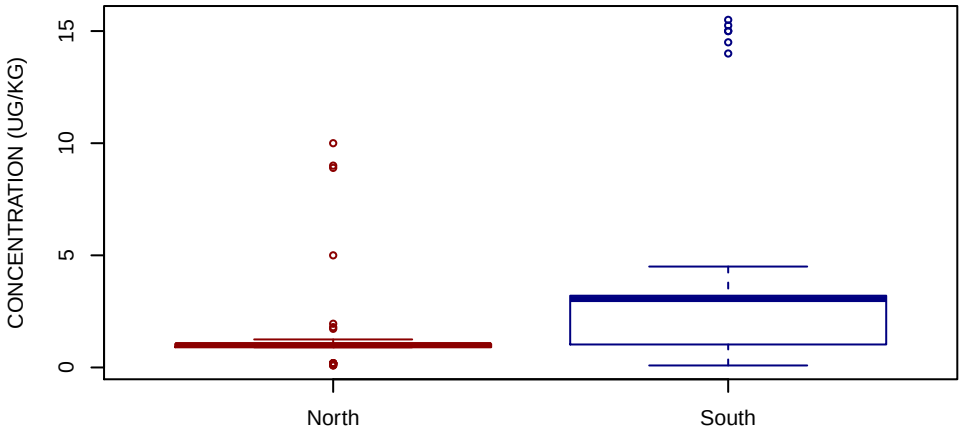
UNITS ARE UG/KG

1/2 DETECTION LIMIT USED FOR NON−DETECTS

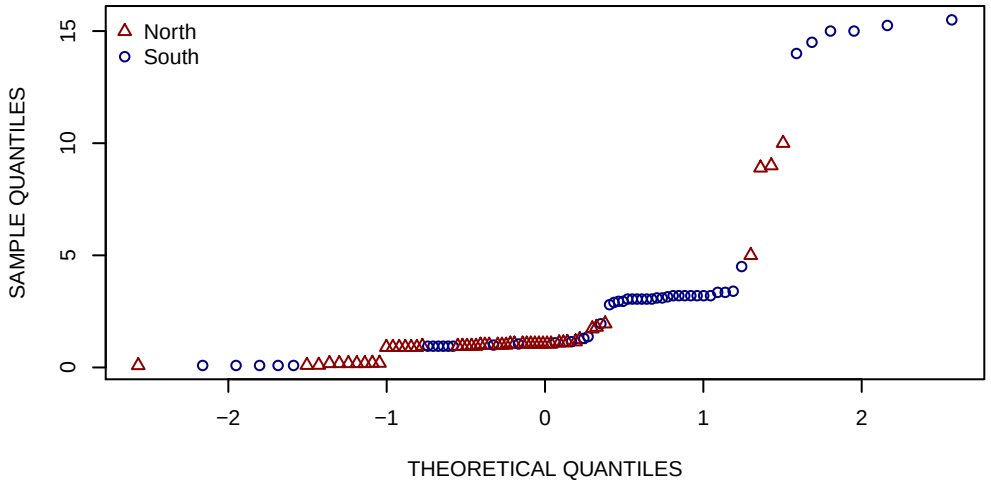
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

BETA−BHC SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 25 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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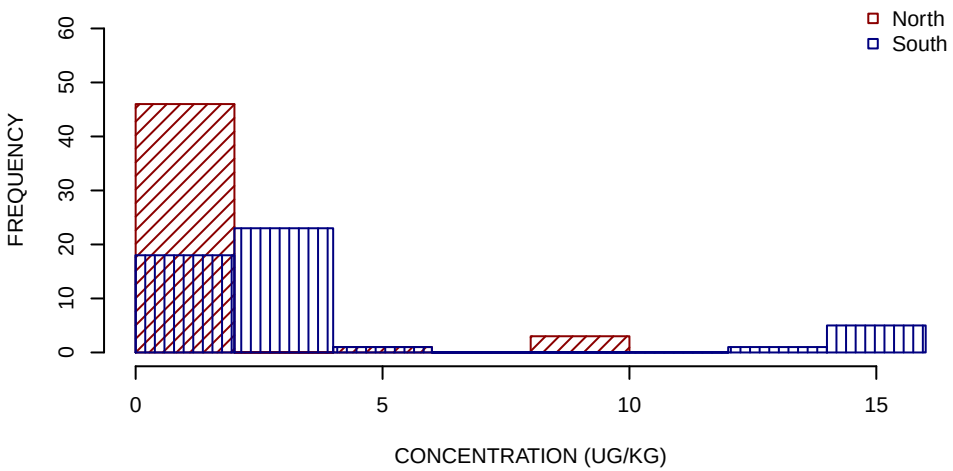


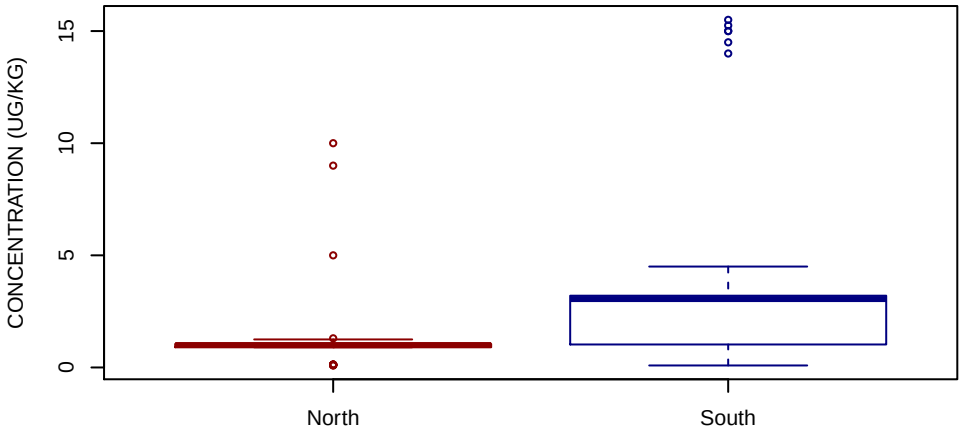
SUMMARY STATISTICS

	North	South
MINIMUM	0.09	0.09
25TH PERCENTILE	0.9	1
MEDIAN	1	3
MEAN	1.5	3.8
75TH PERCENTILE	1	3.2
MAXIMUM	10	16

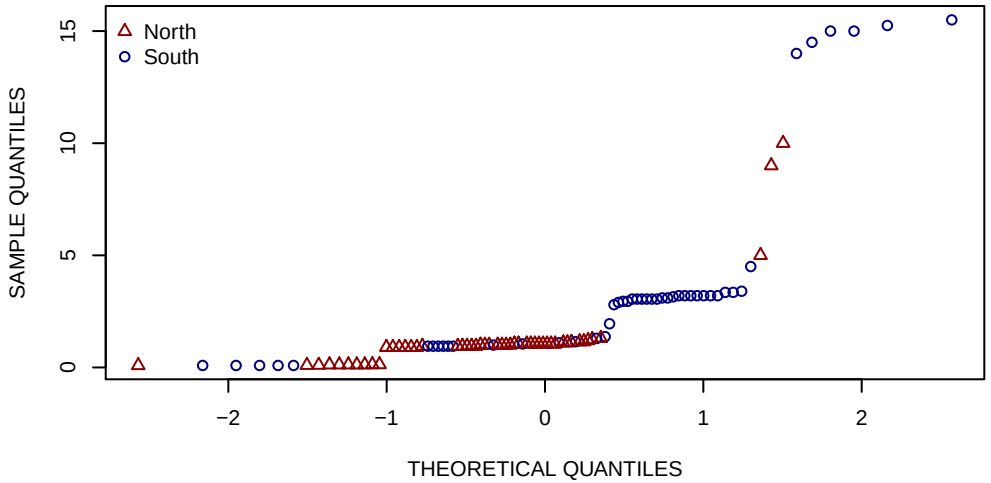
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

DELTA−BHC SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 26 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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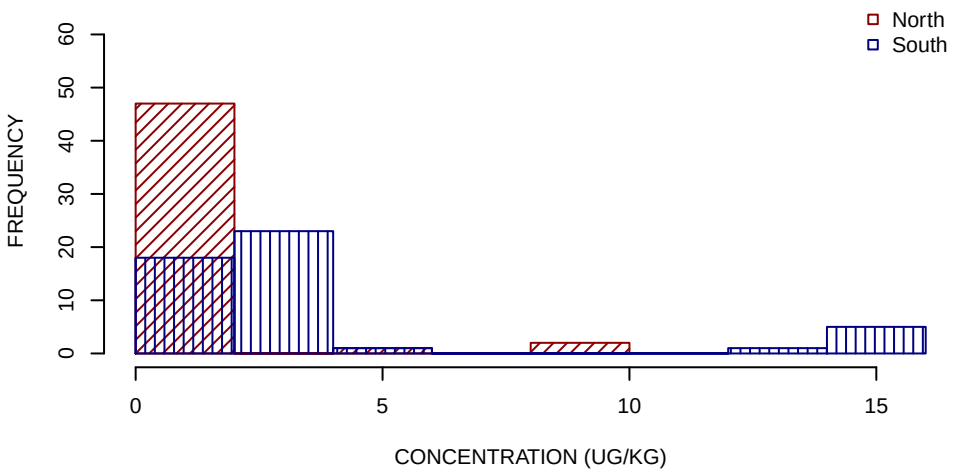


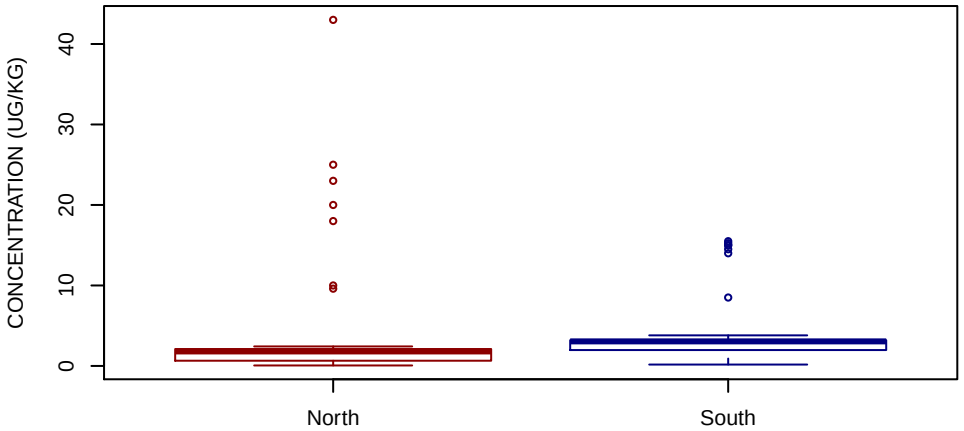
SUMMARY STATISTICS

	North	South
MINIMUM	0.09	0.09
25TH PERCENTILE	0.9	1
MEDIAN	1	3
MEAN	1.3	3.8
75TH PERCENTILE	1	3.2
MAXIMUM	10	16

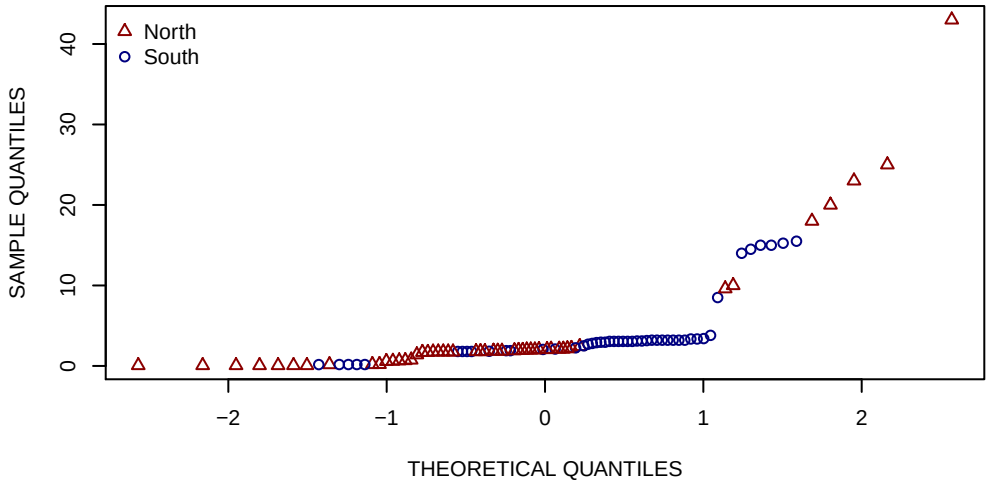
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

DIELDRIN SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 27 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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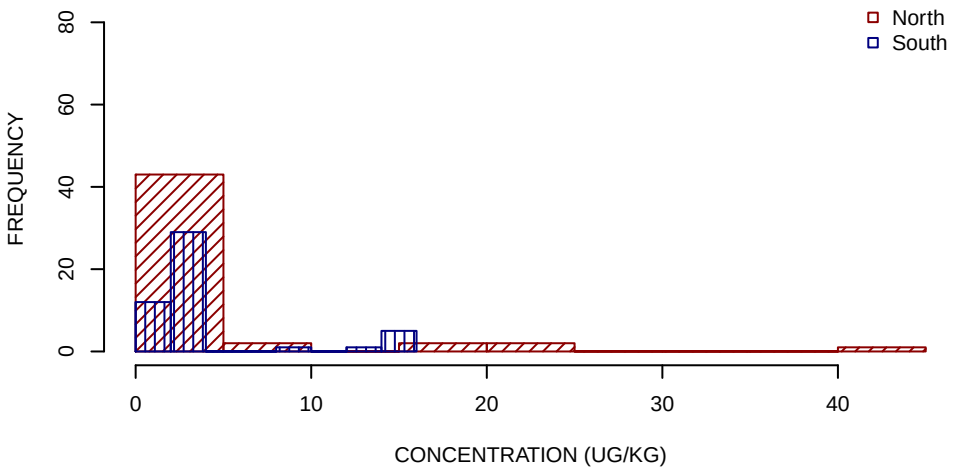


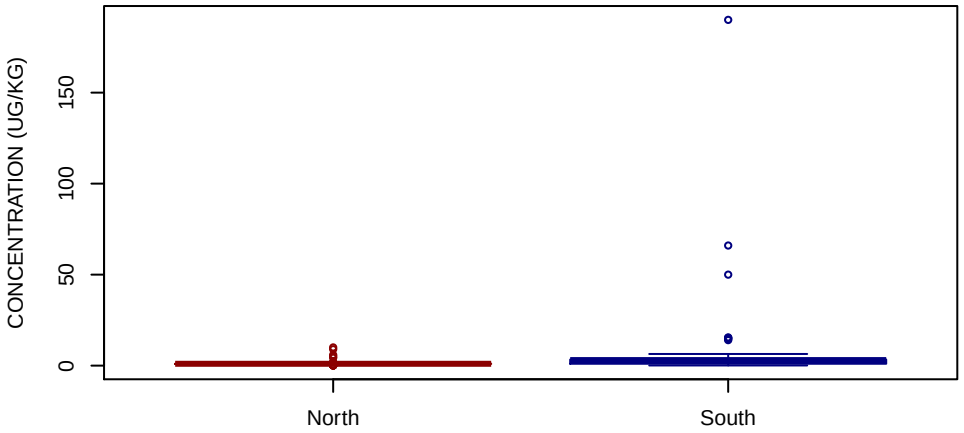
SUMMARY STATISTICS

	North	South
MINIMUM	0.06	0.17
25TH PERCENTILE	0.66	2
MEDIAN	1.8	3
MEAN	4.1	4.1
75TH PERCENTILE	2.1	3.2
MAXIMUM	43	16

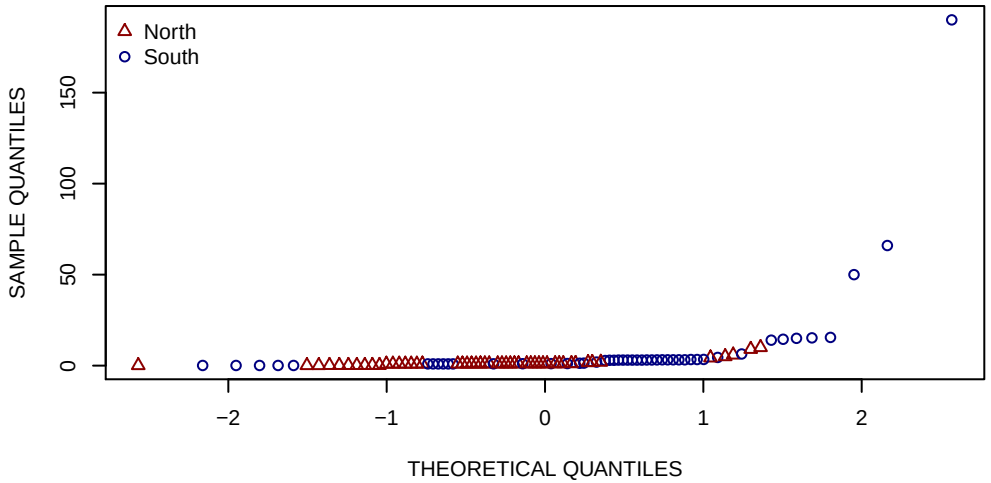
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ENDOSULFAN I SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 28 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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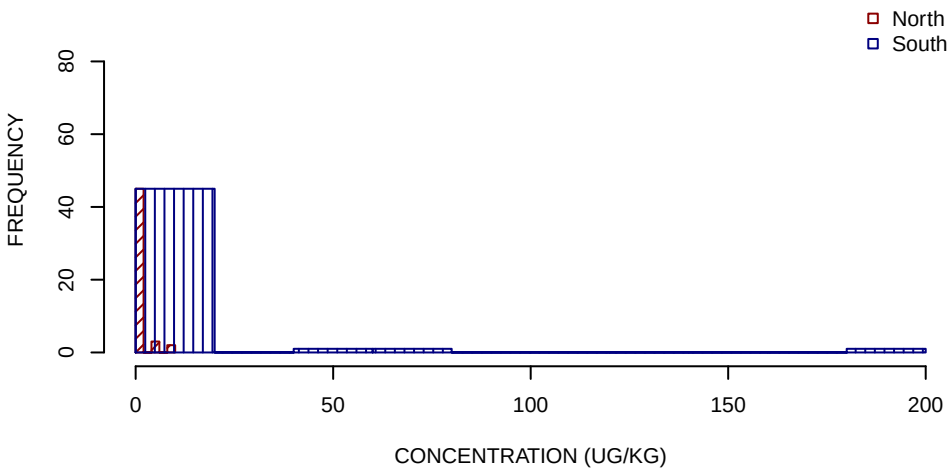


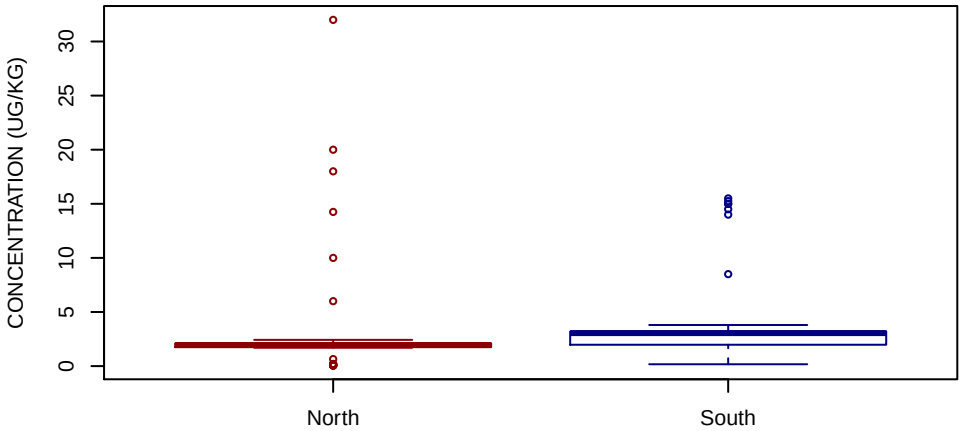
SUMMARY STATISTICS

	North	South
MINIMUM	0.09	0.09
25TH PERCENTILE	0.9	1
MEDIAN	1	3
MEAN	1.5	9.8
75TH PERCENTILE	1.1	3.4
MAXIMUM	10	190

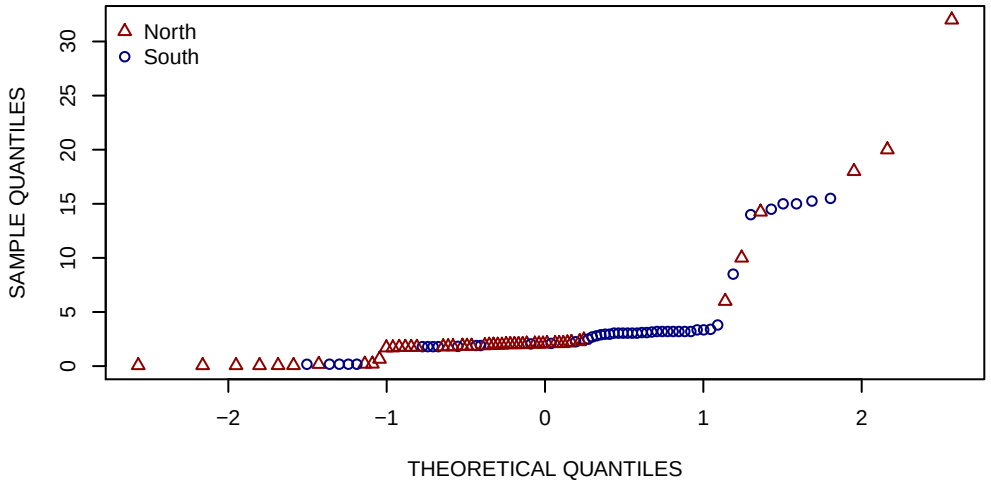
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ENDOSULFAN II SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 29 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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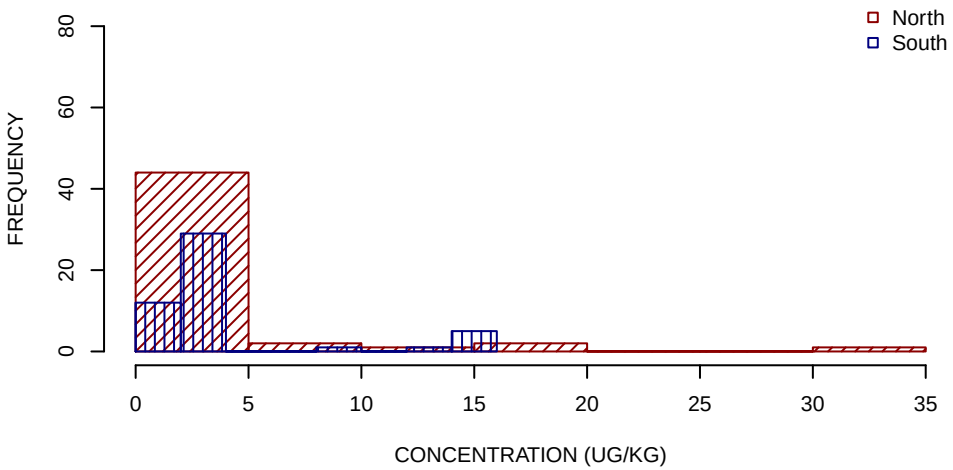


SUMMARY STATISTICS

	North	South
MINIMUM	0.06	0.17
25TH PERCENTILE	1.8	2
MEDIAN	2	3
MEAN	3.4	4.1
75TH PERCENTILE	2.1	3.2
MAXIMUM	32	16

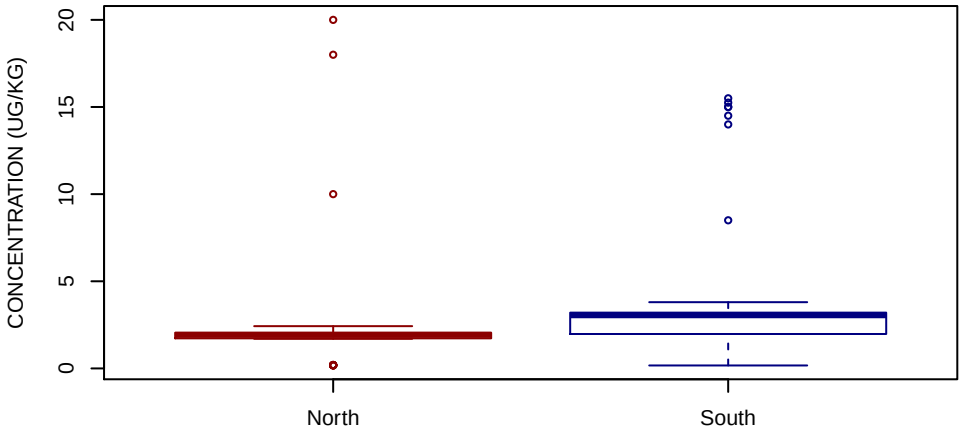
UNITS ARE UG/KG

1/2 DETECTION LIMIT USED FOR NON−DETECTS

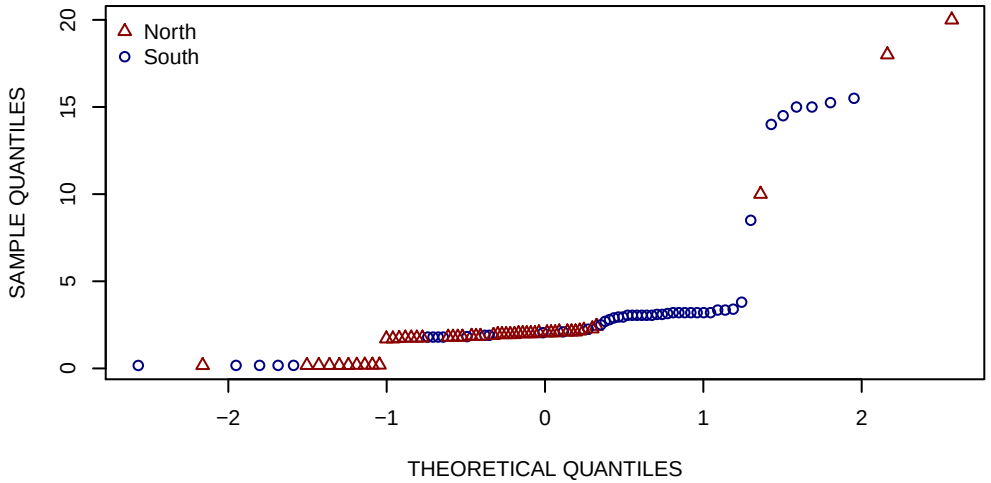
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ENDOSULFAN SULFATE SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 30 OF 41

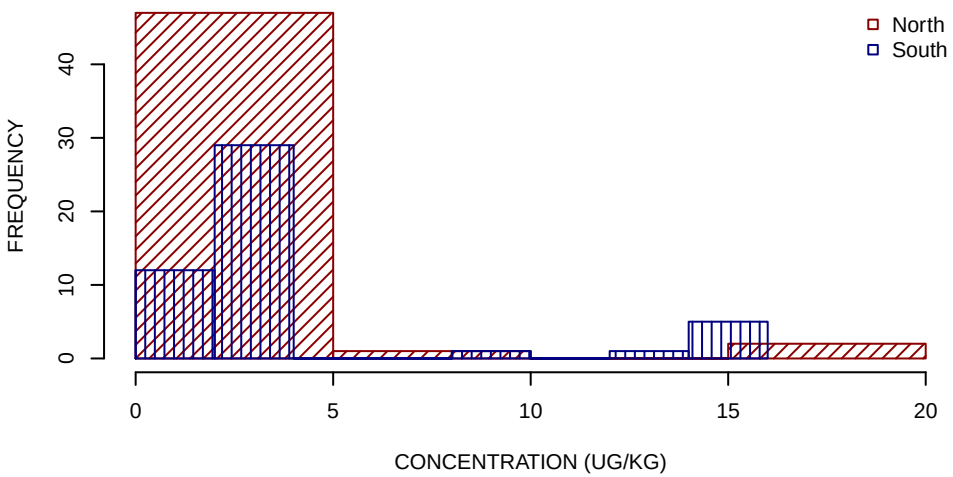
BOXPLOTS



NORMAL Q−Q PLOT



HISTOGRAMS



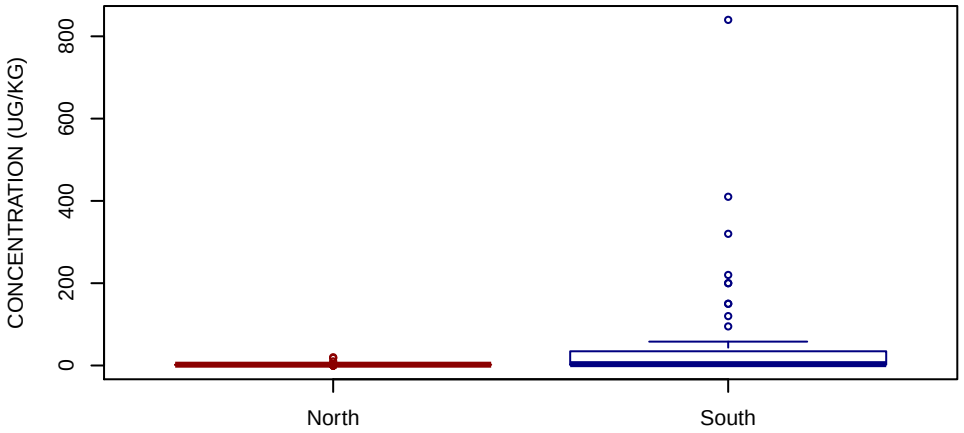
SUMMARY STATISTICS

	North	South
MINIMUM	0.18	0.17
25TH PERCENTILE	1.7	2
MEDIAN	1.9	3
MEAN	2.4	4.1
75TH PERCENTILE	2	3.2
MAXIMUM	20	16

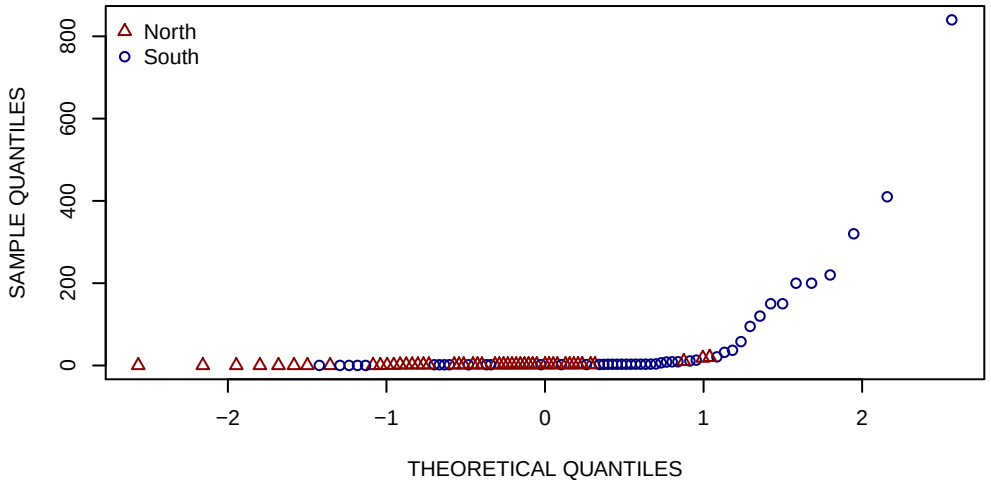
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ENDRIN SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 31 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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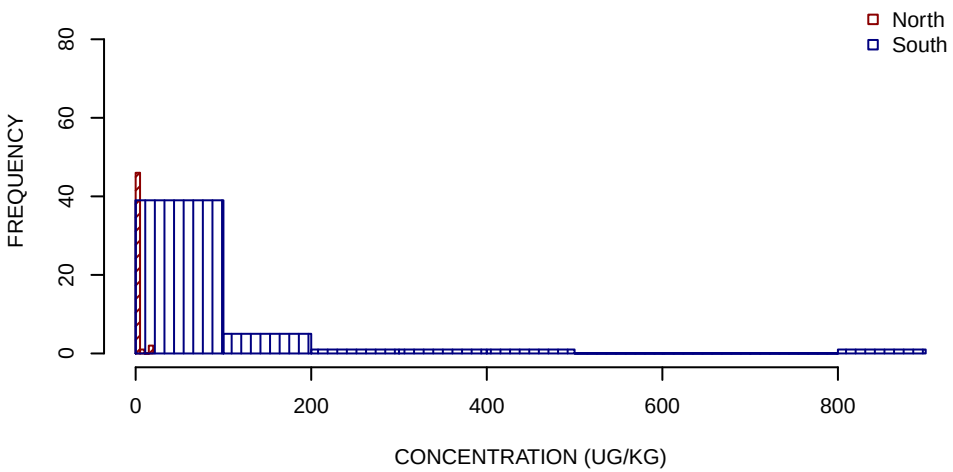


SUMMARY STATISTICS

	North	South
MINIMUM	0.06	0.17
25TH PERCENTILE	1.7	2
MEDIAN	1.9	3.2
MEAN	2.4	62
75TH PERCENTILE	2	33
MAXIMUM	20	840

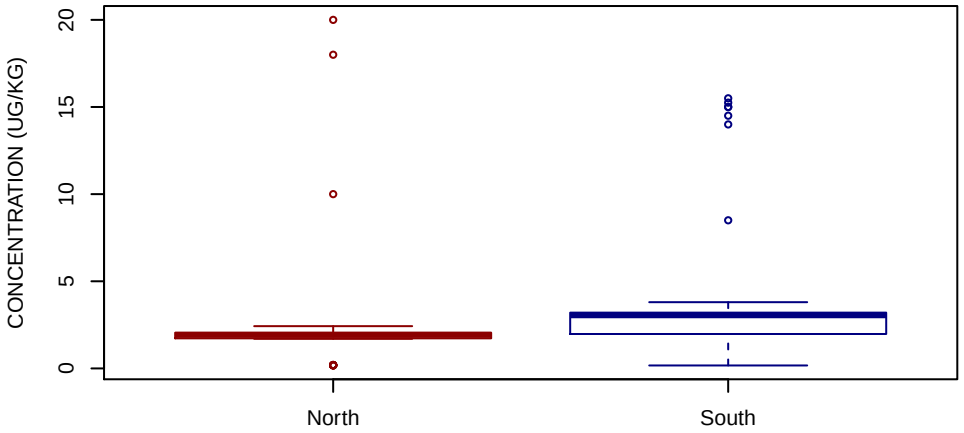
UNITS ARE UG/KG

1/2 DETECTION LIMIT USED FOR NON−DETECTS

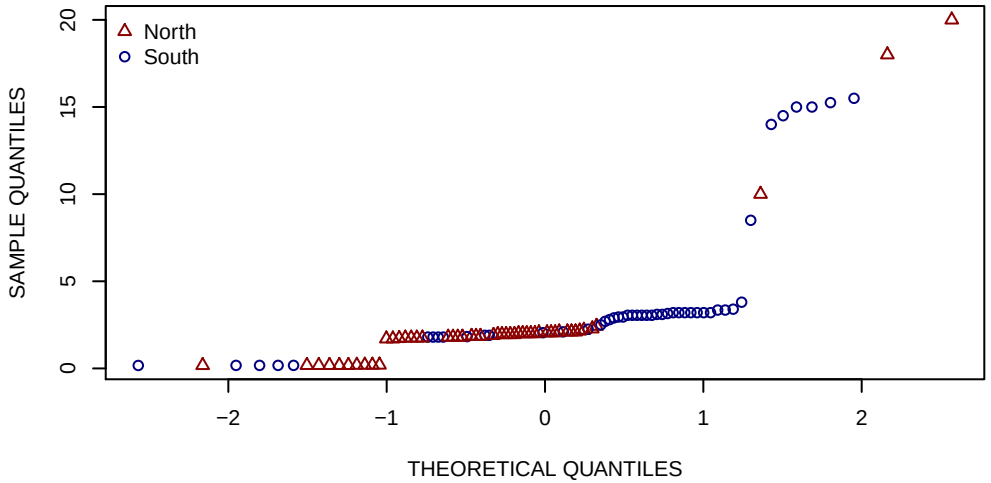
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ENDRIN ALDEHYDE SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 32 OF 41

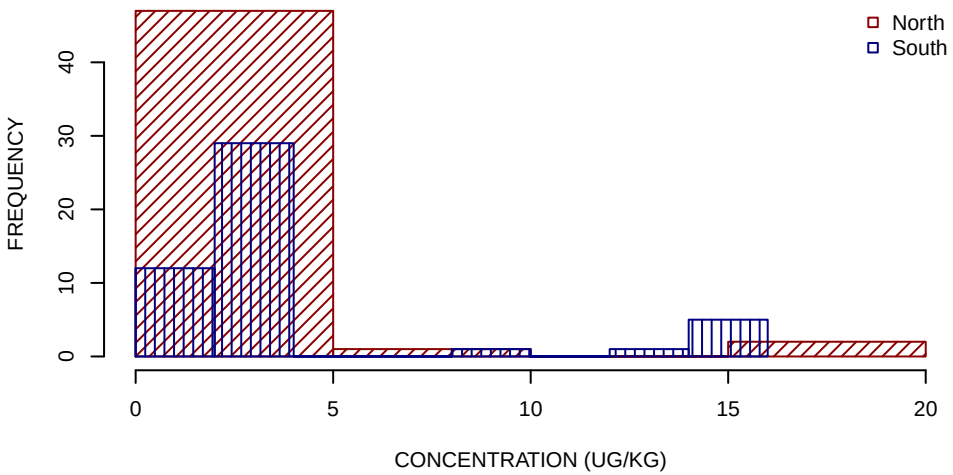
BOXPLOTS



NORMAL Q−Q PLOT



HISTOGRAMS



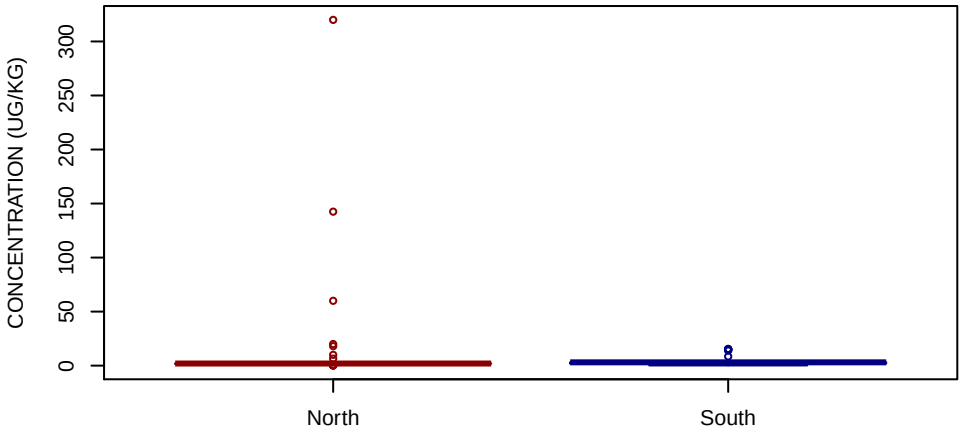
SUMMARY STATISTICS

	North	South
MINIMUM	0.18	0.17
25TH PERCENTILE	1.7	2
MEDIAN	1.9	3
MEAN	2.4	4.1
75TH PERCENTILE	2	3.2
MAXIMUM	20	16

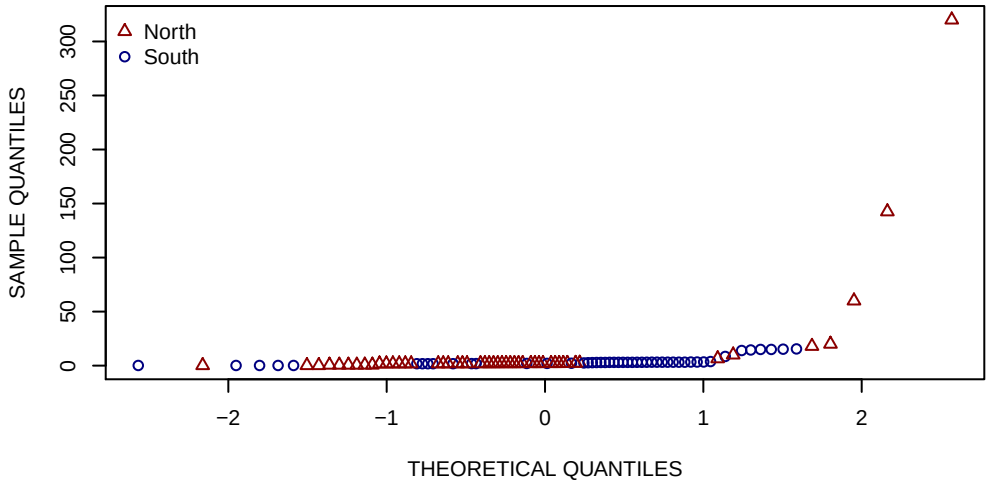
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ENDRIN KETONE SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 33 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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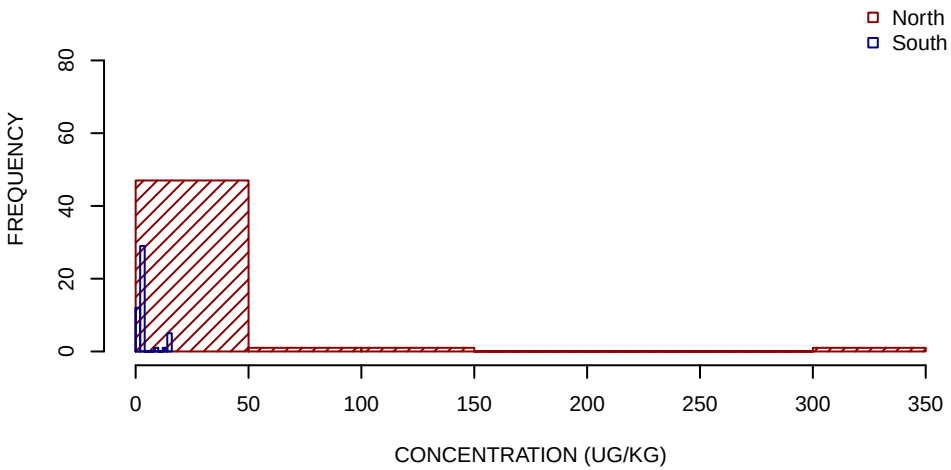


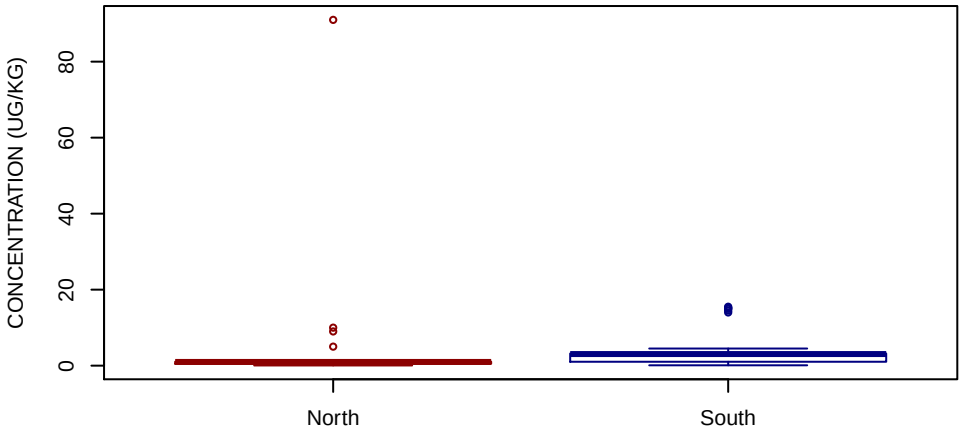
SUMMARY STATISTICS

	North	South
MINIMUM	0.18	0.17
25TH PERCENTILE	1.8	2
MEDIAN	2	3
MEAN	13	4.1
75TH PERCENTILE	2.1	3.2
MAXIMUM	320	16

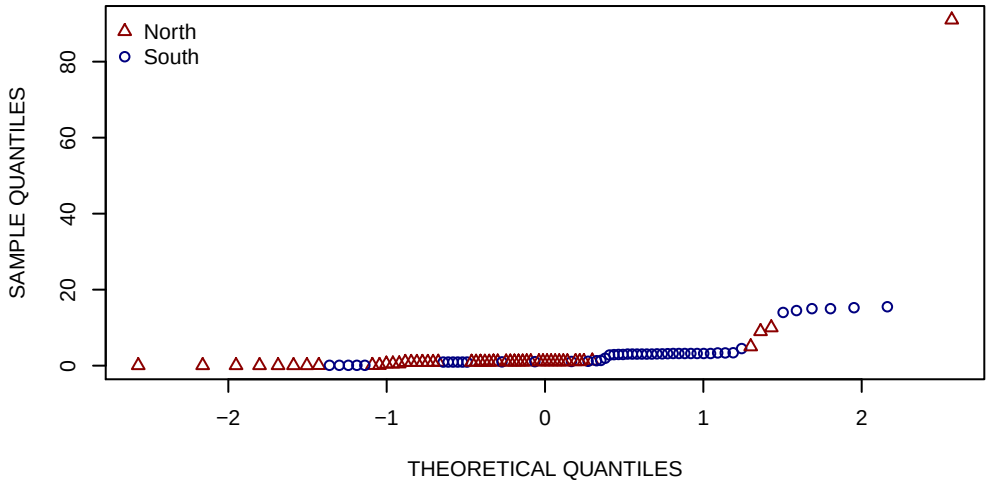
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

GAMMA−BHC (LINDANE) SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 34 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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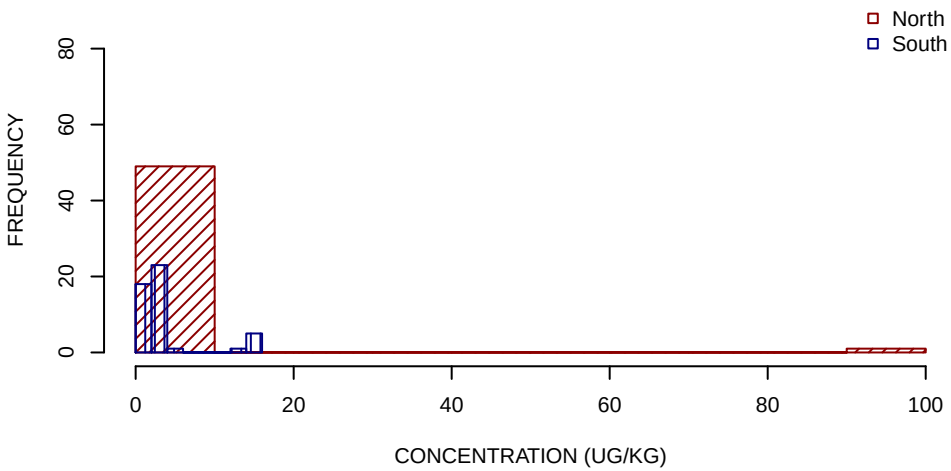


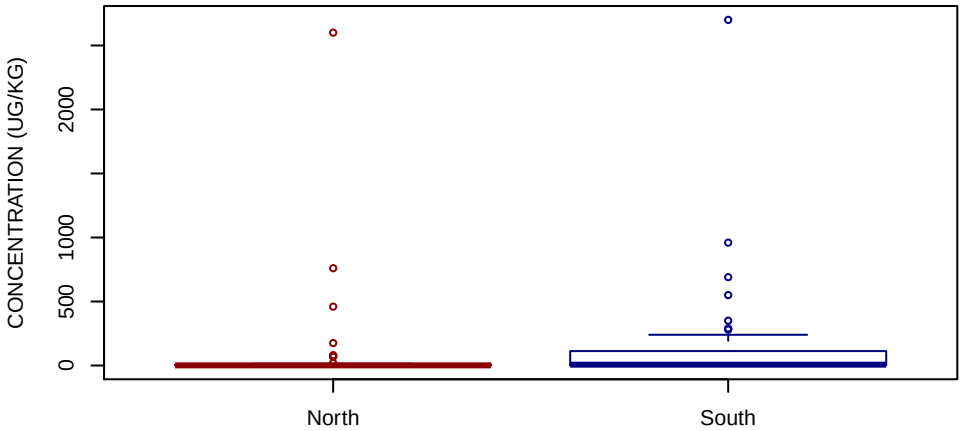
SUMMARY STATISTICS

	North	South
MINIMUM	0.05	0.09
25TH PERCENTILE	0.6	1
MEDIAN	0.98	3
MEAN	3	3.8
75TH PERCENTILE	1	3.2
MAXIMUM	91	16

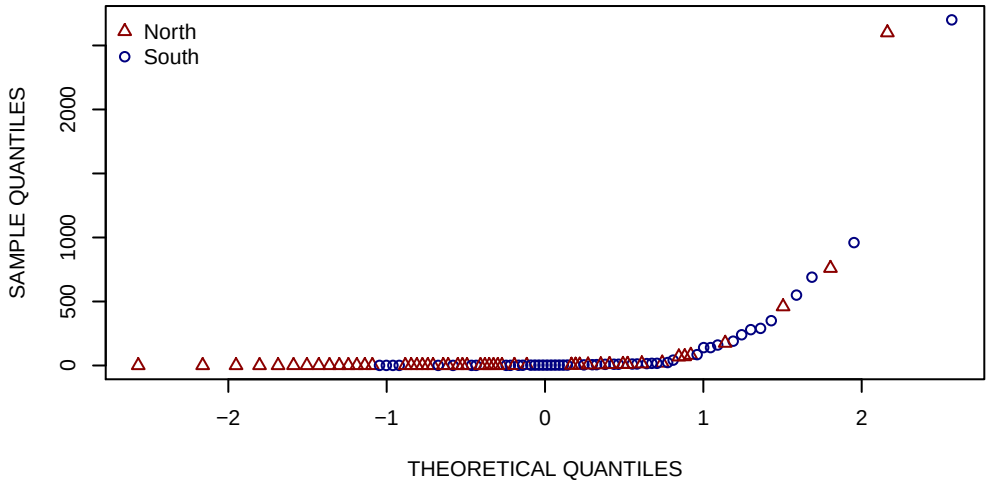
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

GAMMA−CHLORDANE SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 35 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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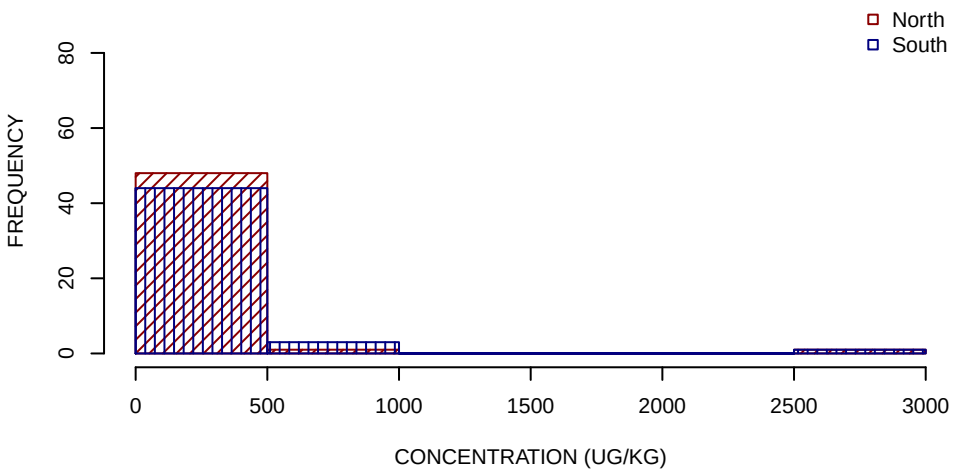


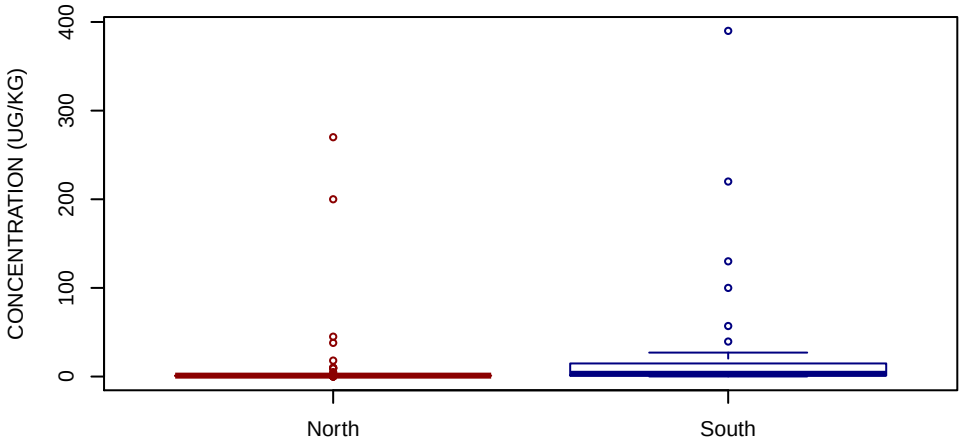
SUMMARY STATISTICS

	North	South
MINIMUM	0.36	0.95
25TH PERCENTILE	0.94	2.6
MEDIAN	1.1	6.5
MEAN	87	150
75TH PERCENTILE	6.3	99
MAXIMUM	2600	2700

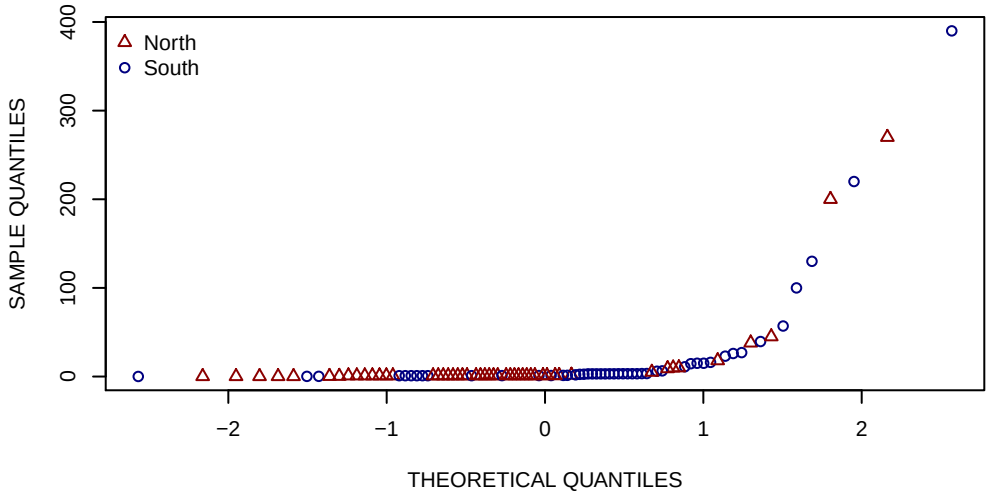
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

HEPTACHLOR SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 36 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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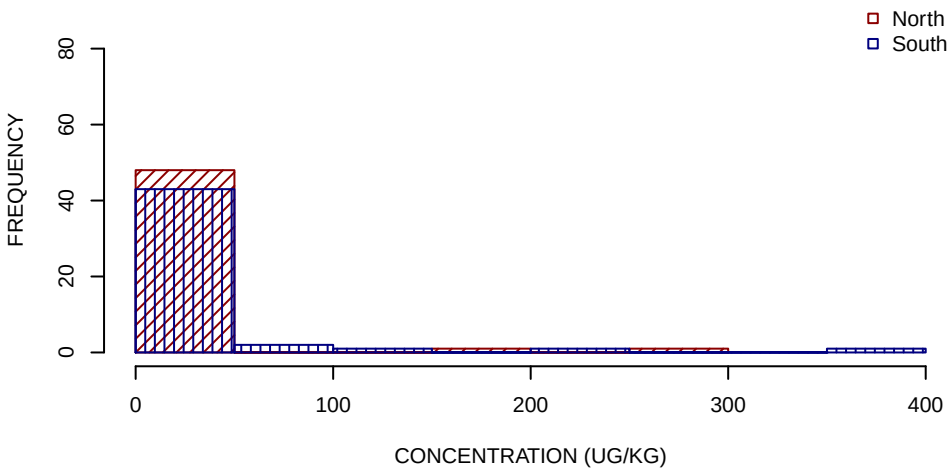


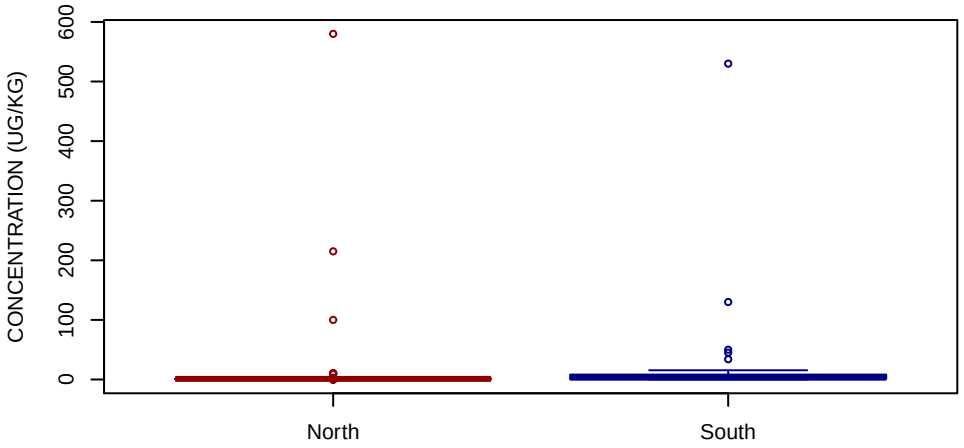
SUMMARY STATISTICS

	North	South
MINIMUM	0.12	0.09
25TH PERCENTILE	0.91	1.1
MEDIAN	1	3.1
MEAN	13	24
75TH PERCENTILE	1.1	15
MAXIMUM	270	390

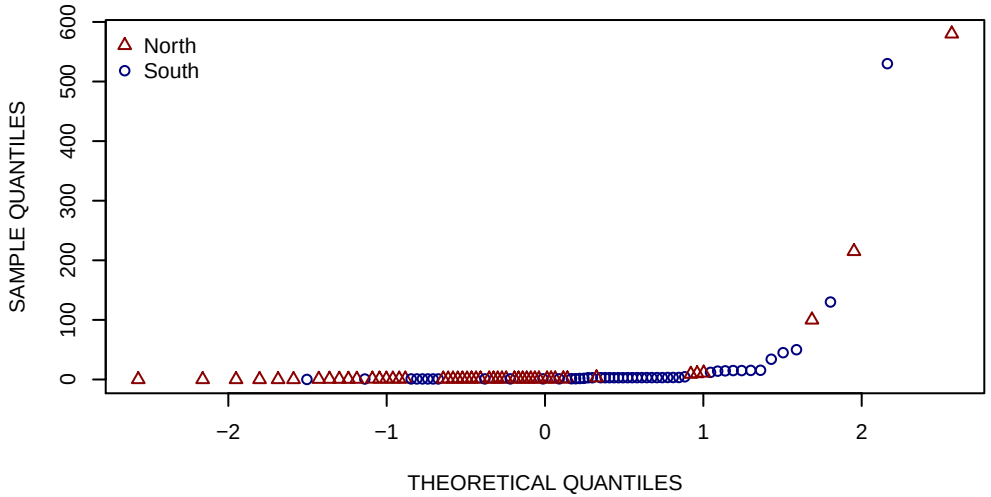
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

HEPTACHLOR EPOXIDE SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 37 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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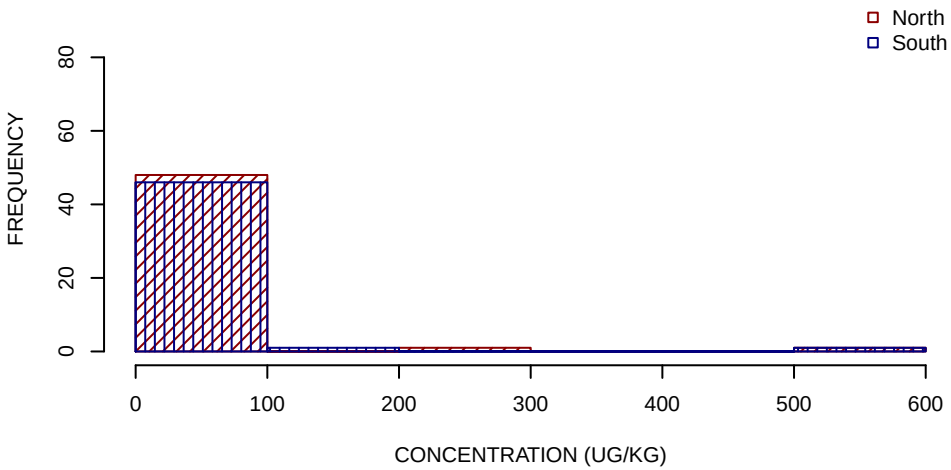


SUMMARY STATISTICS

	North	South
MINIMUM	0.06	0.09
25TH PERCENTILE	0.9	1.3
MEDIAN	1	3.1
MEAN	19	20
75TH PERCENTILE	1	6.4
MAXIMUM	580	530

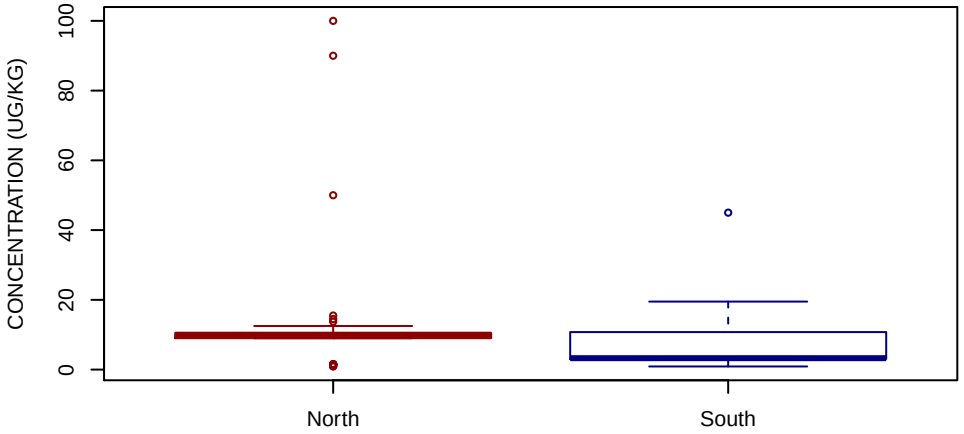
UNITS ARE UG/KG

1/2 DETECTION LIMIT USED FOR NON−DETECTS

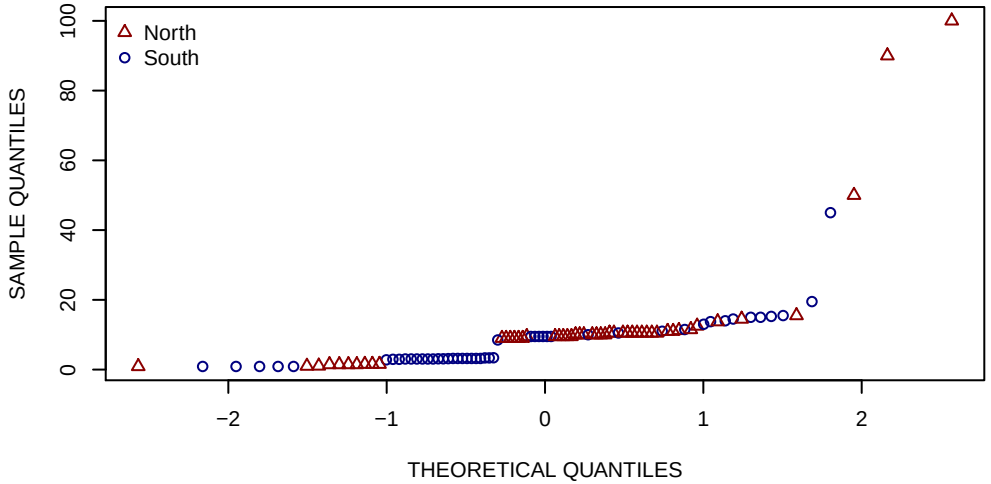
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

METHOXYCHLOR SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 38 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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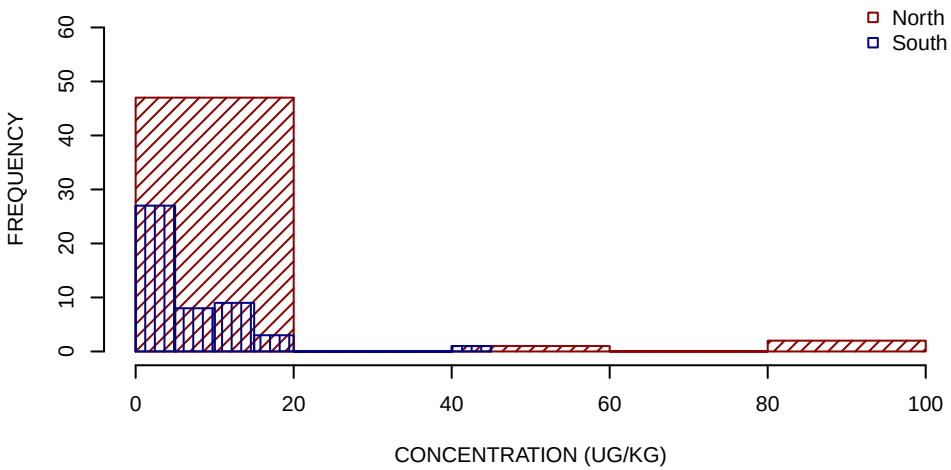


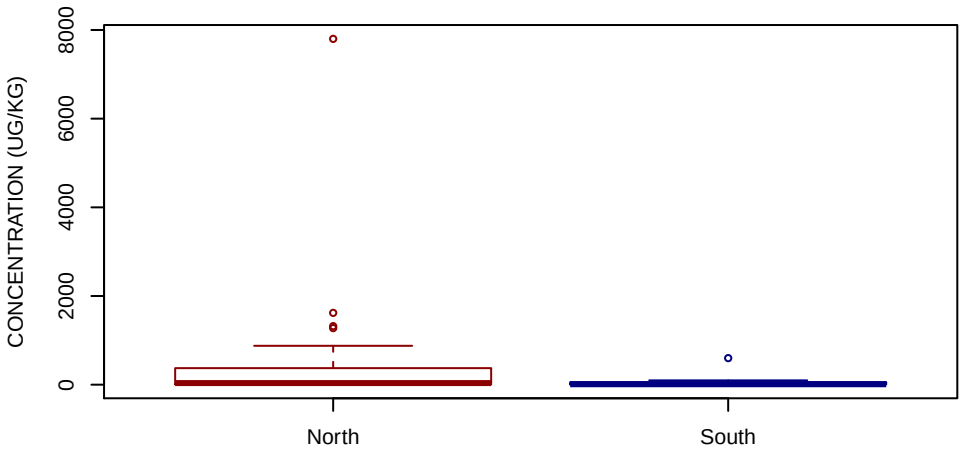
SUMMARY STATISTICS

	North	South
MINIMUM	0.9	0.9
25TH PERCENTILE	9	3
MEDIAN	10	3.3
MEAN	13	7.5
75TH PERCENTILE	10	11
MAXIMUM	100	45

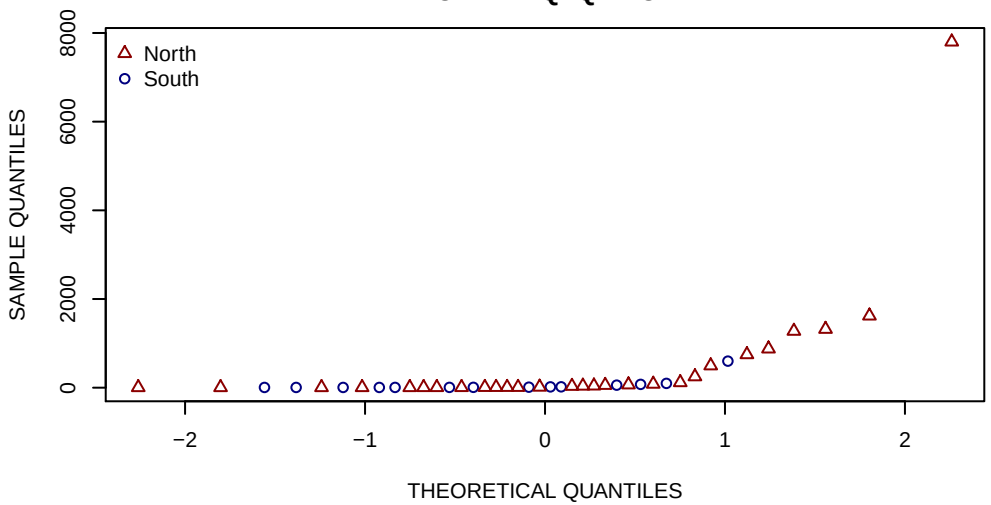
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

TOTAL DDT HALFND SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 39 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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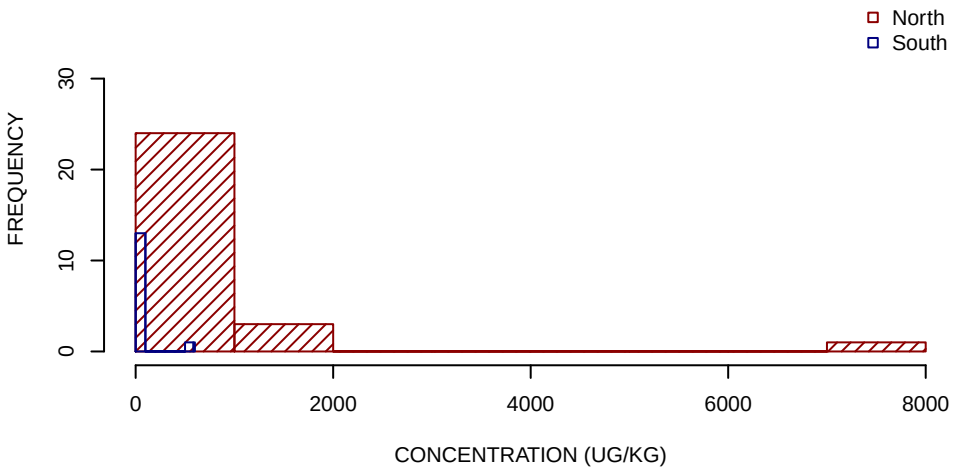


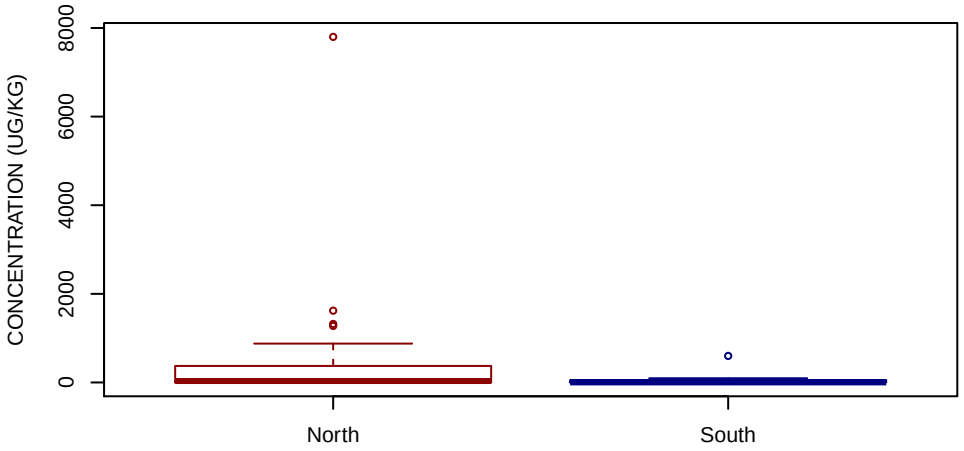
SUMMARY STATISTICS

	North	South
MINIMUM	5.1	5.4
25TH PERCENTILE	6.7	5.9
MEDIAN	36	9.8
MEAN	530	66
75TH PERCENTILE	310	48
MAXIMUM	7800	600

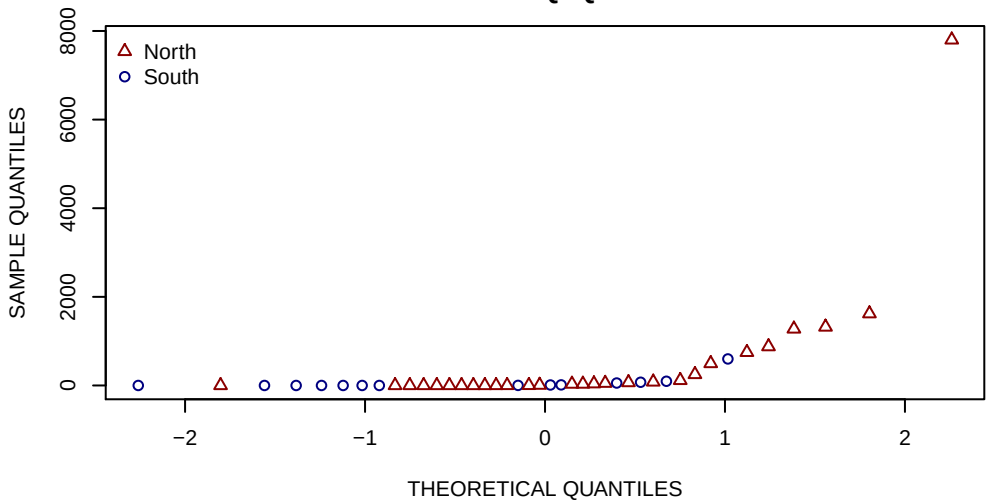
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

TOTAL DDT POS SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 40 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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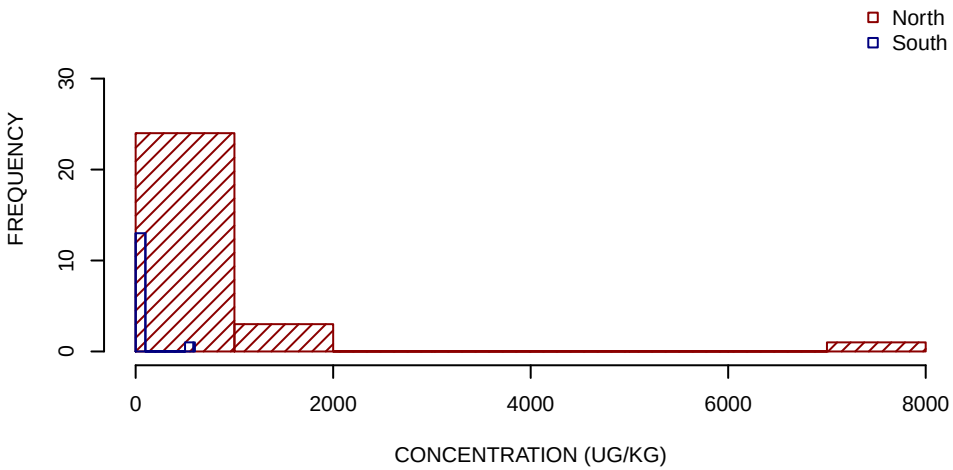


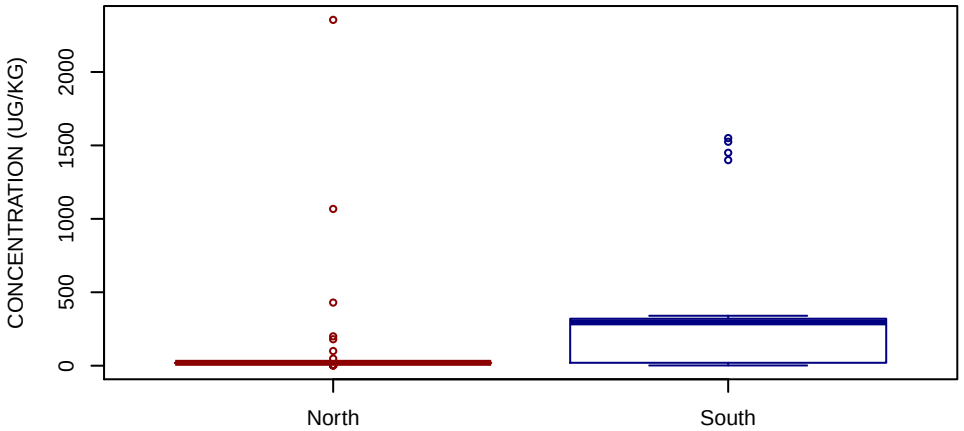
SUMMARY STATISTICS

	North	South
MINIMUM	0	0
25TH PERCENTILE	0	0
MEDIAN	32	0.9
MEAN	530	61
75TH PERCENTILE	310	45
MAXIMUM	7800	600

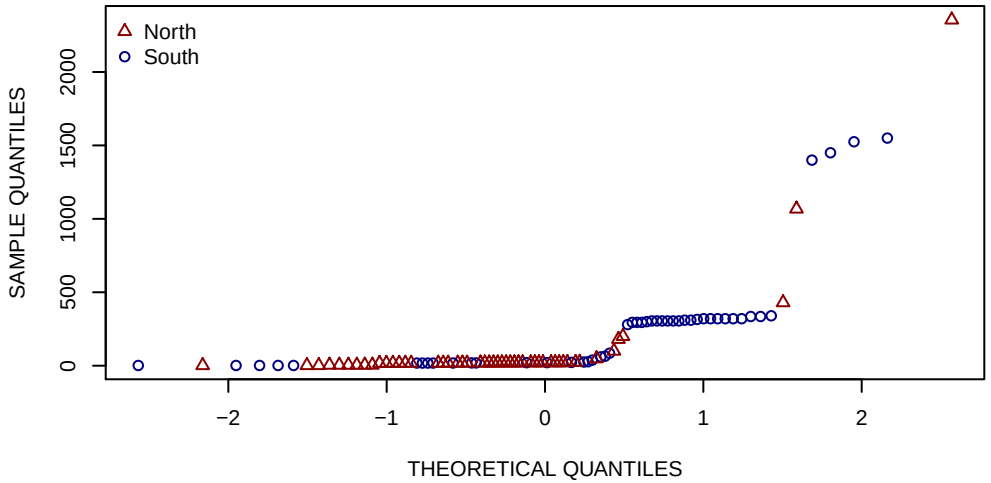
UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

TOXAPHENE SUBSURFACE SOIL GRAPHICAL DISPLAYS
SITE 17
NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE
FIGURE 41 OF 41

BOXPLOTS



NORMAL Q−Q PLOT



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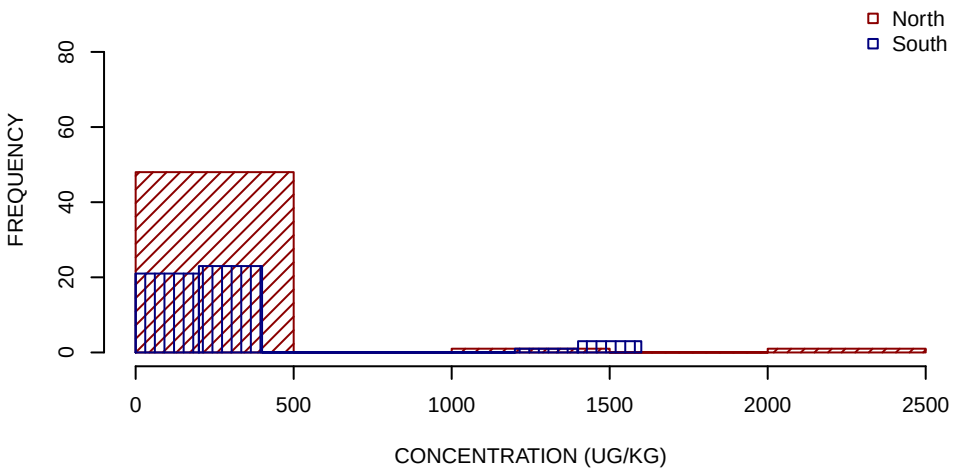


SUMMARY STATISTICS

	North	South
MINIMUM	1.7	1.6
25TH PERCENTILE	18	20
MEDIAN	20	300
MEAN	100	280
75TH PERCENTILE	21	320
MAXIMUM	2400	1600

UNITS ARE UG/KG
1/2 DETECTION LIMIT USED FOR NON−DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

E.6 TECHNICAL MEMORANDUM SITE 17 SOIL BACKGROUND DATASET DETERMINATION

TECHNICAL MEMORANDUM

SITE 17 SOIL BACKGROUND DATASET DETERMINATION

NAVAL AIR STATION, BRUNWICK, MAINE

MARCH 18, 2011

The Navy would like to discuss the selection of soil background datasets for comparison to site-specific soil datasets at NAS Brunswick Site 17. As part of the Site 17 risk assessment, background datasets will be compared to site-specific datasets in order to determine if chemical contaminants are within facility background. Three soil background datasets exist for NAS Brunswick including the Upper Sand, Transition Unit, and Mixed Soils datasets. The Upper Sand unit generally occurs at or near ground surface and consists of fine to medium sand with varying minor amounts of silt. Transition Unit soils underlie the Upper Sand Unit and consist of fine sand and silt with interbedded clay. The Mixed Soils background dataset combines both the Upper Sand and Transition Unit background soil datasets. The purpose of the Mixed Soils background dataset is to represent facility background for areas where the soil has been disturbed or filling has occurred.

The State of Maine had previously expressed on a conference call pertaining to the Draft Site 17 Remedial Investigation (RI) that most of the site soil seemed to be in the Upper Sand unit and therefore the Upper Sand background dataset should be used for comparison to site-specific data. However, several soil removal actions have occurred within the site and some fairly extensive soil removal/backfilling activities have occurred, particularly for shallow soils. In 1994, removal actions occurred resulting in the removal of approximately 1,350 cubic yards of soil. The majority of those excavations extended to a depth of 1 to 2 feet (ft) below ground surface (bgs). In July 2009, approximately 60 cubic yards of soil was excavated south of Avenue B to a depth of approximately 3 ft bgs. In December 2010, approximately 90 cubic yards was excavated to a depth of approximately 6 ft bgs north of Avenue B. Figure 1 shows the approximate extent of those excavations.

According to site boring logs, see tables 1 and 2[1], fill is also present in areas where removal actions have not occurred (most notably in the dog kennel training area north of the site). Furthermore, it appears that there is a general correlation between the presence of fill and relatively high levels of arsenic (8+ mg/kg), most notably in the dog kennel training area, where the two highest levels of arsenic were

[1] Tables 1 and 2 attached to this document are lists of surface and subsurface soil sample locations and the associated soil types.

found in surface soil samples (from borings (102 and 103, also 104 was relatively high in arsenic). These samples were discussed in the boring logs as fill that has a combination of fine sand and silt (which is similar to transition soils) and fine-medium sand (which is similar to upper sand soils), implying a soil sample that is a mix of multiple soil types.

Two sample hypothesis tests (Wilcoxon Rank Sum and Gehan) were computed to determine if concentrations in fill samples are statistically different from concentrations in the rest of the site. The hypothesis tests computed compare median concentrations from each data set (fill data set and all other site soils data set) to determine if the concentrations of a given analyte in fill is statistically different at a given confidence level from concentrations of the same analyte in the all other site soils. Two sample hypothesis tests were computed for all inorganic analytes with at least five positive detected results. Results of the hypothesis tests conclude that all inorganic analyte concentrations, expect copper, lead, and zinc, in fill are different than corresponding concentrations in all other site soils at the 75-percent confidence level at a minimum. Several analytes concentrations in fill, such as arsenic, are statistically different than concentrations of all other site soils at the 95-percent confidence level. The presence of 14 inorganic analytes (including arsenic) in fill samples at concentrations different from other (non-fill) site soils implies that the elevated arsenic is not site-related but is more likely a function of the differing soil type (i.e. fill). Results of the two sample hypothesis tests are presented in Table 3.

The observations and statistical tests described above suggest that concentrations of analytes in fill material are different than corresponding concentrations in all other site soils. The Navy believes that the Upper Sand and Transition Unit background datasets are not representative of Site 17 soils containing fill material. Therefore, the Mixed Soils background dataset is proposed as the best alternative dataset for comparison to site-specific data at Site 17, particularly with regard to samples containing fill material. The Navy requests a conference call to reach an agreement with regulatory agencies on the selection of a background dataset for Site 17 prior to finalization of the risk assessment and submittal of the Final RI.

Table 1
Surface Soil Sample Location and Soil Type List
Site 17 Soil Background Determination Technical Memorandum
NAS Brunswick, Brunswick, Maine

LOCATION	SAMPLE ID	TOP DEPTH (feet)	BOTTOM DEPTH (feet)	ARSENIC (mg/kg)	Soil Type
SB-17-101	SB-17-101-0001	0	1	2	Topsoil/Fill
SB-17-102	SB-17-102-0001	0	1	10.7	Topsoil/Fill
SB-17-103	SB-17-103-0001	0	1	18.2	Topsoil/Fill
SB-17-104	SB-17-104-0001	0	1	9.4	Topsoil/Fill
SB-17-105	SB-17-105-0001	0	1	1.4	Topsoil/Upper Sand
SB-17-105	SB-17-105-0001-AVG	0	1	1.5	Topsoil/Upper Sand
SB-17-105	SB-17-105-0001-D	0	1	1.6	Topsoil/Upper Sand
SB-17-106	SB-17-106-0001	0	1	2.4	Topsoil/Upper Sand
SB-17-107	SB-17-107-0001	0	1	7.8	Topsoil/Upper Sand
SB-17-108	SB-17-108-0001	0	1	5.2	Topsoil/Upper Sand
SB-17-109	SB-17-109-0001	0	1	1.8	Topsoil/UpperSand
SB-17-112	SB-17-112-0001	0	1	9.4	Fill
SB-17-113	SB-17-113-0001	0	1	8.3	Topsoil/Upper Sand
SB-17-114	SB-17-114-0001	0	1	1.8	Topsoil/Upper Sand
SB-17-118	SB-17-118-0001	0	1	6.8	Topsoil/Upper Sand
SB-17-123	SB-17-123-0001	0	1	9.1 J	Fill
SB-17-124	SB-17-124-0001	0	1	8.6	Topsoil/Fill
SB-17-125	SB-17-125-0001	0	1	5.6 J	Topsoil/Upper Sand
SB-17-126	SB-17-126-0001	0	1	3 J	Topsoil/Upper Sand
SB-17-130	SB-17-130-0001	0	1	5.9 J	Topsoil/Upper Sand
SB-17-131	SB-17-131-0001	0	1	6.8 J	Topsoil
SB-17-132	SB-17-132-0001	0	1	6.9 J	Fill
SB-17-133	SB-17-133-0001	0	1	7.9 J	Topsoil/Fill
SB-17-206	SB-17-206-0001	0	1	3.9	Upper Sand
SB-17-207	SB-17-207-0001	0	1	6.4	Upper Sand
SB-17-208	SB-17-208-0001	0	1	7.5	Upper Sand
SB-17-209	SB-17-209-0001	0	1	6.3	Upper Sand
SB-17-210	SB-17-210-0001	0	1	7.1	Upper Sand

Table 2
Subsurface Soil Sample Location and Soil Type List
Site 17 Soil Background Determination Technical Memorandum
NAS Brunswick, Brunswick, Maine

LOCATION	SAMPLE ID	TOP DEPTH (feet)	BOTTOM DEPTH (feet)	ARSENIC (mg/kg)	Soil Type
S17-SS-04	S17-SS-04	2.4	2.7	--	Reworked - Test Pit
S17-SS-05	S17-SS-05	3.5	3.7	--	Reworked - Test Pit
S17-SS-06	S17-SS-06	2.2	2.4	--	Reworked - Test Pit
S17-SS-09	S17-SS-09	2	2.2	--	Reworked - Test Pit
SB-17-101	SB-17-101-0104	1	4	1.3	Fill
SB-17-102	SB-17-102-0104	1	4	4.6	Fill
SB-17-103	SB-17-103-0104	1	4	6.1	Fill
SB-17-104	SB-17-104-0104	1	4	8.1	Fill
SB-17-105	SB-17-105-0104	1	4	1.5	Upper Sand
SB-17-106	SB-17-106-0104	1	4	1.7	Upper Sand
SB-17-107	SB-17-107-0104	1	4	6.8	Upper Sand
SB-17-107	SB-17-107-0408	4	8	1.5	Upper Sand
SB-17-108	SB-17-108-0104	1	4	3.1	Upper Sand
SB-17-109	SB-17-109-0104	1	4	1.4	Upper Sand
SB-17-110	SB-17-110-0104	1	4	2.2	Upper Sand
SB-17-111	SB-17-111-0104	1	4	3.4	Upper Sand
SB-17-112	SB-17-112-0104	1	4	2.2	Upper Sand
SB-17-113	SB-17-113-0104	1	4	4.1	Upper Sand
SB-17-114	SB-17-114-0104	1	4	1.8	Upper Sand
SB-17-115	SB-17-115-0710	7	10	1.1	Upper Sand
SB-17-116	SB-17-116-0407	4	7	1.5	Upper Sand
SB-17-117	SB-17-117-0104	1	4	3	Upper Sand
SB-17-118	SB-17-118-0104	1	4	3.2	Upper Sand
SB-17-119	SB-17-119-0104	1	4	1.4	Upper Sand
SB-17-120	SB-17-120-0205	2	5	2.2	Upper Sand /Peat
SB-17-120	SB-17-120-0205-AVG	2	5	2	Upper Sand /Peat
SB-17-120	SB-17-120-0205-D	2	5	1.8	Upper Sand /Peat
SB-17-121	SB-17-121-0710	7	10	1.1	Upper Sand
SB-17-121	SB-17-121-1215	12	15	5.2	Upper Sand/ Transition Unit
SB-17-122	SB-17-122-0407	4	7	1.5	Upper Sand
SB-17-122	SB-17-122-0407-AVG	4	7	1.4	Upper Sand
SB-17-122	SB-17-122-0407-D	4	7	1.3	Upper Sand
SB-17-123	SB-17-123-0104	1	4	1.4 J	Fill/Upper Sand
SB-17-124	SB-17-124-0104	1	4	4.2	Fill/Upper Sand
SB-17-125	SB-17-125-0104	1	4	2.7 J	Upper Sand
SB-17-125	SB-17-125-0608	6	8	0.89 UJ	Upper Sand
SB-17-126	SB-17-126-0104	1	4	1.6 J	Upper Sand
SB-17-127	SB-17-127-0306	3	6	0.99 UJ	Upper Sand
SB-17-128	SB-17-128-0506	5	6	1.4 J	Upper Sand /Peat
SB-17-129	SB-17-129-0306	3	6	2 J	Upper Sand /Peat
SB-17-129	SB-17-129-0306-AVG	3	6	5.35 J	Upper Sand /Peat
SB-17-129	SB-17-129-0306-D	3	6	8.7 J	Upper Sand /Peat
SB-17-130	SB-17-130-0104	1	4	1.7 J	Upper Sand
SB-17-131	SB-17-131-0104	1	4	6 J	Upper Sand
SB-17-132	SB-17-132-0104	1	4	3.4 J	Fill
SB-17-132	SB-17-132-0104-AVG	1	4	3.5 J	Fill

Table 2
Subsurface Soil Sample Location and Soil Type List
Site 17 Soil Background Determination Technical Memorandum
NAS Brunswick, Brunswick, Maine

LOCATION	SAMPLE ID	TOP DEPTH (feet)	BOTTOM DEPTH (feet)	ARSENIC (mg/kg)	Soil Type
SB-17-132	SB-17-132-0104-D	1	4	3.6 J	Fill
SB-17-132	SB-17-132-0408	4	8	4.4	Upper Sand / Peat
SB-17-132	SB-17-132-0408-AVG	4	8	4	Upper Sand / Peat
SB-17-132	SB-17-132-0408-D	4	8	3.6	Upper Sand / Peat
SB-17-133	SB-17-133-0104	1	4	2 J	Fill
SB-17-141	SB-17-141-0307	3	7	1.9	Upper Sand / Peat
SB-17-142	SB-17-142-0203-D	2	3	--	Upper Sand
SB-17-142	SB-17-142-0203	2	3	--	Upper Sand
SB-17-142	SB-17-142-0203-AVG	2	3	--	Upper Sand
SB-17-143	SB-17-143-0203	2	3	--	Upper Sand
SB-17-144	SB-17-144-0203	2	3	--	Upper Sand
SB-17-145	SB-17-145-0203	2	3	--	Upper Sand
SB-17-146	SB-17-146-0104	1	4	--	Upper Sand
SB-17-147	SB-17-147-0104	1	4	--	Upper Sand
SB-17-148	SB-17-148-0104	1	4	--	Upper Sand / Peat
SB-17-149	SB-17-149-0104	1	4	--	Upper Sand
SB-17-150	SB-17-150-0205	2	5	--	Upper Sand
SB-17-151	SB-17-151-0205	2	5	--	Upper Sand
SB-17-152	SB-17-152-0205	2	5	--	Upper Sand
SB-17-153	SB-17-153-0205	2	5	--	Upper Sand
SB-17-154	SB-17-154-0205	2	5	--	Upper Sand
SB-17-154	SB-17-154-0205-AVG	2	5	--	Upper Sand
SB-17-154	SB-17-154-0205-D	2	5	--	Upper Sand
SB-17-155	SB-17-155-0205	2	5	--	Upper Sand
S17-00	S17-00	2.7	3	--	Reworked - Confirmatory Location
S17-PB-01	S17-PB-01	2.7	3	--	Reworked - Confirmatory Location
S17-PB-02	S17-PB-02	2.7	3	--	Reworked - Confirmatory Location
S17-PB-03	S17-PB-03	2.7	3	--	Reworked - Confirmatory Location
S17-PB-04	S17-PB-04	2.7	3	--	Reworked - Confirmatory Location
S17-PB-05	S17-PB-05	2.7	3	--	Reworked - Confirmatory Location
S17-PB-05	S17-PB-05-AVG	2.7	3	--	Reworked - Confirmatory Location
S17-PB-05	S17-PB-05-D	2.7	3	--	Reworked - Confirmatory Location
S17-PB-06	S17-PB-06	2.7	3	--	Reworked - Confirmatory Location
S17-PB-07	S17-PB-07	2.7	3	--	Reworked - Confirmatory Location
S17-PB-08	S17-PB-08	2.7	3	--	Reworked - Confirmatory Location
S17-PB-09	S17-PB-09	2.7	3	--	Reworked - Confirmatory Location
S17-PB-10	S17-PB-10	2.7	3	--	Reworked - Confirmatory Location
S17-PB-11	S17-PB-11	2.7	3	--	Reworked - Confirmatory Location
S17-PB-12	S17-PB-12	2.7	3	--	Reworked - Confirmatory Location
S17-PB-13	S17-PB-13	2.7	3	--	Reworked - Confirmatory Location
S17-PB-14	S17-PB-14	2.7	3	--	Reworked - Confirmatory Location
S17-PB-14	S17-PB-14-AVG	2.7	3	--	Reworked - Confirmatory Location
S17-PB-14	S17-PB-14-D	2.7	3	--	Reworked - Confirmatory Location
S17-PB-15	S17-PB-15	2.7	3	--	Reworked - Confirmatory Location
S17-PB-16	S17-PB-16	2.7	3	--	Reworked - Confirmatory Location
S17-PB-17	S17-PB-17	2.7	3	--	Reworked - Confirmatory Location

Table 2
Subsurface Soil Sample Location and Soil Type List
Site 17 Soil Background Determination Technical Memorandum
NAS Brunswick, Brunswick, Maine

LOCATION	SAMPLE ID	TOP DEPTH (feet)	BOTTOM DEPTH (feet)	ARSENIC (mg/kg)	Soil Type
S17-PB-18	S17-PB-18	2.7	3	--	Reworked - Confirmatory Location
S17-SW-01	S17-SW-01	2.7	3	--	Reworked - Confirmatory Location
S17-SW-02	S17-SW-02	2.7	3	--	Reworked - Confirmatory Location
S17-SW-03	S17-SW-03	2.7	3	--	Reworked - Confirmatory Location
S17-SW-04	S17-SW-04	2.7	3	--	Reworked - Confirmatory Location
S17-SW-05	S17-SW-05	2.7	3	--	Reworked - Confirmatory Location
S17-SW-05	S17-SW-05-AVG	2.7	3	--	Reworked - Confirmatory Location
S17-SW-05	S17-SW-05-D	2.7	3	--	Reworked - Confirmatory Location
S17-SW-06	S17-SW-06	2.7	3	--	Reworked - Confirmatory Location
SB-17-202	SB-17-202-0205	2	5	--	Upper Sand
SB-17-203	SB-17-203-0205	2	5	--	Upper Sand/Peat
SB-17-204	SB-17-204-0205	2	5	--	Upper Sand/Peat
SB-17-204	SB-17-204-0205-AVG	2	5	--	Upper Sand/Peat
SB-17-204	SB-17-204-0205-D	2	5	--	Upper Sand/Peat
SB-17-205	SB-17-205-0205	2	5	--	Upper Sand/Peat
SB-17-205	SB-17-205-0205-AVG	2	5	--	Upper Sand/Peat
SB-17-205	SB-17-205-0205-D	2	5	--	Upper Sand/Peat
SB-17-206	SB-17-206-0103	1	3	2.9	Upper Sand/Fill
SB-17-207	SB-17-207-0103	1	3	6	Upper Sand
SB-17-208	SB-17-208-0103	1	3	5	Upper Sand
SB-17-208	SB-17-208-0103-AVG	1	3	6.2	Upper Sand
SB-17-208	SB-17-208-0103-D	1	3	7.4	Upper Sand
SB-17-209	SB-17-209-0103	1	3	6.2	Upper Sand
SB-17-210	SB-17-210-0103	1	3	3.6	Upper Sand
GRID A BOTTOM	GRID A BOTTOM	2	6	--	Reworked - Confirmatory Location
GRID A BOTTOM	GRID A BOTTOM-AVG	2	6	--	Reworked - Confirmatory Location
GRID A BOTTOM	GRID A BOTTOM-D	2	6	--	Reworked - Confirmatory Location
GRID A SOUTH SIDEWALL	GRID A SOUTH SIDEWALL	2	6	--	Reworked - Confirmatory Location
GRID A WEST SIDEWALL A	GRID A WEST SIDEWALL A	2	6	--	Reworked - Confirmatory Location
GRID A WEST SIDEWALL B	GRID A WEST SIDEWALL B	2	6	--	Reworked - Confirmatory Location
GRID B BOTTOM	GRID B BOTTOM	2	6	--	Reworked - Confirmatory Location
GRID B EAST SIDEWALL A	GRID B EAST SIDEWALL A	2	6	--	Reworked - Confirmatory Location
GRID B EAST SIDEWALL B	GRID B EAST SIDEWALL B	2	6	--	Reworked - Confirmatory Location
GRID A NORTH SIDEWALL	GRID A NORTH SIDEWALL	2	6	--	Reworked - Confirmatory Location
GRID B SOUTH SIDEWALL	GRID B SOUTH SIDEWALL	2	6	--	Reworked - Confirmatory Location
GRID B NORTH SIDEWALL #2	GRID B NORTH SIDEWALL #2	2	6	--	Reworked - Confirmatory Location

J = Result qualifed as estimated.

Table 3

Two Sample Hypothesis Test Results for the Fill Data Compared to All Other Site Soils Data

Site 17 Soil Background Determination Technical Memorandum

NAS Brunswick, Brunswick, Maine

Chemical	Hypothesis Test[1]	Hypothesis Test p-value[2]	Conclusion[3]
Aluminum	Wilcoxon Rank Sum Test	0.0761	90 Percent Confident Statistically Different
Arsenic	Gehan	0.00509	95 Percent Confident Statistically Different
Barium	Wilcoxon Rank Sum Test	0.0863	90 Percent Confident Statistically Different
Beryllium	Wilcoxon Rank Sum Test	0.235	75 Percent Confident Statistically Different
Calcium	Wilcoxon Rank Sum Test	0.0239	95 Percent Confident Statistically Different
Chromium	Wilcoxon Rank Sum Test	0.0429	95 Percent Confident Statistically Different
Cobalt	Wilcoxon Rank Sum Test	0.072	90 Percent Confident Statistically Different
Copper	Wilcoxon Rank Sum Test	0.315	Not Statistically Different
Iron	Wilcoxon Rank Sum Test	0.0455	95 Percent Confident Statistically Different
Lead	Wilcoxon Rank Sum Test	0.827	Not Statistically Different
Magnesium	Wilcoxon Rank Sum Test	0.197	80 Percent Confident Statistically Different
Manganese	Wilcoxon Rank Sum Test	0.0878	90 Percent Confident Statistically Different
Nickel	Wilcoxon Rank Sum Test	0.0774	90 Percent Confident Statistically Different
Potassium	Wilcoxon Rank Sum Test	0.0669	90 Percent Confident Statistically Different
Sodium	Wilcoxon Rank Sum Test	0.0223	90 Percent Confident Statistically Different
Vanadium	Wilcoxon Rank Sum Test	0.104	85 Percent Confdent Statistically Different
Zinc	Wilcoxon Rank Sum Test	0.628	Not Statistically Different

Footnotes

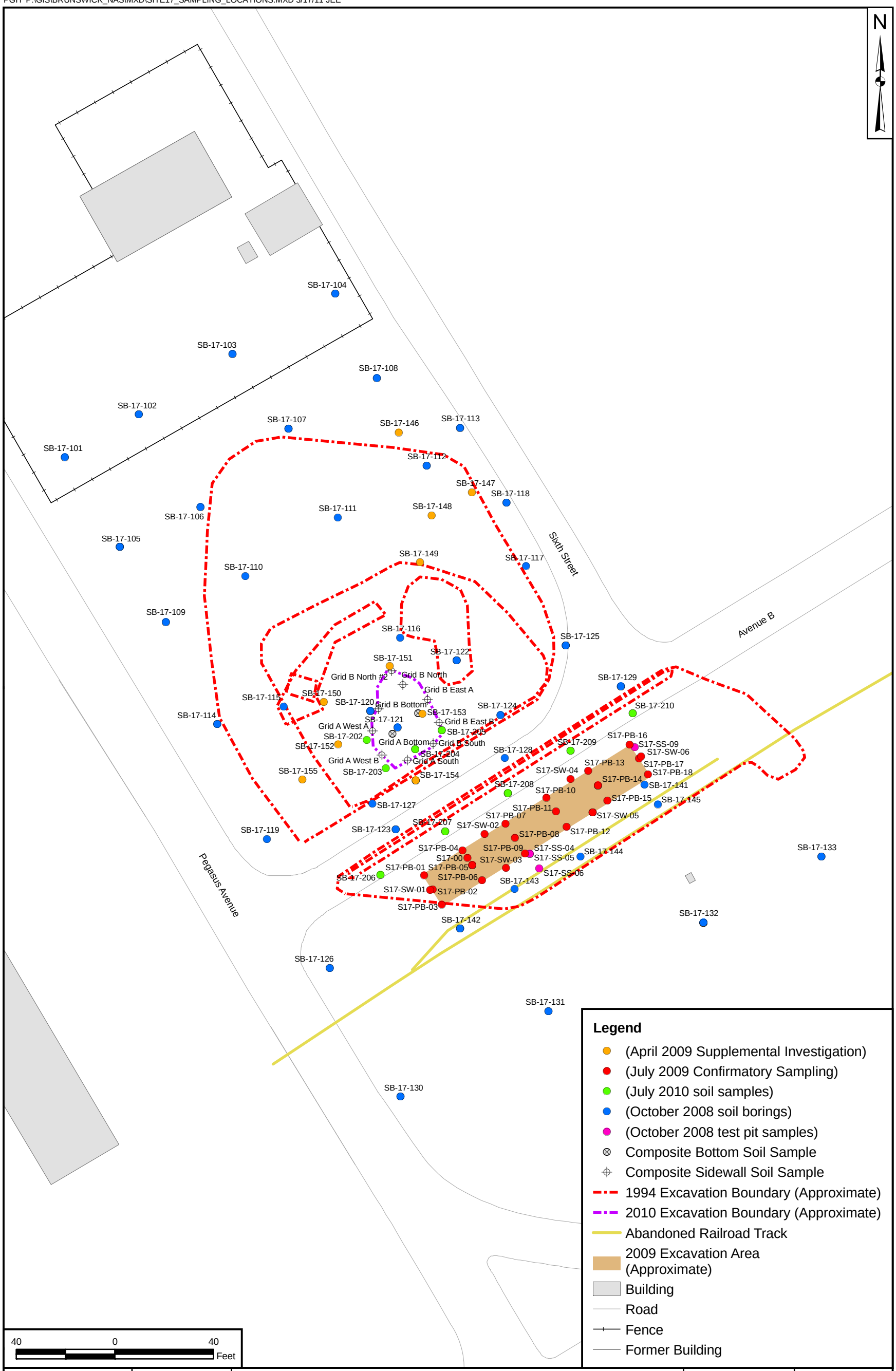
1 WRS test was computed because the data from either the fill or the rest of the site was not normally distributed and the samples were all detected or Gehan test was computed because the data from either the fill or the rest of the site was not normally distributed and there were more than two detection limits.

2 Pro UCL version 4.1 was used to compute the Gehan and WRS tests.

3 Rationale for conclusions are listed below:

- To be 95 percent confident that fill concentrations are statistically different from rest of site p-value must be less than 0.05.
- To be 90 percent confident that fill concentrations are statistically different from rest of site p-value must be less than 0.10.
- To be 85 percent confident that fill concentrations are statistically different from rest of site p-value must be less than 0.15.
- To be 80 percent confident that fill concentrations are statistically different from rest of site p-value must be less than 0.20.
- To be 75 percent confident that fill concentrations are statistically different from rest of site p-value must be less than 0.25.

PGH P:\GIS\BRUNSWICK_NAS\MXD\SITE17_SAMPLING_LOCATIONS.MXD 3/17/11 JEE



DRAWN BY	DATE
K. MOORE	3/17/11
CHECKED BY	DATE
M. KRAUS	3/17/11
REVISED BY	DATE
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SCALE	
AS NOTED	

NAVFAC

EXISTING SOIL SAMPLING LOCATIONS
SITE 17
NAVAL AIR STATION
BRUNSWICK, MAINE

CONTRACT NUMBER	CTO NUMBER
___	WE 49
APPROVED BY	DATE
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APPROVED BY	DATE
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FIGURE NO.	REV
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E.7 PROPOSED PATH FORWARD WHITE PAPER

PROPOSED PATH FORWARD
SITE 17, FORMER BUILDING 95
NAVAL AIR STATION BRUNSWICK, MAINE

1.0 INTRODUCTION

The purpose of this document is to solicit input from the Regulatory stakeholders and gain concurrence on the general approach for Cleanup of Site 17. As discussed previously, the Navy believes that a soil removal action for this site will reduce site risks significantly and will be consistent with the overall remedial strategy. Following this removal action, the Navy proposes resubmission of the Remedial Investigation (RI) Report for Site 17 followed by execution of a Proposed Remedial Action Plan (PRAP) and Record of Decision (ROD).

2.0 SITE DESCRIPTION

Site 17 is located in the north-central area of Naval Air Station Brunswick (NASB), one block north of Fitch Avenue at the corner of Pegasus Avenue and Avenue B. The Site (approximately 0.9 acres) is bounded to the northeast by the former Old Navy Fuel Farm and to the west by Pegasus Avenue (Figure 1). The southeastern site boundary extends approximately 50 feet south of Avenue B to the former railroad tracks. Currently, a large portion of the site is covered with grass, bushes and trees. South of Avenue B, the site is grass-covered and contains an abandoned train track bed (tracks were removed in 1994), a few trees, and a line of transformers. To the north of the area a fence separates the site from a dog kennel.

Site 17 was the location of NASB pest control operations that included storage, mixing, and disposal of pesticides and herbicides from the late 1940s until 1985. Pesticide and herbicide chemicals were mixed with a carrier such as water or kerosene as needed when NASB personnel responded to service calls. Prior to 1976, any materials left over after the service call reportedly were dumped behind former Building 95, located on Site 17. Empty containers were rinsed, crushed, and placed in the trash for disposal. Dumping of unused materials stopped in 1976 and pest control operations were moved from Building 95 to Building 647 in 1985.

Three former buildings were located on Site 17 including Building 95, Building 31, and a storage shed (Figure 1). Building 95 was constructed in the late 1940s and had approximate dimensions of 15 feet by 20 feet. It was a one-story building constructed of wood on a cinder block foundation. At a later date, a heated storage shed with a plywood floor that measured approximately 8 feet by 11 feet was added to the north side of Building 95. A drum storage rack was located outside of the building along the eastern side. Subsurface utilities consisted of potable water and steam line that provided heat for the building. The building was served by a 500-gallon, stainless-steel septic tank and associated tile overflow pipe. The building and septic tank were removed from Site 17 between January and February 1994.

In previous investigations the following pesticides were identified as being stored at Building 95: malathion, diazinon, Baygon, pyrethrin, cyndgas, Sevin, esmethrin, dichlorodiphenyltrichloroethane (DDT) (used from 1955 to 1970), chlordane (used from 1955 to 1970), dieldrin (used in 1960), zinc phosphide (used from 1970 to 1975), arsenic lead (used from 1960 to at least 1983), rotenone (used from 1960 to at least 1983), and Avitrol (used from 1960 to 1980). Lindane and carbaryl may also have been used. The following herbicides were identified in the Initial Assessment Summary (IAS) (Roy F. Weston, Inc, 1983), as being stored at Building 95: drexel, simazine, monuron trichloroethane, 2,4 dichlorophenoxyacetic acid (used from 1955 to at least 1983), 2,4,5-trichlorophenoxyacetic acid (used in 1978), and maleic hydrazide. The most commonly used liquid chemicals, such as malathion, DDT, and drexel, were reportedly stored in drums on a rack outside of Building 95. During the winter months, chemicals were stored in former Building 95 to avoid freezing. Additional storage space was available in the detached storage building located to the north (Figure 1).

Building 31 was located northeast of Building 95 and had approximate dimensions of 12 feet by 25 feet. The building was built on four concrete footings; however, the date of construction of Building 31 is unknown. This building was used for changing and showering by NASB workers who conducted asbestos abatement. Reportedly, shower and lavatory facilities were connected to and shared by the septic system that served Building 95. Subsurface utilities consisted of potable water and steam that provided heat, while electricity for Building 31 was provided by overhead wires. Building 31 was removed from Site 17 between January and February 1994.

An 8-foot by 10-foot storage shed constructed on a cinder block foundation was located north of Building 95. The storage shed was used to store asbestos abatement equipment only and was removed from Site 17 between January and February 1994.

Between January and February 1994, Buildings 31 and 95, the storage shed, septic tank, and railroad lines were demolished and removed from Site 17. Prior to demolition, an asbestos abatement contractor removed all asbestos-containing materials from these structures and disposed of the materials at a disposal facility in Michigan. After the asbestos abatement was complete, the buildings were demolished and the debris transported for disposal in Michigan. The septic tank was removed in 1994, cleaned, cut into pieces, and disposed of off base. The septic tank was found to contain a black, "cake-type" sludge, which was removed and stockpiled with excavated soil for off-site transportation and disposal. Railroad ties were removed from approximately 150 feet of abandoned rail line south of Avenue B and disposed of at a disposal facility in Michigan.

Previous investigations conducted at the Site are described in the following documents:

- Initial Assessment Survey [IAS](Roy F. Weston, Inc, 1983),
- Engineering Evaluation/Cost Analysis Report (EE/CA)(ABB Environmental Services, Inc. 1992),
- Action Memorandum (ABB Environmental Services, Inc., 1993a),
- Remedial Design Summary Report (ABB Environmental Services, Inc, 1993b)
- Draft Final Closure Report Site 17 (Harding Lawson Associates [HLA], 1998), and
- Draft Remedial Investigation Report for Site 17 (Tetra Tech NUS, Inc. 2009).

2.1 Historical Soil Data

In September 1990, four surface soil samples were collected by the Navy in the vicinity of Building 95, and analyzed for target compound list (TCL) pesticides and polychlorinated biphenyls (PCBs). The initial sampling results indicated that the soils were impacted with DDT and its degradation products, dichlorodiphenyldichloroethane (DDD) and dichlorodiphenyldichloroethylene DDE. No PCBs were detected. Based on these data and the area of the Site (less than 1 acre), the Navy performed an Engineering Evaluation/Cost Analysis (EE/CA) in support of a soil removal action. Additional investigations identified the presence of several herbicides and pesticides, including DDT, DDD, DDE, pyrethrums, dieldrin, and chlordane in the soil and on the structures (detected in wipe samples) at Site 17. DDT was detected at depths of up to 15 feet below ground surface (bgs) at a concentration of 2,200 micrograms per kilogram (µg/kg). Overall, individual pesticides were collocated with DDT and pyrethrums.

The baseline risk assessment, conducted as part of the EE/CA (ABB, 1992), concluded that exposure to contaminated soil at Site 17 posed a risk to both human and ecological receptors. The greatest risks to humans for both carcinogenic and non-carcinogenic effects were associated with exposure to DDT, DDD, and DDE. The pesticide DDT was found to pose the greatest acute and chronic risks to ecological receptors. The highest concentrations of DDT were detected in shallow surface soils.

Excavation areas were determined based on preliminary remediation goals (PRGs) established for the Site and areas where contamination was detected above these PRGs. The removal actions consisted of the following:

- From February 2 through March 2, 1994, the Navy completed the initial excavation of soils that exceeded the PRGs. A total of 1,310 cubic yards of soil were excavated from the Site and transported to the Aptus, Inc. incineration facility in Aragonite, Utah. Confirmatory soil samples collected at the limits of the excavation indicated the presence of Site contaminants at concentrations exceeding the established PRGs (ECC, 2008b). During the remedial action, an area immediately south of Avenue B was found exceeding the surface soil remediation goal for total pyrethrins but below the subsurface remediation goal. The soil from this area was excavated and placed in a 6-inch lift within the area of previously excavated material south of Avenue B, identified as the Soil Relocation Area "Soil Strip" on Figure 2. This lift of soil was then covered with a geotextile fabric and backfilled with 2 feet of common fill during site restoration activities.

- In July 2009, a Navy contractor (ECC) excavated a total of 117 tons of pesticide impacted soil from the Soil Relocation Area Soil Strip previously buried during the 1994 removal action. The confirmatory sampling results indicated pesticide contaminated soil was still remaining in place at approximately 3 feet bgs. A geotextile was placed over the remaining contaminated soil and clean, off-site-source, fill material and topsoil was placed over the geotextile as part of the site restoration.

Based upon the above information, the majority of the Site was excavated to a depth of 1 to 2 feet bgs; however, excavation activities resulted in soil removal to a depth of 7 feet in one location (SB-17-115) at the Site.

In October 2008, as part of the RI conducted by Tetra Tech, forty-five soil borings were advanced using direct push technology (DPT). Soil borings were advanced to facilitate soil sampling and subsurface lithologic characterization. Monitoring wells were installed at soil boring locations SB-17-106 (MW-17-01), SB17-120 (MW-17-03), SB-17-121 (MW-17-02), and SB-17-144 (MW-17-04). A total of 80 soil samples (including eight duplicates) were collected and submitted for laboratory analysis.

Soil samples were collected from three areas on the Site: the main site area that was previously excavated and covered with fill; a small area across Avenue B that was excavated, partially backfilled with slightly contaminated soil (exceeded surface soil PRGs but not subsurface soil PRGs), and then covered with fill (the soil strip); and fringe areas that have not been excavated as part of any soil removal activities. Sample collection locations are described below:

- In the main excavated area (not in the soil strip), soil samples were collected at the bottom of the fill layer and below.
- In the soil strip, soil samples were collected from 2 to 3 feet bgs, corresponding to the depth where slightly contaminated soils were placed previously.
- In areas that have not undergone any excavation for contaminated soil removal, soil samples were collected from 0 to 1 foot and from 1 to 4 feet bgs.
- At three locations, an additional soil sample was collected to determine if contamination was linked to a black layer ("peat") associated with elevated FID headspace measurements. At location SB-17-125, the additional soil sample was collected from the 6 to 8 feet bgs. In soil borings SB-17-132 and SB-17-141 additional soil samples were collected from 4 to 8 feet bgs and from 3 to 7 feet bgs, respectively.

The previous remedial design specified that a geotextile fabric be placed in the excavated area prior to backfilling and compaction (ABB, 1992). The existence of the geotextile was confirmed prior to DPT soil sampling. The geotextile was identified at approximately two feet below grade in several borings advanced in October 2008.

Concentrations of DDD and DDE exceeded the minimum screening criteria at one soil boring location, SB-17-121-0205 (54 milligrams per kilogram [mg/kg] and 25 mg/kg, respectively). Concentrations of 4,4'-DDT exceeded residential screening criteria (1.7 mg/kg) in soil samples collected from three soil borings, SB-17-112-0104 (7.2J mg/kg), SB-17-120-0205[duplicate sample] (2.2J mg/kg), and SB-17-121-0205 (1500 mg/kg). Soil borings SB-17-120 and SB-17-121 are located adjacent to the former buildings as

shown on Figure 2. Soil boring SB-17-112 is located at the northeastern edge of the former excavation area as shown on Figure 2.

Monuron was detected in soil samples collected from five borings (SB-17-128, SB-17-129, SB-17-132, SB-17-133 and SB-17-141) located within and south of Avenue B (Figure 2). Concentrations of monuron detected in soil samples ranged from 0.017J mg/kg (SB-17-133-0104) to 0.550J mg/kg (SB-17-129-0306). No U.S. EPA regional screening levels (RSLs) or Maine Remedial Action Guidelines (RAGs) screening criteria currently exist for monuron.

The arsenic minimum screening level of 0.39 mg/kg was exceeded at all but two sample locations (SB-17-125 and SB-17-127). Maximum arsenic concentrations were detected in surficial soil samples collected from the dog kennel training area to the north of the Site (SB-17-103-0001 [18.2 mg/kg] and SB-17-102-001 [10.7 mg/kg]).

Recent soil data exceedances compared to residential screening criteria are included in Table 1. Recent soil data exceedances compared to industrial screening criteria are included in Table 2. Attachment A documents the development of PRGs for soil. Identified COCs include 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT. Arsenic was determined to be present at background levels. Under a soil removal action, the following PRGs would be used to target soil removal activities:

Chemical of Concern	Soil PRG (mg/kg)
4,4'-DDD	22
4,4"-DDE	15
4,4' DDT	15

2.2 Historical Groundwater Data

In February 1993, the Navy collected groundwater samples from monitoring wells MW-NASB-065 through MW-NASB-068. The groundwater samples were submitted for laboratory analysis for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides and herbicides, and target analyte list (TAL) metals. Six pesticides were identified in the groundwater samples: DDT, DDE, endrin, alpha chlordane, gamma chlordane, and heptachlor epoxide. Concentrations of endrin (MW-NASB-065), gamma chlordane (MW-NASB-067), and heptachlor epoxide (MW-NASB-068) were detected in groundwater at levels exceeding the Maine Maximum Exposure Guidelines (MEGs). The concentrations of gamma chlordane detected in the sample collected from MW-NASB-067 were also above the Federal Maximum Contaminant Level (MCL). Concentrations of other compounds were below their respective MEGs and the MCLs.

Groundwater was sampled periodically after the removal action was implemented in 1994. A summary of the historical groundwater sample analytical results is presented in April 2007 Monitoring Event 25 (ME25) (ECC, 2008a). Low concentrations of pesticides and inorganics were reported in the groundwater samples. The Site groundwater was monitored on a bi-annual basis until 2008 for pesticides and the results were provided in monitoring event reports.

Pesticides results were non-detect in three Site 17 monitoring wells listed in ME25 with the exception of estimated values for 4,4'-DDD (0.039 J µg/L) in the sample collected from well MW-NASB-067 and 4,4'-DDT (0.023 J µg/L) detected in the samples collected from well MW-NASB-097.

The following historical pesticides detections are noted for reference:

Monitoring Well MW-NASB-067 – 4,4'-DDT was detected in samples collected during the Monitoring Events 18 through 20 and again during Events 24 and 25; however, these detections were below the MEG (1 µg/L) (ECC, 2008a).

Monitoring Well MW-NASB-097 – Heptachlor epoxide and alpha chlordane exceeded the Maine MEGs (0.04 µg/L and 0.27 µg/L, respectively) in groundwater samples collected during all sample events between 2000 and 2003. Since the April 2004 sampling event, heptachlor epoxide no longer exceeded the State MEG and was not detected in groundwater samples collected between Monitoring Events 21 and 25. In addition, the concentration of alpha chlordane, which reached a maximum observed concentration of 0.72 µg/L in October 2001, has been steadily decreasing to levels below the MEG (0.3 µg/L) and was not detected during the last six monitoring events (ECC, 2008c). Other pesticide compounds were not detected or were detected at levels below corresponding MEGs and MCLs since well MW-NASB-097 was installed and first sampled in March 2000.

Monitoring Well MW-NASB-098 – pesticide compounds were not detected in groundwater samples collected from this well during Monitoring Events 1 through 18 or 20 through 25. An estimated 4,4'-DDT concentration of 0.0090 J µg/L in the groundwater sample collected during Monitoring Event 19 in April 2004 was below the MEG of 1 µg/L.

The Site 17 Remedial Investigation was implemented by TtNUS in October 2008. The investigation included soil boring advancement, well installation, hydraulic conductivity testing, soil and groundwater sampling and chemical analysis, and a sample location survey.

Trace levels of eleven pesticides were detected in groundwater samples. Concentrations of 4,4'-DDT and dieldrin exceeded MEGs at MW-17-02 (2.1 µg/L and 1.7 µg/L, respectively). Endosulfan I (0.95 µg/L) and 4,4'-DDD (4.3 µg/L) were detected in the groundwater sample collected from well MW-17-02. Endrin aldehyde was detected in the groundwater sample collected from well MW-17-04 at a concentration of 0.027J µg/L. No U.S. EPA RSLs or MEGs screening criteria currently exist for these compounds. Concentrations of the remaining pesticides were below the minimum screening criteria. Dieldrin in groundwater was the major contributor to cancer risk for all receptors.

Trace levels of maleic hydrazide and propoxur were detected in groundwater samples at concentrations below minimum screening criteria. Monuron was detected in one groundwater sample collected from well MW-17-NASB-98 at a concentration of 0.36J µg/L. No U.S. EPA RSLs or MEGs screening criteria currently exist for monuron in groundwater.

Lead and zinc were detected in groundwater samples at levels below the minimum screening criteria. The other target inorganics (arsenic and cyanide) were not detected in groundwater samples.

DRO concentrations were above the minimum MEDEP screening criteria in groundwater samples collected from wells MW-17-01, MW-17-02, and MW-17-03. DRO was detected in groundwater samples collected from each of the four newly installed monitoring wells at concentrations ranging from 45J µg/L (MW-17-04) to 210 µg/L (MW-17-02). DRO was detected in the upgradient monitoring well, MW-17-01, at a concentration of 85 µg/L.

The Draft RI Report (TtNUS, July 2009) concluded that trace levels of pesticides were detected in groundwater. Concentrations exceeded applicable criteria in only one well (MW-17-02). DRO was detected above the minimum screening criteria in groundwater samples collected from four wells and is likely at least partially attributable to fuel tanks formerly located upgradient of Site 17.

Detected groundwater contaminant concentration ranges are summarized below:

- 4,4'-DDT from non-detect to 2.1 µg/L in MW-17-02
- Dieldrin from non-detect to 1.7 µg/L in MW-17-02
- Diesel range organics from 45 µg/L in MW-17-04 to 210 µg/L in MW-17-02

3.0 PROPOSED REMOVAL ACTION SCOPE

The tasks and major components making up the proposed removal effort consist of the following:

Task 1 – Removal Action Planning Documents

- Prepare a Remedial Action (RA) Work Plan
- Prepare a Time-Critical Action Memo

Task 2 - Supplemental Soil Sampling

- Collect and analyze shallow soil samples from the Soil Removal Area for COCs (4,4'-DDD, 4,4'-DDE, and 4,4'-DDT).
- Collect and analyze shallow soil samples from the Soil Relocation Area Soil Strip for 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT.
- Collect and analyze shallow soil samples along the former utility excavations (Utility Trench Area) between the soil strip and Avenue B for 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT to address potential movement of contaminated soil during utility excavation.

Task 3 - Removal Action

- Excavate and dispose of approximately 280 cubic yards of pesticide contaminated soil north of Avenue B.
- Excavate and dispose of an estimated 150 cubic yards of contaminated soil along the Soil Relocation Area Soil Strip, if necessary based on supplemental soil sample results.
- Excavate and dispose of an estimated 15 cubic yards of contaminated soil from the Utility Trench Area, if necessary based on supplemental soil sample results.
- Site Restoration (backfilling, grading and seeding)

Task 4 - Remedial Action Close-Out Report

- Prepare a Remedial Action Close-Out Report

4.0 CERCLA DECISION DOCUMENTS

Following completion of the removal action, a PRAP and ROD would be prepared for the site. The documents would reflect the site conditions existing after completion of the removal action.

REFERENCES

ABB Environmental Services, Inc., 1992. Engineering Evaluation/Cost Analysis Report Building 95. Naval Air Station Brunswick, Maine. November 1992.

ABB Environmental Services, Inc., 1993a. Action Memorandum Building 95. Naval Air Station Brunswick, Maine, April 1993.

ABB Environmental Services, Inc., 1993b. Remedial Design Summary Report. Building 95 Removal Action. Naval Air Station Brunswick, Maine. June 1993.

ECC, 2008a. Final Site 17 (Building 95) Monitoring Event 25 Summary Report. April 2007. Naval Air Station Brunswick, Maine. May 2008.

ECC, 2008b. Final Site 17 Work Plan to Investigate and Remove Relocated Soils. Naval Air Station Brunswick, Maine. October 2008.

ECC, 2008c. Final Site 17 (Building 95) Monitoring Event 26 Report. September 2007. Naval Air Station Brunswick, Maine. November 2008.

ECC, 2009. Draft Completion Report, Investigation and Removal of Relocated Soils, Site 17. Naval Air Station Brunswick, Maine. October 2009.

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Tetra Tech NUS, Inc., 2008. Remedial Investigation Work Plan for Site 17 Naval Air Station, Brunswick, Brunswick, Maine. September 2008.

Tetra Tech NUS, Inc. 2009. Draft Remedial Investigation Report for Site 17 Naval Air Station, Brunswick, Maine. July 2009.

TABLE 1
SITE 17 SOIL COCs
COMPARED TO RESIDENTIAL SCREENING CRITERIA
NAS BRUNSWICK, BRUNSWICK, MAINE

							Remedial Investigation Data						
SAMPLE LOCATION **SAMPLE DESCRIPTION** **SAMPLE DATE** **TOP DEPTH (FT)** **BOTTOM DEPTH (FT)**	**ORNL Residential Screening Level[2]**	**Maine RAGs-Residential Screening Level[3]**	**Maine RAGs-Soil to GW Screening Level[3]**	**Minimum Screening Criteria[4]**	**Background UPL[5]**	**Preliminary Remediation Goal**	SB-17-102 SB-17-102-0001 20081017 0 1	SB-17-103 SB-17-103-0001 20081017 0 1	SB-17-112 SB-17-112-0104 20081020 1 4	SB-17-120 SB-17-DUP05 20081016 2 5	SB-17-121 SB-17-121-0205 20081016 2 5	SB-17-122 SB-17-122-0407 20081017 4 7	SB-17-122 SB-17-DUP06 20081017 4 7
Pesticides/PCBs (ug/kg)													
4,4'-DDD	2000	4500	NC	2000	1.1	22000	3.5 UJ	3.5 UJ	**520**	**54 J**	54000	5.2 U	4.7 U
4,4'-DDE	1400	3200	NC	1400	1.3	15000	**0.7 J**	**0.88 J**	**80**	**33 J**	25000	5 U	4.7 U
4,4'-DDT	1700	3800	NC	1700	3.1	15000	3.5 U	3.5 U	7200 J	2200 J	1500000	**65 J**	4.8 UJ
DIELDRIN	30	68	NC	30	--	--	3.5 U	3.5 U	40 U	4.5 U	2200 U	5 U	4.7 U
HEPTACHLOR	110	240	NC	110	--	--	1.8 U	1.8 U	20 U	2.3 U	1100 UJ	2.6 U	2.4 U
VOCs													
Tetrachloroethene (PCE)	550	2600	430	430	--	--	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)													
ARSENIC	0.39	0.14	NC	0.14	14.65	--	10.7	18.2	2.2	1.8	1.6	1.5	1.3

1. This table contains the results for all detected parameters that exceeded screening criteria in at least one sample in this media subgroup. Complete results for all parameters are presented in Appendix B-1 of the RI and in the Technical Memorandum for the Jan 2010 Site 17 Supplemental Investigation II

2. ORNL Regional Screening Levels (RSLs)- Oak Ridge National Laboratory (Dec, 2009) available online at http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm. Values represent the risk-based soil screening level for residential soil

3. Maine RAGs - Maine Remedial Action Guidelines for Contaminated Soil, Jan 13, 2010

4. The value listed is the lowest of the available screening criteria.

5. Mixed soils upper prediction limit

-- Value not developed

Black background/White print - Criteria Exceeded

Bold - Detected

U - Not Detected

UJ - Detection Limit Approximate

J - Quantitation Limit Approximate

NC - Criterion not available

NA - Not Analyzed

TABLE 1
SITE 17 SOIL COCs
COMPARED TO RESIDENTIAL SCREENING CRITERIA
NAS BRUNSWICK, BRUNSWICK, MAINE

							Supplemental Investigation				
SAMPLE LOCATION **SAMPLE DESCRIPTION** **SAMPLE DATE** **TOP DEPTH (FT)** **BOTTOM DEPTH (FT)**	**ORNL Residential Screening Level[2]**	**Maine RAGs-Residential Screening Level[3]**	**Maine RAGs-Soil to GW Screening Level[3]**	**Minimum Screening Criteria[4]**	**Background UPL[5]**	**Preliminary Remediation Goal**	SB-17-147 20' SE of 112 20090423 1 4	SB-17-148 20' S of 112 20090423 1 4	SB-17-149 40' SSW of 112 20090423 1 4	SB-17-152 20' SW of 120 20090423 2 5	SB-17-153 40' SW of 120 20090423 2 5
Pesticides/PCBs (ug/kg)											
4,4'-DDD	2000	4500	NC	2000	1.1	22000	**41**	**84**	**88**	3.9 U	**89**
4,4'-DDE	1400	3200	NC	1400	1.3	15000	**63**	**20**	**36**	**43**	**270**
4,4'-DDT	1700	3800	NC	1700	3.1	15000	**820**	**750**	**120**	**330**	**1200**
DIELDRIN	30	68	NC	30	--	--	**9.6**	43	**25**	**23**	**28**
HEPTACHLOR	110	240	NC	110	--	--	2.1 U	2.1 U	2.1 U	270	**1.1 J**
VOCs											
Tetrachloroethene (PCE)	550	2600	430	430	--	--	NA	NA	NA	NA	NA
Inorganics (mg/kg)											
ARSENIC	0.39	0.14	NC	0.14	14.65	--	NA	NA	NA	NA	NA

1. This table contains the results for all detected parameters that exceeded screening criteria in at least one sample in this media subgroup. Complete results for all parameters are presented in Appendix B-1 of the RI and in the Technical Memorandum for the Jan 2010 Site 17 Supplemental Investigation II

2. ORNL Regional Screening Levels (RSLs)- Oak Ridge National Laboratory (Dec, 2009) available online at http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm. Values represent the risk-based soil screening level for residential soil

3. Maine RAGs - Maine Remedial Action Guidelines for Contaminated Soil, Jan 13, 2010

4. The value listed is the lowest of the available screening criteria.

5. Mixed soils upper prediction limit

-- Value not developed

Black background/White print - Criteria Exceeded

Bold - Detected

U - Not Detected

UJ - Detection Limit Approximate

J - Quantitation Limit Approximate

NC - Criterion not available

NA - Not Analyzed

TABLE 1
SITE 17 SOIL COCs
COMPARED TO RESIDENTIAL SCREENING CRITERIA
NAS BRUNSWICK, BRUNSWICK, MAINE

							Strip South of Avenue B			
SAMPLE LOCATION **SAMPLE DESCRIPTION** **SAMPLE DATE** **TOP DEPTH (FT)** **BOTTOM DEPTH (FT)**	**ORNL Residential Screening Level[2]**	**Maine RAGs-Residential Screening Level[3]**	**Maine RAGs-Soil to GW Screening Level[3]**	**Minimum Screening Criteria[4]**	**Background UPL[5]**	**Preliminary Remediation Goal**	S17-PB-06 ~2.75 ft bgs 200907	S17-PB-14/XD3 ~2.75 ft bgs 200907 (Duplicate)	S17-SW-01 ~2.25 ft bgs 200907	S17-00 ~2.25 ft bgs 200907
Pesticides/PCBs (ug/kg)										
4,4'-DDD	2000	4500	NC	2000	1.1	22000	**53**	**90**	28.0U	**40**
4,4'-DDE	1400	3200	NC	1400	1.3	15000	**140**	**64**	**320**	**98**
4,4'-DDT	1700	3800	NC	1700	3.1	15000	1900	2000	4400	**1000**
DIELDRIN	30	68	NC	30	--	--	ND	ND	ND	ND
HEPTACHLOR	110	240	NC	110	--	--	690	**39**	130	**100**
VOCs										
Tetrachloroethene (PCE)	550	2600	430	430	--	--	NA	NA	NA	**170**
Inorganics (mg/kg)										
ARSENIC	0.39	0.14	NC	0.14	14.65	--	NA	NA	NA	NA

1. This table contains the results for all detected parameters that exceeded screening criteria in at least one sample in this media subgroup. Complete results for all parameters are presented in Appendix B-1 of the RI and in the Technical Memorandum for the Jan 2010 Site 17 Supplemental Investigation II

2. ORNL Regional Screening Levels (RSLs)- Oak Ridge National Laboratory (Dec, 2009) available online at http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm. Values represent the risk-based soil screening level for residential soil

3. Maine RAGs - Maine Remedial Action Guidelines for Contaminated Soil, Jan 13, 2010

4. The value listed is the lowest of the available screening criteria.

5. Mixed soils upper prediction limit

-- Value not developed

Black background/White print - Criteria Exceeded

Bold - Detected

U - Not Detected

UJ - Detection Limit Approximate

J - Quantitation Limit Approximate

NC - Criterion not available

NA - Not Analyzed

TABLE 2
SITE 17 SOIL COCs
COMPARED TO INDUSTRIAL SCREENING CRITERIA
NAS BRUNSWICK
BRUNSWICK, MAINE

SAMPLE LOCATION **SAMPLE DESCRIPTION** **SAMPLE DATE** **TOP DEPTH (FT)** **BOTTOM DEPTH (FT)**	**ORNL Industrial Screening Level[2]**	**Maine RAGs-Industrial Screening Level[3]**	**Maine RAGs-Soil to GW Screening Level[3]**	**Minimum Screening Criteria[4]**	**Background UPL[5]**	**Preliminary Remediation Goal**	SB-17-102 SB-17-102-0001 20081017 0 1	SB-17-103 SB-17-103-0001 20081017 0 1	SB-17-112 SB-17-112-0104 20081020 1 4	SB-17-121 SB-17-121-0205 20081016 2 5
Pesticides/PCBs (ug/kg)										
4,4'-DDD	7200	12000	NC	7200	1.1	22000	3.5 UJ	3.5 UJ	**520**	54000
4,4'-DDE	5100	8500	NC	5100	1.3	15000	**0.7 J**	**0.88 J**	**80**	25000
4,4'-DDT	7000	12000	NC	7000	3.1	15000	3.5 U	3.5 U	7200 J	1500000
DIELDRIN	110	180	NC	110	--	--	3.5 U	3.5 U	40 U	2200 U
HEPTACHLOR	380	640	NC	380	--	--	1.8 U	1.8 U	20 U	1100 UJ
Inorganics (mg/kg)										
ARSENIC	0.39	0.42	NC	0.39	14.65	--	10.7	18.2	2.2	2.2

1. This table contains the results for all detected parameters that exceeded screening criteria in at least one sample in this media subgroup. Complete results for all parameters are presented in Appendix B-1 of the RI and in the Technical Memorandum for the Jan 2010 Site 17 Supplemental Investigation II

2. ORNL Regional Screening Levels (RSLs)- Oak Ridge National Laboratory (Dec, 2009) available online at http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm. Values represent the risk-based soil screening level for residential soil

3. Maine RAGs - Maine Remedial Action Guidelines for Contaminated Soil, Jan 13, 2010

4. The value listed is the lowest of the available screening criteria.

5. Mixed soils upper prediction limit

-- Value not developed

Black background/White print - Criteria Exceeded

Bold - Detected

U - Not Detected

UJ - Detection Limit Approximate

J - Quantitation Limit Approximate

NC - Criterion not available

NA - Not Analyzed

TABLE 2
SITE 17 SOIL COCs
COMPARED TO INDUSTRIAL SCREENING CRITERIA
NAS BRUNSWICK
BRUNSWICK, MAINE

SAMPLE LOCATION **SAMPLE DESCRIPTION** **SAMPLE DATE** **TOP DEPTH (FT)** **BOTTOM DEPTH (FT)**	**ORNL Industrial Screening Level[2]**	**Maine RAGs-Industrial Screening Level[3]**	**Maine RAGs-Soil to GW Screening Level[3]**	**Minimum Screening Criteria[4]**	**Background UPL[5]**	**Preliminary Remediation Goal**	SB-17-147 20' SE of 112 20090423 1 4	SB-17-148 20' S of 112 20090423 1 4	SB-17-149 40' SSW of 112 20090423 1 4	SB-17-152 20' SW of 120 20090423 2 5	SB-17-153 40' SW of 120 20090423 2 5
Pesticides/PCBs (ug/kg)											
4,4'-DDD	7200	12000	NC	7200	1.1	22000	**41**	**84**	**88**	3.9 U	**89**
4,4'-DDE	5100	8500	NC	5100	1.3	15000	**63**	**20**	**36**	**43**	**270**
4,4'-DDT	7000	12000	NC	7000	3.1	15000	**820**	**750**	**120**	**330**	**1200**
DIELDRIN	110	180	NC	110	--	--	**9.6**	**43**	**25**	**23**	**28**
HEPTACHLOR	380	640	NC	380	--	--	2.1 U	2.1 U	2.1 U	**270**	**1.1 J**
Inorganics (mg/kg)											
ARSENIC	0.39	0.42	NC	0.39	14.65	--	NA	NA	NA	NA	NA

1. This table contains the results for all detected parameters that exceeded screening criteria in at least one sample in this media subgroup. Complete results for all parameters are presented in Appendix B-1 of the RI and in the Technical Memorandum for the Jan 2010 Site 17 Supplemental Investigation II

2. ORNL Regional Screening Levels (RSLs)- Oak Ridge National Laboratory (Dec, 2009) available online at http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm. Values represent the risk-based soil screening level for residential soil

3. Maine RAGs - Maine Remedial Action Guidelines for Contaminated Soil, Jan 13, 2010

4. The value listed is the lowest of the available screening criteria.

5. Mixed soils upper prediction limit

-- Value not developed

Black background/White print - Criteria Exceeded

Bold - Detected

U - Not Detected

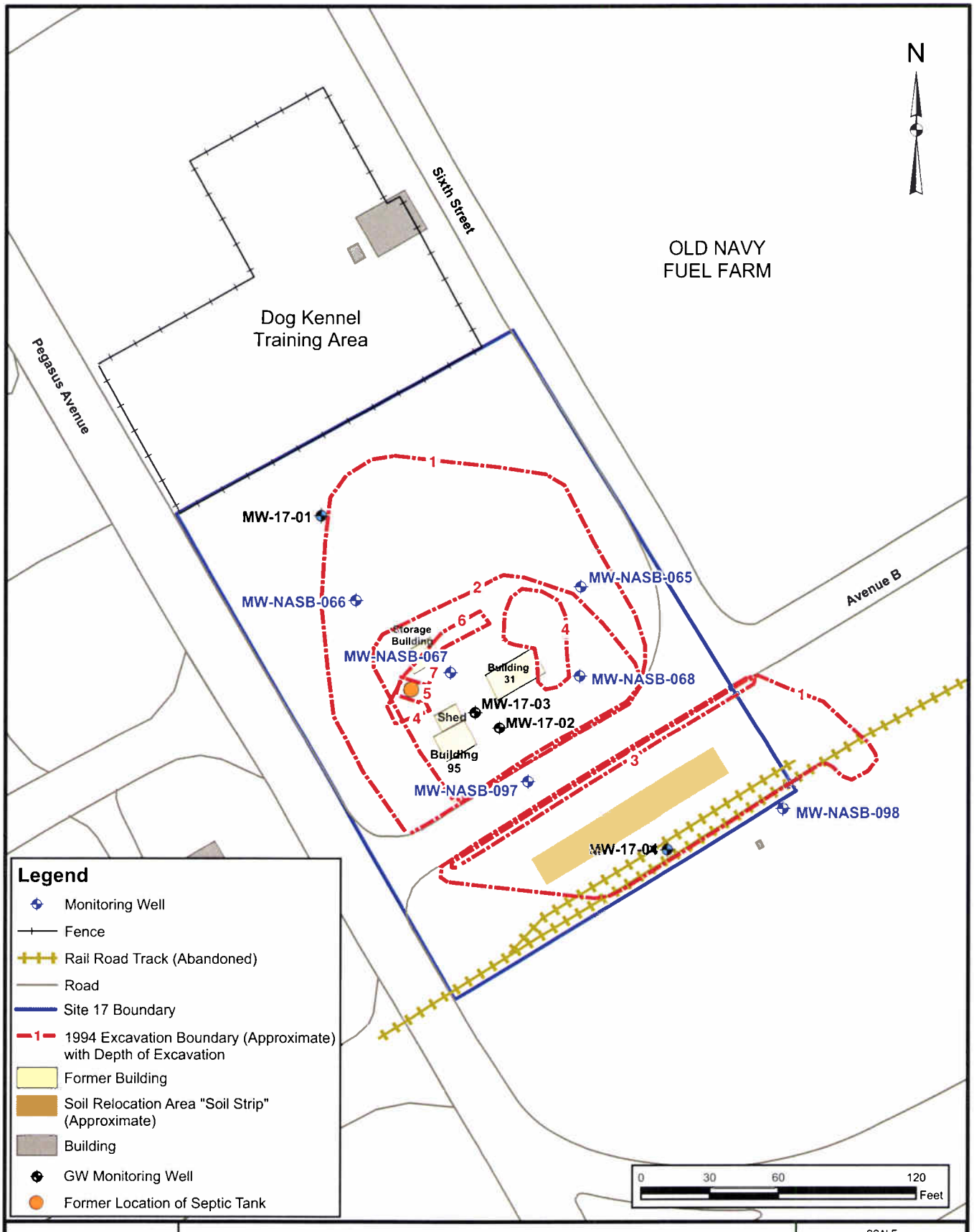
UJ - Detection Limit Approximate

J - Quantitation Limit Approximate

NC - Criterion not available

NA - Not Analyzed

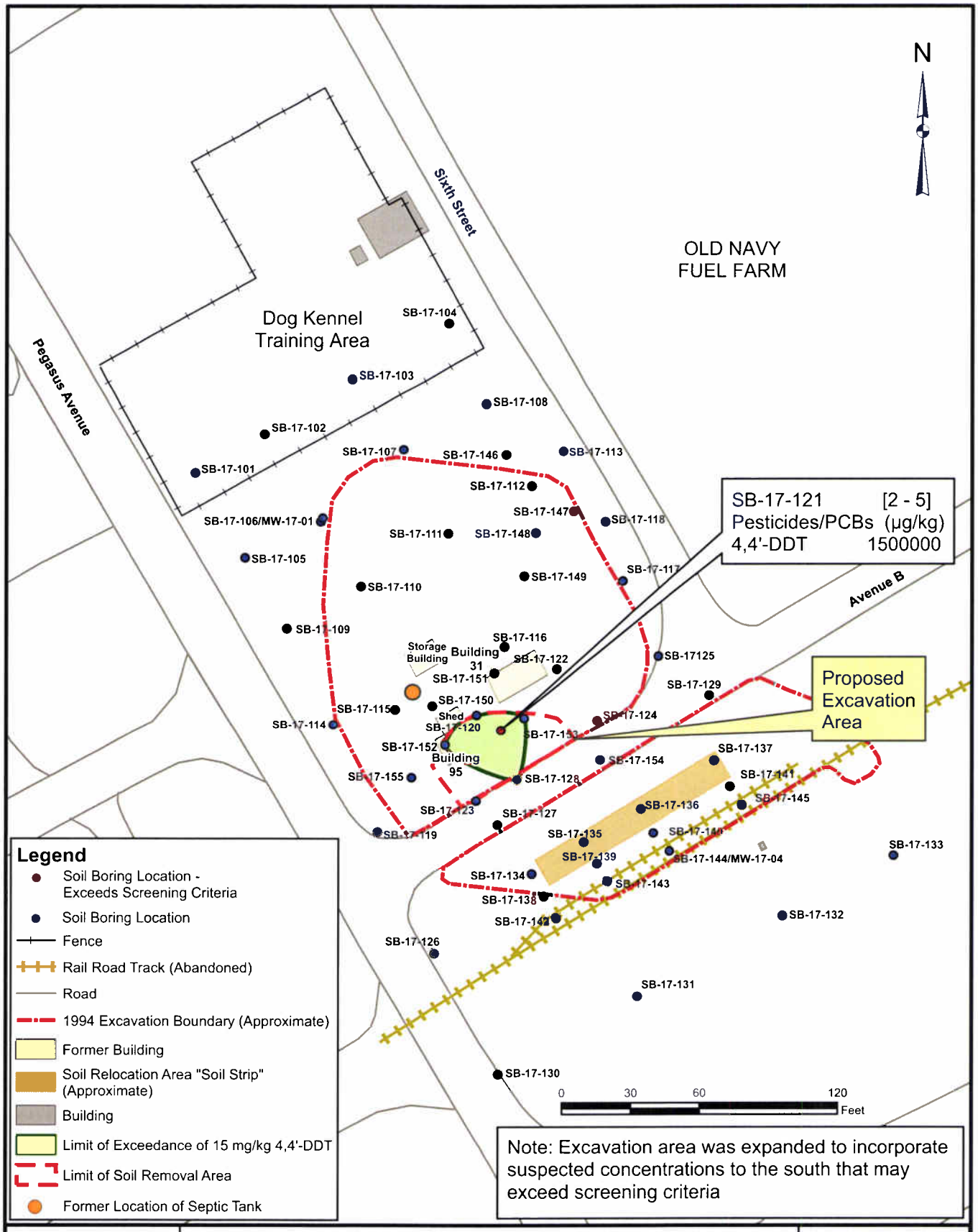
I:\02063\30730\SITE_17_SITE_PLAN.MXD DWM 04/21/10



Tetra Tech NUS, Inc.

SITE 17
SITE PLAN
NAVAL AIR STATION
BRUNSWICK, MAINE

SCALE	AS NOTED
FILE	/../SITE_17_SITE_PLAN.MXD
REV	0
DATE	04/21/10
FIGURE NUMBER	1



Tetra Tech NUS, Inc.

SITE 17
SOIL EXCAVATION AREA
NAVAL AIR STATION
BRUNSWICK, MAINE

SCALE	AS NOTED
FILE	/../SITE_17_EXC_AREA.MXD
REV	0
DATE	04/21/10
FIGURE NUMBER	2

ATTACHMENT A

PRG DEVELOPMENT DOCUMENT

PRELIMINARY REMEDIATION GOALS
SITE 17 SOILS
NAS BRUNSWICK
APRIL 2010

Preliminary remediation goals (PRGs) were calculated by Tetra Tech NUS, Inc. (Tetra Tech) for compounds chosen as chemicals of concern (COCs) for receptors having unacceptable risks due to soil exposure per the Site 17 Remedial Investigation (RI) risk assessment. Unacceptable risks were calculated for the lifelong resident, adult resident, adolescent resident, young child resident, and industrial worker exposed to subsurface soil. The draft version of the Site 17 RI lists arsenic and 4,4'-DDT as the subsurface soil COCs. Due to risk assessment updates, including a site soil concentration to facility background comparison and revisions based on regulator comments, the subsurface soil COCs for the lifelong resident are 4,4'-DDD, 4,4'-DDE and 4,4'-DDT. Arsenic is no longer a COC because the Site 17 subsurface soil concentrations were determined to be similar to facility background concentrations as demonstrated in the attached Background Concentration Comparison Summary for Arsenic in soil (Attachment B). For the industrial worker exposed to subsurface soil, 4,4'-DDT is the only COC. According to the Site 17 RI risk assessment the subsurface soil concentrations of COCs do not pose unacceptable risks to the construction worker, lifelong trespasser, adult trespasser, or the adolescent trespasser, and none of the receptors were found to have unacceptable risks associated with surface soil exposure; therefore, PRGs for those receptors are not presented in this document. For the following PRG calculations, chemical intakes were based on site specific exposure point concentrations (EPCs) calculated for surface and subsurface soil. PRGs were back-calculated from site-specific calculated risks and EPCs using the risk-ratio methodology are presented below. Calculation of PRGs for NAS Brunswick utilized a target cancer risk (TCR) of 1 X 10^{-5} to comply with Maine Department of Environmental Protection (MEDEP) risk goals. PRGs were calculated using the following equations:

Equation for Cancer-Based PRGs

$$PRG = (EPC)(TCR)/Risk$$

Where:
PRG = the soil preliminary remediation goal (mg/kg)
EPC = exposure point concentration (mg/kg)
TCR = target cancer risk
Risk = site specific risk calculated

Equation for Noncancer-Based PRGs

$$PRG = (EPC)(THI)/HI$$

Where:
PRG = the soil preliminary remediation goal (mg/kg)
EPC = exposure point concentration (mg/kg)
calculated
THI = target hazard index
HI = site specific hazard index

Example PRG Calculations: Young Child Resident Exposed to Subsurface Soil

Following are cancer and noncancer example calculations of the 4,4'-DDT PRGs for the lifelong resident exposed to surface soil:

Cancer Risk-Based PRG Calculation Example

EPC = 140 mg/kg; TCR = 1 X 10^{-5}; Risk = 5.7 X10^{-5}

$$PRG = [(140 \text{ mg/kg})(1 \times 10^{-5})]/5.7 \times 10^{-5}$$

4,4'-DDT cancer risk-based PRG for the young child resident exposed to subsurface soil = 24.6 mg/kg

Noncancer Risk-Based PRG Calculation Example

EPC = 140 mg/kg; THI= 1; HI = 3.9

$$PRG = [(140 \text{ mg/kg})(1)]/3.9$$

4,4'-DDT noncancer risk-based PRG for the young child resident exposed to subsurface soil = 35.9 mg/kg

**** The EPC and risk values used in the above calculations were acquired from the Site 17 human health risk assessment.***

The table below lists the lifelong residential and industrial PRGs calculated for COCs at Site 17. According to the updated Site 17 risk assessment, unacceptable risks were only posed to the residential and industrial receptors; therefore, only PRGs for those receptors are presented below. The lifelong resident PRGs are calculated based on a summation of the child, adolescent, and adult resident risks; therefore, the lifelong residential PRG is more conservative than any of the individual resident receptor PRGs and for that reason is the only residential PRG listed below. Please note that the lower of the cancer or noncancer risk-based PRGs was selected.

Chemical of concern	Receptor	Soil PRG (mg/kg)
4,4'-DDD	Lifelong Resident	22
4,4'-DDE	Lifelong Resident	15
4,4'-DDT	Lifelong Resident	15
	Industrial Worker	70

Discussion: The only RI sampling location where any PRGs were exceeded was at location SB-17-121, where there were exceedances for all three soil COCs (4,4'-DDD=54 mg/kg, 4,4'-DDE=25 mg/kg, 4,4'-DDT=1,500 mg/kg). South of Avenue B, maximum post-excavation concentrations (following the 2009 soil removal) for 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT were 0.064 mg/kg, 0.37 mg/kg, and 4.4 mg/kg, respectively, which are all well below the corresponding calculated PRGs.

Site 17 PRGs

PRGs for Surface Soil

Lifelong Resident

				Cancer Risk-Based Values			
COC	Units	Maximum Concentration	EPC	Estimated Cancer Risk	ILCR = 1E-06	ILCR = 1E-05	ILCR = 1E-04
4,4'-DDD	mg/kg	0.1	0.0200	9.24E-09	2.16E+00	2.16E+01	2.16E+02
4,4'-DDE	mg/kg	0.25	0.0800	5.23E-08	1.53E+00	1.53E+01	1.53E+02
4,4'-DDT	mg/kg	1.2	0.400	2.62E-07	1.53E+00	1.53E+01	1.53E+02

Adult Resident

				Cancer Risk-Based Values			
COC	Units	Maximum Concentration	EPC	Estimated Cancer Risk	ILCR = 1E-06	ILCR = 1E-05	ILCR = 1E-04
4,4'-DDT	mg/kg	1.2	0.400	4.17E-08	9.59E+00	9.59E+01	9.59E+02

			Non-Cancer Risk-Based Values		
COC	Units	Maximum Concentration	EPC	Estimated HI	HI = 1
4,4'-DDT	mg/kg	1.2	0.400	1.23E-03	3.26E+02

Adolescent Resident

				Cancer Risk-Based Values			
COC	Units	Maximum Concentration	EPC	Estimated Cancer Risk	ILCR = 1E-06	ILCR = 1E-05	ILCR = 1E-04
4,4'-DDT	mg/kg	1.2	0.400	5.85E-08	6.84E+00	6.84E+01	6.84E+02

			Non-Cancer Risk-Based Values		
COC	Units	Maximum Concentration	EPC	Estimated HI	HI = 1
4,4'-DDT	mg/kg	1.2	0.400	2.41E-03	1.66E+02

Young Child Resident

				Cancer Risk-Based Values			
COC	Units	Maximum Concentration	EPC	Estimated Cancer Risk	ILCR = 1E-06	ILCR = 1E-05	ILCR = 1E-04
4,4'-DDT	mg/kg	1.2	0.400	1.62E-07	2.48E+00	2.48E+01	2.48E+02

			Non-Cancer Risk-Based Values		
COC	Units	Maximum Concentration	EPC	Estimated HI	HI = 1
4,4'-DDT	mg/kg	1.2	0.400	1.11E-02	3.61E+01

Industrial Worker

				Cancer Risk-Based Values			
COC	Units	Maximum Concentration	EPC	Estimated Cancer Risk	ILCR = 1E-06	ILCR = 1E-05	ILCR = 1E-04
4,4'-DDT	mg/kg	1.2	0.400	5.69E-08	7.03E+00	7.03E+01	7.03E+02

			Non-Cancer Risk-Based Values		
COC	Units	Maximum Concentration	EPC	Estimated HI	HI = 1
4,4'-DDT	mg/kg	1.2	0.400	9.38E-04	4.27E+02

Site 17 PRGs

PRGs for Subsurface Soil

Lifelong Resident

				Cancer Risk-Based Values			
COC	Units	Maximum Concentration	EPC	Estimated Cancer Risk	ILCR = 1E-06	ILCR = 1E-05	ILCR = 1E-04
4,4'-DDD	mg/kg	54	5.09	2.35E-06	2.16E+00	2.16E+01	2.16E+02
4,4'-DDE	mg/kg	25	2.36	1.54E-06	1.53E+00	1.53E+01	1.53E+02
4,4'-DDT	mg/kg	1500	140	9.17E-05	1.53E+00	1.53E+01	1.53E+02

Adult Resident

				Cancer Risk-Based Values			
COC	Units	Maximum Concentration	EPC	Estimated Cancer Risk	ILCR = 1E-06	ILCR = 1E-05	ILCR = 1E-04
4,4'-DDT	mg/kg	1500	140	1.46E-05	9.58E+00	9.58E+01	9.58E+02

			Non-Cancer Risk-Based Values		
COC	Units	Maximum Concentration	EPC	Estimated HI	HI = 1
4,4'-DDT	mg/kg	1.2	140	4.30E-01	3.26E+02

Adolescent Resident

				Cancer Risk-Based Values			
COC	Units	Maximum Concentration	EPC	Estimated Cancer Risk - Lifetime Resident	ILCR = 1E-06	ILCR = 1E-05	ILCR = 1E-04
4,4'-DDT	mg/kg	1500	140	2.05E-05	6.84E+00	6.84E+01	6.84E+02

			Non-Cancer Risk-Based Values		
COC	Units	Maximum Concentration	EPC	Estimated HI	HI = 1
4,4'-DDT	mg/kg	1.2	140	8.43E-01	1.66E+02

Young Child Resident

				Cancer Risk-Based Values			
COC	Units	Maximum Concentration	EPC	Estimated Cancer Risk - Lifetime Resident	ILCR = 1E-06	ILCR = 1E-05	ILCR = 1E-04
4,4'-DDT	mg/kg	1500	140	5.66E-05	2.47E+00	2.47E+01	2.47E+02

			Non-Cancer Risk-Based Values		
COC	Units	Maximum Concentration	EPC	Estimated HI	HI = 1
4,4'-DDT	mg/kg	1.2	140	3.88E+00	3.60E+01

Industrial Worker

				Cancer Risk-Based Values			
COC	Units	Maximum Concentration	EPC	Estimated Cancer Risk	ILCR = 1E-06	ILCR = 1E-05	ILCR = 1E-04
4,4'-DDT	mg/kg	1500	140	1.99E-05	7.02E+00	7.02E+01	7.02E+02

			Non-Cancer Risk-Based Values		
COC	Units	Maximum Concentration	EPC	Estimated HI	HI = 1
4,4'-DDT	mg/kg	1.2	140	3.29E-01	4.26E+02

COC = Contaminant of Concern
EPC = Exposure Point Concentration
HI = Hazard Index
ILCR = Incremental Lifetime Cancer Risk
PRG = Preliminary Remediation Goal

ATTACHMENT B

BACKGROUND COMPARISON METHODOLOGY AND BACKGROUND CONCENTRATION COMPARISON SUMMARY FOR ARSENIC

BACKGROUND COMPARISON METHODOLOGY
SITE 17
NAS BRUNSWICK

The methodology used to compare NAS Brunswick Site 17 arsenic soil concentration data against NAS Brunswick Facility Background arsenic soil concentration data are described below. The background comparison methodology was developed in accordance with the Navy policy "Procedural Guidance For Statistically Analyzing Environmental Background Data" dated September 1998. Statistical analyses were used to compare Site 17 soil arsenic concentrations to Facility Background soil arsenic concentrations to determine if the analytical results for arsenic from samples taken at Site 17 represent conditions specific to Site 17 or are consistent with Facility Background conditions. The results of tests performed and final recommendations for arsenic soil concentration data sets are presented in Table 1 and the Background Concentration Comparison Summary for Arsenic in Soil which immediately follows this methodology.

The comparison of the site data with the background data was performed using summary statistics, probability plots, box plots, and several statistical tests described below. If the sum of the individual concentration data points in a combined data set (i.e. site and background datasets combined) for a given evaluation are greater than 90 percent non-detected then the maximum concentrations of the separated data sets were compared. If the site data appear to be obviously below or above background from visual inspection no formal statistical tests were performed.

Step 1: Producing and Interpreting Probability Plots

Probability plots are a useful first step for visually comparing two data sets in a single graph. If the site and background distributions are exactly identical, the plotted values lie on a straight line through the origin. Deviations from this line show the differences between the two distributions. If the site and background distributions are similar the scattering of the two data sets will be mixed. If there is grouping of the two data sets then data sets are most likely different. The Normal Probability Plot displayed after Background Concentration Comparison Summary for Arsenic in Soil is the probability plot for this background comparison.

Step 2: Producing and Interpreting Box Plots

As an additional aid for the population analysis, box plots were generated for the site data and background data.

Box plots show the central tendency, degree of symmetry, range of variation, and potential outliers of a data set. The data set is shown as a rectangular box that represents the middle 50 percent of the data. The upper value of the box represents the 75th percentile and the lower value of the box represents the 25th percentile. The median is represented by the middle line in the box. The upper whisker is the highest data point within 1.5 times the Interquartile Range (IQR) of the 75th percentile. The IQR is the 75th percentile minus the 25th percentile. The lower whisker is the lowest data point within 1.5 IQR of the 25th percentile. Outliers are points that are greater than the upper whisker or less than the lower whisker and are represented by a circle on the box plots.

Box plots for arsenic concentrations from the two data sets were plotted on the same graph which is displayed following the Background Concentration Comparison Summary for Arsenic in Soil. The plots were visually inspected to see if the data sets appear similar or different. Particular attention was paid to see if the median from one data set fell within the 75th and 25th percentile range of the other data set, which indicates that the data sets are similar.

Step 3: Determine Data Distributions and Appropriate Statistical Hypothesis Test

USEPA's ProUCl 4.00.04 software was used to determine the data distribution of the site and background concentration datasets and to compute the appropriate statistical test (i.e., Two

Sample T-test, Wilcoxon Rank Sum Test, or Gehan Test) which was selected based on the data distributions and the amount of non-detected results. The aforementioned statistical tests can be used to determine if the data sets are similar. If the combined percentage of non-detected concentrations was between 0 and 50 percent then the Two sample T-test, Wilcoxon Rank Sum test, or Gehan test was computed to assist in determining if the site data set is greater than the background data set plus one background standard deviation as outlined in the U.S. EPA document "Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites" dated September 2002. If the combined percentage of non-detected concentrations was greater than 50 percent the two proportion test was computed. If the data were log normally distributed then the statistical tests were performed on the log-transformed concentrations.

To determine which statistical test is appropriate to select out of the Two sample T-test, Wilcoxon Rank Sum test, or Gehan test the data distribution(s) of the site and background datasets must be determined. If the data distribution(s) in normal then the Two Sample T-Test is selected, if not than either the Wilcoxon Rank Sum test or Gehan test should be selected. The Wilcoxon Rank Sum test and the Gehan test are nonparametric hypothesis tests and can be used when the data distributions are not normal. The Gehan Test can be used when there are non-detected concentrations with multiple reporting limits, while the Wilcoxon Rank Sum Test can be used when there are non-detected concentrations with the same reporting limit. Therefore, if non-detected results have the same reporting limits then the Wilcoxon Rank Sum test will be selected, if not the Gehan Test will be selected. In the event that that data distribution(s) are not normal and no results are non-detected the Wilcoxon Rank Sum Test will be selected. Following is a description of the statistical tests introduction in this section.

Two Sample T-Test

The Two Sample T-Test is a test for a difference between two populations means when it can be assumed that the data are approximately normally distributed or sample sizes are large enough (m and n at least 30). If those criteria were not met then calculating the Two Sample T-Test was done. If the variances of the two data sets are not equal than the Two sample T-Test with unequal variance was computed. The Two Sample T Test was computed using USEPA's Pro UCL 4.00.04. The null and alternative hypotheses are:

H_o: The site distribution exceeds the background distribution by more than one background standard deviation.

H_A: The site distribution does not exceed the background distribution by more than one background standard deviation.

Wilcoxon Rank Sum Test

The Wilcoxon Rank-Sum (WRS) nonparametric test is used to test for a shift in location between two independent populations. The WRS test has two main advantages over the independent sample t test: the two data sets need not be drawn from the normal distribution and the WRS test can handle a moderate number of nondetected values by treating them as ties. The WRS test is applicable only when non-detected concentrations have the same reporting limit. The Wilcoxon Rank Sum test was computed using USEPA's PRO UCL 4.00.04 software.

H_o: The site distribution exceeds the background distribution by more than one background standard deviation.

H_A: The site distribution does not exceed the background distribution by more than one background standard deviation.

Gehan Test

The Gehan nonparametric test is used to test for a shift in location between two independent populations. The Gehan test can be used when the background or site datasets contain multiple nondetects with different reporting limits. The Gehan test was computed using USEPA's PRO UCL 4.00.04 software.

H_o: The site distribution exceeds the background distribution by more than one background standard deviation.

H_A: The site distribution does not exceed the background distribution by more than one background standard deviation.

Step 4: Compute Hypothesis Test on Maximum Values

If the hypothesis test on the central tendency of the two data sets shows that the data sets are similar then the upper values of the two data sets must also be compared. If the selected statistical test fails either the Quantile or Slippage test than the site data must be considered to differ from background data (i.e., the site data set cannot be considered to be within the range of the background dataset). If the selected statistical test suggests site data and background data are similar and passes both the Quantile and Slippage tests, then the site data set is statistically consistent with background concentrations (i.e. site data can be considered background). Following is a description of the Quantile and Slippage tests.

Quantile Test

The Quantile test is used to identify the differences in the right tails of the site and background distributions. This may be regarded as detecting if the values in the right-tail of the site population are greater than the right-tail of the background distribution. If the results of the Two Sample T-Test, WRS Test, or Gehan Test found the distributions to not be different then the quantile test was computed. If the quantile test found the right tail of the site data to be larger than the right tail of the background data it was concluded that the site concentrations are greater than background, indicated as "Fail" on the summary table. If the quantile test found the right tail of the site data to be consistent with the right tail of the background data it was concluded that the site concentrations are within background, indicated as "Pass" on the summary table. The test is valid regardless of the underlying distribution of the site and background data sets.

Slippage Test

The Slippage test is used to test for a shift to the right in the extreme right-tail of the site versus the background concentrations. This is equivalent to asking if a set of the largest values of the site distribution are larger than the maximum value of the background distribution. If the results of the Quantile Test were that the right tails of the site and background distributions were not different than the slippage test was computed. If the slippage test found the extreme right tail of the site data to be larger than the background data it was concluded that the site concentrations are greater than background, indicated as "Fail" on the summary table. If the slippage test found the right tails of the site data to be consistent with the right tail of the background data it was concluded that the site concentrations are within background, indicated as "Pass" on the summary table. This test can be used regardless of the underlying distribution of the site and background data sets.

BACKGROUND CONCENTRATION COMPARISON SUMMARY FOR ARSENIC IN SOIL
SITE 17
NAS BRUNSWICK

Following is the background concentration comparison summary for Site 17 arsenic concentrations in soil. The purpose of the comparison was to determine whether or not Site 17 concentrations of arsenic in soil should be considered as similar to or distinct from Facility Background concentrations of arsenic in soil. All plots and graphs referenced in this text are provided on the pages immediately following the text. Table 1 follows the figures and provides a statistical summary of the results discussed below.

The background data set comparisons were evaluated five different way including: a normal probability plot and box plots of the data sets, a statistical hypothesis test on the mean/median and upper values of the datasets, and by analyzing a histogram of the combined data sets. Each evaluation provided evidence for or against the similarity of the data sets. The conclusions of these evaluations were used to determine whether or not the data sets are similar or distinct.

Surface Soil Background Comparison

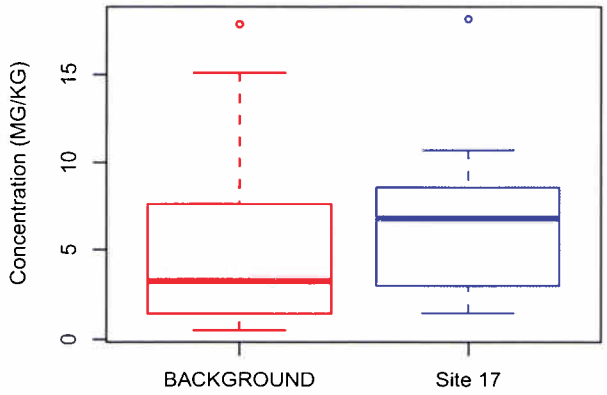
The normal probability plot shows a separation of data sets in the lower and upper tails of the data set because there is only one background concentration in the upper half of the upper tail while the lower half of the lower tail contains only background concentrations. Even though the normal probability plot shows separation it does not prove that the data sets are distinct due to the distribution of the datasets in relation in one another. The box-plots show that the Site 17 median surface soil arsenic concentration is between the Facility Background 75th percentile and median arsenic concentration which is considered evidence that the data sets are similar. The hypothesis test (Wilcoxon Rank Sum test) determined that the Site 17 and Facility Background arsenic median surface soil concentrations were similar; therefore, the upper values of the data sets were compared via the Quantile and Slippage tests. The upper value comparisons (i.e. Quantile and Slippage tests) passed; therefore, the data sets were not considered distinct based on those comparisons. The histogram (shown following this text) shows that the combined data are right skewed meaning that the data sets cannot be distinguished as distinct according to this evaluation. In summary, the normal probability plot and histogram did not indicate that the data sets were distinct while the box plots, statistical hypothesis test and upper value comparisons all indicated that the data sets were similar. Therefore, it can be concluded that the Site 17 surface soil arsenic concentrations are similar to Facility Background surface soil arsenic concentrations.

Subsurface Soil Background Comparison

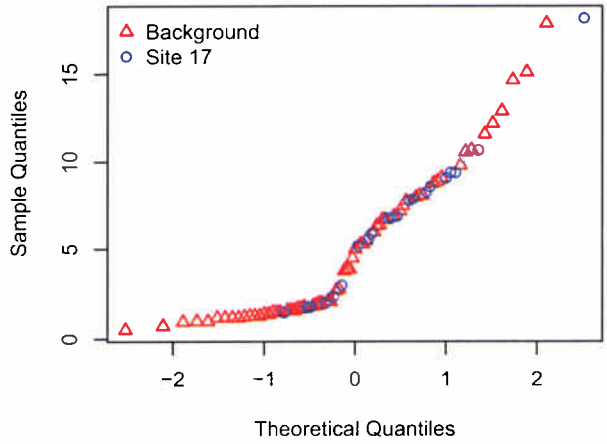
The normal probability plot shows a separation of data sets in the upper tail of the data set because there are no Site 17 arsenic subsurface soil concentrations in the upper tail. Therefore, even though the normal probability plot shows separation it does not prove that the data sets are distinct due to the distribution of the datasets in relation in one another. The box-plots show that the Facility Background median subsurface soil arsenic concentration is between the Site 17 median and 75th percentile which is considered evidence that the data sets are similar. The hypothesis test (Wilcoxon Rank Sum test) determined that the Site 17 and Facility Background arsenic median surface soil concentrations were similar; therefore, the upper values of the data sets were compared via the Quantile and Slippage tests. The upper value comparisons (i.e. Quantile and Slippage tests) passed; therefore, the data sets were not considered distinct based on those comparisons. The histogram (shown following this text) shows that the combined data are right skewed meaning that the data sets cannot be distinguished as distinct according to this evaluation. In summary, the normal probability plot and histogram did not indicate that the data sets were distinct while and the box plots, statistical hypothesis test, and upper value comparisons indicated that the data sets were similar. Therefore, it can be concluded that the Site 17 subsurface soil arsenic concentrations are similar to Facility Background subsurface soil arsenic concentrations.

FIGURES
ARSENIC SURFACE SOIL BACKGROUND COMPARISON
SITE 17
NAS BRUNSWICK

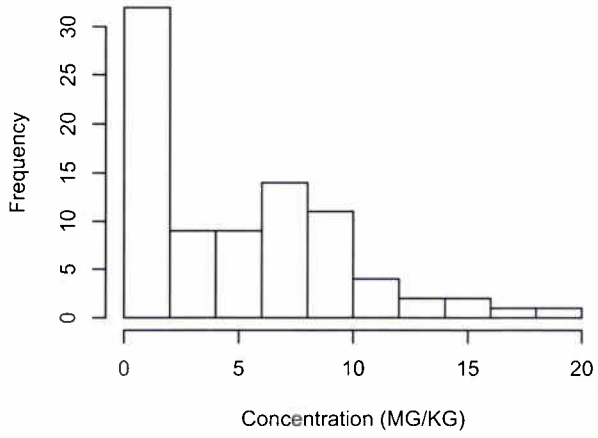
Boxplot



Normal Probability Plot



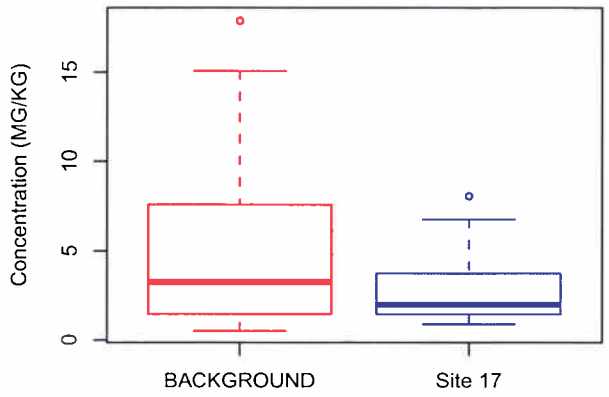
Histogram



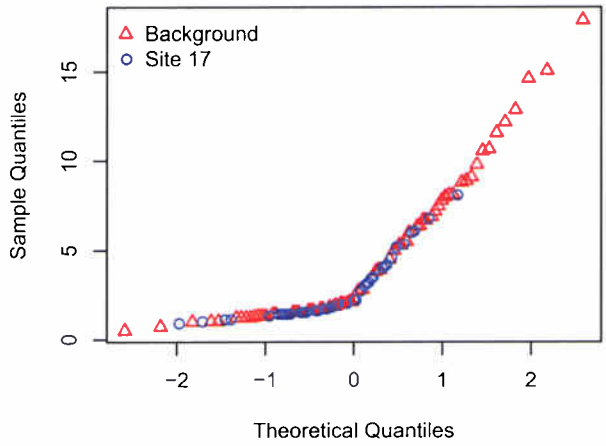
	Site 17	Background
Minimum	2	1
25th Percentile	3	2
Median	7	3
Mean	7	5
75th Percentile	9	8
Maximum	18	18

FIGURES
ARSENIC SUBSURFACE SOIL BACKGROUND COMPARISON
SITE 17
NAS BRUNSWICK

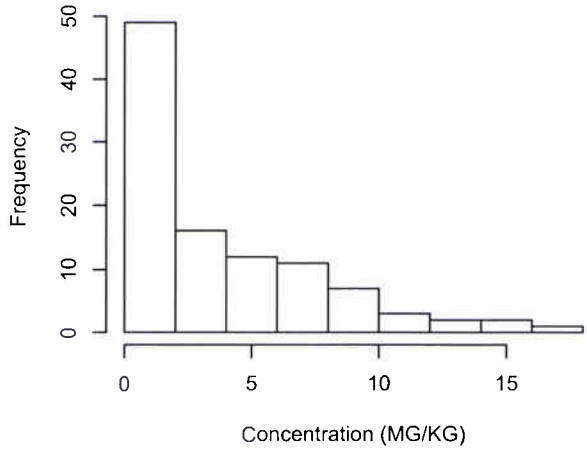
Boxplot



Normal Probability Plot



Histogram



	Site 17	Background
Minimum	1	1
25th Percentile	1	2
Median	2	3
Mean	3	5
75th Percentile	4	8
Maximum	8	18

Table 1
Arsenic Background Statistical Summary
Site 17 Soil
NAS Brunswick

Parameter	Site Total	Site FOD	Background FOD	Total FOD	%ND	Visual Conclusion Site Above Background?	Site Distribution	Background Distribution	Test	Equal Variance?[2]	Test Statistic	P-Value	Quantile Test	Slippage Test	Site Above Background?
Surface Soil															
Arsenic	21	21/21	64/64	85/85	0	Similar	Gamma	Nonparametric	WRS	NA	-2.354	9.29E-03	Pass	Pass	No
Subsurface Soil															
Arsenic	39	37/39	64/64	101/103	4	Similar	Nonparametric	Nonparametric	WRS		-7.652	9.86E-15	Pass	Pass	No

1 Total percentage of Non-detects is greater than 90% conclusion based on comparison of maximum concentrations.
2 Equal Variance F Test was used to determine which T-Test to Compute.

FOD = Frequency of Detect
NA = Not Applicable
ND = Nondetect

APPENDIX F

REGULATOR COMMENTS AND NAVY RESPONSES

RESPONSES TO COMMENTS ON
MAY 2011 REVISED DRAFT (REVISION 1) RI REPORT

Responses to
Maine Department of Environmental Protection
Comments on the
Site 17 Remedial Investigation Report
Dated May 2011
Naval Air Station Brunswick, Maine

July 27, 2011

General Comments:

1. **With the revisions to the Human Health Risk Assessment (HHRA) via email on June 26, 2011 (RAGs Table 2.3) and July 12, 2011 (Appendix E.5 text and tables) has supported the determination of no unacceptable risk to human health from the pesticides in soil. However MEDEP is concerned about future excavations and inappropriate use of the pesticide contaminated soils and suggests that the Maine Solid Waste Management Rules be applied to prevent any potential future ecological risk.**

   Response: *Based on post-removal action results, estimated risks to human health and the environment from site soil were determined to be acceptable for unrestricted land use per CERCLA requirements/guidelines.*

2. **A summary of the confirmation results from the 2009 and 2010 soil excavations needs to be included in the body of this report.**

   Response*: A brief summary of results, as presented in Table 4-3, from the updated data set will be added to Section 4.3 (see response to Specific Comment 15) and other sections.*

3. **The report ignores the number and concentration of pesticides and herbicides in exceedance of their screening levels at one foot and below for future ecological risk.**

   Response*: The soil depth for evaluation of ecological risk of 0 to 1 foot is in accordance with the Site 17 RI Work Plan, as discussed further in the responses to the letter from Wilcox and Barton. However, a discussion of subsurface soil risk will be added to the uncertainty section of the ecological risk assessment.*

4. **Please revise figure 4-4 in the report to include exceedances of both human health and ecological screening criteria or generate a separate figure for the ecological exceedances and note on figure(s) that figure indicate exceedances.**

   Response*: Additional figures will be generated to present exceedances of ecological screening criteria.*

5. **The figures indicate that the December 2010 excavation was expanded to include areas away from the central portion of the site near MW-17-02. This appears to be a consistent graphics error in all figures in the report. Please revise all figures to remove the extra polygons attributed to the December 22, 2010 excavation. Also please indicate the final depth of the 2010 excavation in the legend.**

   Response*: The figures will be corrected as indicated, and the maximum depth of the 2010 excavation will be added to the figures.*

Specific Comments:

6. **Executive Summary, Site History: Please add a sentence regarding the soil removal completed in 2009 south of Avenue B.**

   Response: *The following sentence will be added after the third sentence of the Site History and Remediation Summary section:*

   "In 2009, 117 tons of subsurface soil that had been excavated in 1994 and then relocated and reburied (covered with clean soil) south of Avenue B (in an area known as the "soil strip") was removed and disposed of at an off-base location."

7. **Executive Summary, Nature and Extent:**

   a.) Para 1: Pesticides and diesel-range organics (DRO) were detected in soil samples at several locations…"

   This statement does not take into account the number of detections of pesticides from the confirmations sampling. Also rather than trying to define the number of locations of detections in general terms it might be easier just to include the number of locations of pesticide/herbicide detections on the site.

   Response: *As discussed during the 22 July 2011 conference call, the word "several" in the referenced sentence will be changed to "multiple."*

   b.) Although the statistical review points to fill as a source for the elevated arsenic at the site, it is also possible some soils logged as fill are native soil that was bladed around during construction (such as at the dog kennel) and some soils likely to be fill (any areas between the former "re-buried soil area" and Avenue B) were logged as native. Caution is advisable in trying to draw a distinct line at the Base for fill vs native due to the similarities between local common borrow and native soils. Despite these reservations, the levels of arsenic are not elevated above concentrations commonly found in sand and gravel borrow materials, and the assessment in the report is acceptable. (No response needed.)

   Response: *Noted.*

8. **Executive Summary, Risk Assessment Results: Relying on a single round of monitoring is not representative due to the conservative drinking water criteria and sporadic nature of the groundwater detections at this site. MEDEP also agrees with USEPA that averaging the site groundwater concentrations is not acceptable.**

   Response: *Three additional rounds of groundwater monitoring will be recommended in the RI to assess post-removal groundwater conditions, maximum groundwater concentrations will be used in the risk assessment, and associated text will be revised to reflect these changes.*

9. **Section 1.3.2.2, Post-RI Groundwater Investigations, para 1 and 3:**

   a.) MEDEP believes the Fall 2010 and Spring 2011 monitoring events are mis-numbered and is in the process of resolving this with H&S Environmental. Once this is resolved the correct monitoring event number should be used.

   Response: *All references to the events will list the dates only (monitoring event numbers will be deleted).*

   b.) Para 3: MEDEP has not received the Spring 2011 data presumably because it is being validated. The Navy must ensure that this Monitoring Event data submittal is provided to the regulatory agencies if it is going to be used to support the risk assessments.

***Response**: It is the Navy's understanding that H&S Environmental, Inc., has provided MEDEP the validated data.*

10. Table 2-1 and Figure 1-2: Labels on the figure for SB-17-123 and SB-17-127 appear to be mixed up, and the SB-134 through SB-140 borings are not labeled. Please revise the figure.

***Response**: The locations of SB-17-123 and 127 will be reversed on all figures, and SB-134 through SB-140 will be added to the figures.*

11. Section 3.2, Hydrogeology: Section 7, Conclusions and Recommendations, Conclusion 7 and Appendix A Field Forms: The boring logs, well installation logs and slug test forms indicate that for MW-17-02 and MW-17-03 the screen lengths, saturated thicknesses and well penetration depths need to be checked for the slug test calculations. Please check the data, recalculate as needed and revise the text in Section 3.2 (Page 3-3 paragraph 5 and 6) and Section 7.0 to reflect any differences in the resulting average hydraulic conductivity and groundwater flow velocities.

***Response**: The information was rechecked, and the text, table, and appendix will be revised. Revised table values are highlighted below.*

Well ID	Aquifer Screened	K[1]		Geologic Materials[2]
		(cm/s)	(ft/d)	
Hydraulic Conductivity Results - Overburden Wells				
MW-17-01	Upper Sand/Transition Unit	3.11E-03	8.81	Silty sands, fine sands, well sorted sands
MW-17-02	Upper Sand	3.46E-03	9.81	Silty sands, fine sands, well sorted sands
MW-17-03	Upper Sand/Transition Unit	3.92E-03	11.10	Silty sands, fine sands, well sorted sands
MW-17-04	Upper Sand	3.53E-03	9.99	Silty sands, fine sands, well sorted sands
MW-NASB-065	Upper Sand	1.38E-03	3.90	Silty sands, fine sands, well sorted sands
MW-NASB-066	Upper Sand/Transition Unit	3.36E-03	9.53	Silty sands, fine sands, well sorted sands
MW-NASB-068	Upper Sand	6.18E-03	17.51	Silty sands, fine sands, well sorted sands
MW-NASB-098	Upper Sand	9.91E-04	2.81	Silty sands, fine sands, well sorted sands
Minimum	Upper Sand/Transition Unit	3.11E-03	8.81	
Maximum	Upper Sand/Transition Unit	3.92E-03	11.10	
Geometric Mean	Upper Sand/Transition Unit	3.45E-03	9.77	
Minimum	Upper Sand	9.91E-04	2.81	
Maximum	Upper Sand	6.18E-03	17.51	
Geometric Mean	Upper Sand	2.53E-03	7.16	
Geometric Mean	All wells	2.84E-03	8.04	
Minimum	All wells	9.91E-04	2.81	
Maximum	All wells	6.18E-03	17.51	

12. Section 4.1, 2008 RI Soil Sampling Results, para 2, last sentence: Do you mean "MEDEP" rather than MADEP? Please check and revise as necessary.

***Response**: Yes, the error will be corrected.*

13. Section 4.1.1, Pesticides: Please list the other pesticides detected and add a very brief discussion of the exceedances of the screening level of other pesticides in addition to the DDD, DDE, and DDT found in soils on the site.

***Response**: The text will be revised as follows:*

*"Eight pesticides were detected in soil samples collected during the RI, as shown in Table 4-1, including 4,4'-DDD, 4,4'-DDE 4,4'-DDT, alpha- and gamma-chlordane, gamma-BHC, heptachlor, and heptachlor epoxide. In addition, one organophosphorus pesticide, malathion, was detected. At three locations, SB-17-112, SB-17-120, and SB-17-121, concentrations of one or more pesticides exceeded **minimum human health** screening criteria (EPA residential RSL or MEDEP RAGs) {relocated and revised}. Concentrations of 4,4'-DDD and 4,4'-DDE exceeded EPA residential RSLs and MEDEP RAGs in one soil sample, SB-17-121-0205 (54 and 25 mg/kg, respectively). Concentrations of 4,4'-DDT exceeded the EPA residential RSL (1.7 mg/kg) in three samples, SB-17-112-0104 (7.2 mg/kg), SB-17-120-0205 (2.2 mg/kg in duplicate sample), and SB-17-121-0205 (1,500 mg/kg). Soil borings SB-17-120 and SB-17-121 are located adjacent to the site former buildings, and soil boring SB-17-112 is located at the northeastern edge of the former excavation area, as shown on Figure 4-1.*

Seven pesticides (4,4'-DDD, 4,4'-DDE 4,4'-DDT, heptachlor, alpha- and gamma-chlordane, and gamma-BHC) were detected during the RI at concentrations greater than minimum ESLs. Heptachlor concentrations exceeded the minimum ESL at SB-17-123 and SB-17-135, alpha-and gamma-chlordane concentrations exceeded minimum ESLs at SB-17-123, and the gamma-BHC concentration exceeded the minimum ESL at SB-17-124. SB-17-123 and SB-17-124 were located just north of Avenue B along the southern edge of the 1994 excavation area. SB-17-135 was located within the relocated soil strip area that was excavated in 2009."

14. Section 4.2.1, Pesticides: Since the initial RI, the Maine Exposure Guidelines (MEGs) have been revised and the 4,4 DDD at 4.3 µg/l exceeds it MEG. Please revise or rephrase appropriately.

***Response**: The second and third sentences of Section 4.2.1 will be updated as follows:*

"Concentrations of 4,4'-DDT, 4,4'-DDD, and dieldrin exceeded Maine MEGs at MW-17-02 (2.1, 4.3, and 1.7 µg/L, respectively), as shown on Figure 4-3. Endosulfan I (0.95 µg/L) was ~~and 4,4'-DDD (4.3 µg/L) were~~ also detected in the groundwater sample collected from well MW-17-02, and endrin aldehyde was detected in the sample collected from MW-17-04 at a concentration of 0.027 µg/L."

15. Section 4.3, Current Conditions, para 1:

a.) "The post-RI sampling events and removal actions are summarized in Section 1.3 and supporting documents associated with these activities are included in Appendix E. These updated data … are summarized in Tables …"

A summary of the confirmation data must be included in the body of the document as it reflects current conditions. Also this section must also provide information on the pesticides that exceed ecological screening levels.

***Response**: The following text will be added at the end of Section 4.3:*

"Results from the post-RI soil sample data set include the following (excluding samples that were subsequently excavated):

- *Samples collected during 2009 supplemental sampling to delineate contamination detected during the RI at locations SB-17-112, -120, and -121.*

- *Samples collected in 2008 and 2009 and associated with the 2009 removal of the soil strip south of Avenue B.*

- *Samples collected during 2010 supplemental sampling to further refine excavation limits near SB-17-121 and to evaluate potential impacts from utility activities immediately south of Avenue B.*

Six pesticides were detected in soil samples included in the updated data set at concentrations exceeding minimum human health screening criteria, including 4,4'-DDT, heptachlor, heptachlor epoxide, alpha-chlordane, gamma-chlordane, and dieldrin (see Table 4-3 and Figure 4-6). Based on the updated data set, concentrations of 4,4'-DDT exceeded the minimum human health screening criterion in the following:

- *Two of 37 2008 RI samples*
- *Three of 29 2008/2009 relocated soil strip samples*
- *Three of 14 2010 supplemental samples*
- *Three of 10 2010 removal action samples*

Concentrations of heptachlor exceeded the minimum human health screening criterion in the following:

- *Two of 29 relocated soil strip samples*
- *One of nine 2009 supplemental samples*
- *Two of 14 2010 supplemental samples*

Based on the updated data set, concentrations of heptachlor epoxide exceeded the minimum human health screening criterion in the following:

- *One of 29 relocated soil strip samples*
- *Five of 10 2010 supplemental sampling locations (6 of 14 samples)*

Based on the updated data set, concentrations of alpha- and gamma-chlordane exceeded minimum human health screening criteria in 2 of 14 2010 supplemental samples, and the concentration of dieldrin exceeded the minimum human health screening criterion in one of nine 2009 supplemental samples.

Eight pesticides were detected in soil samples included in the updated data set at concentrations exceeding minimum ESLs, including 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, heptachlor, heptachlor epoxide, alpha-chlordane, gamma-chlordane, and gamma-BHC (see Table 4-3 and Figure 4-7). Based on the updated data set, one or more pesticide concentrations exceeded minimum ESLs at the following:

- *22 of 37 locations in 2008 RI samples (29 of 67 samples)*
- *Eight of nine 2009 supplemental samples*
- *Nineteen of 29 relocated soil strip samples*
- *9 of 10 locations in 2010 supplemental samples (12 of 14 samples)*
- *Eight of 10 2010 removal action samples*

All detected concentrations of 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT exceeded avian and mammalian ESLs, and the maximum concentration of 4,4'-DDT also exceeded the plant and invertebrate ESLs. Pesticides at concentrations exceeded minimum ESLs were detected across the site, within previously excavated (1994 excavation area) and unexcavated areas.

Concentrations of inorganics exceeding human health and ecological screening criteria are presented on Figures 4-7 and 4-8, respectively. Arsenic concentrations in post-excavation samples exceeded the minimum human health criteria at multiple locations; however, as discussed in Section 4.1.3, elevated arsenic concentrations were are not considered site related. Post-excavation inorganic exceedances of minimum ESLs included lead at 14 locations, zinc at two locations, and arsenic at one location."

b.) Para 1: "…and associated tag maps showing the minimum screening criteria exceedances …"

The tag maps provide information above the human health soil screening levels they must be revised to show exceedances above ecological, or develop another figure with this information.

***Response**: Additional figures will be generated to present exceedances of ecological screening criteria.*

c.) Para 2: See comment 9 above. Is the Spring 2011 monitoring event the first event after the removal action or was there another? Please check the wording in the parenthesis in the 2nd sentence and clarify, as necessary. Also please check the 3rd sentence for a typographical error.

***Response**: As discussed in Section 1.3.2.2, the groundwater monitoring program was restarted and samples were collected in September 2010, prior to December 2010 excavation activities, and in April 2011, after those activities. The only exception was the sampling of replacement well MW-17-02R (MW-17-02 was destroyed during the 2010 removal action) in February 2011.*

The typographical error in the third sentence will be corrected.

16. Section 4.4.1, Contaminant Source Areas, para 2: "Elevated concentrations of five pesticides…"

MEDEP counts six pesticides above the residential screening level. Please check and include a list the pesticides that exceed the RSL and provide a summary on the pesticides remaining in soil that exceed ecological screening levels.

***Response**: The text will be revised to list the six pesticides detected in excess of minimum human health screening criteria, and exceedances of minimum ecological screening criteria will also be added.*

"~~Elevated concentrations of five pesticides and DRO were detected in soil samples collected adjacent to the 2010 excavation area and former site buildings.~~ Concentrations of six pesticides (4,4'-DDT, heptachlor, heptachlor epoxide, alpha-chlordane, gamma-chlordane, and dieldrin) exceeding human health screening levels ~~EPA~~ (residential RSLs and/or RAGs) were detected in soil samples collected from soil boring SB-17-112 (1 to 4 feet bgs) located at the northern edge of the 1994 main excavation area, ~~and soil borings~~ in samples located in the vicinity of the former buildings and 2010 excavation area, and in samples collected from the soil strip excavation area south of Avenue B, as shown on Figure 4-4. ~~Pesticides were also detected in excess of EPA residential RSLs in soil samples collected from the soil strip excavation area located south of Avenue B, as shown on Figure 4-4.~~ With the exception of arsenic, concentrations of inorganics were less than minimum screening levels in soil samples collected after soil removal activities.

Maximum DRO concentrations were detected in soil samples from borings SB-17-121 (2 to 5 feet bgs) and SB-17-122 (4 to 7 feet bgs), as shown on Figure 4-1. Arsenic was the only inorganic detected at concentrations exceeding EPA residential RSLs. Arsenic is not considered a site-related contaminant because the elevated detections in soil are attributed to fill material (Appendix E.6). In post-removal action groundwater samples (April 2011), concentrations of pesticides in groundwater exceeding MEDEP MEGs were only detected at MW-17-02R (4,4'-DDD at 1.2 µg/L) and MW-NASB-097 (4,4'-DDT in the sample and duplicate at 1.3 and 1.6 µg/L, respectively). MTBE was detected in two April 2011 groundwater samples but at concentrations significantly less than the MEG. MCLs are not available for 4,4'-DDD, 4,4'-DDT, or MTBE.

Eight pesticides were detected in soil at concentrations exceeding minimum ESLs, including 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, heptachlor, heptachlor epoxide, alpha-chlordane, gamma-chlordane, and gamma-BHC (see Table 4-3). Pesticides at concentrations exceeded minimum ESLs were detected within previously excavated (1994 excavation area) and unexcavated areas of the site (see Figures 4-7A and 4-7B)."

17. Figures: It is difficult to distinguish between the July 2009 confirmatory samples and the October 2008 test pit samples. Please change the color of one of them.

***Response**: The figure will be revised as indicated.*

18. Section 5.2.1, Pesticides:

a.) This section should also incorporate the confirmation data collected from the two excavations that followed the RI, since those data were used in the risk assessment. Please incorporate and revise the text.

***Response**: The text will be revised as follows to incorporate results from the current conditions data set:*

"As discussed in Section 4, ~~trace levels of~~ eight pesticides were detected in soil samples collected during the RI including 4,4'-DDD, 4,4'-DDE 4,4'-DDT, alpha- and gamma-chlordane, gamma-BHC, heptachlor, and heptachlor epoxide. Concentrations of 4,4'-DDD, 4,4'-DDE 4,4'-DDT, gamma-chlordane, gamma-BHC, and heptachlor exceeded residential RSLs and/or RAGs. Fourteen pesticides were detected in post-excavation soil samples ~~14 pesticides were detected in Site 17 soil during the RI~~, including 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, aldrin, alpha-chlordane, beta-BHC, dieldrin, endosulfan I, endrin, gamma-BHC (lindane), gamma-chlordane, heptachlor, heptachlor epoxide, and methoxychlor. Concentrations of six pesticides including 4,4'-DDT, alpha-chlordane, dieldrin, gamma-chlordane, heptachlor, and heptachlor epoxide exceeded ~~EPA~~ residential RSLs and/or RAGs".

b.) Para 1: Please remove the phrase "trace levels".

***Response**: The phrase will be removed.*

c.) Please discuss the pesticides and organics exceeding ecological screening levels.

***Response**: The following text will be added at the end of the first paragraph of Section 5.2.1:*

"Eight pesticides were detected in soil at concentrations exceeding minimum ESLs, including 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, heptachlor, heptachlor epoxide, alpha-chlordane, gamma-chlordane, and gamma-BHC (see Table 4-3). Pesticides at concentrations exceeded minimum ESLs were detected within previously excavated (1994 excavation area) and unexcavated areas of the site."

d.) Para 3: Please update with following two monitoring event detections and exceedances in groundwater. The discussion of exceedances must be of either the EPA RSL or MEDEP's MEGs, (e.g., in the 2008 RI 4,4'-DDD and 4,4'-DDT exceeded the MEG.).
***Response**: The referenced paragraph will be revised as follows:*

"During the RI, 10 pesticides, including 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT, dieldrin, heptachlor, heptachlor epoxide, endosulfan I, alpha-chlordane, gamma-chlordane, and gamma-BHC, were detected in groundwater samples. Concentrations of 4,4'-DDD, 4,4'-DDT, and dieldrin exceeded Maine MEGs at MW-17-02. The pesticides 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and heptachlor epoxide were detected in groundwater samples collected from the site ~~during the RI~~ in September 2010. Only one heptachlor epoxide concentration, 0.17 µg/L at MW-17-04, exceeded screening criteria (MEDEP MEG ~~and EPA residential RSL~~). During the April 2011 post-excavation groundwater monitoring event, 4,4'-DDD, 4,4'-DDE, and/or 4,4'-DDT were detected at three of nine wells sampled. Concentrations of 4,4'-DDD at MW-17-02R and 4,4'-DDT at MW-NASB-097 exceeded Maine MEGs."

19. Section 6.1, Risk Assessment:

a.) It would be helpful to list the sources of the data used in calculating the human health risk and the ecological risk.

***Response**: The following summary of information presented in the second paragraph of Section 4.3 describing the data set used for the risk assessment will be added to Section 6.1:*

"Updated post-excavation soil and groundwater data sets were used in the risk assessment. For soil, the data set includes 2009 and 2010 supplemental sampling results and results of samples collected in association with the 2009 and 2010 removal actions and excludes results from samples that were removed as part of these excavations. For groundwater, the updated data set includes results from the nine wells sampled by H&S Environmental, Inc., during the April 2011 long-term monitoring event (first event after the December 2010 removal action)."

20. Section 6.2, Ecological Risk Assessment and Appendix C.2: (Please see the attached letter from Wilcox and Barton dated July 18, 2011.

***Response**: Separate responses to the ecological risk assessment comments have been provided.*

21. Appendix C.1, Section C.3.3, Page 10, Groundwater EPCs: This comment is being made since there has not been written communication from the Navy concerning their intention for further study for groundwater. Only one round of groundwater was used in assessing the risk to future residents using the water as a source of drinking water. Maximum detected concentrations of both DDD and DDT exceeded Maine Maximum Exposure Guidelines (MEGs) set at a cancer risk of 1E-05. Since maximum concentrations of DDD and DDT exceed their MEGs by approximately 4 and 8-fold, respectively, the cancer risk associated with consuming water for household purposes from the wells with the maximum detected concentrations would exceed 1E-05. Averaging of contaminant concentrations in wells located across the property is not appropriate, especially in light of the fact that only one round of groundwater data has been collected to represent current site conditions and concentrations of these two pesticides in soil exceed values protective of leaching to groundwater used for potable purposes. Further groundwater investigation is recommended to determine whether temporal averaging, rather than spatial averaging, is appropriate to calculate groundwater EPCs for individual wells.

***Response**: Three additional rounds of groundwater monitoring will be recommended in the RI to assess post-removal groundwater conditions, and associated text will be revised to reflect the changes.*

Responses to Wilcox & Barton, Inc., Comments
Dated July 18, 2011, and Follow-On Comments Dated July 26, 2011
Provided to Maine Department of Environmental Protection on the
Site 17 Remedial Investigation Report Ecological Risk Assessment
Dated May 2011
Naval Air Station Brunswick, Maine

July 28, 2011

Comment 1 Inappropriate exposure depth assumption for terrestrial receptors

The ecological risk assessment has limited its assessment to soil sampled from 0 to 1 foot in depth. This approach is inconsistent with ecological risk assessment guidance, inappropriate for the site, and differs with approaches taken in other Navy risk characterizations. The presence of contaminants of concern and receptors in subsurface soil indicates that exposure pathways are complete, and should be assessed. The rationale for limiting exposure to the 0-1 foot interval given in the ERA was as follows:

> **"Some terrestrial receptors such as burrowing mammals could be exposed to shallow layers of contaminated subsurface soils, but depth to groundwater is shallow at this site and can limit the presence of burrowing animals. Terrestrial receptors are not substantially exposed to subsurface soils, so that pathway was not evaluated in the ERA. For this project, the surface soil depth interval was 0 to 1 foot below the ground surface."**

Two issues are raised by this explanation. First, the contention that "terrestrial receptors are not substantially exposed to subsurface soils" is incorrect. Numerous soil invertebrates that are expected to be present at the site reside in soil below one foot, including certain ants, earthworms, and other invertebrates. Some burrowing mammalian wildlife species expected to be at the site may nest, burrow, and feed at depths below one foot, including moles and short-tailed shrews. The Navy has acknowledged the potential for ecological exposure to subsurface soil in prior ecological risk characterizations.

In addition, the soil currently located in the subsurface is subject to bioturbation or human disturbance and may be brought to shallower depths in the future. This potential is acknowledged by Navy risk assessment guidance, which states *"[t]he exposure pathway evaluation should include consideration of potential future exposure pathways, as well as current exposure pathways. For instance, if no current pathway exists because a constituent is located in subsurface soil or sediment beyond the reach of ecological receptors, the likelihood that those subsurface soils/sediments could become exposed due to erosion or displacement of surface soils/sediments should be considered."* [f] Without the implementation of an institutional control that prohibits disturbance or relocation of this soil, along with appropriate covering, monitoring, and maintenance, there is no certainty that subsurface soil will not come to the surface sometime in the future.

Second, the contention that groundwater depth will prevent exposure to subsurface soil below 1 foot in depth is not supportable. According to data presented in the RI, the depth to groundwater measured in site monitoring wells was between 0.4 and 5.6 feet below the ground surface. Data were presented for one sampling event only (in December 2008), so information on the range of seasonal groundwater depths was not provided. However, based on the data presented, all measured locations except one (MW-NASB-068) show a vadose zone thickness of greater than 1 foot. Cross-sections support, *at minimum*, a 0-2 foot vadose zone thickness across most of the impacted area. While the site date were collected in a manner that encourages use of only a 0-1 foot depth interval, use of data that is inclusive of the 0-2 foot depth interval (which includes 0-1, 1-3, and 1-4 foot intervals) is more representative of the soil to which environmental receptors and their food sources may be exposed. Table 1 presents these data.

Response to Comment No. 1: The Navy does not believe that it is necessary to evaluate soil below 1 foot at this site at this point in the process for the following reasons:

- In the Draft Work Plan for the site, the Navy proposed collecting surface soil samples from 0 to 2 feet. However, the depth was revised to 0 to 1 foot based on EPA Comment No. 5 dated August 23, 2007 on the Draft RI Work Plan, which indicated that the surface soil depth should be changed from 0 to 2 feet to 0 to 1 feet, because the 0 to 1 foot interval is preferable for surface soil, particularly for ecological receptors.

- This issue was also discussed during the November 7 – 9, 2007 DQO meeting, in which MEDEP was a participant. At that meeting, it was agreed that surface soil would be 0 to 1 foot for human health and ecological and subsurface soil would be 1 to 10 feet for human health only.

- Section 5.2.2.2 of the final SAP clearly states that only data from 0 to 1 foot would be included in the ecological risk assessment.

- The Navy reviewed the cited FFS Report for SWMU 62, in Adak Island, Alaska. Although the risk assessment indicates that subsurface soil was a potential exposure pathway (based on Washington State Department of Ecology guidance), they did not evaluate risks to any receptors because they indicated that risks were insignificant or that the exposure pathway was incomplete.

- With respect to the cited Navy policy regarding evaluating future risks, it is not likely that if the subsurface soil excavated, the area would contain significant ecological habitat. The primary reasons for excavating soil would be for construction a building, which would further reduce the habitat.

The Navy will remove the part in the ERA regarding the groundwater depth.

The Navy also agrees to prepare a table that shows the summary statistics (i.e., minimum, maximum, and average concentrations, frequency of detection, 95% UCL, etc) for samples with a starting depth between 0 and less than 2 feet. This table will then be discussed qualitatively in the uncertainty analysis section of the ERA to determine how risks may have changed had the deeper samples been included in the ERA. However, this discussion will only focus on those chemicals that were detected in the 0 to 1 foot interval. The chemicals that were not detected in the 0 to 1 foot interval but were detected in the deeper interval include monuron (1 of 44 samples), dieldrin (4 of 57 samples), and endosulfan (2 of 57 samples). These pesticides were all detected infrequently and at very low concentrations and are not expected to significantly impact plants or invertebrates. Therefore, a discussion of them in the uncertainty analysis is not needed.

Reply to Response

Decisions regarding the soil depth to be applied to the ecological risk assessment were made prior to MEDEP's contractor's involvement in the project and also prior to the receipt of soil data. While decisions made on these depths were understandably followed in the ERA, it was appropriate to re-examine those assumptions once the data revealed that higher concentrations were located immediately below the one foot depth. The Adak, Alaska, risk assessment was cited to show that potential exposure to deeper soil was accepted as a potential occurrence; the fact that risks were insignificant or exposure incomplete because of site-specific factors does not invalidate this potential. Note that by assuming exposure only to the 0-1 foot interval, the ERA is assessing current site conditions only in which soil is not disturbed, and cannot claim to be assessing potential future uses in which soil may be disturbed. The commenter still maintains that it is appropriate to examine exposures to soil inclusive of 0-2 feet (at minimum) and appreciates that this information will be addressed in the uncertainty assessment. It is requested, however, that quantitative risk estimates be derived, rather than present this uncertainty as a qualitative discussion. It is not agreed that dieldrin should be excluded because concentrations inclusive of 0-2 feet exceed its screening value. Exclusion of monuron and endosulfan is acceptable since they did not have or exceed screening levels.

While it is recognized that future use of the site may include construction of a building, it is not infeasible that another future use could occur. The ERA should consider unrestricted future uses. If future use of the site includes construction of a new building, the potential for subsurface soil to pose an ecological risk depends not only on how the development affects the presence of an ecological habitat, but also on the disposition of the soil. If the soil is not identified as potentially posing an ecological risk, then the soil would not require management and could be redistributed over the ground surface or even used off-site as "clean" fill. Therefore, assessing this unrestricted use potential is needed to identify appropriate methods of managing the soil based on its potential risk. Any soil to be excavated or disturbed for construction of a building or other site activity, regardless of depth, should be assessed for potential ecological risk under unrestricted uses.

Follow-On Response to Comment No. 1: *As can be seen from the uncertainty analysis that was e-mailed to MEDEP on July 27, 2011, the discussion is really a quantitative discussion. The Navy agrees to include the food chain model calculation sheets for the deeper soil discussed in the uncertainty analysis in an Attachment to the RI. Also, the Navy agrees to add the following discussion of dieldrin to the uncertainty analysis.*

> *"Dieldrin was detected relatively infrequently at the site (in 4 of 57). The only plant benchmarks found were a value in the Los Alamos ECORISK database (2009) of 10,000 µg/kg and a value cited in the Casmialia Report of 1,000 µg/kg. The Casmalia report calculated the benchmark by dividing a value of 10,000 µg/kg by 10, because the 1,000 µg/kg value was LOEC. For invertebrates, MEDEP suggested an invertebrate benchmark value of 500 µg/kg, which is a NOAEC for earthworms as cited in the Casmalia Report. The maximum detected concentration of dieldrin, 43 µg/kg, is much lower than either of these benchmarks so risk to plants and invertebrates from dieldrin is not expected. Regarding risks to wildlife, the 95% UCL value of 4.3 µg/kg would not result in EEQs greater than 1.0 in the Tier 2 food chain model so risks to these receptors are not significant enough to warrant further action."*

Comment 2 Failure to assess constituents without screening benchmark concentrations

The ecological risk assessment is deficient in the assessment of chemicals for which ecological screening benchmarks were not identified. Navy risk guidance states the following:

> **"The Navy ERA Guidance website…. provides links to a variety of sources for screening values and toxicity information. If no screening values are available from listed sources, the Navy can propose screening values to the regulatory agencies as long as the values are based upon No Observed Adverse Effects levels (NOAELs) for long-term, chronic exposures, and supporting citations and references are provided to the appropriate regulatory agencies. …"**
>
> **"The U.S. EPA is developing soil-screening levels for use in ecological screening assessments. At present, the number of constituents for which the EPA has developed soil-screening levels is limited. However, as more EPA soil-screening levels are published, they will become the screening-level of choice…."**
>
> **"Soil screening values have been developed by and are available from a number of other sources (LANL 2000, WSRC 1998), and countries (Environment Australia 1997, CCME 1997, European Community 1996). If EPA soil screening levels are not available, these other sources can be evaluated to determine if defensible soil screening levels can be proposed…."**
>
> **"It is important to note that constituents present at the site that do not have published ecological screening values and for which no defensible screening values can be proposed are automatically carried forward to the COPC refinement step of the baseline ecological risk assessment (BERA)."**

In the ERA, screening ecological benchmark concentrations were not identified for the following constituents detected in soil including the 0-2 foot depth interval:

Chemical	Identification of Benchmark			
	Plant Benchmark	Soil Invertebrate Benchmark	Avian Benchmark	Mammalian Benchmark
Monuron [a]	None	None	None	None
Aldrin [b]	None	None	None	None
α-Chlordane		None	None	None
γ-Chlordane		None	None	None
Dieldrin [a]	None	None	None	None
Endosulfan I [a]	None	None	None	None
Endrin [b]	None	None	None	None
Lindane		None	None	None
Heptachlor	None	None	None	
Heptachlor epoxide	None	None	None	
Methoxychlor [b]	None	None	None	None
Diesel-range organics [a]	None	None	None	None
Cyanide	None	None		

a. Added as COC when soil inclusive of 0-2 feet is included
b. Not detected in soil inclusive of 0-2 feet

No evidence was presented in the ERA that efforts were made to develop screening benchmarks for these contaminants, nor were all sources of screening benchmarks exhausted. In addition, no qualitative assessment of these chemicals was presented or well-discussed in an uncertainty assessment.

The following sources identified applicable benchmarks that could, or should, be applied to the ERA (some overlap may exist):

- **US EPA Region IV Ecological Screening Values. Provides additional screening values for DDD, DDE, DDT, aldrin, alpha-BHC, dieldrin, endrin, Lindane, arsenic, cyanide, lead, and zinc [These values are primarily Dutch Ministry of Housing, Spatial Planning, and Environment (1994) Standards]. (http://www.epa.gov/region4/waste/ots/ecolbul.html#tbl4)**

- **Washington State Department of Ecology, Toxics Cleanup Program. Ecological Indicator Soil Concentrations for the Protection of Terrestrial Plants and Animals. Provides additional mammalian screening levels for aldrin, alpha-chlordane, beta-BHC, dieldrin, endrin, Lindane, heptachlor/heptachlor epoxide. (http://www.ecy.wa.gov/programs/tcp/policies/terrestrial/table_749-3.htm).**

For constituents where pre-existing screening levels could not be located, the ERA should have presented information from the primary literature and proposed a screening benchmark. The absence of this effort is a failure of the ERA.

Other ERAs could also have been consulted for already-applied screening levels. As an example, the Final Remedial Investigation Report for the Casmalia Resources Superfund Site identified the following ecological screening values absent from the ERA (others were also presented):

Aldrin: Plant screening value of 1 mg/kg

DDT & metabolites	**Soil Invertebrate screening level of 0.5 mg/kg** **Plant screening value of 0.9 mg/kg** **Soil invertebrate screening value of 0.1 mg/kg**
Lindane	**Soil invertebrate screening level of 0.03 mg/kg**
Chlordane	**Plant screening value of 0.224 mg/kg** **Soil invertebrate screening level of 0.043 mg/kg**
Dieldrin	**Plant screening value of 1 mg/kg** **Soil Invertebrate screening level of 0.5 mg/kg**
Endrin	**Soil invertebrate screening value of 0.0095 mg/kg**
Endosulfan I	**Plant screening value of 10 mg/kg** **Soil invertebrate screening level of 0.05 mg/kg**
Heptachlor/epoxide	**Soil invertebrate screening level of 0.007 mg/kg**

Response to Comment No. 2: *The Navy disagrees that no effort was made to develop screening values for all chemicals detected in the 0 to 1 foot interval. The Navy did attempt to locate screening values for all of the chemicals detected in the 0 to 1 foot interval, as agreed to in the approved Work Plan. No effort was made to locate screening levels for the chemicals listed above if they were not detected in the 0 to 1 foot interval because the Navy did not believe it was necessary to locate screening levels for chemicals that were not evaluated in the ERA. The Navy also disagrees with the implication that chemicals present at the site that did not have published ecological screening values were eliminated prior to the Tier II refinement. All chemicals that did not have screening levels for one of the receptor groups were carried through to the Tier II refinement.*

As indicated in the footnotes of Table C-2.2, the Navy reviewed five primary sources, including the EPA Eco SSL documents, the Canadian Soil Quality Guidelines, the ORNL Plant and Invertebrate benchmark documents, and the Region 5 Ecological Screening Level table. The Navy also reviewed the NOAA SQUIRT table, but decided not to select the Dutch Target Values because the technical basis for many of those values is not known and they are ultra conservative. For example, the target value for gamma-BHC is 0.00005 mg/kg and is 0.0005 mg/kg for dieldrin. The Navy agrees to use toxicity data from other sources when available and scientifically defensible, but the Navy does not automatically agree to use a screening level for a site just because it was used at another site (see below).

The screening values for birds and mammals are used to determine whether a chemical needs to be carried through the food chain model. The fact that the screening values from some chemicals were not available for mammals and/or birds does not impact the results/conclusions of the risk assessment because those chemicals were then automatically carried through the food chain model. Plant screening values were not found for heptachlor and heptachlor epoxide, and invertebrates screening levels were not found for alpha- and gamma-chlordane, gamma-BHC, heptachlor, or heptachlor epoxide. Therefore, the following discussion focuses on screening levels for plants and invertebrates.

The Navy reviewed the cited RI report for Casmilia Resources Superfund Site in California and does not agree that the values from that document should be used. It appears that in most cases they are using the Dutch Maximum Permissible Concentrations (MPC) after they adjust them by multiplying the values by 10, for reasons stated in the document. For example, the text states that: "For aldrin and dieldrin, the Dutch MPC of 0.05 mg/kg is based on the lowest dieldrin NOAEC data of 0.5 mg/kg for Onychiurus armatus (collembola species) (Crommentuijn, 2000a; Van de Plassche, 1994). Due to lack of other published screening values, the study used for the Dutch MPC was selected as the most appropriate value for dieldrin. Following the guidelines, no UFs are applied to NOAECs in the ERA, therefore a screening value of 0.5 mg/kg was used for soil invertebrates for dieldrin. This value was used as a

surrogate for aldrin." The guidelines that they are referring to were specifically agreed to in that risk assessment. Therefore, the Navy cannot agree to use those values as screening levels at this time.

The Washington State Ecological Indicator Concentrations were also reviewed. The only value presented for pesticides for plants or invertebrates was for chlordane (1 mg/kg), and the citation was for the 1997 ORNL invertebrate benchmark document. However, chlordane is not listed in that document so the value could not be verified.

Additional plant benchmarks for some of the pesticides were found in the Los Alamos ERORISK database (2009).

As indicated in the Navy's response to Comment No. 1, the Navy agrees to add a discussion to the uncertainty analysis to qualitatively evaluate the analytical data for samples with a starting depth between 0 and less than 2 feet. This evaluation will incorporate several of the values listed above, even though there is some uncertainty in those values.

Reply to Response

It is conceded that aldrin, dieldrin, endrin, and endosulfan were not detected in the 0-1 foot interval so there was no need for screening values for these compounds if only the 0-1 foot interval was assessed. However, when the 0-2 foot interval is re-examined in the uncertainty assessment, appropriate screening values are needed.

It is recognized that the Navy used five primary sources for identifying screening values, and if these sources had screening values for all of the detected constituents, this would have been sufficient. However, this was not the case. Other potential sources should have been explored or the scientific literature consulted to propose an appropriate value, and this effort should have been documented in the ERA. If an identified screening level was found to be technically inappropriate or if no information could be found, this should have been clearly identified and discussed in the ERA. Identifying a benchmark as "ultra-conservative" is not a supportable reason for disregarding a benchmark if its technical basis is sound; that amounts to cherry-picking benchmarks. For terrestrial invertebrates, information on concentrations that were used to control the target pest would be suitable for deriving a screening value, rather than leaving that portion of the assessment incomplete.

Because other potentially applicable screening values were not applied, some chemicals were not carried through Tier II. For example, heptachlor and heptachlor epoxide effects on soil invertebrates were eliminated in Tier II without consulting, or discussing, the soil invertebrate screening level of 0.007 mg/kg used in the Casmalia assessment, which was based on ten times the Dutch Target Level.

***Follow-On Response to Comment No. 2*:** *The Navy believes that the uncertainty analysis section should address MEDEPs concerns.*

Comment 3 Inappropriate Plant and Soil Invertebrate Soil Screening Benchmark for DDD, DDE and DDT

The plant/invertebrate screening levels adopted in the ERA for DDD, DDE, and DDT (1,200 mg/kg) was adopted from the CCME, using values for commercial/industrial land use. This value is based on soil contact only, and does not consider potential food chain impacts. The Canadian guidance specifically states that "in site-specific situations where the size and/or the location of these land uses may impact primary, secondary, or tertiary consumers, the soil and food ingestion guideline is recommended as the SQGE." The soil and food ingestion guideline is reflected in the agricultural and residential/parkland guidelines for DDT (total) and is 0.7 mg/kg. It is nearly inconceivable that the food chain accumulation effects of DDT were disregarded in the adoption

of the soil screening benchmark of 1,200 mg/kg; clearly this is inappropriate. The CCME benchmark of 0.7 mg/kg should be applied to the ERA in place of the 1,200 mg/kg benchmark.

Response to Comment No. 3**:** *The plant/invertebrate screening value used in the ERA was actually 12,000 µg/kg (or 12 mg/kg) not 1,200 mg/kg as presented in the comment (see Table C-2.2 in the report). The reviewer is correct in that this value is for soil contact only. However, the reviewer is incorrect that it was adopted using values for industrial/commercial land use. Basically, the CCME developed criteria for soil contact (based on impacts to plants, invertebrates, or nutrient and energy cycling) and food ingestion (based on impacts to birds and mammals). They then apply the lower of the criteria to areas considered agricultural, residential or parkland and apply only the soil contact values to the commercial/industrial areas (with some exceptions). The actual criteria for soil contact and food ingestion are developed separate from the land use. The Navy is not implying that criteria for commercial/industrial areas be used as screening values for Site 17. The Navy is using screening values developed for plants and invertebrates to evaluate risks to plants and invertebrates and is using screening levels for birds and mammals to evaluate risks to birds and mammals. The value of 12 mg/kg (for plants and invertebrates) was not used as the screening value for wildlife (again see Table C-2.2). The screening levels used for birds and mammals were 0.093 mg/kg and 0.021 mg/kg, which are EPA Ecological Soil Screening Levels. There values are more appropriate than the value of 0.7 mg/kg suggested by the reviewer. Therefore, the Navy does not agree that the CCME benchmark of 0.7 mg/kg should replace the benchmark of 12 mg/kg when screening for plants and invertebrates.*

Reply to Response

Reference to a screening level of 1,200 mg/kg in the original comments was incorrect; 12 mg/kg was intended. It was not intended to suggest that the Navy was using a commercial/industrial number as a screening value, only that the screening value of 12 mg/kg is applicable to commercial/industrial land use (as a reference). It is further recognized that this screening value was not applied to birds and mammals. The applied value of 12 mg/kg, however, is not necessarily protective of plants/invertebrates; the CCME fact sheet for DDT identifies a concentration of 3 mg/kg as inhibiting root growth in the Blakemore strawberry plant, and the EcoSSL document for DDT and metabolites identifies an MATC concentration of 7.1 mg/kg for beans. The EcoSSL document also identifies LC50 soil concentrations for the common cricket at or below 4.4 mg/kg for soil with 2 percent or less organic matter. While these data were not used to derive EcoSSLs, they do indicate that soil concentrations below the 12 mg/kg screening value adversely affect plants and soil invertebrates. In lieu of using the CCME value of 0.7 mg/kg, an alternate value protective of at least the studies identified in the EcoSSL document is appropriate.

Follow-On Response to Comment No. 3**:** *The Navy does not agree that all of the toxicity data for DDT needs to be evaluated because even the Eco SSLs developed for plants and invertebrates for other chemicals evaluated studies with effects levels that are lower than the selected Eco SSL value. For DDT, the authors of the CCME Soil Quality Guideline (SQG) believed that 12 mg/kg was a safe threshold for plants and invertebrates. They may have evaluated the other studies and determined that they were not acceptable for some reason. Therefore, the Navy does not believe it is necessary to evaluate every toxicity value that was used to develop the SQG*.

Comment 4 Lack of use of US EPA EcoSSLs for dieldrin

The available EcoSSLs for dieldrin for avian and mammalian wildlife were not applied as screening levels.

Response to Comment No. 4: *The available Eco SSLs for dieldrin were not applied as screening levels because dieldrin was not detected in the surface soil samples.*

Reply to Response

Understood. It is assumed that the EcoSSLs will be applied in the evaluation of the 0-2 foot soil data as part of the uncertainty assessment.

***Follow-On Response to Comment No. 4**: No further action is needed.*

Comment 5 Effect of Comments 1-4 on Tier I Screening

The effects of the recommendation to include soil inclusive of the 0-2 foot interval and to use additional screening levels are shown in the following table. 95th Percentile upper confidence limits of the mean concentrations (95% UCL) were calculated by ProUCL version 4.1, using the non-detection feature. The ProUCL output files are presented in Appendix A.

Constituent	Concentration µg/kg		Screening Benchmark µg/kg / EEQ				Conclusion
	Maximum	95% UCL	Plant	Soil Invert-ebrate	Avian	Mammalian	
Monuron	0.017	--					None
4,4'-DDD	520	44.7	700	100	93	**21 (2.1)**	Assess #
4,4'-DDE	250	51.82	700	100	93	**21 (2.5)**	Assess
4,4'DDT	7,200	1,139	**700 (1.6)**	**100 (11)**	**93 (12)**	**21 (54)**	Risk/Assess
Total DDTs	7,800	997.3	**700 (1.4)**	**100 (10)**	**93 (11)**	**21 (47)**	Risk/Assess
α-Chlordane	3,100	638.7	**224 (2.8)**	**43 (15)**	--	2,700	Risk
Dieldrin	43	4.295	100	500	22	4.9	No Risk
Endosulfan I	5.9	5.9	10,000	50	--	--	No Risk
Lindane	91	24.57	**5 (5)**	30	--	2,700	Risk
γ-Chlordane	2,700	561.3	**224 (2.5)**	**43 (13)**	--	2,700	Risk
Heptachlor	390	21.27	2,500	**7 (3)**	--	5.98	Risk
Heptachlor epoxide	530	31.12	2,500	**7 (4.4)**	--	152	Risk

Assess for food chain

The above shows that the 95 % UCL concentrations exceeded the plant and/or soil invertebrate screening levels for 4,4'-DDT, total DDTs, alpha-chlordane, Lindane, gamma-chlordane, heptachlor and heptachlor epoxide, with the sum of the ecological effects quotient (EEQ) for just those exceeding one of 13 for plants and 56 for soil invertebrates. By these results alone (i.e., not even considering the changes to results of the food chain assessment for avian and mammalian wildlife), a conclusion that no further action is needed is incorrect.

While the ecological significance of impacts to plants and soil invertebrates "feels" less important than effects upon birds and mammals, to which we, as humans, feel a stronger connection, this prejudice must be resisted. This is true particularly with a pesticide release, products that have been and are used by humans to systemically kill insects. The release at this site was not a legal use of pesticides and the soil organisms impacted are not "target pests." So acceptance of adverse impacts upon soil organisms is not justified.

***Response to Comment No. 5:** See the Navy's response to Comments No. 1 and 2. Also, the purpose of the last paragraph is unclear in that the Navy did not indicate that risks to plants or invertebrates are less important than risks to other receptors.*

Reply to Response

The ERA identified EEQs over 1 for alpha- and gamma-chlordane for plants, yet still recommended no further action. The absence of soil invertebrate screening benchmarks for over half of the pesticides also suggests a lesser concern with these receptors.

Follow-On Response to Comment No. 5: *The Navy believes that the uncertainty analysis section should address MEDEPs concerns.*

Comment 6 Effect of Alternate EPCs on Food Chain Modeling

The calculations performed for birds and mammals were reproduced because the presentation in the ERA was inadequate. The following minor errors or omissions were noted:

- **The food ingestion rate for Tier I evaluations was based on an average receptor body weight rather than the lowest body weight that was otherwise applied to the Tier I evaluation.**
- **The "metabolic scaling" used to derive the robin food ingestion rate is not well-described.**
- **No avian toxicity values for heptachlor or heptachlor epoxide were applied. The attached abstract provides data that can be used to define a no observed adverse effect level of 0.1 mg/kg [(worm concentration 0.65 mg/kg) x (average body weight 0.197 kg) x (food ingestion rate 0.77 g/g-day) = 0.098 mg/kg-day =~ 0.1 mg/kg-dy]. While some uncertainty is associated with this value, its use is better than disregarding the two constituents altogether.**

The calculations were re-performed correcting the above errors/omissions and substituting the 95% ULC concentration using soil data for inclusive of 0-2 feet. Calculations are presented in Appendix B and the results are summarized below:

Receptor Group	Constituent	Tier I				Tier II			
		ERA	Recal-culated	ERA	Recal-culated	ERA	Recal-culated	ERA	Recal-culated
		NOAEL HQ		LOAEL HQ		NOAEL HQ		LOAEL HQ	
Meadow Vole	α-Chlordane	0.0009	0.002	0.0004	0.0008	0.0000	0.0002	0.0000	0.00008
	Lindane	0.0000	0.0002	0.0000	0.00002	0.0000	0.00004	0.0000	0.00000
	γ-Chlordane	0.0008	0.001	0.0004	0.0006	0.0000	0.0001	0.0000	0.00006
	Heptachlor	0.003	0.009	0.0003	0.0009	0.0001	0.0002	0.0000	0.00002
	Heptachlor epoxide	0.01	0.02	0.001	0.002	0.0006	0.0009	0.00006	0.00009
	DDTs	0.1	0.2	0.003	0.006	0.02	0.03	0.0005	0.0008
	Total	**0.1**	**0.3**	**0.005**	**0.01**	**0.02**	**0.03**	**0.0006**	**0.001**
Short-Tailed Shrew	α-Chlordane	0.3	1.2	0.2	0.6	0.04	0.2	0.02	0.1
	Lindane	0.0002	0.01	0.0000	0.001	0.0002	0.003	0.0000	0.0003
	γ-Chlordane	0.3	1.0	0.2	0.5	0.03	0.2	0.02	0.1
	Heptachlor	0.7	3.9	0.07	0.4	0.08	0.2	0.008	0.02
	Heptachlor epoxide	0.4	1.6	0.04	0.2	0.05	0.08	0.005	0.008
	DDTs	12	59	0.3	1.6	3.7	6.8	0.1	0.2
	Total	**14**	**67**	**0.8**	**3.2**	**4**	**7**	**0.1**	**0.4**
American Robin	α-Chlordane	1.1	4.2	0.2	0.8	0.1	0.8	0.03	0.2
	Lindane	0.001	0.1	0.0001	0.008	0.001	0.02	0.0001	0.002
	γ-Chlordane	1.03	3.7	0.2	0.7	0.1	0.7	0.02	0.1
	Heptachlor	1.1	6.4	1.1	6.4	0.1	0.3	0.1	0.3
	Heptachlor epoxide	0.7	2.7	0.7	2.7	0.08	0.1	0.08	0.1
	DDTs	12	63	1.0	5.3	4.0	7.3	0.3	0.6

	Total	16	80	3.3	16	5	9	0.6	1.4
Bobwhite Quail	α-Chlordane	0.006	0.02	0.001	0.004	0.0003	0.002	0.0000	0.0003
	Lindane	0.0000	0.002	0.000	0.0002	0.0000	0.0003	0.0000	0.00003
	γ-Chlordane	0.006	0.02	0.001	0.003	0.0002	0.001	0.0000	0.0003
	Heptachlor	0.01	0.05	0.01	0.05	0.0005	0.001	0.0005	0.001
	Heptachlor epoxide	0.03	0.09	0.03	0.09	0.002	0.003	0.002	0.003
	DDTs	0.1	0.6	0.01	0.05	0.03	0.05	0.002	0.004
	Total	**0.2**	**0.8**	**0.05**	**0.2**	**0.03**	**0.06**	**0.005**	**0.009**

Note: Table does not include dieldrin or metals

Both the short-tailed shrew and the American robin have total hazard quotients exceeding 1 under the Tier II assessment, as it did with the original ERA, but with higher "ecological effects quotients." Total hazard indices ranged from 1.4 to 9, and these do not include metals or dieldrin, which were also detected in the soil depth interval inclusive of 0-2 feet, or potential exposure to groundwater. This indicates that the site poses an unacceptable risk to ecological receptors. Note that according to US EPA's Wildlife Exposure Factors Handbook, the average foraging or home range for an American robin is 1.2 acres and for short-tailed shrew is 0.96 acres, indicating that it is reasonable to assume that the majority of the food source for these species could come from the 0.7-acre site.

In conclusion, the ERA does not fully meet either the Navy's or US EPA's risk assessment guidance, and incorrectly concludes that an unacceptable risk is not present to ecological receptors. It is recommended that the ERA be revised to address these comments and that appropriate remedial responses to address these risks be undertaken.

Response to Comment No. 6: *The food ingestion rate was based on the average receptor body weight because if the minimum body weight was used the ingestion rate would be lower than the average ingestion rate in some cases. This can actually be seen in the reviewer's spreadsheet in that the food ingestion rate for the Tier I conservative evaluation for the meadow vole is 0.00084 kg/day while it is 0.00175 kg/day for the average scenario. Therefore, using the average receptor body weight for the Tier I evaluation is more conservative than what is suggested by the reviewer.*

The metabolic scaling is explained in the article by Nagy et al., (1999) (see attached). The Navy cannot determine how the reviewer developed the avian TRV for heptachlor of 0.1 mg/kg-day because the abstract was not attached. However, the Navy did locate a TRV of 0.92 mg/kg-day in the Los Alamos ERORISK database (2009). This TRV will be included in the revised food chain model.

As indicated in the Navy's response to Comment No. 1, the Navy agrees to add a discussion to the uncertainty analysis to qualitatively evaluate the analytical data for samples with a starting depth between 0 and less than 2 feet. For evaluating risks to wildlife species, this evaluation will include a risk-ratio to show how the HQs would have changed had the deeper samples been included in the food chain model.

The foraging areas listed in the Wildlife Exposure Factors handbook are for forested areas, not for grass covered industrial areas. Therefore, it is unlikely that birds such as robins will obtain 100 percent of their food from the site. This would be a similar situation for shrews, because the area is a low quality habitat for small mammals.

The Navy strongly disagrees that the ERA does not fully meet either the Navy's or US EPA's risk assessment guidance. The reviewer has not correctly pointed out any instances in which the ERA does not follow either Navy's or EPA's guidance, after taking into account that the depth interval of 0 to 1 foot was requested by EPA and agreed to by MEDEP during the development of the work plan.

Reply to Response

The comment regarding use of the lowest body weight is an issue of consistency, not of the result. In any case, use of the average body weight should have been discussed.

The comment regarding the metabolic scaling concerned the fact that it was not adequately explained in the ERA. While we appreciate receipt of the article, the procedure still needs to be explained in the ERA for transparency.

The Heptachlor abstract was inadvertently omitted but is attached to this reply. Please consider this article.

We appreciate consideration of the deeper soil interval, but request that the uncertainty assessment be quantitative, rather than qualitative, and include plant and invertebrate species. There is no technical reason for excluding these receptors groups. We also request that all chemicals detected in the 0-2 foot inclusive interval be assessed, not only those detected in the 0-1 foot interval.

We respectfully disagree on assuming a lower percentage of an organism's diet from the site as a basis for discounting the potential future risk posed by the contaminated soil.

It is the reviewer's opinion that the ERA does not fully meet the Navy's or US EPA's guidance for the following reasons: the ERA did not apply the Navy's guidance to consider potential future exposure to subsurface soil (which could have originally been included as an alternate assessment or discussed in the uncertainty assessment), the ERA did not exhaust potential sources of screening values or propose alternate screening values based on original evaluation of primary toxicological data (or at minimum, did not present these data in the ERA), did not present reasons for dismissing other readily-available screening benchmarks, and did not adequately discuss the uncertainty in the ERA associated with the lack of screening values.

***Follow-On Response to Comment No. 6*:**

The following text will be added to the Receptor Profiles Attachment: "In most cases, the maximum and average ingestion rates were multiplied by the average body weights to convert the ingestion rates from g/g-day to mg/kg-day because if the maximum ingestion rate was multiplied by the minimum body weight, there would be some cases where the ingestion rate for the conservative food chain model would be lower than the ingestion rate for the average food chain model."

Metabolic scaling is explained in the Receptor Profiles presented in Attachment C-2.5 and the Calculation of Exposure Factors presented in Attachment C-2.3.

The heptachlor TRV in the provided article was reviewed. However, the heptachlor TRV value obtained from the Los Alamos ECORISK database (2009) is included in the revised food chain model.

The Navy believes that it has adequately addressed MEDEP's other concerns with the previous comments and the revised uncertainty analysis section.

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ENERGETICS OF FREE-RANGING MAMMALS, REPTILES, AND BIRDS

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KEY WORDS: allometric scaling, bioenergetics, doubly labeled water, field metabolic rate, food requirement

ABSTRACT

We summarize the recent information on field metabolic rates (FMR) of wild terrestrial vertebrates as determined by the doubly labeled water technique. Allometric (scaling) relationships are calculated for mammals (79 species), reptiles (55 species), and birds (95 species) and for various taxonomic, dietary, and habitat groups within these categories. Exponential equations based on body mass are offered for predicting rates of daily energy expenditure and daily food requirements of free-ranging mammals, reptiles, and birds. Significant scaling differences between various taxa, dietary, and habitat groups (detected by analysis of covariance with $P \leq 0.05$) include the following: (*a*) The allometric slope for reptiles (0.889) is greater than that for mammals (0.734), which is greater than that for birds (0.681); (*b*) the slope for eutherian mammals (0.772) is greater than that for marsupial mammals (0.590); (*c*) among families of birds, slopes do not differ but elevations (intercepts) do, with passerine and procellariid birds having relatively high FMRs and gallinaceous birds having low FMRs; (*d*) Scleroglossan lizards have a higher slope (0.949) than do Iguanian lizards (0.793); (*e*) desert mammals have a higher slope (0.785) than do nondesert mammals; (*f*) marine birds have relatively high FMRs and desert birds have low FMRs; and (*g*) carnivorous mammals have a relatively high slope and carnivorous, insectivorous, and nectarivorous birds have relatively higher FMRs than do omnivores and granivores. The difference detected between passerine and nonpasserine birds reported in earlier reviews is not evident in the larger data set analyzed here. When the results are adjusted for phylogenetic effects using independent contrasts analysis, the difference between allometric slopes for marsupials and eutherians is no longer significant and the slope difference between Scleroglossan and Iguanian lizards

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disappears as well, but other taxonomic differences remain significant. Possible causes of the unexplained variations in FMR that could improve our currently inaccurate FMR prediction capabilities should be evaluated, including many important groups of terrestrial vertebrates that remain under- or unstudied and such factors as reproductive, thermoregulatory, social, and predator-avoidance behavior.

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INTRODUCTION

The rate at which a wild animal uses resources in its environment is determined primarily by its metabolic energy requirements. The need for chemical potential energy to fuel energy metabolism is the most influential aspect in determining hunger for food. Thus, daily energy needs largely determine daily feeding rate, a major determinant of the daily intake of other nutrients, including protein, vitamins, and minerals. Diet selection also plays an important role in nutrient and energy intake and feeding activity influences an animal's ecological interactions because it preys on particular plant or animal organisms and must expose itself to specific kinds and durations of predation while feeding.

The ability to measure energy requirements of free-ranging animals is a technological development that is having a major impact on the fields of animal nutrition and ecophysiology. In 1949, it was discovered that oxygen in body water was in isotopic exchange equilibrium with oxygen in exhaled CO_2, mainly because of the carbonic anhydrase present in red blood cells (82). It was realized that the washout rates of purposely-enriched isotopes of oxygen and hydrogen in an animal's body water could be used in measuring its respiratory CO_2 production—and hence energy metabolism—over relatively long periods of time. Application of this doubly labeled water (DLW) method to measure the field metabolic rates (FMR) of wild vertebrate animals has been vigorous and has yielded many insights into the physiology, nutrition,

ecology, and evolution of animals. Many new studies of FMR in terrestrial vertebrates have been published since the last reviews appeared. Here, we (*a*) summarize the new information, (*b*) provide new equations for predicting (with 95% confidence intervals) both daily energy expenditure and daily food requirement of free-living birds, mammals, and reptiles, and (*c*) analyze (with and without adjustments for phylogenetic effects) the allometric relationships for differences that might help explain the factors that determine the energy and food requirements of these animals. Our purposes are to provide updated equations for nutritionists, physiologists, ecologists, and conservationists to predict animal food and energy needs and to explore, through correlation analysis, possible reasons for the large variation (more than 220,000 times from the lowest, 0.23 kJ/day, to the highest, 52500 kJ/day) in the FMRs of active vertebrates.

FIELD METABOLIC RATE LITERATURE

Following the 1966 summary paper on the DLW method (82), many more publications reporting methodological refinements, validation tests, and assumption evaluations have appeared (see summaries in 98, 100, 101, 103, 143). Initial validation studies indicated that the error in the DLW method was approximately 8%, but recent refinements reduced errors in studies of captive animals to approximately 2%. In the field, uncontrolled factors and uncertainties probably increase errors to 4%.

The literature on DLW-determined FMRs has been reviewed for reptiles (99), mammals (102, 104), and birds (102, 118, 172). We summarize and review subsequent research published up to August 1998. Only references for articles not cited in previous reviews are provided here. For older references, please see Table 1, which includes the published information we are aware of on mammals, birds, and reptiles.

When more than one value for FMR and body mass was available for a species, we calculated a single weighted average using a method that reflects the amount of information available for the various cohorts studied. For example, if the mean FMR for spring only was reported in one article, but mean FMRs for the same species studied at a different site during all four seasons appeared in another article, we used the average of all five means. We did not use FMR data for neonate or juvenile reptiles, for young birds and mammals that were not self-supporting (independent of parental feeding, for example juvenile ostriches), or for animals that were seasonally inactive (hibernating mammals, overwintering reptiles). The protocol requiring only one data point per species in allometric analyses necessitates, when measurements for both adults and self-supporting juveniles are available, the use of mean body mass and FMR values that are

Table 1 Summary of field metabolic rates (FMR) in kilojoules per day measured with doubly labeled water in free-living mammals, birds, and reptiles[a]

Species	Common name	Mass (g)	FMR (kJ/day)	Taxon[b]	Habitat[c]	Diet[d]	Reference
Mammals							
Pipistrellus pipistrellus	Pipistrelle	7.3	29.3	Ch	ND	I	104
Plecotus auritus	Brown long-eared bat	8.5	27.6	Ch	ND	I	145
Myotis lucifugus	Little brown bat	9.0	29.9	Ch	ND	I	79
Gerbillus henleyi	Northern pygmy gerbil	9.3	26.5	Ro	D	G	39
Tarsipes rostratus	Honey possum	9.9	34.4	Tr	ND	N	115
Anoura caudifer	Flower-visiting bat	11.5	51.9	Ch	ND	N	63
Macrotus californicus	Big-eared bat	13.0	21.5	Ch	D	I	102
Peromyscus crinitus	Cactus mouse	13.4	39.3	Ro	D	O	102
Mus domesticus	Wild house mouse	15.1	47.1	Ro	D	O	97, 104
Cleithrionomys rutilus	Bank vole	16.0	57.6	Ro	ND	H	102
Sminthopsis crassicaudata	Narrow-footed marsup. mouse	16.6	68.6	Da	ND	I	102
Perognathus formosus	Long-tailed pocket mouse	17.9	45.2	Ro	D	G	102
Peromyscus maniculatus	Deer mouse	17.9	53.4	Ro	D	O	61
Peromyscus leucopus	White-footed deer mouse	19.2	41.4	Ro	ND	O	95, 102
Microtus arvalis	Meadow mouse	20.0	90.0	Ro	ND	O	104
Eremitalpa namibensis	Namib Desert golden mole	20.7	12.5	In	D	I	140
Eptesicus fuscus	Big brown bat	20.8	43.6	Ch	ND	I	80
Gerbillus allenbyi	Allenby's gerbil	22.8	35.6	Ro	D	G	104
Cleithrionomys glareolus	Bank vole	23.4	88.0	Ro	ND	H	104
Microtus agrestis	Field vole	26.8	77.8	Ro	ND	H	86, 104
Gerbillus pyramidum	Greater Egyptian gerbil	31.8	45.2	Ro	D	G	104
Pseudomys albocinereus	Australian native mouse	32.6	62.2	Ro	ND	O	102
Antechinus stuartii	Brown antechinus	33.0	86.4	Da	ND	I	104
Phascogale calura	Wambenger	33.5	61.9	Da	ND	C	104
Dipodomys merriami	Merriam's kangaroo rat	34.3	47.6	Ro	D	G	102, 104

Table 1 (*Continued*)

Species	Common name	Mass (g)	FMR (kJ/day)	Taxon[b]	Habitat[c]	Diet[d]	Reference
Microtus pennsylvanicus	Meadow vole	36.9	115	Ro	ND	H	12
Acomys cahirinus	Common spiny mouse	38.3	51.8	Ro	D	O	102
Sekeetamys calurus	Bushy-tailed jird	41.2	44.0	Ro	D	O	102
Microgale dobsoni	Shrew-tenrec	42.6	77.1	In	ND	I	146
Microgale talazaci	Shrew-tenrec	42.8	66.5	In	ND	I	146
Acomys russatus	Golden spiny mouse	45.0	47.8	Ro	D	O	102
Lemmus trimucronatus	Brown lemming	55.2	201	Ro	ND	H	102
Dipodomys microps	Chisel-tooth kangaroo rat	57.1	84.5	Ro	D	O	102
Praomys natalensis	Multi-mammate mouse	57.3	86.6	Ro	ND	O	102
Antechinus swainsonii	Broad-footed marsup. mouse	62.6	150	Da	ND	I	102
Meriones crassus	Jird	69.2	65.0	Ro	D	G	39
Phyllostomus hastatus	Spear-nosed bat	80.8	146	Ch	ND	I	78
Arvicola terrestris	Water vole	85.8	119	Ro	ND	H	102
Ammospermophilus leucurus	Antelope ground squirrel	87.0	88.0	Ro	D	O	102
Tamias striatus	Eastern chipmunk	96.3	143	Ro	ND	O	102
Thomomys bottae	Botta's pocket gopher	104	130	Ro	ND	H	102
Petaurus breviceps	Sugar glider	124	173	Pt	ND	O	102
Gymnobelideus leadbeateri	Leadbeater's possum	125	226	Pt	ND	O	102
Psammomys obesus	Fat sand rat	170	165	Ro	D	H	104
Spermophilus saturatus	Golden-mantled ground sqrl.	214	226	Ro	ND	H	104
Isoodon auratus	Golden bandicoot	333	285	Pe	ND	O	16
Spermophilus parryi	Arctic ground squirrel	630	817	Ro	ND	O	104
Bassariscus astutus	Ring-tailed cat	752	472	Ca	D	C	26
Potorous tridactylus	Long-nosed potoroo	825	517	Ma	ND	H	157
Vulpes cana	Blanford's fox	972	642	Ca	D	C	104
Petauroides volans	Greater glider	995	520	Pt	ND	H	104
Pseudocheirus peregrinus	Ring-tail possum	1,000	615	Pt	ND	H	96

(*Continued*)

Table 1 (*Continued*)

Species	Common name	Mass (g)	FMR (kJ/day)	Taxon[b]	Habitat[c]	Diet[d]	Reference
Bettongia penicillata	Short-nosed rat kangaroo	1,100	593	Ma	ND	H	104
Isoodon obesulus	Short-nosed brown bandicoot	1,230	644	Pe	ND	O	106
Vulpes macrotis	Kit fox	1,480	1,180	Ca	D	C	53
Lepus californicus	Black-tailed jackrabbit	1,800	1,300	La	D	H	102
Setonix brachyurus	Quokka	1,900	548	Ma	ND	H	102
Vulpes velox	Swift fox	2,100	1,780	Ca	ND	C	34
Aepyrpimnus rufescens	Rufous rat kangaroo	2,860	1,430	Ma	ND	H	104
Tachyglosssus aculeatus	Echidna	2,860	875	Ta	ND	I	104
Marmota flaviventris	Yellow-bellied marmot	3,190	2,430	Ro	ND	H	138
Bradypus variegatus	Three-toed sloth	4,150	545	Xe	ND	H	117
Macropus eugenii	Tammar wallaby	4,380	1,150	Ma	ND	H	102
Thylogale billiardieri	Red-bellied wallaby	5,980	1,630	Ma	ND	H	102, 120
Aloutta palliata	Mantled howler monkey	7,330	2,580	Pr	D	H	102
Phascolarctos cinereus	Koala	7,520	1,710	Ph	ND	H	43, 77, 102
Proteles cristatus	Aardwolf	8,540	1,850	Ca	D	I	168
Petrogale xanthopus	Rock wallaby	8,900	2,210	Ma	ND	H	104
Lyacon pictus	African wild dog	25,170	15,300	Ca	D	C	54
Arctocephalus gazella	Antarctic fur seal	34,600	23,000	Pi	M	C	6, 104
Canis lupus	Timber wolf	37,300	17,700	Ca	ND	C	104
Arctocephalus galapagoensis	Galapagos fur seal	37,400	4,780	Pi	M	C	104
Odocoileus hemionus	Mule deer	39,100	18,000	Ar	ND	H	102
Antidorcas marsupialis	Springbok	43,300	24,100	Ar	D	H	113
Macropus giganteus	Eastern grey kangaroo	44,500	8,670	Ma	ND	H	102
Callorhinus ursinus	Northern fur seal	51,100	36,100	Pi	M	C	102

Table 1 (*Continued*)

Species	Common name	Mass (g)	FMR (kJ/day)	Taxon[b]	Habitat[c]	Diet[d]	Reference
Zalophus californianus	California sea lion	78,000	38,600	Pi	M	C	104
Neophoca cinerea	Australian sea lion	83,500	39,500	Pi	M	C	104
Phoca vitulina	Common seal	99,000	52,500	Pi	M	C	135
Birds							
Archilochus alexandri	Black-chinned hummingbird	3.7	29.1	Ap	TeF	N	133
Calypte anna	Anna's hummingbird	4.5	31.8	Ap	CS	N	134
Thalurania colombica	Crowned woodnymph	4.9	37.9	Ap	TF	N	162
Auriparus flaviceps	Verdin	6.6	30.0	Pa	D	I	162
Chalybura urochrysia	Bronze-tailed plumeleteer	7.2	57.9	Ap	TF	N	162
Malurus cyaneus	Superb blue wren	8.3	34.2	Pa	TeF	I	160
Lampornis clemenciae	Blue-throated hummingbird	8.8	81.7	Ap	TeF	N	133
Zosterops lateralis	Grey-breasted silvereye	9.5	41.7	Pa	EF	F	102
Parus ater	Coal tit	9.5	47.4	Pa	CF	I	118
Nectarinia violacea	Orange-breasted sunbird	9.5	66.2	Pa	FY	N	167
Acanthorhynchus tenuirostris	Eastern spinebill	9.7	53.0	Pa	TeF	N	161
Troglodytes aedon	House wren	10.6	60.8	Pa	TeF	I	42
Parus cristatus	Crested tit	11.1	40.6	Pa	CF	I	118
Parus montanus	Willow tit	11.4	44.1	Pa	CF	I	23, 118
Parus caeruleus	Blue tit	11.5	64.0	Pa	CF	I	148
Eremiornis carteri	Spinifexbird	12.0	51.5	Pa	D	I	1
Parus cinctus	Siberian tit	12.8	51.4	Pa	CF	I	23
Ficedula hypoleuca	Pied flycatcher	13.5	65.8	Pa	OW	I	91, 93
Riparia riparia	Sand martin	14.3	81.7	Pa	TM	I	102
Muscicapa striata	Pacific swallow	14.4	52.0	Pa	TeF	I	22
Hirundo tahitica	Spotted flycatcher	14.4	64.9	Pa	TF	I	102, 148
Phylidonyris pyrrhoptera	Crescent honeyeater	14.6	75.9	Pa	TeF	N	161
Ficedula albicollis	Collared flytcatcher	15.9	78.6	Pa	TeF	I	92
Phylidonyris novaehollandiae	New Holland honeyeater	17.3	77.6	Pa	TeF	N	161
Parus major	Great tit	18.0	97.4	Pa	TeF	O	109, 151

(*Continued*)

Table 1 (*Continued*)

Species	Common name	Mass (g)	FMR (kJ/day)	Taxon[b]	Habitat[c]	Diet[d]	Reference
Erithacus rubecula	Robin	18.7	71.3	Pa	TeF	I	148
Passerculus sandwichensis	Savannah sparrow	18.7	80.4	Pa	SM	O	102, 165, 171
Delichon urbica	House martin	19.0	79.8	Pa	TM	I	102
Junco phaeonotus	Yellow-eyed junco	19.5	73.8	Pa	TM	O	172
Junco hyemalis	Dark-eyed junco	19.6	76.6	Pa	TM	O	163
Tachycineata bicolor	Tree swallow	20.2	209	Pa	TM	I	118
Hirundo rustica	Barn swallow	20.4	95.8	Pa	TM	I	35, 102, 158
Prunella modularis	Dunnocky	21.2	86.0	Pa	TeF	I	22
Phainopepla nitens	Phainopepla	22.7	79.1	Pa	D	O	102
Cormobates leucophaeus	White-throated treecreeper	23.7	81.4	Pa	TeF	I	160
Oenanthe oenanthe	Northern wheatear	24.3	91.4	Pa	TM	I	90, 147
Pyrrhula pyrrhula	Bullfinch	25.1	88.0	Pa	TeF	G	22
Philetairus socius	Sociable weaver	25.5	48.7	Pa	D	O	170
Sialia mexicana	Western bluebird	27.4	95.0	Pa	TeF	I	89
Melopsittacus undulatus	Budgerigar	27.9	59.1	Ps	D	O	172
Mirafra erythrochlamys	Dune lark	28.5	64.3	Pa	D	O	172
Merops viridis	Blue-throated bee-eater	34.3	85.3	Co	TF	I	102, 148
Oceanites oceanus	Wilson's storm-petrel	42.3	119	Pr	M	C	102
Oceanodroma leucorhoa	Leach's storm-petrel	45.9	118	Pr	M	C	118
Mimus polyglottos	Mockingbird	47.6	121	Pr	DF	O	102
Progne subis	Purple martin	49.0	163	Pa	DF	I	102
Actitis hypoleucos	Common sandpiper	51.6	146	Ch	M	C	148
Calidris alba	Sanderling	52.0	141	Ch	M	C	24
Neophema petrophila	Rock parrot	62.8	106	Ps	D	O	172
Cinclus cinclus	Dipper	63.7	196	Pa	TM	I	18, 118
Charadrius hiaticula	Ringed plover	74.8	302	Ch	M	C	148
Ceryle rudis	Pied kingfisher	76.0	210	Co	TF	C	118
Sturnus vulgaris	Starling	78.7	269	Pa	DF	O	102
Aethia pusilla	Least auklet	80.3	350	Ch	M	C	118, 125

Table 1 (*Continued*)

Species	Common name	Mass (g)	FMR (kJ/day)	Taxon[b]	Habitat[c]	Diet[d]	Reference
Melanerpes formicivorous	Acorn woodpecker	82.0	195	Pi	OW	O	172
Geophaps plumifera	Spinifex pigeon	87.0	76.0	Cl	D	G	169
Turdus merula	Blackbird	96.0	179	Pa	TeF	I	22
Sterna paradisaea	Arctic tern	101	335	Ch	M	C	152
Arenaria interpres	Ruddy turnstone	108	352	Ch	M	C	131
Pelecanoides georgicus	South Georgia diving petrel	109	464	Pr	M	C	118
Sterna hirundo	Common tern	127	343	Ch	M	C	72
Pelecanoides urinatrix	Common diving petrel	137	557	Pr	M	C	118
Callipepla gambelii	Gambel's quail	145	90.8	Ga	D	O	102
Barnardius zonarius	Port Lincoln parrot	145	189	Ps	D	O	172
Pachyptila desolata	Antarctic prion	149	391	Pr	M	C	149
Alle alle	Dovkie	164	696	Ch	M	C	172
Ptychoramphus aleuticus	Cassin's auklet	174	413	Ch	M	C	65
Sterna fuscata	Sooty tern	187	241	Ch	M	C	102
Ammoperdix heyi	Sand partridge	190	148	Ga	D	O	102
Anous stolidus	Brown noddy	195	352	Ch	M	C	102
Falco tinnunculus	Eurasian kestrel	211	341	Fa	TM	C	67, 84, 118
Cacatua roseicapilla	Galah	307	349	Ps	D	O	172
Phaethon lepturus	White-tailed tropicbird	370	777	Pe	M	C	127
Cepphus grylle	Black guillemot	380	860	Ch	M	C	87, 118
Puffinus pacificus	Wedge-tailed shearwater	384	614	Pr	M	C	102
Rissa tridactyla	Black-legged kittiwake	386	795	Pr	M	C	102
Alectoris chukar	Chukar	395	260	Ga	D	O	102
Uria lomvia	Thick-billed murre	834	1,480	Ch	M	C	118
Uria aalga	Guillemot	940	1,870	Ch	M	C	172
Eudyptula minor	Little penguin	1,050	1,050	Sp	M	C	46, 118
Sula sula	Red-footed booby	1,070	1,220	Pe	M	C	7
Centrocercus urophasianus	Sage grouse	2,500	1,540	Ga	D	G	154
Morus capensis	Cape gannet	2,580	3,380	Pe	M	C	172
Diomedea immutabilis	Laysan albatross	3,070	1,330	Pr	M	C	130
Spheniscus demersus	Jackass penguin	3,170	1,950	Sp	M	C	102

(*Continued*)

Table 1 (*Continued*)

Species	Common name	Mass (g)	FMR (kJ/day)	Taxon[b]	Habitat[c]	Diet[d]	Reference
Sula bassanus	Northern gannet	3,210	4,870	Pe	M	C	172
Diomedea chrysostoma	Grey-headed albatross	3,710	2,390	Pr	M	C	118
Pygoscelis antarctica	Chinstrap penguin	3,790	5,600	Sp	M	C	94
Macronectes giganteus	Giant petrel	3,890	4,330	Pr	M	C	124
Pygoscelis adeliae	Adelie penguin	3,990	3,790	Sp	M	C	25, 36, 119
Eudyptes chrysolophus	Macaroni penguin	4,270	2,950	Sp	M	C	172
Pygoscelis papua	Gentoo penguin	6,170	4,650	Sp	M	C	47, 172
Diomedea exulans	Wandering albatross	8,420	3,350	Pr	M	C	102
Aptenodytes patagonicus	King penguin	12,900	7,410	Sp	M	C	75
Struthio camelus	Ostrich	88,300	18,000	St	D	O	172
Reptiles							
Mesalina olivieri	Sand lizard	1.1	0.29	La	SA	I	156
Rhoptropus afer	Namib Desert gecko	2.6	0.23	Ge	D	I	121
Urosaurus nigricaudus	Black-tailed brush lizard	3.2	1.38	Ph	SC	I	60
Uta stansburiana	Side-blotched lizard	3.2	0.67	Ph	D	I	60, 101
Pedioplanis lineoocellata	Spotted sand lizard	3.3	0.54	La	D	I	111
Heliobolus lugubris	Bushveld lizard	3.8	0.80	La	D	I	111
Meroles anchietae	Namib Desert dune lizard	4.0	0.60	La	D	O	137
Cnemidophorus hyperythrus	Orangethroat whiptail	4.3	1.13	Te	SC	I	60, 68
Acanthodactylus pardalis	Sand lizard	4.5	0.23	La	SA	I	156
Sceloporus graciosus	Sagebrush lizard	5.0	0.82	Ph	SC	I	33
Sceloporus virgatus	Striped plateau lizard	6.3	1.06	Ph	SC	I	88
Callisaurus draconoides	Zebra-tailed lizard	7.1	1.12	Ph	D	I	69
Podarcis lilfordi	Lacertid lizard	7.4	1.49	La	SC/ME	I	19
Sceloporus variabilis	Rosebelly lizard	7.7	1.92	Ph	TR	I	10

Table 1 (*Continued*)

Species	Common name	Mass (g)	FMR (kJ/day)	Taxon[b]	Habitat[c]	Diet[d]	Reference
Chalcides sexlineatus	Gran Canarian skink	7.8	0.72	Sc	STR	I	20
Ptyodactylus hasselquistii	Negev Desert gecko	9.1	1.2	Ge	D	I	108
Varanus caudolineatus	Goanna/monitor lizard	10.4	3.0	Va	SA/SC	C	150
Galloti altantica	Agamid lizard	11.9	1.5	La	STR	H	155
Sceloporus occidentalis	Western fence lizard	12.1	1.8	Ph	SC	I	11, 13
Cnemidophorus tigris	Western whiptail	16.5	4.1	Te	D	I	2, 3
Pachydactylus bibronii	Birbon's gecko	16.6	2.2	Ge	D	I	112
Sceloporus jarrovi	Yarrow's spiny lizard	16.6	1.9	Ph	SC	I	10, 83
Mabuya striata	Stiped skink	19.5	2.9	Sc	D	I	112
Thamnophis sirtalis	Common garter snake	22.0	5.2	Co	SC	C	129
Phrynosoma platyrhinos	Desert horned lizard	23.0	2.7	Ph	D	I	21
Elgaria multicarinatus	Southern alligator lizard	25.3	2.0	An	SC	I	70
Lacerta viridis	Common lizard	25.5	5.8	La	TE	I	17
Galloti galloti	Agamid lizard	25.6	4.6	La	STR	H	155
Microlophus albemariensis	Lava lizard	28.2	3.3	Tr	IT	I	99
Ctenophorus nuchalis	Central netted dragon	36.8	9.6	Ag	D	I	105
Galloti stehlini	Giant agamid lizard	47.3	7.9	La	STR	H	155
Dipsosaurus dorsalis	Desert iguana	52.5	6.5	Ig	D	H	85
Agama impalearis	Bibron's agama	54.4	16.8	Ag	D	I	173
Angolosaurus skoogi	Skoog's lizard	57.4	3.0	Gr	D	H	107
Varanus acanthurus	Ridge-tailed monitor	60.0	3.7	Va	TE	C	41
Varanus scalaris	Goanna/monitor lizard	66.4	7.8	Va	EW	C	29
Vipera aspis	European viper	67.2	6.3	Vi	TE	C	17
Crotalus lepidus	Mottled rock rattlesnakes	109	4.7	Vi	SC	C	9
Masticophus flagellum	Coachwhip	124	11.7	Co	D	C	139
Crotalus cerastes	Sidewinder	129	5.0	Vi	D	C	139

(*Continued*)

Table 1 (*Continued*)

Species	Common name	Mass (g)	FMR (kJ/day)	Taxon[b]	Habitat[c]	Diet[d]	Reference
Coluber constrictor	Racer	132	12.8	Co	W	C	132
Sauromalus obesus	Chuckwalla	167	15.7	Ig	D	H	122
Chlamydosaurus kingii	Frillneck lizard	635	52.4	Ag	W	I	28
Iguana iguana	Green iguana	860	60.1	Ig	SA	H	153
Tupinambis teguixin	Tegu	1,170	214	Te	TR	C	57
Varanus rosenbergi	Goanna/monitor lizard	1,180	100	Va	EW	C	56
Varanus mertensi	Merten's water monitor	1,210	143	Va	M	C	31
Varanus gouldii	Sand monitor	1,320	233	Va	TRW	C	30
Varanus panoptes	Goanna/monitor	1,350	180	Va	TRW/RI	C	30
Amblyrhynchus cristatus	Galapagos marine iguana	1,610	91.2	Ig	M	H	123
Gopherus agassizzi	Desert tortoise	2,120	42.9	Ts	D	H	64, 114, 128
Varanus bengalensis	Bengal monitor	2,560	393	Va	TR	C	40
Varanus salvator	Goanna/monitor lizard	7,530	906	Va	SA/TR	C	40
Varanus giganteus	Perenties	7,700	807	Va	DTR	C	40, 59
Varanus komodensis	Komodo dragon	45,200	2,430	Va	TR	C	58

[a]Body mass and FMR values are means or weighted means where more than one study per species is available.

[b]Marsupial (marsup.) mammals: Squirrel (sqrl.); Tr, Tarsipedidae; Da, Dasyuridae; Pt, Petauridae; Pe, Peramelidae; Ma, Macropodidae; Ph, Phascolarctidae. Eutherian mammals: Ch, Chiroptera; Ro, Rodentia; In, Insectivora; Ca, Carnivora; La, Lagomorpha; Xe, Xenarthra; Pr, Primates; Pi, Pinniped; Ar, Artiodactyla. Monotreme: Ta, Tachyglossidae. Birds: Ap, Apodiformes; Pa, Passeriformes; Ps, Psittaciformes; Co, Coraciiformes; Pr, Procellariformes; Ch, Charadriiformes; Pi, Piciformes; Cl, Columbiformes; Ga, Galliformes; Fa, Falconiformes; Pe, Pelicaniformes; Sp, Sphenisciformes; St, Struthioniformes. Reptiles: Squamata (families): Ag, Agamidae; An, Anguidae; Co, Colubridae; Ge, Gekkonidae; Gr, Gerrhosauride; Ig, Iguanidae; La, Lacertidae; Ph, Phrynosomatidae; Sc, Scincidae; Te, Teiidae; Tr, Tropiduridae; Va, Varanidae; Vi, Viperidae. Testudines: Ts, Testudinidae.

[c]Habitat: ND, nondesert; D, desert; M, marine; TeF, temperate forest; CS, chaparral scrub; TF, tropical forest; EF, eucalypt forest; CF, coniferous forest; FY, fynbos; OW, oak woodland; TM, temperate meadow; SM, salt marsh; DF, deciduous forest; SA, semiarid; A, arid; SC, scrub; TR, tropical; STR, subtropical; DTR, dry tropical; TE, temperate; F, forest; EW, eucalypt woodland; TRW, tropical woodland; RI, riparian; W, woodland; IT, inter-tidal; ME, mediterranean.

[d]Diet: I, insectivore; G, granivore; N, nectarivore; O, omnivore; H, herbivore; C, carnivore; F, frugivore.

intermediate. Thus, values for some species in Table 1 may seem to be in error, but they are correct for the applications used in this study.

FMR data are given in units of kilojoules per day. When necessary, we converted reported FMR results from CO_2 to kilojoules using the factors 21.7 kJ per liter of CO_2 for herbivores, 20.8 for frugivores, 21.9 for granivores, 25.7 for insectivores, and 25.8 for carnivores (100, 116). We assumed that authors corrected their FMR results to a 24-h average (144). Categorization of habitat and diet for each species was based on information given in the article, or from field guides. Habitats of mammals were determined only as desert, nondesert, or marine, but habitats of reptiles and birds were resolved into more detailed categories. For reptiles, the term desert refers to an area that receives less than 250 mm of rain per year, and semi-arid usually refers to a scrub-type habitat that receives more than 250 mm of rain per year.

PREDICTING METABOLIC RATES

One of the most useful applications of allometric equations ($\log_{10}$ vs $\log_{10}$ regressions) for food and energy requirements of animals is in predicting the needs of species that have not yet been studied by using DLW. Commonly, such predictions are used in (*a*) hypotheses involving species that are expected to differ from typical (or predicted) animals in a given taxon, (*b*) community or ecosystem-level studies of ecological energetics, (*c*) conservation and management efforts to estimate population food needs, and (*d*) evolutionary studies such as those concerning the food requirements of warm-blooded vs cold-blooded dinosaurs.

Allometric analyses may be done using at least three different methods: linear least-squares regression of $\log_{10}$-transformed variables, reduced major axis regression, and phylogenetically independent contrasts analysis. For making predictions, we used the linear least-squares regression method, for two main reasons. First, this method yields equations that can be used to predict FMR values directly, and the other methods do not. Second, it yields statistical parameters that allow calculation of confidence intervals for predicted values, and the other methods do not.

We calculated allometric regressions for all mammals, all birds, and all reptiles listed in Table 1, and then for groups within each of these taxonomic classes, based either on smaller taxonomic categories, habitat, or diet. The equation (in power form) for every regression that was statistically significant ($P < 0.05$ via an F test for significance of the regression) is shown in Table 2, along with the regression statistics r^2 (coefficient of determination) and P (probability value from an F test) for that equation. Also shown are the values needed to calculate the 95% confidence interval (CI) of any FMR predicted by solving that

Table 2 Summary of allometric equations for field metabolic rates (FMR) of free-living mammals, birds, and reptiles[a]

Group	*a*	*b*	*n*	r^2	*P*	Statistics for 95% CI of prediction				Equation
						Mean log x	c	d	e	
Mammals										
All mammals	4.82	0.734	79	0.950	<0.0001	2.481	0.422	1.013	0.008	1
Eutherians	4.21	0.772	58	0.959	<0.0001	2.364	0.423	1.017	0.010	2
Marsupials	10.1	0.59	20	0.977	<0.0001	2.772	0.200	1.050	0.051	3
Chiroptera	6.49	0.681	7	0.781	0.008	1.164	0.365	1.143	1.286	4
Carnivora	1.67	0.869	7	0.918	0.001	3.609	0.504	1.143	0.350	5
Rodentia	5.48	0.712	30	0.848	<0.0001	1.684	0.332	1.003	0.125	6
Diprotodont marsupials	8.67	0.609	14	0.973	<0.0001	3.126	0.216	1.071	0.090	7
Desert mammals	3.18	0.785	25	0.963	<0.0001	2.174	0.366	1.040	0.033	8
Terrestrial mesic mammals	8.18	0.639	48	0.947	<0.0001	2.355	0.336	1.021	0.018	9
Desert rodents	9.68	0.487	15	0.763	<0.0001	1.519	0.207	1.067	0.618	10
Mesic rodents	7.38	0.694	15	0.912	<0.0001	1.849	0.305	1.067	0.179	11
Carnivores	2.23	0.85	13	0.956	<0.0001	3.960	0.448	1.077	0.073	12
Granivores	11.1	0.414	6	0.860	0.008	1.409	0.153	1.167	2.314	13
Herbivores	7.94	0.646	26	0.914	<0.0001	2.995	0.435	1.038	0.036	14
Insectivores	6.98	0.622	14	0.890	<0.0001	1.685	0.453	1.071	0.092	15
Omnivores	6.03	0.678	18	0.876	<0.0001	1.808	0.310	1.056	0.190	16
Birds										
All birds	10.5	0.681	95	0.938	<0.0001	1.950	0.328	1.011	0.012	17
Passerines	10.4	0.68	40	0.724	<0.0001	1.268	0.225	1.025	0.375	18
Charadriiformes	8.13	0.77	13	0.878	<0.0001	2.202	0.270	1.077	0.496	19
Procellariiformes	18.4	0.599	11	0.907	<0.0001	2.671	0.381	1.091	0.144	20

Sphenisciformes	4.53	0.795	7	0.808	<0.01	3.605	0.357	1.143	1.555	21
Galliformes	0.851	0.959	4	0.994	<0.005	2.609	0.216	1.250	1.073	22
Pelecaniformes	4.54	0.844	4	0.939	<0.05	3.129	0.484	1.250	1.829	23
Psittaciformes	5.05	0.735	4	0.999	<0.001	1.973	0.061	1.250	1.643	24
Apodiformes	5.54	1.212	5	0.979	<0.003	0.742	0.102	1.200	10.520	25
Marine birds	14.25	0.659	36	0.923	<0.0001	2.721	0.298	1.028	0.050	26
Temperate forest birds	15.9	0.543	16	0.801	<0.001	1.203	0.183	1.063	0.718	27
Desert birds	6.35	0.671	15	0.957	<0.0001	2.089	0.330	1.067	0.067	28
Temperate meadow birds	18.7	0.548	9	0.697	0.005	1.461	0.339	1.111	0.909	29
Insectivores	9.70	0.705	26	0.754	<0.0001	1.254	0.229	1.038	0.547	30
Omnivores	9.36	0.628	18	0.911	<0.0001	1.927	0.373	1.056	0.077	31
Reptiles										
All reptiles	0.196	0.889	55	0.945	<0.0001	1.726	0.459	1.018	1.017	32
All lizards	0.190	0.916	48	0.963	<0.0001	1.668	0.400	1.021	0.018	33
Iguanians	0.301	0.793	17	0.948	<0.0001	1.502	0.344	1.059	0.087	34
Scleroglossans	0.163	0.949	31	0.971	<0.0001	1.760	0.415	1.032	0.022	35
Varanidae	0.208	0.915	11	0.966	<0.0001	2.986	0.433	1.091	0.089	36
Lacertidae	0.158	1.009	10	0.870	<0.0001	0.884	0.477	1.100	0.444	37
Iguanidae	0.291	0.782	4	0.999	0.0003	2.521	0.074	1.250	0.729	38
Phrynosomatidae	0.454	0.542	9	0.666	0.007	0.877	0.289	1.111	1.417	39
Desert lizards	0.177	0.935	16	0.876	<0.0001	1.157	0.428	1.062	0.220	40
Herbivores	0.232	0.813	8	0.939	<0.0001	2.000	0.406	1.125	0.261	41

[a]The equations are in the power form: kJ/day $= a(g \text{ body mass})^b$; n, number of species; r^2, coefficient of determination; P, probability of a statistically significant regression (via F-test); and mean log x, c, d, and e are values for use in the following equation for calculation of 95% confidence intervals of the prediction:

$$95\%\ \text{CI}_{\log(\text{predicted kJ/day})} = \log(\text{predicted kJ/day}) \pm c\{d + e[\log(g \text{ body mass}) - (\text{mean log } x)]^2\}^{0.5}.$$

equation for a given body mass. The equation for 95% CI of the prediction is 95% $CI_{log(FMR)} = \log(FMR) \pm c\{d + e[\log(mass) - mean\ \log(mass)]^2\}^{0.5}$.

As an example of how to use these equations, we show the results of predicting the FMR ± 95% CI of the prediction for a spotted hyena weighing 62 kg. Using Equation 1 in Table 2, we get $4.82\ (62{,}000)^{0.734} = 15{,}873 \approx 15{,}900$ kJ/day as the predicted FMR. For the 95% CI, we get $\log(15{,}900) \pm 0.422\{1.013 + 0.008[\log(62{,}000) - 2.481]^2\}^{0.5}$, or $4.201 \pm 0.422[1.013 + 0.008(5.343)]0.5$, or $4.201 \pm 0.422(1.027)$, or $4.201 + 0.434 = 4.635$, and $4.201 - 0.434 = 3.767$. The anti-logs of these values are 43,100 kJ/day and 5,850 kJ/day, which are 271% and 37%, respectively, of the predicted FMR. If these equations are used to predict FMRs for animals with body masses that fall outside the range of masses used to derive the equations (see Table 1), 95% CI will be larger (extrapolation vs interpolation). The relatively large CIs of the predicted values are due to the amount of residual variation around the allometric regression lines (Figure 1), despite the high r^2 values (Table 2). We recommend that colleagues calculate predicted FMR and 95% CI values using the equation that applies most specifically to their animal of interest.

The literature contains additional allometric equations for predicting FMR for a variety of bird subgroups not addressed here. These include small birds (58 species), kJ/day $= 15.94(g)^{0.53}$ (22); aerially foraging birds with nestlings (seven species of Hirundines), kJ/day $= 21.9(g)^{0.53}$ (166); ground-foraging, flycatching, and piscivorous birds with nestlings (11 species), kJ/day $= 7.76(g)^{0.75}$ (166); incubating birds (17 species), kJ/day $= 12.93(g)^{0.61}$ (148); seabirds (23 species), kJ/day $= 12.0(g)^{0.667}$ (15); cold-water seabirds (5 species), kJ/day $= 15.6(g)^{0.646}$ (15); warm-water seabirds (16 species), kJ/day $= 9.16(g)^{0.646}$ (15); seabirds using flapping flight (10 species), $10.3(g)^{0.726}$ (15); seabirds not using flapping flight (13 species), kJ/day $= 6.63(g)^{0.726}$ (15); cold-water seabirds using flapping flight (8 species), kJ/day $= 11.5(g)^{0.727}$ (15); hovering nectarivores (five species of hummingbirds), kJ/day $= 5.61(g)^{1.21}$ (161); perching nectarivores (three species of honeyeaters), kJ/day $= 11.0(g)^{0.697}$ (161); birds during parental care (30 species), kJ/day $= 13.8(g)^{0.65}$ (84); and fledgling birds (11 species), kJ/day $= 4.58(g)^{0.76}$ (136).

PREDICTING FOOD REQUIREMENTS

The ration of food, in dry matter units (grams/day), that an animal must consume to supply the metabolizable energy it uses in a day can be estimated from its FMR. This calculation requires a factor indicating the metabolizable energy available from a gram of dry matter (DM) in the animal's diet. Fortunately, different kinds of vertebrate animals that eat a given diet have similar digestive efficiencies. For example, nectarivorous bats and birds both assimilate essentially 100% of the dry matter (sugar) in their diet. Thus, for these animals,

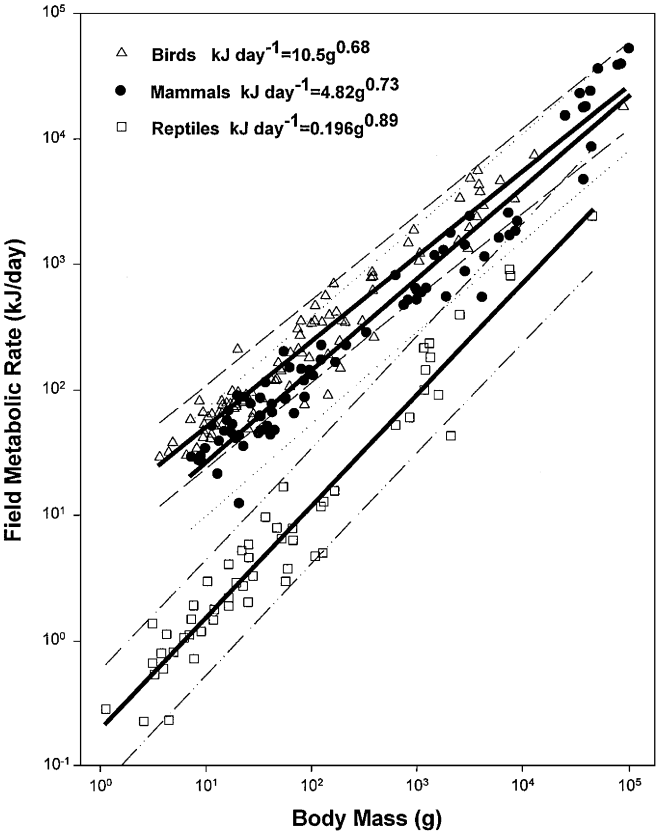

Figure 1 Allometry of field metabolic rate in terrestrial vertebrates. (*Solid lines*) least-squares linear regression lines for birds, mammals, and reptiles (see Equations 1, 17, and 32 in Table 2); (*dashed or dotted lines*) 95% confidence intervals of the prediction for each line.

daily food requirements may be estimated as their FMR, in kJ/day, divided by 16.0 kJ/g of DM, the gross energy content of mixed sugars. Energy digestibility studies done on a variety of wild vertebrates suggest the following conversion factors: mammalian insectivores, 18.7 kJ/g of DM, and bird and reptile insectivores, 18.0 kJ/g of DM (lower than mammals due to greater energy loss in uric acid); fish-eating mammals, 18.7 kJ/g of DM, and fish-eating birds, 16.2 kJ/g of DM; mammalian carnivores, 16.8 kJ/g of DM; mammalian frugivores, 6.6 kJ/g of DM; mammalian granivores, 16.9 kJ/g of DM; herbivores, 10.0 kJ/g of DM for monogastric digesters and 11.5 kJ/g of DM for ruminants and other fermentative digesters; and an estimated intermediate value of 14 kJ/g of DM for omnivores (100, 102, 110). Daily feeding rates necessary to maintain energy balance, in grams of DM consumed per day, may be estimated easily by

dividing predicted FMR (in kilojoules per day), by the appropriate dietary factor (in metabolizable kilojoules per day of DM, given above). For example, the hyena mentioned above (a carnivore) had a predicted FMR of 15,900 kJ/day, and its diet contains about 16.8 metabolizable kJ/g of DM, so its estimated food consumption is (15,900 kJ/day ÷ 16.8 kJ/g of DM =) 946 g of DM/day. Fresh matter (FM) intake can be estimated by multiplying the grams of DM/day estimate by the ratio of grams of FM/grams of DM for the diet. For example, animal foods (insects, fish, rodents) are usually about 70% water, or 30% DM, so their ratio is about 1 g of FM/0.30 g of DM = 3.33 g of FM/g of DM, and their rate of FM intake will be 3.33 times greater than their rate of DM intake, with the difference being water in the food. Our hyena would thus consume (946 g of DM/day × 3.33 g of FM/g of DM =) 3150 g of FM/day (a little over 3 kg daily) to achieve energy balance in its natural habitat.

WHAT DETERMINES ENERGY REQUIREMENTS?

The highest measured FMR to date (52,500 kJ/day in a harbor seal) is 228,000 times, or more than five orders of magnitude greater than, the lowest vertebrate FMR measured (0.23 kJ/day in two small species of lizards) (Table 1). What accounts for this huge difference in the energetic cost of living through one day? Body size (mass) differences explain most of the variation in the FMR data in Table 1. The r^2 value for the overall regression (mammals, birds, and reptiles combined) is 0.71, indicating that over 70% of the variation in log FMR is due to variation in log body mass.

After accounting only for body mass effects, variation of more than 20 times between lowest and highest still exists. A simple way to demonstrate this is to calculate predicted FMRs for a 100-g mammal, bird, and reptile using the equations in Table 2. The results are 142 kJ/day for a 100-g mammal, 242 kJ/day for a 100-g bird, and 11.8 kJ/day for a 100-g reptile (see Table 2). The bird has to use 20 times more energy to live each day than does the lizard, and the mammal pays 12 times more than the lizard. Thus, there are large differences between these three taxonomic classes of animals. The slopes (b) of the regressions for mammals (b = 0.734, 95% CI = 0.696–0.772), birds (0.681, 0.645–0.717), and reptiles (0.889, 0.830–0.948) all differ significantly from each other, judging by nonoverlap of 95% CIs and confirmed by analysis of covariance (ANCOVA). However, within these classes, the r^2 values in Table 2 indicate that from 93% to 95% of the variation in log FMR is explained by variation in log body mass. Thus, the second most important determinant of FMR is taxonomic class.

The higher FMRs of birds may reflect a higher cost of living than for mammals in general, which would be in accord with the significantly higher basal metabolic rates of birds (8). Or it may reflect the fact that nearly all of the bird

FMR data were gathered during the birds' breeding season, when birds can be reliably recaptured for DLW sampling. This interpretation, however, assumes that birds have higher FMRs during breeding than in other seasons. No such significant elevation of FMR during the breeding season is found in mammals studied throughout the year with DLW (see below).

Even after accounting for body mass and taxonomic class effects, variation in FMRs is still more than about six times (see scatter about the regression lines in Figure 1). Can lower taxonomic categories, or habitat effects, or diet effects account for this variation? If so, then allometric regressions calculated for these subgroups should contain less scatter and have higher r^2 values and perhaps significantly different slopes or intercepts. We use analysis of covariance (ANCOVA, using Prophet 5.0 software, copyright 1997 BBN Systems and Technologies) to test for significant differences (where $P < 0.05$) between slopes and intercepts of regression lines.

Taxonomic Differences

The FMRs of eutherian and marsupial mammals scale differently (Table 2). The slope of the log-log regression for eutherians is 0.772 (95% CI = 0.730–0.815), which is significantly higher than the value of 0.696 reported by Hayssen & Lacey (62) for basal metabolic rate (BMR) in eutherians ($P = 0.0015$) but does not differ from the reported (and theoretical) value of 0.75 (73). For marsupial mammals, the slope is 0.590 (0.545–0.635), which is significantly lower than the eutherian slope (ANCOVA $F_{1,74} = 15.1$, $P = 0.0002$) and is significantly lower ($P < 0.0001$) than the BMR slope values of 0.747 reported by Dawson & Hulbert (37) and of 0.747 reported by Hayssen & Lacey (62). The slope of marsupial FMR is also significantly different ($P < 0.001$) from both of the theoretical slopes of 0.75 and 0.67. The intercept for the eutherian regression (0.624) is lower than that of the marsupial regression (1.00), such that small eutherians (<125 g) have a relatively lower FMR, whereas larger eutherians tend to have a relatively higher FMR, than do similarly sized marsupials. The single montreme, the echidna (*Tachyglossus aculeatus*), had a field metabolic rate within the 95% CI of the predictions for both eutherians and marsupials and was 89.3% and 96.6% of the FMR predicted for its body mass by the eutherian and marsupial equations, respectively. Although significant regressions existed for Carnivora, Chiroptera, Rodentia, and Diprodontia, there were no significant differences in scaling among any of the lower taxonomic categories (eutherian orders Carnivora, Chiroptera, Pinnipedia, Rodentia, and the marsupial superorders Dasyuromorphia and Diprodontia contained sufficient sample sizes for comparison) (ANCOVA $F_{5,56} = 2.02$, $P = 0.0895$). Regressions for Artiodactyla ($n = 2$), Insectivora ($n = 3$), Pinnipedia ($n = 6$), and Dasyuromorphia ($n = 4$) were not significant.

For all birds studied, the slope of the regression (0.681, 95% CI = 0.645–0.71) is different from the theoretical slope of 0.75 but is not different from the theoretical slope of 0.67 or the slope of 0.668 for BMR of all birds (81). The scaling of FMR among passerine birds does not differ from that of non-passerine species taken together, in contrast to the earlier finding based on fewer data (102). However, an ANCOVA on all taxonomic orders for which adequate data exist indicates no significant differences in slopes, but in pairwise comparisons, intercepts of regressions for Passeriformes and Procellariformes are relatively high, and the intercept for Galliformes is relatively low, compared with other families.

The 55 species of reptiles used in the analyses included 48 lizards, 6 snakes and 1 tortoise (Table 1). The allometric slope for all reptiles is 0.889 (95% CI = 0.830–0.948), which is higher than both theoretical slopes of 0.67 or 0.75. Among lizards, the slope is even higher, at 0.916, and has smaller relative CIs (0.863–0.969). The regression for snakes is not significant. The measured FMR of the two *Crotalus* snakes and the desert tortoise (*Gopherus agassizii*) fall below the 95% CI of the prediction, indicating that they have significantly lower FMRs than would lizards of comparable size. For all subsequent analyses (see below), only lizard data are used. No significant differences are found in the scaling of four lizard families (Iguanidae, Phrynosomatidae, Varanidae, and Lacertidae). When each family is compared with all other lizards (i.e. phrynosomatids versus nonphrynosomatids), there are also no significant differences. It is interesting to note that excluding the varanids does not lower the slope or the intercept of the lizard regression (slope for all lizards 0.916, nonvaranid lizards slope is 0.88, $P = 0.659$). Thus, varanids, despite their generally large body size and highly active lifestyle, do not appear to have higher energy expenditures than do nonvaranid lizards of the same body mass. Are there differences at higher taxonomic levels of reptiles? Within the order Squamata, there are two major clades, Iguania and Scleroglossa (Gekkota plus Autarchoglossa), that diverged about 200 million years ago. Our data include species from the Iguania clade (Iguanidae, Phrynosomatidae, Tropiduridae, and Agamidae) as well as the Scleroglossa clade (Teiidae, Lacertidae, Scincidae, Gerrhosauridae, Anguidae, and Varanidae). ANCOVA indicates that Iguanians ($n = 17$) and Scleroglossans ($n = 31$) have significantly different slopes (Iguanian 0.793; Scleroglossan 0.949; $P = 0.017$). Even if varanids are excluded, there is still a significant scaling difference between the two clades ($F_{1,33} = 4.422$; $P = 0.043$).

To summarize, taxonomic differences in FMR of vertebrates are substantial between classes (mammals vs birds vs reptiles). Scaling differences apparently extend down only to the infraclass level in mammals (eutherians, marsupials), to just below the order level in reptiles, and to the family level in birds. A lack of information about many taxonomic groups precludes a more robust conclusion about taxonomic effects on FMR, at present.

Habitat Effects

The allometric slope for desert mammals (0.785) is significantly higher ($P = 0.0007$) than that for nondesert, nonmarine mammals (0.639), although marine mammals (1.438) do not differ from either desert or nondesert groups. Among rodents, there is no significant difference in scaling between desert ($n = 15$) and nondesert species ($n = 15$). Among birds, the allometric slopes of marine, desert, temperate forest, and temperate meadow species do not differ, but significant differences exist in the intercepts, which indicate that marine birds have FMRs averaging 60% higher than those of nonmarine birds, and desert birds have FMRs averaging 48% lower than those of nondesert birds. In reptiles, no significant scaling differences in FMR are found between desert and nondesert species, even among nonherbivores. Thus, demonstrated habitat effects on FMR of vertebrates are restricted to an increased allometric slope in desert mammals, a lower intercept (reduced FMR) in desert birds, and a higher intercept (elevated FMR) in marine birds.

Effects of Diet

There are significant differences in the scaling of FMR among the five mammalian dietary categories we compared (carnivores, granivores, herbivores, insectivores, and omnivores): Carnivores have a higher slope than both insectivores and herbivores. However, these results must be interpreted with caution, because the analysis of dietary effects is confounded by taxonomic affiliation. For example, most of the mammalian carnivores are canids and pinnipeds, which have relatively higher slopes, and many of the herbivores are marsupials, which have a relatively lower slope. If dietary categories are compared within eutherians and marsupials separately, no differences in scaling of FMR between dietary types remain. For birds, there are no significant differences in slopes of dietary categories, but carnivores, nectarivores, and insectivores have relatively high FMRs whereas granivores are lowest. Among lizards, there are no significant differences in the slopes or intercepts among insectivores, carnivores, and herbivores, or between insectivores and carnivores combined vs herbivores.

Season

The data for mammals are complete enough, including summer and winter measurements in 19 species of mammals (4 marsupials, 1 monotreme, 12 rodents, and 2 canids), to test for effects of season on FMR. There is no difference between summer and winter values in FMR (kJ/day), in mass-adjusted FMR ($\text{kJ g}^{-0.772}\,\text{d}^{-1}$ for eutherians or $\text{kJ g}^{-0.590}\,\text{d}^{-1}$ for marsupials and the monotreme), or in body mass (t-test, $P > 0.05$). Seven of these species were studied in spring, summer, autumn, and winter, and ANCOVA indicated no significant seasonal effects on body mass, FMR, or mass-adjusted FMR. These findings

challenge the assumption that mammals increase energy expenditure in winter when thermoregulatory costs presumably increase.

PHYLOGENETICALLY INDEPENDENT CONTRASTS: AN EXAMPLE

Because mean values for two or more closely related species cannot truly be considered to be completely independent in statistical analyses, it is becoming common practice to adjust results for phylogenetic relatedness (48, 50). We use Felsenstein's (45) method of phylogenetically independent contrasts to investigate the effects of phylogeny on the relationships revealed by the conventional log-linear methods used above. We used the program PDTREE [version 5.0, described in Garland et al (51)] to generate statistically independent observations, using Grafen's (55) arbitrary branch lengths (49). This method minimizes bias due to relatedness at the subspecific level as well as at higher levels, so published mean FMR and body mass values for different populations within species for which we have data (details not shown in Table 1) are used in the analyses for mammals and reptiles. Standardized contrasts for FMR are analyzed by least-squares regression through the origin on the positivized body mass contrasts. The intercept of the regression is then generated by PDTREE by mapping the slope of the standardized regression back onto the original data space (50).

The mammalian phylogenetic tree (figures and legends from this review for the phylogenetic trees for mammals, birds, and reptiles can be accessed at Annual Review's Website: http://www.annualreviews.org under Supplementary Materials, Nutrition) has been constructed from a number of published sources, including Wayne et al (159) (Carnivora), Degen et al (38) (Rodentia), Kirsch et al (71) (Marsupialia), Bininda-Edmonds & Russell (14) (Pinnipeds), Onuma et al (126) (Insectivora), Hutcheon et al (66) (Chiroptera), Simmons & Geisler (142) (Chiroptera), Arnason et al (4), and Geffen et al (52). The avian phylogenetic tree is based mainly on Sibley & Ahlquist (141). Because of the small number of FMR studies done on snakes and tortoises, and their unresolved phylogenetic positions, only lizards are included in the phylogenetically independent contrast analysis of reptiles. The lizard phylogenetic tree is based largely on Appendix II of Clobert et al (32), combined with trees from Estes & Pregill (44), Christian & Garland (27), Wiens & Reeder (164), Kluge (74), and Arnold (5).

Analyses of independent contrasts (ICA) yields estimates of slope for all mammals, and for eutherians, which were similar to the slopes from the nonphylogenetic (conventional) analyses. The ICA slope for all mammals (including multiple populations for some species) is 0.772 (SE $=$ 0.390, $n = 85$ independent contrasts), which is not significantly different from the conventional slope of 0.734 (t-test, $P = 0.38$). The ICA intercept (in $\log_{10}$ format) of 0.460

(SE = 0.0394) is significantly lower than that of the conventional intercept (in $\log_{10}$ format) of 0.683 ($P < 0.001$). For eutherian mammals, the ICA slope of 0.820 (SE = 0.558, $n = 62$) does not differ from the conventional slope of 0.772, but the ICA intercept is lower than the conventional intercept (0.391 vs 0.624, $P = 0.0014$). For marsupials, the method of independent contrasts yields a significantly higher scaling coefficient than does the nonphylogenetic regression [0.706 (SE = 0.0412, $n = 21$) vs 0.590 ($P = 0.018$)] and is more similar to the marsupial BMR slope of 0.747 (62) and the marsupial BMR-FMR slope of 0.723 (76). The marsupial ICA (0.682) and conventional (1.005) intercepts do not differ. With the phylogenetic analysis, there is no difference in slope or intercept between eutherians and marsupials (t-test, $P > 0.1$), in contrast to the results of the conventional analysis above and of previous studies (102, 104).

In birds, the ICA slopes and intercepts ($\log_{10}$ format) for all birds ($b = 0.746, a = 0.807, n = 94$) and for passerine birds ($b = 0.650, a = 1.063, n = 39$) do not differ significantly from those derived conventionally. The ICA slopes and intercepts of passerine and nonpasserine birds are not different from each other, as is the case for conventionally derived regression parameters.

For reptiles, the ICA regressions tend to have lower slopes and higher intercepts than do the conventional regression results. For all lizards (including multiple populations), the ICA slope (0.787; 95% CI = 0.695–0.879) and $\log_{10}$ format intercept (0.281; 0.043–1.85) are not significantly different from the conventional results. Even when the ICA data were limited to only species means (no multiple populations), no significant differences were detected from the conventional regressions. Clobert et al (32) compared several demographic parameters between Iguanians and Scleroglossans using ICA and found some significant differences, including the rate of evolution of mortality (corrected for body mass). Within the two lizard clades (Iguania and Scleroglossa), the ICA slope and intercept estimates of FMR are not significantly different from conventional results (ICA iguanian $b = 0.701, a = 0.426$; ICA scleroglossan $b = 0.822, a = 0.233$). Furthermore, in contrast to the conventional clade comparison, no significant difference exists between the clades, even if the ICA data are limited to species means.

As demonstrated, use of ICA can produce different results than conventional linear regression comparisons. For both mammals and reptiles, conventional comparisons indicate significant differences in the scaling of FMR to body mass between major taxonomic groups (marsupials vs eutherians; iguanians vs scleroglossans). When using ICA to lessen phylogenetic bias, these differences disappear. ICA does not identify new differences that are not found by conventional regression. It is clear from the obvious differences in FMR allometry between mammals, birds, and reptiles identified early in this article (Figure 1), and from the above phylogenetically independent analysis, that phylogenetic relationships are an important component influencing energy

expenditure in wild animals. As more robust phylogenetic trees and improved statistical methods become available, incorporation of phylogeny into analyses of field metabolism will improve understanding of the determinants of FMR in free-living animals.

CONCLUSIONS AND RECOMMENDATIONS

Doubly labeled water (DLW) studies of the field metabolic rates of free-living mammals, birds, and reptiles reveal that body mass is the primary determinant of energy and food requirements (accounting for 71% of the variation in log FMR), followed by phylogeny, which together account for 93–95% of the variation in log FMR. Nevertheless, the residual variation remaining (after anti-log transformation) is large (more than six times, lowest to highest) and is poorly explained by taxonomic affiliations below the order level, or by habitat or dietary considerations. Thus, the 95% CI around FMRs predicted from body masses of unstudied animals are large (ca 50–200% of the predicted value). Our experience with DLW results for single species indicates that variation in FMR among individuals within a study is typically only about 20% for endotherms and 35% for ectotherms, so it should be possible to predict FMRs more accurately than we can now. One of the reasons for this is that there are insufficient data available for lower taxons (e.g. families) to evaluate whether these categories can improve explanatory and predictive capabilities. Major taxa of vertebrates [e.g. turtles, raptors, cetaceans, skinks, owls, insectivores (moles and shrews), etc] remain poorly or unstudied. Another reason is that DLW studies are relatively short-term, and one-time FMR measurements may reflect unusually energetic or unusually slothful phases of an animal's life, rather than being a representative year-round FMR. A third, and perhaps most important, reason is that we are probably missing the factors that cause variation in the existing FMR data. Habitat and dietary considerations may be much less influential regarding daily energy expenditure than are reproductive activities, responses to immediate social or predator pressures, and adjustments to that day's or week's vagaries of weather conditions. We recommend increased attention to evaluating these sources of variation in vertebrate FMR.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
5 POST OFFICE SQUARE, SUITE 100
BOSTON, MASSACHUSETTS 02109-3912

June 20, 2011

Mr. Todd Bober
Department of Navy
Base Realignment and Closure
Program Management Office-Northeast
4911 South Broad Street
Philadelphia, PA 19112-1303

Re: **Revised Remedial Investigation Report for Site 17 – Former Building 95, Naval Air Station Brunswick, ME, May 2011**

Dear Mr. Bober:

Thank you for the opportunity to review the above referenced document. The Site 17 RI Report was revised from an earlier draft prepared and submitted by the Navy in July 2009 in order to reassess site risk after completion of a limited soil removal action in late-2010. The removal action involved the excavation and off-base disposal of approximately 200 cubic yards of DDx-contaminated subsurface soil. This approximate soil volume was originally defined as part of the 2008 Site 17 RI field investigation program and subsequently refined with further subsurface soil sampling in 2010 to support development of the removal action work plan. 2010 removal action cleanup goal concentrations were calculated for DDT, DDD, and DDE so that residual site risk would be protective of potential future residential users. Upon review of the post 2010 removal action Site 17 RI HHRA, risks associated with site soils are within EPA's incremental cancer lifetime risk range of 1x10-4 to 1x10-6 and are less than a hazard quotient of 1 for non-carcinogenic effects.

Upon review of the revised HHRA for the ground water media, EPA noted that future potential risks from ground water exposure were calculated using the average concentrations and therefore do not follow EPA Region 1's practice of using the maximum detected concentration of each contaminant in any well, or the highest average concentration of each contaminant across several rounds in the same well, if there is more than one round of data, in calculating the RME exposure. The average plume concentration can be used in calculating the central tendency exposure. EPA therefore requests that the Region I approach of using the maximum concentrations for calculating ground water risks be documented in the RI Report. EPA suggests that the Navy revise the HHRA portion of the report and submit page changes to the document instead of issuing a whole new version to regulators.

Should you have any questions with regard to this letter, please feel free to contact me at (617) 918-1386.

Sincerely,

Michael J. Daly
Remedial Project Manager
Federal Facilities Superfund Section

cc: Paul Burgio, USN-PMO (e-mail only)
David Barclift, USN-PMO (e-mail only)
Claudia Sait, ME DEP (e-mail only)
Chau Vu, EPA Region I (e-mail only)
Bryan Olson, EPA Region I (e-mail only)
Jeff Orient, TetraTech (e-mail only)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
5 POST OFFICE SQUARE, SUITE 100
BOSTON, MASSACHUSETTS 02109-3912

August 1, 2011

Mr. Todd Bober
Department of Navy
Base Realignment and Closure
Program Management Office-Northeast
4911 South Broad Street
Philadelphia, PA 19112-1303

Re: **Remedial Investigation Report for Site 17, Former Building 95, Former Naval Air Station Brunswick, ME, July 2011**

Dear Mr. Bober:

The purpose of this letter is to provide concurrence on the Site 17 RI Report. EPA understands that although no unacceptable risks were estimated for the ground water pathway, three additional rounds of post-excavation sampling will be conducted to confirm representative post-excavation groundwater concentrations at the site.

Should you have any questions with regard to this letter, please feel free to contact me at (617) 918-1386.

Sincerely,

Michael J. Daly
Remedial Project Manager
Federal Facilities Superfund Section

cc: Paul Burgio, USN-PMO (e-mail only)
Claudia Sait, ME DEP (e-mail only)
Bryan Olson, EPA Region I (e-mail only)
Jeff Orient, TetraTech (e-mail only)
Jane Connet, TetraTech (e-mail only)
Ed Benedkt, BACSE

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAUL R. LEPAGE
GOVERNOR

PATRICIA W. AHO
ACTING COMMISSIONER

Mr. Todd Bober
Department of Navy
Base Realignment and Closure
Program Management Office-Northeast
4911 South Broad Street
Philadelphia, PA 19112-1303

Re: Remedial Investigation Report-Site 17
(Former Building 95)
Naval Air Station, Brunswick, Maine

Dear Mr. Bober:

Pursuant to Section VI of the Naval Air Station, Brunswick, Maine Federal Facility Agreement (Oct 1990), as amended, the Maine Department of Environmental Protection (MEDEP) has reviewed the draft "Remedial Investigation Report for Site 17, Former Building 95", dated May 2011, prepared by Tetra Tech NUS. Based on that review MEDEP has the following comments and issues.

General Comments:

1. With the revisions to the Human Health Risk Assessment (HHRA) via email on June 26, 2011 (RAGs Table 2.3) and July 12, 2011 (Appendix E.5 text and tables) has supported the determination of no unacceptable risk to human health from the pesticides in soil. However MEDEP is concerned about future excavations and inappropriate use of the pesticide contaminated soils and suggests that the Maine Solid Waste Management Rules be applied to prevent any potential future ecological risk.

2. A summary of the confirmation results from the 2009 and 2010 soil excavations needs to be included in the body of this report.

3. The report ignores the number and concentration of pesticides and herbicides in exceedance of their screening levels at one foot and below for future ecological risk.

4. Please revise figure 4-4 in the report to include exceedances of both human health and ecological screening criteria or generate a separate figure for the ecological exceedances and note on figure(s) that figure indicate exceedances.

5. The figures indicate that the December 2010 excavation was expanded to include areas away from the central portion of the site near MW-17-02. This appears to be a consistent graphics error in all figures in the report. Please revise all figures to remove the extra polygons attributed to the December 22, 2010 excavation. Also please indicate the final depth of the 2010 excavation in the legend.

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Specific Comments:

6. Executive Summary, Site History: Please add a sentence regarding the soil removal completed in 2009 south of Avenue B.

7. Executive Summary, Nature and Extent:
   a.) Para 1: Pesticides and diesel-range organics (DRO) were detected in soil samples at several locations…"

   This statement does not take into account the number of detections of pesticides from the confirmations sampling. Also rather than trying to define the number of locations of detections in general terms it might be easier just to include the number of locations of pesticide/herbicide detections on the site.

   b.) Although the statistical review points to fill as a source for the elevated arsenic at the site, it is also possible some soils logged as fill are native soil that was bladed around during construction (such as at the dog kennel) and some soils likely to be fill (any areas between the former "re-buried soil area" and Avenue B) were logged as native. Caution is advisable in trying to draw a distinct line at the Base for fill vs native due to the similarities between local common borrow and native soils. Despite these reservations, the levels of arsenic are not elevated above concentrations commonly found in sand and gravel borrow materials, and the assessment in the report is acceptable. (No response needed.)

8. Executive Summary, Risk Assessment Results: Relying on a single round of monitoring is not representative due to the conservative drinking water criteria and sporadic nature of the groundwater detections at this site. MEDEP also agrees with USEPA that averaging the site groundwater concentrations is not acceptable.

9. Section 1.3.2.2, Post-RI Groundwater Investigations, para 1 and 3:

   a.) MEDEP believes the Fall 2010 and Spring 2011 monitoring events are mis-numbered and is in the process of resolving this with H&S Environmental. Once this is resolved the correct monitoring event number should be used.

   b.) Para 3: MEDEP has not received the Spring 2011 data presumably because it is being validated. The Navy must ensure that this Monitoring Event data submittal is provided to the regulatory agencies if it is going to be used to support the risk assessments.

10. Table 2-1and Figure 1-2: Labels on the figure for SB-17-123 and SB-17-127 appear to be mixed up, and the SB-134 through SB-140 borings are not labeled. Please revise the figure.

11. Section 3.2, Hydrogeology: Section 7, Conclusions and Recommendations, Conclusion 7 and Appendix A Field Forms: The boring logs, well installation logs and slug test forms indicate that for MW-17-02 and MW-17-03 the screen lengths, saturated thicknesses and well penetration depths need to be checked for the slug test calculations. Please check the data, recalculate as needed and revise the text in Section 3.2 (Page 3-3 paragraph 5 and 6) and Section 7.0 to reflect any differences in the resulting average hydraulic conductivity and groundwater flow velocities.

12. Section 4.1, 2008 RI Soil Sampling Results, para 2, last sentence: Do you mean "MEDEP" rather than MADEP? Please check and revise as necessary.

13. Section 4.1.1, Pesticides: Please list the other pesticides detected and add a very brief discussion of the exceedances of the screening level of other pesticides in addition to the DDD, DDE, and DDT found in soils on the site.

14. Section 4.2.1, Pesticides: Since the initial RI, the Maine Exposure Guidelines (MEGs) have been revised and the 4,4 DDD at 4.3 µg/l exceeds it MEG. Please revise or rephrase appropriately.

15. Section 4.3, Current Conditions, para 1:

    a.) "The post-RI sampling events and removal actions are summarized in Section 1.3 and supporting documents associated with these activities are included in Appendix E. These updated data … are summarized in Tables …"

    A summary of the confirmation data must be included in the body of the document as it reflects current conditions. Also this section must also provide information on the pesticides that exceed ecological screening levels.

    b.) Para 1: "…and associated tag maps showing the minimum screening criteria exceedances …"

    The tag maps provide information above the human health soil screening levels they must be revised to show exceedances above ecological, or develop another figure with this information.

    c.) Para 2: See comment 9 above. Is the Spring 2011 monitoring event the first event after the removal action or was there another? Please check the wording in the parenthesis in the 2nd sentence and clarify, as necessary. Also please check the 3rd sentence for a typographical error.

16. Section 4.4.1, Contaminant Source Areas, para 2: "Elevated concentrations of five pesticides…"

    MEDEP counts six pesticides above the residential screening level. Please check and include a list the pesticides that exceed the RSL and provide a summary on the pesticides remaining in soil that exceed ecological screening levels.

17. Figures: It is difficult to distinguish between the July 2009 confirmatory samples and the October 2008 test pit samples. Please change the color of one of them.

18. Section 5.2.1, Pesticides:

    a.) This section should also incorporate the confirmation data collected from the two excavations that followed the RI, since those data were used in the risk assessment. Please incorporate and revise the text.

    b.) Para 1: Please remove the phrase "trace levels".

    c.) Please discuss the pesticides and organics exceeding ecological screening levels.

    d.) Para 3: Please update with following two monitoring event detections and exceedances in groundwater. The discussion of exceedances must be of either the EPA RSL or MEDEP's MEGs, (e.g., in the 2008 RI 4,4'-DDD and 4,4'-DDT exceeded the MEG.).

19. Section 6.1, Risk Assessment:

    a.) It would be helpful to list the sources of the data used in calculating the human health risk and the ecological risk.

20. Section 6.2, Ecological Risk Assessment and Appendix C.2: (Please see the attached letter from Wilcox and Barton dated July 18, 2011.

21. Appendix C.1, Section C.3.3, Page 10, Groundwater EPCs: This comment is being made since there has not been written communication from the Navy concerning their intention for further study for groundwater. Only one round of groundwater was used in assessing the risk to future residents using the water as a source of drinking water. Maximum detected concentrations of both DDD and DDT exceeded Maine Maximum Exposure Guidelines (MEGs) set at a cancer risk of 1E-05. Since maximum concentrations of DDD and DDT exceed their MEGs by approximately 4 and 8-fold, respectively, the cancer risk associated with consuming water for household purposes from the wells with the maximum detected concentrations would exceed 1E-05. Averaging of contaminant concentrations in wells located across the property is not appropriate, especially in light of the fact that only one round of groundwater data has been collected to represent current site conditions and concentrations of these two pesticides in soil exceed values protective of leaching to groundwater used for potable purposes. Further groundwater investigation is recommended to determine whether temporal averaging, rather than spatial averaging, is appropriate to calculate groundwater EPCs for individual wells.

Thank you for the opportunity to review this document and if you have any questions or comment regarding it please contact me at (207) 287-7713 or claudia.b.sait@maine.gov.

Respectfully,

Claudia Sait
Project Manager-Federal Facilities
Bureau of Remediation & Waste Management

Cf:

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Wilcox & Barton INC.
ENVIRONMENTAL AND ENGINEERING SERVICES

July 18, 2011

Claudia Sait
Maine Department of Environmental Protection
Bureau of Remediation and Waste Management
17 State House Station
Augusta, Maine 04333-0017

Re: Comments on Ecological Risk Assessment
Revised Remedial Investigation Report (May 2011)
Site 17, Building 95
Naval Air Station Brunswick
Brunswick, Maine

Dear Ms. Sait,

At your request, I have reviewed the ecological risk assessment component of the above-referenced report and provide comments herein. In general, it is my opinion that the ecological risk assessment does not adequately assess the potential risks to ecological receptors and falsely concludes that the site poses no unacceptable risk. This primarily is a result of incorrect exposure point concentrations, lack of complete screening values and/or toxicity values, and inappropriate dismissal of hazard indices based on weakly supported qualitative factors. Specific comments are presented below.

Comment 1 Inappropriate exposure depth assumption for terrestrial receptors

The ecological risk assessment has limited its assessment to soil sampled from 0 to 1 foot in depth. This approach is inconsistent with ecological risk assessment guidance, inappropriate for the site, and differs with approaches taken in other Navy risk characterizations. The presence of contaminants of concern and receptors in subsurface soil indicates that exposure pathways are complete, and should be assessed. The rationale for limiting exposure to the 0-1 foot interval given in the ERA was as follows:

> "Some terrestrial receptors such as burrowing mammals could be exposed to shallow layers of contaminated subsurface soils, but depth to groundwater is shallow at this site and can limit the presence of burrowing animals. Terrestrial receptors are not substantially exposed to subsurface soils, so that pathway was not evaluated in the ERA. For this project, the surface soil depth interval was 0 to 1 foot below the ground surface."

Two issues are raised by this explanation.

First, the contention that "terrestrial receptors are not substantially exposed to subsurface soils" is incorrect. Numerous soil invertebrates that are expected to be present at the site reside in soil below one foot, including certain ants, earthworms, and other invertebrates.[a,b] Some burrowing mammalian wildlife species expected to be at the site may nest, burrow, and feed at depths below one foot, including moles and short-tailed shrews.[c,d] The Navy has acknowledged the potential for ecological exposure to subsurface soil in prior ecological risk characterizations.[e]

In addition, the soil currently located in the subsurface is subject to bioturbation or human disturbance and may be brought to shallower depths in the future. This potential is acknowledged by Navy risk assessment guidance, which states *"[t]he exposure pathway evaluation should include consideration of potential future exposure pathways, as well as current exposure pathways. For instance, if no current pathway exists because a constituent is located in subsurface soil or sediment beyond the reach of ecological receptors, the likelihood that those subsurface soils/sediments could become exposed due to erosion or displacement of surface soils/sediments should be considered."* [f] Without the implementation of an institutional control that prohibits disturbance or relocation of this soil, along with appropriate covering, monitoring, and maintenance, there is no certainty that subsurface soil will not come to the surface sometime in the future.

Second, the contention that groundwater depth will prevent exposure to subsurface soil below 1 foot in depth is not supportable. According to data presented in the RI, the depth to groundwater measured in site monitoring wells was between 0.4 and 5.6 feet below the ground surface. Data were presented for one sampling event only (in December 2008), so information on the range of seasonal groundwater depths was not provided. However, based on the data presented, all measured locations except one (MW-NASB-068) show a vadose zone thickness of greater than 1 foot. Cross-sections support, *at minimum*, a 0-2 foot vadose zone thickness across most of the impacted area. While the site date were collected in a manner that encourages use of only a 0-1 foot depth interval, use of data that is inclusive of the 0-2 foot depth interval (which includes 0-1, 1-3, and 1-4 foot intervals) is more representative of the soil to which environmental receptors and their food sources may be exposed. Table 1 presents these data.

Comment 2 Failure to assess constituents without screening benchmark concentrations

The ecological risk assessment is deficient in the assessment of chemicals for which ecological screening benchmarks were not identified. Navy risk guidance states the following [f]:

> "The Navy ERA Guidance website…. provides links to a variety of sources for screening values and toxicity information.[1] If no screening values are available from listed sources, the Navy can propose screening values to the regulatory agencies as long as the values are based upon No Observed Adverse Effects levels (NOAELs) for long-term, chronic exposures, and supporting citations and references are provided to the appropriate regulatory agencies. …"
>
> "The U.S. EPA is developing soil-screening levels for use in ecological screening assessments. At present, the number of constituents for which the EPA has developed soil-screening levels is limited. However, as more EPA soil-screening levels are published, they will become the screening-level of choice…."
>
> "Soil screening values have been developed by and are available from a number of other sources (LANL 2000, WSRC 1998), and countries (Environment Australia 1997, CCME 1997, European Community 1996). If EPA soil screening levels are not available, these other sources can be evaluated to determine if defensible soil screening levels can be proposed…."
>
> "It is important to note that constituents present at the site that do not have published ecological screening values and for which no defensible screening values can be proposed are **automatically** carried forward to the COPC refinement step of the baseline ecological risk assessment (BERA)."

[1] Note that many of these links are currently broken.

In the ERA, screening ecological benchmark concentrations were not identified for the following constituents detected in soil including the 0-2 foot depth interval:

Chemical	Identification of Benchmark			
	Plant Benchmark	Soil Invertebrate Benchmark	Avian Benchmark	Mammalian Benchmark
Monuron [a]	None	None	None	None
Aldrin [b]	None	None	None	None
alpha-Chlordane		None	None	None
gamma-Chlordane		None	None	None
Dieldrin [a]	None	None	None	None
Endosulfan I [a]	None	None	None	None
Endrin [b]	None	None	None	None
Lindane		None	None	None
Heptachlor	None	None	None	
Heptachlor epoxide	None	None	None	
Methoxychlor [b]	None	None	None	None
Diesel-range organics [a]	None	None	None	None
Cyanide	None	None		

a. Added as COC when soil inclusive of 0-2 feet is included
b. Not detected in soil inclusive of 0-2 feet

No evidence was presented in the ERA that efforts were made to develop screening benchmarks for these contaminants, nor were all sources of screening benchmarks exhausted. In addition, no qualitative assessment of these chemicals was presented or well-discussed in an uncertainty assessment.

The following sources identified applicable benchmarks that could, or should, be applied to the ERA (some overlap may exist):

- US EPA Region IV Ecological Screening Values. Provides additional screening values for DDD, DDE, DDT, aldrin, alpha-BHC, dieldrin, endrin, Lindane, arsenic, cyanide, lead, and zinc [These values are primarily Dutch Ministry of Housing, Spatial Planning, and Environment (1994) Standards]. (http://www.epa.gov/region4/waste/ots/ecolbul.html#tbl4)

- Washington State Department of Ecology, Toxics Cleanup Program. Ecological Indicator Soil Concentrations for the Protection of Terrestrial Plants and Animals. Provides additional mammalian screening levels for aldrin, alpha-chlordane, beta-BHC, dieldrin, endrin, Lindane, heptachlor/heptachlor epoxide. (http://www.ecy.wa.gov/programs/tcp/policies/terrestrial/table_749-3.htm).

For constituents where pre-existing screening levels could not be located, the ERA should have presented information from the primary literature and proposed a screening benchmark. The absence of this effort is a failure of the ERA.

Other ERAs could also have been consulted for already-applied screening levels. As an example, the Final Remedial Investigation Report for the Casmalia Resources Superfund Site identified the following ecological screening values absent from the ERA (others were also presented):

Aldrin:	Plant screening value of 1 mg/kg Soil Invertebrate screening level of 0.5 mg/kg
DDT & metabolites	Plant screening value of 0.9 mg/kg Soil invertebrate screening value of 0.1 mg/kg
Lindane	Soil invertebrate screening level of 0.03 mg/kg
Chlordane	Plant screening value of 0.224 mg/kg Soil invertebrate screening level of 0.043 mg/kg
Dieldrin	Plant screening value of 1 mg/kg Soil Invertebrate screening level of 0.5 mg/kg
Endrin	Soil invertebrate screening value of 0.0095 mg/kg
Endosulfan I	Plant screening value of 10 mg/kg Soil invertebrate screening level of 0.05 mg/kg
Heptachlor/epoxide	Soil invertebrate screening level of 0.007 mg/kg

Comment 3 Inappropriate Plant and Soil Invertebrate Soil Screening Benchmark for DDD, DDE and DDT

The plant/invertebrate screening levels adopted in the ERA for DDD, DDE, and DDT (1,200 mg/kg) was adopted from the CCME, using values for commercial/industrial land use. This value is based on soil contact only, and does not consider potential food chain impacts. The Canadian guidance specifically states that "in site-specific situations where the size and/or the location of these land uses may impact primary, secondary, or tertiary consumers, the soil and food ingestion guideline is recommended as the SQGE." The soil and food ingestion guideline is reflected in the agricultural and residential/parkland guidelines for DDT (total) and is 0.7 mg/kg. It is nearly inconceivable that the food chain accumulation effects of DDT were disregarded in the adoption of the soil screening benchmark of 1,200 mg/kg; clearly this is inappropriate. The CCME benchmark of 0.7 mg/kg should be applied to the ERA in place of the 1,200 mg/kg benchmark.

Comment 4 Lack of use of US EPA EcoSSLs for dieldrin

The available EcoSSLs for dieldrin for avian and mammalian wildlife were not applied as screening levels.

Comment 5 Effect of Comments 1-4 on Tier I Screening

The effects of the recommendation to include soil inclusive of the 0-2 foot interval and to use additional screening levels are shown in the following table. 95th Percentile upper confidence limits of the mean concentrations (95% UCL) were calculated by ProUCL version 4.1, using the non-detection feature. [2] The ProUCL output files are presented in Appendix A.

[2] In addition, in samples with duplicate analyses, the higher detected concentration or lower reporting limit, if not detected, was applied.

Constituent	Concentration µg/kg		Screening Benchmark µg/kg / EEQ				Conclusion
	Maximum	95% UCL	Plant	Soil Invertebrate	Avian	Mammalian	
Monuron	0.017	--					None
4,4'-DDD	520	44.7	700	100	93	**21 (2.1)**	Assess #
4,4'-DDE	250	51.82	700	100	93	**21 (2.5)**	Assess
4,4'DDT	7,200	1,139	**700 (1.6)**	**100 (11)**	**93 (12)**	**21 (54)**	Risk/Assess
Total DDTs	7,800	997.3	**700 (1.4)**	**100 (10)**	**93 (11)**	**21 (47)**	Risk/Assess
α-Chlordane	3,100	638.7	**224 (2.8)**	**43 (15)**	--	2,700	Risk
Dieldrin	43	4.295	100	500	22	4.9	No Risk
Endosulfan I	5.9	5.9	10,000	50	--	--	No Risk
Lindane	91	24.57	**5 (5)**	30	--	2,700	Risk
γ-Chlordane	2,700	561.3	**224 (2.5)**	**43 (13)**	--	2,700	Risk
Heptachlor	390	21.27	2,500	**7 (3)**	--	5.98	Risk
Heptachlor epoxide	530	31.12	2,500	**7 (4.4)**	--	152	Risk

Assess for food chain

The above shows that the 95 % UCL concentrations exceeded the plant and/or soil invertebrate screening levels for 4,4'-DDT, total DDTs, alpha-chlordane, Lindane, gamma-chlordane, heptachlor and heptachlor epoxide, with the sum of the ecological effects quotient (EEQ) for just those exceeding one of 13 for plants and 56 for soil invertebrates. By these results alone (i.e., not even considering the changes to results of the food chain assessment for avian and mammalian wildlife), a conclusion that no further action is needed is incorrect.

While the ecological significance of impacts to plants and soil invertebrates "feels" less important than effects upon birds and mammals, to which we, as humans, feel a stronger connection, this prejudice must be resisted. This is true particularly with a pesticide release, products that have been and are used by humans to systemically kill insects. The release at this site was not a legal use of pesticides and the soil organisms impacted are not "target pests." So acceptance of adverse impacts upon soil organisms is not justified.

Comment 6 Effect of Alternate EPCs on Food Chain Modeling

The calculations performed for birds and mammals were reproduced because the presentation in the ERA was inadequate. The following minor errors or omissions were noted:

- The food ingestion rate for Tier I evaluations was based on an average receptor body weight rather than the lowest body weight that was otherwise applied to the Tier I evaluation.
- The "metabolic scaling" used to derive the robin food ingestion rate is not well-described.
- No avian toxicity values for heptachlor or heptachlor epoxide were applied. The attached abstract provides data that can be used to define a no observed adverse effect level of 0.1 mg/kg [(worm concentration 0.65 mg/kg) x (average body weight 0.197 kg) x (food ingestion rate 0.77 g/g-day) = 0.098 mg/kg-day =~ 0.1 mg/kg-dy]. While some uncertainty is associated with this value, its use is better than disregarding the two constituents altogether.

The calculations were re-performed correcting the above errors/omissions and substituting the 95% ULC concentration using soil data for inclusive of 0-2 feet. Calculations are presented in Appendix B and the results are summarized below:

Receptor Group	Constituent	Tier I				Tier II			
		ERA	Recal-culated	ERA	Recal-culated	ERA	Recal-culated	ERA	Recal-culated
		NOAEL HQ		LOAEL HQ		NOAEL HQ		LOAEL HQ	
Meadow Vole	α-Chlordane	0.0009	0.002	0.0004	0.0008	0.00003	0.0002	0.00001	0.00008
	Lindane	0.000006	0.0002	0.0000006	0.00002	0.000003	0.00004	0.0000003	0.000004
	γ-Chlordane	0.0008	0.001	0.0004	0.0006	0.00002	0.0001	0.00001	0.00006
	Heptachlor	0.003	0.009	0.0003	0.0009	0.0001	0.0002	0.00001	0.00002
	Heptachlor epoxide	0.01	0.02	0.001	0.002	0.0006	0.0009	0.00006	0.00009
	DDTs	0.1	0.2	0.003	0.006	0.02	0.03	0.0005	0.0008
	Total	**0.1**	**0.3**	**0.005**	**0.01**	**0.02**	**0.03**	**0.0006**	**0.001**
Short-Tailed Shrew	α-Chlordane	0.3	1.2	0.2	0.6	0.04	0.2	0.02	0.1
	Lindane	0.0002	0.01	0.00002	0.001	0.0002	0.003	0.00002	0.0003
	γ-Chlordane	0.3	1.0	0.2	0.5	0.03	0.2	0.02	0.1
	Heptachlor	0.7	3.9	0.07	0.4	0.08	0.2	0.008	0.02
	Heptachlor epoxide	0.4	1.6	0.04	0.2	0.05	0.08	0.005	0.008
	DDTs	12	59	0.3	1.6	3.7	6.8	0.1	0.2
	Total	**14**	**67**	**0.8**	**3.2**	**4**	**7**	**0.1**	**0.4**
American Robin	α-Chlordane	1.1	4.2	0.2	0.8	0.1	0.8	0.03	0.2
	Lindane	0.001	0.1	0.0001	0.008	0.001	0.02	0.0001	0.002
	γ-Chlordane	1.03	3.7	0.2	0.7	0.1	0.7	0.02	0.1
	Heptachlor	1.1	6.4	1.1	6.4	0.1	0.3	0.1	0.3
	Heptachlor epoxide	0.7	2.7	0.7	2.7	0.08	0.1	0.08	0.1
	DDTs	12	63	1.0	5.3	4.0	7.3	0.3	0.6
	Total	**16**	**80**	**3.3**	**16**	**5**	**9**	**0.6**	**1.4**
Bobwhite Quail	α-Chlordane	0.006	0.02	0.001	0.004	0.0003	0.002	0.00006	0.0003
	Lindane	0.00003	0.002	0.000003	0.0002	0.00002	0.0003	0.000002	0.00003
	γ-Chlordane	0.006	0.02	0.001	0.003	0.0002	0.001	0.00005	0.0003
	Heptachlor	0.01	0.05	0.01	0.05	0.0005	0.001	0.0005	0.001
	Heptachlor epoxide	0.03	0.09	0.03	0.09	0.002	0.003	0.002	0.003
	DDTs	0.1	0.6	0.01	0.05	0.03	0.05	0.002	0.004
	Total	**0.2**	**0.8**	**0.05**	**0.2**	**0.03**	**0.06**	**0.005**	**0.009**

Note: Table does not include dieldrin or metals

Both the short-tailed shrew and the American robin have total hazard quotients exceeding 1 under the Tier II assessment, as it did with the original ERA, but with higher "ecological effects quotients." Total hazard indices ranged from 1.4 to 9, and these do not include metals or dieldrin, which were also detected in the soil depth interval inclusive of 0-2 feet, or potential exposure to groundwater. This indicates that the site poses an unacceptable risk to ecological receptors. Note that according to US EPA's Wildlife Exposure Factors Handbook, the average foraging or home range for an

American robin is 1.2 acres and for short-tailed shrew is 0.96 acres, indicating that it is reasonable to assume that the majority of the food source for these species could come from the 0.7-acre site.

In conclusion, the ERA does not fully meet either the Navy's or US EPA's risk assessment guidance, and incorrectly concludes that an unacceptable risk is not present to ecological receptors. It is recommended that the ERA be revised to address these comments and that appropriate remedial responses to address these risks be undertaken.

Please contact me if you have any questions regarding these comments.

Regards,

WILCOX & BARTON, INC.

Cynthia Fuller
Health Risk Assessor

Attachments
Table 1 Summary of Soil Analytical Data
Appendix A ProUCL Output Files
Appendix B Revised Calculations

References

a. University of Arkansas, Division of Agriculture, "Twenty Questions about Fire Ants" FSA7052; Cerquera and Tschinkel (2009) Journal of Insect Sciences (2009) Volume 10 Article 64; Tschinkel WR (1999) Ecological Entomology (1999) 24,222-237.)

b. Tugel A. et al. eds. (2000. Soil Biology Primer. Rev. Ed. Ankent, Iowa: Soil and Water Conservation Society.

c. Maine Dept of Inland Fisheries and Wildlife (2004) "Facts About Maine Moles."

d. SUNY College of Environmental Science and Forestry (2011) "Short-Tailed Shrew."

e. The Final Focused Feasibility Study Report for SWMU 62, New Housing Fuel Leak, U.S. Navy, Naval Facilities Engineering Command, Northwest, in Adak Island, Alaska.

f. U.S. Navy (2003). Ecological Screening and COPC Refinement for Sediment, Soil, and Surface Water. Neal Parker, author.

TABLE

TABLE 1
Summary of Soil Analytical Data
Site 17 Former Building 65
Naval Air Station, Brunswick, Maine

Sample ID	Sampling Date	Sample Depth	Tetrachloro-ethene	Maleic hydrazide	Monuron	Propoxur	4,4'-DDD	4,4'-DDE	4,4'-DDT	Total DDTs	Aldrin	α-Chlordane
		ft bgs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
SB-17-101	2008	0 - 1	--	22 UJ	22 U	22 U	3.8 UJ	13	12 U	13	1.9 U	1.9 U
SB-17-102	2008	0 - 1	--	21 U	21 U	21 U	3.5 UJ	0.7 J	3.5 U	0.7 J	1.8 U	1.8 U
SB-17-103	2008	0 - 1	--	21 UJ	21 UJ	21 U	3.5 UJ	0.88 J	3.5 U	0.88 J	1.8 U	1.8 U
SB-17-104	2008	0 - 1	--	22 U	22 U	22 U	3.6 UJ	0.8 J	4.2 U	0.8 J	1.9 U	1.9 U
SB-17-105/Dup [1]	2008	0 - 1	--	22 UJ	22 UJ	22 U	3.7 U	17	**28 J**	**45 J**	1.9 U	1.9 U
SB-17-106	2008	0 - 1	--	22 U	22 U	22 U	10	8.3	210	**228.3**	1.8 U	1.8 U
SB-17-107	2008	0 - 1	--	22 UJ	22 U	22 U	4.1 U	4.1 U	19 J	19 J	2.1 U	1.1 J
SB-17-108	2008	0 - 1	--	27 UJ	27 U	27 U	3.8 U	12	8.2 J	20.2 J	2.0 U	2.0 U
SB-17-109	2008	0 - 1	--	22 U	22 UJ	22 UJ	11	9.3 J	**180**	**200.3 J**	1.8 U	1.8 U
SB-17-112	2008	0 - 1	--	24 U	24 UJ	24 UJ	**100**	**46**	**1,200 J**	**1,346 J**	2.0 U	7.0
SB-17-113	2008	0 - 1	--	27 U	27 U	27 U	8.7	15	**45 J**	**68.7 J**	1.9 U	1.9 U
SB-17-114	2008	0 - 1	--	22 U	110 UJ	110 U	17	**22**	**380 J**	**419 J**	1.8 U	1.8 U
SB-17-118	2008	0 - 1	--	22 U	22 U	22 U	7.6	**52**	**210 J**	**269.6 J**	1.8 U	1.8 U
SB-17-123	2008	0 - 1	--	24 U	24 UJ	24 UJ	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	0.8 J
SB-17-124	2008	0 - 1	--	25 U	25 UJ	25 UJ	3.8 U	3.8 U	3.8 U	3.8 U	2.0 U	2.0 U
SB-17-125	2008	0 - 1	--	22 U	22 UJ	22 UJ	**53**	**250**	**1,200**	**1,503**	9.6 U	**100**
SB-17-126	2008	0 - 1	--	21 U	21 UJ	21 UJ	3.5 UJ	19	**110**	**129**	1.8 U	13 J
SB-17-130	2008	0 - 1	--	21 U	21 UJ	21 UJ	3.6 UJ	4.6	*26 U*	4.6	1.8 U	0.99 J
SB-17-131	2008	0 - 1	--	22 UJ	22 U	22 U	3.7 U	**34**	**77**	**111**	1.9 U	1.9 U
SB-17-132	2008	0 - 1	--	22 U	22 UJ	22 UJ	3.7 U	3.4 J	5.4 U	3.4 J	1.9 U	1.9 U
SB-17-133	2008	0 - 1	--	24 UJ	24 U	24 U	4 U	33 J	*31 U*	**33 J**	2.1 U	2.1 U
SB-17-206	2010	0 - 1	--	--	--	--	**24 J**	**34 J**	**220 J**	**278 J**	0.17 UJ	**840 J**
SB-17-207	2010	0 - 1	--	--	--	--	**28 J**	**89 J**	**920 J**	**1,037 J**	0.19 UJ	**240 J**
SB-17-208	2010	0 - 1	--	--	--	--	13 J	**26 J**	**97 J**	**136 J**	0.18 UJ	32 J
SB-17-209	2010	0 - 1	--	--	--	--	7.7 J	**22 J**	**62 J**	**92 J**	0.18 UJ	13 J
SB-17-210	2010	0 - 1	--	--	--	--	3.2 J	21 J	**57 J**	**81 J**	0.18 UJ	11 J
SB-17-206	2010	1 - 3	--	--	--	--	**63 J**	**72 J**	**650 J**	**785 J**	0.18 UJ	**3,100 J**
SB-17-207	2010	1 - 3	--	--	--	--	21 J	**44 J**	**590 J**	**655 J**	0.18 UJ	**170 J**
SB-17-208/Dup [1]	2010	1 - 3	--	--	--	--	3 J	5.4 J	**36 J**	**44 J**	0.18 UJ	7.6 J
SB-17-209	2010	1 - 3	--	--	--	--	6.7	16	**81 J**	**104 J**	0.18 U	8.2
SB-17-210	2010	1 - 3	--	--	--	--	1.1 J	5.9 J	14 J	21 J	0.18 UJ	2.8 J
SB-17-101	2008	1 - 4	--	21 U	21 U	21 U	3.5 U	1.3 J	13 U	1.3 J	1.8 U	1.8 U
SB-17-103	2008	1 - 4	--	23 U	23 U	23 U	10	3.6 J	**53**	**67 J**	1.9 U	1.9 U
SB-17-104	2008	1 - 4	--	23 U	23 U	23 U	6.5	1.7 J	4.0 U	8.2 J	1.9 U	1.9 U
SB-17-105	2008	1 - 4	--	28 U	28 UJ	28 UJ	3.4 U	3.4 U	**3.4 UJ**	10.2	1.8 U	1.8 U
SB-17-106	2008	1 - 4	--	21 U	21 UJ	21 U	3.5 U	3.5 U	24 UJ	***24 U***	1.8 U	1.8 U
SB-17-107	2008	1 - 4	--	28 U	28 U	28 U	4 U	4 U	5 UJ	5 U	2 U	2 U
SB-17-108	2008	1 - 4	--	24 U	24 U	24 U	4.3 U	4.3 U	5 UJ	5 U	2.2 U	2.2 U
SB-17-109	2008	1 - 4	--	21 U	21 UJ	21 U	3.4 UJ	3.4 U	3.4 UJ	3.4 U	1.8 U	1.8 U
SB-17-110	2008	1 - 4	--	22 U	22 UJ	22 U	**220**	**56 J**	**1,000**	**1,276 J**	18 U	18 U
SB-17-111	2008	1 - 4	--	22 U	22 U	22 U	3.6 U	12	**28 J**	**40 J**	1.9 U	1.9 U
SB-17-112	2008	1 - 4	--	24 U	24 U	24 UJ	**520**	**80**	**7,200 J**	**7,800 J**	20 U	20 U
SB-17-113	2008	1 - 4	--	23 U	23 U	23 U	**84**	**84**	**580 J**	**748 J**	2.1 U	14 J

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Naval Air Station, Brunswick, Maine

Sample ID	Sampling Date	Sample Depth	Tetrachloro-ethene	Maleic hydrazide	Monuron	Propoxur	4,4'-DDD	4,4'-DDE	4,4'-DDT	Total DDTs	Aldrin	α-Chlordane
		ft bgs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
SB-17-114	2008	1 - 4	--	21 U	21 U	21 U	3.5 U	0.51 J	16 UJ	0.51 J	1.8 U	1.8 U
SB-17-117	2008	1 - 4	--	24 U	24 UJ	24 UJ	**60**	**160**	**1,100 J**	**1,320 J**	10 U	**67**
SB-17-118	2008	1 - 4	--	23 U	23 U	23 U	3.8 U	10	**22 J**	**32 J**	2 U	1.3 J
SB-17-119	2008	1 - 4	--	23 U	23 U	23 U	3.6 U	2.7 J	9.7 U	2.7 J	1.9 U	1.2 J
SB-17-123	2008	1 - 4	--	24 U	24 U	24 U	20	**49**	**530**	**599**	9 U	**200 J**
SB-17-124	2008	1 - 4	--	23 U	23 UJ	23 UJ	3.9 U	8.3	**72**	**80**	2 U	2 U
SB-17-125	2008	1 - 4	--	23 UJ	23 UJ	23 UJ	**39 J**	**67**	**390**	**496 J**	2 U	32 J
SB-17-126	2008	1 - 4	--	22 U	22 U	22 U	3.6 UJ	3.6 U	4.8 U	4.8 U	1.9 U	1.9 U
SB-17-131	2008	1 - 4	--	23 U	23 U	23 U	3.8 U	8.4	**47**	**55**	2 U	0.78 J
SB-17-132/Dup [1]	2008	1 - 4	--	26 UJ	26 UJ	26 UJ	4.2 U	12	11 U	12	2.2 U	2.2 U
SB-17-133	2008	1 - 4	--	27 U	17 J	27 U	4.1 U	1.8 J	4.1 U	1.8 J	2.1 U	2.1 U
SB-17-146	2009	1 - 4	--	--	--	--	5.3	**33**	**34**	**72**	2.1 U	0.87 J
SB-17-147	2009	1 - 4	--	--	--	--	**41**	**63**	**820**	**924**	2.1 U	1.1 J
SB-17-148	2009	1 - 4	--	--	--	--	**84**	20	**750**	**854**	2.1 U	2.1
SB-17-149	2009	1 - 4	--	--	--	--	**88**	**36**	**120**	**244**	2.1 U	5.9
S17-SS-09	2009 Relocated	2 - 2.25	--	--	--	--	*30 U*	**59**	**190**	**249**	*30 U*	30 U
SB-17-142/Dup [1]	2008	2 - 3	--	--	--	--	3.6 UJ	3.6 U	3.6 U	3.6 U	1.9 U	1.9 U
SB-17-143	2008	2 - 3	--	--	--	--	3.6 U	3.6 UJ	3.6 U	3.6 U	1.9 U	1.9 U
SB-17-144	2008	2 - 3	--	--	--	--	3.8 U	13 J	**82 J**	**95 J**	1.9 U	14
SB-17-145	2009	2 - 3	--	--	--	--	3.6 U	8.9 J	**64**	**73 J**	1.9 U	11
SB-17-120/Dup [1]	2008	2 - 5	--	27 U	27 UJ	370	**54 J**	33 J	**2,200 J**	**2,287 J**	2.2 U	21
SB-17-150	2009	2 - 5	--	--	--	--	1.2 J	2.9 J	10	14.1 J	2 U	0.81 J
SB-17-151	2009	2 - 5	--	--	--	--	2.2 J	13	**120**	**135 J**	2.1 U	0.96 J
SB-17-152	2009	2 - 5	--	--	--	--	3.9 U	**43**	**330**	**373**	2.0 U	**700**
SB-17-154/D	2009	2 - 5	--	--	--	--	9.5	18	**210**	**238**	2.3 U	**96**
SB-17-155	2010	2 - 5	--	--	--	--	3.5 U	0.84 J	1.4 J	2.24 J	1.8 U	1.8
SB-17-202	2010	2 - 5	--	--	--	--	190 J	**280 J**	**8,600 J**	**9,070 J**	0.2 UJ	**520 J**
SB-17-203	2010	2 - 5	--	--	--	--	200 J	**1000 J**	**10,000 J**	**11,200 J**	0.18 UJ	**2,900 J**
SB-17-205/Dup [1]	2010	2 - 5	--	--	--	--	110	**85**	**4,000**	**4,195**	0.21 U	**170 J**
Grid A Bottom/Dup [1]	2010 Removal Action	2 - 6	--	--	--	--	**271**	**50**	**9,000**	**9,321**	2.2 U	35
Grid A North Sidewall ??	2010 Removal Action	2 - 6	--	--	--	--	3.3 J	0.96 U	**242**	**245 J**	0.24 U	0.12 U
Grid A South Sidewall	2010 Removal Action	2 - 6	--	--	--	--	1.1 J	1.2 J	12	14.3 J	0.26 U	7.5
Grid A West Sidewall A	2010 Removal Action	2 - 6	--	--	--	--	16	1.0 U	**502**	**518**	0.26 U	0.13 U
Grid B Bottom	2010 Removal Action	2 - 6	--	--	--	--	**63**	11 J	**2,940**	**3,014 J**	2.4 U	1.2 U
Grid B East Sidewall A	2010 Removal Action	2 - 6	--	--	--	--	5.5	17	**150**	**173**	0.24 U	0.12 U
Grid B East Sidewall B	2010 Removal Action	2 - 6	--	--	--	--	**313 J**	**69 J**	**15,200**	**15,582 J**	2.6 UJ	**74 J**
Grid B North Sidewall No. 2	2009 Relocated	2 - 6	--	--	--	--	8.6	4.1	**677**	**690**	0.24 U	0.12 U
Grid B South Sidewall	2009 Relocated	2 - 6	--	--	--	--	0.36 U	0.96 U	8.8	8.8	0.24 U	0.12 U
Grid A West Sidewall B	2010 Removal Action	2 - 6	--	--	--	--	1.7 J	1.9 J	**34**	**38 J**	0.24 U	11
S17-SS-06	2009 Relocated	2.17 - 2.42	--	--	--	--	*30 U*	**110**	**720**	**830**	*30 U*	**280**
S17-SS-04	2009 Relocated	2.42 - 2.67	--	--	--	--	**34**	**100**	**570**	**704**	5.8 U	**110**
S17-00	2009 Relocated	2.75 - 3	170 J	--	--	--	**40**	**98**	**1,000**	**1,138**	**18**	**550**
S17-PB-01	2009 Relocated	2.75 - 3	--	--	--	--	5.6 U	**24**	**420**	**444**	5.6 U	**140**

TABLE 1
Summary of Soil Analytical Data
Site 17 Former Building 65
Naval Air Station, Brunswick, Maine

Sample ID	Sampling Date	Sample Depth ft bgs	Tetrachloro-ethene µg/kg	Maleic hydrazide µg/kg	Monuron µg/kg	Propoxur µg/kg	4,4'-DDD µg/kg	4,4'-DDE µg/kg	4,4'-DDT µg/kg	Total DDTs µg/kg	Aldrin µg/kg	α-Chlordane µg/kg
S17-PB-02	2009 Relocated	2.75 - 3	--	--	--	--	6.1 U	**60**	**800**	**860**	6.1 U	**180**
S17-PB-03	2009 Relocated	2.75 - 3	--	--	--	--	6.2 U	6.2 U	6.2 U	6.2 U	6.2 U	6.2 U
S17-PB-04	2009 Relocated	2.75 - 3	--	--	--	--	18	**23**	**290**	**331**	6.4 U	**240**
S17-PB-05/Dup [1]	2009 Relocated	2.75 - 3	--	--	--	--	6.5 U	6.5 U	**33**	**33**	6.5 U	12
S17-PB-06	2009 Relocated	2.75 - 3	--	--	--	--	**53**	**140**	**1,900**	**2,093**	*31 U*	**660**
S17-PB-07	2009 Relocated	2.75 - 3	--	--	--	--	6.1 U	6.1	**43**	**49**	6.1 U	8.4
S17-PB-08	2009 Relocated	2.75 - 3	--	--	--	--	14	**72**	**600 J**	**686 J**	6.4 U	22
S17-PB-09	2009 Relocated	2.75 - 3	--	--	--	--	2.3 J	19	**79**	**100 J**	5.9 U	9.2
S17-PB-10	2009 Relocated	2.75 - 3	--	--	--	--	6.1 U	6.1 U	4.4 J	4.4 J	6.1 U	6.1 U
S17-PB-11	2009 Relocated	2.75 - 3	--	--	--	--	6.3 U	6.3 U	6.3 U	6.3 U	6.3 U	6.3 U
S17-PB-12	2009 Relocated	2.75 - 3	--	--	--	--	6.4 U	6.4 U	2.9 J	2.9 J	6.4 U	5.2 J
S17-PB-13	2009 Relocated	2.75 - 3	--	--	--	--	**52**	**370**	**1,400**	**1,822**	29 U	**83**
S17-PB-14/Dup [1]	2009 Relocated	2.75 - 3	--	--	--	--	**64**	**90**	**2,000**	**2,154**	*30 U*	**300**
S17-PB-15	2009 Relocated	2.75 - 3	--	--	--	--	6.4 U	6.4 U	3.4 J	3.4 J	6.4 U	6.4 U
S17-PB-16	2009 Relocated	2.75 - 3	--	--	--	--	6.1 U	6.1 U	6.1 U	6.1 U	6.1 U	6.1 U
S17-PB-17	2009 Relocated	2.75 - 3	--	--	--	--	6.1 U	6.1 U	6.1 U	6.1 U	6.1 U	6.1 U
S17-PB-18	2009 Relocated	2.75 - 3	--	--	--	--	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U
S17-SW-01	2009 Relocated	2.75 - 3	--	--	--	--	*28 U*	**320**	**4,400**	**4,720**	28 U	**940**
S17-SW-02	2009 Relocated	2.75 - 3	--	--	--	--	12	**39**	**600 J**	**651 J**	5.9 U	**44**
S17-SW-03	2009 Relocated	2.75 - 3	--	--	--	--	6.4 U	14	**43**	**57**	6.4 U	16
S17-SW-04	2009 Relocated	2.75 - 3	--	--	--	--	6.2 U	6.2 U	3.1 J	3.1 J	6.2 U	6.2 U
S17-SW-05/Dup [1]	2009 Relocated	2.75 - 3	--	--	--	--	6.4 U	6.4 U	6.4 U	6.4 U	6.4 U	6.4 U
S17-SW-06	2009 Relocated	2.75 - 3	--	--	--	--	6.1 U	11	**63**	**74**	6.1 U	4.5 J
SB-17-127	2008	3 - 6	--	24 U	24 U	24 U	3.9 UJ	3.9 U	3.9 U	3.9 U	2 U	3.5
SB-17-129/Dup [1]	2008	3 - 6	--	25 UJ	550 J	94 J	5.3 U	5.3 U	5.3 U	5.3 U	2.7 U	2.7 U
SB-17-141	2008	3 - 7	--	30 U	100	30 U	5.0 U	5.0 U	13 J	13	2.6 U	2.6 U
SB-17-116	2008	4 - 7	--	26 U	26 UJ	100	4.2 UJ	19 J	**96 J**	**115**	2.2 UJ	2.2 UJ
SB-17-122/Dup [1]	2008	4 - 7	--	27 UJ	27 UJ	27 UJ	4.7 U	4.7 U	**65 J**	**65 J**	2.4 U	2.4 U
SB-17-107	2008	4 - 8	--	26 UJ	26 U	26 U	4.2 U	4.2 U	4.2 UJ	4.2 U	2.1 U	2.1 U
SB-17-132/Dup [1]	2008	4 - 8	--	31 U	140 J	31 U	6.8 U	6.8 U	6.8 UJ	6.8 U	3.5 U	3.5 U
SB-17-128	2008	5 - 6	--	25 UJ	61 J	15 J	4.5 UJ	4.5 U	4.5 U	4.5 U	2.3 U	2.3 U
SB-17-125	2008	6 - 8	--	25 UJ	25 UJ	25 UJ	3.7 U	3.7 U	**52**	**52**	1.9 U	1.9 U
SB-17-115	2008	7 - 10	--	25 U	25 UJ	25 U	4.0 U	4.0 U	4.0 U	4 U	2.1 U	2.1 U
SB-17-121 ?	2008	7 - 10	--	26 U	26 UJ	470	**32**	**15**	**830**	**877**	2.1 U	2.1 U
SB-17-121 ?	2008	12 -15	--	12 J	25 UJ	25 U	15	4.4	**230**	**249**	2.1 U	1.2 J
S17-SS-05	2009 Relocated	3.5 - 3.75	--	--	--	--	6.4 U	5.5 J	**47**	**53 J**	6.4 U	9.6

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Sample ID	Sampling Date	Sample Depth ft bgs	Tetrachloro-ethene µg/kg	Maleic hydrazide µg/kg	Monuron µg/kg	Propoxur µg/kg	4,4'-DDD µg/kg	4,4'-DDE µg/kg	4,4'-DDT µg/kg	Total DDTs µg/kg	Aldrin µg/kg	α-Chlordane µg/kg
Number of Samples			1	57	57	57	122	122	122	122	122	122
Number of Detections			1	1	5	5	56	88	87	101	1	63
Arithmetic Mean Concentration (0-1 '))			NA	ND	ND	ND	12.9	**28.6**	**196.8**	**232.6**	ND	**49.5**
Maximum Detected Concentration (0-1')			--	--	--	--	**100**	**250**	**1,200**	**1,503**	--	**840**
Exposure Point Concentration (0-1')			--	--	--	--	**19.83**	**70.77**	**327.7**	**584.7**	--	**107.1**
Arithmetic Mean Concentration (including 0-2 ')			NA	ND	24.9	ND	**28.7**	**27.9**	**333.4**	**385.2**	ND	**85.6**
Maximum Detected Concentration (including 0-2')			--	--	17 J	--	**520**	**250**	**7,200**	**7,800**	--	**3,100**
Exposure Point Concentration (including 0-2')							**44.7**	**51.82**	**1,139**	**997**	--	**638.7**
US EPA Plant EcoSSL			--	--	--	--	--	--	--	--	--	224
US EPA Invertebrate EcoSSL			--	--	--	--	--	--	--	--	--	--
US EPA Avian Wildlife EcoSSL			--	--	--	--	93	93	93	93	--	--
US EPA Mammalian Wildlife EcoSSL			--	--	--	--	21	21	21	21	--	--
US EPA Region IV Ecological Screening Value			10	--	--	--	2.5 (total)	2.5 (total)	2.5 (total)	2.5 (total)	2.5	--
CCME		agricultural	100	--	--	--	700	700	700	700	--	--
		residential/park	200	--	--	--	700	700	700	700	--	--
Other benchmark		plant	--	--	--	--	900 [3]	--	--	--	--	--
		invertebrate	--	--	--	--	100 [3]	100 [3]	100 [3]	100 [3]	500 [3]	43 [3]
		bird	--	--	--	--	--	--	--	--	--	--
		mammal	--	--	--	--	--	--	--	--	100 [4]	2700 [4]
Applied Benchmarks		plant	--	--	--	--	700	700	700	700	--	224
		invertebrate	--	--	--	--	100	100	100	100	--	43
		bird	--	--	--	--	93	93	93	93	--	--
		mammal	--	--	--	--	21	21	21	21	--	2700

All detected constituents are presented.

Value	Exceeds lowest avian or mammalan wildlife screening value
Value	Exceeds plant screening value
Value	Exceeds Soil Invertebrate screening value
ft bgs	Feet below ground surface
µg/kg	Micrograms per kilogram
mg/kg	Milligrams per kilogram
U	Not detected at reporting limit presented
ND	Not detected
J	Estimated concentration
--	Not analyzed or not available.
1.	Highest detected concentration or lowest reporting limit (if not detected) of sample and duplicate applied.
2.	Ecotox database. For plants; LOAEL for root growth in Beta vulgaris (sugar beet), divided by 10.
3.	Casmalia Resources Superfund Site, Fina Remedidal Investigation Report.
4.	4. Washington State Department of Ecology, Toxics Cleanup Program. Ecological Indicator Soil Concentrations for the Protection of Terrestrial Plants and Animals (http://www.ecy.wa.gov/programs/tcp/policies/terrestrial/table_749-3.htm)

Not applied - no detected organic constituents/at periphery of impacted area.

Sample ID	Sampling Date	Sample Depth ft bgs	Tetrachloro-ethene µg/kg	Maleic hydrazide µg/kg	Monuron µg/kg	Propoxur µg/kg	4,4'-DDD µg/kg	4,4'-DDE µg/kg	4,4'-DDT µg/kg	Total DDTs µg/kg	Aldrin µg/kg	α-Chlordane µg/kg
SB-17-102	2008	1 - 4	--	22 U	22 U	22 U	3.6 U	3.6 U	3.6 U		1.9 U	1.9 U
SB-17-130	2008	1 - 4	--	22 U	22 U	22 U	3.6 U	3.6 U	3.6 U		1.9 U	1.9 U

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Naval Air Station, Brunswick, Maine

Sample ID	Sampling Date	Sample Depth	β-BHC	Dieldrin	Endosulfan I	Endrin	γ-BHC (Lindane)	γ-Chlordane	Heptachlor	Heptachlor Epoxide	Methoxychlor	Diesel-Range Organics
		ft bgs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	mg/kg
SB-17-101	2008	0 - 1	1.9 U	3.8 U	1.9 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	19 U	--
SB-17-102	2008	0 - 1	1.8 U	3.5 U	1.8 U	3.5 U	1.8 U	1.8 U	1.8 U	1.8 U	18 U	--
SB-17-103	2008	0 - 1	1.8 U	3.5 U	1.8 U	3.5 U	1.8 U	1.8 U	1.8 U	1.8 U	18 U	--
SB-17-104	2008	0 - 1	1.9 U	3.6 U	1.9 U	3.6 U	1.9 U	1.9 U	1.9 U	1.9 U	19 U	--
SB-17-105/Dup [1]	2008	0 - 1	1.9 U	3.7 U	1.9 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	19 U	--
SB-17-106	2008	0 - 1	1.8 U	3.6 U	1.8 U	3.6 U	1.8 U	1.8 U	1.8 U	1.8 U	18 U	--
SB-17-107	2008	0 - 1	2.1 U	4.1 U	2.1 U	4.1 U	2.1 U	1.0 J	2.1 U	2.1 U	21 U	--
SB-17-108	2008	0 - 1	2.0 U	3.8 U	2.0 U	3.8 U	2.0 U	2.0 U	2.0 U	2.0 U	20 U	--
SB-17-109	2008	0 - 1	1.8 U	3.6 U	1.8 UJ	3.6 UJ	1.8 U	1.8 U	1.8 U	1.8 U	18 UJ	--
SB-17-112	2008	0 - 1	2.0 U	4.0 U	2.0 U	4.0 U	2.0 U	7.7	2.0 U	2.0 U	20 U	--
SB-17-113	2008	0 - 1	1.9 U	3.6 U	1.9 U	3.6 U	1.9 U	1.9 U	1.9 UJ	1.9 U	19 U	--
SB-17-114	2008	0 - 1	1.8 U	3.6 U	1.8 U	3.6 U	1.8 U	1.8 U	1.8 U	1.8 U	18 U	--
SB-17-118	2008	0 - 1	1.8 U	3.5 U	1.8 U	3.5 U	1.8 U	1.8 U	1.8 U	1.8 U	18 U	--
SB-17-123	2008	0 - 1	1.9 U	3.7 U	1.9 U	3.7 U	1.9 U	1 J	1.9 U	1.9 U	19 U	120
SB-17-124	2008	0 - 1	2.0 U	3.8 U	2.0 U	3.8 U	2.0 U	2.0 U	2.0 U	2.0 U	20 U	--
SB-17-125	2008	0 - 1	9.6 U	19 U	9.6 U	19 U	*9.6 U*	**130**	*9.6 U*	9.6 U	96 U	--
SB-17-126	2008	0 - 1	1.8 U	3.5 U	1.8 U	3.5 U	1.8 U	17 J	1.8 U	1.8 U	18 U	--
SB-17-130	2008	0 - 1	1.8 U	3.6 U	1.8 U	3.6 U	1.8 U	1.8 U	1.8 U	1.8 U	18 U	--
SB-17-131	2008	0 - 1	1.9 U	3.7 U	1.9 U	3.7 U	1.9 U	1.9 U	1.0 J	1.9 U	19 U	--
SB-17-132	2008	0 - 1	1.9 U	3.7 U	1.9 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	19 U	--
SB-17-133	2008	0 - 1	2.1 U	4.0 U	2.1 UJ	4.0 UJ	1.5 J	2.1 U	2.1 U	2.1 U	21 U	--
SB-17-206	2010	0 - 1	0.17 UJ	0.34 UJ	0.17 UJ	0.34 UJ	0.17 UJ	**760 J**	**69 J**	**130 J**	1.7 UJ	--
SB-17-207	2010	0 - 1	0.19 UJ	0.36 UJ	0.19 UJ	0.36 UJ	0.19 UJ	**180 J**	**28 J**	**63 J**	1.9 UJ	--
SB-17-208	2010	0 - 1	0.18 UJ	0.34 UJ	0.18 UJ	0.34 UJ	0.18 UJ	19 J	0.66 J	5.6 J	1.8 UJ	--
SB-17-209	2010	0 - 1	0.18 UJ	0.35 UJ	0.18 UJ	0.35 UJ	0.18 UJ	7.6 J	0.38 J	1.7 J	1.8 UJ	--
SB-17-210	2010	0 - 1	0.18 UJ	0.35 UJ	0.18 UJ	0.35 UJ	0.18 UJ	6.7 J	0.25 J	1.5 J	1.8 UJ	--
SB-17-206	2010	1 - 3	0.18 UJ	0.35 UJ	0.18 UJ	0.35 UJ	0.18 UJ	**2,700 J**	**390 J**	**530 J**	1.8 UJ	--
SB-17-207	2010	1 - 3	0.18 UJ	0.35 UJ	0.18 UJ	0.35 UJ	0.18 UJ	**140 J**	**26 J**	**45 J**	1.8 UJ	--
SB-17-208/Dup [1]	2010	1 - 3	0.18 UJ	0.34 UJ	0.18 UJ	0.34 UJ	0.18 UJ	6.3 J	0.21 J	1.7 J	1.8 UJ	--
SB-17-209	2010	1 - 3	0.18 U	0.35 U	0.18 U	0.35 U	0.18 U	6.7	0.18 U	0.81 J	1.8 U	--
SB-17-210	2010	1 - 3	0.18 UJ	0.35 UJ	0.18 UJ	0.35 UJ	0.18 UJ	2 J	0.24 J	0.18 UJ	1.8 UJ	--
SB-17-101	2008	1 - 4	1.8 U	3.5 U	1.8 U	3.5 U	1.8 U	1.8 U	1.8 U	1.8 U	18 U	--
SB-17-103	2008	1 - 4	1.9 U	3.7 U	1.9 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	19 U	--
SB-17-104	2008	1 - 4	1.9 U	3.7 U	1.9 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	19 U	--
SB-17-105	2008	1 - 4	1.8 U	3.4 U	1.8 U	3.4 U	1.8 U	1.8 U	1.8 U	1.8 U	18 U	--
SB-17-106	2008	1 - 4	1.8 U	3.5 U	1.8 U	3.5 U	1.8 U	1.8 U	1.8 U	1.8 U	18 U	--
SB-17-107	2008	1 - 4	2 U	4 U	2 U	4.0 U	2.0 U	2.0 U	2.0 U	2.0 U	20 U	--
SB-17-108	2008	1 - 4	2.2 U	4.3 U	2.2 U	4.3 U	2.2 U	2.2 U	2.2 U	2.2 U	22 U	--
SB-17-109	2008	1 - 4	1.8 U	3.4 U	1.8 U	3.4 U	1.8 U	1.8 U	1.8 U	1.8 U	18 U	--
SB-17-110	2008	1 - 4	18 U	*36 U*	18 UJ	36 UJ	*18 U*	18 U	*18 U*	18 U	180 UJ	--
SB-17-111	2008	1 - 4	1.9 U	3.6 U	1.9 U	3.6 U	1.9 U	1.9 U	1.9 U	1.9 U	19 U	14
SB-17-112	2008	1 - 4	20 U	*40 U*	20 U	40 U	*20 U*	20 U	*20 U*	20 U	200 U	--
SB-17-113	2008	1 - 4	2.1 U	4.1 U	2.1 U	4.1 U	2.1 U	14	2.1 U	2.1 U	21 U	--

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		ft bgs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	mg/kg
SB-17-114	2008	1 - 4	1.8 U	3.5 U	1.8 UJ	3.5 UJ	1.8 U	1.8 U	1.8 U	1.8 U	18 UJ	--
SB-17-117	2008	1 - 4	10 U	20 U	10 UJ	20 UJ	*10 U*	**70**	*10 U*	**11 J**	100 UJ	--
SB-17-118	2008	1 - 4	2 U	3.8 U	2 U	3.8 U	2.0 U	1.1 J	2.0 U	2.0 U	20 UJ	--
SB-17-119	2008	1 - 4	1.9 U	3.6 U	1.9 U	3.6 U	1.9 U	1.2 J	1.9 U	1.9 U	19 U	--
SB-17-123	2008	1 - 4	9 U	17 U	9 U	17 U	*9 U*	**280**	**11**	9 U	90 U	--
SB-17-124	2008	1 - 4	2 U	3.9 U	2 U	3.9 U	**91**	2.0 U	2.0 U	2.0 U	20 U	--
SB-17-125	2008	1 - 4	2 U	4 U	2 U	4.0 U	2.0 U	2.0 U	2.0 U	2.0 U	20 U	--
SB-17-126	2008	1 - 4	1.9 U	3.6 U	1.9 U	3.6 U	1.9 U	1.9 U	1.9 U	1.9 U	19 U	--
SB-17-131	2008	1 - 4	2 U	3.8 U	2 U	3.8 U	2.0 U	1.0 J	2.0 U	2.0 U	20 U	--
SB-17-132/Dup [1]	2008	1 - 4	2.2 U	4.2 U	2.2 U	4.2 U	2.2 U	2.2 U	2.2 U	2.2 U	22 U	--
SB-17-133	2008	1 - 4	2.1 U	4.1 U	2.1 UJ	4.1 UJ	2.1 UJ	2.1 U	2.1 U	2.1 U	21 U	--
SB-17-146	2009	1 - 4	2.1 U	1.4 J	2.1 U	4.1 U	2.1 U	0.81 J	2.1 U	2.1 U	21 U	--
SB-17-147	2009	1 - 4	2.1 U	**9.6**	5.9	4.2 U	2.1 U	1.1 J	2.1 U	2.1 U	21 U	--
SB-17-148	2009	1 - 4	2.1 U	**43**	4.3	4.0 U	2.1 U	2.2	2.1 U	2.1 U	21 U	--
SB-17-149	2009	1 - 4	2.1 U	**25**	2.1 U	4.0 U	2.1 U	4.1	2.1 U	2.1 U	21 U	--
S17-SS-09	2009 Relocated	2 - 2.25	30 U	30 U	30 U	**37**	***30 U***	30 U	*30 U*	30 U	30 U	--
SB-17-142/Dup [1]	2008	2 - 3	1.9 U	3.6 U	1.9 U	3.6 U	1.9 U	1.9 U	1.9 U	1.9 U	19 U	--
SB-17-143	2008	2 - 3	1.9 U	3.6 U	1.9 UJ	3.6 UJ	1.9 UJ	1.9 U	1.9 U	1.9 U	19 U	--
SB-17-144	2008	2 - 3	1.9 U	3.8 U	1.9 UJ	3.8 UJ	1.9 UJ	17	1.9 U	1.9 U	19 U	--
SB-17-145	2009	2 - 3	1.9 U	3.6 U	1.9 UJ	3.6 UJ	1.9 UJ	10	1.9 U	1.9 U	19 U	--
SB-17-120/Dup [1]	2008	2 - 5	2.2 U	4.3 U	2.2 U	4.3 U	2.2 U	21	2.3 J	2.2 U	22 U	--
SB-17-150	2009	2 - 5	2 U	**0.75 J**	2.0 U	3.9 U	2.0 U	0.87 J	2 U	0.61 J	20 U	--
SB-17-151	2009	2 - 5	2.1 U	**0.68 J**	2.1 U	4.1 U	2.1 U	0.93 J	2.1 U	0.62 J	21 U	--
SB-17-152	2009	2 - 5	**8.9**	**23**	2.0 U	3.9 U	2.0 U	**760**	**270**	2.0 U	20 U	--
SB-17-154/D	2009	2 - 5	2.3 U	**2.5 J**	2.3 U	4.5 U	1.0 J	**100**	**12**	2.3 U	23 U	--
SB-17-155	2010	2 - 5	1.8 U	3.5 U	1.8 U	3.5 U	1.8 U	1.9	1.8 U	0.95 J	18 U	--
SB-17-202	2010	2 - 5	0.2 UJ	0.38 UJ	0.2 UJ	0.36 UJ	0.2 UJ	**460 J**	**38 J**	100 J	2 UJ	--
SB-17-203	2010	2 - 5	0.18 UJ	0.35 UJ	0.18 UJ	0.35 UJ	0.18 UJ	**2600 J**	**200 J**	**580 J**	1.8 UJ	--
SB-17-205/Dup [1]	2010	2 - 5	0.21 U	0.4 U	0.21 U	0.4 U	0.21 U	**190 J**	**45 J**	**250 J**	2.4 U	--
Grid A Bottom/Dup [1]	2010 Removal Action	2 - 6	3.3 U	1.1 U	3.3 U	1.1 U	0.88 U	21	3.0 J	1.1 U	26 U	--
Grid A North Sidewall ??	2010 Removal Action	2 - 6	0.36 U	0.12 U	0.36 U	0.12 U	0.1 U	0.72 U	0.24 U	0.12 U	3.1 U	--
Grid A South Sidewall	2010 Removal Action	2 - 6	0.39 U	0.13 U	0.39 U	0.13 U	0.1 U	5.1	0.26 U	0.13 U	3.1 U	--
Grid A West Sidewall A	2010 Removal Action	2 - 6	0.39 U	0.13 U	0.39 U	0.13 U	0.1 U	0.78 U	0.4 J	0.13 U	3.1 U	--
Grid B Bottom	2010 Removal Action	2 - 6	3.6 U	1.2 U	3.6 U	1.2 U	0.96 U	7.2 U	2.4 U	1.2 U	29 U	--
Grid B East Sidewall A	2010 Removal Action	2 - 6	0.36 U	0.12 U	0.36 U	0.12 U	0.1 U	0.72 U	0.24 U	0.12 U	2.9 U	--
Grid B East Sidewall B	2010 Removal Action	2 - 6	3.9 UJ	1.3 UJ	3.9 UJ	1.3 UJ	1.0 UJ	**68 J**	**18 J**	1.3 UJ	31 UJ	--
Grid B North Sidewall No. 2	2009 Relocated	2 - 6	0.36 U	0.12 U	0.36 U	0.12 U	0.1 U	0.72 U	0.24 U	0.12 U	2.9 U	--
Grid B South Sidewall	2009 Relocated	2 - 6	0.36 U	0.12 U	0.36 U	0.12 U	0.1 U	0.72 U	0.24 U	0.12 U	2.9 U	--
Grid A West Sidewall B	2010 Removal Action	2 - 6	0.36 U	0.12 U	0.36 U	0.12 U	0.1 U	6.7	0.3 J	3.0	2.9 U	--
S17-SS-06	2009 Relocated	2.17 - 2.42	30 U	30 U	**190**	**220**	*30 U*	**350**	*30 U*	30 U	30 U	--
S17-SS-04	2009 Relocated	2.42 - 2.67	5.8 U	5.8 U	**66**	**150**	*5.8 U*	**140**	**16**	**34**	8.5	--
S17-00	2009 Relocated	2.75 - 3	6.7 U	6.7 U	6.7 U	**200**	*6.7 U*	**550**	**100**	6.7 U	6.7 U	--
S17-PB-01	2009 Relocated	2.75 - 3	5.6 U	5.6 U	5.6 U	**120**	*5.6 U*	**160**	**23**	**50**	5.6 U	--

TABLE 1
Summary of Soil Analytical Data
Site 17 Former Building 65
Naval Air Station, Brunswick, Maine

Sample ID	Sampling Date	Sample Depth ft bgs	β-BHC µg/kg	Dieldrin µg/kg	Endosulfan I µg/kg	Endrin µg/kg	γ-BHC (Lindane) µg/kg	γ-Chlordane µg/kg	Heptachlor µg/kg	Heptachlor Epoxide µg/kg	Methoxychlor µg/kg	Diesel-Range Organics mg/kg
S17-PB-02	2009 Relocated	2.75 - 3	6.1 U	6.1 U	6.1 U	**150**	*6.1 U*	**190**	**27**	6.1 U	6.1 U	--
S17-PB-03	2009 Relocated	2.75 - 3	6.2 U	6.2 U	6.2 U	6.2 U	*6.2 U*	6.2 U	*6.2 U*	6.2 U	6.2 U	--
S17-PB-04	2009 Relocated	2.75 - 3	6.4 U	6.4 U	50	**58**	*6.4 U*	**240**	**220**	**130**	6.4 U	--
S17-PB-05/Dup [1]	2009 Relocated	2.75 - 3	6.5 U	6.5 U	6.5 U	**6.8**	*6.5 U*	12	*6.5 U*	6.5 U	6.5 U	--
S17-PB-06	2009 Relocated	2.75 - 3	31 U	31 U	31 U	**410**	*31 U*	**690**	**57**	31 U	31 U	--
S17-PB-07	2009 Relocated	2.75 - 3	6.1 U	6.1 U	6.1 U	**8.9**	*6.1 U*	9	*6.1 U*	6.1 U	6.1 U	--
S17-PB-08	2009 Relocated	2.75 - 3	6.4 U	6.4 U	6.4 U	**95**	*6.4 U*	23	2.6 J	6.4 U	6.4 U	--
S17-PB-09	2009 Relocated	2.75 - 3	5.9 U	5.9 U	5.9 U	**21**	*5.9 U*	10	2.5 J	5.9 U	5.9 U	--
S17-PB-10	2009 Relocated	2.75 - 3	6.1 U	6.1 U	6.1 U	6.1 U	*6.1 U*	6.1 U	*6.1 U*	6.1 U	6.1 U	--
S17-PB-11	2009 Relocated	2.75 - 3	6.3 U	6.3 U	6.3 U	6.3 U	*6.3 U*	6.3 U	*6.3 U*	6.3 U	6.3 U	--
S17-PB-12	2009 Relocated	2.75 - 3	6.4 U	6.4 U	6.4 U	6.4 U	*6.4 U*	2.8 J	*6.4 U*	6.4 U	6.4 U	--
S17-PB-13	2009 Relocated	2.75 - 3	29 U	29 U	29 U	**200**	*29 U*	**85**	*29 U*	29 U	29 U	--
S17-PB-14/Dup [1]	2009 Relocated	2.75 - 3	30 U	30 U	30 U	**350**	*30 U*	**300**	**40**	30 U	30 U	--
S17-PB-15	2009 Relocated	2.75 - 3	6.4 U	6.4 U	6.4 U	6.4 U	*6.4 U*	6.4 U	*6.4 U*	6.4 U	6.4 U	--
S17-PB-16	2009 Relocated	2.75 - 3	6.1 U	6.1 U	6.1 U	6.1 U	*6.1 U*	6.1 U	*6.1 U*	6.1 U	6.1 U	--
S17-PB-17	2009 Relocated	2.75 - 3	6.1 U	6.1 U	6.1 U	6.1 U	*6.1 U*	6.1 U	*6.1 U*	6.1 U	6.1 U	--
S17-PB-18	2009 Relocated	2.75 - 3	6.8 U	6.8 U	6.8 U	6.8 U	*6.8 U*	6.8 U	*6.8 U*	6.8 U	6.8 U	--
S17-SW-01	2009 Relocated	2.75 - 3	28 U	28 U	28 U	**840**	*28 U*	**960**	**130**	28 U	28 U	--
S17-SW-02	2009 Relocated	2.75 - 3	5.9 U	5.9 U	5.9 U	**32**	*5.9 U*	42	**6.4**	5.9 U	5.9 U	--
S17-SW-03	2009 Relocated	2.75 - 3	6.4 U	6.4 U	6.4	**9.0**	*6.4 U*	17	**6.0 J**	**12**	6.4 U	--
S17-SW-04	2009 Relocated	2.75 - 3	6.2 U	6.2 U	6.2 U	6.2 U	*6.2 U*	6.2 U	*6.2 U*	6.2 U	6.2 U	--
S17-SW-05/Dup [1]	2009 Relocated	2.75 - 3	6.4 U	6.4 U	6.4 U	6.4 U	*6.4 U*	6.4 U	*6.4 U*	6.4 U	6.4 U	--
S17-SW-06	2009 Relocated	2.75 - 3	6.1 U	6.1 U	6.1 U	**11**	*6.1 U*	5.0 J	*6.1 U*	6.1 U	6.1 U	--
SB-17-127	2008	3 - 6	2 U	3.9 U	2.0 U	3.9 U	2.0 U	3.8 J	2.0 U	2.0 U	20 U	--
SB-17-129/Dup [1]	2008	3 - 6	2.7 U	5.3 U	2.7 U	5.3 U	2.7 U	2.7 U	2.7 U	2.7 U	27 U	--
SB-17-141	2008	3 - 7	2.6 U	5.0 U	2.6 U	5.0 U	2.6 U	2.6 U	2.6 U	2.6 U	26 UJ	--
SB-17-116	2008	4 - 7	2.2 UJ	4.2 UJ	2.2 UJ	4.2 UJ	2.2 UJ	2.2 UJ	2.2 UJ	2.2 UJ	22 UJ	--
SB-17-122/Dup [1]	2008	4 - 7	2.4 U	4.7 U	2.4 U	4.7 U	2.4 U	2.4 U	2.4 U	2.4 U	24 U	200
SB-17-107	2008	4 - 8	2.1 U	4.2 U	2.1 U	4.2 U	2.1 U	2.1 U	2.1 U	2.1 U	21 U	--
SB-17-132/Dup [1]	2008	4 - 8	3.5 U	6.8 U	3.5 U	6.8 U	3.5 U	3.5 U	3.5 U	3.5 U	35 UJ	--
SB-17-128	2008	5 - 6	2.3 U	4.5 U	2.3 U	4.5 U	2.3 U	1.1 J	2.3 U	2.3 U	23 U	--
SB-17-125	2008	6 - 8	1.9 U	3.7 U	1.9 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	19 U	--
SB-17-115	2008	7 - 10	2.1 U	4.0 U	2.1 U	4.0 U	2.1 U	2.1 U	2.1 U	2.1 U	21 U	1.3 J
SB-17-121 ?	2008	7 - 10	2.1 U	4.1 U	2.1 U	4.1 U	2.1 U	2.1 U	2.1 U	2.1 U	21 U	6.2 U
SB-17-121 ?	2008	12 -15	2.1 U	4.2 U	2.1 U	4.2 U	2.1 U	1.1 J	2.1 U	2.1 U	21 U	13
S17-SS-05	2009 Relocated	3.5 - 3.75	6.4 U	6.4 U	6.4 U	**13**	*6.4 U*	12	*6.4 U*	6.4 U	6.4 U	--

TABLE 1
Summary of Soil Analytical Data
Site 17 Former Building 65
Naval Air Station, Brunswick, Maine

Sample ID	Sampling Date	Sample Depth ft bgs	β-BHC µg/kg	Dieldrin µg/kg	Endosulfan I µg/kg	Endrin µg/kg	γ-BHC (Lindane) µg/kg	γ-Chlordane µg/kg	Heptachlor µg/kg	Heptachlor Epoxide µg/kg	Methoxychlor µg/kg	Diesel-Range Organics mg/kg
Number of Samples			122	122	122	122	122	122	122	122	122	6
Number of Detections			1	8	6	19	3	62	33	21	1	5
Arithmetic Mean Concentration (0-1 '))			ND	ND	ND	ND	1.8	**44.6**	5.6	9.6	ND	120
Maximum Detected Concentration (0-1')			--	--	--	--	1.5 J	**760 J**	**69 J**	**130 J**	--	120
Exposure Point Concentration (0-1')			**--**	**--**	**--**	**--**	**1.5 J**	**96.69**	**9.395**	**26.47**	**--**	**120**
Arithmetic Mean Concentration (including 0-2 ')			ND	6.2	2.7	ND	**4.1**	**76.9**	**11.5**	**16.0**	ND	67.0
Maximum Detected Concentration (including 0-2')			--	43	**5.9**	--	**91**	**2700**	**390**	**530**	--	**120**
Exposure Point Concentration (including 0-2')			**--**	**4.295**	**5.9**		**24.57**	**561.3**	**21.27**	**31.12**	**--**	
US EPA Plant EcoSSL			--	--	--	--	5	224	--	--	--	--
US EPA Invertebrate EcoSSL			--	--	--	--	--	--	--	--	--	--
US EPA Avian Wildlife EcoSSL			--	22	--	--	--	--	--	--	--	--
US EPA Mammalian Wildlife EcoSSL			--	4.9	--	--	--	--	5.98	152	--	--
US EPA Region IV Ecological Screening Value			1	0.5	--	1	0.05	--	--	--	--	
CCME		agricultural	--	--	--	--	10	--	--	--	--	--
		residential/park	--	--	--	--	--	--	--	--	--	--
Other benchmark		plant	--	1000 [3]	10000 [3]	--	--	--	2,500 [2]	2,500 [2]	--	--
		invertebrate	--	500 [3]	50 [3]	9.5 [3]	30 [3]	43 [3]	7 [3]	7 [3]	--	--
		bird	--	--	--	--	--	--	--	--	--	--
		mammal	6000 [4]	70 [4]	--	200 [4]	2700 [4]	2700 [4]	400 [4]	400 [4]	--	--
Applied Benchmarks		plant	--	1000	10000	--	5	224	2,500	2,500	--	--
		invertebrate	--	500	50	9.5	30	43	7	7	--	--
		bird	--	22	--	--	--	--	--	--	--	--
		mammal	--	4.9	--	200	2700	2700	5.98	152	--	--

All detected constituents are presented.

Value	Exceeds lowest avian or mammalan wildlife screening value
Value	Exceeds plant screening value
Value	Exceeds Soil Invertebrate screening value
ft bgs	Feet below ground surface
µg/kg	Micrograms per kilogram
mg/kg	Milligrams per kilogram
U	Not detected at reporting limit presented
ND	Not detected
J	Estimated concentration
--	Not analyzed or not available.
1.	Highest detected concentration or lowest reporting limit (if not
2.	Ecotox database. For plants; LOAEL for root growth in Beta v
3.	Casmalia Resources Superfund Site, Fina Remedidal Investigat
4.	4. Washington State Department of Ecology, Toxics Cleanup l

Not applied - no detected organic constituents/at periphery of impacted area.

Sample ID	Sampling Date	Sample Depth ft bgs	β-BHC µg/kg	Dieldrin µg/kg	Endosulfan I µg/kg	Endrin µg/kg	γ-BHC (Lindane) µg/kg	γ-Chlordane µg/kg	Heptachlor µg/kg	Heptachlor Epoxide µg/kg	Methoxychlor µg/kg	Diesel-Range Organics mg/kg
SB-17-102	2008	1 - 4	1.9 U	3.6 U	1.9 U	3.6 U	1.9 U	1.9 U	1.9 U	1.9 U	19 U	--
SB-17-130	2008	1 - 4	1.9 U	3.6 U	1.9 U	3.6 U	1.9 U	1.9 U	1.9 U	1.9 U	19 U	--

TABLE 1
Summary of Soil Analytical Data
Site 17 Former Building 65
Naval Air Station, Brunswick, Maine

Sample ID	Sampling Date	Sample Depth ft bgs	Arsenic mg/kg		Cyanide mg/kg		Lead mg/kg	Zinc mg/kg
SB-17-101	2008	0 - 1	2		0.55	U	8.1	11.7
SB-17-102	2008	0 - 1	10.7		0.5	U	10	21.9
SB-17-103	2008	0 - 1	**18.2**		0.55	U	**11.1**	25.8
SB-17-104	2008	0 - 1	9.4		0.55	U	11	26.7
SB-17-105/Dup [1]	2008	0 - 1	1.4		0.55	UJ	**11.4**	13.2
SB-17-106	2008	0 - 1	2.4		0.5	UJ	23.2	21.8
SB-17-107	2008	0 - 1	7.8		0.6	UJ	9.0	25
SB-17-108	2008	0 - 1	5.2		0.55	UJ	6.2	23
SB-17-109	2008	0 - 1	1.8		0.55	U	**14.2**	17.6
SB-17-112	2008	0 - 1	9.4		0.6	UJ	4.7	24.6
SB-17-113	2008	0 - 1	8.3		0.55	UJ	**12.4**	29
SB-17-114	2008	0 - 1	1.8		0.55	U	**17.8**	17.6
SB-17-118	2008	0 - 1	6.8		0.5	UJ	9.1	25.1
SB-17-123	2008	0 - 1	9.1	J	0.5	U	5.7	32.7
SB-17-124	2008	0 - 1	8.6		0.55	U	6.0	36.4
SB-17-125	2008	0 - 1	5.6	J	0.34	J	**23**	40.8
SB-17-126	2008	0 - 1	3	J	0.5	U	**20.6**	38
SB-17-130	2008	0 - 1	5.9	J	0.5	U	**23.8**	46
SB-17-131	2008	0 - 1	6.8	J	0.5	U	**37.5**	**47.7**
SB-17-132	2008	0 - 1	6.9	J	0.55	U	**12.3**	34.4
SB-17-133	2008	0 - 1	7.9	J	0.6	U	**16.6**	36.1
SB-17-206	2010	0 - 1	3.9		0.4	U	**14.4**	28.9
SB-17-207	2010	0 - 1	6.4		0.44	U	6.8	24.5
SB-17-208	2010	0 - 1	7.5		0.4	U	5.9	24.3
SB-17-209	2010	0 - 1	6.3		0.44	U	5.6	20.3
SB-17-210	2010	0 - 1	7.1		0.44	U	8.0	26.9
SB-17-206	2010	1 - 3	2.9		0.4	U	**15.9**	28.1
SB-17-207	2010	1 - 3	6		0.4	U	3.8	19
SB-17-208/Dup [1]	2010	1 - 3	7.4		0.4	U	6.3	24
SB-17-209	2010	1 - 3	6.2		0.44	U	5.3	19.3
SB-17-210	2010	1 - 3	3.6		0.44	U	**11.8**	21.5
SB-17-101	2008	1 - 4	1.3		0.5	U	2.5	10.3
SB-17-103	2008	1 - 4	6.1		0.55	U	5.1	17.8
SB-17-104	2008	1 - 4	8.1		0.55	U	3.4	17.9
SB-17-105	2008	1 - 4	1.5		0.5	UJ	3	11.9
SB-17-106	2008	1 - 4	1.7		0.55	U	**7.5**	10.6
SB-17-107	2008	1 - 4	6.8		0.6	UJ	5.6	18.4
SB-17-108	2008	1 - 4	3.1		0.65	UJ	6.2	19.9
SB-17-109	2008	1 - 4	1.4		0.5	U	2.6	11.2
SB-17-110	2008	1 - 4	2.2		0.55	U	3.7	11.7
SB-17-111	2008	1 - 4	3.4		0.55	UJ	7.7	23.7
SB-17-112	2008	1 - 4	2.2		0.6	UJ	3.6	18.9
SB-17-113	2008	1 - 4	4.1		0.6	UJ	**32.3**	21

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Summary of Soil Analytical Data
Site 17 Former Building 65
Naval Air Station, Brunswick, Maine

Sample ID	Sampling Date	Sample Depth ft bgs	Arsenic mg/kg	Cyanide mg/kg	Lead mg/kg	Zinc mg/kg
SB-17-114	2008	1 - 4	1.8	0.5 U	3.4	13.4
SB-17-117	2008	1 - 4	3	0.6 U	7.4	23.6
SB-17-118	2008	1 - 4	3.2	0.6 UJ	6.1	18
SB-17-119	2008	1 - 4	1.4	0.55 U	2.4	**54.5**
SB-17-123	2008	1 - 4	1.4 J	0.5 U	1.8	10
SB-17-124	2008	1 - 4	4.2	0.55 U	4.4	16.6
SB-17-125	2008	1 - 4	2.7 J	0.55 U	7.0	24.2
SB-17-126	2008	1 - 4	1.6 J	0.5 U	2.5	15
SB-17-131	2008	1 - 4	6 J	0.55 U	6.2	25.5
SB-17-132/Dup [1]	2008	1 - 4	3.6 J	0.6 U	**12.8**	29.6
SB-17-133	2008	1 - 4	2 J	0.6 U	4.1	13.7
SB-17-146	2009	1 - 4	--	--	--	--
SB-17-147	2009	1 - 4	--	--	--	--
SB-17-148	2009	1 - 4	--	--	--	--
SB-17-149	2009	1 - 4	--	--	--	--
S17-SS-09	2009 Relocated	2 - 2.25	--	--	--	--
SB-17-142/Dup [1]	2008	2 - 3	--	--	--	--
SB-17-143	2008	2 - 3	--	--	--	--
SB-17-144	2008	2 - 3	--	--	--	--
SB-17-145	2009	2 - 3	--	--	--	--
SB-17-120/Dup [1]	2008	2 - 5	2.2	0.65 U	5.7	25.8
SB-17-150	2009	2 - 5	--	--	--	--
SB-17-151	2009	2 - 5	--	--	--	--
SB-17-152	2009	2 - 5	--	--	--	--
SB-17-154/D	2009	2 - 5	--	--	--	--
SB-17-155	2010	2 - 5	--	--	--	--
SB-17-202	2010	2 - 5	--	--	--	--
SB-17-203	2010	2 - 5	--	--	--	--
SB-17-205/Dup [1]	2010	2 - 5	--	--	--	--
Grid A Bottom/Dup [1]	2010 Removal Action	2 - 6	--	--	--	--
Grid A North Sidewall ??	2010 Removal Action	2 - 6	--	--	--	--
Grid A South Sidewall	2010 Removal Action	2 - 6	--	--	--	--
Grid A West Sidewall A	2010 Removal Action	2 - 6	--	--	--	--
Grid B Bottom	2010 Removal Action	2 - 6	--	--	--	--
Grid B East Sidewall A	2010 Removal Action	2 - 6	--	--	--	--
Grid B East Sidewall B	2010 Removal Action	2 - 6	--	--	--	--
Grid B North Sidewall No. 2	2009 Relocated	2 - 6	--	--	--	--
Grid B South Sidewall	2009 Relocated	2 - 6	--	--	--	--
Grid A West Sidewall B	2010 Removal Action	2 - 6	--	--	--	--
S17-SS-06	2009 Relocated	2.17 - 2.42	--	--	--	--
S17-SS-04	2009 Relocated	2.42 - 2.67	--	--	--	--
S17-00	2009 Relocated	2.75 - 3	--	--	--	--
S17-PB-01	2009 Relocated	2.75 - 3	--	--	--	--

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Sample ID	Sampling Date	Sample Depth ft bgs	Arsenic mg/kg		Cyanide mg/kg		Lead mg/kg	Zinc mg/kg
S17-PB-02	2009 Relocated	2.75 - 3	--		--		--	--
S17-PB-03	2009 Relocated	2.75 - 3	--		--		--	--
S17-PB-04	2009 Relocated	2.75 - 3	--		--		--	--
S17-PB-05/Dup [1]	2009 Relocated	2.75 - 3	--		--		--	--
S17-PB-06	2009 Relocated	2.75 - 3	--		--		--	--
S17-PB-07	2009 Relocated	2.75 - 3	--		--		--	--
S17-PB-08	2009 Relocated	2.75 - 3	--		--		--	--
S17-PB-09	2009 Relocated	2.75 - 3	--		--		--	--
S17-PB-10	2009 Relocated	2.75 - 3	--		--		--	--
S17-PB-11	2009 Relocated	2.75 - 3	--		--		--	--
S17-PB-12	2009 Relocated	2.75 - 3	--		--		--	--
S17-PB-13	2009 Relocated	2.75 - 3	--		--		--	--
S17-PB-14/Dup [1]	2009 Relocated	2.75 - 3	--		--		--	--
S17-PB-15	2009 Relocated	2.75 - 3	--		--		--	--
S17-PB-16	2009 Relocated	2.75 - 3	--		--		--	--
S17-PB-17	2009 Relocated	2.75 - 3	--		--		--	--
S17-PB-18	2009 Relocated	2.75 - 3	--		--		--	--
S17-SW-01	2009 Relocated	2.75 - 3	--		--		--	--
S17-SW-02	2009 Relocated	2.75 - 3	--		--		--	--
S17-SW-03	2009 Relocated	2.75 - 3	--		--		--	--
S17-SW-04	2009 Relocated	2.75 - 3	--		--		--	--
S17-SW-05/Dup [1]	2009 Relocated	2.75 - 3	--		--		--	--
S17-SW-06	2009 Relocated	2.75 - 3	--		--		--	--
SB-17-127	2008	3 - 6	0.99	UJ	0.65	U	2.1	10.3
SB-17-129/Dup [1]	2008	3 - 6	8.7	J	0.7	U	4.7	20.2
SB-17-141	2008	3 - 7	1.9		0.75	UJ	3.0	15.6
SB-17-116	2008	4 - 7	1.5		0.6	U	4.2	17
SB-17-122/Dup [1]	2008	4 - 7	1.5		0.7	U	3.0	15.2
SB-17-107	2008	4 - 8	1.5		0.6	UJ	2.5	11.9
SB-17-132/Dup [1]	2008	4 - 8	4.4		1	UJ	6.3	33.4
SB-17-128	2008	5 - 6	1.4	J	0.65	U	3.6	21.6
SB-17-125	2008	6 - 8	0.89	UJ	0.5	U	1.9	13.6
SB-17-115	2008	7 - 10	1.1		0.6	U	2.0	12.4
SB-17-121 ?	2008	7 - 10	1.1		0.6	U	2.3	14.2
SB-17-121 ?	2008	12 -15	5.2		0.65	U	4.9	33.9
S17-SS-05	2009 Relocated	3.5 - 3.75	--		--		--	--

TABLE 1
Summary of Soil Analytical Data
Site 17 Former Building 65
Naval Air Station, Brunswick, Maine

Sample ID	Sampling Date	Sample Depth ft bgs	Arsenic mg/kg	Cyanide mg/kg	Lead mg/kg	Zinc mg/kg
Number of Samples			67	67	67	67
Number of Detections			65	1	67	67
Arithmetic Mean Concentration (0-1 '))			6.5	0.51	**12.9**	27.7
Maximum Detected Concentration (0-1')			**18.2**	0.34 J	**37.5**	**47.7**
Exposure Point Concentration (0-1')			**8.03**	**0.34 J**	**15.58**	**30.76**
Arithmetic Mean Concentration (including 0-2 ')			5.0	0.5	9.6	23.5
Maximum Detected Concentration (including 0-2')			**18.2**	0.34 J	**37.5**	**54.5**
Exposure Point Concentration (including 0-2')			**6.905**	**0.34 J**	**11.31**	**25.8**
US EPA Plant EcoSSL			18	--	120	160
US EPA Invertebrate EcoSSL			--	--	1,700	120
US EPA Avian Wildlife EcoSSL			43	--	11	46
US EPA Mammalian Wildlife EcoSSL			46	--	56	79
US EPA Region IV Ecological Screening Value			10	0.9	50	50
CCME		agricultural	17	0.9	--	--
		residential/park	--	0.9	--	--
Other benchmark		plant	--	--	--	--
		invertebrate	--	--	--	--
		bird	--	--	--	--
		mammal	--	--	--	--
Applied Benchmarks		plant	18	0.9	120	160
		invertebrate	--	0.9	1,700	120
		bird	43	--	11	46
		mammal	46	--	56	79

All detected constituents are presented.

Value	Exceeds lowest avian or mammalan wildlife screening value
Value	Exceeds plant screening value
Value	Exceeds Soil Invertebrate screening value
ft bgs	Feet below ground surface
µg/kg	Micrograms per kilogram
mg/kg	Milligrams per kilogram
U	Not detected at reporting limit presented
ND	Not detected
J	Estimated concentration
--	Not analyzed or not available.
1.	Highest detected concentration or lowest reporting limit (if not
2.	Ecotox database. For plants; LOAEL for root growth in Beta v
3.	Casmalia Resources Superfund Site, Fina Remedidal Investigat
4.	4. Washington State Department of Ecology, Toxics Cleanup I

Not applied - no detected organic constituents/at periphery of impacted area.

Sample ID	Sampling Date	Sample Depth ft bgs	Arsenic mg/kg	Cyanide mg/kg	Lead mg/kg	Zinc mg/kg
SB-17-102	2008	1 - 4	**4.6**	0.55 U	2.4	16.6
SB-17-130	2008	1 - 4	**1.7 J**	0.6	4.4	12.6

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ProUCL Output Files

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

DDD 0-1

General Statistics			
Number of Valid Data	26	Number of Detected Data	12
Number of Distinct Detected Data	12	Number of Non-Detect Data	14
		Percent Non-Detects	53.85%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	3.2	Minimum Detected	1.163
Maximum Detected	100	Maximum Detected	4.605
Mean of Detected	23.6	Mean of Detected	2.715
SD of Detected	27.58	SD of Detected	0.939
Minimum Non-Detect	3.5	Minimum Non-Detect	1.253
Maximum Non-Detect	4.1	Maximum Non-Detect	1.411

Note: Data have multiple DLs - Use of KM Method is recommend		Number treated as Non-Detect	15
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	11
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	57.69%

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.69	Shapiro Wilk Test Statistic	0.959
5% Shapiro Wilk Critical Value	0.859	5% Shapiro Wilk Critical Value	0.859
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	11.89	Mean	1.586
SD	21.38	SD	1.235
95% DL/2 (t) UCL	19.05	95% H-Stat (DL/2) UCL	21.04
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.634
		SD in Log Scale	1.254
		Mean in Original Scale	12.12
		SD in Original Scale	21.28
		95% t UCL	19.25
		95% Percentile Bootstrap UCL	19.59
		95% BCA Bootstrap UCL	22.39
		95% H-UCL	23.02
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.001	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	23.57		
nu star	24.03		
A-D Test Statistic	0.618	Nonparametric Statistics	
5% A-D Critical Value	0.751	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.751	Mean	12.62
5% K-S Critical Value	0.251	SD	20.62
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	4.224
		95% KM (t) UCL	19.83
Assuming Gamma Distribution		95% KM (z) UCL	19.56
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	18.69
Minimum	1.00E-06	95% KM (bootstrap t) UCL	29.1
Maximum	100	95% KM (BCA) UCL	22.95
Mean	10.89	95% KM (Percentile Bootstrap) UCL	20.91
Median	1.00E-06	95% KM (Chebyshev) UCL	31.03
SD	21.88	97.5% KM (Chebyshev) UCL	38.99
k star	0.11	99% KM (Chebyshev) UCL	54.64
Theta star	99.08		
Nu star	5.717	**Potential UCLs to Use**	
AppChi2	1.497	**95% KM (t) UCL**	**19.83**
95% Gamma Approximate UCL	41.6		
95% Adjusted Gamma UCL	45.79		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

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DDE 0-1

General Statistics			
Number of Valid Data	26	Number of Detected Data	23
Number of Distinct Detected Data	21	Number of Non-Detect Data	3
		Percent Non-Detects	11.54%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.7	Minimum Detected	-0.357
Maximum Detected	250	Maximum Detected	5.521
Mean of Detected	31.87	Mean of Detected	2.641
SD of Detected	51.67	SD of Detected	1.459
Minimum Non-Detect	3.7	Minimum Non-Detect	1.308
Maximum Non-Detect	4.1	Maximum Non-Detect	1.411

Note: Data have multiple DLs - Use of KM Method is recommend		Number treated as Non-Detect	7
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	19
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	26.92%

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.535	Shapiro Wilk Test Statistic	0.929
5% Shapiro Wilk Critical Value	0.914	5% Shapiro Wilk Critical Value	0.914
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	28.41	Mean	2.412
SD	49.45	SD	1.513
95% DL/2 (t) UCL	44.98	95% H-Stat (DL/2) UCL	93.39
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	17.47	Mean in Log Scale	2.403
SD	59.72	SD in Log Scale	1.525
95% MLE (t) UCL	37.47	Mean in Original Scale	28.4
95% MLE (Tiku) UCL	37.89	SD in Original Scale	49.46
		95% t UCL	44.96
		95% Percentile Bootstrap UCL	45.95
		95% BCA Bootstrap UCL	53.47
		95% H UCL	95.35
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.666	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	47.88		
nu star	30.62		
A-D Test Statistic	0.531	Nonparametric Statistics	
5% A-D Critical Value	0.784	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.784	Mean	28.36
5% K-S Critical Value	0.189	SD	48.52
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	9.73
		95% KM (t) UCL	44.98
Assuming Gamma Distribution		95% KM (z) UCL	44.36
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	44.94
Minimum	1.00E-06	95% KM (bootstrap t) UCL	72.71
Maximum	250	95% KM (BCA) UCL	46.71
Mean	28.19	95% KM (Percentile Bootstrap) UCL	46.06
Median	16	95% KM (Chebyshev) UCL	70.77
SD	49.57	97.5% KM (Chebyshev) UCL	89.12
k star	0.265	99% KM (Chebyshev) UCL	125.2
Theta star	106.5		
Nu star	13.76	**Potential UCLs to Use**	
AppChi2	6.407	**95% KM (Chebyshev) UCL**	**70.77**
95% Gamma Approximate UCL	60.54		
95% Adjusted Gamma UCL	63.83		
Note: DL/2 is not a recommended method.			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
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DDT 0-1

General Statistics			
Number of Valid Data	26	Number of Detected Data	17
Number of Distinct Detected Data	15	Number of Non-Detect Data	9
		Percent Non-Detects	34.62%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	8.2	Minimum Detected	2.104
Maximum Detected	1200	Maximum Detected	7.09
Mean of Detected	295.5	Mean of Detected	4.835
SD of Detected	402.6	SD of Detected	1.417
Minimum Non-Detect	3.5	Minimum Non-Detect	1.253
Maximum Non-Detect	31	Maximum Non-Detect	3.434

Note: Data have multiple DLs - Use of KM Method is recommend		Number treated as Non-Detect	12
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	14
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	46.15%

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.678	Shapiro Wilk Test Statistic	0.97
5% Shapiro Wilk Critical Value	0.892	5% Shapiro Wilk Critical Value	0.892
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	195	Mean	3.593
SD	351.5	SD	2.138
95% DL/2 (t) UCL	312.8	95% H-Stat (DL/2) UCL	2182
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	7.244	Mean in Log Scale	3.698
SD	527.1	SD in Log Scale	1.966
95% MLE (t) UCL	183.8	Mean in Original Scale	194.9
95% MLE (Tiku) UCL	217.2	SD in Original Scale	351.6
		95% t UCL	312.7
		95% Percentile Bootstrap UCL	312.5
		95% BCA Bootstrap UCL	339.2
		95% H UCL	1317

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only
k star (bias corrected)	0.622	Data appear Gamma Distributed at 5% Significance Level
Theta Star	475.3	
nu star	21.14	

		Nonparametric Statistics	
A-D Test Statistic	0.616	Kaplan-Meier (KM) Method	
5% A-D Critical Value	0.78	Mean	196.2
K-S Test Statistic	0.78	SD	344
5% K-S Critical Value	0.218	SE of Mean	69.55
Data appear Gamma Distributed at 5% Significance Level		95% KM (t) UCL	315
		95% KM (z) UCL	310.6
Assuming Gamma Distribution		95% KM (jackknife) UCL	311
Gamma ROS Statistics using Extrapolated Data		95% KM (bootstrap t) UCL	377.4
Minimum	1.00E-06	95% KM (BCA) UCL	327.7
Maximum	1200	95% KM (Percentile Bootstrap) UCL	323.8
Mean	193.2	95% KM (Chebyshev) UCL	499.4
Median	51	97.5% KM (Chebyshev) UCL	630.5
SD	352.5	99% KM (Chebyshev) UCL	888.2
k star	0.128		
Theta star	1509		
Nu star	6.658	**Potential UCLs to Use**	
AppChi2	1.985	**95% KM (BCA) UCL**	**327.7**
95% Gamma Approximate UCL	648.1		
95% Adjusted Gamma UCL	706.4		
Note: DL/2 is not a recommended method.			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
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ProUCL Output Files

Total DDT 0-1

General Statistics			
Number of Valid Data	26	Number of Detected Data	24
Number of Distinct Detected Data	24	Number of Non-Detect Data	2
		Percent Non-Detects	7.69%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.7	Minimum Detected	-0.357
Maximum Detected	1503	Maximum Detected	7.315
Mean of Detected	251.6	Mean of Detected	3.956
SD of Detected	423	SD of Detected	2.262
Minimum Non-Detect	3.7	Minimum Non-Detect	1.308
Maximum Non-Detect	3.8	Maximum Non-Detect	1.335

Note: Data have multiple DLs - Use of KM Method is recommend		Number treated as Non-Detect	6
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	20
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	23.08%

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.616	Shapiro Wilk Test Statistic	0.938
5% Shapiro Wilk Critical Value	0.916	5% Shapiro Wilk Critical Value	0.916
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	232.4	Mean	3.7
SD	411.4	SD	2.35
95% DL/2 (t) UCL	370.2	95% H-Stat (DL/2) UCL	5535
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	155.4	Mean in Log Scale	3.704
SD	484.1	SD in Log Scale	2.345
95% MLE (t) UCL	317.6	Mean in Original Scale	232.4
95% MLE (Tiku) UCL	317.5	SD in Original Scale	411.4
		95% t UCL	370.2
		95% Percentile Bootstrap UCL	370.9
		95% BCA Bootstrap UCL	416.7
		95% H UCL	5435
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.392	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	642.3		
nu star	18.8		
A-D Test Statistic	0.351	Nonparametric Statistics	
5% A-D Critical Value	0.825	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.825	Mean	232.4
5% K-S Critical Value	0.19	SD	403.4
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	80.81
		95% KM (t) UCL	370.4
Assuming Gamma Distribution		95% KM (z) UCL	365.3
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	370.2
Minimum	1.00E-06	95% KM (bootstrap t) UCL	456.4
Maximum	1503	95% KM (BCA) UCL	378.3
Mean	232.3	95% KM (Percentile Bootstrap) UCL	367.9
Median	74.85	95% KM (Chebyshev) UCL	584.7
SD	411.4	97.5% KM (Chebyshev) UCL	737.1
k star	0.246	99% KM (Chebyshev) UCL	1036
Theta star	945.8		
Nu star	12.77	**Potential UCLs to Use**	
AppChi2	5.739	**95% KM (Chebyshev) UCL**	**584.7**
95% Gamma Approximate UCL	516.9		
95% Adjusted Gamma UCL	546.4		
Note: DL/2 is not a recommended method.			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

APPENDIX A
ProUCL Output Files

alpha-Chlordane 0-1

General Statistics			
Number of Valid Data	26	Number of Detected Data	11
Number of Distinct Detected Data	10	Number of Non-Detect Data	15
		Percent Non-Detects	57.69%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.8	Minimum Detected	-0.223
Maximum Detected	840	Maximum Detected	6.733
Mean of Detected	114.4	Mean of Detected	2.693
SD of Detected	251.1	SD of Detected	2.271
Minimum Non-Detect	1.8	Minimum Non-Detect	0.588
Maximum Non-Detect	2.1	Maximum Non-Detect	0.742

Note: Data have multiple DLs - Use of KM Method is recommend		Number treated as Non-Detect	18
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	69.23%

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.525	Shapiro Wilk Test Statistic	0.94
5% Shapiro Wilk Critical Value	0.85	5% Shapiro Wilk Critical Value	0.85
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	48.96	Mean	1.105
SD	168.8	SD	1.997
95% DL/2 (t) UCL	105.5	95% H-Stat (DL/2) UCL	109.6
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.009
		SD in Log Scale	2.265
		Mean in Original Scale	49.27
		SD in Original Scale	168.7
		95% t UCL	105.8
		95% Percentile Bootstrap UCL	110
		95% BCA Bootstrap UCL	162.8
		95% H-UCL	266.8
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.302	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	379.4		
nu star	6.636		
A-D Test Statistic	0.698	Nonparametric Statistics	
5% A-D Critical Value	0.814	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.814	Mean	48.97
5% K-S Critical Value	0.275	SD	165.5
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	34.05
		95% KM (t) UCL	107.1
Assuming Gamma Distribution		95% KM (z) UCL	105
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	105.5
Minimum	1.00E-06	95% KM (bootstrap t) UCL	408.9
Maximum	840	95% KM (BCA) UCL	114.8
Mean	48.42	95% KM (Percentile Bootstrap) UCL	107.9
Median	1.00E-06	95% KM (Chebyshev) UCL	197.4
SD	169	97.5% KM (Chebyshev) UCL	261.6
k star	0.0947	99% KM (Chebyshev) UCL	387.7
Theta star	511.2		
Nu star	4.926	**Potential UCLs to Use**	
AppChi2	1.118	**95% KM (t) UCL**	**107.1**
95% Gamma Approximate UCL	213.3		
95% Adjusted Gamma UCL	237.3		
Note: DL/2 is not a recommended method.			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
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APPENDIX A
ProUCL Output Files

Lindane 0-1

General Statistics

Number of Valid Data	26	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	25
		Percent Non-Detects	96.15%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Lindane 0-1 was not processed!

APPENDIX A
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gamma-Chlordane 0-1

General Statistics			
Number of Valid Data	26	Number of Detected Data	10
Number of Distinct Detected Data	9	Number of Non-Detect Data	16
		Percent Non-Detects	61.54%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	1	Minimum Detected	0
Maximum Detected	760	Maximum Detected	6.633
Mean of Detected	113	Mean of Detected	2.844
SD of Detected	235.7	SD of Detected	2.169
Minimum Non-Detect	1.8	Minimum Non-Detect	0.588
Maximum Non-Detect	2.1	Maximum Non-Detect	0.742

Note: Data have multiple DLs - Use of KM Method is recommend		Number treated as Non-Detect	18
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	69.23%

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.546	Shapiro Wilk Test Statistic	0.935
5% Shapiro Wilk Critical Value	0.842	5% Shapiro Wilk Critical Value	0.842
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	44.04	Mean	1.056
SD	152	SD	1.943
95% DL/2 (t) UCL	94.95	95% H-Stat (DL/2) UCL	86.86
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.791
		SD in Log Scale	2.349
		Mean in Original Scale	44.2
		SD in Original Scale	151.9
		95% t UCL	95.09
		95% Percentile Bootstrap UCL	101.8
		95% BCA Bootstrap UCL	138.2
		95% H-UCL	300.1
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.316	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	357.7		
nu star	6.319		
A-D Test Statistic	0.698	Nonparametric Statistics	
5% A-D Critical Value	0.803	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.803	Mean	44.08
5% K-S Critical Value	0.286	SD	149
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	30.8
		95% KM (t) UCL	96.69
Assuming Gamma Distribution		95% KM (z) UCL	94.74
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	94.98
Minimum	1.00E-06	95% KM (bootstrap t) UCL	262.7
Maximum	760	95% KM (BCA) UCL	102.3
Mean	43.46	95% KM (Percentile Bootstrap) UCL	100.8
Median	1.00E-06	95% KM (Chebyshev) UCL	178.3
SD	152.1	97.5% KM (Chebyshev) UCL	236.4
k star	0.0921	99% KM (Chebyshev) UCL	350.6
Theta star	471.8		
Nu star	4.79	**Potential UCLs to Use**	
AppChi2	1.056	**95% KM (t) UCL**	**96.69**
95% Gamma Approximate UCL	197.1		
95% Adjusted Gamma UCL	219.7		
Note: DL/2 is not a recommended method.			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

APPENDIX A
ProUCL Output Files

Heptachlor 0-1

General Statistics

Number of Valid Data	26	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	20
		Percent Non-Detects	76.92%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.25	Minimum Detected	-1.386
Maximum Detected	69	Maximum Detected	4.234
Mean of Detected	16.55	Mean of Detected	0.799
SD of Detected	27.94	SD of Detected	2.376
Minimum Non-Detect	1.8	Minimum Non-Detect	0.588
Maximum Non-Detect	9.6	Maximum Non-Detect	2.262

Note: Data have multiple DLs - Use of KM Method is recommend	Number treated as Non-Detect	24
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	2
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	92.31%

Warning: There are only 6 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.693	Shapiro Wilk Test Statistic	0.836
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	4.696	Mean	0.204
SD	14.16	SD	1.158
95% DL/2 (t) UCL	9.44	95% H-Stat (DL/2) UCL	4.505
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.21
		SD in Log Scale	1.636
		Mean in Original Scale	4.716
		SD in Original Scale	14.19
		95% t UCL	9.468
		95% Percentile Bootstrap UCL	9.831
		95% BCA Bootstrap UCL	12.85
		95% H-UCL	9.472

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.28	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	59.17		
nu star	3.356		
A-D Test Statistic	0.701	Nonparametric Statistics	
5% A-D Critical Value	0.761	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.761	Mean	4.259
5% K-S Critical Value	0.355	SD	13.98
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	3.007
		95% KM (t) UCL	9.395
Assuming Gamma Distribution		95% KM (z) UCL	9.205
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	9.044
Minimum	1.00E-06	95% KM (bootstrap t) UCL	90.31
Maximum	69	95% KM (BCA) UCL	10.65
Mean	7.061	95% KM (Percentile Bootstrap) UCL	9.597
Median	0.211	95% KM (Chebyshev) UCL	17.37
SD	14.97	97.5% KM (Chebyshev) UCL	23.04
k star	0.12	99% KM (Chebyshev) UCL	34.18
Theta star	59.06		
Nu star	6.217	**Potential UCLs to Use**	
AppChi2	1.752	**95% KM (t) UCL**	**9.395**
95% Gamma Approximate UCL	25.06		
95% Adjusted Gamma UCL	27.43		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

APPENDIX A
ProUCL Output Files

Heptachlor epoxide 0-1

General Statistics			
Number of Valid Data	26	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	21
		Percent Non-Detects	80.77%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	1.5	Minimum Detected	0.405
Maximum Detected	130	Maximum Detected	4.868
Mean of Detected	40.36	Mean of Detected	2.334
SD of Detected	56.48	SD of Detected	2.064
Minimum Non-Detect	1.8	Minimum Non-Detect	0.588
Maximum Non-Detect	9.6	Maximum Non-Detect	2.262

Note: Data have multiple DLs - Use of KM Method is recommend		Number treated as Non-Detect	24
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.31%

Warning: There are only 5 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.787	Shapiro Wilk Test Statistic	0.864
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	8.675	Mean	0.467
SD	27.56	SD	1.283
95% DL/2 (t) UCL	17.91	95% H-Stat (DL/2) UCL	7.64
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	0.763
		SD in Log Scale	1.489
		Mean in Original Scale	9.692
		SD in Original Scale	27.34
		95% t UCL	18.85
		95% Percentile Bootstrap UCL	19.24
		95% BCA Bootstrap UCL	24.98
		95% H-UCL	16.84

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.321	Data appear Normal at 5% Significance Level	
Theta Star	125.6		
nu star	3.214		
A-D Test Statistic	0.471	Nonparametric Statistics	
5% A-D Critical Value	0.715	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.715	Mean	9.061
5% K-S Critical Value	0.373	SD	26.91
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	5.901
		95% KM (t) UCL	19.14
Assuming Gamma Distribution		95% KM (z) UCL	18.77
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	18.26
Minimum	1.00E-06	95% KM (bootstrap t) UCL	177.6
Maximum	130	95% KM (BCA) UCL	65.58
Mean	12.23	95% KM (Percentile Bootstrap) UCL	26.47
Median	0.413	95% KM (Chebyshev) UCL	34.78
SD	28.07	97.5% KM (Chebyshev) UCL	45.91
k star	0.113	99% KM (Chebyshev) UCL	67.77
Theta star	108.6		
Nu star	5.853	Potential UCLs to Use	
AppChi2	1.565	95% KM (t) UCL	19.14
95% Gamma Approximate UCL	45.72	**95% KM (Percentile Bootstrap) UCL**	**26.47**
95% Adjusted Gamma UCL	50.24		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

APPENDIX A
ProUCL Output Files

Arsenic 0-1

General Statistics			
Number of Valid Observations	26	Number of Distinct Observations	23
Raw Statistics		Log-transformed Statistics	
Minimum	1.4	Minimum of Log Data	0.336
Maximum	18.2	Maximum of Log Data	2.901
Mean	6.546	Mean of log Data	1.711
Median	6.8	SD of log Data	0.64
SD	3.579		
Std. Error of Mean	0.702		
Coefficient of Variation	0.547		
Skewness	1.092		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.898	Shapiro Wilk Test Statistic	0.897
Shapiro Wilk Critical Value	0.92	Shapiro Wilk Critical Value	0.92
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	7.745	95% H-UCL	8.876
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	10.65
95% Adjusted-CLT UCL (Chen-1995)	7.861	97.5% Chebyshev (MVUE) UCL	12.35
95% Modified-t UCL (Johnson-1978)	7.77	99% Chebyshev (MVUE) UCL	15.68
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.792	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	2.345		
MLE of Mean	6.546		
MLE of Standard Deviation	3.918		
nu star	145.2		
Approximate Chi Square Value (.05)	118.3	Nonparametric Statistics	
Adjusted Level of Significance	0.0398	95% CLT UCL	7.701
Adjusted Chi Square Value	116.7	95% Jackknife UCL	7.745
		95% Standard Bootstrap UCL	7.712
Anderson-Darling Test Statistic	0.905	95% Bootstrap-t UCL	7.919
Anderson-Darling 5% Critical Value	0.75	95% Hall's Bootstrap UCL	8.3
Kolmogorov-Smirnov Test Statistic	0.164	95% Percentile Bootstrap UCL	7.704
Kolmogorov-Smirnov 5% Critical Value	0.172	95% BCA Bootstrap UCL	7.762
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	9.606
		97.5% Chebyshev(Mean, Sd) UCL	10.93
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	13.53
95% Approximate Gamma UCL	8.031		
95% Adjusted Gamma UCL	8.141		
Potential UCL to Use		**Use 95% Approximate Gamma UCL**	**8.031**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

APPENDIX A
ProUCL Output Files

Cyanide 0-1

General Statistics

Number of Valid Data	26	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	25
		Percent Non-Detects	96.15%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Cyanide 0-1 was not processed!

APPENDIX A
ProUCL Output Files

Lead 0-1

General Statistics			
Number of Valid Observations	26	Number of Distinct Observations	26
Raw Statistics		Log-transformed Statistics	
Minimum	4.7	Minimum of Log Data	1.548
Maximum	37.5	Maximum of Log Data	3.624
Mean	12.86	Mean of log Data	2.407
Median	11.05	SD of log Data	0.543
SD	7.691		
Std. Error of Mean	1.508		
Coefficient of Variation	0.598		
Skewness	1.544		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.854	Shapiro Wilk Test Statistic	0.964
Shapiro Wilk Critical Value	0.92	Shapiro Wilk Critical Value	0.92
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	15.44	95% H-UCL	15.98
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	18.99
95% Adjusted-CLT UCL (Chen-1995)	15.83	97.5% Chebyshev (MVUE) UCL	21.68
95% Modified-t UCL (Johnson-1978)	15.51	99% Chebyshev (MVUE) UCL	26.97
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.162	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	4.068		
MLE of Mean	12.86		
MLE of Standard Deviation	7.233		
nu star	164.4		
Approximate Chi Square Value (.05)	135.8	Nonparametric Statistics	
Adjusted Level of Significance	0.0398	95% CLT UCL	15.34
Adjusted Chi Square Value	134	95% Jackknife UCL	15.44
		95% Standard Bootstrap UCL	15.28
Anderson-Darling Test Statistic	0.455	95% Bootstrap-t UCL	16.37
Anderson-Darling 5% Critical Value	0.749	95% Hall's Bootstrap UCL	16.44
Kolmogorov-Smirnov Test Statistic	0.11	95% Percentile Bootstrap UCL	15.37
Kolmogorov-Smirnov 5% Critical Value	0.172	95% BCA Bootstrap UCL	15.91
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	19.44
		97.5% Chebyshev(Mean, Sd) UCL	22.28
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	27.87
95% Approximate Gamma UCL	15.58		
95% Adjusted Gamma UCL	15.78		
Potential UCL to Use		**Use 95% Approximate Gamma UCL**	**15.58**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

APPENDIX A
ProUCL Output Files

Zinc 0-1

General Statistics			
Number of Valid Observations	26	Number of Distinct Observations	25
Raw Statistics		Log-transformed Statistics	
Minimum	11.7	Minimum of Log Data	2.46
Maximum	47.7	Maximum of Log Data	3.865
Mean	27.69	Mean of log Data	3.266
Median	25.45	SD of log Data	0.345
SD	9.161		
Std. Error of Mean	1.797		
Coefficient of Variation	0.331		
Skewness	0.504		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.96	Shapiro Wilk Test Statistic	0.967
Shapiro Wilk Critical Value	0.92	Shapiro Wilk Critical Value	0.92
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	30.76	95% H-UCL	31.6
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	36.1
95% Adjusted-CLT UCL (Chen-1995)	30.84	97.5% Chebyshev (MVUE) UCL	39.71
95% Modified-t UCL (Johnson-1978)	30.79	99% Chebyshev (MVUE) UCL	46.8
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	8.258	Data appear Normal at 5% Significance Level	
Theta Star	3.353		
MLE of Mean	27.69		
MLE of Standard Deviation	9.636		
nu star	429.4		
Approximate Chi Square Value (.05)	382.4	Nonparametric Statistics	
Adjusted Level of Significance	0.0398	95% CLT UCL	30.65
Adjusted Chi Square Value	379.5	95% Jackknife UCL	30.76
		95% Standard Bootstrap UCL	30.6
Anderson-Darling Test Statistic	0.277	95% Bootstrap-t UCL	30.92
Anderson-Darling 5% Critical Value	0.744	95% Hall's Bootstrap UCL	31.15
Kolmogorov-Smirnov Test Statistic	0.107	95% Percentile Bootstrap UCL	30.68
Kolmogorov-Smirnov 5% Critical Value	0.171	95% BCA Bootstrap UCL	30.9
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	35.52
		97.5% Chebyshev(Mean, Sd) UCL	38.91
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	45.57
95% Approximate Gamma UCL	31.1		
95% Adjusted Gamma UCL	31.34		
Potential UCL to Use		**Use 95% Student's-t UCL**	**30.76**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

APPENDIX A
ProUCL Output Files

DDD (0-2+)

General Statistics			
Number of Valid Data	58	Number of Detected Data	29
Number of Distinct Detected Data	27	Number of Non-Detect Data	29
		Percent Non-Detects	50.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	1	Minimum Detected	0.0953
Maximum Detected	520	Maximum Detected	6.254
Mean of Detected	54	Mean of Detected	3.04
SD of Detected	100.7	SD of Detected	1.382
Minimum Non-Detect	3.4	Minimum Non-Detect	1.224
Maximum Non-Detect	4	Maximum Non-Detect	1.459
Note: Data have multiple DLs - Use of KM Method is recommend		Number treated as Non-Detect	32
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	26
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	55.17%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	1	Shapiro Wilk Test Statistic	0.986
5% Shapiro Wilk Critical Value	0.926	5% Shapiro Wilk Critical Value	0.926
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	28	Mean	1.831
SD	75.27	SD	1.558
95% DL/2 (t) UCL	44.28	95% H-Stat (DL/2) UCL	40.64
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.719
		SD in Log Scale	1.732
		Mean in Original Scale	27.78
		SD in Original Scale	75.27
		95% t UCL	44.3
		95% Percentile Bootstrap UCL	45.5
		95% BCA Bootstrap UCL	54.25
		95% H-UCL	54.94
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.604	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	89		
nu star	35.04		
A-D Test Statistic	1	Nonparametric Statistics	
5% A-D Critical Value	1	Kaplan-Meier (KM) Method	
K-S Test Statistic	1	Mean	28.04
5% K-S Critical Value	0	SD	74.53
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	9.963
		95% KM (t) UCL	44.7
Assuming Gamma Distribution		95% KM (z) UCL	44.43
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	44.56
Minimum	1.00E-06	95% KM (bootstrap t) UCL	69.12
Maximum	520	95% KM (BCA) UCL	46.91
Mean	26.82	95% KM (Percentile Bootstrap) UCL	44.25
Median	0.55	95% KM (Chebyshev) UCL	71.47
SD	75.6	97.5% KM (Chebyshev) UCL	90.26
k star	0.101	99% KM (Chebyshev) UCL	127.2
Theta star	265.9		
Nu star	11.7	**Potential UCLs to Use**	
AppChi2	5.033	**95% KM (t) UCL**	**44.7**
95% Gamma Approximate UCL	62.38		
95% Adjusted Gamma UCL	63.8		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

APPENDIX A
ProUCL Output Files

DDE (0-2+)

General Statistics			
Number of Valid Data	58	Number of Detected Data	49
Number of Distinct Detected Data	43	Number of Non-Detect Data	9
		Percent Non-Detects	15.52%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.51	Minimum Detected	-0.673
Maximum Detected	250	Maximum Detected	5.521
Mean of Detected	32.38	Mean of Detected	2.648
SD of Detected	44.39	SD of Detected	1.48
Minimum Non-Detect	3.4	Minimum Non-Detect	1.224
Maximum Non-Detect	4.3	Maximum Non-Detect	1.459

Note: Data have multiple DLs - Use of KM Method is recommend		Number treated as Non-Detect	19
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	39
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	32.76%

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.675	Shapiro Wilk Test Statistic	0.96
5% Shapiro Wilk Critical Value	0.947	5% Shapiro Wilk Critical Value	0.947
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	27.65	Mean	2.335
SD	42.23	SD	1.546
95% DL/2 (t) UCL	36.92	95% H-Stat (DL/2) UCL	65.48
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	15.35	Mean in Log Scale	2.332
SD	54.92	SD in Log Scale	1.551
95% MLE (t) UCL	27.41	Mean in Original Scale	27.64
95% MLE (Tiku) UCL	28.17	SD in Original Scale	42.23
		95% t UCL	36.92
		95% Percentile Bootstrap UCL	37.29
		95% BCA Bootstrap UCL	39.86
		95% H UCL	66.02
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.694	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	46.62		
nu star	68.06		
A-D Test Statistic	0.237	Nonparametric Statistics	
5% A-D Critical Value	0.795	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.795	Mean	27.59
5% K-S Critical Value	0.132	SD	41.9
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	5.559
		95% KM (t) UCL	36.89
Assuming Gamma Distribution		95% KM (z) UCL	36.74
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	36.87
Minimum	1.00E-06	95% KM (bootstrap t) UCL	41.59
Maximum	250	95% KM (BCA) UCL	37.52
Mean	27.36	95% KM (Percentile Bootstrap) UCL	36.93
Median	12	95% KM (Chebyshev) UCL	51.82
SD	42.41	97.5% KM (Chebyshev) UCL	62.31
k star	0.225	99% KM (Chebyshev) UCL	82.9
Theta star	121.8		
Nu star	26.05	**Potential UCLs to Use**	
AppChi2	15.42	**95% KM (Chebyshev) UCL**	**51.82**
95% Gamma Approximate UCL	46.22		
95% Adjusted Gamma UCL	46.85		
Note: DL/2 is not a recommended method.			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

APPENDIX A
ProUCL Output Files

DDT

General Statistics

Number of Valid Data	58	Number of Detected Data	37
Number of Distinct Detected Data	34	Number of Non-Detect Data	21
		Percent Non-Detects	36.21%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	8.2	Minimum Detected	2.104
Maximum Detected	7200	Maximum Detected	8.882
Mean of Detected	517.3	Mean of Detected	5.06
SD of Detected	1191	SD of Detected	1.57
Minimum Non-Detect	3.4	Minimum Non-Detect	1.224
Maximum Non-Detect	31	Maximum Non-Detect	3.434

Note: Data have multiple DLs - Use of KM Method is recommend		Number treated as Non-Detect	27
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	31
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	46.55%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.408	Shapiro Wilk Test Statistic	0.966
5% Shapiro Wilk Critical Value	0.936	5% Shapiro Wilk Critical Value	0.936
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	331.7	Mean	3.678
SD	978.3	SD	2.275
95% DL/2 (t) UCL	546.5	95% H-Stat (DL/2) UCL	1922

Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	3.755
		SD in Log Scale	2.157
		Mean in Original Scale	331.6
		SD in Original Scale	978.4
		95% t UCL	546.4
		95% Percentile Bootstrap UCL	569.5
		95% BCA Bootstrap UCL	735.1
		95% H-UCL	1402

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.505	Data appear Lognormal at 5% Significance Level	
Theta Star	1025		
nu star	37.36		

A-D Test Statistic	1.277	Nonparametric Statistics	
5% A-D Critical Value	0.81	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.81	Mean	333.1
5% K-S Critical Value	0.153	SD	969.4
Data not Gamma Distributed at 5% Significance Level		SE of Mean	129
		95% KM (t) UCL	548.8
Assuming Gamma Distribution		95% KM (z) UCL	545.3
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	545.9
Minimum	1.00E-06	95% KM (bootstrap t) UCL	913.9
Maximum	7200	95% KM (BCA) UCL	600.5
Mean	330	95% KM (Percentile Bootstrap) UCL	553.5
Median	40.5	95% KM (Chebyshev) UCL	895.6
SD	978.9	97.5% KM (Chebyshev) UCL	1139
k star	0.112	99% KM (Chebyshev) UCL	1617
Theta star	2936		
Nu star	13.04	**Potential UCLs to Use**	
AppChi2	5.917	**97.5% KM (Chebyshev) UCL**	**1139**
95% Gamma Approximate UCL	727		
95% Adjusted Gamma UCL	742.4		
Note: DL/2 is not a recommended method.			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

APPENDIX A
ProUCL Output Files

alpha-Chlordane

General Statistics			
Number of Valid Data	58	Number of Detected Data	27
Number of Distinct Detected Data	24	Number of Non-Detect Data	31
		Percent Non-Detects	53.45%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.78	Minimum Detected	-0.248
Maximum Detected	3100	Maximum Detected	8.039
Mean of Detected	180.5	Mean of Detected	2.453
SD of Detected	607	SD of Detected	2.305
Minimum Non-Detect	1.8	Minimum Non-Detect	0.588
Maximum Non-Detect	20	Maximum Non-Detect	2.996

Note: Data have multiple DLs - Use of KM Method is recommend		Number treated as Non-Detect	49
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	9
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	84.48%

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.328	Shapiro Wilk Test Statistic	0.919
5% Shapiro Wilk Critical Value	0.923	5% Shapiro Wilk Critical Value	0.923
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	84.84	Mean	1.196
SD	419.7	SD	2
95% DL/2 (t) UCL	177	95% H-Stat (DL/2) UCL	67
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.075
		SD in Log Scale	2.21
		Mean in Original Scale	84.85
		SD in Original Scale	419.7
		95% t UCL	177
		95% Percentile Bootstrap UCL	188.9
		95% BCA Bootstrap UCL	262.3
		95% H-UCL	114.3

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.254	Data do not follow a Discernable Distribution (0.05)	
Theta Star	711.3		
nu star	13.7		
A-D Test Statistic	2.493	Nonparametric Statistics	
5% A-D Critical Value	0.871	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.871	Mean	84.63
5% K-S Critical Value	0.184	SD	416.1
Data not Gamma Distributed at 5% Significance Level		SE of Mean	55.68
		95% KM (t) UCL	177.7
Assuming Gamma Distribution		95% KM (z) UCL	176.2
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	176.8
Minimum	1.00E-06	95% KM (bootstrap t) UCL	778.1
Maximum	3100	95% KM (BCA) UCL	193.3
Mean	84.03	95% KM (Percentile Bootstrap) UCL	192.4
Median	1.00E-06	95% KM (Chebyshev) UCL	327.3
SD	419.9	97.5% KM (Chebyshev) UCL	432.4
k star	0.0858	99% KM (Chebyshev) UCL	638.7
Theta star	979.6		
Nu star	9.951	**Potential UCLs to Use**	
AppChi2	3.911	**99% KM (Chebyshev) UCL**	**638.7**
95% Gamma Approximate UCL	213.8		
95% Adjusted Gamma UCL	219.2		
Note: DL/2 is not a recommended method.			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

APPENDIX A
ProUCL Output Files

Dieldrin

General Statistics

Number of Valid Data	58	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	54
		Percent Non-Detects	93.10%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	1.4	Minimum Detected	0.336
Maximum Detected	43	Maximum Detected	3.761
Mean of Detected	19.75	Mean of Detected	2.395
SD of Detected	18.33	SD of Detected	1.506
Minimum Non-Detect	0.34	Minimum Non-Detect	-1.079
Maximum Non-Detect	40	Maximum Non-Detect	3.689

Note: Data have multiple DLs - Use of KM Method is recommend	Number treated as Non-Detect	57
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	1
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	98.28%

Warning: There are only 4 Distinct Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.964	Shapiro Wilk Test Statistic	0.929
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.785	Mean	0.499
SD	7.084	SD	1.28
95% DL/2 (t) UCL	5.34	95% H-Stat (DL/2) UCL	6.048
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.319
		SD in Log Scale	2.398
		Mean in Original Scale	1.45
		SD in Original Scale	6.554
		95% t UCL	2.889
		95% Percentile Bootstrap UCL	2.893
		95% BCA Bootstrap UCL	3.565
		95% H-UCL	2.716

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.412	Data appear Normal at 5% Significance Level	
Theta Star	47.9		
nu star	3.299		
A-D Test Statistic	0.232	Nonparametric Statistics	
5% A-D Critical Value	0.667	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.667	Mean	2.694
5% K-S Critical Value	0.403	SD	6.276
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.957
		95% KM (t) UCL	4.295
Assuming Gamma Distribution		95% KM (z) UCL	4.269
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	7.927
Minimum	1.00E-06	95% KM (bootstrap t) UCL	4.019
Maximum	43	95% KM (BCA) UCL	43
Mean	1.362	95% KM (Percentile Bootstrap) UCL	N/A
Median	1.00E-06	95% KM (Chebyshev) UCL	6.867
SD	6.57	97.5% KM (Chebyshev) UCL	8.672
k star	0.0736	99% KM (Chebyshev) UCL	12.22
Theta star	18.49		
Nu star	8.543	Potential UCLs to Use	
AppChi2	3.053	**95% KM (t) UCL**	**4.295**
95% Gamma Approximate UCL	3.811	95% KM (Percentile Bootstrap) UCL	N/A
95% Adjusted Gamma UCL	N/A		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

APPENDIX A
ProUCL Output Files

Endosulfan I

General Statistics

Number of Valid Data	58	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	56
		Percent Non-Detects	96.55%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	4.3	Minimum Detected	1.459
Maximum Detected	5.9	Maximum Detected	1.775
Mean of Detected	5.1	Mean of Detected	1.617
SD of Detected	1.131	SD of Detected	0.224
Minimum Non-Detect	0.17	Minimum Non-Detect	-1.772
Maximum Non-Detect	20	Maximum Non-Detect	2.996

Note: Data have multiple DLs - Use of KM Method is recommend	Number treated as Non-Detect	58
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	0
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	100.00%

Warning: Data set has only 2 Distinct Detected Values.
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.448	Mean	-0.227
SD	1.962	SD	1.169
95% DL/2 (t) UCL	1.879	95% H-Stat (DL/2) UCL	2.371
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% t UCL	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
		95% H-UCL	N/A

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	4.33
5% K-S Critical Value	N/A	SD	0.218
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0423
		95% KM (t) UCL	4.401
Assuming Gamma Distribution		95% KM (z) UCL	4.4
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	5.368
Minimum	N/A	95% KM (bootstrap t) UCL	4.333
Maximum	N/A	95% KM (BCA) UCL	N/A
Mean	N/A	95% KM (Percentile Bootstrap) UCL	5.9
Median	N/A	95% KM (Chebyshev) UCL	4.515
SD	N/A	97.5% KM (Chebyshev) UCL	4.594
k star	N/A	99% KM (Chebyshev) UCL	4.751
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	4.401
95% Gamma Approximate UCL	N/A	**95% KM (% Bootstrap) UCL**	**5.9**

95% Adjusted Gamma UCL	N/A

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

APPENDIX A
ProUCL Output Files

Lindane

General Statistics

Number of Valid Data	58	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	56
		Percent Non-Detects	96.55%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	1.5	Minimum Detected	0.405
Maximum Detected	91	Maximum Detected	4.511
Mean of Detected	46.25	Mean of Detected	2.458
SD of Detected	63.29	SD of Detected	2.903
Minimum Non-Detect	0.17	Minimum Non-Detect	-1.772
Maximum Non-Detect	20	Maximum Non-Detect	2.996

Note: Data have multiple DLs - Use of KM Method is recommend	Number treated as Non-Detect	57
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	1
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	98.28%

Warning: Data set has only 2 Distinct Detected Values.
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.
Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.
However, results obtained using 4 to 9 distinct values may not be reliable.
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.868	Mean	-0.197
SD	11.92	SD	1.284
95% DL/2 (t) UCL	5.484	95% H-Stat (DL/2) UCL	3.035
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% t UCL	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
		95% H-UCL	N/A

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	3.043
5% K-S Critical Value	N/A	SD	11.65
Data not Gamma Distributed at 5% Significance Level		SE of Mean	2.163
		95% KM (t) UCL	6.66
Assuming Gamma Distribution		95% KM (z) UCL	6.602
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	61.18
Minimum	N/A	95% KM (bootstrap t) UCL	3.043
Maximum	N/A	95% KM (BCA) UCL	N/A
Mean	N/A	95% KM (Percentile Bootstrap) UCL	91
Median	N/A	95% KM (Chebyshev) UCL	12.47
SD	N/A	97.5% KM (Chebyshev) UCL	16.55
k star	N/A	99% KM (Chebyshev) UCL	24.57
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	**99% KM (Chebyshev) UCL**	**24.57**
95% Gamma Approximate UCL	N/A		

95% Adjusted Gamma UCL	N/A

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

APPENDIX A
ProUCL Output Files

gamma-Chlordane

General Statistics			
Number of Valid Data	58	Number of Detected Data	25
Number of Distinct Detected Data	21	Number of Non-Detect Data	33
		Percent Non-Detects	56.90%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.81	Minimum Detected	-0.211
Maximum Detected	2700	Maximum Detected	7.901
Mean of Detected	174.4	Mean of Detected	2.424
SD of Detected	550	SD of Detected	2.329
Minimum Non-Detect	1.8	Minimum Non-Detect	0.588
Maximum Non-Detect	20	Maximum Non-Detect	2.996
Note: Data have multiple DLs - Use of KM Method is recommend		Number treated as Non-Detect	51
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	7
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	87.93%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.353	Shapiro Wilk Test Statistic	0.9
5% Shapiro Wilk Critical Value	0.918	5% Shapiro Wilk Critical Value	0.918
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	76.02	Mean	1.097
SD	367.2	SD	1.954
95% DL/2 (t) UCL	156.6	95% H-Stat (DL/2) UCL	53.24
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.91
		SD in Log Scale	2.22
		Mean in Original Scale	75.98
		SD in Original Scale	367.2
		95% t UCL	156.6
		95% Percentile Bootstrap UCL	161.2
		95% BCA Bootstrap UCL	239
		95% H-UCL	100.1
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.254	Data do not follow a Discernable Distribution (0.05)	
Theta Star	687.1		
nu star	12.69		
A-D Test Statistic	2.39	Nonparametric Statistics	
5% A-D Critical Value	0.87	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.87	Mean	75.82
5% K-S Critical Value	0.191	SD	364.1
Data not Gamma Distributed at 5% Significance Level		SE of Mean	48.79
		95% KM (t) UCL	157.4
Assuming Gamma Distribution		95% KM (z) UCL	156.1
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	156.4
Minimum	1.00E-06	95% KM (bootstrap t) UCL	601
Maximum	2700	95% KM (BCA) UCL	174.7
Mean	75.18	95% KM (Percentile Bootstrap) UCL	165.1
Median	1.00E-06	95% KM (Chebyshev) UCL	288.5
SD	367.4	97.5% KM (Chebyshev) UCL	380.5
k star	0.083	99% KM (Chebyshev) UCL	561.3
Theta star	905.8		
Nu star	9.628	Potential UCLs to Use	
AppChi2	3.711	**99% KM (Chebyshev) UCL**	**561.3**
95% Gamma Approximate UCL	195.1		
95% Adjusted Gamma UCL	200.1		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

APPENDIX A
ProUCL Output Files

Heptachlor

General Statistics

Number of Valid Data	58	Number of Detected Data	11
Number of Distinct Detected Data	11	Number of Non-Detect Data	47
		Percent Non-Detects	81.03%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.21	Minimum Detected	-1.561
Maximum Detected	390	Maximum Detected	5.966
Mean of Detected	47.89	Mean of Detected	1.221
SD of Detected	115.4	SD of Detected	2.685
Minimum Non-Detect	0.18	Minimum Non-Detect	-1.715
Maximum Non-Detect	20	Maximum Non-Detect	2.996

Note: Data have multiple DLs - Use of KM Method is recommend		Number treated as Non-Detect	54
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	93.10%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.476	Shapiro Wilk Test Statistic	0.878
5% Shapiro Wilk Critical Value	0.85	5% Shapiro Wilk Critical Value	0.85
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	10.28	Mean	0.299
SD	51.74	SD	1.354
95% DL/2 (t) UCL	21.64	95% H-Stat (DL/2) UCL	5.719

Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.889
		SD in Log Scale	2.21
		Mean in Original Scale	9.766
		SD in Original Scale	51.81
		95% t UCL	21.14
		95% Percentile Bootstrap UCL	22.83
		95% BCA Bootstrap UCL	31.03
		95% H-UCL	16.05

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only
k star (bias corrected)	0.254	Data Follow Appr. Gamma Distribution at 5% Significance Level
Theta Star	188.7	
nu star	5.584	

		Nonparametric Statistics	
A-D Test Statistic	0.835	Kaplan-Meier (KM) Method	
5% A-D Critical Value	0.834	Mean	9.427
K-S Test Statistic	0.834	SD	51.41
5% K-S Critical Value	0.278	SE of Mean	7.081
Data follow Appr. Gamma Distribution at 5% Significance Level		95% KM (t) UCL	21.27
		95% KM (z) UCL	21.07
Assuming Gamma Distribution		95% KM (jackknife) UCL	20.81
Gamma ROS Statistics using Extrapolated Data		95% KM (bootstrap t) UCL	94.77
Minimum	1.00E-06	95% KM (BCA) UCL	22.77
Maximum	390	95% KM (Percentile Bootstrap) UCL	22.59
Mean	14.76	95% KM (Chebyshev) UCL	40.29
Median	1.00E-06	97.5% KM (Chebyshev) UCL	53.65
SD	52.83	99% KM (Chebyshev) UCL	79.88
k star	0.0873		
Theta star	169.1		
Nu star	10.13	Potential UCLs to Use	
AppChi2	4.02	**95% KM (t) UCL**	**21.27**
95% Gamma Approximate UCL	37.17		
95% Adjusted Gamma UCL	38.1		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

APPENDIX A
ProUCL Output Files

Heptachlor epoxide

General Statistics			
Number of Valid Data	58	Number of Detected Data	10
Number of Distinct Detected Data	9	Number of Non-Detect Data	48
		Percent Non-Detects	82.76%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.81	Minimum Detected	-0.211
Maximum Detected	530	Maximum Detected	6.273
Mean of Detected	79.03	Mean of Detected	2.447
SD of Detected	163.8	SD of Detected	2.219
Minimum Non-Detect	0.18	Minimum Non-Detect	-1.715
Maximum Non-Detect	20	Maximum Non-Detect	2.996
Note: Data have multiple DLs - Use of KM Method is recommend		Number treated as Non-Detect	54
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	93.10%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.551	Shapiro Wilk Test Statistic	0.921
5% Shapiro Wilk Critical Value	0.842	5% Shapiro Wilk Critical Value	0.842
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	14.83	Mean	0.487
SD	71.51	SD	1.397
95% DL/2 (t) UCL	30.53	95% H-Stat (DL/2) UCL	7.528
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.0989
		SD in Log Scale	1.968
		Mean in Original Scale	15.04
		SD in Original Scale	71.48
		95% t UCL	30.73
		95% Percentile Bootstrap UCL	32.03
		95% BCA Bootstrap UCL	44.76
		95% H-UCL	20.43
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.311	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	253.7		
nu star	6.229		
A-D Test Statistic	0.625	Nonparametric Statistics	
5% A-D Critical Value	0.805	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.805	Mean	14.71
5% K-S Critical Value	0.286	SD	70.89
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	9.814
		95% KM (t) UCL	31.12
Assuming Gamma Distribution		95% KM (z) UCL	30.85
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	30.27
Minimum	1.00E-06	95% KM (bootstrap t) UCL	114.3
Maximum	530	95% KM (BCA) UCL	34.35
Mean	20.65	95% KM (Percentile Bootstrap) UCL	31.97
Median	1.00E-06	95% KM (Chebyshev) UCL	57.49
SD	72.6	97.5% KM (Chebyshev) UCL	76
k star	0.0845	99% KM (Chebyshev) UCL	112.4
Theta star	244.5		
Nu star	9.797	Potential UCLs to Use	
AppChi2	3.815	**95% KM (t) UCL**	**31.12**
95% Gamma Approximate UCL	53.03		
95% Adjusted Gamma UCL	54.39		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

APPENDIX A
ProUCL Output Files

Arsenic

General Statistics			
Number of Valid Observations	54	Number of Distinct Observations	41
Raw Statistics		Log-transformed Statistics	
Minimum	1.3	Minimum of Log Data	0.262
Maximum	18.2	Maximum of Log Data	2.901
Mean	4.983	Mean of log Data	1.395
Median	4.15	SD of log Data	0.677
SD	3.24		
Std. Error of Mean	0.441		
Coefficient of Variation	0.65		
Skewness	1.356		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.128	Lilliefors Test Statistic	0.157
Lilliefors Critical Value	0.121	Lilliefors Critical Value	0.121
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	5.721	95% H-UCL	6.115
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	7.254
95% Adjusted-CLT UCL (Chen-1995)	5.795	97.5% Chebyshev (MVUE) UCL	8.21
95% Modified-t UCL (Johnson-1978)	5.735	99% Chebyshev (MVUE) UCL	10.09
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.393	Data do not follow a Discernable Distribution (0.05)	
Theta Star	2.083		
MLE of Mean	4.983		
MLE of Standard Deviation	3.222		
nu star	258.4		
Approximate Chi Square Value (.05)	222.2	Nonparametric Statistics	
Adjusted Level of Significance	0.0456	95% CLT UCL	5.709
Adjusted Chi Square Value	221.3	95% Jackknife UCL	5.721
		95% Standard Bootstrap UCL	5.708
Anderson-Darling Test Statistic	1.042	95% Bootstrap-t UCL	5.813
Anderson-Darling 5% Critical Value	0.76	95% Hall's Bootstrap UCL	5.871
Kolmogorov-Smirnov Test Statistic	0.13	95% Percentile Bootstrap UCL	5.707
Kolmogorov-Smirnov 5% Critical Value	0.122	95% BCA Bootstrap UCL	5.743
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	6.905
		97.5% Chebyshev(Mean, Sd) UCL	7.737
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	9.37
95% Approximate Gamma UCL	5.796		
95% Adjusted Gamma UCL	5.82		
Potential UCL to Use		**Use 95% Chebyshev (Mean, Sd) UCL**	**6.905**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

APPENDIX A
ProUCL Output Files

Cyanide

General Statistics

Number of Valid Data	54	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	53
		Percent Non-Detects	98.15%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Cyanide was not processed!

APPENDIX A
ProUCL Output Files

Lead

General Statistics			
Number of Valid Observations	54	Number of Distinct Observations	49
Raw Statistics		Log-transformed Statistics	
Minimum	1.8	Minimum of Log Data	0.588
Maximum	37.5	Maximum of Log Data	3.624
Mean	9.607	Mean of log Data	2.014
Median	6.9	SD of log Data	0.703
SD	7.512		
Std. Error of Mean	1.022		
Coefficient of Variation	0.782		
Skewness	1.825		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.191	Lilliefors Test Statistic	0.0791
Lilliefors Critical Value	0.121	Lilliefors Critical Value	0.121
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	11.32	95% H-UCL	11.67
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	13.9
95% Adjusted-CLT UCL (Chen-1995)	11.56	97.5% Chebyshev (MVUE) UCL	15.78
95% Modified-t UCL (Johnson-1978)	11.36	99% Chebyshev (MVUE) UCL	19.49
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.057	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	4.67		
MLE of Mean	9.607		
MLE of Standard Deviation	6.698		
nu star	222.2		
Approximate Chi Square Value (.05)	188.7	Nonparametric Statistics	
Adjusted Level of Significance	0.0456	95% CLT UCL	11.29
Adjusted Chi Square Value	187.9	95% Jackknife UCL	11.32
		95% Standard Bootstrap UCL	11.26
Anderson-Darling Test Statistic	0.741	95% Bootstrap-t UCL	11.77
Anderson-Darling 5% Critical Value	0.762	95% Hall's Bootstrap UCL	11.66
Kolmogorov-Smirnov Test Statistic	0.116	95% Percentile Bootstrap UCL	11.3
Kolmogorov-Smirnov 5% Critical Value	0.122	95% BCA Bootstrap UCL	11.66
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	14.06
		97.5% Chebyshev(Mean, Sd) UCL	15.99
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	19.78
95% Approximate Gamma UCL	11.31		
95% Adjusted Gamma UCL	11.36		
Potential UCL to Use		**Use 95% Approximate Gamma UCL**	**11.31**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

APPENDIX A
ProUCL Output Files

Zinc

General Statistics			
Number of Valid Observations	54	Number of Distinct Observations	52
Raw Statistics		Log-transformed Statistics	
Minimum	10	Minimum of Log Data	2.303
Maximum	54.5	Maximum of Log Data	3.998
Mean	23.51	Mean of log Data	3.077
Median	22.45	SD of log Data	0.404
SD	9.759		
Std. Error of Mean	1.328		
Coefficient of Variation	0.415		
Skewness	1.084		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.129	Lilliefors Test Statistic	0.0802
Lilliefors Critical Value	0.121	Lilliefors Critical Value	0.121
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	25.73	95% H-UCL	26.05
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	29.34
95% Adjusted-CLT UCL (Chen-1995)	25.9	97.5% Chebyshev (MVUE) UCL	31.87
95% Modified-t UCL (Johnson-1978)	25.76	99% Chebyshev (MVUE) UCL	36.82
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	6.069	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	3.873		
MLE of Mean	23.51		
MLE of Standard Deviation	9.542		
nu star	655.4		
Approximate Chi Square Value (.05)	597	Nonparametric Statistics	
Adjusted Level of Significance	0.0456	95% CLT UCL	25.69
Adjusted Chi Square Value	595.5	95% Jackknife UCL	25.73
		95% Standard Bootstrap UCL	25.71
Anderson-Darling Test Statistic	0.376	95% Bootstrap-t UCL	25.98
Anderson-Darling 5% Critical Value	0.753	95% Hall's Bootstrap UCL	26.1
Kolmogorov-Smirnov Test Statistic	0.0777	95% Percentile Bootstrap UCL	25.66
Kolmogorov-Smirnov 5% Critical Value	0.121	95% BCA Bootstrap UCL	25.85
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	29.29
		97.5% Chebyshev(Mean, Sd) UCL	31.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	36.72
95% Approximate Gamma UCL	25.8		
95% Adjusted Gamma UCL	25.87		
Potential UCL to Use		**Use 95% Approximate Gamma UCL**	**25.8**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

APPENDIX A
ProUCL Output Files

Total DDT (0-2' inclusive)

General Statistics			
Number of Valid Data	58	Number of Detected Data	51
Number of Distinct Detected Data	51	Number of Non-Detect Data	7
		Percent Non-Detects	12.07%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.5	Minimum Detected	-0.673
Maximum Detected	###	Maximum Detected	8.962
Mean of Detected	437	Mean of Detected	4.182
SD of Detected	###	SD of Detected	2.352
Minimum Non-Detect	3.4	Minimum Non-Detect	1.224
Maximum Non-Detect	24	Maximum Non-Detect	3.178
Note: Data have multiple DLs - Use of KM Method is recommend		Number treated as Non-Detect	23
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	35
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	39.66%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.4	Lilliefors Test Statistic	0.0725
5% Lilliefors Critical Value	0.1	5% Lilliefors Critical Value	0.124
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	385	Mean	3.797
SD	###	SD	2.448
95% DL/2 (t) UCL	620	95% H-Stat (DL/2) UCL	4035
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	3.783
		SD in Log Scale	2.46
		Mean in Original Scale	384.7
		SD in Original Scale	1069
		95% t UCL	619.4
		95% Percentile Bootstrap UCL	654.2
		95% BCA Bootstrap UCL	761
		95% H-UCL	4163
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.3	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	###		
nu star	35		
A-D Test Statistic	0.9	Nonparametric Statistics	
5% A-D Critical Value	0.9	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.9	Mean	384.6
5% K-S Critical Value	0.1	SD	1060
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	140.6
		95% KM (t) UCL	619.6
Assuming Gamma Distribution		95% KM (z) UCL	615.8
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	619.3
Minimum	###	95% KM (bootstrap t) UCL	1011
Maximum	###	95% KM (BCA) UCL	660
Mean	384	95% KM (Percentile Bootstrap) UCL	633
Median	61	95% KM (Chebyshev) UCL	997.3
SD	###	97.5% KM (Chebyshev) UCL	1262
k star	0.2	99% KM (Chebyshev) UCL	1783
Theta star	###		
Nu star	22	Potential UCLs to Use	
AppChi2	12	**95% KM (Chebyshev) UCL**	**997.3**
95% Gamma Approximate UCL	685		
95% Adjusted Gamma UCL	695		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

APPENDIX B

Recalculations

Comparison of ERA Calculation and Recalculation Results

Receptor Group	Constituent	Tier I				Tier II			
		ERA	Recalculated	ERA	Recalculated	ERA	Recalculated	ERA	Recalculated
		NOAEL HQ		LOAEL HQ		NOAEL HQ		LOAEL HQ	
Meadow Vole	alpha-Chlordane	0.0009	0.002	0.0004	0.0008	0.00003	0.0002	0.00001	0.00008
	Lindane	0.000006	0.0002	0.0000006	0.00002	0.000003	0.00004	0.0000003	0.000004
	gamma-Chlordane	0.0008	0.001	0.0004	0.0006	0.00002	0.0001	0.00001	0.00006
	Heptachlor	0.003	0.009	0.0003	0.0009	0.0001	0.0002	0.00001	0.00002
	Heptachlor epoxide	0.01	0.02	0.001	0.002	0.0006	0.0009	0.00006	0.00009
	DDT	0.1	0.2	0.003	0.006	0.02	0.03	0.0005	0.0008
	Total	**0.1**	**0.3**	**0.005**	**0.01**	**0.02**	**0.03**	**0.0006**	**0.001**
Short-Tailed Shrew	alpha-Chlordane	0.3	1.2	0.2	0.6	0.04	0.2	0.02	0.1
	Lindane	0.0002	0.01	0.00002	0.001	0.0002	0.003	0.00002	0.0003
	gamma-Chlordane	0.3	1.0	0.2	0.5	0.03	0.2	0.02	0.1
	Heptachlor	0.7	3.9	0.07	0.4	0.08	0.2	0.008	0.02
	Heptachlor epoxide	0.4	1.6	0.04	0.2	0.05	0.08	0.005	0.008
	DDT	12	59	0.3	1.6	3.7	6.8	0.1	0.2
	Total	**14**	**67**	**0.8**	**3.2**	**4**	**7**	**0.1**	**0.4**
American Robin	alpha-Chlordane	1.1	4.2	0.2	0.8	0.1	0.8	0.03	0.2
	Lindane	0.001	0.1	0.0001	0.008	0.001	0.02	0.0001	0.002
	gamma-Chlordane	1.03	3.7	0.2	0.7	0.1	0.7	0.02	0.1
	Heptachlor	1.1	6.4	1.1	6.4	0.1	0.3	0.1	0.3
	Heptachlor epoxide	0.7	2.7	0.7	2.7	0.08	0.1	0.08	0.1
	DDT	12	63	1.0	5.3	4.0	7.3	0.3	0.6
	Total	**16**	**80**	**3.3**	**16**	**5**	**9**	**0.6**	**1.4**
Bobwhite Quail	alpha-Chlordane	0.006	0.02	0.001	0.004	0.0003	0.002	0.00006	0.0003
	Lindane	0.00003	0.002	0.000003	0.0002	0.00002	0.0003	0.000002	0.00003
	gamma-Chlordane	0.006	0.02	0.001	0.003	0.0002	0.001	0.00005	0.0003
	Heptachlor	0.01	0.05	0.01	0.05	0.0005	0.001	0.0005	0.001
	Heptachlor epoxide	0.03	0.09	0.03	0.09	0.002	0.003	0.002	0.003
	DDT	0.1	0.6	0.01	0.05	0.03	0.05	0.002	0.004
	Total	**0.2**	**0.8**	**0.05**	**0.2**	**0.03**	**0.06**	**0.005**	**0.009**

Reproduction of ERA Calculations

(Slight diffrerences due to rounding and different approaches for duplciate samples)

used wrong BW

Meadow vole - Tier I	Csoil-max mg/kg	CA/HR unitless	If (dry) kg/day	% Plant ingestion %	Plant BCF - conserv	Plant Conc mg/kg	% Worm Ingestion %	Worm BCF	Worm Conc mg/kg	Soil (Conserv) decimal %	Is (Conserv) kg/dy	BW kg	Dose from Plant mg/kg-dy	Dose from Worms mg/kg-dy	Dose from Soil mg/kg-dy	Total Dose mg/kg-dy	NOAEL mg/kg-dy	HQ (NOAEL)	LOAEL mg/kg-dy	HQ (LOAEL)
alpha-Chlordane	8.40E-01	1	1.88E-03	1	0.0112	9.41E-03	0	17.8	1.50E+01	0.032	6.01E-05	1.70E-02	1.04E-03	0.00E+00	2.97E-03	4.01E-03	4.58E+00	0.0009	9.16E+00	0.0004
Lindane	1.50E-03	1	1.88E-03	1	0.268	4.02E-04	0	10.1	1.52E-02	0.032	6.01E-05	1.70E-02	4.44E-05	0.00E+00	5.31E-06	4.98E-05	8.00E+00	0.000006	8.00E+01	0.0000006
gamma-Chlordane	7.60E-01	1	1.88E-03	1	0.0095	7.22E-03	0	17.8	1.35E+01	0.032	6.01E-05	1.70E-02	7.98E-04	0.00E+00	2.69E-03	3.49E-03	4.58E+00	0.0008	9.16E+00	0.0004
Heptachlor	6.90E-02	1	1.88E-03	1	0.0112	7.73E-04	0	10	6.90E-01	0.032	6.01E-05	1.70E-02	8.54E-05	0.00E+00	2.44E-04	3.30E-04	1.00E-01	0.003	1.00E+00	0.0003
Heptachlor epoxide	1.30E-01	1	1.88E-03	1	0.0498	6.47E-03	0	3	3.90E-01	0.032	6.01E-05	1.70E-02	7.16E-04	0.00E+00	4.60E-04	1.18E-03	1.00E-01	0.01	1.00E+00	0.001
DDT	1.50E+00	1	1.88E-03	1	regression	1.09E-01	0	11.2	1.68E+01	0.032	6.01E-05	1.70E-02	1.21E-02	0.00E+00	5.31E-03	1.74E-02	1.47E-01	0.1	5.56E+00	0.003
Total																		0.1		0.005

Meadow vole - Tier II	Csoil 95% UCL mg/kg	CA/HR unitless	If (dry) kg/day	% Plant ingestion %	Plant BCF - conserv	Plant Conc mg/kg	% Worm Ingestion %	Worm BCF	Worm Conc mg/kg	Soil (Conserv) decimal %	Is (Conserv) kg/dy	BW kg	Dose from Plant mg/kg-dy	Dose from Worms mg/kg-dy	Dose from Soil mg/kg-dy	Total Dose mg/kg-dy	NOAEL mg/kg-dy	HQ (NOAEL)	LOAEL mg/kg-dy	HQ (LOAEL)
alpha-Chlordane	1.10E-01	1	1.75E-03	1	0.0112	1.23E-03	0	17.8	1.96E+00	0.012	2.09E-05	3.58E-02	6.01E-05	0.00E+00	6.44E-05	1.24E-04	4.58E+00	0.00003	9.16E+00	0.00001
Lindane	1.50E-03	1	1.75E-03	1	0.268	4.02E-04	0	10.1	1.52E-02	0.012	2.09E-05	3.58E-02	1.96E-05	0.00E+00	8.78E-07	2.05E-05	8.00E+00	0.000003	8.00E+01	0.0000003
gamma-Chlordane	9.70E-02	1	1.75E-03	1	0.0095	9.22E-04	0	17.8	1.73E+00	0.012	2.09E-05	3.58E-02	4.49E-05	0.00E+00	5.67E-05	1.02E-04	4.58E+00	0.00002	9.16E+00	0.00001
Heptachlor	9.40E-03	1	1.75E-03	1	0.0112	1.05E-04	0	10	9.40E-02	0.012	2.09E-05	3.58E-02	5.13E-06	0.00E+00	5.50E-06	1.06E-05	1.00E-01	0.0001	1.00E+00	0.00001
Heptachlor epoxide	1.90E-02	1	1.75E-03	1	0.0498	9.46E-04	0	3	5.70E-02	0.012	2.09E-05	3.58E-02	4.61E-05	0.00E+00	1.11E-05	5.72E-05	1.00E-01	0.0006	1.00E+00	0.00006
DDT	5.50E-01	1	1.75E-03	1	regression	5.14E-02	0	11.2	6.16E+00	0.012	2.09E-05	3.58E-02	2.50E-03	0.00E+00	3.22E-04	2.83E-03	1.47E-01	0.02	5.56E+00	0.0005
Total																		0.0		0.0006

Used max BW

Short-tailed Shrew - Tier I	Csoil-max mg/kg	CA/HR unitless	If (dry) kg/day	% Plant ingestion %	Plant BCF - conserv	Plant Conc mg/kg	% Worm Ingestion %	Worm BCF	Worm Conc mg/kg	Soil (Conserv) decimal %	Is (Conserv) kg/dy	BW kg	Dose from Plant mg/kg-dy	Dose from Worms mg/kg-dy	Dose from Soil mg/kg-dy	Total Dose mg/kg-dy	NOAEL mg/kg-dy	HQ (NOAEL)	LOAEL mg/kg-dy	HQ (LOAEL)
alpha-Chlordane	8.40E-01	1	1.60E-03	0	0.0112	9.41E-03	1	17.8	1.50E+01	0.03	4.79E-05	1.50E-02	0.00E+00	1.59E+00	2.68E-03	1.59E+00	4.58E+00	0.3	9.16E+00	0.2
Lindane	1.50E-03	1	1.60E-03	0	0.268	4.02E-04	1	10.1	1.52E-02	0.03	4.79E-05	1.50E-02	0.00E+00	1.61E-03	4.79E-06	1.62E-03	8.00E+00	0.0002	8.00E+01	0.00002
gamma-Chlordane	7.60E-01	1	1.60E-03	0	0.0095	7.22E-03	1	17.8	1.35E+01	0.03	4.79E-05	1.50E-02	0.00E+00	1.44E+00	2.43E-03	1.44E+00	4.58E+00	0.3	9.16E+00	0.2
Heptachlor	6.90E-02	1	1.60E-03	0	0.0112	7.73E-04	1	10	6.90E-01	0.03	4.79E-05	1.50E-02	0.00E+00	7.35E-02	2.20E-04	7.37E-02	1.00E-01	0.7	1.00E+00	0.07
Heptachlor epoxide	1.30E-01	1	1.60E-03	0	0.0498	6.47E-03	1	3	3.90E-01	0.03	4.79E-05	1.50E-02	0.00E+00	4.15E-02	4.15E-04	4.19E-02	1.00E-01	0.4	1.00E+00	0.04
DDT	1.50E+00	1	1.60E-03	0	regression	1.09E-01	1	11.2	1.68E+01	0.03	4.79E-05	1.50E-02	0.00E+00	1.79E+00	4.79E-03	1.79E+00	0.147	12.2	5.56E+00	0.3
Total																		14.0		0.8

Short-tailed Shrew - Tier II	Csoil 95% UCL mg/kg	CA/HR unitless	If (dry) kg/day	% Plant ingestion %	Plant BCF - conserv	Plant Conc mg/kg	% Worm Ingestion %	Worm BCF	Worm Conc mg/kg	Soil (Conserv) decimal %	Is (Conserv) kg/dy	BW kg	Dose from Plant mg/kg-dy	Dose from Worms mg/kg-dy	Dose from Soil mg/kg-dy	Total Dose mg/kg-dy	NOAEL mg/kg-dy	HQ (NOAEL)	LOAEL mg/kg-dy	HQ (LOAEL)
alpha-Chlordane	1.10E-01	1	1.43E-03	0	0.0112	1.23E-03	1	17.8	1.96E+00	0.009	1.29E-05	1.61E-02	0.00E+00	1.74E-01	8.79E-05	1.74E-01	4.58E+00	0.04	9.16E+00	0.02
Lindane	1.50E-03	1	1.43E-03	0	0.268	4.02E-04	1	10.1	1.52E-02	0.009	1.29E-05	1.61E-02	0.00E+00	1.35E-03	1.20E-06	1.35E-03	8.00E+00	0.0002	8.00E+01	0.00002
gamma-Chlordane	9.70E-02	1	1.43E-03	0	0.0095	9.22E-04	1	17.8	1.73E+00	0.009	1.29E-05	1.61E-02	0.00E+00	1.53E-01	7.75E-05	1.53E-01	4.58E+00	0.03	9.16E+00	0.02
Heptachlor	9.40E-03	1	1.43E-03	0	0.0112	1.05E-04	1	10	9.40E-02	0.009	1.29E-05	1.61E-02	0.00E+00	8.35E-03	7.51E-06	8.35E-03	1.00E-01	0.08	1.00E+00	0.008
Heptachlor epoxide	1.90E-02	1	1.43E-03	0	0.0498	9.46E-04	1	3	5.70E-02	0.009	1.29E-05	1.61E-02	0.00E+00	5.06E-03	1.52E-05	5.08E-03	1.00E-01	0.05	1.00E+00	0.005
DDT	5.50E-01	1	1.43E-03	0	regression	5.14E-02	1	11.2	6.16E+00	0.009	1.29E-05	1.61E-02	0.00E+00	5.47E-01	4.40E-04	5.47E-01	0.147	3.7	5.56E+00	0.1
Total																		3.9		0.1

Reproduction of ERA Calculations

(Slight diffrerences due to rounding and different approaches for duplciate samples)

field metabolic scaling?

Robin - Tier I	Csoil-max mg/kg	CA/HR unitless	If (dry) kg/day	% Plant ingestion %	Plant BCF - conserv	Plant Conc mg/kg	% Worm Ingestion %	Worm BCF	Worm Conc mg/kg	Soil (Conserv) decimal %	Is (Conserv) kg/dy	BW kg	Dose from Plant mg/kg-dy	Dose from Worms mg/kg-dy	Dose from Soil mg/kg-dy	Total Dose mg/kg-dy	NOAEL mg/kg-dy	HQ (NOAEL)	LOAEL mg/kg-dy	HQ (LOAEL)
alpha-Chlordane	8.40E-01	1	1.25E-02	0	0.0112	9.41E-03	1	17.8	1.50E+01	0.164	2.05E-03	7.73E-02	0.00E+00	2.42E+00	2.23E-02	2.44E+00	2.14E+00	1.1	1.07E+01	0.2
Lindane	1.50E-03	1	1.25E-02	0	0.268	4.02E-04	1	10.1	1.52E-02	0.164	2.05E-03	7.73E-02	0.00E+00	2.45E-03	3.98E-05	2.49E-03	2.00E+00	0.001	2.00E+01	0.0001
gamma-Chlordane	7.60E-01	1	1.25E-02	0	0.0095	7.22E-03	1	17.8	1.35E+01	0.164	2.05E-03	7.73E-02	0.00E+00	2.19E+00	2.02E-02	2.21E+00	2.14E+00	1.0	1.07E+01	0.2
Heptachlor	6.90E-02	1	1.25E-02	0	0.0112	7.73E-04	1	10	6.90E-01	0.164	2.05E-03	7.73E-02	0.00E+00	1.12E-01	1.83E-03	1.14E-01	1.00E-01	1.1	1.00E-01	1.1
Heptachlor epoxide	1.30E-01	1	1.25E-02	0	0.0498	6.47E-03	1	3	3.90E-01	0.164	2.05E-03	7.73E-02	0.00E+00	6.31E-02	3.45E-03	6.66E-02	1.00E-01	0.7	1.00E-01	0.7
DDT	1.50E+00	1	1.25E-02	0	regression	1.09E-01	1	11.2	1.68E+01	0.164	2.05E-03	7.73E-02	0.00E+00	2.72E+00	3.98E-02	2.76E+00	2.27E-01	12	2.70E+00	1.0
Total																		16		3.3

field metabolic scaling?

Robin - Tier II	Csoil 95% UCL mg/kg	CA/HR unitless	If (dry) kg/day	% Plant ingestion %	Plant BCF - conserv	Plant Conc mg/kg	% Worm Ingestion %	Worm BCF	Worm Conc mg/kg	Soil (Conserv) decimal %	Is (Conserv) kg/dy	BW kg	Dose from Plant mg/kg-dy	Dose from Worms mg/kg-dy	Dose from Soil mg/kg-dy	Total Dose mg/kg-dy	NOAEL mg/kg-dy	HQ (NOAEL)	LOAEL mg/kg-dy	HQ (LOAEL)
alpha chlordane	1.10E-01	1	1.19E-02	0	0.0112	1.23E-03	1	17.8	1.96E+00	0.0064	7.63E-05	8.04E-02	0.00E+00	2.90E-01	1.04E-04	2.90E-01	2.14E+00	0.1	1.07E+01	0.03
Lindane	1.50E-03	1	1.19E-02	0	0.268	4.02E-04	1	10.1	1.52E-02	0.0064	7.63E-05	8.04E-02	0.00E+00	2.25E-03	1.42E-06	2.25E-03	2.00E+00	0.001	2.00E+01	0.0001
gamma-Chlordane	9.70E-02	1	1.19E-02	0	0.0095	9.22E-04	1	17.8	1.73E+00	0.0064	7.63E-05	8.04E-02	0.00E+00	2.56E-01	9.20E-05	2.56E-01	2.14E+00	0.1	1.07E+01	0.02
Heptachlor	9.40E-03	1	1.19E-02	0	0.0112	1.05E-04	1	10	9.40E-02	0.0064	7.63E-05	8.04E-02	0.00E+00	1.39E-02	8.92E-06	1.39E-02	1.00E-01	0.1	1.00E-01	0.1
Heptachlor epoxide	1.90E-02	1	1.19E-02	0	0.0498	9.46E-04	1	3	5.70E-02	0.0064	7.63E-05	8.04E-02	0.00E+00	8.45E-03	1.80E-05	8.47E-03	1.00E-01	0.08	1.00E-01	0.08
DDT	5.50E-01	1	1.19E-02	0	regression	5.14E-02	1	11.2	6.16E+00	0.0064	7.63E-05	8.04E-02	0.00E+00	9.13E-01	5.22E-04	9.13E-01	2.27E-01	4	2.70E+00	0.3
Total																		4.5		0.6

wrong BW

Quail - Tier I	Csoil-max mg/kg	CA/HR unitless	If (dry) kg/day	% Plant ingestion %	Plant BCF - conserv	Plant Conc mg/kg	% Worm Ingestion %	Worm BCF	Worm Conc mg/kg	Soil (Conserv) decimal %	Is (Conserv) kg/dy	BW kg	Dose from Plant mg/kg-dy	Dose from Worms mg/kg-dy	Dose from Soil mg/kg-dy	Total Dose mg/kg-dy	NOAEL mg/kg-dy	HQ (NOAEL)	LOAEL mg/kg-dy	HQ (LOAEL)
alpha-Chlordane	8.40E-01	1	1.63E-02	1	0.0112	9.41E-03	0	17.8	1.50E+01	0.139	2.26E-03	1.54E-01	9.95E-04	0.00E+00	1.23E-02	1.33E-02	2.14E+00	0.006	1.07E+01	0.001
Lindane	1.50E-03	1	1.63E-02	1	0.268	4.02E-04	0	10.1	1.52E-02	0.139	2.26E-03	1.54E-01	4.25E-05	0.00E+00	2.20E-05	6.46E-05	2.00E+00	0.00003	2.00E+01	0.000003
gamma-Chlordane	7.60E-01	1	1.63E-02	1	0.0095	7.22E-03	0	17.8	1.35E+01	0.139	2.26E-03	1.54E-01	7.63E-04	0.00E+00	1.12E-02	1.19E-02	2.14E+00	0.006	1.07E+01	0.001
Heptachlor	6.90E-02	1	1.63E-02	1	0.0112	7.73E-04	0	10	6.90E-01	0.139	2.26E-03	1.54E-01	8.17E-05	0.00E+00	1.01E-03	1.10E-03	1.00E-01	0.01	1.00E-01	0.01
Heptachlor epoxide	1.30E-01	1	1.63E-02	1	0.0498	6.47E-03	0	3	3.90E-01	0.139	2.26E-03	1.54E-01	6.85E-04	0.00E+00	1.91E-03	2.60E-03	1.00E-01	0.03	1.00E-01	0.03
DDT	1.50E+00	1	1.63E-02	1	regression	1.09E-01	0	11.2	1.68E+01	0.139	2.26E-03	1.54E-01	1.16E-02	0.00E+00	2.20E-02	3.36E-02	2.27E-01	0.1	2.70E+00	0.01
Total																		0.2		0.05

Quail -Tier II	Csoil 95% UCL mg/kg	CA/HR unitless	If (dry) kg/day	% Plant ingestion %	Plant BCF - conserv	Plant Conc mg/kg	% Worm Ingestion %	Worm BCF	Worm Conc mg/kg	Soil (Conserv) decimal %	Is (Conserv) kg/dy	BW kg	Dose from Plant mg/kg-dy	Dose from Worms mg/kg-dy	Dose from Soil mg/kg-dy	Total Dose mg/kg-dy	NOAEL mg/kg-dy	HQ (NOAEL)	LOAEL mg/kg-dy	HQ (LOAEL)
alpha-Chlordane	1.10E-01	1	1.37E-02	1	0.0112	1.23E-03	0	17.8	1.96E+00	0.061	8.33E-04	1.75E-01	9.61E-05	0.00E+00	5.23E-04	6.19E-04	2.14E+00	0.0003	1.07E+01	0.00006
Lindane	1.50E-03	1	1.37E-02	1	0.268	4.02E-04	0	10.1	1.52E-02	0.061	8.33E-04	1.75E-01	3.14E-05	0.00E+00	7.14E-06	3.85E-05	2.00E+00	0.00002	2.00E+01	0.000002
gamma-Chlordane	9.70E-02	1	1.37E-02	1	0.0095	9.22E-04	0	17.8	1.73E+00	0.061	8.33E-04	1.75E-01	7.19E-05	0.00E+00	4.62E-04	5.33E-04	2.14E+00	0.0002	1.07E+01	0.00005
Heptachlor	9.40E-03	1	1.37E-02	1	0.0112	1.05E-04	0	10	9.40E-02	0.061	8.33E-04	1.75E-01	8.21E-06	0.00E+00	4.47E-05	5.29E-05	1.00E-01	0.0005	1.00E-01	0.0005
Heptachlor epoxide	1.90E-02	1	1.37E-02	1	0.0498	9.46E-04	0	3	5.70E-02	0.061	8.33E-04	1.75E-01	7.38E-05	0.00E+00	9.04E-05	1.64E-04	1.00E-01	0.002	1.00E-01	0.002
DDT	5.50E-01	1	1.37E-02	1	regression	5.14E-02	0	11.2	6.16E+00	0.061	8.33E-04	1.75E-01	4.01E-03	0.00E+00	2.62E-03	6.62E-03	2.27E-01	0.03	2.70E+00	0.002
Total																		0.0		0.005

average is off

Recalculation of Ecological Risk Values

BW = 0.017

Meadow vole - Tier I	Csoil-max mg/kg	CA/HR unitless	If (dry) kg/day	% Plant ingestion %	Plant BCF	Plant conc mg/kg	% worm ingestion	Worm BCF	Worm Conc mg/kg	Soil (Conserv) decimal %	Is (Conserv) kg/dy	BW kg	Dose from Plant mg/kg-dy	Dose from Worms mg/kg-dy	Dose from Soil mg/kg-dy	Total Dose mg/kg-dy	NOAEL mg/kg-dy	HQ (NOAEL)	LOAEL mg/kg-dy	HQ (LOAEL)
alpha chlordane	3.10E+00	1	8.93E-04	1	0.0112	3.47E-02	0	17.8	5.52E+01	0.032	2.86E-05	1.70E-02	1.82E-03	0.00E+00	5.21E-03	7.03E-03	4.58E+00	0.002	9.16E+00	0.0008
Lindane	9.10E-02	1	8.93E-04	1	0.268	2.44E-02	0	10.1	9.19E-01	0.032	2.86E-05	1.70E-02	1.28E-03	0.00E+00	1.53E-04	1.43E-03	8.00E+00	0.0002	8.00E+01	0.00002
gamma-Chlordane	2.70E+00	1	8.93E-04	1	0.0095	2.57E-02	0	17.8	4.81E+01	0.032	2.86E-05	1.70E-02	1.35E-03	0.00E+00	4.54E-03	5.88E-03	4.58E+00	0.001	9.16E+00	0.0006
Heptachlor	3.90E-01	1	8.93E-04	1	0.0112	4.37E-03	0	10	3.90E+00	0.032	2.86E-05	1.70E-02	2.29E-04	0.00E+00	6.55E-04	8.85E-04	1.00E-01	0.009	1.00E+00	0.0009
heptachlor epoxide	5.30E-01	1	8.93E-04	1	0.0498	2.64E-02	0	3	1.59E+00	0.032	2.86E-05	1.70E-02	1.39E-03	0.00E+00	8.90E-04	2.28E-03	1.00E-01	0.02	1.00E+00	0.002
DDT	7.80E+00	1	8.93E-04	1	regression	3.78E-01	0	11.2	8.74E+01	0.032	2.86E-05	1.70E-02	1.98E-02	0.00E+00	1.31E-02	3.29E-02	1.47E-01	0.2	5.56E+00	0.006
Total																		0.3		0.01

Meadow vole - Tier II	Csoil 95% UCL mg/kg	CA/HR unitless	If (dry) kg/day	% Plant ingestion %	Plant BCF	Plant conc mg/kg	% worm ingestion	Worm BCF	Worm Conc mg/kg	Soil (Conserv) decimal %	Is (Conserv) kg/dy	BW kg	Dose from Plant mg/kg-dy	Dose from Worms mg/kg-dy	Dose from Soil mg/kg-dy	Total Dose mg/kg-dy	NOAEL mg/kg-dy	HQ (NOAEL)	LOAEL mg/kg-dy	HQ (LOAEL)
alpha chlordane	6.39E-01	1	1.75E-03	1	0.0112	7.16E-03	0	17.8	1.14E+01	0.012	2.09E-05	3.58E-02	3.49E-04	0.00E+00	3.74E-04	7.23E-04	4.58E+00	0.0002	9.16E+00	0.00008
Lindane	2.46E-02	1	1.75E-03	1	0.268	6.58E-03	0	10.1	2.48E-01	0.012	2.09E-05	3.58E-02	3.21E-04	0.00E+00	1.44E-05	3.35E-04	8.00E+00	0.00004	8.00E+01	0.000004
gamma-Chlordane	5.61E-01	1	1.75E-03	1	0.0095	5.33E-03	0	17.8	9.99E+00	0.012	2.09E-05	3.58E-02	2.60E-04	0.00E+00	3.28E-04	5.88E-04	4.58E+00	0.0001	9.16E+00	0.00006
Heptachlor	2.13E-02	1	1.75E-03	1	0.0112	2.38E-04	0	10	2.13E-01	0.012	2.09E-05	3.58E-02	1.16E-05	0.00E+00	1.24E-05	2.41E-05	1.00E-01	0.0002	1.00E+00	0.00002
heptachlor epoxide	3.11E-02	1	1.75E-03	1	0.0498	1.55E-03	0	3	9.34E-02	0.012	2.09E-05	3.58E-02	7.56E-05	0.00E+00	1.82E-05	9.38E-05	1.00E-01	0.0009	1.00E+00	0.00009
DDT	9.97E-01	1	1.75E-03	1	regression	8.04E-02	0	11.2	1.12E+01	0.012	2.09E-05	3.58E-02	3.92E-03	0.00E+00	5.83E-04	4.50E-03	1.47E-01	0.03	5.56E+00	0.0008
Total																		0.03		0.001

BW = 0.015

Short-tailed Shrew - Tier I	Csoil-max mg/kg	CA/HR unitless	If (dry) kg/day	% Plant ingestion %	Plant BCF	Plant conc mg/kg	% worm ingestion	Worm BCF	Worm Conc mg/kg	Soil (Conserv) decimal %	Is (Conserv) kg/dy	BW kg	Dose from Plant mg/kg-dy	Dose from Worms mg/kg-dy	Dose from Soil mg/kg-dy	Total Dose mg/kg-dy	NOAEL mg/kg-dy	HQ (NOAEL)	LOAEL mg/kg-dy	HQ (LOAEL)
alpha chlordane	3.10E+00	1	1.49E-03	0	0.0112	3.47E-02	1	17.8	5.52E+01	0.03	4.46E-05	1.50E-02	0.00E+00	5.47E+00	9.23E-03	5.48E+00	4.58E+00	1.2	9.16E+00	0.6
Lindane	9.10E-02	1	1.49E-03	0	0.268	2.44E-02	1	10.1	9.19E-01	0.03	4.46E-05	1.50E-02	0.00E+00	9.12E-02	2.71E-04	9.14E-02	8.00E+00	0.0114	8.00E+01	0.00114
gamma-Chlordane	2.70E+00	1	1.49E-03	0	0.0095	2.57E-02	1	17.8	4.81E+01	0.03	4.46E-05	1.50E-02	0.00E+00	4.77E+00	8.04E-03	4.78E+00	4.58E+00	1.0	9.16E+00	0.5
Heptachlor	3.90E-01	1	1.49E-03	0	0.0112	4.37E-03	1	10	3.90E+00	0.03	4.46E-05	1.50E-02	0.00E+00	3.87E-01	1.16E-03	3.88E-01	1.00E-01	3.9	1.00E+00	0.39
heptachlor epoxide	5.30E-01	1	1.49E-03	0	0.0498	2.64E-02	1	3	1.59E+00	0.03	4.46E-05	1.50E-02	0.00E+00	1.58E-01	1.58E-03	1.59E-01	1.00E-01	1.6	1.00E+00	0.16
DDT	7.80E+00	1	1.49E-03	0	regression	3.78E-01	1	11.2	8.74E+01	0.03	4.46E-05	1.50E-02	0.00E+00	8.67E+00	2.32E-02	8.69E+00	0.147	59	5.56E+00	1.6
Total																		67		3.2

Short-tailed Shrew - Tier II	Csoil 95% UCL mg/kg	CA/HR unitless	If (dry) kg/day	% Plant ingestion %	Plant BCF	Plant conc mg/kg	% worm ingestion	Worm BCF	Worm Conc mg/kg	Soil (Conserv) decimal %	Is (Conserv) kg/dy	BW kg	Dose from Plant mg/kg-dy	Dose from Worms mg/kg-dy	Dose from Soil mg/kg-dy	Total Dose mg/kg-dy	NOAEL mg/kg-dy	HQ (NOAEL)	LOAEL mg/kg-dy	HQ (LOAEL)
alpha chlordane	6.39E-01	1	1.43E-03	0	0.0112	7.16E-03	1	17.8	1.14E+01	0.009	1.29E-05	1.61E-02	0.00E+00	1.01E+00	5.11E-04	1.01E+00	4.58E+00	0.22	9.16E+00	0.11
Lindane	2.46E-02	1	1.43E-03	0	0.268	6.58E-03	1	10.1	2.48E-01	0.009	1.29E-05	1.61E-02	0.00E+00	2.20E-02	1.96E-05	2.21E-02	8.00E+00	0.0028	8.00E+01	0.00028
gamma-Chlordane	5.61E-01	1	1.43E-03	0	0.0095	5.33E-03	1	17.8	9.99E+00	0.009	1.29E-05	1.61E-02	0.00E+00	8.87E-01	4.49E-04	8.88E-01	4.58E+00	0.19	9.16E+00	0.10
Heptachlor	2.13E-02	1	1.43E-03	0	0.0112	2.38E-04	1	10	2.13E-01	0.009	1.29E-05	1.61E-02	0.00E+00	1.89E-02	1.70E-05	1.89E-02	1.00E-01	0.19	1.00E+00	0.019
heptachlor epoxide	3.11E-02	1	1.43E-03	0	0.0498	1.55E-03	1	3	9.34E-02	0.009	1.29E-05	1.61E-02	0.00E+00	8.29E-03	2.49E-05	8.32E-03	1.00E-01	0.08	1.00E+00	0.008
DDT	9.97E-01	1	1.43E-03	0	regression	8.04E-02	1	11.2	1.12E+01	0.009	1.29E-05	1.61E-02	0.00E+00	9.92E-01	7.97E-04	9.92E-01	0.147	6.8	5.56E+00	0.2
Total																		7		0.4

Recalculation of Ecological Risk Values

field metabolic scaling?

Robin - Tier I	Csoil-max mg/kg	CA/HR unitless	If (dry) kg/day	% Plant ingestion %	Plant BCF	Plant conc mg/kg	% worm ingestion	Worm BCF	Worm Conc mg/kg	Soil (Conserv) decimal %	Is (Conserv) kg/dy	BW kg	Dose from Plant mg/kg-dy	Dose from Worms mg/kg-dy	Dose from Soil mg/kg-dy	Total Dose mg/kg-dy	NOAEL mg/kg-dy	HQ (NOAEL)	LOAEL mg/kg-dy	HQ (LOAEL)
alpha chlordane	3.10E+00	1	1.25E-02	0	0.0112	3.47E-02	1	17.8	5.52E+01	0.164	2.05E-03	7.73E-02	0.00E+00	8.93E+00	8.23E-02	9.01E+00	2.14E+00	4.2	1.07E+01	0.8
Lindane	9.10E-02	1	1.25E-02	0	0.268	2.44E-02	1	10.1	9.19E-01	0.164	2.05E-03	7.73E-02	0.00E+00	1.49E-01	2.42E-03	1.51E-01	2.00E+00	0.076	2.00E+01	0.0076
gamma-Chlordane	2.70E+00	1	1.25E-02	0	0.0095	2.57E-02	1	17.8	4.81E+01	0.164	2.05E-03	7.73E-02	0.00E+00	7.78E+00	7.17E-02	7.85E+00	2.14E+00	3.67	1.07E+01	0.7
Heptachlor	3.90E-01	1	1.25E-02	0	0.0112	4.37E-03	1	10	3.90E+00	0.164	2.05E-03	7.73E-02	0.00E+00	6.31E-01	1.04E-02	6.42E-01	1.00E-01	6.4	1.00E-01	6.4
heptachlor epoxide	5.30E-01	1	1.25E-02	0	0.0498	2.64E-02	1	3	1.59E+00	0.164	2.05E-03	7.73E-02	0.00E+00	2.57E-01	1.41E-02	2.71E-01	1.00E-01	2.7	1.00E-01	2.7
DDT	7.80E+00	1	1.25E-02	0	regression	3.78E-01	1	11.2	8.74E+01	0.164	2.05E-03	7.73E-02	0.00E+00	1.41E+01	2.07E-01	1.43E+01	2.27E-01	63	2.70E+00	5.31
Total																		80		16.0

field metabolic scaling?

Robin - Tier II	Csoil 95% UCL mg/kg	CA/HR unitless	If (dry) kg/day	% Plant ingestion %	Plant BCF	Plant conc mg/kg	% worm ingestion	Worm BCF	Worm Conc mg/kg	Soil (Conserv) decimal %	Is (Conserv) kg/dy	BW kg	Dose from Plant mg/kg-dy	Dose from Worms mg/kg-dy	Dose from Soil mg/kg-dy	Total Dose mg/kg-dy	NOAEL mg/kg-dy	HQ (NOAEL)	LOAEL mg/kg-dy	HQ (LOAEL)
alpha chlordane	6.39E-01	1	1.19E-02	0	0.0112	7.16E-03	1	17.8	1.14E+01	0.0064	7.63E-05	8.04E-02	0.00E+00	1.69E+00	6.06E-04	1.69E+00	2.14E+00	0.8	1.07E+01	0.16
Lindane	2.46E-02	1	1.19E-02	0	0.268	6.58E-03	1	10.1	2.48E-01	0.0064	7.63E-05	8.04E-02	0.00E+00	3.68E-02	2.33E-05	3.68E-02	2.00E+00	0.018	2.00E+01	0.0018
gamma-Chlordane	5.61E-01	1	1.19E-02	0	0.0095	5.33E-03	1	17.8	9.99E+00	0.0064	7.63E-05	8.04E-02	0.00E+00	1.48E+00	5.32E-04	1.48E+00	2.14E+00	0.7	1.07E+01	0.14
Heptachlor	2.13E-02	1	1.19E-02	0	0.0112	2.38E-04	1	10	2.13E-01	0.0064	7.63E-05	8.04E-02	0.00E+00	3.15E-02	2.02E-05	3.15E-02	1.00E-01	0.3	1.00E-01	0.3
heptachlor epoxide	3.11E-02	1	1.19E-02	0	0.0498	1.55E-03	1	3	9.34E-02	0.0064	7.63E-05	8.04E-02	0.00E+00	1.38E-02	2.95E-05	1.39E-02	1.00E-01	0.14	1.00E-01	0.14
DDT	9.97E-01	1	1.19E-02	0	regression	8.04E-02	1	11.2	1.12E+01	0.0064	7.63E-05	8.04E-02	0.00E+00	1.65E+00	9.46E-04	1.66E+00	2.27E-01	7	2.70E+00	0.6
Total																		9.2		1.4

wrong BW

Quail - Tier I	Csoil-max mg/kg	CA/HR unitless	If (dry) kg/day	% Plant ingestion %	Plant BCF	Plant conc mg/kg	% worm ingestion	Worm BCF	Worm Conc mg/kg	Soil (Conserv) decimal %	Is (Conserv) kg/dy	BW kg	Dose from Plant mg/kg-dy	Dose from Worms mg/kg-dy	Dose from Soil mg/kg-dy	Total Dose mg/kg-dy	NOAEL mg/kg-dy	HQ (NOAEL)	LOAEL mg/kg-dy	HQ (LOAEL)
alpha chlordane	3.10E+00	1	1.43E-02	1	0.0112	3.47E-02	0	17.8	5.52E+01	0.139	1.99E-03	1.54E-01	3.23E-03	0.00E+00	4.01E-02	4.33E-02	2.14E+00	0.020	1.07E+01	0.004
Lindane	9.10E-02	1	1.43E-02	1	0.268	2.44E-02	0	10.1	9.19E-01	0.139	1.99E-03	1.54E-01	2.27E-03	0.00E+00	1.18E-03	3.44E-03	2.00E+00	0.00172	2.00E+01	0.000172
gamma-Chlordane	2.70E+00	1	1.43E-02	1	0.0095	2.57E-02	0	17.8	4.81E+01	0.139	1.99E-03	1.54E-01	2.39E-03	0.00E+00	3.49E-02	3.73E-02	2.14E+00	0.017	1.07E+01	0.003
Heptachlor	3.90E-01	1	1.43E-02	1	0.0112	4.37E-03	0	10	3.90E+00	0.139	1.99E-03	1.54E-01	4.06E-04	0.00E+00	5.04E-03	5.45E-03	1.00E-01	0.05	1.00E-01	0.05
heptachlor epoxide	5.30E-01	1	1.43E-02	1	0.0498	2.64E-02	0	3	1.59E+00	0.139	1.99E-03	1.54E-01	2.45E-03	0.00E+00	6.85E-03	9.31E-03	1.00E-01	0.09	1.00E-01	0.09
DDT	7.80E+00	1	1.43E-02	1	regression	3.78E-01	0	11.2	8.74E+01	0.139	1.99E-03	1.54E-01	3.51E-02	0.00E+00	1.01E-01	1.36E-01	2.27E-01	0.6	2.70E+00	0.05
Total																		0.8		0.21

Quail -Tier II	Csoil 95% UCL mg/kg	CA/HR unitless	If (dry) kg/day	% Plant ingestion %	Plant BCF	Plant conc mg/kg	% worm ingestion	Worm BCF	Worm Conc mg/kg	Soil (Conserv) decimal %	Is (Conserv) kg/dy	BW kg	Dose from Plant mg/kg-dy	Dose from Worms mg/kg-dy	Dose from Soil mg/kg-dy	Total Dose mg/kg-dy	NOAEL mg/kg-dy	HQ (NOAEL)	LOAEL mg/kg-dy	HQ (LOAEL)
alpha chlordane	6.39E-01	1	1.37E-02	1	0.0112	7.16E-03	0	17.8	1.14E+01	0.061	8.33E-04	1.75E-01	5.58E-04	0.00E+00	3.04E-03	3.60E-03	2.14E+00	0.0017	1.07E+01	0.00034
Lindane	2.46E-02	1	1.37E-02	1	0.268	6.58E-03	0	10.1	2.48E-01	0.061	8.33E-04	1.75E-01	5.14E-04	0.00E+00	1.17E-04	6.31E-04	2.00E+00	0.00032	2.00E+01	0.000032
gamma-Chlordane	5.61E-01	1	1.37E-02	1	0.0095	5.33E-03	0	17.8	9.99E+00	0.061	8.33E-04	1.75E-01	4.16E-04	0.00E+00	2.67E-03	3.09E-03	2.14E+00	0.0014	1.07E+01	0.00029
Heptachlor	2.13E-02	1	1.37E-02	1	0.0112	2.38E-04	0	10	2.13E-01	0.061	8.33E-04	1.75E-01	1.86E-05	0.00E+00	1.01E-04	1.20E-04	1.00E-01	0.0012	1.00E-01	0.0012
heptachlor epoxide	3.11E-02	1	1.37E-02	1	0.0498	1.55E-03	0	3	9.34E-02	0.061	8.33E-04	1.75E-01	1.21E-04	0.00E+00	1.48E-04	2.69E-04	1.00E-01	0.003	1.00E-01	0.003
DDT	9.97E-01	1	1.37E-02	1	regression	8.04E-02	0	11.2	1.12E+01	0.061	8.33E-04	1.75E-01	6.27E-03	0.00E+00	4.74E-03	1.10E-02	2.27E-01	0.05	2.70E+00	0.004
Total																		0.06		0.009

average is off

Wilcox & Barton INC.
ENVIRONMENTAL AND ENGINEERING SERVICES

July 26, 2011

Ms. Claudia Sait
Bureau of Remediation and Waste Management
Maine Department of Environmental Protection
17 State House Station
Augusta, Maine 04333-0017

RE: Reply to Response to Comments on the Ecological Risk Assessment
Remedial Investigation Report (Revision 1)
Site 17, Naval Air Station Brunswick
Brunswick, Maine

Dear Ms. Sait:

This letter provides replies to the response to the original comments made on the ecological risk assessment in the revised Remedial Investigation Report. Below, my original comment (excluding footnotes and citations) and the Navy Contractor's response to the comment are presented, followed by a reply to the response. In many of these replies, it appears that an agreement to disagree may be needed, since no resolution was proposed in the response.

Comment 1 Inappropriate exposure depth assumption for terrestrial receptors

The ecological risk assessment has limited its assessment to soil sampled from 0 to 1 foot in depth. This approach is inconsistent with ecological risk assessment guidance, inappropriate for the site, and differs with approaches taken in other Navy risk characterizations. The presence of contaminants of concern and receptors in subsurface soil indicates that exposure pathways are complete, and should be assessed. The rationale for limiting exposure to the 0-1 foot interval given in the ERA was as follows:

> "Some terrestrial receptors such as burrowing mammals could be exposed to shallow layers of contaminated subsurface soils, but depth to groundwater is shallow at this site and can limit the presence of burrowing animals. Terrestrial receptors are not substantially exposed to subsurface soils, so that pathway was not evaluated in the ERA. For this project, the surface soil depth interval was 0 to 1 foot below the ground surface."

Two issues are raised by this explanation. First, the contention that "terrestrial receptors are not substantially exposed to subsurface soils" is incorrect. Numerous soil invertebrates that are expected to be present at the site reside in soil below one foot, including certain ants, earthworms, and other invertebrates. Some burrowing mammalian wildlife species expected to be at the site may nest, burrow, and feed at depths below one foot, including moles and short-tailed shrews. The Navy has acknowledged the potential for ecological exposure to subsurface soil in prior ecological risk characterizations.

In addition, the soil currently located in the subsurface is subject to bioturbation or human disturbance and may be brought to shallower depths in the future. This potential is acknowledged by Navy risk assessment guidance, which states *"[t]he exposure pathway evaluation should include consideration of potential future exposure pathways, as well as current exposure pathways. For instance, if no current pathway exists because a constituent is located in subsurface soil or sediment beyond the reach of ecological receptors, the likelihood that those subsurface soils/sediments could become exposed due to erosion or displacement of surface soils/sediments should be considered."* [f] Without the implementation of an institutional control that prohibits disturbance or relocation of this soil, along with appropriate covering, monitoring, and

maintenance, there is no certainty that subsurface soil will not come to the surface sometime in the future.

Second, the contention that groundwater depth will prevent exposure to subsurface soil below 1 foot in depth is not supportable. According to data presented in the RI, the depth to groundwater measured in site monitoring wells was between 0.4 and 5.6 feet below the ground surface. Data were presented for one sampling event only (in December 2008), so information on the range of seasonal groundwater depths was not provided. However, based on the data presented, all measured locations except one (MW-NASB-068) show a vadose zone thickness of greater than 1 foot. Cross-sections support, *at minimum*, a 0-2 foot vadose zone thickness across most of the impacted area. While the site date were collected in a manner that encourages use of only a 0-1 foot depth interval, use of data that is inclusive of the 0-2 foot depth interval (which includes 0-1, 1-3, and 1-4 foot intervals) is more representative of the soil to which environmental receptors and their food sources may be exposed. Table 1 presents these data.

Response to Comment No. 1:

The Navy does not believe that it is necessary to evaluate soil below 1 foot at this site at this point in the process for the following reasons:

1. In the Draft Work Plan for the site, the Navy proposed collecting surface soil samples from 0 to 2 feet. However, the depth was revised to 0 to 1 foot based on EPA Comment No. 5 dated August 23, 2007 on the Draft RI Work Plan, which indicated that the surface soil depth should be changed from 0 to 2 feet to 0 to 1 feet, because the 0 to 1 foot interval is preferable for surface soil, particularly for ecological receptors.

2. This issue was also discussed during the November 7 – 9, 2007 DQO meeting, in which MEDEP was a participant. At that meeting, it was agreed that surface soil would be 0 to 1 foot for human health and ecological and subsurface soil would be 1 to 10 feet for human health only.

3. Section 5.2.2.2 of the final SAP clearly states that only data from 0 to 1 foot would be included in the ecological risk assessment.

4. The Navy reviewed the cited FFS Report for SWMU 62, in Adak Island, Alaska. Although the risk assessment indicates that subsurface soil was a potential exposure pathway (based on Washington State Department of Ecology guidance), they did not evaluate risks to any receptors because they indicated that risks were insignificant or that the exposure pathway was incomplete.

5. With respect to the cited Navy policy regarding evaluating future risks, it is not likely that if the subsurface soil excavated, the area would contain significant ecological habitat. The primary reasons for excavating soil would be for construction a building, which would further reduce the habitat.

The Navy will remove the part in the ERA regarding the groundwater depth.

The Navy also agrees to prepare a table that shows the summary statistics (i.e., minimum, maximum, and average concentrations, frequency of detection, 95% UCL, etc) for samples with a starting depth between 0 and less than 2 feet. This table will then be discussed qualitatively in the uncertainty analysis section of the ERA to determine how risks may have changed had the deeper samples been included in the ERA. However, this discussion will only focus on those chemicals that were detected in the 0 to 1 foot interval. The chemicals that were not detected in the 0 to 1 foot interval but were detected in the deeper interval include monuron (1 of 44 samples), dieldrin (4 of 57 samples), and endosulfan (2 of 57 samples). These pesticides were all detected infrequently and at very low concentrations and are not expected to significantly impact plants or invertebrates. Therefore, a discussion of them in the uncertainty analysis is not needed.

Reply to Response

Decisions regarding the soil depth to be applied to the ecological risk assessment were made prior to MEDEP's contractor's involvement in the project and also prior to the receipt of soil data. While decisions made on these depths were understandably followed in the ERA, it was appropriate to re-examine those assumptions once the data revealed that higher concentrations were located immediately below the one foot depth. The Adak, Alaska, risk assessment was cited to show that potential exposure to deeper soil was accepted as a potential occurrence; the fact that risks were insignificant or exposure incomplete because of site-specific factors does not invalidate this potential. Note that by assuming exposure only to the 0-1 foot interval, the ERA is assessing current site conditions <u>only</u> in which soil is not disturbed, and cannot claim to be assessing potential future uses in which soil may be disturbed. The commenter still maintains that it is appropriate to examine exposures to soil inclusive of 0-2 feet (at minimum) and appreciates that this information will be addressed in the uncertainty assessment. It is requested, however, that quantitative risk estimates be derived, rather than present this uncertainty as a qualitative discussion. It is not agreed that dieldrin should be excluded because concentrations inclusive of 0-2 feet exceed its screening value. Exclusion of monuron and endosulfan is acceptable since they did not have or exceed screening levels.

While it is recognized that future use of the site may include construction of a building, it is not infeasible that another future use could occur. The ERA should consider unrestricted future uses. If future use of the site includes construction of a new building, the potential for subsurface soil to pose an ecological risk depends not only on how the development affects the presence of an ecological habitat, but also on the disposition of the soil. If the soil is not identified as potentially posing an ecological risk, then the soil would not require management and could be redistributed over the ground surface or even used off-site as "clean" fill. Therefore, assessing this unrestricted use potential is needed to identify appropriate methods of managing the soil based on its potential risk. Any soil to be excavated or disturbed for construction of a building or other site activity, regardless of depth, should be assessed for potential ecological risk under unrestricted uses.

Comment 2 Failure to assess constituents without screening benchmark concentrations

The ecological risk assessment is deficient in the assessment of chemicals for which ecological screening benchmarks were not identified. Navy risk guidance states the following:

> "The Navy ERA Guidance website…. provides links to a variety of sources for screening values and toxicity information. If no screening values are available from listed sources, the Navy can propose screening values to the regulatory agencies as long as the values are based upon No Observed Adverse Effects levels (NOAELs) for long-term, chronic exposures, and supporting citations and references are provided to the appropriate regulatory agencies. …"
>
> "The U.S. EPA is developing soil-screening levels for use in ecological screening assessments. At present, the number of constituents for which the EPA has developed soil-screening levels is limited. However, as more EPA soil-screening levels are published, they will become the screening-level of choice…."
>
> "Soil screening values have been developed by and are available from a number of other sources (LANL 2000, WSRC 1998), and countries (Environment Australia 1997, CCME 1997, European Community 1996). If EPA soil screening levels are not available, these other sources can be evaluated to determine if defensible soil screening levels can be proposed…."
>
> "It is important to note that constituents present at the site that do not have published ecological screening values and for which no defensible screening values can be proposed

are **automatically** carried forward to the COPC refinement step of the baseline ecological risk assessment (BERA)."

In the ERA, screening ecological benchmark concentrations were not identified for the following constituents detected in soil including the 0-2 foot depth interval:

Chemical	Identification of Benchmark			
	Plant Benchmark	Soil Invertebrate Benchmark	Avian Benchmark	Mammalian Benchmark
Monuron [a]	None	None	None	None
Aldrin [b]	None	None	None	None
α-Chlordane		None	None	None
γ-Chlordane		None	None	None
Dieldrin [a]	None	None	None	None
Endosulfan I [a]	None	None	None	None
Endrin [b]	None	None	None	None
Lindane		None	None	None
Heptachlor	None	None	None	
Heptachlor epoxide	None	None	None	
Methoxychlor [b]	None	None	None	None
Diesel-range organics [a]	None	None	None	None
Cyanide	None	None		

a. Added as COC when soil inclusive of 0-2 feet is included
b. Not detected in soil inclusive of 0-2 feet

No evidence was presented in the ERA that efforts were made to develop screening benchmarks for these contaminants, nor were all sources of screening benchmarks exhausted. In addition, no qualitative assessment of these chemicals was presented or well-discussed in an uncertainty assessment.

The following sources identified applicable benchmarks that could, or should, be applied to the ERA (some overlap may exist):

- US EPA Region IV Ecological Screening Values. Provides additional screening values for DDD, DDE, DDT, aldrin, alpha-BHC, dieldrin, endrin, Lindane, arsenic, cyanide, lead, and zinc [These values are primarily Dutch Ministry of Housing, Spatial Planning, and Environment (1994) Standards]. (http://www.epa.gov/region4/waste/ots/ecolbul.html#tbl4)

- Washington State Department of Ecology, Toxics Cleanup Program. Ecological Indicator Soil Concentrations for the Protection of Terrestrial Plants and Animals. Provides additional mammalian screening levels for aldrin, alpha-chlordane, beta-BHC, dieldrin, endrin, Lindane, heptachlor/heptachlor epoxide. (http://www.ecy.wa.gov/programs/tcp/policies/terrestrial/table_749-3.htm).

For constituents where pre-existing screening levels could not be located, the ERA should have presented information from the primary literature and proposed a screening benchmark. The absence of this effort is a failure of the ERA.

Other ERAs could also have been consulted for already-applied screening levels. As an example, the Final Remedial Investigation Report for the Casmalia Resources Superfund Site identified the following ecological screening values absent from the ERA (others were also presented):

Aldrin: Plant screening value of 1 mg/kg
Soil Invertebrate screening level of 0.5 mg/kg

DDT & metabolites	Plant screening value of 0.9 mg/kg Soil invertebrate screening value of 0.1 mg/kg
Lindane	Soil invertebrate screening level of 0.03 mg/kg
Chlordane	Plant screening value of 0.224 mg/kg Soil invertebrate screening level of 0.043 mg/kg
Dieldrin	Plant screening value of 1 mg/kg Soil Invertebrate screening level of 0.5 mg/kg
Endrin	Soil invertebrate screening value of 0.0095 mg/kg
Endosulfan I	Plant screening value of 10 mg/kg Soil invertebrate screening level of 0.05 mg/kg
Heptachlor/epoxide	Soil invertebrate screening level of 0.007 mg/kg

Response to Comment No. 2:

The Navy disagrees that no effort was made to develop screening values for all chemicals detected in the 0 to 1 foot interval. The Navy did attempt to locate screening values for all of the chemicals detected in the 0 to 1 foot interval, as agreed to in the approved Work Plan. No effort was made to locate screening levels for the chemicals listed above if they were not detected in the 0 to 1 foot interval because the Navy did not believe it was necessary to locate screening levels for chemicals that were not evaluated in the ERA. The Navy also disagrees with the implication that chemicals present at the site that did not have published ecological screening values were eliminated prior to the Tier II refinement. All chemicals that did not have screening levels for one of the receptor groups were carried through to the Tier II refinement.

As indicated in the footnotes of Table C-2.2, the Navy reviewed five primary sources, including the EPA Eco SSL documents, the Canadian Soil Quality Guidelines, the ORNL Plant and Invertebrate benchmark documents, and the Region 5 Ecological Screening Level table. The Navy also reviewed the NOAA SQUIRT table, but decided not to select the Dutch Target Values because the technical basis for many of those values is not known and they are ultra conservative. For example, the target value for gamma-BHC is 0.00005 mg/kg and is 0.0005 mg/kg for dieldrin. The Navy agrees to use toxicity data from other sources when available and scientifically defensible, but the Navy does not automatically agree to use a screening level for a site just because it was used at another site (see below).

The screening values for birds and mammals are used to determine whether a chemical needs to be carried through the food chain model. The fact that the screening values from some chemicals were not available for mammals and/or birds does not impact the results/conclusions of the risk assessment because those chemicals were then automatically carried through the food chain model. Plant screening values were not found for heptachlor and heptachlor epoxide, and invertebrates screening levels were not found for alpha- and gamma-chlordane, gamma-BHC, heptachlor, or heptachlor epoxide. Therefore, the following discussion focuses on screening levels for plants and invertebrates.

The Navy reviewed the cited RI report for Casmilia Resources Superfund Site in California and does not agree that the values from that document should be used. It appears that in most cases they are using the Dutch Maximum Permissible Concentrations (MPC) after they adjust them by multiplying the values by 10, for reasons stated in the document. For example, the text states that: "For aldrin and dieldrin, the Dutch MPC of 0.05 mg/kg is based on the lowest dieldrin NOAEC data of 0.5 mg/kg for Onychiurus armatus (collembola species) (Crommentuijn, 2000a; Van de Plassche, 1994). Due to lack of other published screening values, the study used for the Dutch

MPC was selected as the most appropriate value for dieldrin. Following the guidelines, no UFs are applied to NOAECs in the ERA, therefore a screening value of 0.5 mg/kg was used for soil invertebrates for dieldrin. This value was used as a surrogate for aldrin." The guidelines that they are referring to were specifically agreed to in that risk assessment. Therefore, the Navy cannot agree to use those values as screening levels at this time.

The Washington State Ecological Indicator Concentrations were also reviewed. The only value presented for pesticides for plants or invertebrates was for chlordane (1 mg/kg), and the citation was for the 1997 ORNL invertebrate benchmark document. However, chlordane is not listed in that document so the value could not be verified.

Additional plant benchmarks for some of the pesticides were found in the Los Alamos ERORISK database (2009).

As indicated in the Navy's response to Comment No. 1, the Navy agrees to add a discussion to the uncertainty analysis to qualitatively evaluate the analytical data for samples with a starting depth between 0 and less than 2 feet. This evaluation will incorporate several of the values listed above, even though there is some uncertainty in those values.

Reply to Response

It is conceded that aldrin, dieldrin, endrin, and endosulfan were not detected in the 0-1 foot interval so there was no need for screening values for these compounds if only the 0-1 foot interval was assessed. However, when the 0-2 foot interval is re-examined in the uncertainty assessment, appropriate screening values are needed.

It is recognized that the Navy used five primary sources for identifying screening values, and if these sources had screening values for all of the detected constituents, this would have been sufficient. However, this was not the case. Other potential sources should have been explored or the scientific literature consulted to propose an appropriate value, and this effort should have been documented in the ERA. If an identified screening level was found to be technically inappropriate or if no information could be found, this should have been clearly identified and discussed in the ERA. Identifying a benchmark as "ultra-conservative" is not a supportable reason for disregarding a benchmark if its technical basis is sound; that amounts to cherry-picking benchmarks. For terrestrial invertebrates, information on concentrations that were used to control the target pest would be suitable for deriving a screening value, rather than leaving that portion of the assessment incomplete.

Because other potentially applicable screening values were not applied, some chemicals were not carried through Tier II. For example, heptachlor and heptachlor epoxide effects on soil invertebrates were eliminated in Tier II without consulting, or discussing, the soil invertebrate screening level of 0.007 mg/kg used in the Casmalia assessment, which was based on ten times the Dutch Target Level.

Comment 3 Inappropriate Plant and Soil Invertebrate Soil Screening Benchmark for DDD, DDE and DDT

The plant/invertebrate screening levels adopted in the ERA for DDD, DDE, and DDT (1,200 mg/kg) was adopted from the CCME, using values for commercial/industrial land use. This value is based on soil contact only, and does not consider potential food chain impacts. The Canadian guidance specifically states that "in site-specific situations where the size and/or the location of these land uses may impact primary, secondary, or tertiary consumers, the soil and food ingestion guideline is recommended as the SQGE." The soil and food ingestion guideline is reflected in the agricultural and residential/parkland guidelines for DDT (total) and is 0.7 mg/kg. It is nearly inconceivable that the food chain accumulation effects of DDT were disregarded in the adoption of the soil screening benchmark of 1,200 mg/kg; clearly this is inappropriate. The

CCME benchmark of 0.7 mg/kg should be applied to the ERA in place of the 1,200 mg/kg benchmark.

Response to Comment No. 3:

The plant/invertebrate screening value used in the ERA was actually 12,000 µg/kg (or 12 mg/kg) not 1,200 mg/kg as presented in the comment (see Table C-2.2 in the report). The reviewer is correct in that this value is for soil contact only. However, the reviewer is incorrect that it was adopted using values for industrial/commercial land use. Basically, the CCME developed criteria for soil contact (based on impacts to plants, invertebrates, or nutrient and energy cycling) and food ingestion (based on impacts to birds and mammals). They then apply the lower of the criteria to areas considered agricultural, residential or parkland and apply only the soil contact values to the commercial/industrial areas (with some exceptions). The actual criteria for soil contact and food ingestion are developed separate from the land use. The Navy is not implying that criteria for commercial/industrial areas be used as screening values for Site 17. The Navy is using screening values developed for plants and invertebrates to evaluate risks to plants and invertebrates and is using screening levels for birds and mammals to evaluate risks to birds and mammals. The value of 12 mg/kg (for plants and invertebrates) was not used as the screening value for wildlife (again see Table C-2.2). The screening levels used for birds and mammals were 0.093 mg/kg and 0.021 mg/kg, which are EPA Ecological Soil Screening Levels. There values are more appropriate than the value of 0.7 mg/kg suggested by the reviewer. Therefore, the Navy does not agree that the CCME benchmark of 0.7 mg/kg should replace the benchmark of 12 mg/kg when screening for plants and invertebrates.

Reply to Response

Reference to a screening level of 1,200 mg/kg in the original comments was incorrect; 12 mg/kg was intended. It was not intended to suggest that the Navy was using a commercial/industrial number as a screening value, only that the screening value of 12 mg/kg is applicable to commercial/industrial land use (as a reference). It is further recognized that this screening value was not applied to birds and mammals. The applied value of 12 mg/kg, however, is not necessarily protective of plants/invertebrates; the CCME fact sheet for DDT identifies a concentration of 3 mg/kg as inhibiting root growth in the Blakemore strawberry plant, and the EcoSSL document for DDT and metabolites identifies an MATC concentration of 7.1 mg/kg for beans. The EcoSSL document also identifies LC50 soil concentrations for the common cricket at or below 4.4 mg/kg for soil with 2 percent or less organic matter. While these data were not used to derive EcoSSLs, they do indicate that soil concentrations below the 12 mg/kg screening value adversely affect plants and soil invertebrates. In lieu of using the CCME value of 0.7 mg/kg, an alternate value protective of at least the studies identified in the EcoSSL document is appropriate.

Comment 4 Lack of use of US EPA EcoSSLs for dieldrin

The available EcoSSLs for dieldrin for avian and mammalian wildlife were not applied as screening levels.

Response to Comment No. 4:

The available Eco SSLs for dieldrin were not applied as screening levels because dieldrin was not detected in the surface soil samples.

Reply to Response

Understood. It is assumed that the EcoSSLs will be applied in the evaluation of the 0-2 foot soil data as part of the uncertainty assessment.

Comment 5 Effect of Comments 1-4 on Tier I Screening

The effects of the recommendation to include soil inclusive of the 0-2 foot interval and to use additional screening levels are shown in the following table. 95th Percentile upper confidence limits of the mean concentrations (95% UCL) were calculated by ProUCL version 4.1, using the non-detection feature. The ProUCL output files are presented in Appendix A.

Constituent	Concentration µg/kg		Screening Benchmark µg/kg / EEQ				Conclusion
	Maximum	95% UCL	Plant	Soil Invert-ebrate	Avian	Mammalian	
Monuron	0.017	--					None
4,4'-DDD	520	44.7	700	100	93	**21 (2.1)**	Assess #
4,4'-DDE	250	51.82	700	100	93	**21 (2.5)**	Assess
4,4'DDT	7,200	1,139	**700 (1.6)**	**100 (11)**	**93 (12)**	**21 (54)**	Risk/Assess
Total DDTs	7,800	997.3	**700 (1.4)**	**100 (10)**	**93 (11)**	**21 (47)**	Risk/Assess
α-Chlordane	3,100	638.7	**224 (2.8)**	**43 (15)**	--	2,700	Risk
Dieldrin	43	4.295	100	500	22	4.9	No Risk
Endosulfan I	5.9	5.9	10,000	50	--	--	No Risk
Lindane	91	24.57	**5 (5)**	30	--	2,700	Risk
γ-Chlordane	2,700	561.3	**224 (2.5)**	**43 (13)**	--	2,700	Risk
Heptachlor	390	21.27	2,500	**7 (3)**	--	5.98	Risk
Heptachlor epoxide	530	31.12	2,500	**7 (4.4)**	--	152	Risk

Assess for food chain

The above shows that the 95 % UCL concentrations exceeded the plant and/or soil invertebrate screening levels for 4,4'-DDT, total DDTs, alpha-chlordane, Lindane, gamma-chlordane, heptachlor and heptachlor epoxide, with the sum of the ecological effects quotient (EEQ) for just those exceeding one of 13 for plants and 56 for soil invertebrates. By these results alone (i.e., not even considering the changes to results of the food chain assessment for avian and mammalian wildlife), a conclusion that no further action is needed is incorrect.

While the ecological significance of impacts to plants and soil invertebrates "feels" less important than effects upon birds and mammals, to which we, as humans, feel a stronger connection, this prejudice must be resisted. This is true particularly with a pesticide release, products that have been and are used by humans to systemically kill insects. The release at this site was not a legal use of pesticides and the soil organisms impacted are not "target pests." So acceptance of adverse impacts upon soil organisms is not justified.

Response to Comment No. 5**:**

See the Navy's response to Comments No. 1 and 2. Also, the purpose of the last paragraph is unclear in that the Navy did not indicate that risks to plants or invertebrates are less important than risks to other receptors.

Reply to Response

The ERA identified EEQs over 1 for alpha- and gamma-chlordane for plants, yet still recommended no further action. The absence of soil invertebrate screening benchmarks for over half of the pesticides also suggests a lesser concern with these receptors.

Comment 6 Effect of Alternate EPCs on Food Chain Modeling

The calculations performed for birds and mammals were reproduced because the presentation in the ERA was inadequate. The following minor errors or omissions were noted:

- The food ingestion rate for Tier I evaluations was based on an average receptor body weight rather than the lowest body weight that was otherwise applied to the Tier I evaluation.
- The "metabolic scaling" used to derive the robin food ingestion rate is not well-described.
- No avian toxicity values for heptachlor or heptachlor epoxide were applied. The attached abstract provides data that can be used to define a no observed adverse effect level of 0.1 mg/kg [(worm concentration 0.65 mg/kg) x (average body weight 0.197 kg) x (food ingestion rate 0.77 g/g-day) = 0.098 mg/kg-day =~ 0.1 mg/kg-dy]. While some uncertainty is associated with this value, its use is better than disregarding the two constituents altogether.

The calculations were re-performed correcting the above errors/omissions and substituting the 95% ULC concentration using soil data for inclusive of 0-2 feet. Calculations are presented in Appendix B and the results are summarized below:

Receptor Group	Constituent	Tier I				Tier II			
		ERA	Recal-culated	ERA	Recal-culated	ERA	Recal-culated	ERA	Recal-culated
		NOAEL HQ		LOAEL HQ		NOAEL HQ		LOAEL HQ	
Meadow Vole	α-Chlordane	0.0009	0.002	0.0004	0.0008	0.00003	0.0002	0.00001	0.00008
	Lindane	0.000006	0.0002	0.0000006	0.00002	0.000003	0.00004	0.0000003	0.000004
	γ-Chlordane	0.0008	0.001	0.0004	0.0006	0.00002	0.0001	0.00001	0.00006
	Heptachlor	0.003	0.009	0.0003	0.0009	0.0001	0.0002	0.00001	0.00002
	Heptachlor epoxide	0.01	0.02	0.001	0.002	0.0006	0.0009	0.00006	0.00009
	DDTs	0.1	0.2	0.003	0.006	0.02	0.03	0.0005	0.0008
	Total	**0.1**	**0.3**	**0.005**	**0.01**	**0.02**	**0.03**	**0.0006**	**0.001**
Short-Tailed Shrew	α-Chlordane	0.3	1.2	0.2	0.6	0.04	0.2	0.02	0.1
	Lindane	0.0002	0.01	0.00002	0.001	0.0002	0.003	0.00002	0.0003
	γ-Chlordane	0.3	1.0	0.2	0.5	0.03	0.2	0.02	0.1
	Heptachlor	0.7	3.9	0.07	0.4	0.08	0.2	0.008	0.02
	Heptachlor epoxide	0.4	1.6	0.04	0.2	0.05	0.08	0.005	0.008
	DDTs	12	59	0.3	1.6	3.7	6.8	0.1	0.2
	Total	**14**	**67**	**0.8**	**3.2**	**4**	**7**	**0.1**	**0.4**
American Robin	α-Chlordane	1.1	4.2	0.2	0.8	0.1	0.8	0.03	0.2
	Lindane	0.001	0.1	0.0001	0.008	0.001	0.02	0.0001	0.002
	γ-Chlordane	1.03	3.7	0.2	0.7	0.1	0.7	0.02	0.1
	Heptachlor	1.1	6.4	1.1	6.4	0.1	0.3	0.1	0.3
	Heptachlor epoxide	0.7	2.7	0.7	2.7	0.08	0.1	0.08	0.1
	DDTs	12	63	1.0	5.3	4.0	7.3	0.3	0.6
	Total	**16**	**80**	**3.3**	**16**	**5**	**9**	**0.6**	**1.4**
Bobwhite Quail	α-Chlordane	0.006	0.02	0.001	0.004	0.0003	0.002	0.00006	0.0003
	Lindane	0.00003	0.002	0.000003	0.0002	0.00002	0.0003	0.000002	0.00003
	γ-Chlordane	0.006	0.02	0.001	0.003	0.0002	0.001	0.00005	0.0003
	Heptachlor	0.01	0.05	0.01	0.05	0.0005	0.001	0.0005	0.001
	Heptachlor epoxide	0.03	0.09	0.03	0.09	0.002	0.003	0.002	0.003
	DDTs	0.1	0.6	0.01	0.05	0.03	0.05	0.002	0.004
	Total	**0.2**	**0.8**	**0.05**	**0.2**	**0.03**	**0.06**	**0.005**	**0.009**

Note: Table does not include dieldrin or metals

Both the short-tailed shrew and the American robin have total hazard quotients exceeding 1 under the Tier II assessment, as it did with the original ERA, but with higher "ecological effects quotients." Total hazard indices ranged from 1.4 to 9, and these do not include metals or dieldrin,

which were also detected in the soil depth interval inclusive of 0-2 feet, or potential exposure to groundwater. This indicates that the site poses an unacceptable risk to ecological receptors. Note that according to US EPA's Wildlife Exposure Factors Handbook, the average foraging or home range for an American robin is 1.2 acres and for short-tailed shrew is 0.96 acres, indicating that it is reasonable to assume that the majority of the food source for these species could come from the 0.7-acre site.

In conclusion, the ERA does not fully meet either the Navy's or US EPA's risk assessment guidance, and incorrectly concludes that an unacceptable risk is not present to ecological receptors. It is recommended that the ERA be revised to address these comments and that appropriate remedial responses to address these risks be undertaken.

Response to Comment No. 6:

The food ingestion rate was based on the average receptor body weight because if the minimum body weight was used the ingestion rate would be lower than the average ingestion rate in some cases. This can actually be seen in the reviewer's spreadsheet in that the food ingestion rate for the Tier I conservative evaluation for the meadow vole is 0.00084 kg/day while it is 0.00175 kg/day for the average scenario. Therefore, using the average receptor body weight for the Tier I evaluation is more conservative than what is suggested by the reviewer.

The metabolic scaling is explained in the article by Nagy et al., (1999) (see attached).
The Navy cannot determine how the reviewer developed the avian TRV for heptachlor of 0.1 mg/kg-day because the abstract was not attached. However, the Navy did locate a TRV of 0.92 mg/kg-day in the Los Alamos ERORISK database (2009). This TRV will be included in the revised food chain model.

As indicated in the Navy's response to Comment No. 1, the Navy agrees to add a discussion to the uncertainty analysis to qualitatively evaluate the analytical data for samples with a starting depth between 0 and less than 2 feet. For evaluating risks to wildlife species, this evaluation will include a risk-ratio to show how the HQs would have changed had the deeper samples been included in the food chain model.

The foraging areas listed in the Wildlife Exposure Factors handbook are for forested areas, not for grass covered industrial areas. Therefore, it is unlikely that birds such as robins will obtain 100 percent of their food from the site. This would be a similar situation for shrews, because the area is a low quality habitat for small mammals.

The Navy strongly disagrees that the ERA does not fully meet either the Navy's or US EPA's risk assessment guidance. The reviewer has not correctly pointed out any instances in which the ERA does not follow either Navy's or EPA's guidance, after taking into account that the depth interval of 0 to 1 foot was requested by EPA and agreed to by MEDEP during the development of the work plan.

Reply to Response

The comment regarding use of the lowest body weight is an issue of consistency, not of the result. In any case, use of the average body weight should have been discussed.

The comment regarding the metabolic scaling concerned the fact that it was not adequately explained in the ERA. While we appreciate receipt of the article, the procedure still needs to be explained in the ERA for transparency.

The Heptachlor abstract was inadvertently omitted but is attached to this reply. Please consider this article.

We appreciate consideration of the deeper soil interval, but request that the uncertainty assessment be quantitative, rather than qualitative, and include plant and invertebrate species. There is no technical reason for excluding these receptors groups. We also request that all chemicals detected in the 0-2 foot inclusive interval be assessed, not only those detected in the 0-1 foot interval.

We respectfully disagree on assuming a lower percentage of an organism's diet from the site as a basis for discounting the potential future risk posed by the contaminated soil.

It is the reviewer's opinion that the ERA does not fully meet the Navy's or US EPA's guidance for the following reasons: the ERA did not apply the Navy's guidance to consider potential future exposure to subsurface soil (which could have originally been included as an alternate assessment or discussed in the uncertainty assessment), the ERA did not exhaust potential sources of screening values or propose alternate screening values based on original evaluation of primary toxicological data (or at minimum, did not present these data in the ERA), did not present reasons for dismissing other readily-available screening benchmarks, and did not adequately discuss the uncertainty in the ERA associated with the lack of screening values.

If you have any questions regarding these replies, please contact the undersigned at 401-323-9571.

Regards,

WILCOX & BARTON, INC.

Cynthia Fuller
Health Risk Assessor

Attachment

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EFFECTS OF HEPTACHLOR-CONTAMINATED EARTHWORMS ON WOODCOCKS

WILLIAM H. STICKEL, U. S. Bureau of Sport Fisheries and Wildlife, Patuxent Wildlife Research Center, Laurel, Maryland
DON W. HAYNE, U. S. Bureau of Sport Fisheries and Wildlife, Patuxent Wildlife Research Center, Laurel, Maryland[1]
LUCILLE F. STICKEL, U. S. Bureau of Sport Fisheries and Wildlife, Patuxent Wildlife Research Center, Laurel, Maryland

Abstract: The effects on woodcocks (*Philohela minor*) of eating heptachlor-contaminated earthworms were studied experimentally in a series of feeding trials in Louisiana in the winter of 1960–61. Six of 12 woodcocks fed worms which had been contaminated at an average of 2.86 ppm of heptachlor epoxide died within 35 days; 4 more had died by the fifty-third day, when the other 2 were killed for analysis. Worms from areas in Louisiana treated with 2 pounds of heptachlor per acre often contain more than 3 ppm of heptachlor epoxide. Eleven of 12 woodcocks fed worms contaminated at an average of 0.65 ppm survived the full 60 days of the experiment; one died on the forty-fifth day, apparently from other causes. All 11 untreated birds survived. Survivors were kept on one-quarter rations of untreated worms for 11 days. Two woodcocks, untreated previously, died during this starvation period. Five previously treated died; two were observed in spasms at death, and these contained 5.9 and 7.2 ppm heptachlor epoxide in their tissues, suggesting that the previous contaminated diet may have influenced mortality, even though the difference between two of nine dying and five of nine dying is not statistically significant. Surviving starved birds given an unrestricted supply of treated or untreated worms for 5 days survived and gained weight. Residues accumulated in their tissues in this time approached levels in birds that died of heptachlor poisoning. Residues in tissues of birds with different histories suggested residue loss at a rate of approximately 2.8 percent per day. Toxicant absorption was estimated to be in the approximate range of 16–20 percent. Residues in birds fed worms containing 0.65 ppm heptachlor epoxide were in the same general magnitude as those in field-caught birds, suggesting a similar average contamination of food supply. Weights and weight changes did not differ significantly between untreated birds and those receiving the lower level of toxicant. Among birds on one-quarter rations, the percentage of weight that could be lost without danger seemed to be near 20 percent. Woodcocks ate 18–208 grams of worms per day (average, 121 grams), representing 11–143 percent (average, 77 percent) of their body weights; birds ate contaminated and uncontaminated food in essentially equivalent amounts. Symptoms of heptachlor poisoning differed considerably between birds.

The program initiated in 1958 for control of the imported fire ant (*Solenopsis saevissima*) created active concern for the woodcock population of North America, for most American woodcocks winter in the Gulf States, where 27 million acres were scheduled for treatment with heptachlor or dieldrin at the dangerous rate of 2 pounds per acre.

Barker (1958:272–273) had demonstrated that earthworms concentrated DDT in large times catastrophically, in areas treated heavily with DDT for control of Dutch elm disease.

Heptachlor, the chemical chiefly used in the fire ant program, was known to be far more toxic than DDT to birds and to break down in the environment to heptachlor epoxide, a chemical at least as toxic as, and more persistent than, heptachlor itself. It was expected to persist in the soil for 3 years. As woodcocks were known to feed

amounts without being killed and thus became poison bait for birds. Various workers (cited in Bernard 1963) had shown that robin populations could be reduced, someon earthworms to an even greater extent than robins did, and to feed in fields and pastures that would be treated for fire ant control, there was justification for fearing that the woodcock might be lost as a game species and persist only in small numbers.

[1] Present address: Institute of Statistics, North Carolina State College, Raleigh.

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Abstract

The effects on woodcocks (Philohela minor) of eating heptachlor-contaminated earthworms were studied experimentally in a series of feeding trials in Louisiana in the winter of 1960-61. Six of 12 woodcocks fed worms which had been contaminated at an average of 2.86 ppm of heptachlor epoxide died within 35 days; 4 more had died by the fifty-third day, when the other 2 were killed for analysis. Worms from areas in Louisiana treated with 2 pounds of heptachlor per acre often contain more than 3 ppm of heptachlor epoxide. Eleven of 12 woodcocks fed worms contaminated at an average of 0.65 ppm survived the full 60 days of the experiment; one died on the forty-fifth day, apparently from other causes. All 11 untreated birds survived. Survivors were kept on one-quarter rations of untreated worms for 11 days. Two woodcocks, untreated previously, died during this starvation period. Five previously treated died; two were observed in spasms at death, and these contained 5.9 and 7.2 ppm heptachlor epoxide in their tissues, suggesting that the previous contaminated diet may have influenced mortality, even though the difference between two of nine dying and five of nine dying is not statistically significant. Surviving starved birds given an unrestricted supply of treated or untreated worms for 5 days survived and gained weight. Residues accumulated in their tissues in this time approached levels in birds that died of heptachlor poisoning. Residues in tissues of birds with different histories suggested residue loss at a rate of approximately 2.8 percent per day. Toxicant absorption was estimated to be in the approximate range of 16-20 percent. Residues in birds fed worms containing 0.65 ppm heptachlor epoxide were in the same general magnitude as those in field-caught birds, suggesting a similar average contamination of food supply. Weights and weight changes did not differ significantly between untreated birds and those receiving the lower level of toxicant. Among birds on one-quarter rations, the percentage of weight that could be lost without danger seemed to be near 20 percent. Woodcocks ate 18-208 grams of worms per day (average, 121 grams), representing 11-143 percent (average, 77 percent) of their body weights; birds ate contaminated and uncontaminated food in essentially equivalent amounts. Symptoms of heptachlor poisoning differed considerably between birds.

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STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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GOVERNOR

PATRICIA W. AHO
ACTING COMMISSIONER

July 27, 2011

Mr. Todd Bober
Department of Navy
Base Realignment and Closure
Program Management Office-Northeast
4911 South Broad Street
Philadelphia, PA 19112-1303

Re: Site 17, Remedial Investigation Report
Naval Air Station, Brunswick, Maine

Dear Mr. Bober:

Pursuant to Section VI of the Naval Air Station, Brunswick, Maine Federal Facility Agreement (Oct 1990), as amended, the Maine Department of Environmental Protection (MEDEP) has reviewed the Navy's responses dated July 25, 2011, to MEDEP's comments (undated sent via email July 21, 2011), and follow responses dated July 26, 2011 for draft "Remedial Investigation Report for Site 17, Former Building 95", dated May 2011, prepared by Tetra Tech NUS.

MEDEP does not necessarily agree with the Navy on all its responses to our technical comments. However, we believe that the bottom line is that MEDEP concurs that a no further action Record of Decision (ROD) is appropriate under CERCLA for site 17. To address any potential future ecological risk from remaining pesticides in deeper soil if they were to be move off-site, MEDEP believes that it would be appropriate that a covenant be placed in the deed to the site directing future users to adhere to Maine's Solid Waste Management Rules or a soils management plan – either will work. The value of the deed notice is that subsequent owners most likely will review their deed, and be aware that they need to discuss reuse of excavated soil with the MEDEP. MEDEP can then make sure that the soils are reused appropriately. This approach has been successfully employed at hundreds of sites in Maine that are similar to the BNAS site 17 situation."

MEDEP has no further comments provided that the proposed revisions and additions are incorporated into the final report along with all regulator comments, Navy responses and this letter.

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Thank you for the opportunity to review this document and please feel free to contact me at (207) 287-7713 or claudia.b.sait@maine.gov, if you have any questions or comments.

Respectfully,

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RESPONSES TO COMMENTS ON
JULY 2009 DRAFT (REVISION 0) RI REPORT

RESPONSES TO MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
COMMENTS DATED AUGUST 26, 2009
Site 17 Remedial Investigation Report
Naval Air Station, Brunswick, Maine

General Comments:

1. Since the buried strip of contaminated soil was removed in July 2009 based on specific dimensions the bottom and side wall confirmation sample data must be included in the Remedial Investigation (RI) report and must be included in the risk evaluations if there were detections.

   Response: ***The RI risk assessment will be modified to include consideration of the confirmation sampling results.***

2. It has come to MEDEP's attention that sometime around 2000 the Navy installed a gas pipeline along the south edge of Avenue B through Site 17. The reported depth of the pipeline is approximately 3 feet below ground surface. The installation of the gas pipeline may have brought pesticide contaminated soil up to the surface, therefore additional soil samples must be taken in this area. This data must also be included in the RI and risk evaluations.

   Response: ***The Navy believes that sufficient information exists to accomplish a defensible risk assessment that will support risk management decisions for this site. Any future contract to remediate this site, however, shall include a provision to accomplish pre-design sampling in this area and execute removals as necessary based on associated risk management cleanup levels to be developed for this site.***

3. The Method Detection Limit (MDL) and Quantitation Limit (QL) for a number of compounds were never determined by the time the Workplan was finalized. The MDL and QL for these compounds need to be included in the RI report.

   Response: ***The MDLs and QLs for these compounds will be included as a new table in the Final RI Report.***

4. Groundwater monitoring was to have included all the existing monitoring wells, in addition to the new wells. However there was inconsistencies in the Workplan that were not noticed and it appears that two wells were inadvertently missed, MW-67 and MW-97. These two wells had had pesticide detections historically. To correct this oversight another round of groundwater samples must be collected from all the wells and the human health risk assessment (HHRA) revised accordingly. There is a three to four foot variation seasonally in groundwater elevations at Site 17, typically the elevations seen in the RI are noted in the spring round, rather than in the fall. The chemical data have not been associated with either high or low water levels, so the follow-up monitoring should be accomplished in the spring 2010.

   Response: ***The wells sampled for the RI were all those identified for sampling in the approved final work plan (see Worksheets 17 and 18). Historical data for MW-67 indicate that in 14 rounds of sampling there have been no exceedances of any screening criteria (maximum pesticide/herbicide detection <0.1 µg/L). Historical data for MW-97 indicate that in 16 rounds of sampling there have been a few isolated exceedances of screening criteria (maximum pesticide/herbicide detection <1 µg/L) but none in the most recent eight rounds extending back through 2004. Some discussion of historical sampling data for these wells will be included in the RI Report to address this concern. Based on recent discussions with MEDEP and EPA, however, there are a number of groundwater issues to be resolved for Site 17 to finalize the RI Report. The Navy looks forward to future discussions with EPA and MEDEP regarding these issues.***

5. The data need to be compared to appropriate criteria in Table 4-1 in order to assess the conclusions of the investigation as presented. The report also needs to show any non-detect values that exceed the screening criteria. The 1997 Maine Remedial Action Guidelines (RAGs) are not appropriate for screening, and the Region 9 Preliminary Remediation Goals (PRGs) have been replaced by the "Regional Screening Levels for Chemical Contaminants at Superfund Sites" updated in April 2009. (http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/) These tables also include values for human health risk and soil to groundwater criteria. (See comment 20 below.)

   Response: Current Navy policy is to not consider draft criteria such as the updated RAGs (July 2009) because those values and corresponding support documents are currently in the draft phase undergoing public comment. After the updated RAGs are finalized, the Navy will consider those values. Additionally, Comment No. 20 states that PRGs (now RSLs) are to be used for screening purposes in accordance with a previous response to a comment pertaining to the RI work plan.

6. The presence of the peat layer and the elevated FID headspace readings are potentially related to methane generation as noted in the text. This potential is supported by groundwater data from the adjacent Old Fuel Farm (OFF) where methane concentrations have been found as high as 5.7 mg/L in groundwater. Peat has been noted in borings and excavations at that site and the degradation of residual fuels is likely to contribute to methane generation in the subsurface. Site 7, further to the east, also has peat present in the subsurface, based on test pit information. The recent investigation at Site 7 has not been compiled into a report, so the FID readings are not yet available for review. Although there is no significant toxicological risk to methane in the subsurface, it can present a hazard if present as a gas in enclosed or confined spaces. If land-use controls are included as part of the remedy for Site 17, methane may need to be considered. Guidance developed by Michigan's Department of Environmental Quality suggests 0.5 to 28 mg/L as a preliminary screening number in groundwater that indicates methane should be assessed. If additional groundwater data are collected at Site 17, methane analysis needs to be included to assess its distribution. Alternatively its distribution could be assessed more comprehensively across the three sites, to determine if it is present due to natural conditions or related to the various disposal activities in the area, or a combination of the two, and whether the concentrations present represent a hazard. A soil gas survey is one approach that could be used for this purpose.

   Response: The Navy is willing to discuss potential methane concerns and the best path forward to resolve this issue.

7. Please add an acronym list to the report.

   Response: An acronym list will be included in the report.

8. Please add a brief section on any deviations from the Workplan.

   Response: A section will be added to the report to document any deviations from the work plan.

Specific Comments:

9. Executive Summary, E-2, para 1: If the fuel tanks referred to were at the former Old Fuel Farm (OFF), the OFF is cross gradient not up gradient. If the OFF is not the possible source referenced please identify what source is being discussed, otherwise please revise accordingly. (Also correct Section 2.2.1, para 1, Section 4.2.4 and Section 7, as necessary.)

   Response: The text will be revised to clarify that the OFF is cross-gradient, not upgradient of Site 17.

10. Executive Summary, E-2, para 3: Please define ILCRs here and add to the acronym list.

Response: ***Incremental lifetime cancer risks will be spelled out here and added to the acronym list that will be added to the report.***

11. Executive Summary, E-2, para 3: "…this area is designated for business and/or office …"

This area is designated "Mixed Use" which according to the Midcoast Regional Redevelopment Authority's literature, includes among other things: day care, town houses, flats and multi-family apartments. Please revise.

Response: ***The planned future use of the area will be redefined to be in alignment with MRRAs reuse plan. At this time however, there are no detailed maps or other information available that provide specific reuse plans for this area.***

12. Section 1.2.2, Environmental Setting, page 1-3, para 2: "The direction of groundwater flow is interpreted to be generally in the southeast direction."

Based on historic groundwater data, the groundwater flow direction shifts seasonally due to variations in groundwater elevations. Evaluation of flow directions based on the long-term monitoring data indicate the flow directions shift 45 degrees over time, depending upon water elevations and influenced by the relatively flat gradient at the site. Please revise.

Response: This section will be revised to include discussion of seasonal variations that have been observed in the past.

13. Section 1.2.4.1, Soil, page 1-5, para 3 & 4:

a.) In paragraph 3, please discuss the eco risk from pyrethrins.

Response: ***In the document that is discussed in this section (ABB, 1992), pyrethrins did not prove to be an ecological risk concern. Ecological risks were driven by DDT - this statement will be added to the text.***

b.) In paragraph 4, please add the surface and subsurface preliminary remedial goals for DDT and pyrethrin.

Response: ***The PRGs will be added to the text as requested.***

14. Section 1.2.4.1, Soil, page 1-6: Please add an update on the removal of the buried contaminated soil south of Avenue B.

Response: ***A brief update will be added regarding the recently completed removal, with a reference to the associated completion report provided for further details.***

15. Section 2.2.2, Well Development, page 2-5, para 1: Two of the existing wells were not included in the redevelopment and monitoring, MW-NASB-67 and MW-NASB-97, which historically had had pesticide detections. To obtain a more representative dataset MW-NASB-67 and MW-NASB-97 must also be sampled and gauged along with the other wells to support the RI. (Also see Comment 4 above.) (Spring 2010)

Response: ***See response to Comment No. 4.***

16. Section 3.1, Geology, page 3-1: "…parallel to interpreted groundwater flow, west to east across the site…"

Groundwater flow is south-southeast so cross section A-A' is roughly parallel to groundwater flow and B-B'/C-C' are roughly perpendicular to groundwater flow. Please revise.

Response: This section will be revised to more accurately reflect cross section alignments relative to groundwater flow directions.

17. Section 3.1, Fill, page 3-1: Please identify the excavation area where the geotextile liner was not in evidence.

Response: As stated on page 3-1, geotextile fabric was only observed in two soil borings, SB-17-135 and SB-17-136, located within the "soil strip" area. Geotextile was not observed in any other borings advanced during RI activities.

18. Section 3.1, Peat, pages 3-1 & 3-2: In confined spaces and at elevated concentrations methane can pose an explosive risk and cause anoxia. While the decomposition of peat may be the cause so may the degradation of the Diesel Range Organics at the OFF or the sewer line which was noted in the area. If a sewer line is present in the area please note it on the site figure. The distribution of high FID readings is affected by the availability of headspace data in addition to the limited depth of some borings that may not have reached the peat as noted. If the sewer line is leaking there may be other sewer gases such as hydrogen sulfide, ammonia, carbon dioxide, sulfur dioxide and nitrous oxide. Direct measure of methane concentrations of methane by soil gas or other methods is needed to determine if the methane presents a hazard to future uses of the property. (See comment 6 above.)

Response: The presence/location of a sewer line in the vicinity of Site 17 will be researched and noted on Figure 1-2 (if present). Because potential sewer line leaks are not a Site 17-related issue, the Navy proposes to consider this concern outside of the Site 17 RI. The Navy is willing to discuss potential methane concerns and the best path forward to resolve this issue.

19. Section 3.2, Hydrogeology, page 3-4, top para., Section 7, # 8, and Appendix A-4: The average groundwater flow velocity of 0.27 feet per day contradicts the information on E-2 and Section 7 of 0.15 ft/day. In the appendix, for MW-17-02 and MW-17-03 please check the screen length and other input parameters and re-calculate the hydraulic conductivities, means and groundwater flow velocity. For example, at MW-17-02 the screen length and the saturated thickness are incorrect based on the boring and well construction logs. Revise the appendix and the text as needed, and please attach the logs for the existing wells for reference, or note where those logs can be found.

Response: The hydraulic conductivity calculations will be reviewed and corrected as necessary, and a revised groundwater flow velocity will be calculated. The revised velocity will be consistently used in the various sections of the report.

20. Section 4.1, RI Soil Sampling Results, page 4-1, para 2: During the review of the RI workplan MEDEP provided the Navy with a comment (31.a) that the Maine Remedial Action Guidelines are not conservative enough for screening numbers and that the Region 9 Preliminary Remediation Goals (PRGs) were to be used and the Navy agreed to revise the workplan accordingly. Therefore the 1997 RAGs must not be used for screening in the RI report, however the 2009 RAGs can be used for screening if they are lower than the other criteria. (See comment 42 below.)

Response: Section 4-1 has been revised as requested with the "Regional Screening Levels for Chemical Contaminants at Superfund Sites" dated April 2009, as discussed in response to Comment No. 5.

21. Section 4.0, page 4-1: The information in this section is only human risk not ecological. Please provide information on exceedances for ecological screening numbers.

Response: ***Table 4-1 will be modified to include the ecological screening levels, and the information will be discussed in Section 4.0. However, in accordance with the response to Comment No. 66, only chemical concentrations in surface soil samples will be compared to the ecological screening levels.***

22. Section 4.1.3, Inorganics, page 4-2: The arsenic concentrations detected at Site 17 are within the range of values commonly detected in Maine soils. The two highest values are an order of magnitude above other locations, and are both in the Dog Kennel area. This could be a result of fill or different land uses over time. Final evaluation of the arsenic in soils should be delayed until the Background Study data are available.

    Response: ***Final evaluation of the arsenic in soils will be conducted using the Background Study data when available. Section 4.1.3 will be revised to address this.***

23. Section 4.2.4, DRO, page 4-4:

    a.) The "Stringent Sites" criteria must be used for comparison because Site 17 is located on a mapped sand and gravel aquifer. Please revise.

    Response: ***The stringent sites criteria were used for comparison purposes, as was stated in the text. No revision is necessary.***

    b.) "The limited aquifer thickness at Site 17 and the availability of public water make future groundwater use as a potable water supply unlikely."

    Although the aquifer is not particularly extensive, unless there are land-use controls in place there are no restrictions from installing a well and utilizing the groundwater therefore a water supply well is still a possibility that warrants consideration.

    Response: ***No text revision is necessary. Any groundwater controls for this site will be addressed via the CERCLA process as required***

24. Section 4.3, Long-Term Monitoring Program Results, page 4-4:

    a.) Please note in this section that monitoring wells (MW) 67 and 97 have historically had detections of DDD, DDT, heptachlor epoxide, alpha chlordane, gamma chlordane, and endosulfan (2004-2007).

    Response: ***This section will be revised to include a summary discussion of historical sampling results for these wells.***

    b.) For the Maine MEGs, the DDT criterion is to be compared to the sum of 4,4 DDT, DDD, and DDE. Please revise as needed.

    Response: ***This section will be revised as requested.***

25. Section 4.4.1, Contaminant Source Areas, page 4-5, para 2: "With the exception of arsenic, concentration were below minimum screening levels in samples collected from the soil strip area located south of Avenue B."

    While this may be true it misrepresents the multiple pesticides detected in the soil strip by ECC during the test pitting operation. Please revise appropriately and noting that the buried soil strip has been removed.

    Response: ***This section will be revised as requested.***

26. Section 4.4.2, Controls on Contaminant Migration, page 4-6, last sentence: Based on current and historic groundwater flow data from Site 17 and the OFF, it is unlikely that dissolved petroleum could migrate west or southwest to Site 17, unless there were some preferential pathway that directed migration of product westward around the time of the releases.

Response: Historical groundwater flow information will be reviewed to consider varying flow patterns over time, and the text will be modified to reflect the findings.

27. Section 5.2, Contaminant Fate and Transport, page 5-6 and Table 6-1: The two paragraphs are repetitive, please combine into one for clarity. Based on Table 6-1 there needs to be a general statement that most of the detected compounds exceed the criteria for soil to groundwater leaching.

Response: This section will be revised as requested.

28. Section 5.2.1, Pesticides, page 5-6, and Table 6-1: The text and table are contradictory, with respect to the number of groundwater exceedances. Table 6-1 indicates that 4,4 DDD and heptachlor epoxide also exceeded screening criteria. This conclusion may well change when the updated criteria are evaluated as noted elsewhere.

Response: This section will be revised to address any inconsistencies. Current Navy policy is to not consider draft criteria such as the updated RAGs (July 2009) because those values and corresponding support documents are currently in the draft phase undergoing public comment. After the updated RAGs are finalized, the Navy will consider those values when appropriate.

29. Section 6, Risk Assessment, pages 6-1 to 6-8:

    a.) Overall, the risk assessment text in Appendix C-1 only generically discusses the procedures used to perform the evaluation, and does not provide sufficient site-specific justification or document for some of the assumptions used or calculations performed. There also appear to be some discrepancies in the risk and hazard calculations that require correction or explanation. The conclusions of the risk assessment cannot be reviewed and confirmed until these errors, omissions and discrepancies have been rectified. Therefore, the human health risk assessment must be revised and resubmitted for a second review to determine whether the conclusions are substantiated by a well-supported and accurate risk assessment.

    b.) Once the risk assessment has been revised appropriately, the Executive Summary, Section 6 and Section 7 of the Remedial Investigation Report must also need to be updated to reflect revisions to Appendix C-1.

    Response: The human health risk assessment will be revised to provide more detail and the calculations checked/revised as necessary to eliminate errors/omissions. Appendix C-1 will be resubmitted for review prior to resubmission of the RI Report.

30. Section 6.2.1, ERA Conclusions, pages 6-7 to 6-8: Please see MEDEP's comments on Appendix C-2 below regarding the Ecological Risk Assessment. Once the Navy has responded to the comments and revisions, it may be necessary to revise Sections 6.21 and Section 7.

Response: Comment noted.

31. Section 7, Conclusions and Recommendations, pages 7-1 to 7-3:

    a.) Item 3, last sentence: The elevated FID readings are more specifically related to potential methane concentrations rather than the organic matter. Please revise the text.

    Response: The text will be revised per the comment.

b.) Item 8: Please confirm the groundwater flow velocity and revise as necessary. (See comment 19 above.)

Response: The text will be revised as appropriate.

c.) Item 12: "Low levels of arsenic exceedance were detected in soil samples were widespread but are likely to represent background conditions."

The arsenic data need to be compared to the Background Study data.

Response: Agreed, however, the text already includes this recommendation (Recommendation No. 1). No change is required to the report.

d.) Item 13: "Concentration exceeded applicable criteria in only one well (MW-17-02)."

Unfortunately the monitoring wells with historic detections were not included in the sampling. This statement must either wait until all the wells are sampled again or heavily qualified.

Response: The text will be revised to include a statement about the historical data for wells MW-67 and MW-97.

e.) Item 14: "…at least partially attributable to fuel tanks formerly located upgradient…"

Before this statement can be made it needs to be clarified regarding which tanks are being referenced."

Response: The statement will be revised as appropriate pending review of historical water level data for the site.

f.) Item 16: (Please see Comment 11 above.)

Response: The statement will be revised as necessary to reflect the MRRA reuse plan.

g.) Items 15 – 19: These items may need to be revised pending further information on the risk assessments.

Response: These items will be revisited after the risk assessment concerns are addressed and adjusted in the final report as appropriate.

h.) Conclusions: MEDEP concurs with items 1, 2, and 4. As stated previously, the follow-up groundwater sampling needs to include all monitoring wells and also include gauging of the wells prior to sampling. MW-NASB-67 and MW-NASB-97 will need to be redeveloped following the procedures used at other site wells prior to the sampling effort. The sample round should also include methane analysis to support the conclusion that the high FID headspace readings are related to that compound.

Response: Based on recent discussions with MEDEP and EPA, there are a number of groundwater issues to be resolved for Site 17 to finalize the RI Report. The Navy looks forward to future discussions with EPA and MEDEP regarding these issues.

Tables:

32. Table 2-1 and Figure 1-2, Borings SB-101 through 104: The location of any known upgradient gasoline or diesel tanks needs to be added to the figure.

Response: ***Figure 1-2 will be revised per the request. At a minimum, arrows will be added pointing toward tanks in the area that are located outside the footprint of the figure.***

33. Table 3-1, Borings SB-115 and SB-17-144: To the north at SB-17-115 an increase in soil density was an indication of the native soil/fill boundary, while at SB-17-144 decreased soil density was evidence of the boundary. Is this related to the presence of the excavation fill to the north and the railroad bed to the south? If so please add a brief note to the table to explain the contradiction.

    Response: ***The table is in error – no significant density change was noted at 2 feet during drilling operations. The fill/native soil boundary at SB-17-144 was based on the estimated depth of excavation in this area. This will be noted on the revised Table 3-1 provided in the Final RI Report.***

34. Table 4-1: It would be helpful to add the ecological screening numbers to the table for easy comparison or create a similar table with ecological information.

    Response: ***The table will be revised to include the ORNL screening numbers and ecological screening numbers.***

35. Table 4-1, 2nd column: See comment 42 below.

    Response: ***This table will be revised as necessary to reflect any recent updates to the ORNL screening levels.***

36. Table 4-1, 3rd and 4th columns: As stated in the development of the workplan, the current Remedial Action Guidelines were not developed as screening number therefore are not conservative enough. Please remove them from table 4-1. (However, if the Navy prefers it can use the 2009 draft RAGs, which will be adopted as guidance prior to the finalization of this report and the Feasibility Study. (See comment 42 below.)

    Response: ***The table will be revised to remove the current RAGs.***

37. Tables 6-1 and 6-2: These tables may need to be revised depending on the responses on Appendix C and additional groundwater monitoring.

    Response: ***These tables will be revised, as appropriate, in the final report after consensus is reached on report revisions.***

Figures:

38. Figure 1-2, Legend: The figure (or a separate detail) needs to show the different depths of excavation for the "Excavation Boundaries" noted in red dashed lines, so reviewers can evaluate boring logs and depths of samples.

    Response: ***Accurate data depicting the historical excavation depths, locations, and backfill thicknesses are not well documented in the site database. Table 3-1 shows approximate fill thicknesses based on the RI drilling program. With the exception of a limited area within the central portion of the site, most of the fill is estimated at 1 to 2 feet in thickness. A figure will be added to Section 3 showing the estimated fill thickness across the site based on the boring log data.***

39. Figure 3-1B: The Southeast endpoint of the cross-section needs to be labeled as "**A′** ".

    Response: ***The figure will be corrected as requested.***

40. Figure 4-1 and Figure 4-3: These figures need to be revised to show all detections and their distribution, not just the exceedances, in order to assess contaminant distribution at the site. Alternatively separate figures can show detects and exceedances. The figures may also need to be revised pending comparison to updated criteria.

Response: Tag maps were created for ease of use to assess concentrations exceeding applicable criteria. The Navy will revise the existing figures and/or provide additional figures as requested. As stated in the response to Comment No. 28, the Navy respectfully declines the request to evaluate updated RAGs (July 2009) because those values and corresponding support documents are currently in the draft phase undergoing public comment. After the updated RAGs are finalized, the Navy will consider those values when appropriate. Additionally, Comment No. 20 states that PRGs (now RSLs) are to be used for screening purposes in accordance with a previous response to a comment pertaining to the RI work plan.

Appendix B:

41. Appendix B-3, Data Validation and Analytical Data: The detection limits for SB-17-121 and MW-17-02 are elevated for many compounds, if there was a notable difference in the chemistry at this location please note it in the text under the results discussion.

Response: The detection limits for the pesticide analyses in soil (SB-17-121-0205) for this sample were affected, in some cases, by non-target compound interferences. However, for other soil intervals, the detection limits are similar to the detection limits in other samples. Text will be added to Section 4 to point out the elevated detection limits for sample SB-17-121-0205. For MW-17-02, the only elevated detection limit was for pyrethrins, which has no screening criteria and has not been detected in any of the other groundwater samples.

Appendix C:
Appendix C-1:

42. Page 3, Section 2.1, 1st paragraph:

a.) The Oak Ridge National Laboratory (ORNL) Regional Screening Levels (RSLs) were most recently updated in April 2009. April 2009 RSLs need to be reviewed to determine whether there are any changes to the RSL for the compounds detected at the Site, and the COPC selection should be updated, as necessary.

Response: The Navy concurs. April 2009 RSLs will be reviewed to determine whether there are any changes to the RSLs for the compounds detected at the site, and the COPC selections will be updated, as necessary.

b.) In addition, MEDEP recently released updated RAGs; (July 2009) that are requested for use in COPC selection, rather than the outdated 1997 values. The 2009 RAGs include both soil direct contact (cancer risk of 10^{-6} and hazard quotient of 0.2) and soil leaching-to-groundwater values.

Response: The Navy respectfully declines the request to evaluate updated RAGs (July 2009) because those values and corresponding support documents are currently in the draft phase undergoing public comment. After the updated RAGs are finalized, the Navy will consider those values. Additionally, Comment No. 20 states that PRGs (now RSLs) are to be used for screening purposes in accordance with a previous response to a comment pertaining to the RI work plan. The Navy will update the risk assessment so that chemicals are screened against that most recent version of the EPA RSLs (April 2009).

43. Page 9 and 10, Section 3.1.2, Trespassers/Recreational Users, Typical Industrial Worker and Future Residents: Clarify that "air" exposures are specifically referring to the inhalation of fugitive dusts. It should be discussed that no volatile COPCs were selected, and therefore the inhalation of volatile compounds released from soil has not been evaluated as a complete exposure pathway.

Response: The Navy concurs. Text will be added noting that no volatile COPCs were selected and therefore the inhalation of volatile compounds released from soil was not evaluated as a complete exposure pathway.

44. Page 10, Section 3.1.2, Construction Workers: Please edit the paragraph to include the inhalation of fugitive dust as a complete exposure pathway. It should also be discussed that no volatile COPCs were selected, and therefore the inhalation of volatile compounds released from soil has not been evaluated as a complete exposure pathway.

Response: The Navy concurs. The paragraph will be edited to include the inhalation of fugitive dust as a complete exposure pathway. It will also discuss that no volatile COPCs were selected and therefore the inhalation of volatile compounds released from soil was not evaluated as a complete exposure pathway.

45. Page 11, Section 3.3, Exposure Point Concentrations, 2nd paragraph: The 0.7-acre site is divided by a roadway. Therefore, it seems plausible that, in the future, the Site could be developed into two properties with exposures occurring independently on each property. From an exposure standpoint, it is more defensible to generate exposure point concentrations (EPCs) for each of the two parcels (north and south of Avenue B) for both current and future land use unless there is some information that these two parcels are being used and will be used in the future as one exposure point. This may be particularly important given the higher concentrations of pesticides on the northern parcel. The higher concentrations on the northern parcel are currently being diluted by the lower concentrations on the southern parcel in the EPC calculations, and some compounds may not be included as significant risk contributors due to this dilution. Please either calculate two sets of EPCs for the two parcels of land, or justify that not doing so will have no significant effect on the conclusions of the risk assessment (i.e., the compounds selected as significant risk contributors will be the same regardless of the approach used).

Response: Calculating EPCs for the two parcels of land will have no significant effect on the conclusions of the risk assessment because unacceptable risk will still exist on site. Contamination distribution will be further evaluated in the FS.

46. Page 14, Section 5.3, Comparison of Quantitative Risk Estimates…1st para: Maine's cumulative cancer risk management criterion of 10^{-5} needs to be discussed as a separate regulatory benchmark, and the calculated cancer risks should be discussed relative to the Maine criterion.

Response: The Navy concurs.

47. Page 14, Section 5.4, Results of the Risk Characterization: This section should be updated, as appropriate, once the comments contained herein are addressed.

Response: Comment noted.

48. Page 25, Section 6.3, Toxicity Assessment, 1st para: The default absorption factor for semi-volatiles on the ORNL RSL table is 0.1, not 0.01. This error needs to be corrected. In addition, chromium, iron, manganese and nickel are not considered COPCs for this risk assessment. Please revise this paragraph, as appropriate. Finally, a discussion may need to be added concerning compounds with permeability constants outside the effective prediction domain of the model, if these permeability constants were not used in the quantitative evaluation. Adequate documentation has not been provided to determine whether or not any of these values were used in the dermal water evaluation. The permeability constants used in the dermal water calculations need to be provided in the report.

***Response**: The paragraph states that the default absorption factor for inorganics is 0.01 and does not include the semivolatiles in application of this absorption factor. No text change for this statement is necessary. The last two sentences of the paragraph that refer to chromium, iron, manganese, and nickel will be deleted. Text will be added to declare that compounds with permeability constants outside the effective predictive domain of the model were not used in the quantitative evaluation. Permeability constants used in the dermal water calculations will be provided in the revised report.*

49. Table C-1.1: Because the RSLs and RAGs factor in ingestion, dermal contact and inhalation of particulates from soil, there is no need to separately select "Soil to Air" COPCs. This column should be removed. In addition, monuron in groundwater should have the "N" designation (as done for soil) since this compound was detected in groundwater but lacks screening criteria. This table is re-presented as Table 6-1 in the Remedial Investigation Report and should be similarly updated.

***Response**: The Navy concurs. The "Soil to Air" columns will be removed from COPC tables, and monuron in groundwater will be revised to have the "N" designation in Tables C-1.1 and 6-1.*

50. Table C-1.2: For residents, the soil ingestion pathway should only include surface and subsurface, not groundwater.

***Response**: The Navy concurs; groundwater will be deleted from the soil ingestion pathway.*

51. Tables C-1.3 and C-1.4: These tables will need to be updated once the comments contained herein are addressed. However, one notable comment for these tables is the summing of age-specific cancer risks to generate total receptor risks. The summing of cancer risks across age groups needs to be performed for the trespasser (child and adult) and for the resident (child, adolescent and adult). This omission may significantly change the conclusions of the risk assessment. This summing to generate total receptor cancer risk is further discussed in comments to Attachment C-1.4, Table 9s. Tables C-1.3 and C-1.4 are re-presented as Tables 6-2 and 6-3 in the Remedial Investigation Report and should be similarly updated.

***Response**: The Navy concurs. The tables will be updated after comments are addressed, and age-specific cancer risks will be summed to generate total receptor risks.*

52. Table C-1.5: Again, this table will need to be updated once the comments contained herein are addressed. Note that for receptors with a total cancer risk greater than 10^{-5}, contaminants of concern need to be selected. This table is re-presented as Table 6-4 in the Remedial Investigation Report and should be similarly updated.

***Response**: Tables C-1.5 and 6-4 will be updated, and contaminants of concern will be selected for those receptors with a total cancer risk greater than 10^{-5}.*

53. Attachment C-1.2, Page 4, Section C-1.2.2, soil dermal absorption fractions: The dermal absorption fraction for Lindane is 0.04, not 0.01. The dermal absorption factor for heptachlor is 0.1, not 0.01. No value is provided for heptachlor epoxide. A value of 0.1 should be used for this compound. Correct these errors and update the risk and hazard calculations, as appropriate.

***Response**: The Navy concurs. Dermal absorption factors will be updated in accordance with the April 2009 ORNL updates. Risk calculations will be updated as appropriate.*

54. Attachment C-1.2, Page 5, Section C-1.2.3, PEFs and VFs: Because no volatile COPCs have been selected, please edit this section to remove any discussion of volatilization to air. More importantly, note that the PEFs listed on page 5 (1st full paragraph) do not match the values provided on the RAGS Part D Table 4s in Attachment C-1.4. Clarify which PEFs are correct and justify the selection

of values. In addition, the text states that calculations showing how PEFs were calculated are presented in Appendix H.4, which does not appear to exist. Please include the stated information.

Response: Section C-1.2.3 will be edited to remove any discussion of volatilization to air. The PEF for Portland, Maine, listed in the text is incorrect. The value of 9.37 x 10^9 m^3/kg listed in the RAGS Part D Table 4s is correct and consistent with the default value for Portland, Maine, provided at http://rais.ornl.gov/epa/ssl1.sthml. The PEF for construction workers listed in the text is correct and was used in risk calculations. The PEF for construction workers listed in RAGS Part D tables will be corrected to 1.62 x 10^6 m^3/kg. Sample PEF calculations will be provided, and corresponding text will be amended accordingly.

55. Attachment C-1.3, Page 2, Sections C-1.3.3 and C-1.3.4: Remove the discussion concerning chromium and iron toxicity values as these compounds were not selected as direct contact COPCs.

Response: The Navy concurs. The aforementioned discussion will be removed.

56. Attachment C-1.4, Table 1: Update the table to include ingestion of groundwater as an exposure pathway for the construction worker. Incidental ingestion of groundwater was quantitatively evaluated in the risk assessment.

Response: The Navy concurs. Table 1 of Attachment C-1.4 will be updated to include ingestion of groundwater as an exposure pathway for the construction worker.

57. Attachment C-1.4, Table 2s: Update screening criteria for both the ORNL (April 2009) and Maine RAGs (July 2009) sources. Monuron in groundwater should be selected as a COPC with the rationale "NTX".

Response: As discussed in the response to Comment No. 42, screening criteria will be updated using the April 2009 ORNL RSLs. Monuron in groundwater will be selected as a COCP with the rationale "NTX."

58. Attachment C-1.4, Table 3s: It is requested that back-up documentation (e.g., ProUCL output sheets) be presented in an attachment to provide necessary information to check the soil EPC calculations.

Response: Soil EPC calculations will be provided.

59. Attachment C-1.4, Table 4s:

a.) Tables 4.2.RME, 4.5.RME, 4.7.RME, 4.9.RME, 4.11.RME, 4.14.RME and 4.17.RME: Confirm that the PEF and any factors presented that are used to calculate it are correct, as the PEF does not match the value provided in Attachment C-1.2. In addition, remove the VF information as the COPCs selected are not considered volatile compounds.

Response: PEFs and factors presented to calculate PEFs will be corrected where necessary, and VF information will be removed.

b.) Table 4.3.RME: Water concentration units for the dermal pathway are incorrectly specified as mg/kg instead of mg/L. In addition, provide documentation of the DA_{event} values for each organic compound, including compound-specific permeability coefficients. The dermal water calculations could not be confirmed absent this documentation.

Response: The Navy concurs. Water concentration units for the dermal pathway will be specified as mg/L, and DA_{event} calculations will be provided.

c.) Table 4.8.RME: The Receptor Age should be listed as "Adult" to match the 70 kg body weight. The Fraction Ingested term should be set at "1" to be consistent with other receptors, unless specific justification can be provided for the listed value of 0.5.

Response: The Navy concurs with the Receptor Age comment and will amend it in Table 4.8 RME to read "Adult." The Fraction Ingested term was set at "0.5" to account for the receptor only being at the site part of the day.

d.) Table 4.12.RME: Groundwater concentrations are incorrectly listed as mg/kg for both the ingestion and dermal exposure pathways. Provide documentation of the DA_{event} values for each organic compound. In addition, t_{event} for a RME child should be 1 hr/event as listed in Exhibit 3-2 of EPA's 2004 Dermal Guidance. Finally, the cancer and noncancer ingestion intake values provided in the footnote on this table are three orders of magnitude lower than calculated based on the formula provided. Please check the calculation or correct any error that has been made.

Response: The Navy concurs. Groundwater concentration units will be corrected, DA_{event} values provided, the t_{event} for a RME child will be checked, and the intake values checked and corrected as necessary.

e.) Table 4.14.RME: The Receptor Age should be listed as "Older Child".

Response: The Navy concurs.

f.) Tables 4.15.RME and 4.17.RME: Groundwater concentrations are incorrectly listed as mg/kg for the ingestion and/or dermal exposure pathways. Provide documentation of the DA_{event} values for each organic compound. In addition, t_{event} for a RME older child and adult should be 0.58 hr/event as listed in Exhibit 3-2 of EPA's 2004 Dermal Guidance. Finally, the cancer and noncancer ingestion intake values provided in the footnote on these tables are three orders of magnitude lower than calculated based on the formula provided. Please check the calculation or correct any error that has been made.

Response: The Navy concurs. Groundwater concentration units will be corrected, DA_{event} values provided, the t_{event} for a RME older child will be checked, and the intake values checked and corrected as necessary.

g.) Note that there are similar errors and discrepancies on the CTE Table 4s that need to be addressed (incorrect groundwater concentrations units, possibly incorrect PEFs, and an incorrect t_{event} value for the young child).

Response: Noted. CTE Table 4s will be checked and corrected as necessary.

61. Attachment C-1.4, Table 7.1.RME: The construction worker air inhalation calculations for surface and subsurface soil could not be confirmed based on the information provided in the applicable Table 4. In addition, the dermal water calculations could not be confirmed since the DA_{event} documentation has not been provided. Finally, provide an explanation as to why no dermal risk has been calculated for DDD, DDE and DDT in water and no dermal hazard calculation has been provided for DDT in water.

Response: Construction work air inhalation and DA_{event} documentation will be provided. No dermal risk was calculated for DDD, DDE, and DDT in water because those contaminants are outside the effective predictive domain as listed in Exhibit B-3 of EPA's 2004 Dermal Guidance.

62. Attachment C-1.4, Table 7.2.RME: Explain why no air inhalation hazard has been calculated for alpha- and gamma-chlordane for either surface or subsurface soil.

***Response**: Air inhalation hazards were calculated for alpha- and gamma-chlordane. The results were not revealed due to formatting. The formatting will be corrected.*

63. Attachment C-1.4, Tables 7.5.RME through 7.7.RME: The dermal water calculations could not be confirmed since the DA_{event} documentation has not been provided. In addition, provide an explanation as to why no dermal risk has been calculated for DDD, DDE and DDT in water and no dermal hazard calculation has been provided for DDT in water.

***Response**: DA_{event} documentation will be provided. No dermal risk was calculated for DDD, DDE, and DDT in water because those contaminants are outside the effective predictive domain as listed in Exhibit B-3 of EPA's 2004 Dermal Guidance.*

64. Attachment C-1.4, Table 9s: The goal of the RAGS Part D Table 9 series is to present cumulative receptor risks, most notably the summing of cancer risks for any receptor with more than one age group evaluated (e.g., the resident and the trespasser/recreational user). For these two receptors, please prepare a Table 9 that sums the cancer risk across all age groups for each COPC and for each medium. For the noncancer hazard, the highest of the HQs for the individual age groups should be presented (typically the youngest receptor) as hazards are not cumulative in the same manner as cancer risks. Once the Table 9s have been prepared, a RAGS Part D Table 10 needs to be prepared for each receptor with risks and hazards above DEP risk management guidelines. Any compounds with a cancer risk greater than 10^{-6} or a noncancer hazard greater than 1 should be included on the Table 10.

***Response**: The Navy concurs. A Table 9 that sums cancer risk across all age groups will be prepared, and RAGS Part D Table 10s will be prepared.*

65. Attachment C-1.6, HHRA CSM Figure: Please update the figure to include trespassers. In addition, trespassers/recreational users and industrial workers were also evaluated for exposures to subsurface soil. The CSM needs to be updated for consistency with the exposure pathways evaluated in the risk assessment.

***Response**: The Navy concurs. The figure will be updated.*

Appendix C-2:

66. The ERA assumed that ecological receptors would be exposed only to surface soil, defined in the ERA as soil 0-1 foot in depth. This assumption is valid only if an institutional control is placed on the property prohibiting the disturbance or excavation of soil. Under unrestricted land uses, soil from the site may be excavated or reworked, resulting in the exposure of currently deeper soil to the surface. Under this scenario, ecological receptors may be exposed to constituents currently present in subsurface soil. Even excluding detected concentrations at SB-17-121 (an obvious "hot spot"), average concentrations of most detected pesticides in soil samples containing all or a portion of the 0-4 foot interval are roughly two times higher than in the 0-1 foot interval.

    An additional exposure scenario needs to be assessed in which ecological receptors are exposed to soil within the unsaturated zone that could be disturbed by excavation or construction activities. This scenario will enable decision-makers to identify what, if any, land use restrictions regarding soil disturbance are needed to provide a condition of no significant risk to ecological receptors.

***Response**: Although the Navy recognizes the state's concern regarding future exposure to subsurface soil if it was to be excavated, ecological risk assessments do not typically include evaluation of subsurface soil (i.e., deeper than 2 feet). There is already a considerable amount of uncertainty in the ecological risk assessment process, and considering exposure to subsurface soil would increase the uncertainty because the resulting exposure concentration is not known. Therefore, the Navy does not agree that it would be appropriate*

to establish land use controls based on future risks to ecological receptors, and the Navy does not believe that this exposure pathway needs to be evaluated in the ERA.

67. The apparent "hot spot" at SB-17-121 needs to be assessed discretely to evaluate the need to perform focused remediation in and around SB-17-121. Additional characterization of areas proximate to SB-17-121 is warranted to refine the extent of this "hot spot" area. A paired assessment of the risks posed by soils excluding SB-17-121 would provide information on the acceptability of remaining soil if SB-17-121 is addressed.

Response: Please see response to Comment No. 66.

68. The ERA states that no site-specific investigations or biological studies were conducted. Assessed and non-assessed receptors were selected or excluded based on likely presence or absence, or the likelihood of minimal exposure, but methods to identify potential ecological receptors were not rigorous. The following comments regard the selection, or lack therefore, of assessed ecological receptors.

a.) The ERA does not discuss whether state or federal endangered species or species or special concern are present or likely to be present at the site. According to the Maine Department of Inland Fisheries and Wildlife (http://www.maine.gov/ifw/wildlife/species/endangered species/species.htm), several federal or state protected species have either been identified in the vicinity of the site or have a habitat range encompassing the site. The ERA should discuss the presence or possible presence of these protected species and, if warranted, specifically assess the risk posed by the site to such species.

Response: Discussion will be added to the report addressing the likelihood that protected species may be present at the site, and will consider risks posed to such species if warranted.

b.) Risks to large carnivorous birds and mammals were not assessed because, as stated in the ERA, their home range is larger than the site and only a portion of potential exposure would come from the site. This may be true; however, reduced exposure due to the size of the site may be off-set by the bioaccumulative properties of the constituents of concern. Rather than dismissing this potential exposure, the ERA should assess appropriate carnivorous bird and mammal species to provide a quantitative estimate of the potential risks.

Response: When conducting ecological risk assessments at small sites, the exposure doses for small invertivorous mammals and birds are almost always greater than the exposure doses for large carnivorous birds and mammals for several reasons. The smaller animals have much greater ingestion rates relative to the body weights than larger animals. Therefore, even though some of the bioaccumulation factors for soil to earthworms (the food for small mammals and birds) are a little lower than the bioaccumulation factors for soil to mammals (the food for larger birds and mammals), risks are almost always greater to small mammals and birds. This is supported by the EPA Ecological Soil Screening Level (Eco SSL) guidance documents. For example, the Eco SSLs for DDT are 0.12 mg/kg for the hawk but 0.093 mg/kg for the woodcock. Therefore, even if a hawk obtained all of its food from the site, it would still be at lower risk than the woodcock. The Eco SSLs for DDT are 0.021 mg/kg for the weasel and 0.063 for the shrew. Therefore, after accounting for the fact that a weasel, or other larger carnivorous mammal or bird, will not obtain a significant portion of their diet from the site (< 1 acre), especially given the industrial nature of the area surrounding the site, the Navy determined that it was not necessary to quantitatively evaluate risks to these larger receptors.

c.) Although the site itself is terrestrial, Naval Air Station Brunswick is located in a coastal environment, which provides the potential for aquatic or semi-aquatic mammals and birds to be

exposed to the site. The ERA should evaluate this potential in its selection of receptors, and assess such a receptor if the evaluation indicates that potential exposure may exist.

Response: ***The Navy does not concur. It appears that the reviewer is asking the Navy to consider evaluating piscivorous wildlife for this site, which is not appropriate because piscivorous wildlife will not obtain any food from the site.***

d.) It may be appropriate for a field biologist to conduct a survey that provides a more rigorous identification of ecological species that are or may be present at the site.

Response: ***The Navy does not believe that it is necessary to have a field biologist conduct a survey to provide a more rigorous identification of ecological species that are or may be present at the site. This survey would not change the receptors selected in the ERA because the receptors are only representative species.***

69. In general, most screening levels and toxicity reference values (TRVs) applied to the ERA were appropriate and could be verified in the referenced source. However, some could not. Avian and mammalian lowest observed adverse effect levels (LOAELs) obtained from US EPA EcoSSL documents for DDT and metabolites (DDT), arsenic, lead, and zinc were not apparent in the documentation. It appears that a geometric mean of the LOAEL values for growth and reproduction was used for DDT; if so, this should be presented and discussed in the ERA for DDT and all others so derived. A rationale should be provided for using the geometric mean, rather than a value selected in a manner analogous to how EPA selected the TRV for the EcoSSLs. In selecting the TRV, EPA used the lower of 1) the no observed adverse effect level (NOAEL) geometric mean for growth, survival, and reproduction or 2) the highest bounded NOAEL below the lowest bounded LOAEL value.[1] An argument could be made that the appropriate LOAEL value should be the lower of the LOAEL geometric mean for growth, survival, and reproduction or 2) the lowest bounded LOAEL above the highest bounded NOAEL. The conclusions of the ERA would differ if this approach had been used.

Response: ***The footnote on Attachment Table C.2-1.2 indicates that geometric means of the LOAEL values for growth and reproduction were used for the metals. This was also the case for DDT, and that will be added to the footnote as well as Section 2.1 in Appendix C.2. The Navy agrees that other procedures could have been used to select the LOAEL and that the conclusions of the ERA would have been different had another approach been used. However, the Navy believes that the approach used for the ERA is appropriate and conservative because the survival LOAELs (which tend to be greater than growth or reproductive LOAELS) were excluded from the calculation and because the selected LOAELs are generally much lower than many of the NOAELs for growth, reproduction, and survival.***

70. In general, exposure factors applied to the ERA were appropriate and could be verified in the referenced source. Factors that could not be verified include the following:

a.) Table C.2-5. Plant bioaccumulation factors (BAFs) for chlordane, heptachlor, and lindane. The table references ORNL (2008) and/or ORNL (2007), which are not listed in the references for the ERA. Under the presumption that this reference intended to identify ORNL's Risk Assessment Information System (RAIS), RAIS was accessed. However, no plant BAFs are contained on this system (which looks like it has recently been modified). Please update the references for these values.

Response: ***The plant BAFs for chlordane, heptachlor, and lindane were obtained from http://rais.ornl.gov/cgi-bin/tox/TOX_select?select=chem. The values in Table C.2-5 were rounded slightly, but the values were there when checked on September 8, 2009.***

[1] "Bounded values" indicate that a NOAEL was reported with a paired LOAEL.

b.) Table C.2-5. Earthworm BAFs for chlordane, heptachlor, and lindane (aka gamma-BHC) are referenced to Appendix E, which does not exist. Reference to Attachment Table C.2-2.1 is probably intended. These values are calculated from one study each. The State of Washington (http://www.ecy.wa.gov/PROGRAMS/ tcp/policies/ terrestrial/table_749-5.pdf) published default earthworm BAFs of 10.1 and 17.8 for lindane and chlordane, respectively, versus values of 5 and 5, respectively, applied in the ERA. For chemicals for which there is no a consensus BAF value or calculation approach (such as in the EcoSSL documents), it is preferable to present multiple BAFs from different sources and select a representative value from among them, rather than base the BAF on one study only.

Response: The reviewer is correct that Attachment Table C.2-2.1 is the intended reference. This will be changed on Table C.2.5. The Navy downloaded the referenced document from the Washington State Department of Ecology but was unable to determine the source of the BAFs to evaluate whether they are more appropriate than the BAFs used in the ERA. Please provide that information to the Navy, if available.

71. Some information presented in Attachment C.2-3 conflicts with information in the main body of the ERA text, tables, and/or calculations. For example, the introduction references discussion of American robin, raccoon, and mallard duck, none of which were assessed in the EPA. The appendix references a 30 percent solids content of food for a meadow vole, whereas 15 percent solids content is referenced in Table C.2-4 and used in the ERA. For bobwhite quail, the appendix states the food ingestion rate is already presented as dry weight, whereas Table C.2-4 identifies an adjustment factor of 15 percent to express ingestion rate as dry weight. These inconsistencies need to be corrected.

Response: The inconsistencies will be corrected.

72. Table C.2-7, which summarizes the final EEQs for the "less conservative" exposure assumptions, is incomplete. Rather than removing chemicals as non-COPCs, all assessed constituents should be on the table to enable the calculation of a total hazard index (sum individual NOAEL EEQs and LOAEL EEQs, excluding either individual EEQs for DDD, DDE, and DDT or the EEQ for total DDT to avoid double counting). A total hazard index must also be presented on Table C.2-6.

Response: Table C.2.7 only presents the chemicals that had HQs greater than 1.0 in the conservative food-chain model. Total HIs are not generally calculated in ERAs because the chemicals do not all affect the same target organ. Where appropriate, EEQs were calculated for total values, such as for total DDT. As requested, the EEQs for DDD, DDE, and DDT will be excluded.

73. Section 3.2, Wildlife Receptors: It is stated that "[t]he site is only 0.7 acres and is surrounded by roads so it is unlikely that the site comprises the entire home range for most, if any, wildlife receptors." NOAEL-based EEQs exceeded 1 for 4,4'-DDT and total DDT in this scenario for short-tailed shrew and American woodcock. According to Wildlife Exposure Factors Handbook (US EPA 1993), the mean home range size for the short-tailed shrew is 0.39 hectare (~ 1 acre) and ranges from <0.1 - 1.8 hectares (0.25 - 4.5 acres). It is possible that the short-tailed shrew and other smaller mammals that the shrew represents could obtain their entire diet from the site. Please revise.

Response: The referenced sentence will be changed to remove the words "if any." Because the industrialized nature of the area surrounding the site would preclude significant numbers of receptors from inhabiting the site, potential impacts would be limited to a few individual organisms. Also, because the LOAEL HQ is less than 1.0, potential impacts to wildlife are even less likely. This information will be added to Section 3.2.

74. Miscellaneous Comments

a.) The values for organic chemicals listed under “Average Concentration” and “Average of Positive Detects” are reversed in Table C.2-2.

Response: Agreed. The column headings will be corrected.

b.) In Table C.2-3, bottom, the presented “average” percentage of a food ingestion rate represented by the soil ingestion rate is not an average but a 50th percentile. The average values for meadow vole, bobwhite quail, short-tailed shrew, and American woodcock are 1.3 percent, 6.8 percent, 1.1 percent, and 6.8 percent. Use of either value is acceptable as long as referenced correctly.

Response: Table C.2-3 will be corrected to reference 50th percentile values.

c.) Throughout the text and tables of the ERA, references to water ingestion are presented, although this is not an exposure pathway included in the ERA. These references should be removed from the text and hidden in the tables.

Response: Agreed. The references to water ingestion will be removed or hidden.

d.) Plant concentrations of cyanide appear to be based on a different BAF than the value of 1 presented.

Response: The vegetation concentrations of cyanide for the meadow vole and bobwhite quail were incorrectly presented with the arsenic BAF. The cyanide BAF will be corrected to a value of 1. This change does not result in EEQs greater than 1.

RESPONSES TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION I
COMMENTS DATED SEPTEMBER 29, 2009
Site 17 Remedial Investigation Report
Naval Air Station, Brunswick, Maine

General Comments

1. Editorial Comment

   Typically an RI investigation involves the sampling and analysis of environmental media for a full suite of chemicals rather than just pesticides/herbicides and other limited constituents completed for this RI report. EPA requests that the introductory portions of the report briefly reference any other Building 95/Site 17 studies where these more comprehensive analyses may have been completed and/or why the current Site 17 conceptual model supports the decision to only sample for a more limited COC list.

   Response: Section 1.0 will be revised to provide the rationale for the suite of contaminants that was focused on for the RI.

2. Human Health and Ecological Risk Assessments

   Overall, the human health risk assessment (HHRA) is clear, sufficient and follows EPA guidance. The ecological risk assessment (ERA) is also basically sound. The ERA problem formulation and COPC selection are sound with appropriate and protective screening levels. The Assessment and Measurement endpoints, representative wildlife receptors, exposure parameters for each receptor, bioaccumulation factors for plants and earthworms, NOAEL and LOAEL TRVs, etc., are appropriate and well supported. Wildlife EEQ were calculated correctly and suggest that there is no unacceptable risk to small birds and mammals foraging at Site 17, especially given that the less conservative EEQs are based on 95% UCLs rather than average EPCs, which is a welcome and conservative approach.

   The assertion that there is no unacceptable risk to plants and invertebrates is not thoroughly supported, however. The arguments in Section 3.1 are well supported for 4,4'-DDD, 4,4'DDE, 4,4'-DDT, total DDx, gamma BCH, heptachlor, arsenic, lead, and zinc. It is clear that these chemicals do not pose unacceptable risk to plants or invertebrates. The picture is not so clear for alpha-chlordane and gamma chlordane. The frequency of detection is not low enough to eliminate these two pesticides as COPC. The benchmark screening showed a preliminary EEQ of 3333 and 4333. The food chain modeling demonstrated that this there is no unacceptable risk to bird and mammals. One might assume, therefore, that the screening benchmarks were based on potential risk to plants or invertebrates. Please review the origin/derivation of the selected soil benchmarks ([MHSPE 2000] see related page-specific comment below) to help explain what such high EEQs might actually mean.

   There were many non-detects in the surface soil samples. It is not clear, however, that the detection limits were sufficiently low for these chemicals. Please add a sentence or two in the uncertainties noting that some detection limits were not low enough to meet ecological benchmarks. Because of this, exposure point concentrations are less accurate and risk may be underestimated.

   Response: Additional discussion presented here will be included to strengthen the assertion that there is no unacceptable risk to plants and invertebrates from alpha-chlordane and gamma-chlordane. The screening value used to select COPCs was 0.03 µg/kg, which was based on the target value presented in Annex A of the Circular on Target Values and Intervention Values for Soil Remediation (version February 4, 2000; MHSPE, 2000). The basis of the target value is not reported; however, target values for DDT and other pesticides are

derived using equilibrium partitioning (Verbruggen et al., April 2001), which is really designed for sediment invertebrates. That is why they are referenced as Earth/Sediment in MHSPE, 2000. EPA Region 5 has a screening value for risk to plants of 224 µg/kg. This value will be referenced in the text; impacts to plants are not expected because the maximum concentrations of alpha-chlordane (100 µg/kg) and gamma-chlordane (130 µg/kg) were significantly less than this screening value. An alternate benchmark was not available for alpha-chlordane or gamma-chlordane to evaluate risks to soil invertebrates. However, the maximum chlordane concentrations were less than the Canadian Soil Quality Guideline (SQG) of 12,000 µg/kg for total DDT (EC, 1999b), derived using toxicological data for vascular plants and soil invertebrates. Although total DDT is a different pesticide, chlordane is not expected to be 100 times more toxic to soil invertebrates than DDT.

Finally, alpha-chlordane and gamma-chlordane were detected at elevated concentrations (100 and 130 µg/kg, respectively) at one location. The next greatest concentrations of alpha-chlordane and gamma-chlordane were 13 and 17 µg/kg, respectively, indicating that chlordane was not generally detected at elevated concentrations and unlikely to be related to site activities. The text will be expanded/revised to reflect the above discussion.

Additional references:

MHSPE, 2000. Circular on Target Values and Intervention Values for Soil Remediation. Ministry of Housing, Spatial Planning and Environment. DBO/1999226863. Department of Soil Protection, The Netherlands. February 4.

Verbruggen, E.M.J, R. Posthumas, A.P. van Wezel. April 2001. Ecotoxicological Serious Risk Concentrations for Soil, Sediment and (Ground) water: Updated Proposals for First Series of Compounds. RIVEM report 711701 020.

A statement will also be added to the uncertainty section stating that because some detection limits were greater than ecological benchmarks, exposure point concentrations are less accurate and risk may be underestimated for those compounds.

3. DRO Detected in Site 17 Ground Water

The RI Report presents a narrowly-focused interpretation of local ground water flow direction that does not completely support the RI Report statements that diesel range organic (DRO) compounds detected in Site 17 monitoring wells are likely attributed to fuel tanks formerly located north of Site 17 that are acting as an upgradient source. EPA assumes that the report is referring to the Old Navy Fuel Farm (ONFF) Site located east-northeast of Site 17. Interpreted ground water flow direction for the local area that includes the ONFF, Site 17, and areas south of these sites depict Site 17 as being side-gradient to the ONFF study area (please see Draft ONFF Groundwater Monitoring Report -May 2009). Interpretation of the local ground water flow field needs to be expanded to include ground water level data from other nearby NAS Brunswick sites that routinely collect water level data as part of their LTM programs, including the ONFF. A synoptic round of ground water elevation measurements should be taken across the larger local ground water study area and the results and revised graphical interpretations provided in the revised report. Based on this expanded analysis, any other potential upgradient sources of this petroleum-related ground water contamination could be identified. The DRO detection in Site 17 source area monitoring well MW-17-02 appears to site-related as this well is co-located with soil sample SB-17-121 that reported an elevated DRO concentration.

Response: The soil sample from boring SB-17-121 was collected from 2 to 5 feet below grade. Groundwater was measured at approximately 1.85 feet below grade on December 10, 2008. The Navy proposes to include an evaluation of historical groundwater flow data from the ONFF to provide a larger-scale perspective of groundwater flow in the area. Based on recent discussions with MEDEP and EPA, however, there are a number of groundwater

issues to be resolved for Site 17 to finalize the RI Report. The Navy looks forward to future discussions with EPA and MEDEP regarding these issues.

4. Interpreting DRO Results In Soil & Ground Water and Assessment of Risk

DRO analytical analysis of soil and ground water samples, which measures petroleum hydrocarbons in the C10 -C28 range, is useful as a bulk measurement for delineating mid-range petroleum product releases into the environment but it is not adequate to calculate and assess potential human and ecological risks as is required at a CERCLA site such as Site 17. Therefore, in the absence of any other historical data that may be available for Site 17 monitoring wells that could be used for the HHRA, some limited ground water sampling for VOCs and SVOCs is necessary so that any potential risks associated with the future human exposure to ground water pathway can be completely quantified. This issue also applies to the subsurface soil hotspot defined by soil boring S8-17-121. An

Contaminant	Protection of Groundwater Soil Screening Levels (Risk-based SSL)
DDD	86 ug /kg
DDE	60 ug/kg
DDT	87 ug/kg
Dieldrin	0.091 ug/kg

additional soil sample(s) at this location should be collected and analyzed for VOCs and SVOCs. This sampling can be completed as part of the Navy's efforts to further delineate the extent of DDx in subsurface soils as recommended by the Navy in the conclusions/recommendation section of the RI Report.

Response: As discussed in the response to Comment No. 3, the soil sample from SB-17-121 was collected from the saturated zone. Per the project work plan, DRO soil results were only to be compared to the Maine DRO limit for site characterization purposes, not COPC selection or extent delineation. Prior to making any decisions regarding additional sampling, the Navy would like to engage EPA and MEDEP in discussions about the long-range path forward for Site 17.

5. Fate & Transport of Pesticides in Soils and Potential Risks to Ground Water

Similar to the elevated DRO soil detection at SB-17-121 and the corresponding elevated ground water DRO concentration in monitoring well MW-17-02, if appears that elevated pesticides in soils detected in this soil boring (total DDx = 1.,579 mg/kg) area also impacting ground water quality in MW-17-02. The pesticides Dieldrin and DDT exceeded the State of Maine MEGs of 0.02 ug/l and 2.1 ug/l, respectively. While these pesticides readily adsorb to soil and do not typically pose a significant risk to ground water by these contaminants leaching to ground water, the data from these two sampling locations indicate that the high contaminant concentrations are impacting Site 17 ground water quality and are resulting in future potential elevated ground water risk to human receptors.

Region I consulted EPA Region Ill's Regional Screening Levels (RSLs) Tables to identify soil screening concentrations for DDx and Dieldrin that would potentially result in human health risk from leaching of these contaminants to ground water. The following was excerpted from these tables:

Although the Region III “protection of groundwater” risk-based SSLs are not site-specific derived concentrations, these screening criteria provide another line of evidence that elevated levels of these contaminants in Site 17 soils likely provide a continuing limited source of ground water contamination.

Response: The Navy agrees that it appears that elevated pesticides in the saturated soil

sample collected from soil boring SB-17-121 are related to the pesticides found in groundwater at MW-17-02. The Navy will add text stating that elevated pesticide concentrations in soil at SB-17-121 appear to be related to the pesticides in MW-17-02 and refer to data that support this conclusion.

6. Delineation of Identified Soil Contamination and Possible Execution of an Interim Remedial Measure to Reduce Future Potential Human Health Risks

   Because of the issues enumerated above, EPA concurs with the Navy recommendation to refine the extent of contamination in the vicinity of SB-17-121 in order to develop an accurate contaminated soil volume estimate. This refined soil volume calculation could then be used to develop more accurate cost estimates when screening potential cleanup alternatives as part of the feasibility study (FS) process.

   EPA believes that as an alternative to developing a Site 17 FS, the Navy could conduct an interim remedial measure (IRM) to reduce marginally elevated risks associated with future residential exposure pathways, thereby eliminating need to develop remedial alternatives as part of the FS process. It appears from the current RII data set that the extent of soil contamination is limited in volume and this would facilitate targeted excavation and off-base disposal of the contaminated soil. By removing this contaminated soil, both human receptor soil ingestion/contact risks and risk associated with leaching of soil contaminants to ground water could be reduced to within acceptable risk ranges. Upon completion of the IRM, revised risk calculations using the existing Site 17 RI HHRA could be conducted to document the reduction of risks to acceptable levels. EPA would also expect that pesticide MEG exceedances in ground water monitoring well MW-17-02 would be reduced to below standards. Upon completion of the IRM and confirmation that residual contaminant levels are below acceptable risk levels, a no-further-action (NFA) Record of Decision could be competed for the site. An NFA ROD for Site 17 would assume that the completed IRM has reduced risks to levels acceptable for future residential/unrestricted use, thereby eliminating the need for institutional controls at Site 17.

   Response: Agree. It should be noted that the Navy performed some additional soil sampling around the hot spot exceedances identified during the RI to support assessment of remediation approaches. The results will be provided to EPA and MEDEP in a technical memorandum. The Navy supports the implementation of Interim Remedial Measures for Site 17 and looks forward to discussions with EPA and MEDEP regarding this approach.

7. Measured Arsenic Concentrations in Site 17 Soil

   The Navy concludes in the RI Report that arsenic concentrations detected in surface and subsurface soil samples likely reflect background concentrations for this inorganic constituent. EPA has reviewed the range of arsenic detections and concurs with the Navy conclusion that these data likely represent background levels. Results from the on-going NAS Brunswick background study should confirm these professional judgments.

   Response: Agreed.

Page-Specific Comments

8. Page E-1 and Page 4-1:

   Please clarify that the lowest or the most conservative screening criteria would be used for screening COPCs at the Site.

   Response: A sentence will be added to the second paragraph of Section 4.1 clarifying that the most conservation screening criteria were used for COPC selection.

9. Page 2, Section 2.1.2:

   Please include in Section 2.1.2 a brief summary of the soil sampling depth decision logic detailed in Worksheet #17 of the Site 17 RI Work Plan. Specifically, a phased approach to soil sampling was utilized to determine how deep soil sampling should be conducted for various portions of the Site.

   Response: Section 2.1.2 will be revised per the comment.

10. Page 12, Section 3.1:

    The text asserts that the plants on-Site are not impacted by contamination because the Site is vegetated. This is not a sufficient argument to assume no plant toxicity, as there are some plants that are more resistant to chemicals than others. At the least, a qualitative description of plant health would better support this assertion; are plants lush, dense, healthy, diverse, etc., or are they stunted and growing sparsely with faded or spotted leaves, etc.? Is the plant community similar to comparable areas or is it dominated by a single or a few species that might be more resistant to contamination?

    Response: The referenced text has been deleted. See response to Comment No. 2.

11. Page 12, Section 3.1:

    This section provides rationale for why COPC that exceeded soil screening benchmarks do not pose risk to plants and invertebrates. The arguments could be more clearly demonstrated with a table showing available plant and invertebrate benchmarks compared to site maxima, 95% UCLs, and averages.

    Response: Although it is agreed that a table may clarify the rationale for why COPCs that exceeded soil screening benchmarks do not pose a risk to plants and invertebrates, it was not considered necessary for this report because there were few chemicals selected as COPCs and rationales were presented in the text.

12. Page 13, Section 3.2:

    The second-last sentence states: "The EEQ would be less than one assuming a mammal or bird would obtain no more than 25 percent of their food from the site ... " Please support this statement. While the woodcock home range is much larger than Site 17, that for the short-tailed shrew is only a little larger. This would suggest that the shrew would get a majority of its food from the Site, unless the Site is not attractive and there is obviously preferable habitat adjacent or near to the Site.

    Response: Although it is possible that a few small mammals may inhabit the site, because the site is surrounded by roads, is not likely to contain a significant population of small mammals or birds. The following sentence will be added before the last sentence in the referenced paragraph: "Also, because the site is in the middle of an industrial area, it is not likely that there will be a significant population of small mammals or birds at the site."

13. Page 1, Section 4.1:

    The Navy completed removal of the pesticide-contaminated soil strip south of Avenue B earlier this year. Soil confirmation samples were collected as part of this effort. This confirmation data should be incorporated into this RI Report and evaluated along with the rest of the RI data.

<u>Response</u>: The Navy proposes to evaluate these data as part of any engineering studies performed to evaluate remedial alternatives for Site 17 (including areas both north and south for Avenue B) rather than incorporate the data into the RI Report at this time.

14. Table C.2-2:

The table lists 0.03 ug/kg as the soil benchmark for alpha-chlordane and gamma-chlordane, citing MHSPE (2000). EPA could not find this value in the MHSPE (2000). Please review and clarify if another source was used.

<u>Response</u>: The screening value for chlordane is presented in Table 1b of the attached MHSPE document (2000).

RESPONSES TO FEBRUARY 2, 2010, UNITED STATES ENVIRONMENTAL PROTECTION AGENCY FOLLOW-UP REVIEW COMMENTS
Site 17 - Remedial Investigation Report
Naval Air Station Brunswick, Maine

EPA #2 Human Health and Ecological Risk Assessments: EPA's comment endorsed the human health risk assessment (HHRA) and noted that the ecological risk assessment (ERA) was mostly sound. A couple exceptions to the endorsement of the ERA were as follows:

- The conclusions that risk to plants and invertebrates is unacceptable is not supported for alpha chlordane and gamma chlordane.
- The uncertainties should recognize that some detection limits were not low enough to meet ecological benchmarks.

The response makes a reasonable case for why unacceptable risk to plants and invertebrates from exposure to chlordanes is not likely. However, the response does not address the proposal in the comment to include text in the Uncertainties Section regarding detection limits. Please address this in the draft final version of the RI report.

Response: A statement will be added to the uncertainties section stating that because detection limits for some compounds were greater than ecological benchmarks, exposure point concentrations are less accurate and risk may be underestimated for those compounds.

EPA #12: The comment noted that the assumption that a short-tailed shrew would obtain no more that 25 percent of its food from the site should be supported. The response argues that "because the site is surrounded by roads" and "is in the middle of an industrial area, it is not likely that there will be a significant population of small mammals or birds at the site." These arguments do not sufficiently support the original assumption. EEQs for small mammals should not be modified based on the 25 percent assumption. Nonetheless, EPA notes that EEQs do not suggest unacceptable risk to the shrew.

Response: Reference to the shrew obtaining 25 percent of food from the site will be removed, but the text stating that “because the site is surrounded by roads and is in the middle of an industrial area, it is not likely that there will be a significantly population of small mammals or birds at the site” will be included.

EPA #13: The comment recommended that confirmatory data from the pesticide-contaminated strip south of Avenue B be incorporated into the RI report. The response states that the data will be evaluated as part of any engineering studies associated with evaluations of remedial alternatives. Given that remedial efforts will be based on the RI, if the confirmatory data represent possible exposure points for human or ecological receptors, they should be included in the RI report so that risk is accurately assessed. This will ensure that remedial efforts are based on accurate conclusions in the RI.

Response: Confirmation sampling data will be included in the RI Report and risk evaluation.

Finally, a discussion amongst the Navy, EPA, and MEDEP should commence at the earliest possible convenience in order to determine the appropriate laboratory analytical method(s) and quantity of data needed to accurately evaluate any future potential health risks that may be associated with detected DRO concentrations in an up-gradient and a "source area" monitoring well. EPA believes that additional ground water data collection utilizing more definitive analytical methods is required to fully evaluate site risk.

Response: The Navy is willing to discuss with EPA and MEDEP potential paths forward for Site 17 groundwater, but would prefer to engage in these discussions outside the framework of completing the Site 17 RI Report. The Site 17 RI groundwater analytical approach executed was in accordance with the approved work plan.

RESPONSES TO FEBRUARY 1, 2010, MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION FOLLOW-UP REVIEW COMMENTS
Site 17 - Remedial Investigation Report
Naval Air Station Brunswick, Maine

General Comments:

The inclusions of new criteria and other evaluation changes as requested in MEDEP comments may alter the conclusions of the report significantly. To aid in review of the revisions to the Investigation Report, especially to the tables and to risk assessment, MEDEP would prefer to receive a red line strike out copy to aid its review. (Also see comment 29.b. below.)

Response: A red-line/strikeout version of the report will be provided to MEDEP for their review prior to release of Revision 1 of the RI Report.

RTC 1: The response is acceptable. Please be sure to include the data on the black strip of soil which exceeds the new Remedial Action Guidelines soils leaching to groundwater criteria for tetrachloroethene (PCE) as well as the "confirmation" data.

Response: The requested data will be added, as well as the confirmation data.

RTC 2, Follow-Up Comment: This is acceptable as long the soil in the area of the gas line is identified in the RI as a data gap which will be dealt with as part of the pre-design sampling as proposed.

Response: The data gap will be identified in the RI and addressed prior to any additional remedial measures that the Navy decides to implement for soil at Site 17.

RTC 4, Follow-Up Comment: If the site is going to be transferred with institutional controls restricting the use of groundwater the RTC is acceptable to MEDEP not to have a synoptic round of groundwater data from all the on-site wells. However, if the Navy's plan is unrestricted use then all the Long Term Monitoring Wells and the new wells installed as part of the RI should be sampled to provide current data on the wells. MEDEP looks forward to discussing this further with EPA and the Navy.

Response: Should the Navy decide to pursue an unrestricted groundwater use for the site, it is recognized that additional groundwater characterization will be necessary.

RTC 5, Follow-Up Comment: The Maine Remedial Action Guidelines (RAGs) have been finalized and are online at http://www.marine.gov/dep/rmw/publications/guidance/index.htm.

Response: Comment noted.

Specific Comments:

RTCs 20 & 42(a), Follow-Up Comment: Please note that the newest version of EPA's Regional Screening Levels (RSLs) were published in December 2009. EPA's December 2009 updated RSLs have been posted on-line:

http://www.epa.gov/reg3hwmd/risk/human/rbconcentration_table/Generic_Tables/index.htm.

The most recent version of the RSLs available at the time of the risk assessment revision should be used for screening and the new RAGs as noted below.

A comparison of the EPA RSLs and the revised RAGs values for direct contact (residential scenario), indicates that three of the detected compounds in soil have lower RAGs values than RSLs. These three compounds are:

- Gamma-BHC (Lindane) with a RAGs value of 0.12 mg/kg (RSL of 0.52 mg/kg): Maine used a more current toxicity (and more protective) value than EPA

- Arsenic with a RAGs value of 0.14 mg/kg (RSL of 0.39 mg/kg): Maine used a more current (and more protective) toxicity value than EPA

- Lead with a RAGs value of 170 mg/kg (RSL of 400 mg/kg): Maine is using the CA-OEHHA cancer slope factor for lead that EPA is not using.

Response: The report will be revised to incorporate the new RSLs (please note that the December 2009 RSLs were not available during the development of this document). In order to finalize the report, however, the Navy's position is that no further RSL updates will be performed for this document beyond the December 2009 update. The RAGs will be updated in Table 4-1 for screening purposes, however, in the Applicability section of the Final Maine RAGs Guidance (January 2010), Section F is titled: Not Applicable to Selection of COPCs for Full Risk Assessment. The section clearly states that Maine RAGs are not to be used for selection of COPCs; therefore, the three compounds listed above with lower RAGs values than RSLs will not be considered in COPC selection tables. The aforementioned RAGs values were evaluated and it was determined that those values would have no effect on corresponding COPC selections currently presented in the report. Section 5: Part H of the Final RAGs Guidance states that either the RAGs procedures or site-specific target clean-up values developed following risk assessment guidance may be used to determine target clean-up values. Because a risk assessment was performed for Site 17, it is the Navy's intent to develop site-specific target clean-up values. It should also be noted that, as guidance, the RAGs are "To be Considered" criteria, not ARARs.

RTC 23, Follow-Up Comment: The new MEDEP Remediation Guidelines for Petroleum Contaminated Sites has been finalized for use, and the future sampling needs to use EPH/VPH based analysis for soil and groundwater which can be found at the following link:

http://www.maine.gov/dep/rwm/petroleum/pdf/111809finalpetroremguidelines.pdf.

(Also see Response # 4 to USEPA's comments.).

Response: The new analytical methods will be considered for any future sampling of soil/groundwater,

RTC 28, Follow-Up Comment: See follow up comment 20 & 42.a. above.

Response: See response to follow up comment 20 & 42.a. above.

RTC 29.b, Follow-Up Comment: To facilitate review of the risk assessment, please provide a red line strike out version for regulator review.

Response: A redline/strikeout version will be prepared for MEDEP/EPA review prior to release of Revision 1 of the report.

RTC 34, Follow-Up Comment: A cursory review of the ecological screening numbers in the workplan indicated that not all the changes as agreed to in the RTCs in the workplan may have been incorporated into the workplan and were likely not carried through into this report. Please review the agreed upon screening numbers in the RTC 69.c for the draft final RI workplan (MEDEP comment) and revise the eco risk assess and this report as necessary.

Response: The screening levels for alpha-chlordane, gamma chlordane, gamma-BHC, and heptachlor will be changed in accordance with the response to comment. The new values will be the Region V ecological soil screening levels, which are as follows:

- alpha-chlordane and gamma chlordane (224 µg/kg)
- gamma-BHC (5 µg/kg)
- Heptachlor (5.98 µg/kg)

Because all detections are less than these screening levels, these four pesticides will be eliminated as COPCs.

RTC 36, Follow-Up Comment: See follow up comment 20 above regarding the 2010 RAGs.

Response: See response to follow-up comment 20 & 42.a. above.

RTC 38, Follow-Up Comment: The excavation outlines shown in multiple figures within this report however the report will be strengthen if the excavation depths are also shown. This information is available in the Draft Final Close-Out Report (August 1998). It is important for consideration of the previous work completed at the site and for comparison to the recent borings. At a minimum it is relevant for consideration of how the site has been regraded since the excavations were completed, and it shows where contamination extended to greater depths around the septic system and buildings. Please add the associated depths to the figure. (MEDEP can provide the information and will provide it, if necessary.)

Response: The additional information will be added into the report. Per MEDEP's offer, please provide the information referenced above.

RTC 40, Follow-Up Comment: See follow up comment 20 above.

Response: See response to follow-up comment 20 & 42.a. above.

RTC 45, Follow-Up Comment: Though it is agreed that dividing the site into two exposure points and calculating risk for each exposure point separately will not change the overall conclusion that there is an unacceptable risk at the site, there may be a change in the Contaminants of Concern (COCs) identified as requiring further consideration in the Feasibility Study. Currently, only DDT and arsenic are identified as COCs. However, the calculation of exposure point concentrations (EPCs) for the northern parcel where contaminant concentrations are higher might result in unacceptable risk associated with more than just DDT and arsenic (e.g., DDE, DDD and/or dieldrin might be identified as additional risk contributors). The identification of additional COCs might change the ultimate remedial plan for the site. Please provide further justification for the statement "Calculating EPCs for the two parcels of land will have no significant effect on the conclusions of the risk assessment...." through a demonstration that additional COCs will not be identified as significant risk-contributors if the northern parcel was separately evaluated.

Response: The locations of the highest 4,4'-DDE and 4,4'-DDD soil concentrations have even higher soil concentrations of 4,4'-DDT; therefore, identifying those chemicals as COCs in separate EUs would not affect the remedial plan for the site since risk will still be driven be 4,4'-DDT at those locations. For example, remedies such as excavation of 4,4'-DDT would also address 4,4'-DDE and 4,4'-DDD. For this reason, demonstrating additional COCs will not be identified as significant risk-contributors by calculating EPCs and risks in two land parcels rather than performing those calculations for just one land parcel is not necessary.

RTC 59(c), Follow-Up Comment: Please provide additional justification for the use of a fraction ingested (FI) term of 0.5 for the RME adult trespasser since this is the only RME receptor for which a FI term other than 1 is assumed (e.g., the RME adolescent trespasser assumes a FI of 1). A FI of 0.5 may be considered appropriate for the CTE scenario, but not for the RME scenario without providing further justification.

Response: The FI term for the adult trespasser will be changed to 1.

RTC 66, Follow-Up Comment: While future ecological exposure concentrations may be uncertain if subsurface soil is relocated to the surface, this does not negate the fact that it is possible for subsurface

soil to be relocated to the surface and environmental receptors exposed. Because this possibility exists in the absence of institutional controls, this scenario should be assessed and the uncertainty discussed. It is appropriate to establish land use controls based on future risks; this is done for human health concerns all of the time.

Response: A discussion will be added to the uncertainty analysis to indicate that because subsurface soil samples were not evaluated in the ecological risk assessment, there is uncertainty in the conclusions. A discussion of the relative concentrations in the surface and subsurface samples for certain chemicals will also be presented. The need for LUCs will be determined in the future based on the Navy's final remedy decisions for the Site.

RTC 67, Follow-Up Comment: See follow up comment to RTC 66 above.

Response: Please see the Navy's response to Comment No. 66 above.

RTC 68.b., Follow-Up Comment: MEDEP will accept this response for Site 17 however in the future it may require the evaluation risk for large carnivorous birds and mammals at other sites, based on specific site conditions.

Response: Comment noted.

RTC 69, Follow-Up Comment: Referencing the response, it is then requested that the specific Lowest Observed Adverse Effect Level (LOAELs) that were included in the calculation be identified and compared with the appropriate No Observed Adverse Effect Levels (NOAELs) to justify use of the LOAEL.

Response: A table with the LOAELs that were used to calculate the overall LOAEL will be presented in the report. The table will also include the NOAELs that were used to calculate the NOAEL in the EcoSSL document.

RTC 70, Follow-Up Comment. Please provide a current, updated reference or append an output of the older reference to the ERA.

Response: Attached is the correct link, which was recently updated**:**

http://rais.ornl.gov/cgi-bin/tools/TOX_search?select=chem

RTC 70.b., Follow-Up Comment: Unfortunately MEDEP does not have this information, so the Washington State Department of Ecology will need to be contacted to obtain this reference.

Response: The Navy has obtained the source of the BAFs from the Washington State Department of Ecology. Those BAFs used some of the same studies the Navy cited in their BAFs, but had some additional ones as well. Although the BAFs from the additional studies could not yet be verified, the Navy agrees to use the BAFs of 10.1 for lindane and 17.8 for chlordane from the Washington State Department of Ecology for this ERA.

RTC 72, Follow-Up Comment: It is acknowledged that Table C.2.7 presented only chemicals with HIs greater than 1 in the food chain model. However, total HIs should be calculated for COCs that affect the same target organ, so the target organ for each COC should be identified and the HIs summed for each target organ.

Response: Because many of the NOAELs and LOAELs were developed based on a geometric mean of several studies, it is not possible to identify specific target organs as it is for human health risk assessments. Therefore, total HIs will not be calculated for COCs that affect the same target organ.

RTC 73, Follow-Up Comment: Because the assessment examines individual, not population, risks, this section should be revised to indicate that the site may compose the entire home range for a few individual organisms of these species. Calculations should reflect this potential.

Response: Actually, unless threatened or endangered species are being evaluated, ecological risk assessments are typically concerned with protecting populations, not individuals. That being said, please see the Navy's response to EPA comment No. 12. The Navy will revise any text in Section 3.2 to be consistent with changes in Appendix C-2.