

FINAL

**REMEDIAL INVESTIGATION / FEASIBILITY STUDY
REPORT FOR PARCELS 83, 103, 104 AND 108**

**FORT MONMOUTH, OCEANPORT,
MONMOUTH COUNTY, NEW JERSEY**

**BRAC 05 Facility
Contract W912DY-09-D-0062
Task Order: 0012, Project No. 369857**

Submitted To:
**U.S. Army Engineering and Support Center
Huntsville, Alabama**
and
U.S. Army Corps of Engineers, New York District



401 Diamond Dr. NW, Huntsville, AL 35806

**Revision No. 1
September 2020**



New Jersey Department of Environmental Protection
Site Remediation Program

Report Certifications for RCRA GPRA 2020, CERCLA, and Federal Facility Sites

These certifications are to be used for reports submitted for RCRA GPRA 2020, CERCLA, and Federal Facility Sites. The Department has developed guidance for report certifications for RCRA GPRA 2020, CERCLA, and Federal Facility Sites under traditional oversight. The "Person Responsible for Conducting the Remediation Information and Certification" is required to be submitted with each report. For those sites that are required or opt to use a Licensed Site Remediation Professional (LSRP) the report must also be certified by the LSRP using the "Licensed Site Remediation Professional Information and Statement". For additional guidance regarding the requirement for LSRPs at RCRA GPRA 2020, CERCLA and Federal Facility Sites see http://www.nj.gov/dep/srp/srra/training/matrix/quick_ref/rcra_cercla_fed_facility_sites.pdf.

Document:

- "Remedial Investigation/Feasibility Study Report for Parcels 83, 103, 104, and 108, Fort Monmouth, Oceanport, Monmouth County, New Jersey" (September 2020)

PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION INFORMATION AND CERTIFICATION

Full Legal Name of the Person Responsible for Conducting the Remediation: William R. Colvin

Representative First Name: William

Representative Last Name: Colvin

Title: Fort Monmouth BRAC Environmental Coordinator (BEC)

Phone Number: (732) 383-5104

Ext: _____

Fax: _____

Mailing Address: P.O. Box 148

City/Town: Oceanport

State: NJ

Zip Code: 07757

Email Address: william.r.colvin18.civ@mail.mil

This certification shall be signed by the person responsible for conducting the remediation who is submitting this notification in accordance with Administrative Requirements for the Remediation of Contaminated Sites rule at N.J.A.C. 7:26C-1.5(a).

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.

Signature: _____

Date: 17 September 2020

Name/Title: William R. Colvin

Fort Monmouth BRAC Environmental Coordinator

Completed form should be sent to:

Mr. Ashish Joshi
New Jersey Department of Environmental Protection
Office of Brownfield & Community Revitalization
401 East State St
Mail Code: 401-05K
P.O. Box 420
Trenton, NJ 08625

TABLE OF CONTENTS

List of Tables	iii
List of Figures	iv
List of Appendices	iv
List of Acronyms	v
EXECUTIVE SUMMARY	E-1
E.1 Site Description.....	E-1
E.2 Soil Sampling Results.....	E-1
E.3 Groundwater Sampling Results	E-1
E.4 Human Health Risk Assessment.....	E-1
E.5 RI Conclusions.....	E-2
E.6 Feasibility Study	E-2
SECTION 1 INTRODUCTION.....	1-1
SECTION 2 SITE DESCRIPTION.....	2-1
2.1 Site Land Use.....	2-1
2.2 Site Geology and Hydrogeology.....	2-1
SECTION 3 PREVIOUS INVESTIGATIONS.....	3-1
SECTION 4 REMEDIAL INVESTIGATION RESULTS.....	4-1
4.1 Soil Results for VOCs.....	4-1
4.1.1 VOC Exceedances of Comparison Criteria	4-1
4.1.2 Constituents of Potential Concern (COPCs).....	4-2
4.1.3 Potential Sources of VOCs in Soil.....	4-2
4.1.4 Fate and Transport of VOCs in Soil	4-2
4.2 Soil Results for Semivolatile Organic Compounds	4-2
4.2.1 SVOC Exceedances of Comparison Criteria	4-3
4.2.2 Constituents of Potential Concern (COPCs).....	4-3
4.2.3 Potential Sources of SVOC COPCs in Soil	4-3
4.2.4 Fate and Transport of SVOC COPCs in Soil.....	4-4
4.3 Soil Results for PCBs.....	4-4
4.3.1 PCB Exceedances of Comparison Criteria	4-5

4.3.2	Constituents of Potential Concern (COPCs).....	4-5
4.3.3	Potential Sources of PCBs in Soil.....	4-5
4.3.4	Fate and Transport of PCBs in Soil	4-5
4.4	Soil Results for Petroleum Hydrocarbons.....	4-5
4.5	Soil Results for Metals.....	4-6
4.5.1	Metal Exceedances of Comparison Criteria	4-6
4.5.2	Constituents of Potential Concern (COPCs).....	4-7
4.5.3	Potential Sources of Metals in Soil.....	4-7
4.5.4	Fate and Transport of Metals in Soil.....	4-7
4.6	Groundwater Results.....	4-7
SECTION 5 RISK ASSESSMENT SUMMARY AND CONCLUSIONS		5-1
SECTION 6 REMEDIAL INVESTIGATION SUMMARY AND CONCLUSION.....		6-1
6.1	VOCs in Soil.....	6-1
6.2	SVOCs in Soil.....	6-1
6.3	PCBs in Soil.....	6-1
6.4	Petroleum Hydrocarbons in Soil.....	6-1
6.5	Metals in Soil	6-1
6.6	Groundwater	6-1
6.7	Remedial Investigation Conclusions.....	6-2
SECTION 7 FEASIBILITY STUDY REMEDIAL ACTION OBJECTIVES AND ARARS.....		7-1
7.1	Remedial Action Objectives	7-1
7.2	Cleanup Levels.....	7-3
SECTION 8 IDENTIFICATION AND SCREENING OF RESPONSE ACTIONS		8-1
8.1	General Response Actions	8-1
8.2	Identification and Screening of Technology Types and Process Options	8-2
8.2.1	No Action.....	8-3
8.2.2	Risk and Hazard Management.....	8-3
8.2.3	Containment.....	8-3
8.2.4	Treatment	8-3
8.2.5	Source Removal and Disposal	8-4
8.3	Evaluation of Technology Process Options.....	8-4
8.3.1	No Action.....	8-5
8.3.2	Land Use Controls	8-6

8.3.3	Containment via Asphalt Capping	8-6
8.3.4	Source Removal via Mechanical Excavation and Offsite Disposal.....	8-7
8.4	Summary of Process Option Selection	8-7
SECTION 9 DESCRIPTION OF REMEDIAL ALTERNATIVES.....		9-1
9.1	Alternative 1 – No Action.....	9-1
9.2	Alternative 2 – Land Use Controls	9-1
9.3	Alternative 3 – Containment via Asphalt Capping with Alternative 2.....	9-2
9.4	Alternative 5 - Source Removal via Direct Excavation and Backfill	9-4
SECTION 10 DETAILED COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES.....		10-1
10.1	Evaluation Criteria.....	10-1
10.2	Detailed Comparative Analysis of Remedial Alternatives	10-2
10.2.1	Overall Protection of Human Health and the Environment.....	10-2
10.2.2	Compliance with ARARs	10-3
10.2.3	Long-Term Effectiveness and Permanence	10-3
10.2.4	Reduction of Toxicity, Mobility, or Volume through Treatment	10-4
10.2.5	Short-Term Effectiveness	10-5
10.2.6	Implementability	10-6
10.2.7	Cost	10-7
10.3	Summary of Comparative Analysis	10-7
SECTION 11 CONCLUSIONS		11-1
SECTION 12 REFERENCES.....		12-1

LIST OF TABLES

Table 1 – Soil Sample and Analytical Summary
Table 2 – Detected Soil Sampling Results – Comparison to USEPA Risk-Based Screening Levels
Table 3 – Detected Soil Sampling Results – Comparison to NJDEP Direct Contact Criteria
Table 4 – Soil Sampling Summary of Detections
Table 5 – Groundwater Sampling Results – Comparison to USEPA and NJDEP Groundwater Criteria
Table 6 – Human Health Risk Assessment Summary
Table 7 – Constituents of Concern and Cleanup Goals for Soil
Table 8 – Applicable or Relevant and Appropriate Requirements and To Be Considered Criteria
Table 9 – Initial Screening of Technologies for Soil
Table 10 – Evaluation of Process Options for Soil
Table 11 – Criteria for Detailed Evaluation of Remedial Alternatives
Table 12 – Summary of Comparative Analysis of Remedial Alternatives

LIST OF FIGURES

Figure 1 – Parcel 83, 103, and 104 Site Location
Figure 2 – Parcel 83 Site Layout and Soil Sampling Locations
Figure 3 – Parcel 83 Sampling Locations and USEPA RSL Exceedances for VOCs, PCBs, and Metals
Figure 4 – Parcel 83 Sampling Locations and RDCSRS Exceedances for VOCs, PCBs, and Metals
Figure 5 – Parcel 83 Sampling Locations and USEPA RSL Exceedances for SVOCs
Figure 6 – Parcel 83 Sampling Locations and RDCSRS Exceedances for PAHs
Figure 7 – Parcel 83 Site Layout and Groundwater Sampling Locations
Figure 8 – Parcel 83 Exposure Area with COCs
Figure 9 – Alternative 2 Conceptual Layout
Figure 10 – Alternative 3 Conceptual Layout
Figure 11 – Alternative 4 Conceptual Layout

LIST OF APPENDICES

Appendix A	Regulatory Correspondence
Appendix B	Soil Boring Logs
Appendix C	Historical Information
Appendix D	Laboratory Analytical Reports and Data Tables
Appendix E	Data Validation Reports
Appendix F	Alternative Soil Remediation Standard Application
Appendix G	Human Health Risk Assessment
Appendix H	Remedial Alternatives Cost Estimates

LIST OF ACRONYMS

ACRONYM	DEFINITION
API	American Petroleum Institute
ARAR	Applicable or Relevant and Appropriate Requirements
ARS	Alternative Soil Remediation Standard
BaP	benzo(a)pyrene
bgs	below ground surface
BRAC	Base Realignment and Closure
CAFRA	Coastal Area Facility Review Act
CDC	Centers for Disease Control and Prevention
CEHNC	U.S. Army Engineering and Support Center, Huntsville
CERCLA	Comprehensive Environmental Response, Compensation, and Liability
CFR	Code of Federal Regulations
CLU-IN	USEPA Contaminated Site Cleanup Information
COC	constituent of concern
COPC	constituent of potential concern
DER	Declaration of Environmental Restriction
DERP	Defense Environmental Restoration Program
EC	engineering controls
ECP	Environmental Condition of Property
EPC	exposure point concentration
EPH	extractable petroleum hydrocarbon
FHACA	Flood Hazard Area Control Act
FMERA	Fort Monmouth Economic Revitalization Authority
FOST	Finding of Suitability to Transfer
FS	Feasibility Study
ft	Feet or foot
ft bgs	feet below ground surface
FTMM	Fort Monmouth
GRA	general response action
GWQS	Ground Water Quality Standard
HASP	health and safety plan
HHRA	human health risk assessment
HI	hazard index
HQ	hazard quotient
IC	institutional controls
IEUBK	Integrated Exposure Uptake Biokinetic
IGW	Impact to Ground Water
IRP	Installation Restoration Program
K _d	Contaminant-specific distribution coefficient
K _{oc}	Soil sorption coefficient
LUC	land use control
LUCIP	Land Use Control Implementation Plan
mg/kg	milligrams per kilogram

ACRONYM	DEFINITION
MP	Main Post
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	No Further Action
N.J.A.C.	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
N.J.S.A.	New Jersey Statutes Annotated
NRDCSRS	Non-Residential Direct Contact Soil Remediation Standard
O&M	operation and maintenance
OSHA	Occupational Safety and Health Administration
PAH	polycyclic aromatic hydrocarbon
Parsons	Parsons Government Services, Inc.
PCB	polychlorinated biphenyls
PID	photoionization detector
PPE	personal protective equipment
RACR	Remedial Action Completion Report
RAO	remedial action objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RDCSRS	Residential Direct Contact Soil Remediation Standard
RfD	reference dose
RI	remedial investigation
RI/FS	Remedial Investigation/Feasibility Study
RSL	Regional Screening Levels
SAP	sampling and analysis plan
SI	site investigation
SL	screening level
SRA	specific response action
SVOC	semivolatile organic compound
TBC	to be considered
TCE	trichloroethene
THQ	Target Hazard Quotient
TO	task order
TPH	Total Petroleum Hydrocarbons
TPV	total present value
TR	Target Risk
UCL	upper confidence limit
USEPA	U.S. Environmental Protection Agency
UST	underground storage tank
UU/UE	unlimited use and unrestricted exposure
VOCs	volatile organic compounds
WERS	Worldwide Environmental Restoration Services
WP	Work Plan

EXECUTIVE SUMMARY

The U.S. Army Base Realignment and Closure Division is responsible for compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at the former Fort Monmouth Army Installation. Parsons Government Services, Inc. (Parsons) has prepared this Remedial Investigation (RI) / Feasibility Study (FS) Report for Parcels 83, 103, 104 and 108 at the former Fort Monmouth (FTMM) in Oceanport, Monmouth County, New Jersey. This RI / FS Report is based on data collected for the 2008 Site Investigation (SI), the 2016 Phase II SI, and the 2017 Letter Work Plan Addendum for Parcels 83, 103, 104, and 108. This report provides an overview of historical information; characterizes the nature and extent of site-related contamination; evaluates the potential risk to human health and the environment; and evaluates remedial alternatives for these parcels (hereinafter collectively referred to as “Parcel 83” as discussed in Section 2.0).

E.1 SITE DESCRIPTION

Parcel 83 is located in the northeastern portion of the Main Post. A substantial portion of Parcel 83 is currently covered by buildings. Asphalt pavement for parking areas and roads covers approximately half of the parcel and a relatively small portion (less than 20 percent) consists of landscaped areas. The site is currently unoccupied. Future land use includes open space, residential, and possibly commercial or institutional use.

E.2 SOIL SAMPLING RESULTS

Soil samples were collected for the 2008 SI, the 2015 Phase II SI, and the 2017 Letter Work Plan Addendum activities and compared to U.S. Environmental Protection Agency (USEPA) and New Jersey Department of Environmental Protection (NJDEP) criteria. Both residential and non-residential criteria were used to provide context in consideration of potential future land use.

Constituents of potential concern (COPCs) in soil included one volatile organic compound (VOC: trichloroethene [TCE]), semivolatile organic compounds (SVOCs: 1-methylnaphthalene, 2-methylnaphthalene, bis(2-chloroethyl)ether, including polycyclic aromatic hydrocarbons [PAHs: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene]), polychlorinated biphenyls (PCBs: Aroclor-1254 and Aroclor-1260), and metals (antimony, arsenic, cobalt, lead, manganese, mercury, and vanadium).

E.3 GROUNDWATER SAMPLING RESULTS

There are no COPCs in groundwater and the investigation of Parcel 83 groundwater is complete.

E.4 HUMAN HEALTH RISK ASSESSMENT

An evaluation of the potential risk resulting from human exposure to contaminants in soil was conducted as part of this RI (**Appendix G**). This human health risk assessment (HHRA) evaluated the exposure of current and/or future unlimited use and unrestricted exposure (UU/UE) receptors (the scenario protective of residential users), outdoor workers, utility workers, and recreational users to COPCs in soil through dermal contact, incidental ingestion, and inhalation of particulates.

The HHRA concluded that unacceptable risks to human health from PAHs in surface soil within Exposure Area 2 are present for the UU/UE receptors. There are no COPCs in 2016 groundwater samples, therefore, there is no unacceptable risk to human health associated with Parcel 83 groundwater.

E.5 RI CONCLUSIONS

The HHRA concluded that there is no unacceptable risk to human health from VOCs, SVOCs other than PAHs, PCBs, or metals in soil. However, there are unacceptable risks to human health from exposure to carcinogenic PAHs in surface soil at Exposure Area 2 (Section 4.2.3) for the UU/UE receptors. Therefore, the Army has determined that no further action (NFA) with regard to VOCs, SVOCs other than PAHs, PCBs, or metals in soil is warranted under CERCLA and an FS was conducted to address the risk to human health due to exposure to carcinogenic PAHs in surface soil within Exposure Area 2 at Parcel 83. There are no COPCs in groundwater and the investigation of Parcel 83 groundwater is complete. Consequently, groundwater was not evaluated in the HHRA, and additional characterization or action for groundwater is not warranted.

E.6 FEASIBILITY STUDY

Five alternatives were evaluated in the FS:

Alternative 1: No Action

Alternative 2: Land Use Controls

Alternative 3: Containment via Asphalt Capping with Alternative 2

Alternative 4: Source Removal via Direct Excavation and Backfill

Based on the analyses of remedial alternatives conducted in this FS, a Proposed Plan should be developed to recommend a preferred alternative for implementation. This preferred alternative should be the alternative that best meets the nine CERCLA criteria.

SECTION 1 INTRODUCTION

The U.S. Army Base Realignment and Closure Division is responsible for compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at the former Fort Monmouth Army Installation. Parsons Government Services, Inc. (Parsons) is the prime contractor to the United States Army Corps of Engineers, New York District and the United States Army Engineering and Support Center, Huntsville (CEHNC) for preparation of Remedial Investigation (RI) or RI/Feasibility Study (RI/FS) reports as part of the U.S. Army's obligations under CERCLA and the Defense Environmental Restoration Program (DERP) for cleanup at former Fort Monmouth (FTMM) in Oceanport, Monmouth County, New Jersey. This project is being performed under task order (TO) 0012 issued under the Worldwide Environmental Restoration Services (WERS) contract number W912DY-09-D-0062 to support the US Army Corps of Engineers New York District and its customer G9.

The Army conducted this RI/FS in accordance with its delegated authority under Executive Order 12580, as amended, to carry out the federal government's environmental obligations under CERCLA of 1980 (42 U.S.C. 9601 et. seq.). FTMM is not on the National Priorities List and the Army's environmental response is in accordance with DERP (10 U.S.C. 2701), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 40 Code of Federal Regulations [CFR] Part 300). All environmental investigations and responses have been coordinated with the state of New Jersey, Department of Environmental Protection (NJDEP), as required by §121(f) of CERCLA and 40 CFR 300.500.

The purpose of this report is to characterize the nature and extent of contamination at the site, discuss contaminant fate and transport, and assess the risk to human health and the environment in order to develop and evaluate effective remedial alternatives (40 CFR 300.430(d)). This report summarizes relevant information from previous investigations and presents the results from the most recent field investigations for Parcel 83.

This RI/FS Report is based on data collected for the 2008 Site Investigation (SI), the 2016 Phase II SI, and the 2017 Letter Work Plan Addendum for Parcels 83, 103, 104, and 108. The purpose of this report is to provide an overview of historical information, characterize the nature and extent of contamination at the site, discuss contaminant fate and transport, and assess the risk to human health and the environment in order to develop and evaluate effective remedial alternatives for these parcels (hereinafter collectively referred to as "Parcel 83" as discussed in Section 2.0) (40 CFR 300.430(d)).

The objective of the 2016 Phase II SI was to address NJDEP comments on the previous U.S. Army Base Realignment and Closure (BRAC) 2008 SI (**Appendix A, Correspondence 7**) (Parsons 2015a). NJDEP requested further evaluation of polycyclic aromatic hydrocarbons (PAHs) as well as trichloroethene (TCE), arsenic, and lead in soil (**Appendix A, Correspondence 7**). NJDEP also indicated there was insufficient documentation on multiple underground storage tanks (USTs) within Parcel 83; USTs were subsequently further addressed in **Appendix A, Correspondences 9 to 14**. All known USTs within Parcel 83 have No Further Action (NFA) Determinations.

The 2017 Letter Work Plan Addendum (**Appendix A, Correspondence 3 and 4**) was prepared to augment the work performed previously at the subject parcels: 1) as reported in the

U.S. Army BRAC 2005 Site Investigation Report, Fort Monmouth (U.S. Army, 2008); and 2) the results from implementing the April 2016 *Revision 1 Environmental Condition of Property (ECP) Phase II Site Investigation (SI) Work Plan (WP) Addendum*, which was approved by NJDEP in December 2015 (**Appendix A, Correspondence 5**) (Parsons 2015a).

SECTION 2 SITE DESCRIPTION

Parcel 83 is located in the northeastern portion of the Main Post (**Figure 1**). Parcel 83 was associated with numerous former industrial processes and motor pool operations. Multiple fuel oil USTs were once present at or near Parcel 83. Parcel 83 as designated in the ECP Report (U.S. Army, 2007) was 35.3 acres in size (see **Figure 1**) and was divided into multiple areas for field investigations: the former motor vehicle maintenance and repair facilities at Building 166 and former Buildings 44, 64, 159, 161, 163, 197, and 483; the previous shop activities at Building 279, 280, 281, and former building 485; the previous coal storage area around the vicinity of Building 75; and the former electrical transformer storage location east of Building 173. A smaller 8.2 acre area was subsequently re-categorized in the 2016 Finding of Suitability to Transfer (FOST) and designated as the Parcel 83 “carve-out” of environmental concern, along with carve-out Parcels 103 (0.2 acre), 104 (0.2 acre), and 108 (0.05 acre; see **Figure 2**). Parcel 103, Parcel 104, and Parcel 108 were designated in the 2017 work plan (**Correspondence 4** in **Appendix A**) as requiring further investigation based on PAHs in soil identified in the 2008 SI Report. These four carve-out parcels, as well as the remaining portions of Parcel 83, are collectively referred to as “Parcel 83” in this report based on common origin as well as location within the previous Parcel 83 boundary designated in the ECP Report (U.S. Army, 2007).

2.1 SITE LAND USE

A substantial portion of the Parcel 83 vicinity is currently covered by Buildings 116, 117, 154, 166, 167, 273, 276, 279, 280, 281, 476, 480, 481, 482, T-79, T-105, and T-106 (**Figure 2**). Asphalt pavement for parking areas and roads covers approximately half of the parcel and a relatively small portion (less than 20 percent) consists of landscaped areas. The site is currently unoccupied. Future land use includes open space and residential (EDAW, 2008), and possibly commercial or institutional use (Fort Monmouth Economic Revitalization Authority [FMERA], 2019).

2.2 SITE GEOLOGY AND HYDROGEOLOGY

Parcel 83 is located on the former Main Post (MP) of FTMM. The Hornerstown Formation underlies much of the MP including the Parcel 83 area and is approximately 25 to 30 feet thick based on other MP soil borings. This formation is distinguished by varying proportions of glauconitic clay, silty clay, and minor sand. The Tinton Formation underlies the Hornerstown Formation and consists of dense fine sand and trace silt, glauconite, and clay.

The soil at Parcel 83 consists primarily of silty sand that is light gray to gray and orange-reddish-brown to at least five feet below ground surface (ft bgs). In some borings, deeper soils below five ft bgs consist of wet, olive-gray greenish-tan sand with traces of clay. Indications of fill (concrete, coal, wood, debris, and asphalt) were observed in several borings at varying depths from the ground surface to 3.5 ft bgs. Soil boring forms from the 2008, 2016, and 2017 investigations are provided in **Appendix B**.

Groundwater wells were installed within Parcel 83 associated with Installation Restoration Program (IRP) site FTMM-56 (near Building 166), UST 65A and UST 161 (near Building 167) and IRP site FTMM-57. The wells near Building 167 were abandoned in 2018). The depth to groundwater at FTMM-57 ranged from approximately 3.6 to 8.8 ft bgs and the depth to

groundwater in wells associated with FTMM-56 ranged from 12 to 13 ft bgs during the most recent groundwater monitoring event in October 2015. Based on an earlier groundwater modeling study (Brinkerhoff, 2010), groundwater flows approximately northeast in the northern portion of Parcel 83, and approximately southeast in the southern portion of Parcel 83 (**Figure 2**).

SECTION 3 PREVIOUS INVESTIGATIONS

In December 2007, soil and groundwater samples were collected at Parcel 83 for the 2008 SI (U.S. Army, 2008) to determine the impact of historical releases from former operations at Parcel 83. Multiple PAHs including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene were detected at concentrations exceeding the NJDEP Non-Residential Direct Contact Soil Remediation Standard (NRDCSRS) in nine surface and subsurface soil samples. Two metals (arsenic and lead) were detected in surface soil samples at concentrations exceeding the NJDEP Residential Direct Contact Soil Remediation Standard (RDCSRS). The polychlorinated biphenyl (PCB) Aroclor-1260 was detected above the NJDEP RDCSRS in a surface soil sample and TCE was detected above the NJDEP RDCSRS in one surface soil sample. NJDEP, in a 2008 letter (see page 7 of **Appendix A, Correspondence 8**), concurred that NFA for groundwater was acceptable based on the results presented in the SI. NJDEP (2012) subsequently commented that further evaluation of PAHs including potential sources (such as asphalt pavement), and additional evaluation of TCE, arsenic, and lead in soil was required. Three surface soil (0-6 inch bgs) samples were also collected to investigate the former electrical storage location east of Building 273 and analyzed for Total Petroleum Hydrocarbons (TPH). NJDEP (2015) requested additional sampling to delineate PCBs at P83-B5 due to the exceedance at this location during the 2008 SI. An excerpt of the 2008 SI Report concerning Parcel 83 is provided in **Appendix C**.

The follow-on field work performed in 2016 included groundwater and soil sampling. Even though NJDEP had concurred with the NFA determination for groundwater, three groundwater samples from temporary wells were collected for TCE analysis at PAR-83-SB-12, PAR-83-SB-13, and PAR-83-SB-14 due to one TCE detection in soil at a concentration greater than the NJDEP RDCSRS. The 2016 investigation also included the collection of soil samples from 16 borings for analysis of PAHs, but also for volatile organic compounds (VOCs), lead, arsenic, and/or PCBs analyses in areas where these analytes exceeded the NJDEP RDCSRS. The work performed under the 2017 Letter Work Plan Addendum addressed the surface and subsurface soil PAH exceedances of the RDCSRSs encountered in the 2016 investigation. The results of the data collected in 2016 and 2017, along with the data and results compiled from the 2008 SI, comprise the data set for this RI Report for Parcel 83.

SECTION 4 REMEDIAL INVESTIGATION RESULTS

Soil boring log forms for the 2008, 2016, and 2017 sampling activities are included in **Appendix B**. Soil samples were collected from depths ranging from 0-10.75 feet bgs. Surface soil samples are those samples with beginning sample depths from 0-2 feet bgs and subsurface soil samples are those with beginning sample depths greater than 2 feet bgs. Laboratory analytical reports for the most recent 2017 data are included in electronic form in **Appendix D** and data validation reports for are included in electronic form in **Appendix E**. Soil and groundwater analytical results were compared to June 2017 U.S. Environmental Protection Agency (USEPA) Regional Screening Levels (RSLs) to determine constituents of potential concern (COPCs) in compliance with CERCLA. Laboratory analytical results for soil were also compared to 2017 NJDEP RDCSRS, 2017 NRDCSRS, and 2013 Impact to Groundwater (IGW) screening levels (SLs), and groundwater concentrations were compared to 2010 NJDEP Groundwater Quality Standards (GWQS), which were current at the time of the preparation of this report. Soil vanadium concentrations were compared to an NJDEP Alternative Soil Remediation Standard (ARS) (**Appendix F**). Results were compared to NJDEP criteria in order to consider NJDEP requirements when requesting NJDEP concurrence in the case of an NFA determination and to provide context for NJDEP to evaluate potential future land use.

Table 1 includes a sample and analytical summary of the 2008 SI, the 2015 Phase II SI, and the 2017 Letter Work Plan Addendum activities. **Tables 2** and **3** show the soil sampling results for detected analytes as well as comparison to USEPA (**Table 2**) and NJDEP (**Table 3**) criteria. Both residential and non-residential criteria are used to provide context for considering potential future land use. **Table 4** summarizes the detections and screening criteria exceedances in soil and the selection of COPCs.

4.1 SOIL RESULTS FOR VOCs

Soil sampling results for VOCs obtained in 2007 and 2016 were compared to June 2017 USEPA criteria in **Table 2** and to current September 2017 NJDEP RDCSRS and NRDCSRS and 2013 NJDEP IGW SL criteria in **Table 3**, and results of the comparison to the USEPA RSLs criteria are shown on **Figure 3** and to 2017 NJDEP on **Figure 4**. There was only one VOC (TCE) detected at a concentration that exceeded both the USEPA Residential RSL and the NJDEP RDCSRS. TCE was detected in 1 surface soil sample out of 62 total samples at Parcel 83 as described in the following section.

4.1.1 VOC Exceedances of Comparison Criteria

The concentration of TCE in surface soil at P83-SS/SB-09 of 5.8 milligrams per kilogram (mg/kg) during the 2008 SI exceeded the USEPA Residential RSL (0.41 mg/kg) and the NJDEP RDCSRS (3 mg/kg). In the vicinity of Building 279, a confirmation soil boring (PAR-83-SB-13) and two additional soil borings (PAR-83-SB-12 and PAR-83-SB-14) were installed in 2016 to ensure delineation of TCE (**Figure 3**; PAR-83-SB-14 falls within FTMM-57). As shown in the attached boring logs (**Appendix B**), soil samples were collected from surface soil and subsurface soil at depths of approximately 1 to 1.5 and 2.5 to 3 ft bgs. Soil collected from both depths was analyzed for TCE and there were no detections in any of these soil samples (**Table 2 and 3**). TCE has been vertically and horizontally delineated.

Concentrations of the following VOCs exceeded their June 2017 USEPA Groundwater Protection RSL and/or 2013 NJDEP IGW SL in at least one of the surface or subsurface soil samples collected in 2007 and 2016 (**Table 4**): 1,2-dichloroethane, acetaldehyde, acetone, benzene, carbon disulfide, ethyl benzene, isopropylbenzene, methylene chloride, n-butylbenzene, propylbenzene, sec-butylbenzene, toluene, total xylenes, and trichloroethene.

4.1.2 Constituents of Potential Concern (COPCs)

VOCs in soil were identified by comparing the maximum detected concentration of each analyte to the USEPA Residential RSL (Target Risk (TR) = 1×10^{-6} and Target Hazard Quotient (THQ) = 0.1) as detailed in the Risk Assessment Work Plan (Parsons, 2015b). TCE found in surface soil is the only VOC that is considered a COPC in soil at Parcel 83 (**Table 4**).

4.1.3 Potential Sources of VOCs in Soil

The 2008 SI report indicated that TCE was historically used for parts cleaning at Building 279.

4.1.4 Fate and Transport of VOCs in Soil

The mobility of VOCs in soil will depend largely on the following factors (USEPA, 1998):

- Chemical-specific soil/water distribution coefficient (K_d) and organic carbon/water partition coefficient (K_{oc}) impacting the tendency of the constituent to sorb to soil particles;
- Water solubility; and
- Vapor pressure and Henry's Law constant (impacting the tendency to volatilize into air).

Concentrations of VOCs exceeding USEPA and/or NJDEP comparison criteria were rarely detected in soil samples collected at Parcel 83. TCE in surface soil is the only VOC that was retained as a COPC in soil. In general, VOCs in soil are subject to volatilization, biodegradation, and vertical migration toward the water table in percolating recharge water. Therefore, VOCs are expected to have a relatively low degree of persistence in vadose zone soil at Parcel 83.

4.2 SOIL RESULTS FOR SEMIVOLATILE ORGANIC COMPOUNDS

Soil sampling results for semivolatile organic compounds (SVOCs, including PAHs) obtained in 2007, 2016, and 2017 were compared to June 2017 USEPA criteria in **Table 2** and to September 2017 NJDEP criteria in **Table 3**, and results of the comparison to the USEPA RSLs criteria are shown on **Figure 5** and to 2017 NJDEP RDCSRS on **Figure 6**. In the more recent soil sampling events, additional care was taken by the field sampling crew to prevent the incorporation of the existing asphalt pavement or underlying base material into the soil samples for laboratory analyses.

In summary, SVOCs (most notably PAHs) were detected in surface and subsurface soil samples at 44 of 55 soil boring locations (**Table 4**). PAHs were the most prevalent SVOCs in Parcel 83 soil samples and exceeded the USEPA and 2017 NJDEP comparison criteria in numerous samples.

4.2.1 SVOC Exceedances of Comparison Criteria

Concentrations of the following semivolatile organic compounds (SVOCs, including PAHs) exceeded their June 2017 USEPA Residential RSL and/or September 2017 NJDEP RDCSRS in at least one of the surface or subsurface soil samples collected in 2007, 2016, and 2017 (**Table 4**): 1-methylnaphthalene, 2-methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, bis(2-chloroethyl)ether, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene. PAH exceedances of the USEPA Residential RSL and/or NJDEP RDCSRS ranged in depth from 0.0 to 8.0 ft bgs. In some cases, samples were collected below the base of the asphalt pavement and underlying granular base material. In these cases, sample depth was recorded as the depth below ground surface, with the ground surface being the top of the asphalt layer.

Concentrations of the following SVOCs (including PAHs) exceeded their June 2017 USEPA Groundwater Protection RSL and/or 2013 NJDEP IGW SL in at least one of the surface or subsurface soil samples collected in 2007, 2016 and 2017 (**Table 4**): acenaphthene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, bis(2-chloroethyl)ether, chrysene, dibenz(a,h)anthracene, dibenzofuran, di-n-butylphthalate, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 1-methylnaphthalene, 2-methylnaphthalene, 4-chloroaniline, naphthalene, and pyrene.

Soil exceedances were delineated to the NJDEP RDCSRS. The SVOCs with NJDEP RDCSRS exceedances in surface and subsurface soil have been delineated horizontally (**Figure 6**) and vertically (**Table 3**) within Parcel 83.

4.2.2 Constituents of Potential Concern (COPCs)

SVOC (including PAHs) COPCs in surface and subsurface soil were identified by comparing the maximum detected concentration of each analyte to the USEPA Residential RSL ($TR = 1 \times 10^{-6}$ and $THQ = 0.1$) as detailed in the Risk Assessment Work Plan (Parsons, 2015b). The SVOC COPCs in surface and subsurface soil at Parcel 83 include (**Table 4**): 1-methylnaphthalene, 2-methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, bis(2-chloroethyl)ether, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

4.2.3 Potential Sources of SVOC COPCs in Soil

PAHs and bis(2-chloroethyl)ether were the only SVOCs in Parcel 83 soil samples identified as COPCs. Based on the results of the 2008, 2016 and 2017 soil sampling, the former coal storage area is a likely primary source of PAHs in soil or historic fill related to the development of Parcel 83. However, PAHs were also found to be ubiquitous across Parcel 83 and the surrounding area and not only present in the former coal storage area.

Boring logs (**Appendix B**) indicate that coal fragments were encountered in borings advanced near the former coal storage area footprint at P83-B1, P82-SB3, P83-B4, and PAR-83-SB-08 at a depth ranging up to approximately 2.5 ft bgs. In addition, asphalt fragments, crushed concrete, rock fragments, and debris were encountered in multiple borings with PAH exceedances at depths ranging up to approximately 1 ft below the base of the current asphalt pavement. Historical fill materials are likely sources of PAHs at Parcel 83. These observations indicate that there are potential sources of PAHs in soil fill at multiple locations within and outside of the former coal storage area.

PAHs were also detected in surface and subsurface soil within the southern area of Parcel 83 at PAR-83-SS/SB/GW-12 and PAR-83-SS/SB/GW-14 at a concentration greater than the current September 2017 NJDEP RDCSRs. The presence of fill, coal, asphalt, and ash fragments were also noted in the soil borings in this area (**Appendix B**). Therefore, PAHs are also present in surface and subsurface soils at Parcel 83 that may not be related to the former coal storage area. Other sources of PAHs could be asphalt pavement (present at most of the sampling locations), historic fill material, or other ubiquitous anthropogenic sources such as deposition of airborne PAHs resulting from fossil fuel combustion.

Two of the PAHs (1-methylnaphthalene and 2-methylnaphthalene) exceeded the USEPA RSL at only one sample location, PAR-83-SB-12 (2.5-3 feet bgs). These COPCs are fuel oil constituents, likely associated with the adjacent UST 482 site.

The COPC bis(2-chloroethyl)ether has been commonly related to pesticide use, but the specific source at Parcel 83 is unknown.

4.2.4 Fate and Transport of SVOC COPCs in Soil

Potential migration routes for contaminants detected in soil include the following:

- Dissolution of soluble residual contamination in soil into infiltrating precipitation that percolates through the vadose zone to the water table; and
- Volatilization into soil gas and/or the atmosphere.

The SVOC COPCs 1-methylnaphthalene and 2-methylnaphthalene are expected to be slightly mobile to immobile in soils (ASTDR, 2005). There is not much information available on the fate and transport of the SVOC COPC bis(2-chloroethyl)ether, however, it is not expected to absorb strongly to soils and therefore is likely mobile in soil (ASTDR, 2017). However, samples collected at deeper intervals from the same location (P83-B5) as the one exceedance of bis(2-chloroethyl)ether at Parcel 83 (in surface soil) had no detections of bis(2-chloroethyl)ether.

The remaining SVOCs identified as COPCs in soil (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene) are PAHs having 18 to 22 carbon atoms (i.e., C18-C22). As hydrocarbons approach a size of approximately 15 to 20 carbon atoms, their vapor pressures and water solubilities become negligible, and partitioning to air or dissolution in water is unimportant (American Petroleum Institute [API], 2011). API generally classifies petroleum substances in the C9 to C25 range as “not readily biodegradable” because their biodegradation rates are typically slower than lighter, more volatile fuels, such as gasoline or jet fuel. Therefore, PAHs such as those listed above are expected to be relatively persistent in vadose zone soil at Parcel 83 and are expected to be relatively immobile and will not readily leach to groundwater.

4.3 SOIL RESULTS FOR PCBS

Soil sampling results for PCBs obtained in 2007 and 2016 were compared to June 2017 USEPA criteria in **Table 2** and to September 2017 NJDEP criteria in **Table 3**, and results of the comparison to USEPA RSLs are shown on **Figure 3** and to the 2017 NJDEP criteria on **Figure 4**. In summary, Aroclor-1254 was detected in 2 surface soil samples out of 5 total soil samples and Aroclor-1260 was detected in 5 surface soil samples out of 65 total soil samples (**Table 4**).

4.3.1 PCB Exceedances of Comparison Criteria

The P83-B5 Aroclor-1260 concentration of 0.8 mg/kg during the 2008 SI exceeded the USEPA Residential RSL (0.12 mg/kg) and the NJDEP RDCSRS for total PCBs (0.2 mg/kg).

During the Phase II SI (2016), surface and subsurface soil samples from borings PAR-83-SB-09, PAR-83-SB-10, and PAR-83-SB-11 were analyzed to delineate for PCBs. Two surface soil locations (PAR-83-SB-09 and PAR-83-SB-11) exceeded the USEPA Residential RSL for Aroclor-1254 (0.12 mg/kg). PAR-83-SB-09 and PAR-83-SB-11 also exceeded the Aroclor-1254 and Aroclor-1260 USEPA Protection of Groundwater RSL in the surface soil (**Table 4**). The only Phase II SI PCB exceedance of the NJDEP RDCSRS was Aroclor-1254 at PAR-83-SB-09 in the surface soil (1-1.5 ft bgs), and a deeper sample was analyzed at 2 to 2.5 ft bgs that did not exceed the NJDEP RDCSRS. The 2008 PCB (Aroclor-1260) exceedance was located at P83-B5, which is adjacent to the 2016 sample PAR-83-SB-09; therefore, both PCB exceedances (Aroclor-1254 and Aroclor-1260) occurred in the surface soil. PCBs have been vertically and horizontally delineated to the NJDEP RDCSRS at Parcel 83 (**Figure 4**).

4.3.2 Constituents of Potential Concern (COPCs)

PCB COPCs in surface soil were identified by comparing the maximum detected concentration of each analyte to the USEPA Residential RSL ($TR = 1 \times 10^{-6}$ and $THQ = 0.1$) as detailed in the Risk Assessment Work Plan (Parsons, 2015b). The PCB COPCs in surface soil at Parcel 83 include (**Table 4**): Aroclor-1254 and Aroclor-1260.

4.3.3 Potential Sources of PCBs in Soil

There are no known PCB sources or releases at Parcel 83.

4.3.4 Fate and Transport of PCBs in Soil

PCBs are expected to have little to no mobility in soil. The lower the degree of chlorination, the more water soluble a PCB congener will be. However, PCBs may be volatilized from soil surfaces into the atmosphere and subsequently removed from the atmosphere by wet or dry deposition. PCBs detected in soil at Parcel 83 are expected to be strongly sorbed to soil particles and have little to no mobility in soil. Therefore, they will not readily leach to groundwater.

4.4 SOIL RESULTS FOR PETROLEUM HYDROCARBONS

Surface soil samples (P83-SS-18, P83-SS-19, and P83-SS-20) were collected via hand auger and analyzed for TPH during the SI (U.S. Army, 2008) to investigate a former electrical transformer storage location east of Bldg. 173. Detections of TPH ranged from 111 to 181 mg/kg. The TPH results are considered comparable to extractable petroleum hydrocarbon (EPH) results for decision making purposes based on NJDEP guidance (NJDEP, 2010a and 2010b). These results are less than the NJDEP's threshold for contingency analyses (1,000 mg/kg) and less than the residential exposure scenario criteria of 5,100 mg/kg (NJDEP, 2010a), and therefore are not discussed further.

During the 2017 sampling event, the samples collected at borings PAR-83-SB-23 and PAR-83-SB-25 were also analyzed for EPH due to petroleum-like odors and high photoionization detector (PID) readings observed in the field. EPH was also analyzed in one boring (PAR-83-482-

SB-01) that was associated with former UST 482. The EPH results are presented in **Tables 2 and 3**, and boring logs are presented in Appendix B. These results are summarized as follows:

- The concentration of total EPH (114 mg/kg) encountered in subsurface soil at boring PAR-83-SB-23 (5 to 5.5 ft bgs) is less than the NJDEP's threshold for contingency analyses (1,000 mg/kg) and less than the residential exposure scenario criteria of 5,100 mg/kg (NJDEP, 2010a), and therefore additional characterization or action is not warranted. There are no former USTs or other sources of petroleum hydrocarbons known to have been located near this boring.
- The total EPH concentration of 2,060 mg/kg encountered in subsurface soil at boring PAR-83-SB-25 (3 to 3.5 ft bgs) possibly indicated a release. Three former fuel oil USTs have previously been reported in the vicinity of this boring: UST 434 and UST 439 were just north, and UST 443 was just south, of Building 439. All three of these former fuel oil USTs have NFA determinations from the NJDEP (OACSIM, 2015; NJDEP, 2015). The total EPH concentration encountered at boring PAR-83-SB-25 is greater than the NJDEP's threshold for contingency analyses (1,000 mg/kg) but is less than the residential exposure scenario criteria of 5,100 mg/kg (NJDEP, 2010a). The EPH encountered at boring PAR-83-SB-25 is attributed to former fuel oil USTs that have been previously closed, and additional characterization or action is not warranted.
- The highest total EPH concentration encountered at boring PAR-83-482-SB-01 was 2,410 mg/kg in surface soil (sampled from 1.5 to 2 ft bgs). Although located within the Parcel 83 study area, this boring was associated with former fuel oil UST 482, which was previously evaluated (OACSIM, 2018) and has an NFA determination (NJDEP, 2018). Therefore, additional characterization or action is not warranted.

4.5 SOIL RESULTS FOR METALS

Surface and subsurface soil sampling results for metals obtained in 2007 and 2016 were compared to USEPA criteria in **Table 2** and to NJDEP criteria or an ARS (in the case of vanadium) in **Table 3**; results of the comparison to USEPA RSL are shown on **Figure 3** and NJDEP RDCSRS are shown on **Figure 4**. Results that are B flagged are considered not-detected as detailed in the Risk Assessment Work Plan (Parsons, 2015b). All detections of aluminum, copper, and manganese in soil are B flagged and therefore they were treated as not detected. Metals were detected in surface or subsurface soil at all soil boring locations (**Table 4**).

4.5.1 Metal Exceedances of Comparison Criteria

Arsenic and lead are the only metals detected at concentrations greater than the NJDEP RDCSRS. These exceedances are present in five locations (P83-B5, PAR-83-SB-09, P83-SS/SB-09, P83-SS/SB/GW-10, and P83-SS/SB-11). The arsenic and lead exceedances occur in surface soil (0-0.5 or 1-1.5 ft bgs) (**Table 3**).

The NJDEP RDCSRS for vanadium is based on a provisional reference dose (RfD). However, the USEPA no longer uses the provisional RfD. The RSL is based on an RfD that is based on the vanadium pentoxide RfD that is presented in the Integrated Risk Information System (USEPA, 2017a). Therefore, an ARS of 390 mg/kg, based on the USEPA RSL, was used for the NJDEP RDCSRS value for vanadium (**Appendix F**).

Concentrations of the following metals exceeded their June 2017 USEPA Residential RSL and the 1995 background investigation performed by Weston (Weston, 1995) in at least one of the soil samples collected in 2007 or 2016: antimony, arsenic, cobalt, lead, manganese, mercury, and vanadium (**Table 4**). Metal exceedances of the NJDEP RDCSRS or the USEPA Residential RSL were in surface and subsurface soil and ranged in depth from 0.0 to 7.5 ft bgs.

Concentrations of the following metals exceeded their June 2017 USEPA Groundwater Protection RSL and/or 2013 NJDEP IGW SL in at least one of the surface or subsurface soil samples collected in 2007 and 2016 (**Tables 2 and 3**): antimony, arsenic, beryllium, cadmium, cobalt, lead, manganese, mercury, nickel, vanadium, and zinc.

4.5.2 Constituents of Potential Concern (COPCs)

Metal COPCs in surface and subsurface soil were identified by comparing the maximum detected concentration of each analyte to the USEPA Residential RSL ($TR = 1 \times 10^{-6}$ and $THQ = 0.1$). The metal COPCs in surface and subsurface soil at Parcel 83 include (**Table 4**): antimony, arsenic, cobalt, lead, manganese, mercury, and vanadium.

4.5.3 Potential Sources of Metals in Soil

Based on the results of the soil sampling, the former coal storage area is a potential source of metals in soil at Parcel 83. However, metals were also found to be ubiquitous across the Parcel 83 and surrounding area, and not only present in the former coal storage area.

4.5.4 Fate and Transport of Metals in Soil

Potential migration routes for contaminants detected in soil include the following:

- Dissolution of soluble residual contamination in soil into infiltrating precipitation that percolates through the vadose zone to the water table; and
- Volatilization into soil gas and/or the atmosphere.

Metals are subject to various transformation processes in soil. For example, metals can exist in the environment in several valence forms, and they can also exist as organometallic compounds that have a metal-carbon bond. Metal transformation processes, such as metal methylation, occur through interactions with other chemicals and biota in the environment. In general, however, metals are elements that have limited mobility in the environment, and therefore are expected to be relatively persistent in vadose zone soil at Parcel 83.

4.6 GROUNDWATER RESULTS

A 2008 NJDEP letter concurred that NFA for groundwater was acceptable based on the results presented in the SI. However, during the 2008 SI, TCE exceeded the NJDEP RDCSRS at one soil sample (P-83-SS/SB-9) and was not detected at any other soil boring on site. The SI report indicated that TCE was historically used for parts cleaning at nearby Building 279. However, TCE was not detected in the soil or groundwater sample at the nearby boring P83-SS/SB/GW-10. Therefore, the soil TCE occurrence is isolated and located in shallow soil. NJDEP comments (July 2012) on the 2008 SI requested additional discussion of this TCE exceedance (**Correspondence 7 in Appendix A**).

Even though NJDEP had concurred with the NFA determination for groundwater in the 2008 SI, in response to the NJDEP request for discussion regarding the TCE exceedance in soil, three groundwater samples from temporary wells were collected in 2016 for TCE analysis at PAR-83-SB-12, PAR-83-SB-13, and PAR-83-SB-14 as shown on **Figure 7**. As shown in the groundwater data presented in **Table 5**, there were no detections of TCE; therefore, there are no COPCs in groundwater and the investigation of Parcel 83 groundwater is once again complete.

SECTION 5 RISK ASSESSMENT SUMMARY AND CONCLUSIONS

An evaluation of the potential risk resulting from human exposure to contaminants in soil was conducted as part of this RI Report (**Appendix G**). This Human Health Risk Assessment (HHRA)(40 CFR 300.430(d)(4)) evaluated the exposure of current and/or future unlimited use and unrestricted exposure (UU/UE) receptors (the scenario protective of residential users), outdoor workers, utility workers, and recreational users to COPCs in soil through dermal contact, incidental ingestion, and inhalation of particulates.

The HHRA compared the cumulative risk and hazard index to the USEPA's acceptable incremental cancer risk range of 1×10^{-6} and 1×10^{-4} and hazard index cutoff of 1. If the cumulative risk is less than the upper end of the USEPA's acceptable incremental cancer risk range and the hazard index is less than 1, this indicates that assumed exposures to COPCs at the site are unlikely to result in unacceptable carcinogenic risks or hazards for the receptors evaluated.

The HHRA used an exposure point concentration (EPC) for soil that was the maximum detected concentration or the 95% upper confidence limit (UCL) on the mean of each analyte. 95% UCLs were calculated for those COPCs contributing significantly to the risk/hazard (i.e., greater than 25% of the cumulative risk/hazard) unless there was an insufficient sample size within the exposure area to calculate a 95% UCL (less than eight samples) or there was only one detection in the exposure area, then the maximum detected concentration was used as the EPC. Unlike the method described above for determining the EPC for other COPCs, in all cases, the EPC for lead is the arithmetic mean concentration for lead in soil, as recommended in USEPA guidance (USEPA, 2007).

Three Exposure Areas of approximately 0.5 acres (i.e. representing the approximate size of a residential lot) were evaluated for the UU/UE receptor exposed to soil, based on the areas at the site with the highest concentrations of COPCs that would be most likely to pose an unacceptable risk (**Appendix G, Figure G.2.2**). The remaining receptors were assumed to access the entire site.

Only one potential future receptor had an estimated risk greater than the USEPA's acceptable levels. The cumulative carcinogenic risks and noncarcinogenic hazards estimated for the receptors at the site are summarized on **Table 6** and are as follows:

- UU/UE receptors exposed to surface soil, combined surface and subsurface soil and outdoor air: The cumulative carcinogenic risks in surface soil and combined surface and subsurface soil are less than or equal to the upper end of the USEPA's acceptable incremental cancer risk range of 1×10^{-4} in every Exposure Area except surface soil in Exposure Area 2 where the cumulative risk of 2×10^{-4} is greater than the upper end of the USEPA's acceptable incremental cancer risk range of 1×10^{-4} . This risk is wholly attributable to exposure to carcinogenic PAHs in soil as represented by the benzo(a)pyrene (BaP)-equivalent concentration in surface soil.

The hazard index (HI) for surface soil and combined surface and subsurface soil are less than or equal to 1 for all Exposure Areas, for the UU/UE adult receptor. The HI for the UU/UE child receptor in Exposure Area 1 is 3 in surface soil and 3 in combined surface and subsurface soil, in Exposure Area 2 is 3 in surface soil and 2 in combined surface and subsurface soil, and in Exposure Area 3 is 2 in surface soil and 2 in

combined surface and subsurface soil which are all greater than 1. However, the individual hazard quotients (HQs) for each chemical are all less than 1. In addition, the hazards were separated by target organ, and the target-organ specific HIs were all less than or equal to 1. Therefore, no action is necessary for soils based on non-cancer endpoints.

The highest modeled blood lead levels in children for each Exposure Area were all less than the USEPA level of concern for blood-lead levels of 10 µg/dL, as well as the current Centers for Disease Control and Prevention (CDC) reference value for lead of 5 µg/dL. The estimated potential blood lead concentrations modeled using the Integrated Exposure Uptake Biokinetic (IEUBK) model are protective of the other receptors on-site including adult UU/UE receptors

- Utility workers exposed to surface soil and combined surface and subsurface soil: The cumulative carcinogenic risk for utility worker exposure to surface soil (3×10^{-7}) and combined surface and subsurface soil (3×10^{-7}) are less than the upper end of the USEPA's acceptable incremental cancer risk range of 1×10^{-4} . The HI for utility workers is less than 1 for exposure to surface soil (HI=0.1) and combined surface and subsurface soil (HI=0.1).
- Outdoor workers exposed to surface soil: The cumulative carcinogenic risk for outdoor worker exposure to surface soil (2×10^{-5}) is less than the upper end of the USEPA's acceptable incremental cancer risk range of 1×10^{-4} . The HI for outdoor workers is less than 1 for exposure to surface soil (HI=0.5).
- Recreational users exposed to surface soil: The cumulative carcinogenic risk for recreational users exposure to surface soil (6×10^{-6}) is less than the upper end of the USEPA's acceptable incremental cancer risk range of 1×10^{-4} . The recreational user HI_{adl} for exposure to surface soil is 0.1 and the HI_{adult} is 0.04, which are less than 1.

The HHRA concluded that there are no unacceptable risks to human health from exposure to VOCs, PCBs, and metals in soil. However, there are unacceptable risks to human health from exposure to carcinogenic PAHs in surface soil at Exposure Area 2 (Section 4.2.3) for the UU/UE receptors. Therefore, a feasibility study is recommended to address carcinogenic PAHs in surface soil at Exposure Area 2 (**Figure 8**).

There are no COPCs in 2016 groundwater samples, therefore, there is no unacceptable risk to human health associated with Parcel 83 groundwater.

6 SECTION 6 REMEDIAL INVESTIGATION SUMMARY AND CONCLUSION

6.1 VOCS IN SOIL

Concentrations in surface soil at Parcel 83 exceed the RDCSRS for TCE. The HHRA concluded that there is no unacceptable risk to human health from VOCs in soil. Therefore, the Army has determined that no further action with regard to VOCs in soil is warranted under CERCLA.

6.2 SVOCS IN SOIL

Concentrations in surface or subsurface soil at Parcel 83 exceed the RDCSRS for 1-methylnaphthalene, 2-methylnaphthalene and multiple other PAHs. The HHRA concluded that there is an unacceptable risk to human health attributable to exposure to carcinogenic PAHs in surface soil as represented by the BaP-equivalent concentration in surface soil. The HHRA concluded that there is no unacceptable risk to human health attributable to exposure to carcinogenic PAHs in combined surface and subsurface soil. Therefore, a Feasibility Study is required to address carcinogenic PAHs in surface soil at Exposure Area 2 (**Figure 8**).

6.3 PCBS IN SOIL

Concentrations in surface soil at Parcel 83 exceed the RDCSRS for Aroclor-1254 and Aroclor-1260. The HHRA concluded that there is no unacceptable risk to human health from PCBs in soil. Therefore, the Army has determined that no further action with regard to PCBs in soil is warranted under CERCLA.

6.4 PETROLEUM HYDROCARBONS IN SOIL

EPH was not evaluated in the HHRA. As described in Section 4.4, EPH encountered at borings PAR-83-SB-25 and PAR-83-482-SB-01 is attributed to former fuel oil USTs that have been previously closed, and therefore additional characterization or action is not warranted.

6.5 METALS IN SOIL

Concentrations in soil at Parcel 83 exceed the RDCSRS for arsenic and lead. The HHRA concluded that there is no unacceptable risk to human health from metals in surface or subsurface soil. Therefore, the Army has determined that no further action with regard to metals in soil is warranted under CERCLA.

6.6 GROUNDWATER

There are no COPCs in groundwater and the investigation of Parcel 83 groundwater is considered complete. Consequently, groundwater was not evaluated in the HHRA, and additional characterization or action for groundwater is not warranted.

6.7 REMEDIAL INVESTIGATION CONCLUSIONS

A Feasibility Study (FS) is recommended to address the risk to human health due to exposure to carcinogenic PAHs in surface soil within Exposure Area 2 at Parcel 83 which is related to former coal storage or historical fill. It is also recommended that the FS consider a response in the other areas within Parcel 83 but outside Exposure Area 2 where the concentrations of PAHs exceed the NJDEP RDCSRS, as incidental remediation areas. This will allow attainment of NJDEP cleanup standards within and outside of Exposure Area 2 at Parcel 83 to facilitate property transfer. Property transfer reduces the Army's environmental liabilities and places the land back into use, which is a BRAC objective.

SECTION 7

FEASIBILITY STUDY

REMEDIAL ACTION OBJECTIVES AND ARARS

This FS uses a focused approach to reduce redundancy, facilitate rapid reviews, and accelerate cleanup decisions pursuant to the NCP (40 CFR 300.430(a)(1)(ii)(C)). The scope of this FS has been streamlined as practicable for the conditions present at Parcel 83 and applies only to select constituents of concern (COCs) that pose an unacceptable risk in the surface soil and warrant action at Parcel 83. The purpose of an FS is to identify, develop, and perform a detailed analysis of potential remedial alternatives that are protective of human health and the environment, can be implemented in a cost-effective manner, and can meet the remedial action objectives (RAOs) for Parcel 83 so that decision-makers will have adequate information to select the most appropriate remedial alternative (40 CFR 300.430(e)(1)). In this section, RAOs for Parcel 83 are defined so that appropriate general response actions (GRAs) and specific response actions (SRAs) can be selected. Finally, Applicable or Relevant and Appropriate Requirements (ARARs, (40 CFR 300.400(g))) and “to be considered” (TBC) criteria are identified.

7.1 REMEDIAL ACTION OBJECTIVES

RAOs are specific goals for protecting human health and the environment from the environmental hazards identified in the HHRA. RAOs can be accomplished by ensuring exposure pathways are not completed or by reducing concentrations of COCs at exposure points to protective concentrations.

COCs are “the hazardous substances, pollutants, and contaminants that, at the end of the risk assessment, are found to be the risk drivers or those that may actually pose unacceptable human or ecological risks.” The COCs were derived from the list of COPCs that are contributing to risk in soil shown on HHRA tables (RI Section 4). Only the analytes that contribute to either the cumulative risk (carcinogenic analytes) or the HQ (i.e., for noncarcinogenic analytes) were retained as COCs. The COCs in soil identified for Parcel 83 are presented in **Table 7**.

The RAO developed in this section addresses the risks and hazards identified in the HHRA (Section 5 and **Appendix G**). For hypothetical receptors representing a UU/UE scenario at Parcel 83 Exposure Area 2, the contributors to cumulative carcinogenic risk are carcinogenic PAHs in surface soil (0 to 2 ft bgs) as represented by the BaP-equivalent concentration. However, there was no unacceptable carcinogenic risk from combined surface and subsurface soil. In addition, there were no unacceptable noncarcinogenic risk or noncarcinogenic hazard identified in the HHRA for soil. Furthermore, the RI concluded there are no COPCs in groundwater and no further action is warranted for groundwater. Therefore, the following RAO was developed for Parcel 83 to protect human health and the environment:

- Protect public health, welfare and the environment by preventing exposure (inhalation, dermal contact, and ingestion) to surface soil containing carcinogenic PAHs (BaP, benzo(a)anthracene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene) at concentrations in excess of cleanup levels (Section 7.3).

7.2 ARARs and TBC Criteria

The NCP established a general requirement that response actions comply with ARARs, based on site-specific conditions. “Applicable requirements” are promulgated environmental cleanup standards, standards of control, and other substantive requirements, criteria, or limitations that specifically address a hazardous substance, remedial action, location, or other circumstances found at a release site. “Relevant and appropriate requirements” are promulgated environmental cleanup standards, standards of control, and other substantive requirement, criteria, or limitations that, while not legally “applicable” to site conditions, address problems or situations sufficiently similar to those encountered at the site that their use is well suited for the site. Pursuant to the USEPA guidance (USEPA, 1988), ARARs are generally divided into three categories: chemical-, location- and action-specific requirements. ARARs must be complied with unless waived. Other TBC criteria, such as non-promulgated policy and guidance documents, may also be useful in directing a response action at a site. The ARARs and TBC criteria for this site are presented in **Table 8**.

7.2.1 Chemical-Specific ARARs

Chemical-specific ARARs are promulgated health-based numerical values that establish the acceptable amount or concentration of a chemical that may remain in, or be discharged to, the ambient environment. Parcel 83 chemical-specific ARARs are the NJDEP RDCSRS published in the New Jersey Administrative Code (N.J.A.C.) 7:26D Remediation Standards. Risk-based screening levels (e.g., USEPA RSLs) used in determining COPCs are not considered chemical-specific ARARs because they are not promulgated.

7.2.2 Location-Specific ARARs

Location-specific ARARs prevent damage to unique or sensitive areas, such as floodplains, historic places, wetlands, and fragile ecosystems, and restrict other activities that are potentially harmful because of where they take place. The Resource Conservation and Recovery Act (RCRA), for example, prohibits the placement of hazardous waste in geologically unstable areas. Based on the proximity of tidally-influenced Parkers Creek, Oceanport Creek, and the back-bay areas of the Shrewsbury River, Parcel 83 lies within a potential flood hazard area. Therefore, any remediation activity conducted within the Parcel 83 vicinity needs to be in compliance with N.J.A.C. 7:13 Flood Hazard Area Control Act (FHACA) Rules, and the substantive permit and authorization requirements of the FHACA need to be established. As stated in N.J.A.C. 7:13-1.1(c), flooding presents a significant risk to the public health, safety, and welfare due to loss of life, injury, and property damage, and therefore needs to be controlled. There are multiple development scenarios that are subject to the FHACA Rules and that could apply to the remediation of Parcel 83, including stormwater management (N.J.A.C. 7:13-12.2); excavation, filling and grading (N.J.A.C. 7:13-12.3); and the cleanup of hazardous substances (N.J.A.C. 7:13-12.17).

New Jersey Statutes Annotated (N.J.S.A.) 13:19-1 Coastal Area Facility Review Act (CAFRA), as promulgated under N.J.A.C. 7:7 Coastal Zone Management Rules, requires that any coastal area use be protective of public health. Oceanport, New Jersey is designated as a municipality within the CAFRA zone. Therefore, any remediation activity conducted within the Parcel 83 vicinity needs to be in substantive compliance with the CAFRA requirements.

7.2.3 Action-Specific ARARs

Action-specific ARARs are usually technology or activity-based requirements or limitations placed on actions taken with respect to remedial/removal actions, or requirements to conduct certain actions to address circumstances at a site. These actions include capping, removal, decontamination, and/or control of impacted media. Provisions of RCRA regulations which may become ARARs include 40 CFR Sections 261, 262, 264, 258, 268, and 260-268, and RCRA (42 U.S. Code Chapter 82, Subchapter III) regulations that establish rules for hazardous waste management that may apply to capping, excavation, storage, management, and disposal of impacted media has been identified as potential action-specific ARARs.

7.2.4 TBC Criteria

When ARARs do not exist for a chemical or remedial activity, other criteria, advisories, and guidance referred to as TBC are useful in designing and selecting a remedial alternative. TBC criteria include the risk-based screening levels (e.g., USEPA RSLs) used in determining COPCs, which are chemical-specific TBC because they are not promulgated.

7.3 CLEANUP LEVELS

The RAO refers to analyte-specific cleanup levels for soil. The numerical cleanup goals for the soil COCs identified at Parcel 83 evaluated in this FS are the NJDEP RDCSRS presented on **Table 7**. As required to meet the Army's objective of addressing CERCLA risk within Exposure Area 2, NJDEP RDCSRS are state promulgated values which were reviewed to address all of Parcel 83. Any response at Exposure Area 2 to address unacceptable risk and meet the NJDEP RDCSRS will also address those areas in other portions of the site outside of Area 2 as incidental to the remediation of the primary unacceptable risk.

At Parcel 83, PAH concentrations in soil that exceed the NJDEP RDCSRS in other portions of the site due to historic fill were evaluated. The NJDEP RDCSRS have been identified as ARARs for Parcel 83 and as such, provide remediation standards for PAH concentrations associated with both the coal storage areas and historic fill areas through the Parcel boundaries.

Attainment of a No Further Action (NFA) determination from the NJDEP would require an action such as land use controls or remediation throughout Parcels 83, 103, 104 and 108 to reduce COC concentrations to the NJDEP RDCSRSs listed in Table 7. Therefore, specific remedial alternatives described in Section 10 will address all exceedances of the cleanup goals listed in Table 7.

§ SECTION 8 IDENTIFICATION AND SCREENING OF RESPONSE ACTIONS

The NCP establishes expectations for the types of remedies that will be used for addressing principal threat and low-level threat wastes. Parcel 83 is considered a low level threat waste rather than a principal threat waste. The concept of principal threat waste and low level threat waste developed in the NCP is applied on a site-specific basis when characterizing source material. Source material is defined as material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, to air, or acts as a source for direct exposure. Low-level threat wastes are wastes that exhibit a low toxicity, low mobility in the environment or are near health-based levels. In contrast, principal threat wastes are highly toxic or highly mobile wastes that would present a significant risk to human health or the environment should exposure occur.

The NCP establishes the expectation to:

- Use treatment to address the principal threats posed by a site, wherever practicable;
- Use engineering controls (EC), such as containment, for wastes that pose a relatively low long-term threat or where treatment is impractical;
- Use institutional controls (IC) such as water use and deed restrictions to supplement EC as appropriate for short- and long-term management to prevent or limit exposure to hazardous substances; and
- Use a combination of methods, as appropriate to achieve protection of human health and the environment.

The primary objective of this section is to identify remedial technologies and approaches that are suitable to address one or more elements of the site conditions that warrant a response action. This section identifies GRAs that could possibly be used to achieve the RAO. Under each GRA, numerous SRAs that could potentially be implemented are identified and screened.

8.1 GENERAL RESPONSE ACTIONS

GRAs represent broad classes of technologies that have common characteristics that could possibly be used to address the risk posed by site impacts and achieve the RAO. Following the USEPA guidelines (USEPA, 1988), these GRAs are considered for soil at Parcel 83:

- **No Action:** Contaminated media are left in place and remain un-mitigated. The No Action response action is used as a baseline for comparison to other preliminary response actions. Under this action, Parcel 83 will be maintained under the current conditions, and the RAO would not be met. This action will be retained for evaluation in accordance with the NCP to provide a baseline comparison with other alternatives (40 CFR 300.430(e)(6)).
- **Risk and Hazard Management (Land Use Controls):** Contaminated media are left in place and land use controls (LUCs) such as ICs (deed restrictions) or ECs (signs and fences) are established to prevent potential exposure, but no active remediation of

contaminated media is considered. The actions meet the RAO of minimizing direct contact via the soil exposure pathway with the contaminated soil. LUCs may be used in conjunction with other technologies.

- **Containment:** Contaminated media are isolated from the environment and potential receptors by blocking the exposure/transport mechanism. These technologies are generally appropriate for wastes that pose a relatively low-level threat or where treatment is impracticable. Containment technologies range from simple to complex depending on the risks and hazards identified at a site.
- **Treatment:** Contaminated soil could be remediated through either in situ or ex situ treatment including physical, chemical, and biological treatments. Treatment measures would reduce toxicity, mobility, or volume of a contaminant or waste by altering the physical or chemical properties of the contaminants and/or media. The action meets the RAO because the contaminated soil would be treated to regulated acceptable levels to protect human health and the environment.
- **Source Removal and Disposal:** Contaminated media and solid wastes are physically removed from the subsurface and are either treated or properly disposed offsite. The action meets the RAO because the contaminated soil would be completely removed from Parcel 83.

8.2 IDENTIFICATION AND SCREENING OF TECHNOLOGY TYPES AND PROCESS OPTIONS

The objective of this section is to identify remedial technologies and process options for soil remediation at Parcel 83. A focused approach was used considering only the conditions present at Parcel 83 Exposure Area 2 to address the COCs that pose an unacceptable risk in the surface soil (0 to 2 feet bgs) and to address the COCs that exceed cleanup levels. This objective is accomplished using a variety of information including previous investigations and remedial actions conducted at Parcel 83, remedial actions at other sites, references developed by USEPA for application at remedial sites, USEPA computerized technology databases (ATTIC, Version 1.0 and CLU-IN), and standard engineering references.

For each GRA discussed above, several remedial technologies exist that are applicable to the type of soil contamination at Parcel 83. The goal of the screening process is to evaluate these technologies to identify those that are technically feasible to implement under the site-specific conditions. In this step, entire technology types and process options can be eliminated based on technical effectiveness and/or implementability considerations. Information on site characteristics and chemical types and concentrations were used to eliminate technology types and process options that are neither applicable nor effectively implementable at Parcel 83.

Table 9 lists the GRAs for identified Parcel 83 impacts requiring remedy and identifies the remedial technologies and process types for each response action. In order to streamline the development of remedial action alternatives, only “presumptive” remedial technologies from each general response action are identified. This table also shows graphically which technologies were retained and screened out, with a brief description of each. General technology description is presented below along with if it was retained or screened out.

8.2.1 No Action

No action refers to a site remedy where no active remediation or risk and hazard management are implemented. Under DERP, evaluation of a no-action remedial alternative is required, pursuant to the NCP (40 CFR 300.430(e)) to provide a baseline for comparison with other remedial alternatives. Under the no action alternative, no formal programs would be put into place to control potential receptor exposures to COCs.

8.2.2 Risk and Hazard Management

Risk and hazard management uses enforceable LUCs, including both ICs and/or ECs to prevent or limit exposure of receptors to potentially harmful concentrations of COCs. ICs and ECs are actions taken to reduce or eliminate risks to public health and the environment by controlling exposure pathways rather than removing the contaminants or reducing their mobility, toxicity, or volume. ICs may consist of physical restrictions, administrative restrictions to include deed notices, zoning ordinances, special use permits, or restrictions on construction activities. Examples of ECs include physical barriers and access restrictions such as fencing, locked gates, or warning signs.

LUCs are cost-effective, reliable, and immediately effective; they can be implemented either alone or with other remedial components. Inspections are typically required to document long-term effectiveness of LUCs. The administrative feasibility of and cost to implement LUCs depend on site-specific circumstances (e.g., whether a site is under the direct operational control of the federal government or has been transferred to non-federal ownership). Typically, this GRA is easily implemented. Implementation of LUCs is addressed in the DoD Policy and Guidance Document on LUCs associated with Environmental Restoration Activities (Office of the Under Secretary of Defense-Acquisition and Technology, 2001). Risk and hazard management using LUCs is a viable option and was retained for further evaluation.

8.2.3 Containment

Containment technologies range from simple (such as asphalt pavement) to complex (such as a hazardous waste containment system) depending on the risks and hazards identified at a site. Examples of containment approaches applicable to Parcel 83 include impermeable barriers such as an asphalt cap. An asphalt cap would be protective of human health by eliminating contact with underlying soil but would not reduce or eliminate the contamination. An asphalt cap would require hydrologic modeling and extensive State permitting, design and installation considerations due to the Parcel 83 location in a lowland coastal area. A Deed Notice would be required as well as on-going pavement maintenance. Containment technologies have been retained for further evaluation.

8.2.4 Treatment

Treatment uses engineered and non-engineered approaches to reduce the toxicity, mobility, or volume of contaminants in the subsurface, thereby preventing or minimizing exposure of receptors to, or further degradation of natural resources by, site contamination. The primary potential advantage of in situ treatment is that it allows the contaminated media to be treated without being removed and could result in cost savings due to the elimination of costs associated with physical removal, ex situ treatment, and disposal. Biological, chemical, and physical processes may be used

for in situ treatment. Examples of in situ treatment options include solvent extraction/soil washing, electro kinetic, chemical oxidation, and phytoremediation technologies. Implementability and effectiveness generally are governed by site hydrogeologic, geochemical, and microbiological conditions, the physicochemical properties of the COCs, and the mass of contaminants present in the affected media.

Solvent extraction/soil washing success depends on many factors and variables and would result in additional materials that would require disposal. Electro kinetic would require a complicated system, power supply, installation of electrodes, and higher capital and operation and maintenance (O&M) costs. Chemical oxidation would require pilot test, design to include oxidant and delivery system, multiple applications, and would require impractical amounts of reagent to treat relatively low concentrations of COCs present across a wide area. Phytoremediation would require long term plant growth and extensive maintenance to be effective. Due to these limitations and based on impracticality of implementation and unknown success for the COCs, treatment technology options are not retained for further evaluation.

8.2.5 Source Removal and Disposal

Removal of source materials by direct excavation and offsite disposal would be effective at Parcel 83. The targeted source area that precludes UU/UE at Parcel 83 Exposure Area 2 is approximately 4 feet long, 4 feet wide, and about 3 feet deep. Alternatively, this technology could be applied to the much larger area that exceeds cleanup levels (for example, the NJDEP RDCSRs as shown on Figure 6). This technology has been previously applied at multiple locations within FTMM for remediation. It represents a viable technology for site remediation. Source removal and offsite disposal was retained for further evaluation as an appropriate remedial option.

8.3 EVALUATION OF TECHNOLOGY PROCESS OPTIONS

The next step in developing and screening alternatives involves an evaluation of the technologies and process options remaining from the initial technology screening. Technologies and process options judged to be potentially viable in the previous section for application to Parcel 83 soil are reviewed according to three criteria: effectiveness, implementability, and cost. These criteria are briefly discussed below.

- **Effectiveness.** The effectiveness evaluation focuses on the following elements:
 - Potential effectiveness of process options for handling the estimated areas or volumes of media and meeting the RAO;
 - Potential impacts to human health and the environment during the construction and implementation phase; and
 - Reliability and proven effectiveness of the process with respect to the contaminants and conditions at Parcel 83.
- **Implementability.** The initial technology screening eliminated technology types or process options that were clearly ineffective or unworkable at the site. The following evaluation addresses both the technical and institutional feasibility of implementing each

process that was retained after the initial technology screening, including the following institutional aspects:

- Ability to obtain necessary permits and rights-of-way for offsite actions;
- Availability of necessary equipment and skilled workers to implement the technology; and
- Availability (including capacity) of treatment, storage, and disposal services.
- **Cost.** Cost plays a limited role in the screening of technologies at this phase. Relative capital and O&M costs are considered rather than absolute costs. For this evaluation, the cost analysis is based on engineering judgment. Each technology is evaluated as to whether costs are low, moderate, or high relative to other process options in the same technology type. Therefore, a process option that has a relatively low cost associated with its implementation would receive a “High” rating in the evaluation table, while a process option that is relatively costly to implement would receive a “Low” rating. The greatest cost consequences in site remediation are usually associated with the degree to which different technology types are used. Using different process options within a technology type usually has a less significant effect on cost than the use of different technology types. A technology process option can be eliminated based on costs only if other process options within the same technology type are comparably effective and implementable but have a much lower cost.

Based on the above criteria, the process options were evaluated relative to other processes within the same technology type to select a representative process option to be included in a remedial alternative. At this stage of the FS, the major focus is on the effectiveness of each option; implementability and cost are of lesser importance. Each criterion is rated as low, moderate, or high relative to the technologies within the same process option. The results of the evaluation are discussed in the following sections and are summarized in **Table 10**.

8.3.1 No Action

The evaluation of the no action option for soil is summarized below:

Criterion	Evaluation	Rating
Effectiveness	Contaminants would remain in the soil. COCs are expected to be persistent in vadose zone soil and are expected to be relatively immobile and will not readily leach to groundwater. The effectiveness of the no action option is rated low because exposure to impacted soil would be unrestricted.	Low
Implementability	No equipment, skilled workers, or permits are required for the no action option.	High
Cost	There are no costs associated with no action.	High

The no action option is retained for incorporation into remedial action alternatives, as required by the NCP, and will be used as a baseline for comparison of other options.

8.3.2 Land Use Controls

This option involves LUCs and restricting access to soil at Parcel 83. The evaluation of this option is summarized below:

Criterion	Evaluation	Rating
Effectiveness	Contaminants would remain in the soil. A Deed Notice or Declaration of Environmental Restriction (DER) would be in effect which is an effective, reliable, and proven technology that is an integral component of any remedial action. This option will not directly contribute to cleaning up contaminated soil but would protect human health by limiting access/use of soil.	Moderate
Implementability	A Deed Notice or DER is required. A LUC Implementation Plan (LUCIP) would be prepared and would include five-year reviews.	High
Cost	Costs associated with this option include minimal administrative and five year inspection and reporting preparation.	Moderate

Based on the moderate ratings for effectiveness and cost, and the high rating for implementability, LUCs is retained for incorporation into the remedial action alternatives.

8.3.3 Containment via Asphalt Capping

Containment via an asphalt cap would mitigate exposure to soil at Parcel 83. The evaluation of this option is summarized below:

Criterion	Evaluation	Rating
Effectiveness	This option will not directly contribute to cleaning up contaminated soil but would protect human health by limiting access/use of soil. An asphalt cap is a proven, effective technology that provides a physical barrier between receptors and contaminated soils. The cap would reduce the potential for direct contact and would minimize exposure. This option would require LUCs in the form of a Deed Notice to limit use of or access to the site, environmental monitoring to detect breaching of the cap, and maintenance. The major disadvantage of the capping alternative is that soil contamination is not addressed.	Moderate to High
Implementability	Requires extensive State permitting (including CAFRA and FHACA), design and installation due to location in lowland coastal area. Requires long-term maintenance and limits future use. Capping is a well-established technology and would be implementable at the site. Some clearing and grubbing, rerouting of utilities and other site preparation activities would be required before the cap could be constructed. Site monitoring would be required for as long as the media under the cap represents a threat to human health and the environment.	Moderate

Criterion	Evaluation	Rating
Cost	Capping would have capital and O&M costs. The capital costs of capping would be lower than soil excavation and off-site disposal. The capital costs include permitting and design, transportation of capping materials to the site, and installation of a cap. O&M costs would consist of the long-term monitoring requirements.	Moderate

Based on the moderate to high ratings for effectiveness, and the moderate rating for implementability and cost, asphalt capping is retained for incorporation into the remedial action alternatives.

8.3.4 Source Removal via Mechanical Excavation and Offsite Disposal

Source removal via direct excavation would target the impacted soil in exceedance of cleanup levels. The evaluation of this process option is summarized below:

Criterion	Evaluation	Rating
Effectiveness	Remove all contaminated soil above cleanup levels and backfill excavation with clean soil. Demonstrated ability to meet RAO very rapidly and without long-term treatment.	High
Implementability	Technology is well established. Excavation area is small (for CERCLA site-specific cleanup levels) to large (for NJDEP cleanup levels) and easily accessible. Requires agency approval, FTMM coordination, and health and safety planning. Requires compliance with the substantive provisions of CAFRA and FHACA for excavation work.	Moderate
Cost	Expected moderate to high initial capital costs and minimal long term O&M costs.	Low

The source removal option is an important strategic option available to support remedial actions at Parcel 83 and is retained for further consideration in the development of remedial alternatives.

8.4 SUMMARY OF PROCESS OPTION SELECTION

The selection of process options for remediation of soil at Parcel 83 is summarized below:

- The no action response is retained as required by the NCP.
- LUCs is selected as the risk and hazard management actions.
- Containment via asphalt capping is retained as a containment action.
- Source removal via direct excavation is retained as the removal action.

The selected process options were retained for further consideration in developing remedial alternatives for Parcel 83 soil. Different combinations of these process options were assembled to form site-wide remedial alternatives. The process options used to implement the design may not

be selected until the remedial design phase. The alternatives developed for Parcel 83 soil are discussed in Section 10.

§ SECTION 9 DESCRIPTION OF REMEDIAL ALTERNATIVES

Guidance for the development of remedial alternatives for Parcel 83 was obtained from the following sources: 40 CFR 300.430), CERCLA §121, and Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (USEPA, 1988). As required by the NCP and recommended by USEPA guidance (USEPA, 1988), acceptable engineering practices that relate to site-specific conditions were considered during development of the remedial action alternatives. The alternatives developed satisfy the requirements of 40 CFR 300.430(e), which specifies that alternatives be developed to include no action, ICs, little to no treatment alternatives, and alternatives that reduce the toxicity, mobility, or volume of contaminants, to the extent practical.

The following remedial alternatives were developed to address the remediation of contaminated soil at Parcel 83:

Alternative 1: No Action

Alternative 2: LUCs

Alternative 3: Containment via Asphalt Capping with Alternative 2

Alternative 4: Source Removal via Direct Excavation and Backfill

Each alternative is described in detail in the following sections. Cost estimates for each alternative (including summary and detailed cost information) are provided in **Appendix H**.

9.1 ALTERNATIVE 1 – NO ACTION

Under the no action alternative, no remedial actions of any kind would be undertaken. The NCP requires that a no action alternative be retained for detailed evaluation to provide a baseline comparison with other alternatives (42 CFR 300.430(e)(6)). No formalized LUCs would be established or monitored to control potential receptor exposures to site-related COCs, and no active remediation would be performed. Any existing monitoring wells on Parcel 83 would be secured and locked to prevent illegal disposal or tampering. Alternative 1 would not achieve the RAO.

9.2 ALTERNATIVE 2 – LAND USE CONTROLS

Alternative 2 consists of implementing LUCs (ICs/ECs) to control exposure of PAHs in soil (**Figure 9**), in the form of a Deed Notice or DER. Reporting would be conducted to document the continuing effectiveness of the remedy. Alternative 2 would achieve the RAO.

The common elements and distinguishing features of Alternative 2 are as follows:

- A Deed Notice/DER will be prepared, submitted for approval, and implemented to restrict access to soil within the Exposure Area 2. In addition, , the localized areas that exceed the NJDEP RDCSRS (as shown on **Figure 9**) will also be included in the LUCs and Deed Notice/DER to meet the requirements for a NJDEP-approved Deed Notice.
- A LUCIP will be prepared and submitted for approval.
- Annual inspections of LUCs and reporting would be conducted.

- Five-year reviews and reporting would be conducted to update and verify the Deed Notice/DER and to assess the effectiveness of meeting the RAO.

In order to accelerate the property transfer for beneficial reuse and to manage the environmental liability at Parcel 83, LUCs will be used to prevent uncontrolled exposure of potential receptors to contaminated soil. The U.S. Army will prepare a LUCIP to document the ICs; specify the physical, administrative, and legal mechanisms; and identify procedural responsibilities including inspections, monitoring and reporting and long-term management responsibilities to be used to ensure the restricted use of, or access to, the specific property parcel. As part of the environmental restoration process and as required by the CERCLA, five-year reviews and long-term monitoring of other environmental restoration sites at FTMM will also provide convenient opportunity to concurrently review LUCs. At that time, the integrity of the LUCs or ECs can also be checked (e.g., are land uses still consistent with the use restrictions, are required markers still in place) to assess the effectiveness of meeting the RAO and verify/confirm the Deed Notice/DER. When the property is transferred to private ownership, the LUCs will be incorporated into the title and the new owner would be responsible for complying with the LUCs. Although the Army may later transfer its procedural responsibilities to another party by contract, property transfer agreement, or through other means, the Army would retain ultimate responsibility for remedy integrity.

LUCs would be required for the site indefinitely because the COCs are unlikely to naturally attenuate in soils. For cost estimating purposes, a 30-year time period was used for estimating O&M costs (**Appendix H**).

9.3 ALTERNATIVE 3 – CONTAINMENT VIA ASPHALT CAPPING WITH ALTERNATIVE 2

Alternative 3 implements the LUCs previously discussed for Alternative 2. In addition, this alternative addresses impacted soil above cleanup levels through installation of an asphalt cap to mitigate risk and ensure achievement of the RAO. The logistics associated with the implementation of Alternative 3 would be addressed in a Remedial Action Work Plan (RAWP). The following elements are associated with Alternative 3:

- Preparation and submittal for approval of RAWP;
- Remedy design including hydrologic modeling to meet the substantive requirements of CAFRA and FHACA, and associated permitting;
- Site demolition, removal of existing pavement, and demolition of existing aboveground structures;
- Earthwork, soil stockpiling, and clean imported borrow material loading;
- Waste characterization, material handling, shipping, and transportation of the excavated top layer of soil and pavement to an offsite landfill disposal facility;
- Construction including base course placement, asphalt paving, and site restoration; and
- Preparation of a Remedial Action Completion Report (RACR).

This alternative involves installing an asphalt cap over approximately 3.8 acres at the areas shown on **Figure 10**, which includes Exposure Area 2 as well as localized areas where PAHs exceed the NJDEP RDCSRS in soil. Capping would involve covering the impacted surface area with asphalt pavement to eliminate direct contact with underlying contaminated soils. The capping system would also minimize percolation of rain and snowmelt through the contaminated soils.

Location-specific ARARSs include the CAFRA and the FHACA rules. Under CAFRA there are limitations to the total percentage of impermeable surfaces versus permeable surfaces at a site in a CAFRA area. Since the asphalt pavement would function as an impermeable surface, site-specific hydrologic modeling would be required within the designated CAFRA-impacted area. The actual percentage of these limitations varies based on the acreage of the site and the corresponding CAFRA zone (which would be determined during remedial design) in accordance with Subchapter 13 of the CAFRA Rules. Under FHACA, site remediation is exempt from flood storage displacement and net-fill standards if the new asphalt cap does not raise the existing elevation. Alternatively, if the cap design will result in raising the existing elevation, then the corresponding flood storage displacement can be addressed with additional water storage somewhere else on the site. To minimize permitting requirements, it is assumed that the new asphalt cap will be constructed at or below the existing grade and will be completed under a CAFRA General Permit 11 for hazardous site investigations and cleanup. In addition, a FHACA Permit-by-Rule 9 will be applied for general construction activities. Through pre-design modelling and inspection, it will be demonstrated that the construction of the asphalt cap will not cause any adverse effects to drainage, flooding, or water quality.

Site demolition would include removing existing pavement and curbs. There are several existing structures located northeast of Building 480 that will require demolition and are assumed to be constructed of concrete with or without reinforcing rebar, or cinder blocks. The various demolition materials will be broken up into smaller pieces and then stockpiled with like material. Earthwork includes excavating the top layer of pavement or soil to 9 inches below grade, stockpiling into like materials, and disposing offsite as non-hazardous contaminated soil or pavement. An aggregate base course subbase layer would be installed first from 9 to 3 inches bgs and the top 3 inches would be asphalt pavement. Stormwater collection and conveyance will be incorporated into the asphalt cap to prevent local flooding.

Capping would not reduce the toxicity of the soil contaminants, but would reduce mobility or migration, as well as exposure. Residual contamination will be left in place. A Deed Notice and institutional controls will be implemented to maintain the integrity of the asphalt cover for the protection of site users from exposure to COCs in soil. Biennial inspection, maintenance, and monitoring of the asphalt cap would be conducted. In addition, in accordance with CERCLA requirements, 5-year reviews of remedy effectiveness will be required with this alternative, because impacted soil will be left in place. Containment of the impacted soil via capping under this alternative combined with LUCs (Alternative 2) would achieve the RAO. The overall time-frame for this alternative would be 30 years to be protective of human health and the environment.

9.4 ALTERNATIVE 4 - SOURCE REMOVAL VIA DIRECT EXCAVATION AND BACKFILL

Alternative 4 addresses soil contaminated above cleanup levels, both inside and outside Exposure Area 2, through excavation, and offsite disposal. This alternative would result in removal of contaminant mass to meet the RAO. The logistics associated with the implementation of Alternative 4 would be addressed in a RAWP. The following elements are associated with Alternative 4:

- Preparation and submittal for approval of RAWP;
- Remedy design including hydrologic modeling to meet the substantive requirements of CAFRA and FHACA, and associated permitting;
- Site preparation including waste characterization for offsite disposal;
- Excavation of all soil exceeding NJDEP RDCSRS cleanup levels (20,000 cubic yards) and placement into stockpiles of contaminated soil;
- Transportation of the excavated contaminated soil to an offsite landfill disposal facility;
- Post-excavation confirmation soil sampling;
- Backfilling the excavation with suitable clean import material;
- Site restoration; and
- Preparation of a Remedial Action Completion Report (RACR).

Excavation would be conducted at the expanded area surrounding (and including) Exposure Area 2 as well as approximately 3.5 acres where the NJDEP RDCSRS cleanup goals were exceeded (**Figure 11**). Under Alternative 4, the entire contaminated soil mass within these areas would be removed by excavation for offsite disposal. The substantive requirements of CAFRA and FHACA permitting (see Section 7.2.2) and authorization for excavation would be established prior to commencement of work. It is assumed the excavation backfill will be compacted and completed at the existing grade and will be completed under a CAFRA General Permit 11 for hazardous site investigations and cleanup. In addition, a FHACA Permit-by-Rule 9 will be applied for general construction activities.

An estimated average soil excavation depth of 3 feet was assumed under this alternative for removal of the contaminated soil mass. Prior to excavation, asphalt would be removed and stockpiled separately for offsite recycling or disposal. It is assumed that groundwater would not be encountered based on the shallow depth of excavation. If precipitation or other water accumulates in the excavation, a temporary sump area would be used as the excavation advances to accumulate water for removal by pumping. The removed water would be staged at the ground surface, characterized for proper waste classification for disposal, and disposed accordingly.

Confirmation soil samples will be collected from the excavation floor and side walls to determine if further step-out excavation is needed. New Jersey state guidance specifies confirmation sampling be conducted at the following intervals: 1 sidewall sample per 30 feet and 1 bottom sample per 900 square feet. If cleanup goals are exceeded in confirmation samples, a 2

feet setback for additional excavation will be conducted in that area. For this alternative, the volume of soil to be excavated was estimated as the original estimated volume plus 20% for 20,000 cubic yards. It is assumed all material will require offsite disposal and import backfill will be required. Conventional earthmoving equipment would be used to excavate the soil to the depth and area required. After excavation has been completed, placement of backfill and compaction would be initiated. Compaction tests would be performed during the backfill operation to document the percent relative compaction of the soil. The excavation would be backfilled to the original surface contours and restored to near pre-excavation conditions (crushed stone in paved areas and reseeded in vegetated areas).

The excavated material will be stockpiled, sampled, and characterized for proper disposal. For the purpose of the cost estimate in this FS, the excavated soil is assumed to be classified as non-hazardous waste. Offsite soil would be hauled to a permitted offsite landfill for disposal, using a manifest tracking system. Contaminated soil from FTMM has previously been transported to the Cumberland County landfill near Newburg, Pennsylvania for offsite disposal; therefore, use of this facility was assumed for soil disposal under this alternative.

Detailed field procedures for the management and maintenance of an open excavation area, temporary soil stockpiles, and soil sampling would be provided in the RAWP. This alternative would achieve source removal. Direct excavation under this alternative would achieve the RAO. The overall time-frame for this alternative would be 2 years to be protective of human health and the environment.

10 SECTION 10 DETAILED COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES

This section summarizes information necessary to evaluate the remedial alternatives in accordance with CERCLA and NCP requirements and, to the extent possible, the substantive requirements of N.J.A.C. 7:26E, and presents a detailed comparative analysis of the remedial alternatives.

10.1 EVALUATION CRITERIA

Nine evaluation criteria were developed under the NCP to select a site remedy from remedial action alternatives to address the CERCLA requirements, as well as additional technical and policy considerations. The nine criteria are divided into two threshold criteria, five balancing criteria, and two modifying criteria, as summarized below. The NCP requires that a detailed evaluation of each alternative address each of the nine criteria. The nine criteria are listed below and briefly described in **Table 11**. The first two criteria are Threshold Criteria and must be satisfied for a remedial alternative to be acceptable. Criteria 3 through 7 are Primary Balancing Criteria and are used to weigh major trade-offs among the remedial alternatives that meet the Threshold Criteria. Criteria 8 and 9 are Modifying Criteria and will be considered once State and community comments are received on the preferred remedial alternative and are evaluated during the public review process. The remedial alternatives were evaluated with respect to seven of the nine evaluation criteria outlined by the NCP (40 CFR 300.430) and USEPA (1988) guidance for conducting feasibility studies under CERCLA.

Nine NCP Evaluation Criteria for Detailed Analysis of Alternatives

Threshold Criteria	1. Overall protection of human health and the environment 2. Compliance with ARARs
Primary Balancing Criteria	3. Long-term effectiveness and permanence 4. Reduction of toxicity, mobility, or volume through treatment 5. Short-term effectiveness 6. Implementability 7. Cost
Modifying Criteria	8. State acceptance 9. Community acceptance

10.2 DETAILED COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES

This section presents a detailed comparative analysis of the five remedial alternatives that were developed for Parcel 83 based on evaluating each selected alternative against seven of the nine NCP evaluation criteria (state and community acceptance will be evaluated in the future). The objective of the detailed analysis is to present and interpret the relevant information necessary to select the most appropriate and cost-effective remedy for a site to meet the RAO. The detailed comparative analysis is designed to provide decision-makers with enough information to compare the alternatives, select an appropriate remedy for the site, and demonstrate conformance with the CERCLA remedy selection requirements.

10.2.1 Overall Protection of Human Health and the Environment

An analysis of how well each alternative meets overall protection of human health and the environment is provided below.

10.2.1.1 Alternative 1: No Action

The no action alternative includes no treatment and no control of exposure pathways. Alternative 1 does not achieve the RAOs. Under this alternative, short and long-term risks could be unacceptable if people were exposed to the soil at Exposure Area 2. Therefore, this alternative does not provide adequate protection of human health.

10.2.1.2 Alternative 2: Land Use Controls

The LUCs alternative adequately protects human health and the environment by restricting access to the impacted soil, effectively eliminating the exposure pathway, and therefore would achieve the RAO. A Deed Notice or DER is required to document the specifics of the LUCs and an implementation plan would be in-place. Implementation of this alternative would not have any adverse environmental or health impacts. In addition to the Exposure Area 2, LUCs and the Deed Notice/DER will provide protection from all NJDEP RDCSRS exceedance areas.

10.2.1.3 Alternative 3: Containment via Asphalt Capping with Alternative 2

An asphalt cap eliminates direct contact with soil exceeding cleanup levels by placing an asphalt cap over approximately 3.8 acres at the Exposure Area 2 and the areas that exceed the NJDEP RDCSRS. Alternative 3 includes remedial actions that will reduce future exposure to the soil and is considered protective of human-health and the environment. The exposure to contaminated soil will be reduced but not eliminated, since the contamination will remain onsite.

10.2.1.4 Alternative 4: Source Removal via Direct Excavation and Backfill

Alternative 4 would protect human and the environment by reducing contaminant mass through physical removal of contaminated soil exceeding cleanup goals, disposal of impacted source material offsite, and backfill of the excavation with clean imported soil. Alternative 5 would protect human health and the environment because contaminated soil would be removed and so the site would no longer pose a risk to potential receptors. Compared to Alternatives 2 and 3, Alternative 4 adds permanent removal of soil contaminants exceeding cleanup goals. LUCs would not be needed since all contaminated soil would be removed.

10.2.2 Compliance with ARARs

An analysis of how well each alternative complies with ARARs is provided below.

10.2.2.1 Alternative 1: No Action

The requirements to meet ARARs are not triggered by the no action alternative and therefore a discussion of compliance with ARARs is not appropriate for this alternative since it is not applicable.

10.2.2.2 Alternative 2: Land Use Controls

Alternative 2 would comply with ARARs. LUCs would be used to prevent exposure by restricting construction and future land use within the cleanup goal exceedance areas. Soil access would be restricted through establishment of a Deed Notice/DER and remain in effect over the expected time duration (greater than 30 years). This alternative includes an LUCIP with annual inspections and five-year reviews, maintenance, and evaluations to verify effectiveness of the technology.

10.2.2.3 Alternative 3: Containment via Asphalt Capping with Alternative 2

Alternative 3 complies with action-specific and chemical-specific ARARs. This alternative will eliminate exposure to contamination in soil by placement of asphalt pavement; therefore, all ARARs will be attained.

10.2.2.4 Alternative 4: Source Removal via Direct Excavation and Backfill

Alternative 4 complies with action-specific and chemical-specific ARARs. This alternative involves direct removal of soil exceeding cleanup goals with offsite disposal to remove source material and reduce contaminant mass. The removed soil and any generated wastewater would be staged on site and characterized prior to offsite disposal. Compliance would be achieved more quickly than with Alternatives 2 and 3.

10.2.3 Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refer to expected residual risk and the ability of the remedial alternative to maintain reliable protection of human health and the environment over time. This criterion includes the consideration of residual risk that would remain onsite following remediation (if any), and the adequacy and reliability of controls. An analysis of the long-term effectiveness and permanence for each alternative is provided below.

10.2.3.1 Alternative 1: No Action

This alternative would not provide any actions or controls to reduce the existing contaminant levels or risks to human health and the environment. No measures are provided to monitor its effectiveness or to control exposure during the duration of this alternative. In addition, implementation of this remedial alternative may have adverse consequences should the soil be exposed. Therefore, the long-term effectiveness and permanence criterion is rated low for this alternative.

10.2.3.2 Alternative 2: Land Use Controls

Alternative 2 provides actions to reduce risks to human health and the environment through LUCs and a Deed Notice/DER designed to prohibit access of impacted soil. The current contamination levels exceed cleanup goals. However, over an extended period (greater than 30 years) this alternative is expected to mitigate exposure to soil contaminants through administrative controls. Therefore, this alternative would provide moderate long-term effectiveness and permanence.

10.2.3.3 Alternative 3: Containment via Asphalt Capping with Alternative 2

This alternative would provide a moderate to high degree of long-term effectiveness and permanence. Controls for exposure and long-term management measures will be implemented through a remedial action to cover the impacted soil with an asphalt cap and impose LUCs to minimize disturbances of the asphalt cap. Biennial inspections and repairs will be required to retain integrity of the asphalt layer. Long-term effectiveness is contingent on maintenance of the asphalt cap. Inspections and maintenance of the asphalt cap will need to be conducted as long as the cover is in place, which is assumed for 30 years for the purpose of this FS.

10.2.3.4 Alternative 4: Source Removal via Direct Excavation and Backfill

This alternative would provide a high degree of long-term effectiveness and permanence because all contaminated soils would be directly removed from the site through excavation and replaced with clean imported soil. The excavation of impacted materials provides a permanent solution for protecting human receptors and results in an adequate and reliable reduction of exposure pathways. This alternative satisfies the RAO. Removing this contamination effectively reduces the area of potential exposure to contamination and accelerates the time frame for attaining RAO by permanent removal of the chemical mass in the soil.

10.2.4 Reduction of Toxicity, Mobility, or Volume through Treatment

Reduction in toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of the remedial alternative to permanently or significantly reduce the toxicity, mobility, or volume of contaminants. An analysis of the reduction of toxicity, mobility, or volume through treatment for each alternative is presented below.

10.2.4.1 Alternative 1: No Action

This alternative would not include active treatment and does not provide for any reduction of toxicity, mobility, or volume through treatment of the contaminated soil. Therefore, this criterion is rated low for this alternative.

10.2.4.2 Alternative 2: Land Use Controls

This criterion is rated low for Alternative 2 because it does not include active treatment of the contaminated soil but contains LUCs and a monitoring program to achieve RAO.

10.2.4.3 Alternative 3: Containment via Asphalt Capping with Alternative 2

This criterion is rated low for Alternative 3 since no treatment is being applied and it will not reduce toxicity, mobility, or volume; however, the risk is mitigated through capping and LUCs.

The asphalt cap will require long-term O&M to verify that the integrity of the impermeable layer is still intact.

10.2.4.4 Alternative 4: Source Removal via Direct Excavation and Backfill

Although treatment is not a component of this alternative, there would be significant mass reduction since all impacted soil would be removed and disposed offsite. Therefore, since the soil contaminants would be removed, this criterion is rated high.

10.2.5 Short-Term Effectiveness

Short-term effectiveness addresses the time needed to implement the remedy and any adverse impacts to workers, the community, and the environment during construction and operation of the remedy. An analysis of the short-term effectiveness for each alternative is provided below.

10.2.5.1 Alternative 1: No Action

No remedial actions would be implemented under the no action alternative; therefore, this evaluation criterion is rated high.

10.2.5.2 Alternative 2: Land Use Controls

Short-term effectiveness is rated moderate for this alternative. Field activity associated with this alternative is limited to installing any ICs or ECs such as markings. This alternative would require implementation for a period of 30 years, which results in increased potential adverse impacts over the entire duration of the project.

10.2.5.3 Alternative 3: Containment via Asphalt Capping with Alternative 2

Measures will be put in place to limit the risk of off-site migration during all remedial activities. Air monitoring will be conducted to verify proper protection of on-site personnel during excavation activities, specifically during grading of each area prior to cover installation. During soil excavation and loading, the work areas will be wetted to minimize dust generation. Proper perimeter monitoring will be conducted to verify that remedial activities do not cause off-site migration. An increased level of truck traffic will occur during implementation. A site-specific workplan, sampling and analysis plan (SAP), and health and safety plan (HASP) would be prepared and implemented. Field personnel would wear personal protective equipment (PPE) as specified in the HASP. HASP will include a traffic control plan to minimize risks from moving equipment during construction. The implementation of the excavation, paving, and disposal portion of this alternative would take approximately 6 months; in addition, LUCs would be implemented for a period of 30 years, which results in increased potential adverse impacts over the entire duration of the project. Therefore, the short-term effectiveness for Alternative 3 is rated moderate to low.

10.2.5.4 Alternative 4: Source Removal via Direct Excavation and Backfill

Field activities associated with this alternative include excavation of 20,000 cubic yards of soil, field sampling, loading, and transport of site media to an approved disposal facility. A site-specific workplan, SAP, and HASP would be prepared and implemented. Field personnel participating in the sampling activity would wear PPE as specified in the HASP. Heavy equipment operated at the site would conform to Occupational Safety and Health Administration (OSHA)

specifications and would be operated only by authorized, trained personnel. Risks associated with exposure of site personnel and nearby receptors to dust emissions and/or direct contact with contaminated soil during excavation, stockpiling, and sampling would be minimized by using dust suppressants and/or appropriate PPE, where applicable. There are associated potential construction hazards over the duration of the excavation remedy, such as potential struck-by hazards from heavy equipment. There would also be added traffic on public roadways associated with the transport of contaminated soil to the disposal facility. The implementation of the excavation and disposal portion of this alternative would take approximately 6 months. Therefore, the short-term effectiveness for Alternative 4 is rated low.

10.2.6 Implementability

Implementability addresses the technical and administrative feasibility of a remedial alternative from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered. An analysis of the implementability of each alternative is provided below.

10.2.6.1 Alternative 1: No Action

This alternative is not rated because no action would be taken.

10.2.6.2 Alternative 2: Land Use Controls

Implementability is ranked high for Alternative 2. LUCs limiting soil access is an administrative process that is readily implementable. A Deed Notice/DER would be required for Exposure Area 2 and the localized areas with NJDEP RDCSRS exceedances, which has been previously applied to numerous sites in New Jersey. The Army will prepare a LUCIP to document the LUCs and identify procedural responsibilities.

10.2.6.3 Alternative 3: Containment via Asphalt Capping with Alternative 2

The installation of an asphalt cap is an established technology but is expected to require design and logistical planning and permitting requirements due to the location of the site within a 100-year flood plain. No new technologies need to be used or implemented. Materials for the asphalt cap can be easily obtained and installed; however, the permitting associated with a large impermeable surface, tying the asphalt cap into existing grade and managing storm water may cause some technical and administrative challenges. The State and community, as well as the Army, would need to accept impacted material remaining onsite. LUCs would also be implemented for the duration of the remedial alternative. Although installation of an asphalt cap is a widely implemented technology, implementability is ranked moderate to low for Alternative 3 due to the logistics and the large area to be capped.

10.2.6.4 Alternative 4: Source Removal via Direct Excavation and Backfill

Excavation and disposal of contaminated soil and any wastewater at an offsite disposal facility is implementable but is expected to require design and logistical planning, and extensive permitting requirements due to the location of the site within a 100-year flood plain. More substantial logistics and permitting scrutiny than the Alternative 4 limited excavation is anticipated due to the larger quantity of soil to be removed (20,000 cubic yards). Several firms can provide the necessary equipment, materials, and labor to excavate and dispose of the contaminated

materials. Any buried utilities will have to be accurately and safely identified prior to excavation which may present logistical challenges during field work. Licensed disposal facilities capable of accepting the contaminated materials currently exist. Over 1,000 truckloads of contaminated soil would be transported across public roadways for offsite disposal. Although excavation is a widely implemented technology, implementability is ranked low for Alternative 4 due to the large quantity of soil to be removed.

10.2.7 Cost

A summary of the costs is provided below. Total present value (TPV) cost including a 20% contingency have been provided. A detailed breakdown of these costs for each alternative is presented in **Appendix H**.

10.2.7.1 Alternative 1: No Action

There are no costs for Alternative 1.

10.2.7.2 Alternative 2: Land Use Controls

The TPV cost for Alternative 2 is approximately \$558,000. The capital costs include the preparation of a LUCIP and a Deed Notice/DER; annual inspection, monitoring, reporting, and long-term management; and five-year periodic cost which includes review and reporting. Time-frame for costing Alternative 2 is 30 years.

10.2.7.3 Alternative 3: Containment via Asphalt Capping with Alternative 2

The TPV cost for Alternative 3 is estimated at \$3,335,000. The capital costs include preparation of a RAWP and all required permitting; the required equipment, materials, and labor to perform site preparation and demolition; excavation, backfilling with clean soil, and stockpiling; asphalt paving at or below existing grade; and waste characterization, transportation and disposal of excavated material at an appropriate disposal facility; and site restoration and the preparation of a completion report. In addition, costs for Alternative 2 are included. Time-frame for costing Alternative 3 is 30 years.

10.2.7.4 Alternative 4: Source Removal via Direct Excavation and Backfill

The TPV cost for Alternative 4 is estimated at \$5,396,000. The capital costs include preparation of a RAWP, all required permitting, and the required equipment, materials, and labor to perform site preparation; excavation, backfilling with clean soil, and stockpiling; confirmation sampling and waste characterization; transportation and disposal of excavated material at an appropriate disposal facility; and site restoration and the preparation of a completion report. Time-frame for costing Alternative 4 is 2 years.

10.3 SUMMARY OF COMPARATIVE ANALYSIS

The results of the comparative analyses are summarized below and on **Table 12**.

Alternative 1 is not protective of human health; does not trigger ARARs since there is no action; provides little long-term effectiveness and permanence; achieves no reduction in toxicity, mobility, or volume through active treatment; does provide short-term effectiveness; and has no cost.

Alternatives 2, 3 and 4 would provide adequate protection of human health and the environment and comply with ARARs and therefore, satisfy the threshold criteria for a CERCLA remedy.

Alternative 2 provides long-term effectiveness and permanence, short-term effectiveness, and ease of implementation, but it does not provide removal of soil contamination, and therefore achieves no reduction of toxicity, mobility, or volume by treatment. This alternative would provide necessary restrictions to limit exposure to the site contaminants.

Alternative 3 mitigates exposure and containment of the impacted soil via capping and would provide moderate to high long-term effectiveness and moderate to low short-term effectiveness and implementability. Alternative 3 does not provide removal of soil contamination, and therefore achieves no reduction of toxicity, mobility, or volume by treatment.

Alternative 4 remediates all impacted soil exceeding cleanup levels and would provide the highest long-term effectiveness and reduction of toxicity, mobility, or volume by removing all impacted material and disposing offsite. Short-term effectiveness and implementability are rated low. Alternative 4 is the most expensive but provides the shortest remedial time-frame.

SECTION 11 CONCLUSIONS

The remedial alternatives identified to address the risk to human health due to exposure to carcinogenic PAHs in surface soil within Exposure Area 2 and other areas with historical fill at Parcel 83 were evaluated against the NCP evaluation criteria. The comparative analysis of alternatives was conducted using the current RI and HHRA results, which include the present state of knowledge concerning potential contamination and both current and reasonably anticipated future land use. If new information arises concerning contamination at the site or if land uses change beyond what has been assumed, the evaluation of these remedial alternatives may need to be revisited. For the alternatives that do not achieve UU/UE, the five-year reviews that are required for each potential alternative provide a formal mechanism to assess these possible changes, evaluate whether implemented remedies remain sufficiently protective of human health and the environment, and to recommend further steps to be taken if they are not.

Based on the analyses of remedial alternatives conducted in this FS, a Proposed Plan should be developed to recommend a preferred alternative for implementation. This preferred alternative should be the alternative that best meets the nine CERCLA criteria.

SECTION 12 REFERENCES

- Agency for Toxic Substances and Disease Registry (ATSDR). 2005. *Toxicological profile for Naphthalene, 1-Methylnaphthalene, and 2-Methylnaphthalene*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.
- Agency for Toxic Substances and Disease Registry (ATSDR). 2017. *Toxicological profile for Bis(2-chloroethyl) Ether (BCEE)*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.
- American Petroleum Institute (API), 2011. Heavy Fuel Oils Category Analysis and Hazard Characterization. Interim Final Submitted to the US EPA. July 12.
- Brinkerhoff, 2010. MODFLOW Groundwater Modeling, US Army, Fort Monmouth, Main Post and Charles Wood Areas. June 10.
- EDAW, 2008. *Fort Monmouth Reuse and Redevelopment Plan, Final Plan*. Prepared for Fort Monmouth Economic Revitalization Planning Authority. August 22.
- FMERA, 2019. E-mail from David Nuse of the Fort Monmouth Economic Revitalization Authority to William Colvin; re: Parcel 83 - Future Land Use. May 9.
- New Jersey Administrative Code (NJAC), 2017. Remediation Standards, NJAC 7:26D. September 18. Available at: http://www.nj.gov/dep/rules/rules/njac7_26d.pdf
- New Jersey Department of Environmental Protection (NJDEP), 2010a. *Protocol for Addressing Extractable Petroleum Hydrocarbons (Version 5.0, August 9, 2010)*. NJDEP Site Remediation Program.
- New Jersey Department of Environmental Protection (NJDEP), 2010b. *Health Based and Ecological Screening Criteria for Petroleum Hydrocarbons, Frequently Asked Questions*. Version 4.0, August 9.
- New Jersey Department of Environmental Protection (NJDEP), 2015. Letter to BRAC Environmental Coordinator, Re: *Underground Storage Tanks within ECP Parcel 79 dated April 2015, Fort Monmouth, Oceanport, Monmouth County*. August 25.
- New Jersey Department of Environmental Protection (NJDEP), 2018. Letter to BRAC Environmental Coordinator, Re: *Unrestricted Use; Areas of Concern: UST 482, Monmouth County*. July 31.
- Office of Assistant Chief of Staff for Installation Management (OACSIM). 2015. *Underground Storage Tanks within Parcel 79, Fort Monmouth, NJ*. April 22.
- Office of Assistant Chief of Staff for Installation Management (OACSIM). 2018. *Request for Unrestricted Use, No Further Action Approval, UST 482 Site Investigation report, Fort Monmouth, Monmouth County, Oceanport, New Jersey*. May 29.
- Office of the Under Secretary of Defense – Acquisition and Technology. 2001. Policy on Land Use Controls Associated with Environmental Restoration Activities. January 17.

- Parsons, 2015a. Environmental Condition of Property Supplemental Phase II Site Investigation Work Plan for Parcels 28, 38, 39, 49, 57, 61, and 69 for Remedial Investigation/Feasibility Study/Decision Documents, Fort Monmouth, Oceanport, Monmouth County, New Jersey, submitted to U.S. Army Engineering and Support Center Huntsville, Alabama. Revision 1. November.
- Parsons, 2015b. Human Health Risk Assessment Work Plan for Remedial Investigation/Feasibility Study at Fort Monmouth Army Installation Non-Landfill Sites, Fort Monmouth, Oceanport, Monmouth County, New Jersey, submitted to U.S. Army Engineering and Support Center Huntsville, Alabama. June.
- U.S. Army, 2007. U.S. Army BRAC 2005 Environmental Condition of Property Report, Fort Monmouth, Monmouth County, New Jersey. Final. January 29.
- U.S. Army, 2008. Site Investigation Report Fort Monmouth. Final. July 21.
- U.S. Environmental Protection Agency (USEPA), 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final. Office of Emergency and Remedial Response. EPA /540/G-89/004. October.
- USEPA. 1998. Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water. Office of Research and Development. EPA/600/R-98/128, September.
- U.S. Environmental Protection Agency (USEPA), 2007. User's Guide for the Integrated Exposure Uptake Biokinetic Model for lead in Children (IEUBK), Window. Office of Superfund Remediation, 9285.7-42. May. (<https://semspub.epa.gov/work/HQ/176289.pdf>)
- USEPA, 2017a. Regional Screening Table User's Guide, June 2017. <http://www.epa.gov/risk/regional-screening-table-users-guide-june-2017>
- USEPA, 2017b. USEPA Regional Screening Levels, June 2017, <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-june-2017>
- Weston, 1995. Final Site Investigation - Main Post and Charles Wood Areas, Fort Monmouth, New Jersey, December.

TABLES

Table 1 – Soil Sample and Analytical Summary

Table 2 – Detected Soil Sampling Results – Comparison to USEPA Risk-Based Screening Levels

Table 3 – Detected Soil Sampling Results – Comparison to NJDEP Direct Contact Criteria

Table 4 – Soil Sampling Summary of Detections

Table 5 – Groundwater Sampling Results – Comparison to USEPA and NJDEP Groundwater Criteria

Table 6 – Human Health Risk Assessment Summary

Table 7 – Constituents of Concern and Cleanup Goals for Soil

Table 8 – Applicable or Relevant and Appropriate Requirements and To Be Considered Criteria

Table 9 – Initial Screening of Technologies for Soil

Table 10 – Evaluation of Process Options for Soil

Table 11 – Criteria for Detailed Evaluation of Remedial Alternatives

Table 12 – Summary of Comparative Analysis of Remedial Alternatives

TABLE 1
SAMPLE AND ANALYTICAL SUMMARY
SUMMARY REMEDIAL INVESTIGATION REPORT FOR PARCEL 83
FORT MONMOUTH, NEW JERSEY

Media	Type	Sample Location	Sample Identification	Sample Type	Sample Date	Sample Depth Top	Sample Depth Bottom	VO+ TICs	SVO+ TICs	Metals	PAHs	Pesticides and PCBs	EPH
2016 Environmental Condition of Property for Parcel 83 (Parsons)													
Soil	Geoprobe	PAR-83-SB-01	PAR-83-SB-01-0.5-1	Primary Sample and Duplicate Sample	04-Apr-16	0.5	1	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-01-2-2.5	Primary Sample	04-Apr-16	2	2.5	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-01-10.25-10.75	Primary Sample	04-Apr-16	10.25	10.75	--	--	--	X	--	--
Soil	Geoprobe	PAR-83-SB-02	PAR-83-SB-02-1-1.5	Primary Sample	04-Apr-16	1	1.5	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-02-1.5-2	Primary Sample and Duplicate Sample	04-Apr-16	1.5	2	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-02-2-2.5	Primary Sample	04-Apr-16	2	2.5	--	--	--	X	--	--
Soil	Geoprobe	PAR-83-SB-03	PAR-83-SB-03-1-1.5	Primary Sample	04-Apr-16	1	1.5	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-03-1.5-2	Primary Sample	04-Apr-16	1.5	2	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-03-2-2.5	Primary Sample	04-Apr-16	2	2.5	--	--	--	X	--	--
Soil	Geoprobe	PAR-83-SB-04	PAR-83-SB-04-0.5-1	Primary Sample	04-Apr-16	0.5	1	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-04-1.25-1.75	Primary Sample	04-Apr-16	1.25	1.75	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-04-2-2.5	Primary Sample	04-Apr-16	2	2.5	--	--	--	X	--	--
Soil	Geoprobe	PAR-83-SB-05	PAR-83-SB-05-0.75-1.25	Primary Sample	04-Apr-16	0.75	1.25	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-05-1.75-2.25	Primary Sample	04-Apr-16	1.75	2.25	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-05-2.5-3	Primary Sample	04-Apr-16	2.5	3	--	--	--	X	--	--
Soil	Geoprobe	PAR-83-SB-06	PAR-83-SB-06-0.3-0.8	Primary Sample	04-Apr-16	0.3	0.8	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-06-1.5-2	Primary Sample	04-Apr-16	1.5	2	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-06-2.5-3	Primary Sample	04-Apr-16	2.5	3	--	--	--	X	--	--
Soil	Geoprobe	PAR-83-SB-07	PAR-83-SB-07-0-0.5	Primary Sample	04-Apr-16	0	0.5	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-07-1.25-1.75	Primary Sample	04-Apr-16	1.25	1.75	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-07-2.25-2.75	Primary Sample	04-Apr-16	2.25	2.75	--	--	--	X	--	--
Soil	Geoprobe	PAR-83-SB-08	PAR-83-SB-08-0.5-1	Primary Sample	04-Apr-16	0.5	1	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-08-1.25-1.75	Primary Sample	04-Apr-16	1.25	1.75	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-08-2.5-3	Primary Sample	04-Apr-16	2.5	3	--	--	--	X	--	--
Soil	Geoprobe	PAR-83-SB-09	PAR-83-SB-09-1-1.5	Primary Sample and Duplicate Sample	04-Apr-16	1	1.5	--	--	X ⁽¹⁾	X	X	--
Soil	Geoprobe		PAR-83-SB-09-2-2.5	Primary Sample	04-Apr-16	2	2.5	--	--	X ⁽¹⁾	X		--
Soil	Geoprobe		PAR-83-SB-09-2.75-3.25	Primary Sample	04-Apr-16	2.75	3.25	--	--	X ⁽¹⁾	X	X	--
Soil	Geoprobe	PAR-83-SB-10	PAR-83-SB-10-0-0.5	Primary Sample	05-Apr-16	0	0.5	--	--	X ⁽¹⁾	--	X	--
Soil	Geoprobe		PAR-83-SB-10-2.5-3	Primary Sample	05-Apr-16	2.5	3	--	--	X ⁽¹⁾	--	--	--
Soil	Geoprobe	PAR-83-SB-11	PAR-83-SB-11-0-0.5	Primary Sample	05-Apr-16	0	0.5	--	--	X ⁽¹⁾	--	X	--
Soil	Geoprobe		PAR-83-SB-11-2.8-3.3	Primary Sample	05-Apr-16	2.8	3.3	--	--	X ⁽¹⁾	--	--	--
Soil	Geoprobe	PAR-83-SB-12	PAR-83-SB-12-1-1.5	Primary Sample	05-Apr-16	1	1.5	X	--	X ⁽¹⁾	X	--	--
Soil	Geoprobe		PAR-83-SB-12-2.5-3	Primary Sample	05-Apr-16	2.5	3	X	--	X ⁽¹⁾	X	--	--
Soil	Geoprobe	PAR-83-SB-13	PAR-83-SB-13-0.5-1	Primary Sample	05-Apr-16	0.5	1	X	--	X ⁽¹⁾	X	--	--
Soil	Geoprobe		PAR-83-SB-13-2.5-3	Primary Sample	05-Apr-16	2.5	3	X	--	X ⁽¹⁾	X	--	--
Soil	Geoprobe	PAR-83-SB-14	PAR-83-SB-14-0.5-1	Primary Sample	05-Apr-16	0.5	1	X	--	X ⁽¹⁾	X	--	--
Soil	Geoprobe		PAR-83-SB-14-2.5-3	Primary Sample	05-Apr-16	2.5	3	X	--	X ⁽¹⁾	X	--	--

TABLE 1
SAMPLE AND ANALYTICAL SUMMARY
SUMMARY REMEDIAL INVESTIGATION REPORT FOR PARCEL 83
FORT MONMOUTH, NEW JERSEY

Media	Type	Sample Location	Sample Identification	Sample Type	Sample Date	Sample Depth Top	Sample Depth Bottom	VO+ TICs	SVO+ TICs	Metals	PAHs	Pesticides and PCBs	EPH
Soil	Geoprobe	PAR-83-SB-15	PAR-83-SB-15-0.5-1	Primary Sample	05-Apr-16	0.5	1	--	--	X ⁽¹⁾	--	--	--
Soil	Geoprobe		PAR-83-SB-15-3-3.5	Primary Sample and Duplicate Sample	05-Apr-16	3	3.5	--	--	X ⁽¹⁾	--	--	--
Soil	Geoprobe		PAR-83-SB-15-5-5.6	Primary Sample	05-Apr-16	5	5.6	--	--	X ⁽¹⁾	--	--	--
Soil	Geoprobe	PAR-83-SB-16	PAR-83-SB-16-0.5-1	Primary Sample	05-Apr-16	0.5	1	--	--	X ⁽¹⁾	--	--	--
Soil	Geoprobe		PAR-83-SB-16-3-3.5	Primary Sample	05-Apr-16	3	3.5	--	--	X ⁽¹⁾	--	--	--
Soil	Geoprobe		PAR-83-SB-16-5-6	Primary Sample	05-Apr-16	5	6	--	--	X ⁽¹⁾	--	--	--
2017 November Field Investigation for Parcel 83, and UST 482 (Parsons)													
Soil	Geoprobe	PAR-83-SB-17	PAR-83-SB-17-6-6.5	Primary Sample	14-Nov-17	6	6.5	--	--	--	X	--	--
Soil	Geoprobe	PAR-83-SB-18	PAR-83-SB-18-0-0.5	Primary Sample	14-Nov-17	0	0.5	--	--	--	X	--	--
Soil	Geoprobe	PAR-83-SB-19	PAR-83-SB-19-0-0.5	Primary Sample	14-Nov-17	0	0.5	--	--	--	X	--	--
Soil	Geoprobe	PAR-83-SB-20	PAR-83-SB-20-0-0.5	Primary Sample and Duplicate Sample	14-Nov-17	0	0.5	--	--	--	X	--	--
Soil	Geoprobe	PAR-83-SB-21	PAR-83-SB-21-0-0.5	Primary Sample	14-Nov-17	0	0.5	--	--	--	X	--	--
Soil	Geoprobe	PAR-83-SB-22	PAR-83-SB-22-0-0.5	Primary Sample	14-Nov-17	0	0.5	--	--	--	X	--	--
Soil	Geoprobe	PAR-83-SB-23	PAR-83-SB-23-0-0.5	Primary Sample and Duplicate Sample	14-Nov-17	0	0.5	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-23-3-3.5	Primary Sample	14-Nov-17	3	3.5	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-23-5-5.5	Primary Sample	14-Nov-17	5	5.5	--	--	--	--	--	X
Soil	Geoprobe		PAR-83-SB-23-6-6.5	Primary Sample	14-Nov-17	6	6.5	--	--	--	X	--	--
Soil	Geoprobe	PAR-83-SB-25	PAR-83-SB-25-3-3.5	Primary Sample	15-Nov-17	3	3.5	--	--	--	--	--	X
Soil	Geoprobe		PAR-83-SB-25-6-6.5	Primary Sample	15-Nov-17	6	6.5	--	--	--	--	--	X
Soil	Geoprobe	PAR-83-SB-33	PAR-83-SB-33-2-2.5	Primary Sample and Duplicate Sample	15-Nov-17	2	2.5	--	--	X ⁽²⁾	X	--	--
Soil	Geoprobe	PAR-83-SB-34	PAR-83-SB-34-2-2.5	Primary Sample	15-Nov-17	2	2.5	--	--	X ⁽²⁾	X	--	--
Soil	Geoprobe	PAR-83-SB-38	PAR-83-SB-38-0-0.5	Primary Sample and Duplicate Sample	15-Nov-17	0	0.5	--	--	--	X	--	--
Soil	Geoprobe	PAR-83-SB-39	PAR-83-SB-39-0-0.5	Primary Sample and Duplicate Sample	16-Nov-17	2	2.5	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-39-3-3.5	Primary Sample	16-Nov-17	3	3.5	--	--	--	--	--	--
Soil	Geoprobe		PAR-83-SB-39-6-6.5	Primary Sample	16-Nov-17	6	6.5	--	--	--	--	--	--
Soil	Geoprobe	PAR-83-SB-44	PAR-83-SB-44-1-1.5	Primary Sample	14-Nov-17	1.5	2	--	--	--	X	--	--
Soil	Geoprobe	PAR-83-SB-45	PAR-83-SB-45-1-1.5	Primary Sample	14-Nov-17	1.5	2	--	--	--	X	--	--
Soil	Geoprobe	PAR-83-SB-46	PAR-83-SB-46-0-0.5	Primary Sample	14-Nov-17	0	0.5	--	--	--	X	--	--
Soil	Geoprobe	PAR-83-SB-47	PAR-83-SB-47-0-0.5	Primary Sample	14-Nov-17	0	0.5	--	--	--	X	--	--
Soil	Geoprobe	PAR-83-SB-48	PAR-83-SB-48-0-0.5	Primary Sample	14-Nov-17	0	0.5	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-48-3-3.5	Primary Sample	14-Nov-17	3	3.5	--	--	--	--	--	--
Soil	Geoprobe		PAR-83-SB-48-6-6.5	Primary Sample	14-Nov-17	6	6.5	--	--	--	--	--	--
Soil	Geoprobe	PAR-83-SB-54	PAR-83-SB-54-1-105	Primary Sample	16-Nov-17	1	1.5	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-54-3-3.5	Primary Sample	16-Nov-17	3	3.5	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-54-6-6.5	Primary Sample	16-Nov-17	6	6.5	--	--	--	X	--	--
Soil	Geoprobe	PAR-83-SB-55	PAR-83-SB-55-1-105	Primary Sample	16-Nov-17	1	1.5	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-55-3-3.5	Primary Sample	16-Nov-17	3	6.5	--	--	--	X	--	--
Soil	Geoprobe		PAR-83-SB-55-6-6.5	Primary Sample	16-Nov-17	6	6.5	--	--	--	X	--	--
Soil	Geoprobe	PAR-83-482-SB-01	PAR-83-482-SB-01-0.5-1	Primary Sample	13-Nov-17	0.5	1	--	--	X ⁽²⁾	X	--	X
Soil	Geoprobe		PAR-83-482-SB-01-1.5-2	Primary Sample	13-Nov-17	1.5	2	--	--	X ⁽²⁾	X	--	X
Soil	Geoprobe		PAR-83-482-SB-01-7.5-8	Primary Sample	13-Nov-17	7.5	8	--	--	X ⁽²⁾	X	--	X

1) X⁽¹⁾ Analyzed for Arsenic and Lead only

2) X⁽²⁾ Analyzed for Arsenic only

3) VO+TICs = volatile organics + tentatively identified compounds, SVO = semivolatile organics, PAHs = polycyclic aromatic hydrocarbons, EPH = extractable petroleum hydrocarbons

4) Soil sample depths are in feet below ground surface

5) Groundwater sample depths, where known, are in feet below top of casing

6) LFPS = low flow purge and sample method

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PAR-83-SB-01				PAR-83-SB-02				PAR-83-SB-03				PAR-83-SB-04		
Sample ID					PAR-83-SB-01-0.5-1	PAR-83-SB-101-0.5-1	PAR-83-SB-01-2.2.5	PAR-83-SB-01-10.25-1.75	PAR-83-SB-02-1.1.5	PAR-83-SB-02-1.5-2	PAR-83-SB-102-1.5-2	PAR-83-SB-02-2.2.5	PAR-83-SB-03-1.1.5	PAR-83-SB-03-1.5-2	PAR-83-SB-03-2.2.5	PAR-83-SB-04-0.5-1	PAR-83-SB-04-1.25-1.75	PAR-83-SB-04-2.2.5	
Sample Date					4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	
Volatile Organic Compounds (mg/kg)																			
1,1,1,2-Tetrachloroethane	2	8.8	0.00022	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1,1-Trichloroethane	810	3,600	0.28	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1,2,2-Tetrachloroethane	0.6	2.7	0.00003	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1,2-Trichloroethane	0.15	0.63	0.000013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1-Dichloroethane	3.6	16	0.00078	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1-Dichloroethene	23	100	0.01	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,3-Trichlorobenzene	6.3	93	0.0021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,3-Trichloropropane	0.0051	0.11	0.00000032	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,4-Trichlorobenzene	5.8	26	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,4-Trimethylbenzene	30	180	0.0081	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2-Dibromo-3-chloropropane	0.0053	0.064	0.00000014	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2-Dibromoethane	0.036	0.16	0.0000021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2-Dichlorobenzene	180	930	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2-Dichloroethane	0.46	2	0.000048	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2-Dichloropropane	0.28	1.2	0.000047	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,3,5-Trimethylbenzene	27	150	0.0087	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,3-Dichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,3-Dichloropropane	160	2,300	0.013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,4-Dichlorobenzene	2.6	11	0.00046	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
2-Chlorotoluene	160	2,300	0.023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Acetone	6,100	67,000	0.29	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Benzene	1.2	5.1	0.00023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Bromobenzene	29	180	0.0042	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Bromochloromethane	15	63	0.0021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Bromodichloromethane	0.29	1.3	0.000036	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Bromoform	19	86	0.00087	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Carbon disulfide	77	350	0.024	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Carbon tetrachloride	0.65	2.9	0.00018	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chlorobenzene	28	130	0.0053	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chlorodibromomethane	8.3	39	0.00023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chloroethane	1,400	5,700	0.59	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chloroform	0.32	1.4	0.000061	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Cis-1,2-Dichloroethene	16	230	0.0011	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Dichlorodifluoromethane	8.7	37	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Ethyl benzene	5.8	25	0.0017	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Hexachlorobutadiene	1.2	5.3	0.00027	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Isopropylbenzene	190	990	0.074	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Meta/Para Xylene	55	240	0.019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl bromide	0.68	3	0.00019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl butyl ketone	20	130	0.00088	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl chloride	11	46	0.0049	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl ethyl ketone	2,700	19,000	0.12	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl isobutyl ketone	3,300	14,000	0.14	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl Tertbutyl Ether	47	210	0.0032	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methylene chloride	35	320	0.0027	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Naphthalene	3.8	17	0.00054	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
n-Butylbenzene	390	5,800	0.32	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Ortho Xylene	65	280	0.019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
p-Chlorotoluene	160	2,300	0.024	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Propylbenzene	380	2,400	0.12	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
sec-Butylbenzene	780	12,000	0.59	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Styrene	600	3,500	0.13	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Tert Butyl Alcohol	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
tert-Butylbenzene	780	12,000	0.1																

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PAR-83-SB-01				PAR-83-SB-02				PAR-83-SB-03			PAR-83-SB-04		
Sample ID					PAR-83-SB-01-0.5-1	PAR-83-SB-101-0.5-1	PAR-83-SB-01-2-2.5	PAR-83-SB-01-10.25-1.75	PAR-83-SB-02-1-1.5	PAR-83-SB-02-1.5-2	PAR-83-SB-102-1.5-2	PAR-83-SB-02-2-2.5	PAR-83-SB-03-1-1.5	PAR-83-SB-03-1.5-2	PAR-83-SB-03-2-2.5	PAR-83-SB-04-0.5-1	PAR-83-SB-04-1.25-1.75	PAR-83-SB-04-2-2.5
Sample Date					4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)																		
Aroclor-1016	0.41	5.1	0.013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.2	0.83	0.00008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.17	0.72	0.00008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.12	0.97	0.002	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	0.24	0.99	0.0055	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1268	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)																		
Aluminum	7,700	110,000	3,000	15,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	3.1	47	0.035	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	0.68	3	0.0015	22.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	1,500	22,000	16	32.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	16	230	1.9	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	7.1	98	0.069	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NLE	NLE	NLE	921	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	12,000	180,000	4,000,000	269	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	2.3	35	0.027	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	310	4,700	2.8	8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	5,500	82,000	35	55,800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	400	800	14	19.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NLE	NLE	NLE	7,230	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	180	2,600	2.8	90.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	1.1	4.6	0.0033	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	150	2,200	2.6	8.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NLE	NLE	NLE	15,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	39	580	0.052	1.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NLE	NLE	NLE	51.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	39	580	8.6	94.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	2,300	35,000	37	81.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dataset.

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PAR-83-SB-05			PAR-83-SB-06			PAR-83-SB-07			PAR-83-SB-08			PAR-83-SB-09
Sample ID					PAR-83-SB-05-0.75-1.25	PAR-83-SB-05-1.75-2.25	PAR-83-SB-05-2.5-3	PAR-83-SB-06-0.3-0.8	PAR-83-SB-06-1.5-2	PAR-83-SB-06-2.5-3	PAR-83-SB-07-0-0.5	PAR-83-SB-07-1.25-1.75	PAR-83-SB-07-2.25-2.75	PAR-83-SB-08-0.5-1	PAR-83-SB-08-1.25-1.75	PAR-83-SB-08-2.5-3	PAR-83-SB-09-1-1.5
Sample Date					4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016
Volatile Organic Compounds (mg/kg)																	
1,1,1,2-Tetrachloroethane	2	8.8	0.00022	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	810	3,600	0.28	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	0.6	2.7	0.00003	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	0.15	0.63	0.000013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	3.6	16	0.00078	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	23	100	0.01	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	6.3	93	0.0021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichloropropane	0.0051	0.11	0.00000032	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	5.8	26	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	30	180	0.0081	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	0.0053	0.064	0.00000014	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	0.036	0.16	0.0000021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	180	930	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	0.46	2	0.000048	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	0.28	1.2	0.000047	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	27	150	0.0087	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichloropropane	160	2,300	0.013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	2.6	11	0.00046	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	160	2,300	0.023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	6,100	67,000	0.29	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	1.2	5.1	0.00023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromobenzene	29	180	0.0042	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	15	63	0.0021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	0.29	1.3	0.000036	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	19	86	0.00087	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	77	350	0.024	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	0.65	2.9	0.00018	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	28	130	0.0053	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorodibromomethane	8.3	39	0.00023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	1,400	5,700	0.59	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	0.32	1.4	0.000061	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,2-Dichloroethene	16	230	0.0011	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	8.7	37	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl benzene	5.8	25	0.0017	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	1.2	5.3	0.00027	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	190	990	0.074	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Meta/Para Xylene	55	240	0.019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl bromide	0.68	3	0.00019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl butyl ketone	20	130	0.00088	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl chloride	11	46	0.0049	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl ethyl ketone	2,700	19,000	0.12	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl isobutyl ketone	3,300	14,000	0.14	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Tertbutyl Ether	47	210	0.0032	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	35	320	0.0027	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	3.8	17	0.00054	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	390	5,800	0.32	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ortho Xylene	65	280	0.019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
p-Chlorotoluene	160	2,300	0.024	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propylbenzene	380	2,400	0.12	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	780	12,000	0.59	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	600	3,500	0.13	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tert Butyl Alcohol	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
tert-Butylbenzene	780	12,000	0.16	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	8.1	39	0.0018	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	490	4,700	0.076	-	NA	NA	NA	NA	NA	NA	NA	NA					

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PAR-83-SB-05			PAR-83-SB-06			PAR-83-SB-07			PAR-83-SB-08			PAR-83-SB-09
Sample ID					PAR-83-SB-05-0.75-1.25	PAR-83-SB-05-1.75-2.25	PAR-83-SB-05-2.5-3	PAR-83-SB-06-0.3-0.8	PAR-83-SB-06-1.5-2	PAR-83-SB-06-2.5-3	PAR-83-SB-07-0-0.5	PAR-83-SB-07-1.25-1.75	PAR-83-SB-07-2.25-2.75	PAR-83-SB-08-0.5-1	PAR-83-SB-08-1.25-1.75	PAR-83-SB-08-2.5-3	PAR-83-SB-09-1-1.5
Sample Date					4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)																	
Aroclor-1016	0.41	5.1	0.013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.042
Aroclor-1221	0.2	0.83	0.00008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.085
Aroclor-1232	0.17	0.72	0.00008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.042
Aroclor-1242	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.042
Aroclor-1248	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.042
Aroclor-1254	0.12	0.97	0.002	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.22 J
Aroclor-1260	0.24	0.99	0.0055	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.18 J
Aroclor-1268	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.042
Inorganics (mg/kg)																	
Aluminum	7,700	110,000	3,000	15,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	3.1	47	0.035	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	0.68	3	0.0015	22.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 7.6
Barium	1,500	22,000	16	32.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	16	230	1.9	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	7.1	98	0.069	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NLE	NLE	NLE	921	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	12,000	180,000	4,000,000	269	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	2.3	35	0.027	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	310	4,700	2.8	8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	5,500	82,000	35	55,800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	400	800	14	19.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.5
Magnesium	NLE	NLE	NLE	7,230	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	180	2,600	2.8	90.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	1.1	4.6	0.0033	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	150	2,200	2.6	8.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NLE	NLE	NLE	15,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	39	580	0.052	1.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NLE	NLE	NLE	51.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	39	580	8.6	94.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	2,300	35,000	37	81.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dataset.

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PAR-83-SB-09			PAR-83-SB-10		PAR-83-SB-11		PAR-83-SB-12		PAR-83-SB-13		PAR-83-SB-14		PAR-83-SB-15
Sample ID					PAR-83-SB-109-1-1.5	PAR-83-SB-09-2-2.5	PAR-83-SB-09-2.75-3.25	PAR-83-SB-10-0-0.5	PAR-83-SB-10-2-5-3	PAR-83-SB-11-0-0.5	PAR-83-SB-11-2-8-3.3	PAR-83-SB-12-1-1.5	PAR-83-SB-12-2-5-3	PAR-83-SB-13-0-5-1	PAR-83-SB-13-2-5-3	PAR-83-SB-14-0-5-1	PAR-83-SB-14-2-5-3	PAR-83-SB-15-0-5-1
Sample Date					4/4/2016	4/4/2016	4/4/2016	4/5/2016	4/5/2016	4/5/2016	4/5/2016	4/5/2016	4/5/2016	4/5/2016	4/5/2016	4/5/2016	4/5/2016	4/5/2016
Volatile Organic Compounds (mg/kg)																		
1,1,1,2-Tetrachloroethane	2	8.8	0.00022	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
1,1,1-Trichloroethane	810	3,600	0.28	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
1,1,2,2-Tetrachloroethane	0.6	2.7	0.00003	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
1,1,2-Trichloroethane	0.15	0.63	0.000013	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
1,1-Dichloroethane	3.6	16	0.00078	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
1,1-Dichloroethene	23	100	0.01	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
1,2,3-Trichlorobenzene	6.3	93	0.0021	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
1,2,3-Trichloropropane	0.0051	0.11	0.00000032	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
1,2,4-Trichlorobenzene	5.8	26	0.0012	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
1,2,4-Trimethylbenzene	30	180	0.0081	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
1,2-Dibromo-3-chloropropane	0.0053	0.064	0.00000014	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
1,2-Dibromoethane	0.036	0.16	0.0000021	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
1,2-Dichlorobenzene	180	930	0.03	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
1,2-Dichloroethane	0.46	2	0.000048	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
1,2-Dichloropropane	0.28	1.2	0.000047	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
1,3,5-Trimethylbenzene	27	150	0.0087	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
1,3-Dichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
1,3-Dichloropropane	160	2,300	0.013	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
1,4-Dichlorobenzene	2.6	11	0.00046	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
2-Chlorotoluene	160	2,300	0.023	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
Acetone	6,100	67,000	0.29	-	NA	NA	NA	NA	NA	NA	NA	0.012	< 0.48	< 0.0038	0.05	0.028	0.062	NA
Benzene	1.2	5.1	0.00023	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
Bromobenzene	29	180	0.0042	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
Bromochloromethane	15	63	0.0021	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
Bromodichloromethane	0.29	1.3	0.000036	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
Bromoform	19	86	0.00087	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
Carbon disulfide	77	350	0.024	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	0.65	2.9	0.00018	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
Chlorobenzene	28	130	0.0053	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
Chlorodibromomethane	8.3	39	0.00023	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
Chloroethane	1,400	5,700	0.59	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
Chloroform	0.32	1.4	0.000061	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
Cis-1,2-Dichloroethene	16	230	0.0011	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
Dichlorodifluoromethane	8.7	37	0.03	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
Ethyl benzene	5.8	25	0.0017	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA
Hexachlorobutadiene	1.2	5.3	0.00027	-	NA	NA	NA	NA	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	<		

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PAR-83-SB-09			PAR-83-SB-10		PAR-83-SB-11		PAR-83-SB-12		PAR-83-SB-13		PAR-83-SB-14		PAR-83-SB-15
Sample ID					PAR-83-SB-109-1-1.5	PAR-83-SB-09-2-2.5	PAR-83-SB-09-2.75-3.25	PAR-83-SB-10-0-0.5	PAR-83-SB-10-2.5-3	PAR-83-SB-11-0-0.5	PAR-83-SB-11-2.8-3.3	PAR-83-SB-12-1-1.5	PAR-83-SB-12-2.5-3	PAR-83-SB-13-0.5-1	PAR-83-SB-13-2.5-3	PAR-83-SB-14-0.5-1	PAR-83-SB-14-2.5-3	PAR-83-SB-15-0.5-1
Sample Date					4/4/2016	4/4/2016	4/4/2016	4/5/2016	4/5/2016	4/5/2016	4/5/2016	4/5/2016	4/5/2016	4/5/2016	4/5/2016	4/5/2016	4/5/2016	4/5/2016
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)																		
Aroclor-1016	0.41	5.1	0.013	-	< 0.038	NA	< 0.038	< 0.038	NA	< 0.039	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.2	0.83	0.0008	-	< 0.076	NA	< 0.078	< 0.077	NA	< 0.079	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.17	0.72	0.0008	-	< 0.038	NA	< 0.038	< 0.038	NA	< 0.039	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.23	0.95	0.0012	-	< 0.038	NA	< 0.038	< 0.038	NA	< 0.039	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.23	0.95	0.0012	-	< 0.038	NA	< 0.038	< 0.038	NA	< 0.039	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.12	0.97	0.002	-	< 0.038 UJ	NA	< 0.038	< 0.038	NA	0.18	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	0.24	0.99	0.0055	-	< 0.038 UJ	NA	< 0.038	< 0.038	NA	0.11	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1268	NLE	NLE	NLE	-	< 0.038	NA	< 0.038	< 0.038	NA	< 0.039	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)																		
Aluminum	7,700	110,000	3,000	15,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	3.1	47	0.035	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	0.68	3	0.0015	22.9	NA	< 6.9	< 10.8	13.1	10.7	6.3	10.2	5.2	5.4	6.3	8	7	16.2	6.5
Barium	1,500	22,000	16	32.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	16	230	1.9	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	7.1	98	0.069	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NLE	NLE	NLE	921	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	12,000	180,000	4,000,000	269	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	2.3	35	0.027	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	310	4,700	2.8	8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	5,500	82,000	35	55,800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	400	800	14	19.5	NA	13.4	5.7 J	38.4	17.2	31.4	8.8	11.1	5.3 J	180	6.6	49.4	8.8	10.7
Magnesium	NLE	NLE	NLE	7,230	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	180	2,600	2.8	90.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	1.1	4.6	0.0033	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	150	2,200	2.6	8.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NLE	NLE	NLE	15,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	39	580	0.052	1.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NLE	NLE	NLE	51.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	39	580	8.6	94.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	2,300	35,000	37	81.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dataset.

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PAR-83-SB-15			PAR-83-SB-16			PAR-83-SB-17	PAR-83-SB-18	PAR-83-SB-19	PAR-83-SB-20		PAR-83-SB-21	PAR-83-SB-22	PAR-83-SB-23
Sample ID					PAR-83-SB-15-3-3.5	PAR-83-SB-115-3-3.5	PAR-83-SB-15-5-5.6	PAR-83-SB-16-0-5-1	PAR-83-SB-16-3-3.5	PAR-83-SB-16-5-5-6	PAR-83-SB-17-6-6.5	PAR-83-SB-18-0-0.5	PAR-83-SB-19-0-0.5	PAR-83-SB-20-0-0.5	PAR-83-SB-120-0-0.5	PAR-83-SB-21-0-0.5	PAR-83-SB-22-0-0.5	PAR-83-SB-23-0-0.5
Sample Date					4/5/2016	4/5/2016	4/5/2016	4/5/2016	4/5/2016	4/5/2016	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017
Volatile Organic Compounds (mg/kg)																		
1,1,1,2-Tetrachloroethane	2	8.8	0.00022	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	810	3,600	0.28	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	0.6	2.7	0.00003	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	0.15	0.63	0.000013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	3.6	16	0.00078	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	23	100	0.01	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	6.3	93	0.0021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichloropropane	0.0051	0.11	0.00000032	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	5.8	26	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	30	180	0.0081	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	0.0053	0.064	0.00000014	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	0.036	0.16	0.0000021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	180	930	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	0.46	2	0.000048	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	0.28	1.2	0.000047	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	27	150	0.0087	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichloropropane	160	2,300	0.013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	2.6	11	0.00046	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	160	2,300	0.023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	6,100	67,000	0.29	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	1.2	5.1	0.00023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromobenzene	29	180	0.0042	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	15	63	0.0021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	0.29	1.3	0.000036	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	19	86	0.00087	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	77	350	0.024	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	0.65	2.9	0.00018	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	28	130	0.0053	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorodibromomethane	8.3	39	0.00023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	1,400	5,700	0.59	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	0.32	1.4	0.000061	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,2-Dichloroethene	16	230	0.0011	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	8.7	37	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl benzene	5.8	25	0.0017	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	1.2	5.3	0.00027	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	190	990	0.074	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Meta/Para Xylene	55	240	0.019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl bromide	0.68	3	0.00019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl butyl ketone	20	130	0.00088	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl chloride	11	46	0.0049	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl ethyl ketone	2,700	19,000	0.12	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl isobutyl ketone	3,300	14,000	0.14	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Tertbutyl Ether	47	210	0.0032	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	35	320	0.0027	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	3.8	17	0.00054	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	390	5,800	0.32	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ortho Xylene	65	280	0.019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
p-Chlorotoluene	160	2,300	0.024	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propylbenzene	380	2,400	0.12	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	780	12,000	0.59	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	600	3,500	0.13	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tert Butyl Alcohol	NLE	NLE	NLE	-	NA</													

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PAR-83-SB-15			PAR-83-SB-16			PAR-83-SB-17	PAR-83-SB-18	PAR-83-SB-19	PAR-83-SB-20		PAR-83-SB-21	PAR-83-SB-22	PAR-83-SB-23
Sample ID					PAR-83-SB-15-3-3.5	PAR-83-SB-115-3-3.5	PAR-83-SB-15-5-5.6	PAR-83-SB-16-0.5-1	PAR-83-SB-16-3-3.5	PAR-83-SB-16-5.5-6	PAR-83-SB-17-6-6.5	PAR-83-SB-18-0-0.5	PAR-83-SB-19-0-0.5	PAR-83-SB-20-0-0.5	PAR-83-SB-120-0-0.5	PAR-83-SB-21-0-0.5	PAR-83-SB-22-0-0.5	PAR-83-SB-23-0-0.5
Sample Date					4/5/2016	4/5/2016	4/5/2016	4/5/2016	4/5/2016	4/5/2016	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)																		
Aroclor-1016	0.41	5.1	0.013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.2	0.83	0.00008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.17	0.72	0.00008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.12	0.97	0.002	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	0.24	0.99	0.0055	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1268	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)																		
Aluminum	7,700	110,000	3,000	15,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	3.1	47	0.035	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	0.68	3	0.0015	22.9	9.4	8.3	10.6	10.5	9.1	11.4	NA	NA	NA	NA	NA	NA	NA	NA
Barium	1,500	22,000	16	32.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	16	230	1.9	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	7.1	98	0.069	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NLE	NLE	NLE	921	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	12,000	180,000	4,000,000	269	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	2.3	35	0.027	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	310	4,700	2.8	8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	5,500	82,000	35	55,800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	400	800	14	19.5	10.4	8.2	7.9	58.9	9.8	8.6	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NLE	NLE	NLE	7,230	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	180	2,600	2.8	90.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	1.1	4.6	0.0033	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	150	2,200	2.6	8.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NLE	NLE	NLE	15,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	39	580	0.052	1.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NLE	NLE	NLE	51.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	39	580	8.6	94.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	2,300	35,000	37	81.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dataset.

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PAR-83-SB-23				PAR-83-SB-25		PAR-83-SB-33		PAR-83-SB-34	PAR-83-SB-38		PAR-83-SB-39		
Sample ID					PAR-83-SB-123-0-0.5	PAR-83-SB-23-3-3.5	PAR-83-SB-23-5-5.5	PAR-83-SB-23-6-6.5	PAR-83-SB-25-3-3.5	PAR-83-SB-25-6-6.5	PAR-83-SB-33-2-2.5	PAR-83-SB-133-2-2.5	PAR-83-SB-34-2-2.5	PAR-83-SB-38-0-0.5	PAR-83-SB-138-0-0.5	PAR-83-SB-39-2-2.5	PAR-83-SB-139-2-2.5	PAR-83-SB-39-3-3.5
Sample Date					11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/15/2017	11/15/2017	11/15/2017	11/15/2017	11/15/2017	11/15/2017	11/15/2017	11/16/2017	11/16/2017	11/16/2017
Volatile Organic Compounds (mg/kg)																		
1,1,1,2-Tetrachloroethane	2	8.8	0.00022	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	810	3,600	0.28	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	0.6	2.7	0.00003	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	0.15	0.63	0.000013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	3.6	16	0.00078	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	23	100	0.01	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	6.3	93	0.0021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichloropropane	0.0051	0.11	0.00000032	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	5.8	26	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	30	180	0.0081	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	0.0053	0.064	0.00000014	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	0.036	0.16	0.0000021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	180	930	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	0.46	2	0.000048	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	0.28	1.2	0.000047	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	27	150	0.0087	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichloropropane	160	2,300	0.013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	2.6	11	0.00046	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	160	2,300	0.023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	6,100	67,000	0.29	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	1.2	5.1	0.00023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromobenzene	29	180	0.0042	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	15	63	0.0021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	0.29	1.3	0.000036	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	19	86	0.00087	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	77	350	0.024	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	0.65	2.9	0.00018	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	28	130	0.0053	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorodibromomethane	8.3	39	0.00023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	1,400	5,700	0.59	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	0.32	1.4	0.000061	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,2-Dichloroethene	16	230	0.0011	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	8.7	37	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl benzene	5.8	25	0.0017	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	1.2	5.3	0.00027	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	190	990	0.074	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Meta/Para Xylene	55	240	0.019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl bromide	0.68	3	0.00019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl butyl ketone	20	130	0.00088	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl chloride	11	46	0.0049	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl ethyl ketone	2,700	19,000	0.12	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl isobutyl ketone	3,300	14,000	0.14	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Tertbutyl Ether	47	210	0.0032	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	35	320	0.0027	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	3.8	17	0.00054	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	390	5,800	0.32	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ortho Xylene	65	280	0.019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
p-Chlorotoluene	160	2,300	0.024	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propylbenzene	380	2,400	0.12	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	780	12,000	0.59	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	600	3,500	0.13	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tert Butyl Alcohol	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA							

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PAR-83-SB-23				PAR-83-SB-25		PAR-83-SB-33		PAR-83-SB-34	PAR-83-SB-38		PAR-83-SB-39		
Sample ID					PAR-83-SB-123-0-0.5	PAR-83-SB-23-3-3.5	PAR-83-SB-23-5-5.5	PAR-83-SB-23-6-6.5	PAR-83-SB-25-3-3.5	PAR-83-SB-25-6-6.5	PAR-83-SB-33-2-2.5	PAR-83-SB-133-2-2.5	PAR-83-SB-34-2-2.5	PAR-83-SB-38-0-0.5	PAR-83-SB-138-0-0.5	PAR-83-SB-39-2-2.5	PAR-83-SB-139-2-2.5	PAR-83-SB-39-3-3.5
Sample Date					11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/15/2017	11/15/2017	11/15/2017	11/15/2017	11/15/2017	11/15/2017	11/15/2017	11/16/2017	11/16/2017	11/16/2017
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	0.37 J	NA	598	8.5 J	NA	NA	NA	NA	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	0.72 J	NA	83.9 J-	5.4	NA	NA	NA	NA	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	0.74 J	NA	55.3	20.3 J-	NA	NA	NA	NA	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	89.2	NA	169	2.5 J	NA	NA	NA	NA	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	3,150	54 J	NA	NA	NA	NA	NA	NA	NA	NA
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	113	NA	1,010	33.4 J-	NA	NA	NA	NA	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	1.2 J	NA	1,050	19.4	NA	NA	NA	NA	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	NA	NA	114.2 J	NA	2,060	52.8	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)																		
Aroclor-1016	0.41	5.1	0.013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.2	0.83	0.0008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.17	0.72	0.0008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.12	0.97	0.002	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	0.24	0.99	0.0055	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1268	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)																		
Aluminum	7,700	110,000	3,000	15,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	3.1	47	0.035	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	0.68	3	0.0015	22.9	NA	NA	NA	NA	NA	NA	5.2	5.8	4	NA	NA	NA	NA	NA
Barium	1,500	22,000	16	32.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	16	230	1.9	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	7.1	98	0.069	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NLE	NLE	NLE	921	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	12,000	180,000	4,000,000	269	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	2.3	35	0.027	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	310	4,700	2.8	8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	5,500	82,000	35	55,800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	400	800	14	19.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NLE	NLE	NLE	7,230	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	180	2,600	2.8	90.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	1.1	4.6	0.0033	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	150	2,200	2.6	8.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NLE	NLE	NLE	15,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	39	580	0.052	1.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NLE	NLE	NLE	51.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	39	580	8.6	94.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	2,300	35,000	37	81.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dataset.

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PAR-83-SB-39	PAR-83-SB-44	PAR-83-SB-45	PAR-83-SB-46	PAR-83-SB-47	PAR-83-SB-48			PAR-83-SB-54			PAR-83-SB-55		
Sample ID					PAR-83-SB-39-6-6.5	PAR-83-SB-44-1-1.5	PAR-83-SB-45-1.5-2	PAR-83-SB-46-0-0.5	PAR-83-SB-47-0-0.5	PAR-83-SB-48-0-0.5	PAR-83-SB-48-3-3.5	PAR-83-SB-48-6-6.5	PAR-83-SB-54-1-1.5	PAR-83-SB-54-3-3.5	PAR-83-SB-54-6-6.5	PAR-83-SB-55-1-1.5	PAR-83-SB-55-3-3.5	PAR-83-SB-55-6-6.5
Sample Date					11/16/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/16/2017	11/16/2017	11/16/2017	11/16/2017	11/16/2017	11/16/2017
Volatile Organic Compounds (mg/kg)																		
1,1,1,2-Tetrachloroethane	2	8.8	0.00022	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	810	3,600	0.28	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	0.6	2.7	0.00003	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	0.15	0.63	0.000013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	3.6	16	0.00078	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	23	100	0.01	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	6.3	93	0.0021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichloropropane	0.0051	0.11	0.00000032	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	5.8	26	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	30	180	0.0081	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	0.0053	0.064	0.00000014	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	0.036	0.16	0.0000021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	180	930	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	0.46	2	0.000048	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	0.28	1.2	0.000047	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	27	150	0.0087	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichloropropane	160	2,300	0.013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	2.6	11	0.00046	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	160	2,300	0.023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	6,100	67,000	0.29	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	1.2	5.1	0.00023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromobenzene	29	180	0.0042	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	15	63	0.0021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	0.29	1.3	0.000036	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	19	86	0.00087	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	77	350	0.024	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	0.65	2.9	0.00018	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	28	130	0.0053	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorodibromomethane	8.3	39	0.00023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	1,400	5,700	0.59	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	0.32	1.4	0.000061	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,2-Dichloroethene	16	230	0.0011	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	8.7	37	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl benzene	5.8	25	0.0017	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	1.2	5.3	0.00027	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	190	990	0.074	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Meta/Para Xylene	55	240	0.019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl bromide	0.68	3	0.00019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl butyl ketone	20	130	0.00088	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl chloride	11	46	0.0049	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl ethyl ketone	2,700	19,000	0.12	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl isobutyl ketone	3,300	14,000	0.14	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Tertbutyl Ether	47	210	0.0032	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	35	320	0.0027	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	3.8	17	0.00054	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	390	5,800	0.32	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ortho Xylene	65	280	0.019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
p-Chlorotoluene	160	2,300	0.024	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propylbenzene	380	2,400	0.12	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	780	12,000	0.59	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	600	3,500	0.13	-	NA	NA	NA	NA	NA	NA	NA	NA						

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PAR-83-SB-39	PAR-83-SB-44	PAR-83-SB-45	PAR-83-SB-46	PAR-83-SB-47	PAR-83-SB-48			PAR-83-SB-54			PAR-83-SB-55		
Sample ID					PAR-83-SB-39-6-6.5	PAR-83-SB-44-1-1.5	PAR-83-SB-45-1.5-2	PAR-83-SB-46-0-0.5	PAR-83-SB-47-0-0.5	PAR-83-SB-48-0-0.5	PAR-83-SB-48-3-3.5	PAR-83-SB-48-6-6.5	PAR-83-SB-54-1-1.5	PAR-83-SB-54-3-3.5	PAR-83-SB-54-6-6.5	PAR-83-SB-55-1-1.5	PAR-83-SB-55-3-3.5	PAR-83-SB-55-6-6.5
Sample Date					11/16/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/16/2017	11/16/2017	11/16/2017	11/16/2017	11/16/2017	11/16/2017
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)																		
Aroclor-1016	0.41	5.1	0.013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.2	0.83	0.0008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.17	0.72	0.0008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.12	0.97	0.002	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	0.24	0.99	0.0055	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1268	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)																		
Aluminum	7,700	110,000	3,000	15,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	3.1	47	0.035	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	0.68	3	0.0015	22.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	1,500	22,000	16	32.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	16	230	1.9	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	7.1	98	0.069	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NLE	NLE	NLE	921	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	12,000	180,000	4,000,000	269	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	2.3	35	0.027	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	310	4,700	2.8	8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	5,500	82,000	35	55,800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	400	800	14	19.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NLE	NLE	NLE	7,230	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	180	2,600	2.8	90.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	1.1	4.6	0.0033	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	150	2,200	2.6	8.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NLE	NLE	NLE	15,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	39	580	0.052	1.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NLE	NLE	NLE	51.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	39	580	8.6	94.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	2,300	35,000	37	81.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dataset.

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PARCEL 83-P83-A1			PARCEL 83-P83-A2			PARCEL 83-P83-A3			PARCEL 83-P83-A4			PARCEL 83-P83-A5	
Sample ID					P83-A1-A	P83-A1-B	P83-A1-C	P83-A2-A	P83-A2-B	P83-A2-C	P83-A3-A	P83-A3-B	P83-A3-C	P83-A4-A	P83-A4-B	P83-A4-C	P83-A5-A	P83-A5-B
Sample Date					12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007
Volatile Organic Compounds (mg/kg)																		
1,1,1,2-Tetrachloroethane	2	8.8	0.00022	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	810	3,600	0.28	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	0.6	2.7	0.00003	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	0.15	0.63	0.000013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	3.6	16	0.00078	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	23	100	0.01	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	6.3	93	0.0021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichloropropane	0.0051	0.11	0.00000032	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	5.8	26	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	30	180	0.0081	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	0.0053	0.064	0.00000014	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	0.036	0.16	0.0000021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	180	930	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	0.46	2	0.000048	-	NA	< 0.28	< 0.29	NA	< 0.27	< 0.3	NA	< 0.28	< 0.28	NA	< 0.25	< 0.28	NA	< 0.29
1,2-Dichloropropane	0.28	1.2	0.000047	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	27	150	0.0087	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichloropropane	160	2,300	0.013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	2.6	11	0.00046	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	160	2,300	0.023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	6,100	67,000	0.29	-	NA	< 0.28	< 0.29	NA	0.26 JB	< 1.3	NA	< 1.3	0.17 JB	NA	< 0.32	< 0.37	NA	< 0.46
Benzene	1.2	5.1	0.00023	-	NA	< 0.28	< 0.29	NA	< 0.27	< 0.3	NA	< 0.28	< 0.28	NA	< 0.25	< 0.28	NA	< 0.29
Bromobenzene	29	180	0.0042	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	15	63	0.0021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	0.29	1.3	0.000036	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	19	86	0.00087	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	77	350	0.024	-	NA	< 0.28	< 0.29	NA	< 0.27	< 0.3	NA	< 0.28	< 0.28	NA	< 0.25	< 0.28	NA	0.023 J
Carbon tetrachloride	0.65	2.9	0.00018	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	28	130	0.0053	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorodibromomethane	8.3	39	0.00023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	1,400	5,700	0.59	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	0.32	1.4	0.000061	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,2-Dichloroethene	16	230	0.0011	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	8.7	37	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl benzene	5.8	25	0.0017	-	NA	< 0.28	< 0.29	NA	< 0.27	< 0.3	NA	< 0.28	< 0.28	NA	< 0.25	< 0.28	NA	< 0.29
Hexachlorobutadiene	1.2	5.3	0.00027	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	190	990	0.074	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Meta/Para Xylene	55	240	0.019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl bromide	0.68	3	0.00019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl butyl ketone	20	130	0.00088	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl chloride	11	46	0.0049	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl ethyl ketone	2,700	19,000	0.12	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl isobutyl ketone	3,300	14,000	0.14	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Tertbutyl Ether	47	210	0.0032	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	35	320	0.0027	-	NA	< 0.28	< 0.29	NA	< 0.27	< 0.3	NA	< 0.28	< 0.28	NA	< 0.25	< 0.28	NA	< 0.29
Naphthalene	3.8	17	0.00054	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	390	5,800	0.32	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ortho Xylene	65	280	0.019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
p-Chlorotoluene	160	2,300	0.024	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propylbenzene	380	2,400	0.12	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	780	12,000	0.59	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA</		

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PARCEL 83-P83-A1			PARCEL 83-P83-A2			PARCEL 83-P83-A3			PARCEL 83-P83-A4			PARCEL 83-P83-A5	
Sample ID					P83-A1-A	P83-A1-B	P83-A1-C	P83-A2-A	P83-A2-B	P83-A2-C	P83-A3-A	P83-A3-B	P83-A3-C	P83-A4-A	P83-A4-B	P83-A4-C	P83-A5-A	P83-A5-B
Sample Date					12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)																		
Aroclor-1016	0.41	5.1	0.013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.2	0.83	0.00008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.17	0.72	0.00008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.12	0.97	0.002	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	0.24	0.99	0.0055	-	< 0.0041	NA	< 0.0041	< 0.0041	NA	< 0.0042	< 0.0042	NA	< 0.004	< 0.004	NA	< 0.0041	< 0.0041	NA
Aroclor-1268	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)																		
Aluminum	7,700	110,000	3,000	15,200	< 11200	NA	< 8860	< 5880	NA	< 5400	< 5520	NA	< 10900	< 6810	NA	< 14700	< 8300	NA
Antimony	3.1	47	0.035	ND	< 0.438	NA	< 0.449	< 0.433	NA	< 0.438	< 0.424	NA	< 0.421	< 0.463	NA	< 0.485	< 0.479	NA
Arsenic	0.68	3	0.0015	22.9	16	NA	4.63	3.59	NA	2.77	2.77	NA	6.49	7.04	NA	9.15	7.49	NA
Barium	1,500	22,000	16	32.3	< 34.2	NA	< 14.4	< 18	NA	< 22.2	< 18.3	NA	< 21.1	< 26	NA	< 59.6	< 124	NA
Beryllium	16	230	1.9	2	1.08	NA	1.22	0.184	NA	0.766	0.341	NA	1.35	0.41	NA	1.68	0.927	NA
Cadmium	7.1	98	0.069	ND	< 0.042	NA	< 0.043	< 0.289	NA	< 0.042	< 0.217	NA	< 0.04	0.66	NA	0.443	0.707	NA
Calcium	NLE	NLE	NLE	921	< 889	NA	< 490	< 10400	NA	< 837	< 1490	NA	< 1060	< 2970	NA	< 1880	< 2060	NA
Chromium	12,000	180,000	4,000,000	269	< 103	NA	< 102	< 17.3	NA	< 40.1	< 33.8	NA	< 110	< 35.9	NA	< 98.2	< 65.5	NA
Cobalt	2.3	35	0.027	2.5	0.353	NA	0.639	1.77	NA	0.605	0.952	NA	0.629	4.15	NA	1.28	2.15	NA
Copper	310	4,700	2.8	8	< 18.8	NA	< 5.72	< 18	NA	< 3.05	< 17.8	NA	< 4.62	< 52.2	NA	< 8.36	< 34.5	NA
Iron	5,500	82,000	35	55,800	< 39800	NA	< 40000	< 11000	NA	< 18500	< 13400	NA	< 45500	19,100	NA	39,900	27,200	NA
Lead	400	800	14	19.5	18.6	NA	< 0.363	11.7	NA	2.17	35.2	NA	0.935	95.8	NA	7.79	252	NA
Magnesium	NLE	NLE	NLE	7,230	< 4300	NA	< 4140	< 1300	NA	< 1610	< 1280	NA	< 4520	< 3340	NA	< 5170	< 2920	NA
Manganese	180	2,600	2.8	90.7	< 22.5	NA	< 29.8	< 52.1	NA	< 56.9	< 44.9	NA	< 32	< 127	NA	< 86	< 76	NA
Mercury	1.1	4.6	0.0033	ND	< 0.107	NA	< 0.108	< 0.111	NA	< 0.114	< 0.112	NA	< 0.116	< 0.118	NA	< 0.114	0.13	NA
Nickel	150	2,200	2.6	8.4	7.11	NA	5.8	6.73	NA	4.08	6.21	NA	5.76	< 0.661	NA	< 8.82	< 9.23	NA
Potassium	NLE	NLE	NLE	15,400	9,600	NA	9,870	710	NA	3,300	2,060	NA	10,700	< 1970	NA	< 10000	< 5830	NA
Selenium	39	580	0.052	1.9	< 0.646	NA	< 0.663	< 0.64	NA	< 0.647	< 0.626	NA	< 0.622	< 0.683	NA	< 0.716	< 0.707	NA
Sodium	NLE	NLE	NLE	51.6	< 37.939	NA	< 38.914	< 37.559	NA	< 37.979	< 36.747	NA	< 36.52	< 40.086	NA	< 42.037	< 41.486	NA
Vanadium	39	580	8.6	94.1	52.4	NA	53.3	20.5	NA	28.1	24	NA	59.1	49.5	NA	57.6	40.5	NA
Zinc	2,300	35,000	37	81.4	67.5	NA	54.6	299	NA	35.6	193	NA	47.4	< 230	NA	< 61.6	< 199	NA

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dataset.

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PARCEL 83-P83-A5	PARCEL 83-P83-B1					PARCEL 83-P83-B2			PARCEL 83-P83-B3			PARCEL 83-P83-B4		
Sample ID					P83-A5-C	P83-B1-A	P83-B1-B	P83-B1-C	P83-B1-C DUP	P83-B2-A	P83-B2-B	P83-B2-C	P83-B3-A	P83-B3-B	P83-B3-C	P83-B4-A	P83-B4-B	P83-B4-C	
Sample Date					12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	
Volatile Organic Compounds (mg/kg)																			
1,1,1,2-Tetrachloroethane	2	8.8	0.00022	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1,1-Trichloroethane	810	3,600	0.28	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1,2,2-Tetrachloroethane	0.6	2.7	0.00003	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1,2-Trichloroethane	0.15	0.63	0.000013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1-Dichloroethane	3.6	16	0.00078	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1-Dichloroethene	23	100	0.01	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,3-Trichlorobenzene	6.3	93	0.0021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,3-Trichloropropane	0.0051	0.11	0.00000032	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,4-Trichlorobenzene	5.8	26	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,4-Trimethylbenzene	30	180	0.0081	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2-Dibromo-3-chloropropane	0.0053	0.064	0.00000014	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2-Dibromoethane	0.036	0.16	0.0000021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2-Dichlorobenzene	180	930	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2-Dichloroethane	0.46	2	0.000048	-	< 0.29	NA	< 0.26	< 0.28	< 0.34	NA	< 0.3	< 0.31	NA	< 0.26	< 0.3	NA	< 0.27	< 0.28	
1,2-Dichloropropane	0.28	1.2	0.000047	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,3,5-Trimethylbenzene	27	150	0.0087	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,3-Dichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,3-Dichloropropane	160	2,300	0.013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,4-Dichlorobenzene	2.6	11	0.00046	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
2-Chlorotoluene	160	2,300	0.023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Acetone	6,100	67,000	0.29	-	0.22 JB	NA	< 0.58	< 0.28	< 0.34	NA	< 0.5	0.15 JB	NA	0.88	1.2	NA	1.3	1.3	
Benzene	1.2	5.1	0.00023	-	< 0.29	NA	0.33	< 0.28	< 0.34	NA	< 0.3	< 0.31	NA	< 0.26	< 0.3	NA	0.015 J	< 0.28	
Bromobenzene	29	180	0.0042	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Bromochloromethane	15	63	0.0021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Bromodichloromethane	0.29	1.3	0.000036	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Bromoform	19	86	0.00087	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Carbon disulfide	77	350	0.024	-	< 0.29	NA	0.015 J	< 0.28	< 0.34	NA	< 0.3	< 0.31	NA	< 0.26	< 0.3	NA	< 0.27	< 0.28	
Carbon tetrachloride	0.65	2.9	0.00018	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chlorobenzene	28	130	0.0053	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chlorodibromomethane	8.3	39	0.00023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chloroethane	1,400	5,700	0.59	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chloroform	0.32	1.4	0.000061	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Cis-1,2-Dichloroethene	16	230	0.0011	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Dichlorodifluoromethane	8.7	37	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Ethyl benzene	5.8	25	0.0017	-	< 0.29	NA	0.22 J	< 0.28	< 0.34	NA	< 0.3	< 0.31	NA	< 0.26	< 0.3	NA	0.023 J	< 0.28	
Hexachlorobutadiene	1.2	5.3	0.00027	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Isopropylbenzene	190	990	0.074	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Meta/Para Xylene	55	240	0.019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl bromide	0.68	3	0.00019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl butyl ketone	20	130	0.00088	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl chloride	11	46	0.0049	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl ethyl ketone	2,700	19,000	0.12	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl isobutyl ketone	3,300	14,000	0.14	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl Tertbutyl Ether	47	210	0.0032	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methylene chloride	35	320	0.0027	-	< 0.29	NA	< 0.26	< 0.28	< 0.34	NA	< 0.3	< 0.31	NA	< 0.26	< 0.3	NA	< 0.27	< 0.28	
Naphthalene	3.8	17	0.00054	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
n-Butylbenzene	390	5,800	0.32	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Ortho Xylene	65	280	0.019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
p-Chlorotoluene	160	2,300	0.024	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Propylbenzene	380	2,400	0.12	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
sec-Butylbenzene	780	12,000	0.59	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PARCEL 83-P83-A5	PARCEL 83-P83-B1				PARCEL 83-P83-B2			PARCEL 83-P83-B3			PARCEL 83-P83-B4		
Sample ID					P83-A5-C	P83-B1-A	P83-B1-B	P83-B1-C	P83-B1-C DUP	P83-B2-A	P83-B2-B	P83-B2-C	P83-B3-A	P83-B3-B	P83-B3-C	P83-B4-A	P83-B4-B	P83-B4-C
Sample Date					12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)																		
Aroclor-1016	0.41	5.1	0.013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.2	0.83	0.00008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.17	0.72	0.00008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.12	0.97	0.002	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	0.24	0.99	0.0055	-	< 0.0042	< 0.0042	NA	< 0.0041	< 0.0041	< 0.0041	NA	< 0.0041	< 0.0041	NA	< 0.0041	< 0.0041	NA	< 0.004
Aroclor-1268	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)																		
Aluminum	7,700	110,000	3,000	15,200	< 17200	< 15800	NA	< 9660	< 8880	< 10400	NA	< 13500	< 8880	NA	< 12800	< 8910	NA	< 18500
Antimony	3.1	47	0.035	ND	< 0.429	< 0.435	NA	< 0.443	< 0.465	< 0.543	NA	< 0.44	< 0.423	NA	< 0.501	< 0.463	NA	< 0.48
Arsenic	0.68	3	0.0015	22.9	9.99	4.87	NA	13.4	9.69	10.8	NA	7.93	7.12	NA	6.41	6.04	NA	5.93
Barium	1,500	22,000	16	32.3	< 22	< 28.3	NA	< 34.3	< 35.5	< 52.1	NA	< 18.4	< 81.4	NA	< 32.5	< 33.7	NA	< 24.6
Beryllium	16	230	1.9	2	2.39	0.282	NA	1.03	0.996	0.931	NA	1.88	0.752	NA	1.63	0.582	NA	1.91
Cadmium	7.1	98	0.069	ND	0.76	0.564	NA	0.312	< 0.044	0.709	NA	0.633	1.01	NA	0.277	0.445	NA	0.476
Calcium	NLE	NLE	NLE	921	< 1730	< 12800	NA	< 875	< 757	< 2490	NA	< 947	< 8590	NA	< 430	< 3620	NA	< 2320
Chromium	12,000	180,000	4,000,000	269	< 171	< 29.4	NA	< 80.4	< 80.5	< 83.3	NA	< 150	< 28.4	NA	< 105	< 45.1	NA	< 168
Cobalt	2.3	35	0.027	2.5	2.19	10.1	NA	0.571	0.824	2.78	NA	1.83	5.07	NA	1.13	1.31	NA	1.25
Copper	310	4,700	2.8	8	< 5.95	< 61.8	NA	< 10.4	< 10.1	< 39.4	NA	< 15.3	< 109	NA	< 10.4	< 33	NA	< 8.35
Iron	5,500	82,000	35	55,800	72,900	23,000	NA	38,700	< 36400	31,800	NA	56,800	16,200	NA	46,500	18,700	NA	62,900
Lead	400	800	14	19.5	< 0.347	7.95	NA	15.5	17.1	111	NA	0.869	103	NA	1.47	45.2	NA	1.57
Magnesium	NLE	NLE	NLE	7,230	< 8770	< 8580	NA	< 4050	< 3760	< 3240	NA	< 6730	< 4450	NA	< 5350	< 2190	NA	< 8360
Manganese	180	2,600	2.8	90.7	< 49	< 266	NA	< 24.7	< 16.4	< 122	NA	< 44.7	< 292	NA	< 32.3	< 111	NA	< 55.2
Mercury	1.1	4.6	0.0033	ND	< 0.11	< 0.105	NA	< 0.108	< 0.114	< 0.119	NA	< 0.115	< 0.11	NA	< 0.118	< 0.112	NA	< 0.114
Nickel	150	2,200	2.6	8.4	< 16.8	< 23.2	NA	< 5.52	7.25	< 12	NA	< 20.2	< 18.7	NA	< 7.41	< 9.75	NA	< 7.96
Potassium	NLE	NLE	NLE	15,400	< 20100	< 1800	NA	< 8460	8,330	< 5020	NA	< 14900	< 1540	NA	< 11600	< 3430	NA	< 18000
Selenium	39	580	0.052	1.9	< 0.633	< 0.642	NA	< 0.654	< 0.686	< 0.802	NA	< 0.649	< 0.624	NA	< 0.739	< 0.684	NA	< 0.708
Sodium	NLE	NLE	NLE	51.6	< 37.168	< 1390	NA	< 38.387	< 40.273	< 47.093	NA	< 38.122	< 36.662	NA	< 43.403	< 40.166	NA	< 41.585
Vanadium	39	580	8.6	94.1	92.1	123	NA	49.8	45.9	60.2	NA	73.8	34.5	NA	58	47.8	NA	92.7
Zinc	2,300	35,000	37	81.4	< 74.8	< 41	NA	< 39	46.9	< 136	NA	< 112	< 148	NA	< 59.5	< 77.8	NA	< 64.8

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dataset.

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PARCEL 83-P83-B5			
Sample ID					P83-B5-A	P83-B5-B	P83-B5-C	P83-B5-C DUP
Sample Date					12/15/2007	12/15/2007	12/15/2007	12/15/2007
Volatile Organic Compounds (mg/kg)								
1,1,1,2-Tetrachloroethane	2	8.8	0.00022	-	NA	NA	NA	NA
1,1,1-Trichloroethane	810	3,600	0.28	-	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	0.6	2.7	0.00003	-	NA	NA	NA	NA
1,1,2-Trichloroethane	0.15	0.63	0.000013	-	NA	NA	NA	NA
1,1-Dichloroethane	3.6	16	0.00078	-	NA	NA	NA	NA
1,1-Dichloroethene	23	100	0.01	-	NA	NA	NA	NA
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA
1,2,3-Trichlorobenzene	6.3	93	0.0021	-	NA	NA	NA	NA
1,2,3-Trichloropropane	0.0051	0.11	0.00000032	-	NA	NA	NA	NA
1,2,4-Trichlorobenzene	5.8	26	0.0012	-	NA	NA	NA	NA
1,2,4-Trimethylbenzene	30	180	0.0081	-	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	0.0053	0.064	0.00000014	-	NA	NA	NA	NA
1,2-Dibromoethane	0.036	0.16	0.0000021	-	NA	NA	NA	NA
1,2-Dichlorobenzene	180	930	0.03	-	NA	NA	NA	NA
1,2-Dichloroethane	0.46	2	0.000048	-	NA	< 0.27	< 0.27	< 0.38
1,2-Dichloropropane	0.28	1.2	0.000047	-	NA	NA	NA	NA
1,3,5-Trimethylbenzene	27	150	0.0087	-	NA	NA	NA	NA
1,3-Dichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA
1,3-Dichloropropane	160	2,300	0.013	-	NA	NA	NA	NA
1,4-Dichlorobenzene	2.6	11	0.00046	-	NA	NA	NA	NA
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA
2-Chlorotoluene	160	2,300	0.023	-	NA	NA	NA	NA
Acetone	6,100	67,000	0.29	-	NA	1.2	1.2	1.5
Benzene	1.2	5.1	0.00023	-	NA	< 0.27	< 0.27	< 0.38
Bromobenzene	29	180	0.0042	-	NA	NA	NA	NA
Bromochloromethane	15	63	0.0021	-	NA	NA	NA	NA
Bromodichloromethane	0.29	1.3	0.000036	-	NA	NA	NA	NA
Bromoform	19	86	0.00087	-	NA	NA	NA	NA
Carbon disulfide	77	350	0.024	-	NA	< 0.27	< 0.27	< 0.38
Carbon tetrachloride	0.65	2.9	0.00018	-	NA	NA	NA	NA
Chlorobenzene	28	130	0.0053	-	NA	NA	NA	NA
Chlorodibromomethane	8.3	39	0.00023	-	NA	NA	NA	NA
Chloroethane	1,400	5,700	0.59	-	NA	NA	NA	NA
Chloroform	0.32	1.4	0.000061	-	NA	NA	NA	NA
Cis-1,2-Dichloroethene	16	230	0.0011	-	NA	NA	NA	NA
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA
Dichlorodifluoromethane	8.7	37	0.03	-	NA	NA	NA	NA
Ethyl benzene	5.8	25	0.0017	-	NA	< 0.27	< 0.27	< 0.38
Hexachlorobutadiene	1.2	5.3	0.00027	-	NA	NA	NA	NA
Isopropylbenzene	190	990	0.074	-	NA	NA	NA	NA
Meta/Para Xylene	55	240	0.019	-	NA	NA	NA	NA
Methyl bromide	0.68	3	0.00019	-	NA	NA	NA	NA
Methyl butyl ketone	20	130	0.00088	-	NA	NA	NA	NA
Methyl chloride	11	46	0.0049	-	NA	NA	NA	NA
Methyl ethyl ketone	2,700	19,000	0.12	-	NA	NA	NA	NA
Methyl isobutyl ketone	3,300	14,000	0.14	-	NA	NA	NA	NA
Methyl Tertbutyl Ether	47	210	0.0032	-	NA	NA	NA	NA
Methylene chloride	35	320	0.0027	-	NA	< 0.27	< 0.27	< 0.38
Naphthalene	3.8	17	0.00054	-	NA	NA	NA	NA
n-Butylbenzene	390	5,800	0.32	-	NA	NA	NA	NA
Ortho Xylene	65	280	0.019	-	NA	NA	NA	NA
o-Chlorotoluene	160	2,300	0.024	-	NA	NA	NA	NA
Propylbenzene	380	2,400	0.12	-	NA	NA	NA	NA
sec-Butylbenzene	780	12,000	0.59	-	NA	NA	NA	NA
Styrene	600	3,500	0.13	-	NA	NA	NA	NA
Tert Butyl Alcohol	NLE	NLE	NLE	-	NA	NA	NA	NA
tert-Butylbenzene	780	12,000	0.16	-	NA	NA	NA	NA
Tetrachloroethene	8.1	39	0.0018	-	NA	NA	NA	NA
Toluene	490	4,700	0.076	-	NA	< 0.27	< 0.27	0.033 J
Total Xylenes	58	250	0.019	-	NA	< 0.8	< 0.81	< 1.15
Trans-1,2-Dichloroethene	160	2,300	0.011	-	NA	NA	NA	NA
Trans-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA
Trichloroethene	0.41	1.9	0.0001	-	NA	< 0.27	< 0.27	< 0.38
Trichlorofluoromethane	2,300	35,000	0.33	-	NA	NA	NA	NA
Vinyl chloride	0.059	1.7	0.0000065	-	NA	NA	NA	NA
TIC VOCs (mg/kg)								
Total TIC VOCs	NLE	NLE	NLE	-	NA	NA	NA	NA
Semivolatile Organic Compounds (mg/kg)								
1-Methylnaphthalene	18	73	0.006	-	NA	NA	NA	NA
2-Methylnaphthalene	24	300	0.019	-	0.14 J	NA	< 1.2	< 1.2
4-Chloroaniline	2.7	11	0.00016	-	< 1	NA	< 1.2	< 1.2
Acenaphthene	360	4,500	0.55	-	< 1	NA	< 1.2	< 1.2
Acenaphthylene	NLE	NLE	NLE	-	0.13 J	NA	< 1.2	< 1.2
Anthracene	1,800	23,000	5.8	-	0.14 J	NA	< 1.2	< 1.2
Benzo(a)anthracene	1.1	21	0.011	-	0.69 J	NA	< 1.2	< 1.2
Benzo(a)pyrene	0.11	2.1	0.029	-	0.68 J	NA	< 1.2	< 1.2
Benzo(b)fluoranthene	1.1	21	0.3	-	1 J	NA	< 1.2	< 1.2
Benzo(ghi)perylene	NLE	NLE	NLE	-	< 1	NA	< 1.2	< 1.2
Benzo(k)fluoranthene	11	210	2.9	-	0.71 J	NA	< 1.2	< 1.2
Bis(2-Chloroethyl)ether	0.23	1	0.0000036	-	0.24 J	NA	< 1.2	< 1.2
Bis(2-Ethylhexyl)phthalate	39	160	1.3	-	0.66 JB	NA	0.16 JB	0.41 JB
Butyl benzyl phthalate	290	1,200	0.24	-	< 1	NA	< 1.2	< 1.2
Chrysene	110	2,100	9	-	0.97 J	NA	< 1.2	< 1.2
Dibenz(a,h)anthracene	0.11	2.1	0.096	-	< 1	NA	< 1.2	< 1.2
Dibenzofuran	7.3	100	0.015	-	0.07 J	NA	< 1.2	< 1.2
Diethyl phthalate	5,100	66,000	0.61	-	< 1	NA	< 1.2	< 1.2
Di-n-butylphthalate	630	8,200	0.23	-	0.41 JB	NA	0.58 JB	0.29 JB
Di-n-octylphthalate	63	820	5.7	-	< 1	NA	< 1.2	< 1.2
Fluoranthene	240	3,000	8.9	-	1 J	NA	< 1.2	< 1.2
Fluorene	240	3,000	0.54	-	< 1	NA	< 1.2	< 1.2
Indeno(1,2,3-cd)pyrene	1.1	21	0.98	-	< 1	NA	< 1.2	< 1.2
Naphthalene	3.8	17	0.00054	-	0.14 J	NA	< 1.2	< 1.2
Phenanthrene	NLE	NLE	NLE	-	0.76 J	NA	0.091 J	< 1.2
Pyrene	180	2,300	1.3	-	1.5	NA	< 1.2	< 1.2
Total Petroleum Hydrocarbons (mg/kg)								
Total Petroleum Hydrocarbons	NLE	NLE	NLE	-	NA	NA	NA	NA
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)								
C10-C12 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA
C12-C16 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA
C12-C16 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA
C16-C21 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PARCEL 83-P83-B5			
Sample ID					P83-B5-A	P83-B5-B	P83-B5-C	P83-B5-C DUP
Sample Date					12/15/2007	12/15/2007	12/15/2007	12/15/2007
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)								
Aroclor-1016	0.41	5.1	0.013	-	NA	NA	NA	NA
Aroclor-1221	0.2	0.83	0.00008	-	NA	NA	NA	NA
Aroclor-1232	0.17	0.72	0.00008	-	NA	NA	NA	NA
Aroclor-1242	0.23	0.95	0.0012	-	NA	NA	NA	NA
Aroclor-1248	0.23	0.95	0.0012	-	NA	NA	NA	NA
Aroclor-1254	0.12	0.97	0.002	-	NA	NA	NA	NA
Aroclor-1260	0.24	0.99	0.0055	-	0.8	NA	< 0.0041	< 0.0039
Aroclor-1268	NLE	NLE	NLE	-	NA	NA	NA	NA
Inorganics (mg/kg)								
Aluminum	7,700	110,000	3,000	15,200	< 11300	NA	< 19400	< 18500
Antimony	3.1	47	0.035	ND	6.5	NA	< 0.485	< 0.483
Arsenic	0.68	3	0.0015	22.9	7.34	NA	10.3	10.8
Barium	1,500	22,000	16	32.3	< 182	NA	< 24.4	< 23.8
Beryllium	16	230	1.9	2	0.942	NA	2.68	2.57
Cadmium	7.1	98	0.069	ND	3.15	NA	0.862	0.874
Calcium	NLE	NLE	NLE	921	< 979	NA	< 725	< 741
Chromium	12,000	180,000	4,000,000	269	< 105	NA	< 207	< 202
Cobalt	2.3	35	0.027	2.5	2.06	NA	2.16	2.27
Copper	310	4,700	2.8	8	2,930 EB	NA	< 9.46	< 10.4
Iron	5,500	82,000	35	55,800	38,400	NA	83,200	80,300
Lead	400	800	14	19.5	972	NA	< 0.392	< 0.391
Magnesium	NLE	NLE	NLE	7,230	< 3240	NA	< 10200	< 9470
Manganese	180	2,600	2.8	90.7	< 110	NA	< 32	< 30.2
Mercury	1.1	4.6	0.0033	ND	4.06	NA	< 0.107	< 0.113
Nickel	150	2,200	2.6	8.4	< 46.1	NA	< 8.96	< 9.7
Potassium	NLE	NLE	NLE	15,400	< 6820	NA	< 23900	< 22200
Selenium	39	580	0.052	1.9	< 0.669	NA	< 0.716	< 0.713
Sodium	NLE	NLE	NLE	51.6	< 39,258	NA	< 42,017	< 41,831
Vanadium	39	580	8.6	94.1	44.8	NA	104	99.7
Zinc	2,300	35,000	37	81.4	< 1100	NA	< 79.1	< 84.2

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dataset.

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PARCEL 83-P83-SS/SB/GW-10				PARCEL 83-SS/SB-11			PARCEL 83-SS/SB/GW-12			PARCEL 83-SS/SB-13		
Sample ID					P83-SB10-A	P83-SB10-B	P83-SB10-C	P83-SB10-D	P83-SB11-A	P83-SB11-B	P83-SB11-C	P83-SB12-A	P83-SB12-B	P83-SB12-C	P83-SB13-A	P83-SB13-B	P83-SB13-C
Sample Date	12/15/2007	12/15/2007	12/15/2007		12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/18/2007	12/18/2007	12/18/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007
Volatile Organic Compounds (mg/kg)																	
1,1,1,2-Tetrachloroethane	2	8.8	0.00022	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	810	3,600	0.28	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	0.6	2.7	0.00003	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	0.15	0.63	0.000013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	3.6	16	0.00078	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	23	100	0.01	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	6.3	93	0.0021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichloropropane	0.0051	0.11	0.00000032	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	5.8	26	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	30	180	0.0081	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	0.0053	0.064	0.00000014	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	0.036	0.16	0.00000021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	180	930	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	0.46	2	0.000048	-	NA	< 0.24	< 0.27	< 0.25	NA	< 0.26	< 0.27	NA	< 0.34	< 0.27	NA	< 0.3	< 0.28
1,2-Dichloropropane	0.28	1.2	0.000047	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	27	150	0.0087	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichloropropane	160	2,300	0.013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	2.6	11	0.00046	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	160	2,300	0.023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	6,100	67,000	0.29	-	NA	1	1	1.1	NA	0.081 J	0.092 J	NA	< 4.2	< 3.4	NA	< 4.1	< 3.7
Benzene	1.2	5.1	0.00023	-	NA	< 0.24	< 0.27	< 0.25	NA	< 0.26	< 0.27	NA	< 0.34	0.016 J	NA	< 0.3	< 0.28
Bromobenzene	29	180	0.0042	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	15	63	0.0021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	0.29	1.3	0.000036	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	19	86	0.00087	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	77	350	0.024	-	NA	< 0.24	< 0.27	< 0.25	NA	< 0.26	< 0.27	NA	< 0.34	< 0.27	NA	< 0.3	< 0.28
Carbon tetrachloride	0.65	2.9	0.00018	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	28	130	0.0053	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorodibromomethane	8.3	39	0.00023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	1,400	5,700	0.59	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	0.32	1.4	0.000061	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,2-Dichloroethene	16	230	0.0011	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	8.7	37	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl benzene	5.8	25	0.0017	-	NA	< 0.24	< 0.27	< 0.25	NA	< 0.26	< 0.27	NA	< 0.34	0.077 J	NA	< 0.3	0.02 J
Hexachlorobutadiene	1.2	5.3	0.00027	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	190	990	0.074	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Meta/Para Xylene	55	240	0.019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl bromide	0.68	3	0.00019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl butyl ketone	20	130	0.00088	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl chloride	11	46	0.0049	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl ethyl ketone	2,700	19,000	0.12	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl isobutyl ketone	3,300	14,000	0.14	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Tertbutyl Ether	47	210	0.0032	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	35	320	0.0027	-	NA	< 0.24	0.023 J	< 0.25	NA	< 0.26	< 0.27	NA	0.11 JB	0.072 JB	NA	0.093 JB	0.099 JB
Naphthalene	3.8	17	0.00054	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	390	5,800	0.32	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ortho Xylene	65	280	0.019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
p-Chlorotoluene	160	2,300	0.024	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propylbenzene	380	2,400	0.12	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	780	12,000	0.59	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	600	3,500	0.13	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tert Butyl Alcohol	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
tert-Butylbenzene	780	12,000	0.16	-	NA	NA	NA	NA	NA	NA	NA	NA					

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PARCEL 83-P83-SS/SB/GW-10				PARCEL 83-SS/SB-11			PARCEL 83-SS/SB/GW-12			PARCEL 83-SS/SB-13		
Sample ID					P83-SB10-A	P83-SB10-B	P83-SB10-C	P83-SB10-D	P83-SB11-A	P83-SB11-B	P83-SB11-C	P83-SB12-A	P83-SB12-B	P83-SB12-C	P83-SB13-A	P83-SB13-B	P83-SB13-C
Sample Date					12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/18/2007	12/18/2007	12/18/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)																	
Aroclor-1016	0.41	5.1	0.013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.2	0.83	0.00008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.17	0.72	0.00008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.12	0.97	0.002	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	0.24	0.99	0.0055	-	< 0.004	NA	< 0.0039	< 0.0039	0.2	NA	< 0.0041	< 0.0039	NA	< 0.004	< 0.004	NA	< 0.0042
Aroclor-1268	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)																	
Aluminum	7,700	110,000	3,000	15,200	< 7040	NA	< 24600	< 15600	< 12700	NA	< 16800	< 7970	NA	< 19100	< 16000	NA	< 19100
Antimony	3.1	47	0.035	ND	2.64	NA	< 0.431	< 0.428	< 0.46	NA	< 0.46	< 0.434	NA	< 0.462	< 0.46	NA	< 0.433
Arsenic	0.68	3	0.0015	22.9	27.1	NA	9.81	11.9	8.96	NA	9.5	5.13	NA	8.73	12.8	NA	9.88
Barium	1,500	22,000	16	32.3	< 148	NA	< 54.1	< 27.2	< 44.8	NA	< 25.6	< 61.3	NA	< 45.6	< 53	NA	< 67.3
Beryllium	16	230	1.9	2	0.539	NA	1.73	1.38	1.18	NA	2.07	0.312	NA	1.6	1.27	NA	2.02
Cadmium	7.1	98	0.069	ND	1.08	NA	0.627	0.613	0.222	NA	0.353	< 0.467	NA	< 0.422	< 0.52	NA	< 0.716
Calcium	NLE	NLE	NLE	921	< 3210	NA	< 1140	< 486	< 1670	NA	< 2080	< 39400	NA	< 1750	< 2970	NA	< 2060
Chromium	12,000	180,000	4,000,000	269	< 41.8	NA	< 125	< 105	73.7	NA	156	21.5	NA	97.4	81.1	NA	149
Cobalt	2.3	35	0.027	2.5	4.96	NA	0.876	3.68	1.78	NA	1.82	1.44	NA	1.71	0.725	NA	1.78
Copper	310	4,700	2.8	8	< 244	NA	< 7.17	< 6.6	< 23.8	NA	< 6.77	< 44	NA	< 7.87	< 21.4	NA	< 13.1
Iron	5,500	82,000	35	55,800	24,600	NA	49,800	47,800	< 33300	NA	< 66600	< 14100	NA	< 45300	< 37200	NA	< 67000
Lead	400	800	14	19.5	401	NA	2.72	1.13	49.9	NA	0.754	63	NA	4.24	44.4	NA	62.8
Magnesium	NLE	NLE	NLE	7,230	< 1840	NA	< 6520	< 5170	< 3620	NA	< 7130	< 3730	NA	< 4950	< 4120	NA	< 7330
Manganese	180	2,600	2.8	90.7	< 53.1	NA	< 99.5	< 62.4	< 119	NA	< 35.3	177	NA	174	151	NA	89
Mercury	1.1	4.6	0.0033	ND	< 0.113	NA	< 0.104	< 0.108	< 0.121	NA	< 0.104	< 0.098	NA	< 0.116	< 0.107	NA	< 0.101
Nickel	150	2,200	2.6	8.4	< 13.3	NA	< 9.34	< 7.75	8.87	NA	7.65	12.7	NA	13.9	13.1	NA	9.41
Potassium	NLE	NLE	NLE	15,400	< 1800	NA	< 12600	< 11300	< 6720	NA	< 16100	1,210	NA	7,370	7,910	NA	16,500
Selenium	39	580	0.052	1.9	< 0.657	NA	< 0.637	< 0.632	< 0.679	NA	< 0.68	< 0.64	NA	< 0.683	< 0.679	NA	< 0.64
Sodium	NLE	NLE	NLE	51.6	< 68.8	NA	< 37.391	< 37.122	< 39.868	NA	< 39.898	< 37.577	NA	< 40.074	< 39.869	NA	< 37.554
Vanadium	39	580	8.6	94.1	27.4	NA	81.1	76.6	52.5	NA	81.8	32.8	NA	64	60.4	NA	88.5
Zinc	2,300	35,000	37	81.4	< 49.6	NA	< 51.2	< 47.9	< 82.2	NA	< 65.9	116	NA	66.7	97.5	NA	113

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dataset.

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PARCEL 83-SS/SB/GW-14				PARCEL 83-SS/SB-15			PARCEL 83-SS/SB-16			PARCEL 83-SS/SB/GW-17		
Sample ID					P83-SB14-A	P83-SB14-B	P83-SB14-C	P83-SB14-C DUP	P83-SB15-A	P83-SB15-B	P83-SB15-C	P83-SB16-A	P83-SB16-B	P83-SB16-C	P83-SB17-A	P83-SB17-B	P83-SB17-C
Sample Date					12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007
Volatile Organic Compounds (mg/kg)																	
1,1,1,2-Tetrachloroethane	2	8.8	0.00022	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	810	3,600	0.28	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	0.6	2.7	0.00003	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	0.15	0.63	0.000013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	3.6	16	0.00078	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	23	100	0.01	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	6.3	93	0.0021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichloropropane	0.0051	0.11	0.00000032	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	5.8	26	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	30	180	0.0081	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	0.0053	0.064	0.00000014	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	0.036	0.16	0.00000021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	180	930	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	0.46	2	0.000048	-	NA	< 0.3	< 0.37	< 0.33	NA	< 0.29	< 0.27	NA	< 0.31	< 0.29	NA	< 0.28	< 0.26
1,2-Dichloropropane	0.28	1.2	0.000047	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	27	150	0.0087	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichloropropane	160	2,300	0.013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	2.6	11	0.00046	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	160	2,300	0.023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	6,100	67,000	0.29	-	NA	0.2 J	< 0.37	< 0.33	NA	0.93	< 0.27	NA	1.2	< 0.29	NA	< 0.28	< 0.26
Benzene	1.2	5.1	0.00023	-	NA	< 0.3	< 0.37	< 0.33	NA	< 0.29	< 0.27	NA	< 0.31	< 0.29	NA	< 0.28	< 0.26
Bromobenzene	29	180	0.0042	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	15	63	0.0021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	0.29	1.3	0.000036	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	19	86	0.00087	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	77	350	0.024	-	NA	< 0.3	< 0.37	< 0.33	NA	0.039 J	< 0.27	NA	< 0.31	< 0.29	NA	< 0.28	< 0.26
Carbon tetrachloride	0.65	2.9	0.00018	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	28	130	0.0053	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorodibromomethane	8.3	39	0.00023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	1,400	5,700	0.59	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	0.32	1.4	0.000061	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,2-Dichloroethene	16	230	0.0011	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	8.7	37	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl benzene	5.8	25	0.0017	-	NA	< 0.3	< 0.37	< 0.33	NA	< 0.29	< 0.27	NA	< 0.31	< 0.29	NA	< 0.28	< 0.26
Hexachlorobutadiene	1.2	5.3	0.00027	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	190	990	0.074	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Meta/Para Xylene	55	240	0.019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl bromide	0.68	3	0.00019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl butyl ketone	20	130	0.00088	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl chloride	11	46	0.0049	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl ethyl ketone	2,700	19,000	0.12	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl isobutyl ketone	3,300	14,000	0.14	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Tertbutyl Ether	47	210	0.0032	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	35	320	0.0027	-	NA	< 0.3	< 0.37	< 0.33	NA	< 0.29	< 0.27	NA	< 0.31	< 0.29	NA	< 0.28	< 0.26
Naphthalene	3.8	17	0.00054	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	390	5,800	0.32	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ortho Xylene	65	280	0.019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
p-Chlorotoluene	160	2,300	0.024	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propylbenzene	380	2,400	0.12	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	780	12,000	0.59	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	600	3,500	0.13	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tert Butyl Alcohol	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
tert-Butylbenzene	780	12,000	0.16	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PARCEL 83-SB/SB/GW-14				PARCEL 83-SS/SB-15			PARCEL 83-SS/SB-16			PARCEL 83-SS/SB/GW-17		
Sample ID					P83-SB14-A	P83-SB14-B	P83-SB14-C	P83-SB14-C DUP	P83-SB15-A	P83-SB15-B	P83-SB15-C	P83-SB16-A	P83-SB16-B	P83-SB16-C	P83-SB17-A	P83-SB17-B	P83-SB17-C
Sample Date					12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)																	
Aroclor-1016	0.41	5.1	0.013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.2	0.83	0.00008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.17	0.72	0.00008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.12	0.97	0.002	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	0.24	0.99	0.0055	-	0.07	NA	< 0.004	< 0.0041	< 0.0041	NA	< 0.0041	< 0.0041	NA	< 0.0042	< 0.0041	NA	< 0.0039
Aroclor-1268	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)																	
Aluminum	7,700	110,000	3,000	15,200	< 6480	NA	< 19000	< 16900	< 8030	NA	< 19800	< 6520	NA	< 17000	< 17100	NA	< 9680
Antimony	3.1	47	0.035	ND	< 0.417	NA	< 0.458	< 0.433	< 0.436	NA	< 0.476	< 0.421	NA	< 0.451	< 0.443	NA	< 0.428
Arsenic	0.68	3	0.0015	22.9	5.22	NA	10.2	8.87	4.51	NA	14.3	4.17	NA	7.93	9.08	NA	8.88
Barium	1,500	22,000	16	32.3	< 23.8	NA	< 45.6	< 43.2	< 50.9	NA	< 32.5	< 50.7	NA	< 46.5	< 53.9	NA	< 19.5
Beryllium	16	230	1.9	2	0.295	NA	1.84	1.82	0.0474	NA	1.9	0.497	NA	1.52	1.88	NA	0.983
Cadmium	7.1	98	0.069	ND	0.207	NA	0.366	0.154	0.426	NA	0.377	0.276	NA	0.129	0.429	NA	0.118
Calcium	NLE	NLE	NLE	921	< 590	NA	< 1830	< 1960	< 5490	NA	< 1410	< 3300	NA	< 1020	< 1410	NA	< 326
Chromium	12,000	180,000	4,000,000	269	23.9	NA	138	130	203	NA	136	21.4	NA	107	124	NA	60.2
Cobalt	2.3	35	0.027	2.5	< 0.317	NA	1.97	2.64	1.5	NA	3.25	2.66	NA	1.99	3.24	NA	0.938
Copper	310	4,700	2.8	8	< 11.8	NA	< 13.6	< 16.8	< 39.9	NA	< 9.34	< 39.5	NA	< 7.24	< 8.35	NA	< 4.28
Iron	5,500	82,000	35	55,800	< 16700	NA	< 55600	52,500	< 25300	NA	< 64400	< 15700	NA	< 43300	< 52700	NA	< 35800
Lead	400	800	14	19.5	25.7	NA	9.67	12.5	15.5	NA	2.23	55.1	NA	1.51	10.3	NA	0.498
Magnesium	NLE	NLE	NLE	7,230	< 719	NA	< 6150	< 6030	< 2670	NA	< 6850	< 835	NA	< 5070	< 5740	NA	< 2320
Manganese	180	2,600	2.8	90.7	< 51.4	NA	< 126	< 158	< 1240	NA	< 87.2	< 51.7	NA	< 136	< 90.8	NA	< 83.6
Mercury	1.1	4.6	0.0033	ND	0.11	NA	< 0.108	< 0.111	< 0.116	NA	< 0.115	< 0.107	NA	< 0.115	< 0.104	NA	< 0.105
Nickel	150	2,200	2.6	8.4	4.51	NA	9.23	9.94	7.76	NA	11.1	12	NA	10.4	12.5	NA	5.82
Potassium	NLE	NLE	NLE	15,400	< 1210	NA	< 12900	< 12300	< 2400	NA	< 13300	< 1440	NA	< 9040	< 13000	NA	< 5190
Selenium	39	580	0.052	1.9	< 0.615	NA	< 0.677	< 0.639	< 0.644	NA	< 0.702	< 0.621	NA	< 0.666	< 0.655	NA	< 0.632
Sodium	NLE	NLE	NLE	51.6	< 36.115	NA	< 39.729	< 37.506	< 37.78	NA	< 41.224	< 36.446	NA	< 39.087	< 38.426	NA	< 37.117
Vanadium	39	580	8.6	94.1	30.9	NA	82.5	75.7	37.3	NA	64.6	39.4	NA	65.9	74.9	NA	60.9
Zinc	2,300	35,000	37	81.4	< 52	NA	< 79.2	< 81.8	< 173	NA	< 150	< 54.4	NA	< 63.5	< 83.3	NA	< 40.3

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole data

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PARCEL 83-SS/SB/GW-1				PARCEL 83-SS/SB-2			PARCEL 83-SS/SB/GW-3				PARCEL 83-SS/SB-4		
Sample ID					P83-SB1-A	P83-SB1-B	P83-SB1-C DUP	P83-SB1-C	P83-SB2-A	P83-SB2-B	P83-SB2-C	P83-SB3-A	P83-SB3-B	P83-SB3-C	P83-SB3-C DUP	P83-SB4-A	P83-SB4-B	P83-SB4-C
Sample Date					12/19/2007	12/19/2007	12/18/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007
Volatile Organic Compounds (mg/kg)																		
1,1,1,2-Tetrachloroethane	2	8.8	0.00022	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	810	3,600	0.28	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	0.6	2.7	0.00003	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	0.15	0.63	0.000013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	3.6	16	0.00078	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	23	100	0.01	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	6.3	93	0.0021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichloropropane	0.0051	0.11	0.00000032	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	5.8	26	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	30	180	0.0081	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	0.0053	0.064	0.00000014	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	0.036	0.16	0.00000021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	180	930	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	0.46	2	0.000048	-	NA	< 0.25	< 0.3	< 0.27	NA	< 0.25	< 0.28	NA	< 0.25	< 0.26	< 0.27	NA	< 0.25	< 0.28
1,2-Dichloropropane	0.28	1.2	0.000047	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	27	150	0.0087	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichloropropane	160	2,300	0.013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	2.6	11	0.00046	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	160	2,300	0.023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	6,100	67,000	0.29	-	NA	0.71	1	< 0.27	NA	< 0.25	< 0.28	NA	< 3.2	< 3.3	< 3.1	NA	< 3	< 3.8
Benzene	1.2	5.1	0.00023	-	NA	< 0.25	< 0.3	< 0.27	NA	< 0.25	< 0.28	NA	< 0.25	< 0.26	< 0.27	NA	< 0.25	< 0.28
Bromobenzene	29	180	0.0042	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	15	63	0.0021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	0.29	1.3	0.000036	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	19	86	0.00087	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	77	350	0.024	-	NA	< 0.25	< 0.3	< 0.27	NA	< 0.25	< 0.28	NA	< 0.25	< 0.26	< 0.27	NA	< 0.25	< 0.28
Carbon tetrachloride	0.65	2.9	0.00018	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	28	130	0.0053	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorodibromomethane	8.3	39	0.00023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	1,400	5,700	0.59	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	0.32	1.4	0.000061	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,2-Dichloroethene	16	230	0.0011	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	8.7	37	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl benzene	5.8	25	0.0017	-	NA	< 0.25	< 0.3	< 0.27	NA	< 0.25	< 0.28	NA	< 0.25	0.036 J	< 0.27	NA	0.028 J	< 0.28
Hexachlorobutadiene	1.2	5.3	0.00027	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	190	990	0.074	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Meta/Para Xylene	55	240	0.019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl bromide	0.68	3	0.00019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl butyl ketone	20	130	0.00088	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl chloride	11	46	0.0049	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl ethyl ketone	2,700	19,000	0.12	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl isobutyl ketone	3,300	14,000	0.14	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Tertbutyl Ether	47	210	0.0032	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	35	320	0.0027	-	NA	< 0.25	< 0.3	< 0.27	NA	< 0.25	< 0.28	NA	0.073 JB	0.077 JB	0.089 JB	NA	0.056 JB	0.068 JB
Naphthalene	3.8	17	0.00054	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	390	5,800	0.32	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ortho Xylene	65	280	0.019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
p-Chlorotoluene	160	2,300	0.024	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propylbenzene	380	2,400	0.12	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	780	12,000	0.59	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	600	3,500	0.13	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tert Butyl Alcohol	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
tert-Butylbenzene	780	12,000	0.16	-	NA	NA	NA	NA	NA									

Table 2
SOIL SAMPLING RESULTS - COMPARISION TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PARCEL 83-SS/SB/GW-1				PARCEL 83-SS/SB-2			PARCEL 83-SS/SB/GW-3				PARCEL 83-SS/SB-4		
Sample ID					P83-SB1-A	P83-SB1-B	P83-SB1-C DUP	P83-SB1-C	P83-SB2-A	P83-SB2-B	P83-SB2-C	P83-SB3-A	P83-SB3-B	P83-SB3-C	P83-SB3-C DUP	P83-SB4-A	P83-SB4-B	P83-SB4-C
Sample Date					12/19/2007	12/19/2007	12/18/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)																		
Aroclor-1016	0.41	5.1	0.013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.2	0.83	0.00008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.17	0.72	0.00008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.12	0.97	0.002	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	0.24	0.99	0.0055	-	< 0.004	NA	< 0.0041	< 0.0042	< 0.004	NA	< 0.004	< 0.004	NA	< 0.0041	< 0.004	< 0.004	NA	< 0.0041
Aroclor-1268	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)																		
Aluminum	7,700	110,000	3,000	15,200	< 8360	NA	< 15000	< 15000	< 5530	NA	< 13600	< 9120	NA	< 13800	< 12400	< 10700	NA	< 16900
Antimony	3.1	47	0.035	ND	< 0.434	NA	< 0.48	< 0.448	< 0.472	NA	< 0.498	< 0.422	NA	< 0.476	< 0.468	< 0.49	NA	< 0.459
Arsenic	0.68	3	0.0015	22.9	3.07	NA	10.2	10.2	3.13	NA	11.4	5.09	NA	8.03	7.93	11.6	NA	9.24
Barium	1,500	22,000	16	32.3	< 16.6	NA	< 22.6	< 24.1	< 9.06	NA	< 22.2	< 20.5	NA	< 43.3	< 38	< 33.1	NA	< 53.1
Beryllium	16	230	1.9	2	0.228	NA	2.1	2.06	0.191	NA	1.74	0.379	NA	1.4	1.22	0.647	NA	1.44
Cadmium	7.1	98	0.069	ND	0.105	NA	0.25	0.312	< 0.045	NA	0.0789	< 0.196	NA	< 0.37	< 0.352	< 0.307	NA	< 0.384
Calcium	NLE	NLE	NLE	921	< 471	NA	< 430	< 407	< 289	NA	< 544	< 335	NA	< 1710	< 1320	< 2250	NA	< 2280
Chromium	12,000	180,000	4,000,000	269	23.6	NA	156	157	22	NA	136	91.9	NA	78.3	71.8	37.9	NA	89.6
Cobalt	2.3	35	0.027	2.5	0.849	NA	1.88	1.57	< 0.359	NA	1.68	< 0.321	NA	0.51	0.507	1.31	NA	< 0.35
Copper	310	4,700	2.8	8	< 5.95	NA	< 7.27	< 6.43	< 6.04	NA	< 5.92	< 5.86	NA	< 8.57	< 8.44	< 14.9	NA	< 11.7
Iron	5,500	82,000	35	55,800	< 10400	NA	< 61800	< 59600	10,700	NA	52,700	< 17300	NA	< 35900	< 32000	< 24400	NA	< 37300
Lead	400	800	14	19.5	5.57	NA	< 0.389	< 0.363	4.18	NA	< 0.403	3.57	NA	11.8	12.2	35.2	NA	8.74
Magnesium	NLE	NLE	NLE	7,230	< 626	NA	< 7030	< 6800	537	NA	5,730	< 1080	NA	< 4100	< 3690	< 1950	NA	< 4490
Manganese	180	2,600	2.8	90.7	< 39.2	NA	< 52.7	< 50.5	< 29.8	NA	< 51.9	23.3	NA	66.8	59.6	90.8	NA	75.5
Mercury	1.1	4.6	0.0033	ND	< 0.103	NA	< 0.112	< 0.117	< 0.118	NA	< 0.112	< 0.095	NA	< 0.104	< 0.105	< 0.107	NA	< 0.105
Nickel	150	2,200	2.6	8.4	3.7	NA	7.65	7.32	3.09	NA	6.57	11.6	NA	9.17	11.3	9.44	NA	9.56
Potassium	NLE	NLE	NLE	15,400	< 1190	NA	< 16900	< 16700	< 844	NA	< 13000	2,200	NA	7,860	6,830	2,650	NA	8,740
Selenium	39	580	0.052	1.9	< 0.641	NA	< 0.709	< 0.662	< 0.696	NA	< 0.735	< 0.623	NA	< 0.703	< 0.691	< 0.723	NA	< 0.677
Sodium	NLE	NLE	NLE	51.6	< 37.606	NA	< 41.602	< 38.884	< 40.873	NA	< 43.13	< 62	NA	< 475	< 581	< 42.434	NA	< 39.769
Vanadium	39	580	8.6	94.1	26.2	NA	82.7	84.8	21.8	NA	74.8	42.8	NA	51.8	47.1	46.9	NA	58.5
Zinc	2,300	35,000	37	81.4	< 14.3	NA	< 66	< 65	< 24	NA	< 50.2	37.8	NA	47.5	59.6	59.1	NA	56.4

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole data

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PARCEL 83-SS/SB/GW-5			PARCEL 83-SS/SB-6			PARCEL 83-SS/SB/GW-7			PARCEL 83-SS/SB/GW-8			PARCEL 83-SS/SB-9		
Sample ID					P83-SB5-A	P83-SB5-B	P83-SB5-C	P83-SB6-A	P83-SB6-B	P83-SB6-C	P83-SB7-A	P83-SB7-B	P83-SB7-C	P83-SB8-A	P83-SB8-B	P83-SB8-C	P83-SB9-A	P83-SB9-B	P83-SB9-C
Sample Date					12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/19/2007	12/19/2007	12/19/2007	12/17/2007	12/17/2007	12/17/2007
Volatile Organic Compounds (mg/kg)																			
1,1,1,2-Tetrachloroethane	2	8.8	0.00022	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	810	3,600	0.28	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	0.6	2.7	0.00003	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	0.15	0.63	0.000013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	3.6	16	0.00078	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	23	100	0.01	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	6.3	93	0.0021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichloropropane	0.0051	0.11	0.00000032	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	5.8	26	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	30	180	0.0081	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	0.0053	0.064	0.00000014	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	0.036	0.16	0.00000021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	180	930	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	0.46	2	0.000048	-	NA	< 0.32	< 0.29	NA	< 0.25	< 0.27	NA	< 0.24	< 0.27	NA	0.33	< 0.29	NA	< 0.39	< 0.26
1,2-Dichloropropane	0.28	1.2	0.000047	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	27	150	0.0087	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichloropropane	160	2,300	0.013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	2.6	11	0.00046	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	160	2,300	0.023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	6,100	67,000	0.29	-	NA	0.11 J	0.11 J	NA	0.076 J	< 0.27	NA	0.15 J	0.18 J	NA	< 0.3	< 0.29	NA	< 5	< 4.3
Benzene	1.2	5.1	0.00023	-	NA	< 0.32	< 0.29	NA	< 0.25	< 0.27	NA	< 0.24	< 0.27	NA	< 0.3	< 0.29	NA	< 0.39	< 0.26
Bromobenzene	29	180	0.0042	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	15	63	0.0021	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	0.29	1.3	0.000036	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	19	86	0.00087	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	77	350	0.024	-	NA	< 0.32	< 0.29	NA	< 0.25	< 0.27	NA	< 0.24	< 0.27	NA	0.098 J	< 0.29	NA	< 0.39	< 0.26
Carbon tetrachloride	0.65	2.9	0.00018	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	28	130	0.0053	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorodibromomethane	8.3	39	0.00023	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	1,400	5,700	0.59	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	0.32	1.4	0.000061	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,2-Dichloroethene	16	230	0.0011	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	8.7	37	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl benzene	5.8	25	0.0017	-	NA	< 0.32	< 0.29	NA	< 0.25	< 0.27	NA	< 0.24	< 0.27	NA	< 0.3	< 0.29	NA	< 0.39	< 0.26
Hexachlorobutadiene	1.2	5.3	0.00027	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	190	990	0.074	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Meta/Para Xylene	55	240	0.019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl bromide	0.68	3	0.00019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl butyl ketone	20	130	0.00088	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl chloride	11	46	0.0049	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl ethyl ketone	2,700	19,000	0.12	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl isobutyl ketone	3,300	14,000	0.14	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Tertbutyl Ether	47	210	0.0032	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	35	320	0.0027	-	NA	< 0.32	< 0.29	NA	< 0.25	< 0.27	NA	< 0.24	< 0.27	NA	< 0.3	< 0.29	NA	0.12 JB	0.055 JB
Naphthalene	3.8	17	0.00054	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	390	5,800	0.32	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ortho Xylene	65	280	0.019	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
p-Chlorotoluene	160	2,300	0.024	-	NA	NA	NA												

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PARCEL 83-SS/SB/GW-5			PARCEL 83-SS/SB-6			PARCEL 83-SS/SB/GW-7			PARCEL 83-SS/SB/GW-8			PARCEL 83-SS/SB-9		
Sample ID					P83-SB5-A	P83-SB5-B	P83-SB5-C	P83-SB6-A	P83-SB6-B	P83-SB6-C	P83-SB7-A	P83-SB7-B	P83-SB7-C	P83-SB8-A	P83-SB8-B	P83-SB8-C	P83-SB9-A	P83-SB9-B	P83-SB9-C
Sample Date					12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/19/2007	12/19/2007	12/19/2007	12/17/2007	12/17/2007	12/17/2007
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)																			
Aroclor-1016	0.41	5.1	0.013	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.2	0.83	0.00008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.17	0.72	0.00008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.12	0.97	0.002	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	0.24	0.99	0.0055	-	< 0.0041	NA	< 0.0041	< 0.0041	NA	< 0.0041	< 0.0041	NA	< 0.0041	< 0.004	NA	< 0.0042	< 0.004	NA	< 0.0041
Aroclor-1268	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)																			
Aluminum	7,700	110,000	3,000	15,200	< 9970	NA	< 12100	< 5070	NA	< 12900	< 5250	NA	< 10800	< 9520	NA	< 18700	< 17500	NA	< 9100
Antimony	3.1	47	0.035	ND	< 0.418	NA	< 0.467	1.85	NA	< 0.492	< 0.472	NA	< 0.479	< 0.414	NA	< 0.453	8.42	NA	< 0.419
Arsenic	0.68	3	0.0015	22.9	5.85	NA	8.74	5.65	NA	7.41	4.4	NA	8.94	6.18	NA	10	27.6	NA	6.09
Barium	1,500	22,000	16	32.3	< 23.3	NA	< 41.3	< 78	NA	< 44.8	< 19.4	NA	< 33.1	< 21.7	NA	< 38.6	< 357	NA	< 45.2
Beryllium	16	230	1.9	2	1.27	NA	1.12	0.442	NA	0.96	0.397	NA	0.94	0.44	NA	1.52	1.38	NA	0.498
Cadmium	7.1	98	0.069	ND	0.216	NA	0.113	0.335	NA	0.0591	0.152	NA	0.0948	0.403	NA	0.287	< 0.896	NA	< 0.344
Calcium	NLE	NLE	NLE	921	< 1460	NA	< 1360	< 1550	NA	< 1090	< 1650	NA	< 2320	< 1050	NA	< 1330	< 16300	NA	< 5990
Chromium	12,000	180,000	4,000,000	269	99.9	NA	61.4	20.9	NA	54.1	33.4	NA	94.9	53.7	NA	104	55.6	NA	33.6
Cobalt	2.3	35	0.027	2.5	1.82	NA	0.596	3.33	NA	0.629	< 0.359	NA	0.364	1.98	NA	1.17	7.35	NA	0.985
Copper	310	4,700	2.8	8	< 21.1	NA	< 8.76	< 118	NA	< 6.65	< 11	NA	< 27	< 29.3	NA	< 9.52	< 1370	NA	< 12.6
Iron	5,500	82,000	35	55,800	< 37700	NA	< 27100	< 17900	NA	< 21800	< 13000	NA	< 27800	17,400	NA	51,100	< 36600	NA	< 17300
Lead	400	800	14	19.5	20.5	NA	15.5	103	NA	14.4	16	NA	27.7	44.1	NA	4.15	1,300	NA	14.4
Magnesium	NLE	NLE	NLE	7,230	< 4110	NA	< 3030	< 775	NA	< 2480	< 1290	NA	< 3900	1,270	NA	4,990	< 3310	NA	< 3270
Manganese	180	2,600	2.8	90.7	< 51.5	NA	< 142	< 69.5	NA	69.5	< 60.6	NA	< 48.1	< 42.4	NA	< 104	230	NA	113
Mercury	1.1	4.6	0.0033	ND	< 0.113	NA	< 0.115	0.16	NA	< 0.11	< 0.118	NA	< 0.111	< 0.097	NA	< 0.107	< 0.11	NA	< 0.097
Nickel	150	2,200	2.6	8.4	6.91	NA	6.2	11.9	NA	7.61	3.59	NA	5.86	5.91	NA	8.19	31	NA	9.42
Potassium	NLE	NLE	NLE	15,400	< 9390	NA	< 4910	< 1300	NA	< 3280	< 2320	NA	< 6910	< 2400	NA	< 12900	3,260	NA	2,100
Selenium	39	580	0.052	1.9	< 0.617	NA	< 0.689	< 0.636	NA	< 0.727	< 0.696	NA	< 0.707	< 0.611	NA	< 0.669	< 1.32	NA	< 0.619
Sodium	NLE	NLE	NLE	51.6	< 36,221	NA	< 40,462	< 37,365	NA	< 306	< 40,873	NA	< 41,505	< 35,851	NA	< 39,303	< 35,868	NA	< 36.33
Vanadium	39	580	8.6	94.1	61.1	NA	41.9	21.9	NA	39.2	23.6	NA	54.2	47.8	NA	71.3	53.8	NA	36.9
Zinc	2,300	35,000	37	81.4	< 107	NA	< 47.5	< 63.2	NA	< 43.7	< 45.7	NA	< 61.3	< 58.2	NA	< 51.1	393	NA	38.9

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole data

Table 2
SOIL SAMPLING RESULTS - COMPARISON TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PARCEL 83-P83-SS18	PARCEL 83-P83-SS19	PARCEL 83-P83-SS20	PAR-83-482-SB-01		
Sample ID					P83-SS18	P83-SS19	P83-SS20	PAR-83-482-SB-01-0.5-1	PAR-83-482-SB-01-1.5-2	PAR-83-482-SB-01-7.5-8
Sample Date					12/18/2007	12/18/2007	12/18/2007	11/13/2017	11/13/2017	11/13/2017
Volatile Organic Compounds (mg/kg)										
1,1,1,2-Tetrachloroethane	2	8.8	0.00022	-	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	810	3,600	0.28	-	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	0.6	2.7	0.0003	-	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	0.15	0.63	0.000013	-	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	3.6	16	0.00078	-	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	23	100	0.01	-	NA	NA	NA	NA	NA	NA
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	6.3	93	0.0021	-	NA	NA	NA	NA	NA	NA
1,2,3-Trichloropropane	0.0051	0.11	0.00000032	-	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	5.8	26	0.0012	-	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	30	180	0.0081	-	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	0.0053	0.064	0.00000014	-	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	0.036	0.16	0.0000021	-	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	180	930	0.03	-	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	0.46	2	0.000048	-	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	0.28	1.2	0.000047	-	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	27	150	0.0087	-	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA
1,3-Dichloropropane	160	2,300	0.013	-	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	2.6	11	0.00046	-	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	160	2,300	0.023	-	NA	NA	NA	NA	NA	NA
Acetone	6,100	67,000	0.29	-	NA	NA	NA	NA	NA	NA
Benzene	1.2	5.1	0.00023	-	NA	NA	NA	NA	NA	NA
Bromobenzene	29	180	0.0042	-	NA	NA	NA	NA	NA	NA
Bromochloromethane	15	63	0.0021	-	NA	NA	NA	NA	NA	NA
Bromodichloromethane	0.29	1.3	0.000036	-	NA	NA	NA	NA	NA	NA
Bromoform	19	86	0.00087	-	NA	NA	NA	NA	NA	NA
Carbon disulfide	77	350	0.024	-	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	0.65	2.9	0.00018	-	NA	NA	NA	NA	NA	NA
Chlorobenzene	28	130	0.0053	-	NA	NA	NA	NA	NA	NA
Chlorodibromomethane	8.3	39	0.00023	-	NA	NA	NA	NA	NA	NA
Chloroethane	1,400	5,700	0.59	-	NA	NA	NA	NA	NA	NA
Chloroform	0.32	1.4	0.000061	-	NA	NA	NA	NA	NA	NA
Cis-1,2-Dichloroethene	16	230	0.0011	-	NA	NA	NA	NA	NA	NA
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	8.7	37	0.03	-	NA	NA	NA	NA	NA	NA
Ethyl benzene	5.8	25	0.0017	-	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	1.2	5.3	0.00027	-	NA	NA	NA	NA	NA	NA
Isopropylbenzene	190	990	0.074	-	NA	NA	NA	NA	NA	NA
Metal/Para Xylene	55	240	0.019	-	NA	NA	NA	NA	NA	NA
Methyl bromide	0.68	3	0.00019	-	NA	NA	NA	NA	NA	NA
Methyl butyl ketone	20	130	0.00088	-	NA	NA	NA	NA	NA	NA
Methyl chloride	11	46	0.0049	-	NA	NA	NA	NA	NA	NA
Methyl ethyl ketone	2,700	19,000	0.12	-	NA	NA	NA	NA	NA	NA
Methyl isobutyl ketone	3,300	14,000	0.14	-	NA	NA	NA	NA	NA	NA
Methyl Tertbutyl Ether	47	210	0.0032	-	NA	NA	NA	NA	NA	NA
Methylene chloride	35	320	0.0027	-	NA	NA	NA	NA	NA	NA
Naphthalene	3.8	17	0.00054	-	NA	NA	NA	NA	NA	NA
n-Butylbenzene	390	5,800	0.32	-	NA	NA	NA	NA	NA	NA
Ortho Xylene	65	280	0.019	-	NA	NA	NA	NA	NA	NA
p-Chlorotoluene	160	2,300	0.024	-	NA	NA	NA	NA	NA	NA
Propylbenzene	380	2,400	0.12	-	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	780	12,000	0.59	-	NA	NA	NA	NA	NA	NA
Styrene	600	3,500	0.13	-	NA	NA	NA	NA	NA	NA
Tert Butyl Alcohol	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA
tert-Butylbenzene	780	12,000	0.16	-	NA	NA	NA	NA	NA	NA
Tetrachloroethene	8.1	39	0.0018	-	NA	NA	NA	NA	NA	NA
Toluene	490	4,700	0.076	-	NA	NA	NA	NA	NA	NA
Total Xylenes	58	250	0.019	-	NA	NA	NA	NA	NA	NA
Trans-1,2-Dichloroethene	160	2,300	0.011	-	NA	NA	NA	NA	NA	NA
Trans-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA
Trichloroethene	0.41	1.9	0.0001	-	NA	NA	NA	NA	NA	NA
Trichlorofluoromethane	2,300	35,000	0.33	-	NA	NA	NA	NA	NA	NA
Vinyl chloride	0.059	1.7	0.0000065	-	NA	NA	NA	NA	NA	NA
TIC VOCs (mg/kg)										
Total TICs	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (mg/kg)										
1-Methylnaphthalene	18	73	0.006	-	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	24	300	0.019	-	NA	NA	NA	NA	NA	NA
4-Chloroaniline	2.7	11	0.00016	-	NA	NA	NA	NA	NA	NA
Acenaphthene	360	4,500	0.55	-	NA	NA	NA	< 0.073	0.84	< 0.082
Acenaphthylene	NLE	NLE	NLE	-	NA	NA	NA	< 0.073	< 0.078	< 0.082
Anthracene	1,800	23,000	5.8	-	NA	NA	NA	< 0.073	< 0.078	< 0.082
Benzo(a)anthracene	1.1	21	0.011	-	NA	NA	NA	< 0.073	< 0.078	< 0.082
Benzo(a)pyrene	0.11	2.1	0.029	-	NA	NA	NA	< 0.073	< 0.078	< 0.082
Benzo(b)fluoranthene	1.1	21	0.3	-	NA	NA	NA	0.0082 J	< 0.078	< 0.082
Benzo(ghi)perylene	NLE	NLE	NLE	-	NA	NA	NA	< 0.073	< 0.078	< 0.082
Benzo(k)fluoranthene	11	210	2.9	-	NA	NA	NA	< 0.073	< 0.078	< 0.082
Bis(2-Chloroethyl)ether	0.23	1	0.0000036	-	NA	NA	NA	NA	NA	NA
Bis(2-Ethylhexyl)phthalate	39	160	1.3	-	NA	NA	NA	NA	NA	NA
Butyl benzyl phthalate	290	1,200	0.24	-	NA	NA	NA	NA	NA	NA
Chrysene	110	2,100	9	-	NA	NA	NA	< 0.073	< 0.078	< 0.082
Dibenz(a,h)anthracene	0.11	2.1	0.096	-	NA	NA	NA	< 0.073	< 0.078	< 0.082
Dibenzofuran	7.3	100	0.015	-	NA	NA	NA	NA	NA	NA
Dibethyl phthalate	5,100	66,000	0.61	-	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	630	8,200	0.23	-	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	63	820	5.7	-	NA	NA	NA	NA	NA	NA
Fluoranthene	240	3,000	8.9	-	NA	NA	NA	< 0.073	< 0.078	< 0.082
Fluorene	240	3,000	0.54	-	NA	NA	NA	< 0.073	1.2	< 0.082
Indeno(1,2,3-cd)pyrene	1.1	21	0.98	-	NA	NA	NA	< 0.073	< 0.078	< 0.082
Naphthalene	3.8	17	0.00054	-	NA	NA	NA	< 0.073	0.092 J	< 0.082
Phenanthrene	NLE	NLE	NLE	-	NA	NA	NA	< 0.073	2.3	< 0.082
Pyrene	180	2,300	1.3	-	NA	NA	NA	< 0.073	0.19	< 0.082
Total Petroleum Hydrocarbons (mg/kg)										
Total Petroleum Hydrocarbons	NLE	NLE	NLE	-	181	111	117	NA	NA	NA
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)										
C10-C12 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA
C12-C16 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA
C12-C16 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA
C16-C21 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA

Table 2
SOIL SAMPLING RESULTS - COMPARISION TO USEPA REGIONAL SCREENING LEVELS
Parcel 83 - Fort Monmouth, New Jersey

Loc ID	2017-06 RSL Residential Soil (HQ=0.1)	2017-06 RSL Industrial Soil (HQ=0.1)	2017-06 RSL Protect GW Risk-Based (HQ=0.1)	Weston 1995 Background (Main Post)	PARCEL 83-P83-SS18	PARCEL 83-P83-SS19	PARCEL 83-P83-SS20	PAR-83-482-SB-01		
Sample ID					P83-SS18	P83-SS19	P83-SS20	PAR-83-482-SB-01-0.5-1	PAR-83-482-SB-01-1.5-2	PAR-83-482-SB-01-7.5-8
Sample Date					12/18/2007	12/18/2007	12/18/2007	11/13/2017	11/13/2017	11/13/2017
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	19.8	2,410	0.55 J
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)										
Aroclor-1016	0.41	5.1	0.013	-	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.2	0.83	0.00008	-	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.17	0.72	0.00008	-	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.23	0.95	0.0012	-	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.12	0.97	0.002	-	NA	NA	NA	NA	NA	NA
Aroclor-1260	0.24	0.99	0.0055	-	NA	NA	NA	NA	NA	NA
Aroclor-1268	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)										
Aluminum	7,700	110,000	3,000	15,200	NA	NA	NA	NA	NA	NA
Antimony	3.1	47	0.035	ND	NA	NA	NA	NA	NA	NA
Arsenic	0.68	3	0.0015	22.9	NA	NA	NA	4.8	6.1	9.3
Barium	1,500	22,000	16	32.3	NA	NA	NA	NA	NA	NA
Beryllium	16	230	1.9	2	NA	NA	NA	NA	NA	NA
Cadmium	7.1	98	0.069	ND	NA	NA	NA	NA	NA	NA
Calcium	NLE	NLE	NLE	921	NA	NA	NA	NA	NA	NA
Chromium	12,000	180,000	4,000,000	269	NA	NA	NA	NA	NA	NA
Cobalt	2.3	35	0.027	2.5	NA	NA	NA	NA	NA	NA
Copper	310	4,700	2.8	8	NA	NA	NA	NA	NA	NA
Iron	5,500	82,000	35	55,800	NA	NA	NA	NA	NA	NA
Lead	400	800	14	19.5	NA	NA	NA	NA	NA	NA
Magnesium	NLE	NLE	NLE	7,230	NA	NA	NA	NA	NA	NA
Manganese	180	2,600	2.8	90.7	NA	NA	NA	NA	NA	NA
Mercury	1.1	4.6	0.0033	ND	NA	NA	NA	NA	NA	NA
Nickel	150	2,200	2.6	8.4	NA	NA	NA	NA	NA	NA
Potassium	NLE	NLE	NLE	15,400	NA	NA	NA	NA	NA	NA
Selenium	39	580	0.052	1.9	NA	NA	NA	NA	NA	NA
Sodium	NLE	NLE	NLE	51.6	NA	NA	NA	NA	NA	NA
Vanadium	39	580	8.6	94.1	NA	NA	NA	NA	NA	NA
Zinc	2,300	35,000	37	81.4	NA	NA	NA	NA	NA	NA

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole data

Footnote:

- 1) All historical data collected prior to 2013 are reported as provided by others.
- 2) Number of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.
- 3) NLE = no limit established.
- 4) ND = not detected in any background sample, no background concentration available.
- 5) Bold chemical detection
- 6) SS = Site Specific action level, see "Specific Chemical Class (or Parameter)" footnote for details.

7) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) during the data validation.

[blank] = detect, i.e. detected chemical result value.	E (or ER) = Estimated result.
B =non-detect, i.e. not detected at or above this value.	D = Results from dilution of sample.
R = Rejected, data validation rejected the results.	J-DL = Elevated sample detection limit due to difficult sample matrix.
U = non-detect, i.e. not detected at or above this value.	JN = Tentatively identified compound, estimated concentration.
U-DL = Elevated sample detection limit due to difficult sample matrix.	UJ=The compound was not detected: however, the results is estimated because of discrepancies in meeting certain analyte-specific QC criteria.
U-ND = Analyte not detected in sample, but no detection or reporting limit provided.	J+ = The result is an estimated quantity, but the result may be biased high.
J = estimated detected value due to a concetration below the reporting limit or due to discrepancies in meeting certain analyte-specific quality control.	J- = The result is an estimated quantity, but the result may be biased low.

8) Specific Chemical Classes (or Parameters) comments or notes regarding how data is displayed, compared to Action Levels, or represented in this table.

a) DELETE THIS NOTE BEFORE GOING FINAL: Refer to the NJDEP Protocol for Addressing Extractable Petroleum Hydrocarbons (Version 5.0, August 9, 2010) and the NJDEP Health Based end Ecological Screening Criteria for Petroleum Hydrocarbons (Version 4.0, August 9, 2010) to determine the category of tank being investigated and the appropriate cleanup standards or screening levels for that category of tank.

9) Chemical results greater than or equal to the action level (depending on criteria) are highlighted based on the Criteria that are present.

- Cell Shade values represent a result that is above the USEPA 2017-06 RSL Residential Soil (HQ=0.1).
- Cell Shade values represent a result that is above the USEPA 2017-06 RSL Industrial Soil (HQ=0.1).
- Cell Shade values represent a result that is above the USEPA 2017-06 RSL Protect GW Risk-Based (HQ=0.1).
- Cell Style values represent a result that is above the Weston 1995 Background (Main Post).
- n/a = all concentrations were less than the detection limit, therefore, no location of maximum value identified.
- Dash (-) = only background concentrations for metals are being used as comparison criteria.
- Cell Shade values represent a result that is above both the USEPA RSL Residential and Industrial Soil (HQ=0.1), 2017-06.
- Cell Shade values represent a result that is above the USEPA RSL Residential, Industrial, Protect GW Risk-Based Soil (HQ=0.1), 2017-06.

####
###
###
###

###
###

10) Criteria action level source document and web address.

- The 2017-06 USEPA RSL Residential Soil (HQ=0.1) refers to the EPA's Regional Screening Levels (HQ=0.1)
<https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-november-2017>
- The 2017-06 USEPA RSL Industrial Soil (HQ=0.1) refers to the EPA's Regional Screening Levels (HQ=0.1)
<https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-november-2017>
- The 2017-06 USEPA RSL Protect GW Risk-Based (HQ=0.1) refers to the EPA's Regional Screening Levels (HQ=0.1)
<https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-november-2017>
- The Weston 1995 Background (Main Post) refers to the FTMM reports.

NA

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non-Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PAR-83-SB-01				PAR-83-SB-02				PAR-83-SB-03			PAR-83-SB-04			PAR-83-SB-05			
					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	
					PAR-83-SB-01-0.5-1 4/4/2016	PAR-83-SB-101-0.5-1 4/4/2016	PAR-83-SB-01-2.2-5 4/4/2016	PAR-83-SB-01-10.25-1.75 4/4/2016	PAR-83-SB-02-1-1.5 4/4/2016	PAR-83-SB-02-1.5-2 4/4/2016	PAR-83-SB-102-1.5-2 4/4/2016	PAR-83-SB-02-2-2.5 4/4/2016	PAR-83-SB-03-1-1.5 4/4/2016	PAR-83-SB-03-1.5-2 4/4/2016	PAR-83-SB-03-2-2.5 4/4/2016	PAR-83-SB-04-0.5-1 4/4/2016	PAR-83-SB-04-1.25-1.75 4/4/2016	PAR-83-SB-04-2-2.5 4/4/2016	PAR-83-SB-05-0.75-1.25 4/4/2016	PAR-83-SB-05-1.75-2.2 4/4/2016	PAR-83-SB-05-2.5-3 4/4/2016	
Sample ID	Sample Date	Volatile Organic Compounds (mg/kg)																				
1.1.1.2-Tetrachloroethane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1.1.1-Trichloroethane	160,000	NLE	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1.1.2.2-Tetrachloroethane	3	3	0.007	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1.1.2-Trichloroethane	2	6	0.02	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1.1-Dichloroethane	8	24	0.2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1.1-Dichloroethene	11	150	0.008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1.1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1.2.3-Trichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1.2.3-Trichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1.2.4-Trichlorobenzene	73	820	0.7	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1.2.4-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1.2-Dibromo-3-chloropropane	0.08	0.2	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1.2-Dibromoethane	0.008	0.04	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1.2-Dichlorobenzene	5,300	59,000	17	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1.2-Dichloroethane	0.9	3	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1.2-Dichloropropane	2	5	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1.3.5-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1.3-Dichlorobenzene	5,300	59,000	19	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1.3-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1.4-Dichlorobenzene	5	13	2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2.2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	70,000	NLE	19	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	2	5	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	1	3	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodiform	81	280	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	7,800	110,000	6	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	2	4	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	510	7,400	0.6	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorodibromomethane	3	8	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	220	1,100	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	0.6	2	0.4	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,2-Dichloroethene	230	560	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	490	230,000	39	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl benzene	7,800	110,000	13	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	6	25	0.9	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Meta/Para Xylene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl bromide	25	59	0.04	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl butyl ketone	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl chloride	4	12	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl ethyl ketone	3,100	44,000	0.9	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl isobutyl ketone	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Tertbutyl Ether	110	320	0.2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	46	230	0.01	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	6	17	25	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ortho Xylene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
p-Chlorotoluene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	90	260	3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tert Butyl Alcohol	1,400	11,000	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
tert-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	43	1,500	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	6,300	91,000	7	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Xylenes	12,000	170,000	19	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trans-1,2-Dichloroethene	300	720	0.6	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trans-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	3	10	0.01	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichlorofluoromethane	23,000	340,000	34	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	0.7	2	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TIC VOCs (mg/kg)																						
1.1.3-Trimethylcyclohexane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Diethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1-Methylnaphthalene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methyl-3-phenyl-1-propene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	230	2,400	8	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methyltetralin	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,7-Dimethylindan	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6,7-Dimethyltetralin	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6-Methyltetraline	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetaldehyde	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene, 1,2,4,5-tetramethyl-	NLE	NLE	NLE	-	NA	NA	NA															

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non-Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PAR-83-SB-01				PAR-83-SB-02				PAR-83-SB-03			PAR-83-SB-04			PAR-83-SB-05		
Sample ID	Contact SRS	Contact SRS	Level		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	
Sample Date					PAR-83-SB-01-0.5-1	PAR-83-SB-101-0.5-1	PAR-83-SB-01-2-2.5	PAR-83-SB-01-10.25-1.75	PAR-83-SB-02-1-1.5	PAR-83-SB-02-1.5-2	PAR-83-SB-102-1.5-2	PAR-83-SB-02-2-2.5	PAR-83-SB-03-1-1.5	PAR-83-SB-03-1.5-2	PAR-83-SB-03-2-2.5	PAR-83-SB-04-0.5-1	PAR-83-SB-04-1.25-1.75	PAR-83-SB-04-2-2.5	PAR-83-SB-05-0.75-1.2	PAR-83-SB-05-1.75-2.2	PAR-83-SB-05-2.5-3
					4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	
Fluorene	2,300	24,000	170	-	< 0.0081	0.004 J	< 0.0079	< 0.0076	< 0.0081	0.0081 J	0.071	0.021	0.1 J	0.013	0.013	0.013 J	< 0.0078	0.0046 J	0.04	< 0.0075	
Indeno(1,2,3-cd)pyrene	5	17	7	-	0.045	0.066	0.014	0.061	0.014	0.21	1.1	0.47	2.7 J	0.2	0.098	1.1	0.0057 J	0.033	0.93	0.01	
Naphthalene	6	17	25	-	< 0.0081	0.0034 J	< 0.0079	0.0078	< 0.0081	0.0029 J	0.011 J	0.0046 J	0.25 J	0.014	0.02	0.24	0.0056 J	0.019	0.039	0.0024 J	
Phenanthrene	NLE	300,000	NLE	-	0.039	0.051	0.011	0.051	0.012	0.17	1.3	0.42	1.9 J	0.17	0.15	0.48	0.0071 J	0.051	0.89	0.01	
Pyrene	1,700	18,000	840	-	0.11	0.15	0.021	0.085	0.031	0.42	3.1	1	5.7 J	0.41	0.2	2.1	0.0098	0.04	2.2	0.02	
Total Petroleum Hydrocarbons (mg/kg)																					
Total Petroleum Hydrocarbons	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)																					
C10-C12 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
C12-C16 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
C12-C16 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
C16-C21 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Pesticides & PCBs (mg/kg)																					
Aroclor-1016	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Aroclor-1221	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Aroclor-1232	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Aroclor-1242	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Aroclor-1248	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Aroclor-1254	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Aroclor-1260	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Aroclor-1268	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Inorganics (mg/kg)																					
Aluminum	78,000	NLE	6,000	15,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Antimony	31	450	6	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Arsenic	19	19	19	22.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Barium	16,000	59,000	2,100	32.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Beryllium	16	140	0.7	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Cadmium	78	78	2	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Calcium	NLE	NLE	NLE	921	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chromium	NLE	NLE	NLE	269	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Cobalt	1,600	590	90	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Copper	3,100	45,000	11,000	8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Iron	NLE	NLE	NLE	55,800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Lead	400	800	90	19.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Magnesium	NLE	NLE	NLE	7,230	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Manganese	11,000	5,900	65	90.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Mercury	23	65	0.1	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Nickel	1,600	23,000	48	8.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Potassium	NLE	NLE	NLE	15,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Selenium	390	5,700	11	1.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Sodium	NLE	NLE	NLE	51.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Vanadium	390 ⁽¹⁾	1,100	NLE	94.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Zinc	23,000	110,000	930	81.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dataset.

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non-Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PAR-83-SB-06			PAR-83-SB-07			PAR-83-SB-08			PAR-83-SB-09		PAR-83-SB-09		PAR-83-SB-10
					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	
Sample ID					PAR-83-SB-06-0.3-0.8	PAR-83-SB-06-1.5-2	PAR-83-SB-06-2.5-3	PAR-83-SB-07-0-0.5	PAR-83-SB-07-1.25-1.75	PAR-83-SB-07-2.25-2.75	PAR-83-SB-08-0.5-1	PAR-83-SB-08-1.25-1.75	PAR-83-SB-08-2.5-3	PAR-83-SB-09-1-1.5	PAR-83-SB-109-1-1.5	PAR-83-SB-09-2-2.5	PAR-83-SB-09-2.75-3.25	PAR-83-SB-10-0-0.5
Sample Date					4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/4/2016	4/5/2016
Volatile Organic Compounds (mg/kg)																		
1,1,1,2-Tetrachloroethane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	160,000	NLE	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	1	3	0.007	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	2	6	0.02	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	8	24	0.2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	11	150	0.008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	73	820	0.7	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	0.08	0.2	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	0.008	0.04	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	5,300	59,000	17	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	0.9	3	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	2	5	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	5,300	59,000	19	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	5	13	2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	70,000	NLE	19	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	2	5	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	1	3	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	81	280	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	7,800	110,000	6	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	2	4	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	510	7,400	0.6	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorodibromomethane	3	8	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	220	1,100	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	0.6	2	0.4	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,2-Dichloroethene	230	560	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	490	230,000	39	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl benzene	7,800	110,000	13	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	6	25	0.9	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Meta/Para Xylene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl bromide	25	59	0.04	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl butyl ketone	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl chloride	4	12	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl ethyl ketone	3,100	44,000	0.9	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl isobutyl ketone	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Tertbutyl Ether	110	320	0.2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	46	230	0.01	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	6	17	25	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ortho Xylene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Chlorotoluene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	90	260	3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tert Butyl Alcohol	1,400	11,000	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non-Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PAR-83-SB-06			PAR-83-SB-07			PAR-83-SB-08			PAR-83-SB-09		PAR-83-SB-09		PAR-83-SB-10
Sample ID					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Sample Date					PAR-83-SB-06-0.3-0.8 4/4/2016	PAR-83-SB-06-1.5-2 4/4/2016	PAR-83-SB-06-2.5-3 4/4/2016	PAR-83-SB-07-0-0.5 4/4/2016	PAR-83-SB-07-1.25-1.75 4/4/2016	PAR-83-SB-07-2.25-2.75 4/4/2016	PAR-83-SB-08-0.5-1 4/4/2016	PAR-83-SB-08-1.25-1.75 4/4/2016	PAR-83-SB-08-2.5-3 4/4/2016	PAR-83-SB-09-1-1.5 4/4/2016	PAR-83-SB-109-1-1.5 4/4/2016	PAR-83-SB-09-2-2.5 4/4/2016	PAR-83-SB-09-2.75-3.25 4/4/2016	PAR-83-SB-10-0-0.5 4/5/2016
Fluorene	2,300	24,000	170	-	< 0.0074	< 0.0077	< 0.0081	1.4	< 0.0076	< 0.0074	0.061	0.0078	< 0.008	0.031	NA	< 0.0075	< 0.0078	NA
Indeno(1,2,3-cd)pyrene	5	17	7	-	0.15	0.0068 J	0.0069 J	9.4	0.012	0.012	1.4	0.1	< 0.008	0.49	NA	0.0054 J	< 0.0078	NA
Naphthalene	6	17	25	-	0.047	< 0.0077	< 0.0081	0.23 J	< 0.0076	< 0.0074	0.039	0.075	< 0.008	0.15	NA	< 0.0075	< 0.0078	NA
Phenanthrene	NLE	300,000	NLE	-	0.13	0.0058 J	< 0.0081	17	0.0094	0.015	3.4	0.16	< 0.008	0.46	NA	0.0057 J	< 0.0078	NA
Pyrene	1,700	18,000	840	-	0.26	0.0097	0.005 J	27	0.019	0.022	3.9	0.22	0.0038 J	0.87	NA	0.0063	< 0.0078	NA
Total Petroleum Hydrocarbons (mg/kg)																		
Total Petroleum Hydrocarbons	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)																		
C10-C12 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C12-C16 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C12-C16 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C16-C21 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)																		
Aroclor-1016	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.042	< 0.038	NA	< 0.038	< 0.038
Aroclor-1221	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.085	< 0.076	NA	< 0.078	< 0.077
Aroclor-1232	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.042	< 0.038	NA	< 0.038	< 0.038
Aroclor-1242	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.042	< 0.038	NA	< 0.038	< 0.038
Aroclor-1248	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.042	< 0.038	NA	< 0.038	< 0.038
Aroclor-1254	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.22 J	< 0.038 UJ	NA	< 0.038	< 0.038
Aroclor-1260	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.18 J	< 0.038 UJ	NA	< 0.038	< 0.038
Aroclor-1268	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.042	< 0.038	NA	< 0.038	< 0.038
Inorganics (mg/kg)																		
Aluminum	78,000	NLE	6,000	15,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	31	450	6	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	19	19	19	22.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 7.6	NA	< 6.9	< 10.8	13.1
Barium	16,000	59,000	2,100	32.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	16	140	0.7	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	78	78	2	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NLE	NLE	NLE	921	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NLE	NLE	NLE	269	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	1,600	590	90	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	3,100	45,000	11,000	8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NLE	NLE	NLE	55,800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	400	800	90	19.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.5	NA	13.4	5.7 J	38.4
Magnesium	NLE	NLE	NLE	7,230	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	11,000	5,900	65	90.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	23	65	0.1	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	1,600	23,000	48	8.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NLE	NLE	NLE	15,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	390	5,700	11	1.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NLE	NLE	NLE	51.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	390 ⁽¹⁾	1,100	NLE	94.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	23,000	110,000	930	81.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dat

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non-Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PAR-83-SB-10			PAR-83-SB-11			PAR-83-SB-12			PAR-83-SB-13			PAR-83-SB-14			PAR-83-SB-15			PAR-83-SB-16		
					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	
Sample ID					PAR-83-SB-10-2.5-3 4/5/2016	PAR-83-SB-11-0-0.5 4/5/2016	PAR-83-SB-11-2.8-3.3 4/5/2016	PAR-83-SB-12-1-1.5 4/5/2016	PAR-83-SB-12-2.5-3 4/5/2016	PAR-83-SB-13-0.5-1 4/5/2016	PAR-83-SB-13-2.5-3 4/5/2016	PAR-83-SB-14-0.5-1 4/5/2016	PAR-83-SB-14-2.5-3 4/5/2016	PAR-83-SB-15-0.5-1 4/5/2016	PAR-83-SB-15-3-3.5 4/5/2016	PAR-83-SB-115-3-3.5 4/5/2016	PAR-83-SB-15-5-5.6 4/5/2016	PAR-83-SB-16-0.5-1 4/5/2016							
Volatile Organic Compounds (mg/kg)																									
1,1,1,2-Tetrachloroethane	NLE	NLE	NLE	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
1,1,1-Trichloroethane	160,000	NLE	0.3	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
1,1,2,2-Tetrachloroethane	1	3	0.007	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
1,1,2-Trichloroethane	2	6	0.02	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
1,1-Dichloroethane	8	24	0.2	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
1,1-Dichloroethene	11	150	0.008	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
1,2,3-Trichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
1,2,3-Trichloropropane	NLE	NLE	NLE	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
1,2,4-Trichlorobenzene	73	820	0.7	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
1,2,4-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
1,2-Dibromo-3-chloropropane	0.08	0.2	0.005	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
1,2-Dibromoethane	0.008	0.04	0.005	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
1,2-Dichlorobenzene	5,300	59,000	17	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
1,2-Dichloroethane	0.9	3	0.005	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
1,2-Dichloropropane	2	5	0.005	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
1,3,5-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
1,3-Dichlorobenzene	5,300	59,000	19	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
1,3-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
1,4-Dichlorobenzene	5	13	2	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
2-Chlorotoluene	NLE	NLE	NLE	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
Acetone	70,000	NLE	19	-	NA	NA	NA	0.012	< 0.48	< 0.0038	0.05	0.028	0.062	NA	NA	NA	NA	NA							
Benzene	2	5	0.005	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
Bromobenzene	NLE	NLE	NLE	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
Bromochloromethane	NLE	NLE	NLE	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
Bromodichloromethane	1	3	0.005	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
Bromoform	81	280	0.03	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
Carbon disulfide	7,800	110,000	6	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA							
Carbon tetrachloride	2	4	0.005	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
Chlorobenzene	510	7,400	0.6	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
Chlorodibromomethane	3	8	0.005	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
Chloroethane	220	1,100	NLE	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
Chloroform	0.6	2	0.4	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
Cis-1,2-Dichloroethene	230	560	0.3	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
Cymene	NLE	NLE	NLE	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
Dichlorodifluoromethane	490	230,000	39	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							
Ethyl benzene	7,800	110,000	13	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	0.00018 J	< 0.0039	NA	NA	NA	NA	NA							
Hexachlorobutadiene	6	25	0.9	-	NA	NA	NA	< 0.0036	< 0.48	< 0.0038	< 0.0043	< 0.0035	< 0.0039	NA	NA	NA	NA	NA							

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non-Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PAR-83-SB-10	PAR-83-SB-11		PAR-83-SB-12		PAR-83-SB-13		PAR-83-SB-14		PAR-83-SB-15		PAR-83-SB-15		PAR-83-SB-16
Sample ID	Contact SRS	Contact SRS			Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Sample Date					PAR-83-SB-10-2.5-3 4/5/2016	PAR-83-SB-11-0-0.5 4/5/2016	PAR-83-SB-11-2.8-3.3 4/5/2016	PAR-83-SB-12-1-1.5 4/5/2016	PAR-83-SB-12-2.5-3 4/5/2016	PAR-83-SB-13-0.5-1 4/5/2016	PAR-83-SB-13-2.5-3 4/5/2016	PAR-83-SB-14-0.5-1 4/5/2016	PAR-83-SB-14-2.5-3 4/5/2016	PAR-83-SB-15-0.5-1 4/5/2016	PAR-83-SB-15-3-3.5 4/5/2016	PAR-83-SB-115-3-3.5 4/5/2016	PAR-83-SB-15-5-5.6 4/5/2016	PAR-83-SB-16-0.5-1 4/5/2016
Fluorene	2,300	24,000	170	-	NA	NA	NA	0.01	3.8	0.027	0.018	0.41	0.0043 J	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	5	17	7	-	NA	NA	NA	0.0063 J	< 0.39	0.12	0.029	0.4	< 0.0081	NA	NA	NA	NA	NA
Naphthalene	6	17	25	-	NA	NA	NA	0.011	< 0.39	0.06	0.0025 J	0.14	< 0.0081	NA	NA	NA	NA	NA
Phenanthrene	NLE	300,000	NLE	-	NA	NA	NA	0.0074	8.9	0.25	0.11	1.2	0.022	NA	NA	NA	NA	NA
Pyrene	1,700	18,000	840	-	NA	NA	NA	0.015	1	0.33	0.097	1.7	0.026	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons (mg/kg)																		
Total Petroleum Hydrocarbons	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)																		
C10-C12 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C12-C16 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C12-C16 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C16-C21 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)																		
Aroclor-1016	0.2	NLE	NLE	-	NA	< 0.039	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.2	NLE	NLE	-	NA	< 0.079	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.2	NLE	NLE	-	NA	< 0.039	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.2	NLE	NLE	-	NA	< 0.039	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.2	NLE	NLE	-	NA	< 0.039	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.2	NLE	NLE	-	NA	0.18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	0.2	NLE	NLE	-	NA	0.11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1268	0.2	NLE	NLE	-	NA	< 0.039	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)																		
Aluminum	78,000	NLE	6,000	15,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	31	450	6	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	19	19	19	22.9	10.7	6.3	10.2	5.2	5.4	6.3	8	7	16.2	6.5	9.4	8.3	10.6	10.5
Barium	16,000	59,000	2,100	32.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	16	140	0.7	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	78	78	2	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NLE	NLE	NLE	921	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NLE	NLE	NLE	269	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	1,600	590	90	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	3,100	45,000	11,000	8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NLE	NLE	NLE	55,800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	400	800	90	19.5	17.2	31.4	8.8	11.1	5.3 J	180	6.6	49.4	8.8	10.7	10.4	8.2	7.9	58.9
Magnesium	NLE	NLE	NLE	7,230	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	11,000	5,900	65	90.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	23	65	0.1	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	1,600	23,000	48	8.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NLE	NLE	NLE	15,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	390	5,700	11	1.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NLE	NLE	NLE	51.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	390 ⁽¹⁾	1,100	NLE	94.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	23,000	110,000	930	81.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dat

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non-Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PAR-83-SB-16		PAR-83-SB-17	PAR-83-SB-18	PAR-83-SB-19	PAR-83-SB-20		PAR-83-SB-21	PAR-83-SB-22	PAR-83-SB-23		PAR-83-SB-23		
Sample ID	Contact SRS	Contact SRS			Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	
Sample Date					PAR-83-SB-16-3-3.5	PAR-83-SB-16-5.5-6	PAR-83-SB-17-6-6.5	PAR-83-SB-18-0-0.5	PAR-83-SB-19-0-0.5	PAR-83-SB-20-0-0.5	PAR-83-SB-120-0-0.5	PAR-83-SB-21-0-0.5	PAR-83-SB-22-0-0.5	PAR-83-SB-23-0-0.5	PAR-83-SB-123-0-0.5	PAR-83-SB-23-3-3.5	PAR-83-SB-23-5-5.5	PAR-83-SB-23-6-6.5
					4/5/2016	4/5/2016	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017
Fluorene	2,300	24,000	170	-	NA	NA	0.02 J	< 0.07	< 0.068	< 0.071	< 0.097	< 0.075	< 0.074	< 0.075	< 0.073	< 0.078	NA	< 0.076
Indeno(1,2,3-cd)pyrene	5	17	7	-	NA	NA	0.076 J	0.02 J	< 0.068	0.018 J	< 0.097	0.069 J	< 0.074	0.17 J	0.4 J	< 0.078	NA	< 0.076
Naphthalene	6	17	25	-	NA	NA	< 0.087	< 0.07	< 0.068	< 0.071	< 0.097	0.016 J	< 0.074	0.19	0.11 J	< 0.078	NA	< 0.076
Phenanthrene	NLE	300,000	NLE	-	NA	NA	0.12 J	0.015 J	0.017 J	0.025 J	< 0.097	0.065 J	< 0.074	0.22	0.24	< 0.078	NA	< 0.076
Pyrene	1,700	18,000	840	-	NA	NA	0.38	0.031 J	0.03 J	0.059 J	0.025 J	0.15	< 0.074	0.36 J	0.92 J	< 0.078	NA	< 0.076
Total Petroleum Hydrocarbons (mg/kg)																		
Total Petroleum Hydrocarbons	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)																		
C10-C12 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 1.1 UJ	NA
C12-C16 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	23.1	NA
C12-C16 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 1.1 UJ	NA
C16-C21 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 1.1	NA
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.37 J	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.72 J	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.74 J	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	89.2	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	113	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.2 J	NA
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	114.2 J	NA
Pesticides & PCBs (mg/kg)																		
Aroclor-1016	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1268	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)																		
Aluminum	78,000	NLE	6,000	15,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	31	450	6	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	19	19	19	22.9	9.1	11.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	16,000	59,000	2,100	32.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	16	140	0.7	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	78	78	2	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NLE	NLE	NLE	921	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NLE	NLE	NLE	269	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	1,600	590	90	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	3,100	45,000	11,000	8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NLE	NLE	NLE	55,800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	400	800	90	19.5	9.8	8.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NLE	NLE	NLE	7,230	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	11,000	5,900	65	90.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	23	65	0.1	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	1,600	23,000	48	8.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NLE	NLE	NLE	15,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	390	5,700	11	1.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NLE	NLE	NLE	51.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	390 ⁽¹¹⁾	1,100	NLE	94.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	23,000	110,000	930	81.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dat

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non-Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PAR-83-SB-25		PAR-83-SB-33		PAR-83-SB-34	PAR-83-SB-38		PAR-83-SB-39				PAR-83-SB-44	PAR-83-SB-45	PAR-83-SB-46
					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Sample ID					PAR-83-SB-25-3-3.5	PAR-83-SB-25-6-6.5	PAR-83-SB-33-2-2.5	PAR-83-SB-133-2-2.5	PAR-83-SB-34-2-2.5	PAR-83-SB-38-0-0.5	PAR-83-SB-138-0-0.5	PAR-83-SB-39-2-2.5	PAR-83-SB-139-2-2.5	PAR-83-SB-39-3-3.5	PAR-83-SB-39-6-6.5	PAR-83-SB-44-1-1.5	PAR-83-SB-45-1.5-2	PAR-83-SB-46-0-0.5
Sample Date					11/15/2017	11/15/2017	11/15/2017	11/15/2017	11/15/2017	11/15/2017	11/15/2017	11/16/2017	11/16/2017	11/16/2017	11/16/2017	11/14/2017	11/14/2017	11/14/2017
Volatile Organic Compounds (mg/kg)																		
1,1,1,2-Tetrachloroethane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	160,000	NLE	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1,2,2-Tetrachloroethane	1	3	0.007	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	2	6	0.02	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	8	24	0.2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	11	150	0.008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	73	820	0.7	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	0.08	0.2	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	0.008	0.04	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	5,300	59,000	17	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	0.9	3	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	2	5	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	5,300	59,000	19	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	5	13	2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	70,000	NLE	19	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	2	5	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	1	3	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	81	280	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	7,800	110,000	6	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	2	4	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	510	7,400	0.6	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorodibromomethane	3	8	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	220	1,100	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	0.6	2	0.4	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,2-Dichloroethene	230	560	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	490	230,000	39	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl benzene	7,800	110,000	13	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	6	25	0.9	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Meta/Para Xylene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl bromide	25	59	0.04	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl butyl ketone	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl chloride	4	12	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl ethyl ketone	3,100	44,000	0.9	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl isobutyl ketone	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Tertbutyl Ether	110	320	0.2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	46	230	0.01	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	6	17	25	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ortho Xylene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Chlorotoluene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	90	260	3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tert Butyl Alcohol	1,400	11,000	0.3	-	NA	NA	NA											

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non- Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PAR-83-SB-25		PAR-83-SB-33		PAR-83-SB-34	PAR-83-SB-38		PAR-83-SB-39				PAR-83-SB-44	PAR-83-SB-45	PAR-83-SB-46
Sample ID	Contact SRS	Contact SRS			Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Sample Date					PAR-83-SB-25-3-3.5 11/15/2017	PAR-83-SB-25-6-6.5 11/15/2017	PAR-83-SB-33-2-2.5 11/15/2017	PAR-83-SB-133-2-2.5 11/15/2017	PAR-83-SB-34-2-2.5 11/15/2017	PAR-83-SB-38-0-0.5 11/15/2017	PAR-83-SB-138-0-0.5 11/15/2017	PAR-83-SB-39-2-2.5 11/16/2017	PAR-83-SB-139-2-2.5 11/16/2017	PAR-83-SB-39-3-3.5 11/16/2017	PAR-83-SB-39-6-6.5 11/16/2017	PAR-83-SB-44-1-1.5 11/14/2017	PAR-83-SB-45-1.5-2 11/14/2017	PAR-83-SB-46-0-0.5 11/14/2017
Fluorene	2,300	24,000	170	-	NA	NA	< 0.076	< 0.075	0.029 J	0.012 J	0.018 J	< 0.076	< 0.076	NA	NA	< 0.07	< 0.079	< 0.08
Indeno(1,2,3-cd)pyrene	5	17	7	-	NA	NA	< 0.076	< 0.075	< 0.083	0.14	0.21	< 0.076	0.016 J	NA	NA	0.038 J	< 0.079	0.088 J
Naphthalene	6	17	25	-	NA	NA	< 0.076	< 0.075	< 0.083	< 0.079	0.02 J	< 0.076	< 0.076	NA	NA	< 0.07	< 0.079	0.019 J
Phenanthrene	NLE	300,000	NLE	-	NA	NA	< 0.076	0.011 J	0.02 J	0.18	0.27	< 0.076	0.016 J	NA	NA	0.012 J	0.015 J	0.11 J
Pyrene	1,700	18,000	840	-	NA	NA	0.019 J	0.022 J	0.017 J	0.36	0.55	0.019 J	0.033 J	NA	NA	0.03 J	0.02 J	0.22
Total Petroleum Hydrocarbons (mg/kg)																		
Total Petroleum Hydrocarbons	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)																		
C10-C12 Aromatics	NLE	NLE	NLE	-	25.7 J-	0.75 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C12-C16 Aliphatics	NLE	NLE	NLE	-	575	7.1 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C12-C16 Aromatics	NLE	NLE	NLE	-	340	4.8 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C16-C21 Aliphatics	NLE	NLE	NLE	-	211	3.6 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C16-C21 Aromatics	NLE	NLE	NLE	-	598	8.5 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	83.9 J-	5.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	55.3	20.3 J-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	169	2.5 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	3,150	54 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aliphatics	NLE	NLE	NLE	-	1,010	33.4 J-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	1,050	19.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	2,060	52.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)																		
Aroclor-1016	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1268	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)																		
Aluminum	78,000	NLE	6,000	15,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	31	450	6	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	19	19	19	22.9	NA	NA	5.2	5.8	4	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	16,000	59,000	2,100	32.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	16	140	0.7	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	78	78	2	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NLE	NLE	NLE	921	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NLE	NLE	NLE	269	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	1,600	590	90	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	3,100	45,000	11,000	8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NLE	NLE	NLE	55,800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	400	800	90	19.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NLE	NLE	NLE	7,230	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	11,000	5,900	65	90.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	23	65	0.1	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	1,600	23,000	48	8.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NLE	NLE	NLE	15,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	390	5,700	11	1.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NLE	NLE	NLE	51.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	390 ⁽¹⁾	1,100	NLE	94.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	23,000	110,000	930	81.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dat

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non-Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PAR-83-SB-47		PAR-83-SB-48		PAR-83-SB-54			PAR-83-SB-55			PARCEL 83-P83-A1				PARCEL 83-P83-A2
					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	
Sample ID	Contact SRS	Contact SRS			PAR-83-SB-47-0-0.5	PAR-83-SB-48-0-0.5	PAR-83-SB-48-3-3.5	PAR-83-SB-48-6-6.5	PAR-83-SB-54-1-1.5	PAR-83-SB-54-3-3.5	PAR-83-SB-54-6-6.5	PAR-83-SB-55-1-1.5	PAR-83-SB-55-3-3.5	PAR-83-SB-55-6-6.5	P83-A1-A	P83-A1-B	P83-A1-C	P83-A2-A	
Sample Date					11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/16/2017	11/16/2017	11/16/2017	11/16/2017	11/16/2017	11/16/2017	12/14/2007	12/14/2007	12/14/2007	12/14/2007	
Volatile Organic Compounds (mg/kg)																			
1,1,1,2-Tetrachloroethane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1,1-Trichloroethane	160,000	NLE	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1,2,2-Tetrachloroethane	1	3	0.007	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1,2-Trichloroethane	2	6	0.02	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1-Dichloroethane	8	24	0.2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1-Dichloroethene	11	150	0.008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,3-Trichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,3-Trichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,4-Trichlorobenzene	73	820	0.7	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,4-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2-Dibromo-3-chloropropane	0.08	0.2	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2-Dibromoethane	0.008	0.04	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2-Dichlorobenzene	5,300	59,000	17	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2-Dichloroethane	0.9	3	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.28	< 0.29	NA	
1,2-Dichloropropane	2	5	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,3,5-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,3-Dichlorobenzene	5,300	59,000	19	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,3-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,4-Dichlorobenzene	5	13	2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
2-Chlorotoluene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Acetone	70,000	NLE	19	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.28	< 0.29	
Benzene	2	5	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.28	< 0.29	
Bromobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Bromochloromethane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Bromodichloromethane	1	3	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Bromoform	81	280	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Carbon disulfide	7,800	110,000	6	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.28	< 0.29	
Carbon tetrachloride	2	4	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chlorobenzene	510	7,400	0.6	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chlorodibromomethane	3	8	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chloroethane	220	1,100	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chloroform	0.6	2	0.4	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Cis-1,2-Dichloroethene	230	560	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Dichlorodifluoromethane	490	230,000	39	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Ethyl benzene	7,800	110,000	13	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.28	< 0.29	
Hexachlorobutadiene	6	25	0.9	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Isopropylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Meta/Para Xylene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl bromide	25	59	0.04	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl butyl ketone	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl chloride	4	12	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl ethyl ketone	3,100	44,000	0.9	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl isobutyl ketone	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl Tertbutyl Ether	110	320	0.2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methylene chloride	46	230	0.01	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.28	< 0.29	
Naphthalene	6	17	25	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
n-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
o-Ortho Xylene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
o-Chlorotoluene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Propylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
sec-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Styrene	90	260	3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Tert Butyl Alcohol	1,400	11,000	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
tert-Butylbenzene	NLE	N																	

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non-Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PAR-83-SB-47		PAR-83-SB-48				PAR-83-SB-54			PAR-83-SB-55			PARCEL 83-P83-A1				PARCEL 83-P83-A2
Sample ID	Contact SRS	Contact SRS			Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	
Sample Date					PAR-83-SB-47-0-0.5 11/14/2017	PAR-83-SB-48-0-0.5 11/14/2017	PAR-83-SB-48-3-3.5 11/14/2017	PAR-83-SB-48-6-6.5 11/14/2017	PAR-83-SB-54-1-1.5 11/16/2017	PAR-83-SB-54-3-3.5 11/16/2017	PAR-83-SB-54-6-6.5 11/16/2017	PAR-83-SB-55-1-1.5 11/16/2017	PAR-83-SB-55-3-3.5 11/16/2017	PAR-83-SB-55-6-6.5 11/16/2017	P83-A1-A 12/14/2007	P83-A1-B 12/14/2007	P83-A1-C 12/14/2007	P83-A2-A 12/14/2007			
Fluorene	2,300	24,000	170	-	0.015 J	< 0.087	NA	NA	< 0.076	< 0.077	< 0.069	< 0.074	< 0.074	< 0.072	< 1.1	NA	0.15 J	0.087 J			
Indeno(1,2,3-cd)pyrene	5	17	7	-	0.12	0.15	NA	NA	0.037 J	< 0.077	< 0.069	0.02 J	< 0.074	< 0.072	3.1	NA	< 1.1	1.7			
Naphthalene	6	17	25	-	0.017 J	0.056 J	NA	NA	< 0.076	< 0.077	< 0.069	< 0.074	< 0.074	< 0.072	0.26 J	NA	< 1.1	0.28 J			
Phenanthrene	NLE	300,000	NLE	-	0.055 J	0.19	NA	NA	< 0.076	< 0.077	< 0.069	0.012 J	< 0.074	< 0.072	2.22	NA	< 1.1	3			
Pyrene	1,700	18,000	840	-	0.31	0.37	NA	NA	0.036 J	< 0.077	< 0.069	0.023 J	< 0.074	< 0.072	12	NA	0.21 J	13			
Total Petroleum Hydrocarbons (mg/kg)																					
Total Petroleum Hydrocarbons	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)																					
C10-C12 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
C12-C16 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
C12-C16 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
C16-C21 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Pesticides & PCBs (mg/kg)																					
Aroclor-1016	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Aroclor-1221	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Aroclor-1232	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Aroclor-1242	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Aroclor-1248	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Aroclor-1254	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Aroclor-1260	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Aroclor-1268	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.0041	NA	< 0.0041	< 0.0041	NA	
Inorganics (mg/kg)																					
Aluminum	78,000	NLE	6,000	15,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 11200	NA	< 8860	< 5880			
Antimony	31	450	6	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.438	NA	< 0.449	< 0.433			
Arsenic	19	19	19	22.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	16	NA	4.63	3.59			
Barium	16,000	59,000	2,100	32.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 34.2	NA	< 14.4	< 18			
Beryllium	16	140	0.7	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.08	NA	1.22	0.184			
Cadmium	78	78	2	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.042	NA	< 0.043	< 0.289			
Calcium	NLE	NLE	NLE	921	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 889	NA	< 490	< 10400			
Chromium	NLE	NLE	NLE	269	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 103	NA	< 102	< 17.3			
Cobalt	1,600	590	90	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.353	NA	0.639	1.77			
Copper	3,100	45,000	11,000	8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 18.8	NA	< 5.72	< 18			
Iron	NLE	NLE	NLE	55,800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 39800	NA	< 40000	< 11000			
Lead	400	800	90	19.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	18.6	NA	< 0.363	11.7			
Magnesium	NLE	NLE	NLE	7,230	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 4300	NA	< 4140	< 1300			
Manganese	11,000	5,900	65	90.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 22.5	NA	< 29.8	< 52.1			
Mercury	23	65	0.1	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.107	NA	< 0.108	< 0.111			
Nickel	1,600	23,000	48	8.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	7.11	NA	5.8	6.73			
Potassium	NLE	NLE	NLE	15,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9,600	NA	9,870	710			
Selenium	390	5,700	11	1.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.646	NA	< 0.663	< 0.64			
Sodium	NLE	NLE	NLE	51.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 37,939	NA	< 38,914	< 37,559			
Vanadium	390 ⁽¹⁾	1,100	NLE	94.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	52.4	NA	53.3	20.5			
Zinc	23,000	110,000	930	81.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	67.5	NA	54.6	299			

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dat

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non-Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PARCEL 83-P83-A2		PARCEL 83-P83-A3			PARCEL 83-P83-A4			PARCEL 83-P83-A5			PARCEL 83-P83-B1		
					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
					P83-A2-B 12/14/2007	P83-A2-C 12/14/2007	P83-A3-A 12/14/2007	P83-A3-B 12/14/2007	P83-A3-C 12/14/2007	P83-A4-A 12/14/2007	P83-A4-B 12/14/2007	P83-A4-C 12/14/2007	P83-A5-A 12/14/2007	P83-A5-B 12/14/2007	P83-A5-C 12/14/2007	P83-B1-A 12/14/2007	P83-B1-B 12/14/2007	P83-B1-C 12/14/2007
Sample ID																		
Sample Date																		
Volatile Organic Compounds (mg/kg)																		
1,1,1,2-Tetrachloroethane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	160,000	NLE	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	1	3	0.007	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	2	6	0.02	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	8	24	0.2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	11	150	0.008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	73	820	0.7	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	0.08	0.2	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	0.008	0.04	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	5,300	59,000	17	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	0.9	3	0.005	-	< 0.27	< 0.3	NA	< 0.28	< 0.28	NA	< 0.25	< 0.28	NA	< 0.29	< 0.29	NA	< 0.26	< 0.28
1,2-Dichloropropane	2	5	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	5,300	59,000	19	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	5	13	2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	70,000	NLE	19	-	0.26 JB	< 1.3	NA	< 1.3	0.17 JB	NA	< 0.32	< 0.37	NA	< 0.46	0.22 JB	NA	< 0.58	< 0.28
Benzene	2	5	0.005	-	< 0.27	< 0.3	NA	< 0.28	< 0.28	NA	< 0.25	< 0.28	NA	< 0.29	< 0.29	NA	0.33	< 0.28
Bromobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	1	3	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodibromomethane	81	280	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodifluoromethane	7,800	110,000	6	-	< 0.27	< 0.3	NA	< 0.28	< 0.28	NA	< 0.25	< 0.28	NA	0.023 J	< 0.29	NA	0.015 J	< 0.28
Carbon tetrachloride	2	4	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	510	7,400	0.6	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorodibromomethane	3	8	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	220	1,100	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	0.6	2	0.4	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,2-Dichloroethene	230	560	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	490	230,000	39	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl benzene	7,800	110,000	13	-	< 0.27	< 0.3	NA	< 0.28	< 0.28	NA	< 0.25	< 0.28	NA	< 0.29	< 0.29	NA	0.22 J	< 0.28
Hexachlorobutadiene	6	25	0.9	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Meta/Para Xylene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl bromide	25	59	0.04	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl butyl ketone	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl chloride	4	12	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl ethyl ketone	3,100	44,000	0.9	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl isobutyl ketone	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Tertbutyl Ether	110	320	0.2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	46	230	0.01	-	< 0.27	< 0.3	NA	< 0.28	< 0.28	NA	< 0.25	< 0.28	NA	< 0.29	< 0.29	NA	< 0.26	< 0.28
Naphthalene	6	17	25	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ortho Xylene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
p-Chlorotoluene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	90	260	3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tert Butyl Alcohol	1,400	11,000	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
tert-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	49	1,500	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	6,300	91,000	7	-	< 0.27	< 0.3	NA	< 0.28	< 0.28	NA	< 0.25	< 0.28	NA	0.029 J	< 0.29	NA	1.2	< 0.28
Total Xylenes	12,000	170,000	19	-	< 0.8	< 0.89	NA	< 0.83	< 0.83	NA	< 0.74	< 0.84	NA	< 0.86	< 0.87	NA	1.4	< 0.85
Trans-1,2-Dichloroethene	300	720	0.6	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trans-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	3	10	0.01	-	< 0.27	< 0.3	NA	< 0.28	< 0.28	NA	< 0.25	< 0.28	NA	< 0.29	< 0.29	NA	< 0.26	< 0.28
Trichlorofluoromethane	23,000	340,000	34	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	0.7	2	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TIC VOCs (mg/kg)																		
1,1,3-Trimethylcyclohexane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Diethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1-Methylnaphthalene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methyl-3-phenyl-1-propene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	230	2,400	8	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methyltetralin	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,7-Dimethylindan	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6,7-Dimethyltetralin	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6-Methyltetraline	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetaldehyde	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene, 1,2,4,5-tetramethyl-	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Decahydro-2-methylnaphthalene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Pentylcyclohexane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TIC Unknown	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total TICs	500	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (mg/kg)																		
1-Methylnaphthalene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	230	2,400	8	-	NA	< 1.1	0.64 J	NA	< 1.2	< 1.2	NA	< 1.2	0.27 J	NA	< 1.2	0.19 J	NA	< 1.2
4-Chloroaniline	NLE	NLE	NLE	-	NA	< 1.1	< 1.1	NA	< 1.2	< 1.2	NA	< 1.2	< 1.1	NA	< 1.2	< 1	NA	< 1.2
Acenaphthene	3,400	37,000	110	-	NA	< 1.1	0.53 J	NA	< 1.2	< 1.2	NA	< 1.2	< 1.1	NA	< 1.2	< 1	NA	< 1.2
Acenaphthylene	NLE	300,000	NLE	-	NA	< 1.1	0.55 J	NA	< 1.2	< 1.2	NA	< 1.2	0.065 J	NA	< 1.2	< 1	NA	< 1.2
Anthracene																		

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non-Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PARCEL 83-P83-A2			PARCEL 83-P83-A3			PARCEL 83-P83-A4			PARCEL 83-P83-A5			PARCEL 83-P83-B1		
Sample ID	Contact SRS	Contact SRS			Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	
Sample Date					P83-A2-B 12/14/2007	P83-A2-C 12/14/2007	P83-A3-A 12/14/2007	P83-A3-B 12/14/2007	P83-A3-C 12/14/2007	P83-A4-A 12/14/2007	P83-A4-B 12/14/2007	P83-A4-C 12/14/2007	P83-A5-A 12/14/2007	P83-A5-B 12/14/2007	P83-A5-C 12/14/2007	P83-B1-A 12/14/2007	P83-B1-B 12/14/2007	P83-B1-C 12/14/2007	
Fluorene	2,300	24,000	170	-	NA	< 1.1	1.1 J	NA	< 1.2	< 1.2	NA	< 1.2	< 1.1	NA	< 1.2	< 1	NA	< 1.2	
Indeno(1,2,3-cd)pyrene	5	17	7	-	NA	< 1.1	0.51 J	NA	< 1.2	1.4	NA	< 1.2	0.19 J	NA	< 1.2	< 1	NA	< 1.2	
Naphthalene	6	17	25	-	NA	< 1.1	0.3 J	NA	< 1.2	0.25 J	NA	0.25 J	0.25 J	NA	< 1.2	0.09 J	NA	< 1.2	
Phenanthrene	NLE	300,000	NLE	-	NA	< 1.1	5	NA	0.26 J	2.6	NA	0.38 J	0.57 J	NA	< 1.2	0.1 J	NA	0.09 J	
Pyrene	1,700	18,000	840	-	NA	0.16 J	6.2	NA	0.32 J	9.3	NA	0.7 J	1.1 J	NA	< 1.2	< 1	NA	0.19 J	
Total Petroleum Hydrocarbons (mg/kg)																			
Total Petroleum Hydrocarbons	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)																			
C10-C12 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
C12-C16 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
C12-C16 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
C16-C21 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Pesticides & PCBs (mg/kg)																			
Aroclor-1016	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Aroclor-1221	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Aroclor-1232	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Aroclor-1242	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Aroclor-1248	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Aroclor-1254	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Aroclor-1260	0.2	NLE	NLE	-	NA	< 0.0042	< 0.0042	NA	< 0.004	< 0.004	NA	< 0.0041	< 0.0041	NA	< 0.0042	< 0.0042	NA	< 0.0041	
Aroclor-1268	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Inorganics (mg/kg)																			
Aluminum	78,000	NLE	6,000	15,200	NA	< 5400	< 5520	NA	< 10900	< 6810	NA	< 14700	< 8300	NA	< 17200	< 15800	NA	< 9660	
Antimony	31	450	6	ND	NA	< 0.438	< 0.424	NA	< 0.421	< 0.463	NA	< 0.485	< 0.479	NA	< 0.429	< 0.435	NA	< 0.443	
Arsenic	19	19	19	22.9	NA	2.77	2.77	NA	6.49	7.04	NA	9.15	7.49	NA	9.99	4.87	NA	13.4	
Barium	16,000	59,000	2,100	32.3	NA	< 22.2	< 18.3	NA	< 21.1	< 26	NA	< 59.6	< 124	NA	< 22	< 28.3	NA	< 34.3	
Beryllium	16	140	0.7	2	NA	0.766	0.341	NA	1.35	0.41	NA	1.68	0.927	NA	2.39	0.282	NA	1.03	
Cadmium	78	78	2	ND	NA	< 0.042	< 0.217	NA	< 0.04	0.66	NA	0.443	0.707	NA	0.76	0.564	NA	0.312	
Calcium	NLE	NLE	NLE	921	NA	< 837	< 1490	NA	< 1060	< 2970	NA	< 1880	< 2060	NA	< 1730	< 12800	NA	< 875	
Chromium	NLE	NLE	NLE	269	NA	< 40.1	< 33.8	NA	< 110	< 35.9	NA	< 98.2	< 65.5	NA	< 171	< 29.4	NA	< 80.4	
Cobalt	1,600	590	90	2.5	NA	0.605	0.952	NA	0.629	4.15	NA	1.28	2.15	NA	2.19	10.1	NA	0.571	
Copper	3,100	45,000	11,000	8	NA	< 3.05	< 17.8	NA	< 4.62	< 52.2	NA	< 8.36	< 34.5	NA	< 5.95	< 61.8	NA	< 10.4	
Iron	NLE	NLE	NLE	55,800	NA	< 18500	< 13400	NA	< 45500	19,100	NA	39,900	27,200	NA	72,900	23,000	NA	38,700	
Lead	400	800	90	19.5	NA	2.17	35.2	NA	0.935	95.8	NA	7.79	252	NA	< 0.347	7.95	NA	15.5	
Magnesium	NLE	NLE	NLE	7,230	NA	< 1610	< 1280	NA	< 4520	< 3340	NA	< 5170	< 2920	NA	< 8770	< 8580	NA	< 4050	
Manganese	11,000	5,900	65	90.7	NA	< 56.9	< 44.9	NA	< 32	< 127	NA	< 86	< 76	NA	< 49	< 266	NA	< 24.7	
Mercury	23	65	0.1	ND	NA	< 0.114	< 0.112	NA	< 0.116	< 0.118	NA	< 0.114	0.13	NA	< 0.11	< 0.105	NA	< 0.108	
Nickel	1,600	23,000	48	8.4	NA	4.08	6.21	NA	5.76	< 0.661	NA	< 8.82	< 9.23	NA	< 16.8	< 23.2	NA	< 5.52	
Potassium	NLE	NLE	NLE	15,400	NA	3,300	2,060	NA	10,700	< 1970	NA	< 10000	< 5830	NA	< 20100	< 1800	NA	< 8460	
Selenium	390	5,700	11	1.9	NA	< 0.647	< 0.626	NA	< 0.622	< 0.683	NA	< 0.716	< 0.707	NA	< 0.633	< 0.642	NA	< 0.654	
Sodium	NLE	NLE	NLE	51.6	NA	< 37.979	< 36.747	NA	< 36.52	< 40.086	NA	< 42.037	< 41.486	NA	< 37.188	< 1390	NA	< 38.387	
Vanadium	390 ⁽¹⁾	1,100	NLE	94.1	NA	28.1	24	NA	59.1	49.5	NA	57.6	40.5	NA	92.1	123	NA	49.8	
Zinc	23,000	110,000	930	81.4	NA	35.6	193	NA	47.4	< 230	NA	< 61.6	< 199	NA	< 74.8	< 41	NA	< 39	

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dat

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non-Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PARCEL 83-P83-B1				PARCEL 83-P83-B2				PARCEL 83-P83-B3			PARCEL 83-P83-B4			PARCEL 83-P83-B5	PARCEL 83-P83-B5		
					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Sample ID					P83-B1-C DUP	P83-B2-A	P83-B2-B	P83-B2-C	P83-B3-A	P83-B3-B	P83-B3-C	P83-B4-A	P83-B4-B	P83-B4-C	P83-B5-A	P83-B5-B	P83-B5-C	P83-B5-C DUP				
Sample Date					12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	
Volatile Organic Compounds (mg/kg)																						
1,1,1,2-Tetrachloroethane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
1,1,1-Trichloroethane	160,000	NLE	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
1,1,2,2-Tetrachloroethane	1	3	0.007	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
1,1,2-Trichloroethane	2	6	0.02	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
1,1-Dichloroethane	8	24	0.2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
1,1-Dichloroethene	11	150	0.008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
1,2,3-Trichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
1,2,3-Trichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
1,2,4-Trichlorobenzene	73	820	0.7	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
1,2,4-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
1,2-Dibromo-3-chloropropane	0.08	0.2	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
1,2-Dibromoethane	0.008	0.04	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
1,2-Dichlorobenzene	5,300	59,000	17	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
1,2-Dichloroethane	0.9	3	0.005	-	< 0.34	NA	< 0.3	< 0.31	NA	< 0.26	< 0.3	NA	< 0.27	< 0.28	NA	< 0.27	< 0.27	< 0.38				
1,2-Dichloropropane	2	5	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
1,3,5-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
1,3-Dichlorobenzene	5,300	59,000	19	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
1,3-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
1,4-Dichlorobenzene	5	13	2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
2-Chlorotoluene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Acetone	70,000	NLE	19	-	< 0.34	NA	< 0.5	0.15 JB	NA	0.88	1.2	NA	1.3	1.3	NA	1.2	1.2	1.5				
Benzene	2	5	0.005	-	< 0.34	NA	< 0.3	< 0.31	NA	< 0.26	< 0.3	NA	0.015 J	< 0.28	NA	< 0.27	< 0.27	< 0.38				
Bromobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Bromochloromethane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Bromodichloromethane	1	3	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Bromoform	81	280	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Carbon disulfide	7,800	110,000	6	-	< 0.34	NA	< 0.3	< 0.31	NA	< 0.26	< 0.3	NA	< 0.27	< 0.28	NA	< 0.27	< 0.27	< 0.38				
Carbon tetrachloride	2	4	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Chlorobenzene	510	7,400	0.6	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Chlorodibromomethane	3	8	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Chloroethane	220	1,100	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Chloroform	0.6	2	0.4	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Cis-1,2-Dichloroethene	230	560	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Dichlorodifluoromethane	490	230,000	39	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Ethyl benzene	7,800	110,000	13	-	< 0.34	NA	< 0.3	< 0.31	NA	< 0.26	< 0.3	NA	0.023 J	< 0.28	NA	< 0.27	< 0.27	< 0.38				
Hexachlorobutadiene	6	25	0.9	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Isopropylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Meta/Para Xylene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Methyl bromide	25	59	0.04	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Methyl butyl ketone	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Methyl chloride	4	12	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Methyl ethyl ketone	3,100	44,000	0.9	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Methyl isobutyl ketone	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Methyl Tertbutyl Ether	110	320	0.2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Methylene chloride	46	230	0.01	-	< 0.34	NA	< 0.3	< 0.31	NA	< 0.26	< 0.3	NA	< 0.27	< 0.28	NA	< 0.27	< 0.27	< 0.38				
Naphthalene	6	17	25	-	NA	NA	NA	NA														

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non-Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PARCEL 83-P83-B1	PARCEL 83-P83-B2			PARCEL 83-P83-B3			PARCEL 83-P83-B4			PARCEL 83-P83-B5	PARCEL 83-P83-B5		
					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		Soil	Soil	Soil
Sample ID					P83-B1-C DUP	P83-B2-A	P83-B2-B	P83-B2-C	P83-B3-A	P83-B3-B	P83-B3-C	P83-B4-A	P83-B4-B	P83-B4-C	P83-B5-A	P83-B5-B	P83-B5-C	P83-B5-C DUP
Sample Date					12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007
Fluorene	2,300	24,000	170	-	< 1.1	< 1.2	NA	< 1.2	< 1.1	NA	< 1.2	< 1.2	NA	< 1.2	< 1	NA	< 1.2	< 1.2
Indeno(1,2,3-cd)pyrene	5	17	7	-	< 1.1	< 1.2	NA	< 1.2	0.26 J	NA	< 1.2	< 1.2	NA	< 1.2	< 1	NA	< 1.2	< 1.2
Naphthalene	6	17	25	-	< 1.1	0.55 J	NA	< 1.2	0.16 J	NA	< 1.2	< 1.2	NA	< 1.2	0.14 J	NA	< 1.2	< 1.2
Phenanthrene	NLE	300,000	NLE	-	0.13 J	0.91 J	NA	< 1.2	0.52 J	NA	< 1.2	0.12 J	NA	0.16 J	0.76 J	NA	0.091 J	< 1.2
Pyrene	1,700	18,000	840	-	0.29 J	1.9	NA	< 1.2	1.7	NA	< 1.2	0.5 J	NA	0.21 J	1.5	NA	< 1.2	< 1.2
Total Petroleum Hydrocarbons (mg/kg)																		
Total Petroleum Hydrocarbons	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)																		
C10-C12 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C12-C16 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C12-C16 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C16-C21 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)																		
Aroclor-1016	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	0.2	NLE	NLE	-	< 0.0041	< 0.0041	NA	< 0.0041	< 0.0041	NA	< 0.0041	< 0.0041	NA	< 0.004	0.8	NA	< 0.0041	< 0.0039
Aroclor-1268	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)																		
Aluminum	78,000	NLE	6,000	15,200	< 8880	< 10400	NA	< 13500	< 8880	NA	< 12800	< 8910	NA	< 18500	< 11300	NA	< 19400	< 18500
Antimony	31	450	6	ND	< 0.465	< 0.543	NA	< 0.44	< 0.423	NA	< 0.501	< 0.463	NA	< 0.48	6.5	NA	< 0.485	< 0.483
Arsenic	19	19	19	22.9	9.69	10.8	NA	7.93	7.12	NA	6.41	6.04	NA	5.93	7.34	NA	10.3	10.8
Barium	16,000	59,000	2,100	32.3	< 35.5	< 52.1	NA	< 18.4	< 81.4	NA	< 32.5	< 33.7	NA	< 24.6	< 182	NA	< 24.4	< 23.8
Beryllium	16	140	0.7	2	0.996	0.931	NA	1.88	0.752	NA	1.63	0.582	NA	1.91	0.942	NA	2.68	2.57
Cadmium	78	78	2	ND	< 0.044	0.709	NA	0.633	1.01	NA	0.277	0.445	NA	0.476	3.15	NA	0.862	0.874
Calcium	NLE	NLE	NLE	921	< 757	< 2490	NA	< 947	< 8590	NA	< 430	< 3620	NA	< 2320	< 979	NA	< 725	< 741
Chromium	NLE	NLE	NLE	269	< 80.5	< 83.3	NA	< 150	< 28.4	NA	< 105	< 45.1	NA	< 168	< 105	NA	< 207	< 202
Cobalt	1,600	590	90	2.5	0.824	2.78	NA	1.83	5.07	NA	1.13	1.31	NA	1.25	2.06	NA	2.16	2.27
Copper	3,100	45,000	11,000	8	< 10.1	< 39.4	NA	< 15.3	< 109	NA	< 10.4	< 33	NA	< 8.35	2,930 EB	NA	< 9.46	< 10.4
Iron	NLE	NLE	NLE	55,800	< 36400	31,800	NA	56,800	16,200	NA	46,500	18,700	NA	62,900	38,400	NA	83,200	80,300
Lead	400	800	90	19.5	17.1	111	NA	0.869	103	NA	1.47	45.2	NA	1.57	97.2	NA	< 0.392	< 0.391
Magnesium	NLE	NLE	NLE	7,230	< 3760	< 3240	NA	< 6730	< 4450	NA	< 5350	< 2190	NA	< 8360	< 3240	NA	< 10200	< 9470
Manganese	11,000	5,900	65	90.7	< 16.4	< 122	NA	< 44.7	< 292	NA	< 32.3	< 111	NA	< 55.2	< 110	NA	< 32	< 30.2
Mercury	23	65	0.1	ND	< 0.114	< 0.119	NA	< 0.115	< 0.11	NA	< 0.118	< 0.112	NA	< 0.114	4.66	NA	< 0.107	< 0.113
Nickel	1,600	23,000	48	8.4	7.25	< 12	NA	< 20.2	< 18.7	NA	< 7.41	< 9.75	NA	< 7.96	< 46.1	NA	< 8.96	< 9.7
Potassium	NLE	NLE	NLE	15,400	8,330	< 5020	NA	< 14900	< 1540	NA	< 11600	< 3430	NA	< 18000	< 6920	NA	< 23900	< 22200
Selenium	390	5,700	11	1.9	< 0.686	< 0.802	NA	< 0.649	< 0.624	NA	< 0.739	< 0.684	NA	< 0.708	< 0.669	NA	< 0.716	< 0.713
Sodium	NLE	NLE	NLE	51.6	< 40.273	< 47.093	NA	< 38.122	< 36.662	NA	< 43.403	< 40.166	NA	< 41.585	< 39.258	NA	< 42.017	< 41.831
Vanadium	390 ⁽¹⁾	1,100	NLE	94.1	45.9	60.2	NA	73.8	34.5	NA	58	92.7	NA	44.8	104	NA	104	100
Zinc	23,000	110,000	930	81.4	46.9	< 136	NA	< 112	< 148	NA	< 59.5	< 77.8	NA	< 64.8	< 1100	NA	< 79.1	< 84.2

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dat

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non-Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PARCEL 83-SS/SB/GW-10				PARCEL 83-SS/SB-11			PARCEL 83-SS/SB/GW-12			PARCEL 83-SS/SB-13		
Sample ID					P83-SB10-A	P83-SB10-B	P83-SB10-C	P83-SB10-D	P83-SB11-A	P83-SB11-B	P83-SB11-C	P83-SB12-A	P83-SB12-B	P83-SB12-C	P83-SB13-A	P83-SB13-B	P83-SB13-C
Sample Date					12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/18/2007	12/18/2007	12/18/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007
Volatile Organic Compounds (mg/kg)																	
1,1,1,2-Tetrachloroethane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	160,000	NLE	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	1	3	0.007	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	2	6	0.02	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	8	24	0.2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	11	150	0.008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	73	820	0.7	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	0.08	0.2	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	0.008	0.04	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	5,300	59,000	17	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	0.9	3	0.005	-	NA	< 0.24	< 0.27	< 0.25	NA	< 0.26	< 0.27	NA	< 0.34	< 0.27	NA	< 0.3	< 0.28
1,2-Dichloropropane	2	5	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	5,300	59,000	19	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	5	13	2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	70,000	NLE	19	-	NA	1	1	1.1	NA	0.081 J	0.092 J	NA	< 4.2	< 3.4	NA	< 4.1	< 3.7
Benzene	2	5	0.005	-	NA	< 0.24	< 0.27	< 0.25	NA	< 0.26	< 0.27	NA	< 0.34	0.016 J	NA	< 0.3	< 0.28
Bromobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	1	3	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	81	280	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	7,800	110,000	6	-	NA	< 0.24	< 0.27	< 0.25	NA	< 0.26	< 0.27	NA	< 0.34	< 0.27	NA	< 0.3	< 0.28
Carbon tetrachloride	2	4	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	510	7,400	0.6	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorodibromomethane	3	8	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	220	1,100	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	0.6	2	0.4	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,2-Dichloroethene	230	560	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	490	230,000	39	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl benzene	7,800	110,000	13	-	NA	< 0.24	< 0.27	< 0.25	NA	< 0.26	< 0.27	NA	< 0.34	0.077 J	NA	< 0.3	0.02 J
Hexachlorobutadiene	6	25	0.9	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Meta/Para Xylene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl bromide	25	59	0.04	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl butyl ketone	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl chloride	4	12	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl ethyl ketone	3,100	44,000	0.9	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl isobutyl ketone	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Tertbutyl Ether	110	320	0.2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	46	230	0.01	-	NA	< 0.24	0.023 J	< 0.25	NA	< 0.26	< 0.27	NA	0.11 JB	0.072 JB	NA	0.093 JB	0.099 JB
Naphthalene	6	17	25	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ortho Xylene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
p-Chlorotoluene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	90	260	3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tert Butyl Alcohol	1,400	11,000	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
tert-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	43	1,500	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	6,300	91,000	7	-	NA	< 0.24	< 0.27	< 0.25	NA	< 0.26	< 0.27	NA	< 0.34	0.11 J	NA	< 0.3	0.061 J
Total Xylenes	12,000	170,000	19	-	NA	< 0.72	< 0.8	< 0.76	NA	< 0.79	< 0.81	NA	< 1.02	0.294 J	NA	< 0.89	0.063 J

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non- Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PARCEL 83-SS/SB/GW-10				PARCEL 83-SS/SB-11			PARCEL 83-SS/SB/GW-12			PARCEL 83-SS/SB-13		
Sample ID					P83-SB10-A	P83-SB10-B	P83-SB10-C	P83-SB10-D	P83-SB11-A	P83-SB11-B	P83-SB11-C	P83-SB12-A	P83-SB12-B	P83-SB12-C	P83-SB13-A	P83-SB13-B	P83-SB13-C
Sample Date					12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/18/2007	12/18/2007	12/18/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007
Total Petroleum Hydrocarbons (mg/kg)																	
Total Petroleum Hydrocarbons	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)																	
C10-C12 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C12-C16 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C12-C16 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C16-C21 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)																	
Aroclor-1016	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	0.2	NLE	NLE	-	< 0.004	NA	< 0.0039	< 0.0039	0.2	NA	< 0.0041	< 0.0039	NA	< 0.004	< 0.004	NA	< 0.0042
Aroclor-1268	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)																	
Aluminum	78,000	NLE	6,000	15,200	< 7040	NA	< 24600	< 15600	< 12700	NA	< 16800	< 7970	NA	< 19100	< 16000	NA	< 19100
Antimony	31	450	6	ND	2.64	NA	< 0.431	< 0.428	< 0.46	NA	< 0.46	< 0.434	NA	< 0.462	< 0.46	NA	< 0.433
Arsenic	19	19	19	22.9	27.1	NA	9.81	11.9	8.96	NA	9.5	5.13	NA	8.73	12.8	NA	9.88
Barium	16,000	59,000	2,100	32.3	< 148	NA	< 54.1	< 27.2	< 44.8	NA	< 25.6	< 61.3	NA	< 45.6	< 53	NA	< 67.3
Beryllium	16	140	0.7	2	0.539	NA	1.73	1.38	1.18	NA	2.07	0.312	NA	1.6	1.27	NA	2.02
Cadmium	78	78	2	ND	1.08	NA	0.627	0.613	0.222	NA	0.353	< 0.467	NA	< 0.422	< 0.52	NA	< 0.716
Calcium	NLE	NLE	NLE	921	< 3210	NA	< 1140	< 486	< 1670	NA	< 2080	< 39400	NA	< 1750	< 2970	NA	< 2060
Chromium	NLE	NLE	NLE	269	< 41.8	NA	< 125	< 105	73.7	NA	156	21.5	NA	97.4	81.1	NA	149
Cobalt	1,600	590	90	2.5	4.96	NA	0.876	3.68	1.78	NA	1.82	1.44	NA	1.71	0.725	NA	1.78
Copper	3,100	45,000	11,000	8	< 244	NA	< 7.17	< 6.6	< 23.8	NA	< 6.77	< 44	NA	< 7.87	< 21.4	NA	< 13.1
Iron	NLE	NLE	NLE	55,800	24,600	NA	49,800	47,800	< 33300	NA	< 66600	< 14100	NA	< 45300	< 37200	NA	< 67000
Lead	400	800	90	19.5	401	NA	2.72	1.13	49.9	NA	0.754	63	NA	4.24	44.4	NA	62.8
Magnesium	NLE	NLE	NLE	7,230	< 1840	NA	< 6520	< 5170	< 3620	NA	< 7130	< 3730	NA	< 4950	< 4120	NA	< 7330
Manganese	11,000	5,900	65	90.7	< 53.1	NA	< 99.5	< 62.4	< 119	NA	< 35.3	177	NA	174	151	NA	89
Mercury	23	65	0.1	ND	< 0.113	NA	< 0.104	< 0.108	< 0.121	NA	< 0.104	< 0.098	NA	< 0.116	< 0.107	NA	< 0.101
Nickel	1,600	23,000	48	8.4	< 13.3	NA	< 9.34	< 7.75	8.87	NA	7.65	12.7	NA	13.9	13.1	NA	9.41
Potassium	NLE	NLE	NLE	15,400	< 1800	NA	< 12600	< 11300	< 6720	NA	< 16100	1,210	NA	7,370	7,910	NA	16,500
Selenium	390	5,700	11	1.9	< 0.657	NA	< 0.637	< 0.632	< 0.679	NA	< 0.68	< 0.64	NA	< 0.683	< 0.679	NA	< 0.64
Sodium	NLE	NLE	NLE	51.6	< 68.8	NA	< 37.391	< 37.122	< 39.868	NA	< 39.898	< 37.577	NA	< 40.074	< 39.869	NA	< 37.554
Vanadium	390 ⁽¹⁾	1,100	NLE	94.1	27.4	NA	81.1	76.6	52.5	NA	81.8	32.8	NA	64	60.4	NA	88.5
Zinc	23,000	110,000	930	81.4	< 49.6	NA	< 51.2	< 47.9	< 82.2	NA	< 65.9	116	NA	66.7	97.5	NA	113

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dataset.

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non-Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PARCEL 83-SS/SB/GW-14				PARCEL 83-SS/SB-15			PARCEL 83-SS/SB-16			PARCEL 83-SS/SB/GW-17		
Sample ID					P83-SB14-A	P83-SB14-B	P83-SB14-C	P83-SB14-C DUP	P83-SB15-A	P83-SB15-B	P83-SB15-C	P83-SB16-A	P83-SB16-B	P83-SB16-C	P83-SB17-A	P83-SB17-B	P83-SB17-C
Sample Date					12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007
Volatile Organic Compounds (mg/kg)																	
1,1,1,2-Tetrachloroethane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	160,000	NLE	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	1	3	0.007	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	2	6	0.02	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	8	24	0.2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	11	150	0.008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	73	820	0.7	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	0.08	0.2	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	0.008	0.04	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	5,300	59,000	17	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	0.9	3	0.005	-	NA	< 0.3	< 0.37	< 0.33	NA	< 0.29	< 0.27	NA	< 0.31	< 0.29	NA	< 0.28	< 0.26
1,2-Dichloropropane	2	5	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	5,300	59,000	19	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	5	13	2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	70,000	NLE	19	-	NA	0.2 J	< 0.37	< 0.33	NA	0.93	< 0.27	NA	1.2	< 0.29	NA	< 0.28	< 0.26
Benzene	2	5	0.005	-	NA	< 0.3	< 0.37	< 0.33	NA	< 0.29	< 0.27	NA	< 0.31	< 0.29	NA	< 0.28	< 0.26
Bromobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	1	3	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	81	280	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	7,800	110,000	6	-	NA	< 0.3	< 0.37	< 0.33	NA	0.039 J	< 0.27	NA	< 0.31	< 0.29	NA	< 0.28	< 0.26
Carbon tetrachloride	2	4	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	510	7,400	0.6	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorodibromomethane	3	8	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	220	1,100	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	0.6	2	0.4	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,2-Dichloroethene	230	560	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	490	230,000	39	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl benzene	7,800	110,000	13	-	NA	< 0.3	< 0.37	< 0.33	NA	< 0.29	< 0.27	NA	< 0.31	< 0.29	NA	< 0.28	< 0.26
Hexachlorobutadiene	6	25	0.9	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Meta/Para Xylene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl bromide	25	59	0.04	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl butyl ketone	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl chloride	4	12	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl ethyl ketone	3,100	44,000	0.9	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl isobutyl ketone	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Tertbutyl Ether	110	320	0.2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	46	230	0.01	-	NA	< 0.3	< 0.37	< 0.33	NA	< 0.29	< 0.27	NA	< 0.31	< 0.29	NA	< 0.28	< 0.26
Naphthalene	6	17	25	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ortho Xylene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
p-Chlorotoluene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	90	260	3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tert Butyl Alcohol	1,400	11,000	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
tert-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	43	1,500	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	6,300	91,000	7	-	NA	< 0.3	< 0.37	< 0.33	NA	< 0.29	< 0.27	NA	< 0.31	< 0.29	NA	< 0.28	< 0.26
Total Xylenes	12,000	170,000	19	-	NA	< 0.9	< 1.12	< 0.98	NA	< 0.87	< 0.81	NA	< 0.92	< 0.86	NA		

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non- Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PARCEL 83-SS/SB/GW-14				PARCEL 83-SS/SB-15			PARCEL 83-SS/SB-16			PARCEL 83-SS/SB/GW-17		
Sample ID					P83-SB14-A	P83-SB14-B	P83-SB14-C	P83-SB14-C DUP	P83-SB15-A	P83-SB15-B	P83-SB15-C	P83-SB16-A	P83-SB16-B	P83-SB16-C	P83-SB17-A	P83-SB17-B	P83-SB17-C
Sample Date					12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007
Total Petroleum Hydrocarbons (mg/kg)																	
Total Petroleum Hydrocarbons	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)																	
C10-C12 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C12-C16 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C12-C16 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C16-C21 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)																	
Aroclor-1016	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	0.2	NLE	NLE	-	0.07	NA	< 0.004	< 0.0041	< 0.0041	NA	< 0.0041	< 0.0041	NA	< 0.0042	< 0.0041	NA	< 0.0039
Aroclor-1268	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)																	
Aluminum	78,000	NLE	6,000	15,200	< 6480	NA	< 19000	< 16900	< 8030	NA	< 19800	< 6520	NA	< 17000	< 17100	NA	< 9680
Antimony	31	450	6	ND	< 0.417	NA	< 0.458	< 0.433	< 0.436	NA	< 0.476	< 0.421	NA	< 0.451	< 0.443	NA	< 0.428
Arsenic	19	19	19	22.9	5.22	NA	10.2	8.87	4.51	NA	14.3	4.17	NA	7.93	9.08	NA	8.88
Barium	16,000	59,000	2,100	32.3	< 23.8	NA	< 45.6	< 43.2	< 50.9	NA	< 32.5	< 50.7	NA	< 46.5	< 53.9	NA	< 19.5
Beryllium	16	140	0.7	2	0.295	NA	1.84	1.82	0.0474	NA	1.9	0.497	NA	1.52	1.88	NA	0.983
Cadmium	78	78	2	ND	0.207	NA	0.366	0.154	0.426	NA	0.377	0.276	NA	0.129	0.429	NA	0.118
Calcium	NLE	NLE	NLE	921	< 590	NA	< 1830	< 1960	< 5490	NA	< 1410	< 3300	NA	< 1020	< 1410	NA	< 326
Chromium	NLE	NLE	NLE	269	23.9	NA	138	130	203	NA	136	21.4	NA	107	124	NA	60.2
Cobalt	1,600	590	90	2.5	< 0.317	NA	1.97	2.64	1.5	NA	3.25	2.66	NA	1.99	3.24	NA	0.938
Copper	3,100	45,000	11,000	8	< 11.8	NA	< 13.6	< 16.8	< 39.9	NA	< 9.34	< 39.5	NA	< 7.24	< 8.35	NA	< 4.28
Iron	NLE	NLE	NLE	55,800	< 16700	NA	< 55600	52,500	< 25300	NA	< 64400	< 15700	NA	< 43300	< 52700	NA	< 35800
Lead	400	800	90	19.5	25.7	NA	9.67	12.5	15.5	NA	2.23	55.1	NA	1.51	10.3	NA	0.498
Magnesium	NLE	NLE	NLE	7,230	< 719	NA	< 6150	< 6030	< 2670	NA	< 6850	< 835	NA	< 5070	< 5740	NA	< 2320
Manganese	11,000	5,900	65	90.7	< 51.4	NA	< 126	< 158	< 1240	NA	< 87.2	< 51.7	NA	< 136	< 90.8	NA	< 83.6
Mercury	23	65	0.1	ND	0.11	NA	< 0.108	< 0.111	< 0.116	NA	< 0.115	< 0.107	NA	< 0.115	< 0.104	NA	< 0.105
Nickel	1,600	23,000	48	8.4	4.51	NA	9.23	9.94	7.76	NA	11.1	12	NA	10.4	12.5	NA	5.82
Potassium	NLE	NLE	NLE	15,400	< 1210	NA	< 12900	< 12300	< 2400	NA	< 13300	< 1440	NA	< 9040	< 13000	NA	< 5190
Selenium	390	5,700	11	1.9	< 0.615	NA	< 0.677	< 0.639	< 0.644	NA	< 0.702	< 0.621	NA	< 0.666	< 0.655	NA	< 0.632
Sodium	NLE	NLE	NLE	51.6	< 36.115	NA	< 39.729	< 37.506	< 37.78	NA	< 41.224	< 36.446	NA	< 39.087	< 38.426	NA	< 37.117
Vanadium	390 ⁽¹⁾	1,100	NLE	94.1	30.9	NA	82.5	75.7	37.3	NA	84.6	39.4	NA	65.9	74.9	NA	60.9
Zinc	23,000	110,000	930	81.4	< 52	NA	< 79.2	< 81.8	< 173	NA	< 150	< 54.4	NA	< 63.5	< 83.3	NA	< 40.3

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dataset.

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non- Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PARCEL 83-SS/SB/GW-1				PARCEL 83-SS/SB-2			PARCEL 83-SS/SB/GW-3				PARCEL 83-SS/SB-4	
Sample ID					P83-SB1-A	P83-SB1-B	P83-SB1-C DUP	P83-SB1-C	P83-SB2-A	P83-SB2-B	P83-SB2-C	P83-SB3-A	P83-SB3-B	P83-SB3-C	P83-SB3-C DUP	P83-SB4-A	P83-SB4-B
Sample Date					12/19/2007	12/19/2007	12/18/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007
Volatile Organic Compounds (mg/kg)																	
1,1,1,2-Tetrachloroethane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	160,000	NLE	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	1	3	0.007	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	2	6	0.02	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	8	24	0.2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	11	150	0.008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	73	820	0.7	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	0.08	0.2	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	0.008	0.04	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	5,300	59,000	17	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	0.9	3	0.005	-	NA	< 0.25	< 0.3	< 0.27	NA	< 0.25	< 0.28	NA	< 0.25	< 0.26	< 0.27	NA	< 0.25
1,2-Dichloropropane	2	5	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	5,300	59,000	19	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	5	13	2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	70,000	NLE	19	-	NA	0.71	1	< 0.27	NA	< 0.25	< 0.28	NA	< 3.2	< 3.3	< 3.1	NA	< 3
Benzene	2	5	0.005	-	NA	< 0.25	< 0.3	< 0.27	NA	< 0.25	< 0.28	NA	< 0.25	< 0.26	< 0.27	NA	< 0.25
Bromobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	1	3	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	81	280	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	7,800	110,000	6	-	NA	< 0.25	< 0.3	< 0.27	NA	< 0.25	< 0.28	NA	< 0.25	< 0.26	< 0.27	NA	< 0.25
Carbon tetrachloride	2	4	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	510	7,400	0.6	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorodibromomethane	3	8	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	220	1,100	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	0.6	2	0.4	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,2-Dichloroethene	230	560	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	490	230,000	39	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl benzene	7,800	110,000	13	-	NA	< 0.25	< 0.3	< 0.27	NA	< 0.25	< 0.28	NA	< 0.25	0.036 J	< 0.27	NA	0.028 J
Hexachlorobutadiene	6	25	0.9	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Meta/Para Xylene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl bromide	25	59	0.04	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl butyl ketone	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl chloride	4	12	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl ethyl ketone	3,100	44,000	0.9	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl isobutyl ketone	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Tertbutyl Ether	110	320	0.2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	46	230	0.01	-	NA	< 0.25	< 0.3	< 0.27	NA	< 0.25	< 0.28	NA	0.073 JB	0.077 JB	0.089 JB	NA	0.056 JB
Naphthalene	6	17	25	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ortho Xylene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
p-Chlorotoluene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	90	260	3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tert Butyl Alcohol	1,400	11,000	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
tert-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	43	1,500	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	6,300	91,000	7	-	NA	< 0.25	< 0.3	< 0.27	NA	< 0.25	< 0.28	NA	< 0.25	0.022 J	< 0.27	NA	< 0.25
Total Xylenes	12,000	170,000	19	-	NA	< 0.76	< 0.9	< 0.81	NA	< 0.75	< 0.85	NA	< 0.74	0.05 J	0.06 J	NA	0.047 J
Trans-1,2-Dichloroethene	300	720	0.6	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trans-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	3	10	0.01	-	NA	< 0.25	< 0.3	< 0.27	NA	< 0.25	< 0.28	NA	< 0.25	< 0.26	< 0.27	NA	< 0.25
Trichlorofluoromethane	23,000	340,000	34	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	0.7	2	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TIC VOCs (mg/kg)																	
Total TICs	500	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (mg/kg)																	
1-Methylnaphthalene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	230	2,400	8	-	< 1.1	NA	< 1.2	< 1.2	< 1	NA	< 1.2	< 1.1	NA	1.3	1.2	< 1.1	NA
4-Chloroaniline	NLE	NLE	NLE	-	< 1.1	NA	< 1.2	< 1.2	< 1	NA	< 1.2	< 1.1	NA	< 1.2	0.47 J	< 1.1	NA
Acenaphthene	3,400	37,000	110	-	< 1.1	NA	< 1.2	< 1.2	< 1	NA	< 1.2	< 1.1	NA	< 1.2	< 1.2	< 1.1	NA
Acenaphthylene	NLE	300,000	NLE	-	< 1.1	NA	< 1.2	< 1.2	< 1	NA	< 1.2	< 1.1	NA	< 1.2	< 1.2	0.31 J	NA
Anthracene	17,000	30,000	2,400	-	< 1.1	NA	< 1.2	< 1.2	< 1	NA	< 1.2	< 1.1	NA	< 1.2	< 1.2	0.28 J	NA
Benzo(a)anthracene	5	17	0.8	-	< 1.1	NA	< 1.2	< 1.2	< 1	NA	< 1.2	< 1.1	NA	< 1.2	< 1.2	1.8	NA
Benzo(a)pyrene	0.5	2	0.2	-	< 1.1	NA	< 1.2	< 1.2	< 1	NA	< 1.2	< 1.1	NA	< 1.2	< 1.2	1.9	NA
Benzo(b)fluoranthene	5	17	2	-	< 1.1	NA	< 1.2	< 1.2	< 1	NA	< 1.2	< 1.1	NA	< 1.2	< 1.2	3.1	NA
Benzo(ghi)perylene	380,000	30,000	NLE	-	< 1.1	NA	< 1.2	< 1.2	< 1	NA	< 1.2	< 1.1	NA	< 1.2	< 1.2	0.71 J	NA
Benzo(k)fluoranthene	45	170	25	-	< 1.1	NA	< 1.2	< 1.2	< 1	NA	< 1.2	< 1.1	NA	< 1.2	< 1.2	1.4 J	NA
Bis(2-Chloroethyl)ether	0.4	2	0.2	-	< 1.1	NA	< 1.2	< 1.2	< 1	NA	< 1.2	< 1.1	NA	< 1.2	< 1.2	< 1.1	NA
Bis(2-Ethylhexyl)phthalate	35	140	1,200	-	0.2 JB	NA	0.12 JB	0.18 JB	0.12 JB	NA	0.21 JB	0.24 JB	NA	0.29 JB	< 1.2	0.24 JB	NA
Butyl benzyl phthalate	1,200	14,000	230	-	< 1.1	NA	< 1.2	< 1.2	< 1	NA	< 1.2	< 1.1	NA	< 1.2	< 1.2	< 1.1	NA
Chrysene	450	1,700	80	-	< 1.1	NA	< 1.2	< 1.2	< 1	NA	< 1.2	< 1.1	NA	< 1.2	< 1.2	1.9	NA
Dibenz(a,h)anthracene	0.5	2	0.8	-	< 1.1	NA	< 1.2	< 1.2	< 1	NA	< 1.2	< 1.1	NA	< 1.2	< 1.2	< 1.1	NA</

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non-Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PARCEL 83-SS/SB/GW-1				PARCEL 83-SS/SB-2			PARCEL 83-SS/SB/GW-3				PARCEL 83-SS/SB-4	
Sample ID					P83-SB1-A	P83-SB1-B	P83-SB1-C DUP	P83-SB1-C	P83-SB2-A	P83-SB2-B	P83-SB2-C	P83-SB3-A	P83-SB3-B	P83-SB3-C	P83-SB3-C DUP	P83-SB4-A	P83-SB4-B
Sample Date					12/19/2007	12/19/2007	12/18/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007
Total Petroleum Hydrocarbons (mg/kg)																	
Total Petroleum Hydrocarbons	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)																	
C10-C12 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C12-C16 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C12-C16 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C16-C21 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)																	
Aroclor-1016	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	0.2	NLE	NLE	-	< 0.004	NA	< 0.0041	< 0.0042	< 0.004	NA	< 0.004	< 0.004	NA	< 0.0041	< 0.004	< 0.004	NA
Aroclor-1268	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)																	
Aluminum	78,000	NLE	6,000	15,200	< 8360	NA	< 15000	< 15000	< 5530	NA	< 13600	< 9120	NA	< 13800	< 12400	< 10700	NA
Antimony	31	450	6	ND	< 0.434	NA	< 0.48	< 0.448	< 0.472	NA	< 0.498	< 0.422	NA	< 0.476	< 0.468	< 0.49	NA
Arsenic	19	19	19	22.9	3.07	NA	10.2	10.2	3.13	NA	11.4	5.09	NA	8.03	7.93	11.6	NA
Barium	16,000	59,000	2,100	32.3	< 16.6	NA	< 22.6	< 24.1	< 9.06	NA	< 22.2	< 20.5	NA	< 43.3	< 38	< 33.1	NA
Beryllium	16	140	0.7	2	0.228	NA	2.1	2.06	0.191	NA	1.74	0.379	NA	1.4	1.22	0.647	NA
Cadmium	78	78	2	ND	0.105	NA	0.25	0.312	< 0.045	NA	0.0789	< 0.196	NA	< 0.37	< 0.352	< 0.307	NA
Calcium	NLE	NLE	NLE	921	< 471	NA	< 430	< 407	< 289	NA	< 544	< 335	NA	< 1710	< 1320	< 2250	NA
Chromium	NLE	NLE	NLE	269	23.6	NA	156	157	22	NA	136	91.9	NA	78.3	71.8	37.9	NA
Cobalt	1,600	590	90	2.5	0.849	NA	1.88	1.57	< 0.359	NA	1.68	< 0.321	NA	0.51	0.507	1.31	NA
Copper	3,100	45,000	11,000	8	< 5.95	NA	< 7.27	< 6.43	< 6.04	NA	< 5.92	< 5.86	NA	< 8.57	< 8.44	< 14.9	NA
Iron	NLE	NLE	NLE	55,800	< 10400	NA	< 61800	< 59600	10,700	NA	52,700	< 17300	NA	< 35900	< 32000	< 24400	NA
Lead	400	800	90	19.5	5.57	NA	< 0.389	< 0.363	4.18	NA	< 0.403	3.57	NA	11.8	12.2	35.2	NA
Magnesium	NLE	NLE	NLE	7,230	< 626	NA	< 7030	< 6800	537	NA	5,730	< 1080	NA	< 4100	< 3690	< 1950	NA
Manganese	11,000	5,900	65	90.7	< 39.2	NA	< 52.7	< 50.5	< 29.8	NA	< 51.9	23.3	NA	66.8	59.6	90.8	NA
Mercury	23	65	0.1	ND	< 0.103	NA	< 0.112	< 0.117	< 0.118	NA	< 0.112	< 0.095	NA	< 0.104	< 0.105	< 0.107	NA
Nickel	1,600	23,000	48	8.4	3.7	NA	7.65	7.32	3.09	NA	6.57	11.6	NA	9.17	11.3	9.44	NA
Potassium	NLE	NLE	NLE	15,400	< 1190	NA	< 16900	< 16700	< 844	NA	< 13000	2,200	NA	7,860	6,830	2,650	NA
Selenium	390	5,700	11	1.9	< 0.641	NA	< 0.709	< 0.662	< 0.696	NA	< 0.735	< 0.623	NA	< 0.703	< 0.691	< 0.723	NA
Sodium	NLE	NLE	NLE	51.6	< 37.606	NA	< 41,602	< 38,884	< 40,873	NA	< 43.13	< 62	NA	< 475	< 581	< 42,434	NA
Vanadium	390 ⁽¹⁾	1,100	NLE	94.1	26.2	NA	82.7	84.8	21.8	NA	74.8	42.8	NA	51.8	47.1	46.9	NA
Zinc	23,000	110,000	930	81.4	< 14.3	NA	< 66	< 65	< 24	NA	< 50.2	37.8	NA	47.5	59.6	59.1	NA

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dataset.

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non- Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PARCEL-83-SS/SB-4'	PARCEL 83-SS/SB/GW-5				PARCEL 83-SS/SB-6			PARCEL 83-SS/SB/GW-7			PARCEL 83-SS/SB/GW-8		
Sample ID					P83-SB4-C 12/17/2007	P83-SB5-A 12/18/2007	P83-SB5-B 12/18/2007	P83-SB5-C 12/18/2007	P83-SB6-A 12/18/2007	P83-SB6-B 12/18/2007	P83-SB6-C 12/18/2007	P83-SB7-A 12/18/2007	P83-SB7-B 12/18/2007	P83-SB7-C 12/18/2007	P83-SB8-A 12/19/2007	P83-SB8-B 12/19/2007	P83-SB8-C 12/19/2007	
Sample Date	Volatile Organic Compounds (mg/kg)																	
1,1,1,2-Tetrachloroethane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1,1-Trichloroethane	160,000	NLE	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1,2,2-Tetrachloroethane	1	3	0.007	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1,2-Trichloroethane	2	6	0.02	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1-Dichloroethane	8	24	0.2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1-Dichloroethene	11	150	0.008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,3-Trichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,3-Trichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,4-Trichlorobenzene	73	820	0.7	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,4-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2-Dibromo-3-chloropropane	0.08	0.2	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2-Dibromoethane	0.008	0.04	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2-Dichlorobenzene	5,300	59,000	17	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2-Dichloroethane	0.9	3	0.005	-	< 0.28	NA	< 0.32	< 0.29	NA	< 0.25	< 0.27	NA	< 0.24	< 0.27	NA	0.33	< 0.29	
1,2-Dichloropropane	2	5	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,3,5-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,3-Dichlorobenzene	5,300	59,000	19	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,3-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,4-Dichlorobenzene	5	13	2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
2-Chlorotoluene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Acetone	70,000	NLE	19	-	< 3.8	NA	0.11 J	0.11 J	NA	0.076 J	< 0.27	NA	0.15 J	0.18 J	NA	< 0.3	< 0.29	
Benzene	2	5	0.005	-	< 0.28	NA	< 0.32	< 0.29	NA	< 0.25	< 0.27	NA	< 0.24	< 0.27	NA	< 0.3	< 0.29	
Bromobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Bromochloromethane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Bromodichloromethane	1	3	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Bromoform	81	280	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Carbon disulfide	7,800	110,000	6	-	< 0.28	NA	< 0.32	< 0.29	NA	< 0.25	< 0.27	NA	< 0.24	< 0.27	NA	0.098 J	< 0.29	
Carbon tetrachloride	2	4	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chlorobenzene	510	7,400	0.6	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chlorodibromomethane	3	8	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chloroethane	220	1,100	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chloroform	0.6	2	0.4	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Cis-1,2-Dichloroethene	230	560	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Dichlorodifluoromethane	490	230,000	39	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Ethyl benzene	7,800	110,000	13	-	< 0.28	NA	< 0.32	< 0.29	NA	< 0.25	< 0.27	NA	< 0.24	< 0.27	NA	< 0.3	< 0.29	
Hexachlorobutadiene	6	25	0.9	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Isopropylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Meta/Para Xylene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl bromide	25	59	0.04	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl butyl ketone	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl chloride	4	12	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl ethyl ketone	3,100	44,000	0.9	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl isobutyl ketone	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methyl Tertbutyl Ether	110	320	0.2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methylene chloride	46	230	0.01	-	0.068 JB	NA	< 0.32	< 0.29	NA	< 0.25	< 0.27	NA	< 0.24	< 0.27	NA	< 0.3	< 0.29	
Naphthalene	6	17	25	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
n-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Ortho Xylene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
p-Chlorotoluene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Propylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
sec-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Styrene	90	260	3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Tert Butyl Alcohol	1,400	11,000	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
tert-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Tetrachloroethene	43	1,500	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Toluene	6,300	91,000	7	-	< 0.28	NA	< 0.32	< 0.29	NA	< 0.25	< 0.27	NA	< 0.24	< 0.27	NA	< 0.3	< 0.29	
Total Xylenes	12,000	170,000	19	-	< 0.28	NA	< 0.79	< 0.87	NA	< 0.76	< 0.82	NA	< 0.72	< 0.81	NA	< 0.9	< 0.87	
Trans-1,2-Dichloroethene	300	720	0.6	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Trans-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Trichloroethene	3	10	0.01	-	< 0.28	NA	< 0.32	< 0.29	NA	< 0.25	< 0.27	NA	< 0.24	< 0.27	NA	< 0.3	< 0.29	
Trichlorofluoromethane	23,000	340,000	34	-	NA	NA	NA	NA	NA	NA	NA>							

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non- Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PARCEL-83-SS/SB-4'	PARCEL 83-SS/SB/GW-5				PARCEL 83-SS/SB/GW-6			PARCEL 83-SS/SB/GW-7			PARCEL 83-SS/SB/GW-8		
Sample ID					P83-SB4-C	P83-SB5-A	P83-SB5-B	P83-SB5-C		P83-SB6-A	P83-SB6-B	P83-SB6-C	P83-SB7-A	P83-SB7-B	P83-SB7-C	P83-SB8-A	P83-SB8-B	P83-SB8-C
Sample Date					12/17/2007	12/18/2007	12/18/2007	12/18/2007		12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/19/2007	12/19/2007	12/19/2007
Total Petroleum Hydrocarbons (mg/kg)																		
Total Petroleum Hydrocarbons	NLE	NLE	NLE	-	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)																		
C10-C12 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA
C12-C16 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA
C12-C16 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA
C16-C21 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)																		
Aroclor-1016	0.2	NLE	NLE	-	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.2	NLE	NLE	-	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.2	NLE	NLE	-	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.2	NLE	NLE	-	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.2	NLE	NLE	-	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.2	NLE	NLE	-	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	0.2	NLE	NLE	-	< 0.0041	< 0.0041	NA	< 0.0041		< 0.0041	NA	< 0.0041	< 0.0041	NA	< 0.0041	< 0.004	NA	< 0.0042
Aroclor-1268	0.2	NLE	NLE	-	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)																		
Aluminum	78,000	NLE	6,000	15,200	< 16900	< 9970	NA	< 12100		< 5070	NA	< 12900	< 5250	NA	< 10800	< 9520	NA	< 18700
Antimony	31	450	6	ND	< 0.459	< 0.418	NA	< 0.467		1.85	NA	< 0.492	< 0.472	NA	< 0.479	< 0.414	NA	< 0.453
Arsenic	19	19	19	22.9	9.24	5.85	NA	8.74		5.65	NA	7.41	4.4	NA	8.94	6.18	NA	10
Barium	16,000	59,000	2,100	32.3	< 53.1	< 23.3	NA	< 41.3		< 78	NA	< 44.8	< 19.4	NA	< 33.1	< 21.7	NA	< 38.6
Beryllium	16	140	0.7	2	1.44	1.27	NA	1.12		0.442	NA	0.96	0.397	NA	0.94	0.44	NA	1.52
Cadmium	78	78	2	ND	< 0.384	0.216	NA	0.113		0.335	NA	0.0591	0.152	NA	0.0948	0.403	NA	0.287
Calcium	NLE	NLE	NLE	921	< 2280	< 1460	NA	< 1360		< 1550	NA	< 1090	< 1650	NA	< 2320	< 1050	NA	< 1330
Chromium	NLE	NLE	NLE	269	89.6	99.9	NA	61.4		20.9	NA	54.1	33.4	NA	94.9	53.7	NA	104
Cobalt	1,600	590	90	2.5	< 0.35	1.82	NA	0.596		3.33	NA	0.629	< 0.359	NA	0.364	1.98	NA	1.17
Copper	3,100	45,000	11,000	8	< 11.7	< 21.1	NA	< 8.76		< 118	NA	< 6.65	< 11	NA	< 27	< 29.3	NA	< 9.52
Iron	NLE	NLE	NLE	55,800	< 37300	< 37700	NA	< 27100		< 17900	NA	< 21800	< 13000	NA	< 27800	17,400	NA	51,100
Lead	400	800	90	19.5	8.74	20.5	NA	15.5		103	NA	14.4	16	NA	27.7	44.1	NA	4.15
Magnesium	NLE	NLE	NLE	7,230	< 4490	< 4110	NA	< 3030		< 775	NA	< 2480	< 1290	NA	< 3900	1,270	NA	4,990
Manganese	11,000	5,900	65	90.7	75.5	< 51.5	NA	< 142		< 69.5	NA	69.5	< 60.6	NA	< 48.1	< 42.4	NA	< 104
Mercury	23	65	0.1	ND	< 0.105	< 0.113	NA	< 0.115		0.16	NA	< 0.11	< 0.118	NA	< 0.111	< 0.097	NA	< 0.107
Nickel	1,600	23,000	48	8.4	9.56	6.91	NA	6.2		11.9	NA	7.61	3.59	NA	5.86	5.91	NA	8.19
Potassium	NLE	NLE	NLE	15,400	8,740	< 9390	NA	< 4910		< 1300	NA	< 3280	< 2320	NA	< 6910	< 2400	NA	< 12900
Selenium	390	5,700	11	1.9	< 0.677	< 0.617	NA	< 0.689		< 0.636	NA	< 0.727	< 0.696	NA	< 0.707	< 0.611	NA	< 0.669
Sodium	NLE	NLE	NLE	51.6	< 39,769	< 36,221	NA	< 40,462		< 37,365	NA	< 306	< 40,873	NA	< 41,505	< 35,851	NA	< 39,303
Vanadium	390 ⁽¹⁾	1,100	NLE	94.1	58.5	61.1	NA	41.9		21.9	NA	39.2	23.6	NA	54.2	47.8	NA	71.3
Zinc	23,000	110,000	930	81.4	56.4	< 107	NA	< 47.5		< 63.2	NA	< 43.7	< 45.7	NA	< 61.3	< 58.2	NA	< 51.1

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dataset.

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non-Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PARCEL 83-SS/SB-09			PARCEL 83-P83-SS18	PARCEL 83-P83-SS19	PARCEL 83-P83-SS20	PAR-83-482-SB-01		
Sample ID					P83-SB9-A	P83-SB9-B	P83-SB9-C	P83-SS18	P83-SS19	P83-SS20	PAR-83-482-SB-01-0.5-1	PAR-83-482-SB-01-1.5-2	PAR-83-482-SB-01-7.5-8
Sample Date					12/17/2007	12/17/2007	12/17/2007	12/18/2007	12/18/2007	12/18/2007	11/13/2017	11/13/2017	11/13/2017
Volatile Organic Compounds (mg/kg)													
1,1,1,2-Tetrachloroethane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	160,000	NLE	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	1	3	0.007	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	2	6	0.02	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	8	24	0.2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	11	150	0.008	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	73	820	0.7	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	0.08	0.2	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	0.008	0.04	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	5,300	59,000	17	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	0.9	3	0.005	-	NA	< 0.39	< 0.26	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	2	5	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	5,300	59,000	19	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	5	13	2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	70,000	NLE	19	-	NA	< 5	< 4.3	NA	NA	NA	NA	NA	NA
Benzene	2	5	0.005	-	NA	< 0.39	< 0.26	NA	NA	NA	NA	NA	NA
Bromobenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	1	3	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	81	280	0.03	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	7,800	110,000	6	-	NA	< 0.39	< 0.26	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	2	4	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	510	7,400	0.6	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorodibromomethane	3	8	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	220	1,100	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	0.6	2	0.4	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,2-Dichloroethene	230	560	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cymene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	490	230,000	39	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl benzene	7,800	110,000	13	-	NA	< 0.39	< 0.26	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	6	25	0.9	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Meta/Para Xylene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl bromide	25	59	0.04	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl butyl ketone	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl chloride	4	12	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl ethyl ketone	3,100	44,000	0.9	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl isobutyl ketone	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Tertbutyl Ether	110	320	0.2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	46	230	0.01	-	NA	0.12 JB	0.055 JB	NA	NA	NA	NA	NA	NA
Naphthalene	6	17	25	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ortho Xylene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Chlorotoluene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	90	260	3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tert Butyl Alcohol	1,400	11,000	0.3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
tert-Butylbenzene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	43	1,500	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	6,300	91,000	7	-	NA	< 0.39	< 0.26	NA	NA	NA	NA	NA	NA
Total Xylenes	12,000	170,000	19	-	NA	< 1.16	< 0.78	NA	NA	NA	NA	NA	NA
Trans-1,2-Dichloroethene	300	720	0.6	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trans-1,3-Dichloropropene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	3	10	0.01	-	NA	5.8	< 0.26	NA	NA	NA	NA	NA	NA
Trichlorofluoromethane	23,000	340,000	34	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	0.7	2	0.005	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
TIC VOCs (mg/kg)													
Total TICs	500	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (mg/kg)													
1-Methylnaphthalene	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	230	2,400	8	-	< 1.1	NA	< 1	NA	NA	NA	NA	NA	NA
4-Chloroaniline	NLE	NLE	NLE	-	< 1.1	NA	< 1	NA	NA	NA	NA	NA	NA
Acenaphthene	3,400	37,000	110	-	< 1.1	NA	0.16 J	NA	NA	NA	< 0.073	0.84	< 0.082
Acenaphthylene	NLE	300,000	NLE	-	< 1.1	NA	0.14 J	NA	NA	NA	< 0.073	< 0.078	< 0.082
Anthracene	17,000	30,000	2,400	-	< 1.1	NA	0.92 J	NA	NA	NA	< 0.073	< 0.078	< 0.082
Benzo(a)anthracene	5	17	0.8	-	0.24 J	NA	2.8	NA	NA	NA	< 0.073	< 0.078	< 0.082
Benzo(a)pyrene	0.5	2	0.2	-	< 1.1	NA	2.4	NA	NA	NA	< 0.073	< 0.078	< 0.082
Benzo(b)fluoranthene	5	17	2	-	< 1.1	NA	3.5	NA	NA	NA	0.0682 J	< 0.078	< 0.082
Benzo(ghi)perylene	380,000	30,000	NLE	-	< 1.1	NA	0.9 J	NA	NA	NA	< 0.073	< 0.078	< 0.082
Benzo(k)fluoranthene	45	170	25	-	< 1.1	NA	1.3	NA	NA	NA	< 0.073	< 0.078	< 0.082
Bis(2-Chloroethyl)ether	0.4	2	0.2	-	< 1.1	NA	< 1	NA	NA	NA	< 0.073	NA	NA
Bis(2-Ethylhexyl)phthalate	35	140	1,200	-	0.39 JB	NA	0.25 JB	NA	NA	NA	NA	NA	NA
Butyl benzyl phthalate	1,200	14,000	230	-	< 1.1	NA	< 1	NA	NA	NA	NA	NA	NA
Chrysene	450	1,700	80	-	0.36 J	NA	2.9	NA	NA	NA	< 0.073	< 0.078	< 0.082
Dibenz(a,h)anthracene	0.5	2	0.8	-	< 1.1	NA	< 1	NA	NA	NA	< 0.073	< 0.078	< 0.082
Dibenzofuran	NLE	NLE	NLE	-	< 1.1	NA	0.14 J	NA	NA	NA	NA	NA	NA
Diethyl phthalate	49,000	550,000	88	-	< 1.1	NA	< 1	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	6,100	68,000	760	-	0.92 JB	NA	0.49 JB	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	2,400	27,000	3,300	-	< 1.1	NA	< 1	NA	NA	NA	NA	NA	NA
Fluoranthene	2,300	24,000	1,300	-	0.49 J	NA	5.5	NA	NA	NA	< 0.073	< 0.078	< 0.082
Fluorene	2,300	24,000	170	-	< 1.1	NA	0.21 J	NA	NA	NA	< 0.073	1.2	< 0.082
Indeno(1,2,3-cd)pyrene	5	17	7	-	< 1.1	NA	0.95 J	NA	NA	NA	< 0.073	< 0.078	< 0.082
Naphthalene	6	17	25	-	< 1.1	NA	< 1	NA	NA	NA	< 0.073	0.092 J	< 0.082
Phenanthrene	NLE	300,000	NLE	-	0.29 J	NA	3.2	NA	NA	NA	< 0.073	2.3	< 0.082
Pyrene	1,700	18,000	840	-	0.58 J	NA	6.3	NA	NA	NA	< 0.073	0.19	< 0.082

TABLE 3
SOIL SAMPLING RESULTS -
COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Residential Direct Contact SRS	NJ Non-Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	Weston 1995 Background (Main Post)	PARCEL 83-SS/SB-09			PARCEL 83-P83-SS18	PARCEL 83-P83-SS19	PARCEL 83-P83-SS20	PAR-83-482-SB-01		
Sample ID					P83-SB9-A	P83-SB9-B	P83-SB9-C	P83-SS18	P83-SS19	P83-SS20	PAR-83-482-SB-01-0.5-1	PAR-83-482-SB-01-1.5-2	PAR-83-482-SB-01-7.5-8
Sample Date					12/17/2007	12/17/2007	12/17/2007	12/18/2007	12/18/2007	12/18/2007	11/13/2017	11/13/2017	11/13/2017
Total Petroleum Hydrocarbons (mg/kg)													
Total Petroleum Hydrocarbons	NLE	NLE	NLE	-	NA	NA	NA	181	111	117	NA	NA	NA
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)													
C10-C12 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
C12-C16 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
C12-C16 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
C16-C21 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
C16-C21 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C36 Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
C21-C40 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
C9-C12 Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPH (C9-C40)	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	19.8	2,410	0.55 J
Total Aliphatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Aromatics	NLE	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total EPH	SS	SS	SS	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides & PCBs (mg/kg)													
Aroclor-1016	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	0.2	NLE	NLE	-	< 0.004	NA	< 0.0041	NA	NA	NA	NA	NA	NA
Aroclor-1268	0.2	NLE	NLE	-	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)													
Aluminum	78,000	NLE	6,000	15,200	< 17500	NA	< 9100	NA	NA	NA	NA	NA	NA
Antimony	31	450	6	ND	8.42	NA	< 0.419	NA	NA	NA	NA	NA	NA
Arsenic	19	19	19	22.9	27.6	NA	6.09	NA	NA	NA	4.8	6.1	9.3
Barium	16,000	59,000	2,100	32.3	< 357	NA	< 45.2	NA	NA	NA	NA	NA	NA
Beryllium	16	140	0.7	2	1.38	NA	0.498	NA	NA	NA	NA	NA	NA
Cadmium	78	78	2	ND	< 0.896	NA	< 0.344	NA	NA	NA	NA	NA	NA
Calcium	NLE	NLE	NLE	921	< 16300	NA	< 5990	NA	NA	NA	NA	NA	NA
Chromium	NLE	NLE	NLE	269	55.6	NA	33.6	NA	NA	NA	NA	NA	NA
Cobalt	1,600	590	90	2.5	7.35	NA	0.985	NA	NA	NA	NA	NA	NA
Copper	3,100	45,000	11,000	8	< 1370	NA	< 12.6	NA	NA	NA	NA	NA	NA
Iron	NLE	NLE	NLE	55,800	< 36600	NA	< 17300	NA	NA	NA	NA	NA	NA
Lead	400	800	90	19.5	1.306	NA	14.4	NA	NA	NA	NA	NA	NA
Magnesium	NLE	NLE	NLE	7,230	< 3310	NA	< 3270	NA	NA	NA	NA	NA	NA
Manganese	11,000	5,900	65	90.7	230	NA	113	NA	NA	NA	NA	NA	NA
Mercury	23	65	0.1	ND	< 0.11	NA	< 0.097	NA	NA	NA	NA	NA	NA
Nickel	1,600	23,000	48	8.4	31	NA	9.42	NA	NA	NA	NA	NA	NA
Potassium	NLE	NLE	NLE	15,400	3,260	NA	2,100	NA	NA	NA	NA	NA	NA
Selenium	390	5,700	11	1.9	< 1.32	NA	< 0.619	NA	NA	NA	NA	NA	NA
Sodium	NLE	NLE	NLE	51.6	< 35,868	NA	< 36.33	NA	NA	NA	NA	NA	NA
Vanadium	390 ⁽¹⁾	1,100	NLE	94.1	53.6	NA	36.9	NA	NA	NA	NA	NA	NA
Zinc	23,000	110,000	930	81.4	393	NA	38.9	NA	NA	NA	NA	NA	NA

1) Summary Statistics were obtained from Result Sheet(s) and reflect values for the whole dataset.

Footnote:

- 1) All historical data collected prior to 2013 are reported as provided by others.
- 2) Number of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.
- 3) NLE = no limit established.
- 4) ND = not detected in any background sample, no background concentration available.
- 5) Bold chemical detection
- 6) SS = Site Specific action level, see "Specific Chemical Class (or Parameter)" footnote for details.

7) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) during the data validation.

[blank] = detect, i.e. detected chemical result value.	E (or ER) = Estimated result.
B =non-detect, i.e. not detected at or above this value.	D = Results from dilution of sample.
R = Rejected, data validation rejected the results.	J-DL = Elevated sample detection limit due to difficult sample matrix.
U = non-detect, i.e. not detected at or above this value.	JN = Tentatively identified compound, estimated concentration.
U-DL = Elevated sample detection limit due to difficult sample matrix.	UJ=The compound was not detected: however, the results is estimated because of discrepancies in meeting certain analyte-specific QC criteria.
U-ND = Analyte not detected in sample, but no detection or reporting limit provided.	J+ = The result is an estimated quantity, but the result may be biased high.
J = estimated detected value due to a concetration below the reporting limit or due to discrepancies in meeting certain analyte-specific quality control.	J- = The result is an estimated quantity, but the result may be biased low.

8) Specific Chemical Classes (or Parameters) comments or notes regarding how data is displayed, compared to Action Levels, or represented in this table.

a) DELETE THIS NOTE BEFORE GOING FINAL: Refer to the NJDEP Protocol for Addressing Extractable Petroleum Hydrocarbons (Version 5.0, August 9, 2010) and the NJDEP Health Based end Ecological Screening Criteria for Petroleum Hydrocarbons (Version 4.0, August 9, 2010) to determine the category of tank being investigated and the appropriate cleanup standards or screening levels for that category of tank.

9) Chemical results greater than or equal to the action level (depending on criteria) are highlighted based on the Criteria that are present.

- Cell Shade values represent a result that is above the NJ Residential Direct Contact Soil Remediation Standard.	####
There are no NJDEP soil standards for individual PCB Aroclors, therefore the total PCB NJDEP standards were used for individual Aroclors.	
- Cell Shade values represent a result that is above the NJ Non-Residential Direct Contact Soil Remediation Standard.	###
- Cell Shade values represent a result that is above the NJ Impact to GW Soil Screening Level	###
- Cell Style values represent a result that is above the Weston 1995 Background (Main Post).	###
n/a = all concentrations were less than the detection limit, therefore, no location of maximum value identified.	
Dash (-) = only background concentrations for metals are being used as comparison criteria.	
- Cell Shade values represent a result that is above both the NJ Residential, Non-Residential, AND NJ Impact to GW Soil Screening Level Direct Contact Soil Remediation Standard.	###
- Cell Shade values represent a result that is above both the NJ Residential and Non-Residential Direct Contact Soil Remediation Standard.	####

10) Criteria action level source document and web address.

- The NJ Residential Direct Contact Soil Remediation Standard refers to the NJDEP's Sept 18, 2017 Remediation Standards
http://www.nj.gov/dep/rules/rules/njac7_26d.pdf
- The NJ Non-Residential Direct Contact Soil Remediation Standard refers to the NJDEP's Sept 18, 2017 Remediation Standards
http://www.nj.gov/dep/rules/rules/njac7_26d.pdf
- The NJ Impact to GW Soil Screening Level criteria refers to the Development of Site Specific Impact to Ground Water Soil Remediation Standards - Nov 2013 revised
http://www.nj.gov/dep/srp/guidance/rs/partition_equation.pdf
- The Weston 1995 Background (Main Post) refers to the FTMM reports.
NA

11) Alternative Soil Remediation Standards, Section 4.3.1 and Attachment F

TABLE 4
SOIL SAMPLING SUMMARY OF DETECTIONS
SITE PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Analyte	Maximum Detected Concentration		Location of Maximum Concentration	Sample Date	Number of Samples	Number of Detections	NJ Residential Direct Contact SRS		NJ Non-Residential Direct Contact SRS		NJ Impact to GW Soil Screening Level		2017-06 RSL Residential Soil (HQ=0.1)		2017-06 RSL Industrial Soil (HQ=0.1)		2017-06 RSL Protect GW Risk-Based (HQ=0.1)		Weston 1995 Background (Main Post)		Identification of COPCs	
							Action Level	Detects Above	Action Level	Detects Above	Action Level	Detects Above	Action Level	Num of Detects Above Standard-1	Action Level	Num of Detects Above Standard-2	Action Level	Num of Detects Above Standard-3	Action Level	Num of Detects Above Standard-4	as COPC in Risk	Rationale
Volatile Organic Compounds (mg/kg)																						
1,2-Dichloroethane	0.33		PARCEL 83-P83-SB8-B	12/19/2007	66	1	0.9	0	3	0	0.005	1	0.46	0	2	0	0.000048	1	-	n/a	No	Less than USEPA Residential RSL
Acetone	1.5		PARCEL 83-P83-B5-C	12/15/2007	62	26	70,000	0	NLE	NLE	19	0	6,100	0	67,000	0	0.29	14	-	n/a	No	Less than USEPA Residential RSL
Benzene	0.33		PARCEL 83-P83-B1-B	12/14/2007	66	3	2	0	5	0	0.005	3	1.2	0	5.1	0	0.00023	3	-	n/a	No	Less than USEPA Residential RSL
Carbon disulfide	0.098	J	PARCEL 83-P83-SB8-B	12/19/2007	60	4	7,800	0	110,000	0	6	0	77	0	350	0	0.024	2	-	n/a	No	Less than USEPA Residential RSL
Ethyl benzene	0.22	J	PARCEL 83-P83-B1-B	12/14/2007	66	7	7,800	0	110,000	0	13	0	5.8	0	25	0	0.0017	6	-	n/a	No	Less than USEPA Residential RSL
Isopropylbenzene	0.86		PAR-83-SB-12	4/5/2016	6	1	NLE	NLE	NLE	NLE	NLE	NLE	190	0	990	0	0.074	1	-	n/a	No	Less than USEPA Residential RSL
Methyl ethyl ketone	0.0068		PAR-83-SB-13	4/5/2016	6	4	3,100	0	44,000	0	0.9	0	2,700	0	19,000	0	0.12	0	-	n/a	No	Less than USEPA Residential RSL
Methylene chloride	0.023	J	PARCEL 83-P83-SB10-C	12/15/2007	55	1	46	0	230	0	0.01	1	35	0	320	0	0.0027	1	-	n/a	No	Less than USEPA Residential RSL
Naphthalene	0.00054	J	PAR-83-SB-14	4/5/2016	6	1	6	0	17	0	25	0	3.8	0	17	0	0.00054	0	-	n/a	No	Less than USEPA Residential RSL
n-Butylbenzene	1.6		PAR-83-SB-12	4/5/2016	6	1	NLE	NLE	NLE	NLE	NLE	NLE	390	0	5,800	0	0.32	1	-	n/a	No	Less than USEPA Residential RSL
Propylbenzene	1.7		PAR-83-SB-12	4/5/2016	6	1	NLE	NLE	NLE	NLE	NLE	NLE	380	0	2,400	0	0.12	1	-	n/a	No	Less than USEPA Residential RSL
sec-Butylbenzene	1.4		PAR-83-SB-12	4/5/2016	6	1	NLE	NLE	NLE	NLE	NLE	NLE	780	0	12,000	0	0.59	1	-	n/a	No	Less than USEPA Residential RSL
tert-Butylbenzene	0.095	J	PAR-83-SB-12	4/5/2016	6	1	NLE	NLE	NLE	NLE	NLE	NLE	780	0	12,000	0	0.16	0	-	n/a	No	Less than USEPA Residential RSL
Toluene	1.2		PARCEL 83-P83-B1-B	12/14/2007	66	8	6,300	0	91,000	0	7	0	490	0	4,700	0	0.076	2	-	n/a	No	Less than USEPA Residential RSL
Total Xylenes	1.4		PARCEL 83-P83-B1-B	12/14/2007	60	7	12,000	0	170,000	0	19	0	58	0	250	0	0.019	7	-	n/a	No	Less than USEPA Residential RSL
Trichloroethene	5.8		PARCEL 83-P83-SB9-B	12/17/2007	66	1	3	1	10	0	0.01	1	0.41	1	1.9	1	0.0001	1	-	n/a	Yes	Exceeded USEPA Residential RSL
TIC VOCs (mg/kg)																						
1,1,3-Trimethylcyclohexane	0.0036	JN	PAR-83-SB-14	4/5/2016	1	1	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	-	n/a	No	No USEPA Residential RSL Established
1,3-Diethylbenzene	4.8	JN	PAR-83-SB-12	4/5/2016	1	1	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	-	n/a	No	No USEPA Residential RSL Established
1-Methylnaphthalene	12	JN	PAR-83-SB-12	4/5/2016	1	1	NLE	NLE	NLE	NLE	NLE	NLE	18	0	73	0	0.006	1	-	n/a	No	No USEPA Residential RSL Established
2-Methyl-3-phenyl-1-propene	5.9	JN	PAR-83-SB-12	4/5/2016	1	1	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	-	n/a	No	No USEPA Residential RSL Established
2-Methylnaphthalene	27	JN	PAR-83-SB-12	4/5/2016	1	1	230	0	2,400	0	8	1	24	1	300	0	0.019	1	-	n/a	No	No USEPA Residential RSL Established
2-Methyltetralin	4.2	JN	PAR-83-SB-12	4/5/2016	1	1	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	-	n/a	No	No USEPA Residential RSL Established
4,7-Dimethylindan	4.9	JN	PAR-83-SB-12	4/5/2016	1	1	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	-	n/a	No	No USEPA Residential RSL Established
6,7-Dimethyltetralin	5.8	JN	PAR-83-SB-12	4/5/2016	1	1	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	-	n/a	No	No USEPA Residential RSL Established
6-Methyltetraline	13	JN	PAR-83-SB-12	4/5/2016	1	1	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	-	n/a	No	No USEPA Residential RSL Established
Acetaldehyde	0.0041	JN	PAR-83-SB-14	4/5/2016	1	1	NLE	NLE	NLE	NLE	NLE	NLE	8.2	0	34	0	0.00038	1	-	n/a	No	No USEPA Residential RSL Established
Benzene, 1,2,4,5-tetramethyl-	4.4	JN	PAR-83-SB-12	4/5/2016	1	1	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	-	n/a	No	No USEPA Residential RSL Established
Decahydro-2-methylnaphthalene	6.5	JN	PAR-83-SB-12	4/5/2016	1	1	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	-	n/a	No	No USEPA Residential RSL Established
n-Pentylcyclohexane	5.6	JN	PAR-83-SB-12	4/5/2016	1	1	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	-	n/a	No	No USEPA Residential RSL Established
TIC Unknown	60.9	J	PAR-83-SB-12	4/5/2016	5	5	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	-	n/a	No	No USEPA Residential RSL Established
Semivolatile Organic Compounds (mg/kg)																						
1-Methylnaphthalene	31		PAR-83-SB-12	4/5/2016	35	20	NLE	NLE	NLE	NLE	NLE	NLE	18	1	73	0	0.006	15	-	n/a	Yes	Exceeded USEPA Residential RSL
2-Methylnaphthalene	53		PAR-83-SB-12	4/5/2016	95	29	230	0	2,400	0	8	1	24	1	300	0	0.019	24	-	n/a	Yes	Exceeded USEPA Residential RSL
4-Chloroaniline	0.51	J	PARCEL 83-P83-SB13-A	12/17/2007	60	2	NLE	NLE	NLE	NLE	NLE	NLE	2.7	0	11	0	0.00016	2	-	n/a	No	Less than USEPA Residential RSL
Acenaphthene	3.3		PAR-83-SB-12	4/5/2016	127	30	3,400	0	37,000	0	110	0	360	0	4,500	0	0.55	4	-	n/a	No	Less than USEPA Residential RSL
Acenaphthylene	1.5		PARCEL 83-P83-A1-A	12/14/2007	127	44	NLE	NLE	300,000	0	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	-	n/a	No	No USEPA Residential RSL Established
Anthracene	4.5		PAR-83-SB-07	4/4/2016	127	52	17,000	0	30,000	0	2,400	0	1,800	0	23,000	0	5.8	0	-	n/a	No	Less than USEPA Residential RSL
Benzo(a)anthracene	12		PAR-83-SB-07	4/4/2016	127	81	5	3	17	0	0.8	13	1.1	12	21	0	0.011	71	-	n/a	Yes	Exceeded USEPA Residential RSL
Benzo(a)pyrene	12		PAR-83-SB-07	4/4/2016	127	70	0.5	21	2	6	0.2	34	0.11	42	2.1	6	0.029	53	-	n/a	Yes	Exceeded USEPA Residential RSL
Benzo(b)fluoranthene	15		PAR-83-SB-07	4/4/2016	127	78	5	3	17	0	2	10	1.1	15	21	0	0.3	32	-	n/a	Yes	Exceeded USEPA Residential RSL
Benzo(ghi)perylene	9.7		PAR-83-SB-07	4/4/2016	127	56	380,000	0	30,000	0	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	-	n/a	No	No USEPA Residential RSL Established
Benzo(k)fluoranthene	5.6		PAR-83-SB-07	4/4/2016	127	64	45	0	170	0	25	0	11	0	210	0	2.9	2	-	n/a	No	Less than USEPA Residential RSL
Bis(2-Chloroethyl)ether	0.24	J	PARCEL 83-P83-B5-A	12/15/2007	59	1	0.4	0	2	0	0.2	1	0.23	1	1	0	0.0000036	1	-	n/a	Yes	Exceeded USEPA Residential RSL
Bis(2-Ethylhexyl)phthalate	0.74	J	PARCEL 83-P83-B1-A	12/14/2007	35	23	35	0	140	0	1,200	0	39	0	160	0	1.3	0	-	n/a	No	Less than USEPA Residential RSL
Butyl benzyl phthalate	0.22	J	PARCEL 83-P83-SB5-A	12/18/2007	60	1	1,200	0	14,000	0	230	0	290	0	1,200	0	0.24	0	-	n/a	No	Less than USEPA Residential RSL
Chrysene	12		PAR-83-SB-07	4/4/2016	127	73	450	0	1,700	0	80	0	110	0	2,100	0	9	1	-	n/a	No	Less than USEPA Residential RSL
Dibenz(a,h)anthracene	2		PAR-83-SB-07	4/4/2016	127	36	0.5	3	2	0	0.8	1	0.11	8	2.1	0	0.096	10	-	n/a	Yes	Exceeded USEPA Residential RSL
Dibenzofuran	0.38	J	PARCEL 83-P83-A3-A	12/14/2007	60																	

TABLE 4
SOIL SAMPLING SUMMARY OF DETECTIONS
SITE PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Analyte	Maximum Detected Concentration		Location of Maximum Concentration	Sample Date	Number of Samples	Number of Detections	NJ Residential Direct Contact SRS		NJ Non-Residential Direct Contact SRS		NJ Impact to GW Soil Screening Level		2017-06 RSL Residential Soil (HQ=0.1)		2017-06 RSL Industrial Soil (HQ=0.1)		2017-06 RSL Protect GW Risk-Based (HQ=0.1)		Weston 1995 Background (Main Post)		Identification of COPCs	
							Action Level	Detects Above	Action Level	Detects Above	Action Level	Detects Above	Action Level	Num of Detects Above Standard-1	Action Level	Num of Detects Above Standard-2	Action Level	Num of Detects Above Standard-3	Action Level	Num of Detects Above Standard-4	as COPC in Risk	Rationale
C9-C12 Aliphatics	169		PAR-83-SB-25	11/15/2017	3	3	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	-	n/a	No	Attributed to former fuel oil USTs that have been previously closed
EPH (C9-C40)	3,150		PAR-83-SB-25	11/15/2017	5	5	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	-	n/a	No	Attributed to former fuel oil USTs that have been previously closed
Total Aliphatics	1,010		PAR-83-SB-25	11/15/2017	3	3	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	-	n/a	No	Attributed to former fuel oil USTs that have been previously closed
Total Aromatics	1,050		PAR-83-SB-25	11/15/2017	3	3	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	-	n/a	No	Attributed to former fuel oil USTs that have been previously closed
Total EPH	2,060		PAR-83-SB-25	11/15/2017	2	2	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	-	n/a	No	Attributed to former fuel oil USTs that have been previously closed
Pesticides & PCBs (mg/kg)																						
Aroclor-1254	0.22	J	PAR-83-SB-09	4/4/2016	5	2	0.2	1	NLE	NLE	NLE	NLE	0.12	2	0.97	0	0.002	2	-	n/a	Yes	Exceeded USEPA Residential RSL
Aroclor-1260	0.8		PARCEL 83-P83-B5-A	12/15/2007	65	5	0.2	1	NLE	NLE	NLE	NLE	0.24	1	0.99	0	0.0055	5	-	n/a	Yes	Exceeded USEPA Residential RSL
Inorganics (mg/kg)																						
Antimony	8.42		PARCEL 83-P83-SB9-A	12/17/2007	60	4	31	0	450	0	6	2	3.1	2	47	0	0.035	4	ND	4	Yes	Maximum Background
Arsenic	27.6		PARCEL 83-P83-SB9-A	12/17/2007	86	83	19	2	19	2	19	2	0.68	83	3	81	0.0015	83	22.9	2	Yes	Maximum Background
Beryllium	2.68		PARCEL 83-P83-B5-C	12/15/2007	60	60	16	0	140	0	0.7	42	16	0	230	0	1.9	8	2	7	No	Less than USEPA Residential RSL
Cadmium	3.15		PARCEL 83-P83-B5-A	12/15/2007	60	41	78	0	78	0	2	1	7.1	0	98	0	0.069	40	ND	41	No	Less than USEPA Residential RSL
Chromium	203		PARCEL 83-P83-SB15-A	12/18/2007	60	35	NLE	NLE	NLE	NLE	NLE	NLE	12,000	0	180,000	0	4,000,000	0	269	0	No	Less than USEPA Residential RSL
Cobalt	10.1		PARCEL 83-P83-B1-A	12/14/2007	60	55	1,600	0	590	0	90	0	2.3	12	35	0	0.027	55	2.5	12	Yes	Maximum Background
Iron	83,200		PARCEL 83-P83-B5-C	12/15/2007	60	23	NLE	NLE	NLE	NLE	NLE	NLE	5,500	23	82,000	1	35	23	55,800	5	No	Essential Nutrient
Lead	1300		PARCEL 83-P83-SB9-A	12/17/2007	80	73	400	3	800	2	90	9	400	3	800	2	14	35	19.5	25	Yes	Maximum Background
Magnesium	5730		PARCEL 83-P83-SB2-C	12/19/2007	60	4	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	7,230	0	No	No USEPA Residential RSL Established
Manganese	230		PARCEL 83-P83-SB9-A	12/17/2007	60	12	11,000	0	5,900	0	65	10	180	1	2,600	0	2.8	12	90.7	6	Yes	Maximum Background
Mercury	4.06		PARCEL 83-P83-B5-A	12/15/2007	60	4	23	0	65	0	0.1	4	1.1	1	4.6	0	0.0033	4	ND	4	Yes	Maximum Background
Nickel	31		PARCEL 83-P83-SB9-A	12/17/2007	60	42	1,600	0	23,000	0	48	0	150	0	2,200	0	2.6	42	8.4	19	No	Less than USEPA Residential RSL
Potassium	16,500		PARCEL 83-P83-SB13-C	12/17/2007	60	18	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	NLE	15,400	1	No	No USEPA Residential RSL Established
Vanadium	123		PARCEL 83-P83-B1-A	12/14/2007	60	60	390 ⁽¹⁾	0	1,100	0	NLE	NLE	39	47	580	0	8.6	60	94.1	3	Yes	Maximum Background
Zinc	393		PARCEL 83-P83-SB9-A	12/17/2007	60	18	23,000	0	110,000	0	930	0	2,300	0	35,000	0	37	17	81.4	6	No	Less than USEPA Residential RSL

1) Detects Summary Statistics presents only detected results, non-detects and rejects were omitted, and were obtained from Summary Statistics Sheet.

Footnote:

- 1) All historical data collected prior to 2013 are reported as provided by others.
- 2) Number of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.
- 3) NLE = no limit established.
- 4) ND = not detected in any background sample, no background concentration available.
- 5) Bold chemical detection
- 6) SS = Site Specific action level, see "Specific Chemical Class (or Parameter)" footnote for details.

7) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) during the data validation.

[blank] = detect, i.e. detected chemical result value.	E (or ER) = Estimated result.
B =non-detect, i.e. not detected at or above this value.	D = Results from dilution of sample.
R = Rejected, data validation rejected the results.	J-DL = Elevated sample detection limit due to difficult sample matrix.
U = non-detect, i.e. not detected at or above this value.	JN = Tentatively identified compound, estimated concentration.
U-DL = Elevated sample detection limit due to difficult sample matrix.	UJ=The compound was not detected; however, the results is estimated because of discrepancies in meeting certain analyte-specific QC criteria.
U-ND = Analyte not detected in sample, but no detection or reporting limit provided.	J+ = The result is an estimated quantity, but the result may be biased high.
J = estimated detected value due to a concentration below the reporting limit or due to discrepancies in meeting certain analyte-specific quality control.	J- = The result is an estimated quantity, but the result may be biased low.

8) Specific Chemical Classes (or Parameters) comments or notes regarding how data is displayed, compared to Action Levels, or represented in this table.

a) DELETE THIS NOTE BEFORE GOING FINAL: Refer to the NJDEP Protocol for Addressing Extractable Petroleum Hydrocarbons (Version 5.0, August 9, 2010) and the NJDEP Health Based and Ecological Screening Criteria for Petroleum Hydrocarbons (Version 4.0, August 9, 2010) to determine the category of tank being investigated and the appropriate cleanup standards or screening levels for that category of tank.

9) Chemical results greater than or equal to the action level (depending on criteria) are highlighted based on the Criteria that are present.

- Cell Shade values represent a result that is above the USEPA 2017-06 RSL Residential Soil (HQ=0.1).
 - Cell Shade values represent a result that is above the USEPA 2017-06 RSL Industrial Soil (HQ=0.1).
 - Cell Shade values represent a result that is above the USEPA 2017-06 RSL Protect GW Risk-Based (HQ=0.1).
 - Cell Style values represent a result that is above the Weston 1995 Background (Main Post).
- n/a = all concentrations were less than the detection limit, therefore, no location of maximum value identified.
- Dash (-) = only background concentrations for metals are being used as comparison criteria.

- Cell Shade values represent a result that is above both the USEPA RSL Residential and Industrial Soil (HQ=0.1), 2017-06.
- Cell Shade values represent a result that is above the USEPA RSL Residential, Industrial, Protect GW Risk-Based Soil (HQ=0.1), 2017-06.

####
###
###
###

###
###

10) Criteria action level source document and web address.

- The NJ Residential Direct Contact Soil Remediation Standard refers to the NJDEP's Sept 18, 2017 Remediation Standards
http://www.nj.gov/deprules/rules/hjac7_26d.pdf
 - The NJ Non-Residential Direct Contact Soil Remediation Standard refers to the NJDEP's Sept 18, 2017 Remediation Standards
http://www.nj.gov/deprules/rules/hjac7_26d.pdf
 - The NJ Impact to GW Soil Screening Level criteria refers to the Development of Site Specific Impact to Ground Water Soil Remediation Standards - Nov 2013 revised
http://www.nj.gov/deprules/guidance/rs/partition_equation.pdf
 - The 2017-06 USEPA RSL Residential Soil (HQ=0.1) refers to the EPA's Regional Screening Levels (HQ=0.1)
<https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-november-2017>
 - The 2017-06 USEPA RSL Industrial Soil (HQ=0.1) refers to the EPA's Regional Screening Levels (HQ=0.1)
<https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-november-2017>
 - The 2017-06 USEPA RSL Protect GW Risk-Based (HQ=0.1) refers to the EPA's Regional Screening Levels (HQ=0.1)
<https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-november-2017>
 - The Weston 1995 Background (Main Post) refers to the FTMM reports.
- NA

11) Alternative Soil Remediation Standards, Section 4.3.1 and Attachment F

Table 5
DETECTED GROUNDWATER SAMPLING RESULTS -
COMPARISION TO USEPA AND NJDEP GROUNDWATER CRITERIA
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Ground Water Quality Criteria	2017-06 RSL Tap Water (HQ=0.1)	P83-161MW-01	P83-A1		P83-A3	P83-A5	P83-GW1
Sample ID			PARCEL 83-GW-P83-161MW-01-0	PARCEL 83-GW-P83-A1-0	PARCEL 83-GW-P83-A1-0-Dup	PARCEL 83-GW-P83-A3-0	PARCEL 83-GW-P83-A5-0	PARCEL 83-GW-P83-GW1-0-Dup
Sample Date			12/20/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/21/2007
Filtered			Total	Total	Total	Total	Total	Total
Volatile Organic Compounds (µg/l)								
1,2-Dichloroethane	2	0.17	< 0.3	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Acetone	6,000	1,400	< 0.85	< 0.85	< 0.85	< 0.85	< 0.85	< 0.85
Carbon disulfide	700	81	< 0.44	< 0.44	< 0.44	< 0.44	< 0.44	< 0.44
Methyl Tertbutyl Ether	70	14	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23
Tert Butyl Alcohol	100	NLE	< 1.82	< 1.82	< 1.82	< 1.82	< 1.82	< 1.82
Toluene	600	110	< 0.27	< 0.27	< 0.27	0.84	< 0.27	< 0.27
Total Xylenes	1,000	19	< 0.49	< 0.49	< 0.49	0.24 J	< 0.49	< 0.49
TIC VOCs (µg/l) (No Detects)								
Semivolatile Organic Compounds (µg/l)								
2-Methylnaphthalene	30	3.6	< 10	< 11	< 11	4 J	< 10	< 10
Acenaphthene	400	53	< 10	< 11	< 11	1 J	< 10	< 10
Anthracene	2,000	180	< 10	< 11	< 11	0.4 J	< 10	< 10
Dibenzofuran	100	0.79	< 10	< 11	< 11	0.7 J	< 10	< 10
Diethyl phthalate	6,000	1,500	< 10	< 11	< 11	0.5 JB	< 10	< 10
Di-n-butylphthalate	700	90	< 10	4 JB	1 JB	< 10	< 10	< 10
Di-n-octylphthalate	100	20	0.5 JB	1 J	1 J	< 10	< 10	< 10
Fluoranthene	300	80	< 10	< 11	< 11	0.5 J	< 10	< 10
Fluorene	300	29	< 10	< 11	< 11	2 J	< 10	< 10
Naphthalene	300	0.17	< 10	< 11	< 11	5 J	< 10	< 10
Phenanthrene	100	NLE	< 10	< 11	< 11	3 J	< 10	< 10
Pyrene	200	12	< 10	0.5 J	< 11	0.4 J	< 10	< 10
Inorganics (µg/l)								
Arsenic	3	0.052	NA	< 2.7	5.04	< 2.7	< 2.7	NA
Barium	6,000	380	NA	58.7	107	26.1	16.3	NA
Beryllium	1	2.5	NA	0.794	0.788	0.437	0.132	NA
Cadmium	4	0.92	NA	0.358	0.672	< 0.2	0.219	NA
Cobalt	100	0.6	NA	1.5	2.08	< 0.2	0.805	NA
Copper	1,300	80	NA	12.1	13.8	5.76	3.34	NA
Iron	300	1,400	NA	3,520	3,860	11,100	516	NA
Magnesium	NLE	NLE	NA	1,290	2,050	626	2,520	NA
Sodium	50,000	NLE	NA	90,000	94,800	4,630	18,500	NA
Vanadium	NLE	8.6	NA	20.5	9.07	25.9	1.75	NA
Zinc	2,000	600	NA	120	142	9.55	13.1	NA

Table 5
DETECTED GROUNDWATER SAMPLING RESULTS -
COMPARISION TO USEPA AND NJDEP GROUNDWATER CRITERIA
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Ground Water Quality Criteria	2017-06 RSL Tap Water (HQ=0.1)	P83GW-1	P83GW-10	P83GW-12	P83GW-14	P83GW-17	P83GW-3
Sample ID			PARCEL 83-GW-P83GW-1-0	PARCEL 83-GW-P83GW-10-0	PARCEL 83-GW-P83GW-12-0	PARCEL 83-GW-P83GW-14-0	PARCEL 83-GW-P83GW-17-0	PARCEL 83-GW-P83GW-3-0
Sample Date			12/20/2007	12/26/2007	12/27/2007	12/28/2007	12/29/2007	12/22/2007
Filtered			Total	Total	Total	Total	Total	Total
Volatile Organic Compounds (µg/l)								
1,2-Dichloroethane	2	0.17	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Acetone	6,000	1,400	< 0.85	2.31	1.63	1.33	< 0.85	< 0.85
Carbon disulfide	700	81	< 0.44	0.66	< 0.44	< 0.44	< 0.44	< 0.44
Methyl Tertbutyl Ether	70	14	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	1.03
Tert Butyl Alcohol	100	NLE	< 1.82	< 1.82	< 1.82	< 1.82	< 1.82	23.38
Toluene	600	110	< 0.27	0.46	< 0.27	< 0.27	< 0.27	< 0.27
Total Xylenes	1,000	19	< 0.49	< 0.49	< 0.49	< 0.49	< 0.49	< 0.49
TIC VOCs (µg/l) (No Detects)								
Semivolatile Organic Compounds (µg/l)								
2-Methylnaphthalene	30	3.6	< 10	< 10	< 10	< 10	< 10	< 10
Acenaphthene	400	53	< 10	< 10	< 10	< 10	< 10	< 10
Anthracene	2,000	180	< 10	< 10	< 10	< 10	< 10	< 10
Dibenzofuran	100	0.79	< 10	< 10	< 10	< 10	< 10	< 10
Diethyl phthalate	6,000	1,500	< 10	< 10	< 10	< 10	0.5 J	< 10
Di-n-butylphthalate	700	90	< 10	< 10	< 10	< 10	< 10	< 10
Di-n-octylphthalate	100	20	< 10	< 10	0.8 JB	0.5 JB	0.5 JB	< 10
Fluoranthene	300	80	< 10	< 10	< 10	< 10	< 10	< 10
Fluorene	300	29	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	300	0.17	< 10	< 10	< 10	< 10	< 10	< 10
Phenanthrene	100	NLE	< 10	< 10	< 10	< 10	< 10	< 10
Pyrene	200	12	< 10	< 10	< 10	< 10	< 10	< 10
Inorganics (µg/l)								
Arsenic	3	0.052	NA	NA	NA	NA	NA	NA
Barium	6,000	380	NA	NA	NA	NA	NA	NA
Beryllium	1	2.5	NA	NA	NA	NA	NA	NA
Cadmium	4	0.92	NA	NA	NA	NA	NA	NA
Cobalt	100	0.6	NA	NA	NA	NA	NA	NA
Copper	1,300	80	NA	NA	NA	NA	NA	NA
Iron	300	1,400	NA	NA	NA	NA	NA	NA
Magnesium	NLE	NLE	NA	NA	NA	NA	NA	NA
Sodium	50,000	NLE	NA	NA	NA	NA	NA	NA
Vanadium	NLE	8.6	NA	NA	NA	NA	NA	NA
Zinc	2,000	600	NA	NA	NA	NA	NA	NA

Table 5
DETECTED GROUNDWATER SAMPLING RESULTS -
COMPARISION TO USEPA AND NJDEP GROUNDWATER CRITERIA
PARCEL 83 - FORT MONMOUTH, NEW JERSEY

Loc ID	NJ Ground Water Quality Criteria	2017-06 RSL Tap Water (HQ=0.1)	P83GW-5	P83GW-7	P83GW-8	PAR-83-TMW-12	PAR-83-TMW-13	PAR-83-TMW-14
Sample ID			PARCEL 83-GW-P83GW-5-0	PARCEL 83-GW-P83GW-7-0	PARCEL 83-GW-P83GW-8-0	PAR-83-TMW-12	PAR-83-TMW-13	PAR-83-TMW-14
Sample Date			12/23/2007	12/24/2007	12/25/2007	4/6/2016	4/6/2016	4/6/2016
Filtered			Total	Total	Total	Total	Total	Total
Volatile Organic Compounds (µg/l)								
1,2-Dichloroethane	2	0.17	< 0.33	< 0.33	1.81	NA	NA	NA
Acetone	6,000	1,400	< 0.85	< 0.85	1.65	NA	NA	NA
Carbon disulfide	700	81	< 0.44	< 0.44	< 0.44	NA	NA	NA
Methyl Tertbutyl Ether	70	14	< 0.23	< 0.23	0.77	NA	NA	NA
Tert Butyl Alcohol	100	NLE	< 1.82	< 1.82	< 1.82	NA	NA	NA
Toluene	600	110	< 0.27	< 0.27	< 0.27	NA	NA	NA
Total Xylenes	1,000	19	< 0.49	< 0.49	< 0.49	NA	NA	NA
TIC VOCs (µg/l) (No Detects)								
Semivolatile Organic Compounds (µg/l)								
2-Methylnaphthalene	30	3.6	< 10	< 10	< 10	NA	NA	NA
Acenaphthene	400	53	< 10	< 10	< 10	NA	NA	NA
Anthracene	2,000	180	< 10	< 10	< 10	NA	NA	NA
Dibenzofuran	100	0.79	< 10	< 10	< 10	NA	NA	NA
Diethyl phthalate	6,000	1,500	< 10	< 10	< 10	NA	NA	NA
Di-n-butylphthalate	700	90	< 10	< 10	0.4 J	NA	NA	NA
Di-n-octylphthalate	100	20	< 10	1 JB	< 10	NA	NA	NA
Fluoranthene	300	80	< 10	< 10	< 10	NA	NA	NA
Fluorene	300	29	< 10	< 10	< 10	NA	NA	NA
Naphthalene	300	0.17	< 10	< 10	< 10	NA	NA	NA
Phenanthrene	100	NLE	< 10	< 10	< 10	NA	NA	NA
Pyrene	200	12	< 10	< 10	< 10	NA	NA	NA
Inorganics (µg/l)								
Arsenic	3	0.052	NA	NA	NA	NA	NA	NA
Barium	6,000	380	NA	NA	NA	NA	NA	NA
Beryllium	1	2.5	NA	NA	NA	NA	NA	NA
Cadmium	4	0.92	NA	NA	NA	NA	NA	NA
Cobalt	100	0.6	NA	NA	NA	NA	NA	NA
Copper	1,300	80	NA	NA	NA	NA	NA	NA
Iron	300	1,400	NA	NA	NA	NA	NA	NA
Magnesium	NLE	NLE	NA	NA	NA	NA	NA	NA
Sodium	50,000	NLE	NA	NA	NA	NA	NA	NA
Vanadium	NLE	8.6	NA	NA	NA	NA	NA	NA
Zinc	2,000	600	NA	NA	NA	NA	NA	NA

Footnote:

- 1) All historical data collected prior to 2013 are reported as provided by others.
- 2) Number of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.
- 3) NLE = no limit established.
- 4) ND = not detected in any background sample, no background concentration available.
- 5) Bold chemical detection
- 6) SS = Site Specific action level, see "Specific Chemical Class (or Parameter)" footnote for details.

7) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) during the data validation.

[blank] = detect, i.e. detected chemical result value.

B = non-detect, i.e. not detected at or above this value.

R = Rejected, data validation rejected the results.

U = non-detect, i.e. not detected at or above this value.

U-DL = Elevated sample detection limit due to difficult sample matrix.

U-ND = Analyte not detected in sample, but no detection or reporting limit provided.

J = estimated detected value due to a concentration below the reporting limit or due to discrepancies in meeting certain analyte-specific quality control.

E (or ER) = Estimated result.

D = Results from dilution of sample.

J-DL = Elevated sample detection limit due to difficult sample matrix.

JN = Tentatively identified compound, estimated concentration.

UJ = The compound was not detected; however, the results is estimated because of discrepancies in meeting certain analyte-specific QC criteria.

J+ = The result is an estimated quantity, but the result may be biased high.

J- = The result is an estimated quantity, but the result may be biased low.

8) Specific Chemical Classes (or Parameters) comments or notes regarding how data is displayed, compared to Action Levels, or represented in this table.

9) Chemical results greater than or equal to the action level (depending on criteria) are highlighted based on the Criteria that are present.

- Cell Shade values represent a result that is above the NJ Ground Water Quality Criteria

####

NJDEP Interim Specific GWQC values are presented for the NJ GWQS where there is not a Specific Ground Water Quality Criteria. A full list of compounds is available at (http://www.nj.gov/dep/wms/bwqsa/gwqs_interim_criteria_table.htm).

NJDEP Interim Generic GWQC values are presented for the NJ GWQS where there is not a XXXXX or a NJDEP Interim Specific GWQC. Available at (http://www.nj.gov/dep/wms/bwqsa/gwqs_interim_criteria_table.htm).

- Cell Shade values represent a result that is above the USEPA 2017-06 RSL Tap Water (HQ=0.1).

###

- Cell Shade values represent a result that is above both the NJ Ground Water Quality Criteria and USEPA 2017-06 RSL Tap Water (HQ=0.1).

###

10) Criteria action level source document and web address.

- The NJ Ground Water Quality Criteria refers to the NJDEP Groundwater Quality Standards - Adopted July 22, 2010

<http://www.state.nj.us/dep/wms/bwqsa/docs/njac79C.pdf>

- The 2017-06 USEPA RSL Tap Water (HQ=0.1) refers to the USEPA's Regional Screening Levels (HQ=0.1)

<https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-november-2017>

TABLE 6
GROUND WATER SAMPLING SUMMARY OF DETECTIONS
SITE PARCEL 83
FORT MONMOUTH, NEW JERSEY

Analyte	Maximum Detected Concentration		Location of Maximum Concentration		Number of Samples	Number of Detections	NJ Ground Water Quality Criteria		2017-06 RSL Tap Water (HQ=0.1)	
				Sample Date			Action Level	Num of Detects Above Standard-1	Action Level	Num of Detects Above Standard-2
Volatile Organic Compounds (µg/l)										
1,2-Dichloroethane	1.81		P83GW-8	12/25/2007	15	1	2	0	0.17	1
Acetone	2.31		P83GW-10	12/26/2007	15	4	6,000	0	1,400	0
Carbon disulfide	0.66		P83GW-10	12/26/2007	15	1	700	0	81	0
Methyl Tertbutyl Ether	1.03		P83GW-3	12/22/2007	15	2	70	0	14	0
Tert Butyl Alcohol	23.38		P83GW-3	12/22/2007	15	1	100	0	NLE	NLE
Toluene	0.84		P83-A3	12/17/2007	15	2	600	0	110	0
Total Xylenes	0.24	J	P83-A3	12/17/2007	15	1	1,000	0	19	0
TIC VOCs (µg/l) No Detects)										
Semivolatile Organic Compounds (µg/l)										
2-Methylnaphthalene	4	J	P83-A3	12/17/2007	15	1	30	0	3.6	1
Acenaphthene	1	J	P83-A3	12/17/2007	15	1	400	0	53	0
Anthracene	0.4	J	P83-A3	12/17/2007	15	1	2,000	0	180	0
Dibenzofuran	0.7	J	P83-A3	12/17/2007	15	1	100	0	0.79	0
Diethyl phthalate	0.5	J	P83GW-17	12/29/2007	14	1	6,000	0	1,500	0
Di-n-butylphthalate	0.4	J	P83GW-8	12/25/2007	13	1	700	0	90	0
Di-n-octylphthalate	1	J	P83-A1	12/17/2007	10	2	100	0	20	0
	J	P83-A1	12/17/2007							
Fluoranthene	0.5	J	P83-A3	12/17/2007	15	1	300	0	80	0
Fluorene	2	J	P83-A3	12/17/2007	15	1	300	0	29	0
Naphthalene	5	J	P83-A3	12/17/2007	15	1	300	0	0.17	1
Phenanthrene	3	J	P83-A3	12/17/2007	15	1	100	0	NLE	NLE
Pyrene	0.5	J	P83-A1	12/17/2007	15	2	200	0	12	0
Inorganics (µg/l)										
Arsenic	5.04		P83-A1	12/17/2007	4	1	3	1	0.052	1
Barium	107		P83-A1	12/17/2007	4	4	6,000	0	380	0
Beryllium	0.794		P83-A1	12/17/2007	4	4	1	0	2.5	0
Cadmium	0.672		P83-A1	12/17/2007	4	3	4	0	0.92	0
Cobalt	2.08		P83-A1	12/17/2007	4	3	100	0	0.6	3
Copper	13.8		P83-A1	12/17/2007	4	4	1,300	0	80	0
Iron	11,100		P83-A3	12/17/2007	4	4	300	4	1,400	3
Magnesium	2,520		P83-A5	12/17/2007	4	4	NLE	NLE	NLE	NLE
Sodium	94,800		P83-A1	12/17/2007	4	4	50,000	2	NLE	NLE
Vanadium	25.9		P83-A3	12/17/2007	4	4	NLE	NLE	8.6	3
Zinc	142		P83-A1	12/17/2007	4	4	2,000	0	600	0

1) Detects Summary Statistics presents only detected results, non-detects and rejects were omitted, and were obtained from Summary Statistics Sheet.

Footnote:

- 1) All historical data collected prior to 2013 are reported as provided by others.
- 2) Number of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.
- 3) NLE = no limit established.
- 4) ND = not detected in any background sample, no background concentration available.
- 5) Bold chemical detection
- 6) SS = Site Specific action level, see "Specific Chemical Class (or Parameter)" footnote for details.

7) Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) during the data validation.

[blank] = detect, i.e. detected chemical result value.

B = non-detect, i.e. not detected at or above this value.

R = Rejected, data validation rejected the results.

U = non-detect, i.e. not detected at or above this value.

U-DL = Elevated sample detection limit due to difficult sample matrix.

U-ND = Analyte not detected in sample, but no detection or reporting limit provided.

J = estimated detected value due to a concentration below the reporting limit or due to discrepancies in meeting certain analyte-specific quality control.

E (or ER) = Estimated result.

D = Results from dilution of sample.

J-DL = Elevated sample detection limit due to difficult sample matrix.

JN = Tentatively identified compound, estimated concentration.

UJ = The compound was not detected; however, the results is estimated because of discrepancies in meeting certain analyte-specific QC criteria.

J+ = The result is an estimated quantity, but the result may be biased high.

J- = The result is an estimated quantity, but the result may be biased low.

8) Specific Chemical Classes (or Parameters) comments or notes regarding how data is displayed, compared to Action Levels, or represented in this table.

9) Chemical results greater than or equal to the action level (depending on criteria) are highlighted based on the Criteria that are present.

- Cell Shade values represent a result that is above the NJ Ground Water Quality Criteria

####

NJDEP Interim Specific GWQC values are presented for the NJ GWQS where there is not a Specific Ground Water Quality Criteria. A full list of compounds is available at (http://www.nj.gov/dep/wms/bwqsa/gwqs_interim_criteria_table.htm).

NJDEP Interim Generic GWQC values are presented for the NJ GWQS where there is not a XXXXX or a NJDEP Interim Specific GWQC. Available at (http://www.nj.gov/dep/wms/bwqsa/gwqs_interim_criteria_table.htm).

- Cell Shade values represent a result that is above the USEPA 2017-06 RSL Tap Water (HQ=0.1).

###

- Cell Shade values represent a result that is above both the NJ Ground Water Quality Criteria and USEPA 2017-06 RSL Tap Water (HQ=0.1).

###

10) Criteria action level source document and web address.

- The NJ Ground Water Quality Criteria refers to the NJDEP Groundwater Quality Standards - Adopted July 22, 2010

<http://www.state.nj.us/dep/wms/bwqsa/docs/njac79C.pdf>

- The 2017-06 USEPA RSL Tap Water (HQ=0.1) refers to the USEPA's Regional Screening Levels (HQ=0.1)

<https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-november-2017>

TABLE 7
CONSTITUENTS OF CONCERN AND CLEANUP GOALS FOR SOIL
PARCEL 83
FORT MONMOUTH, NEW JERSEY

Constituent of Concern	Medium	NJDEP RDCSRS ⁽¹⁾ (mg/kg)
Benzo(a)anthracene	Soil	5
Benzo(a)pyrene	Soil	0.5
Benzo(b)fluoranthene	Soil	5
Dibenz(a,h)anthracene	Soil	0.5
Indeno(1,2,3-cd)pyrene	Soil	5

Notes:

⁽¹⁾ New Jersey Administrative Code (NJAC), 2017. Remediation Standards, NJAC 7:26D. September 18. Available at: http://www.nj.gov/dep/rules/rules/njac7_26d.pdf
mg/kg = milligrams per kilogram

NJDEP = New Jersey Department of Environmental Protection

RDCSRS = Residential Direct Contact Soil Remediation Standard

TABLE 8
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
AND TO BE CONSIDERED CRITERIA
PARCEL 83
FORT MONMOUTH, NEW JERSEY

ARAR	Description
Chemical-Specific:	
N.J.A.C. 7:26D Remediation Standards	New Jersey has promulgated residential direct contact soil remediation standards (RDCSR) for the contaminants in soil that are referenced in NJAC 7:26D. These values were used as a basis for soil clean up goals that are protective of human health for Parcel 83.
Location-Specific:	
New Jersey Administrative Code (N.J.A.C.) 7:13 Flood Hazard Area Control Act Rules (FHACA)	Floodplain use and limitations which establishes limits on land development within flood hazard areas. Identifies requirements governing human disturbance to the land and vegetation in the flood hazard area and/or riparian zone of a regulated water. Parcel 83 lies within a 100-year floodplain; engineering controls and excavation activities need to be in compliance which require permits and authorization. Pertinent to activities that may occur within the floodplain.
New Jersey Statutes Annotated (N.J.S.A.) 13:19-1 Coastal Area Facility Review Act (CAFRA)	Requires all coastal areas should be dedicated to land uses which promote the public health, safety and welfare, protect public and private property, and are reasonably consistent and compatible with the natural laws governing the physical, chemical and biological environment of the coastal area. Requires CAFRA permit, N.J.A.C. 7:7, N.J.A.C. 7:7E.
Action-Specific:	
RCRA, 42 U.S.Code Chapter 82, Subchapter III (Hazardous Waste Management), §§	Defines RCRA hazardous waste. A solid waste is characterized as toxic, based on the TCLP, if the waste exceeds the TCLP maximum concentrations. Substantive provisions are potentially applicable for determining whether waste is hazardous.
RCRA, 40 Code of Federal Regulation (CFR) 261.3(d) and 329 IAC 3.1 Definition of a hazardous waste	For all hazardous waste related equipment, remove or decontaminate all hazardous waste residues, contaminated containment components, contaminated soils, and structures and equipment contaminated with waste, and manage them as hazardous unless 40 CFR 261.3(d) applies.
RCRA, 40 CFR 262.11 (Hazardous Waste Identification), 264.175 (Container Management)	Remedial actions must appropriately identify and manage investigation derive wastes and remedial wastes (that are hazardous wastes) stored onsite, including waste characterization samples to classify waste as hazardous or non-hazardous. Potentially applicable for characterizing waste generated during the remedial action.
RCRA, 40 CFR 262.30, 262.31, 262.32, and 262.33 and 329 IAC 3.1-7 and 329 IAC 3.1-8 Pre-Transportation Requirements	All hazardous waste must be properly packaged, with labels, markings, and placards, prior to transport.
RCRA, 40 CFR 260-268 Off-Site Land Disposal (Subpart C)	Soil and/or sediment that is excavated for off-site disposal and constitutes a hazardous waste must be managed in accordance with the requirements of RCRA.

TABLE 8
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
AND TO BE CONSIDERED CRITERIA
PARCEL 83
FORT MONMOUTH, NEW JERSEY

ARAR	Description
RCRA, 40 CFR 258 Off-Site Land Disposal (Subpart D)	Criteria for Municipal Solid Waste Landfills, establishes requirements for the operation of landfills accepting non-hazardous solid waste. These requirements are applicable to facilities used for the disposal of non-hazardous soil and/or sediment.
RCRA, 40 CFR 268 Land Disposal Restrictions (Subpart D)	The land disposal restrictions provide a second measure of protection from threats posed by hazardous waste disposal by ensuring that hazardous waste cannot be placed on the land until the waste meets specific treatment standards to reduce the mobility or toxicity of its hazardous constituents. Hazardous waste destined for land disposal must meet the applicable Land Disposal Regulations of 40 CFR 268.
N.J.A.C. 7:26C-7 Administrative Requirements for the Remediation of Contaminated Sites	Provides regulatory requirements for a deed notice. The deed notice includes as-built plans and details of the engineering controls (if used), including the cap, as well as monitoring and maintenance requirements.
N.J.A.C. 7:26E-1.1 Technical Requirements for Site Remediation	New Jersey Technical Rules: remediation performed does not relieve any person from obtaining all permits required by federal, state, or local statute or regulation. Soil Remediation Permit must be obtained.
N.J.A.C. 7:26E- 8 Technical Requirements for Site Remediation	Identifies requirements for institutional controls for contaminated soils left in place; identifies administrative requirements for site remediation that may be applicable. Potentially applicable if chemical residuals in soils left in place are above the residential or industrial soil remediation standards.
TBC Criteria	Description
<i>Chemical-Specific:</i>	
USEPA Residential Soil Regional Screening Levels	USEPA resident soil regional screening levels (Target Risk [TR] = 1×10^{-6} and Target Hazard Quotient [THQ] = 0.1) were used to determine constituents of potential concern to be in compliance with CERCLA.

Notes:

ARAR = Applicable or Relevant and Appropriate Requirements

RCRA = Resource Conservation and Recovery Act

TCLP = toxicity characteristic leaching procedure

TABLE 9
INITIAL SCREENING OF TECHNOLOGIES FOR SOIL
PARCEL 83
FORT MONMOUTH, NEW JERSEY

General Response Actions	Remedial Technology	Process Options	Description	Screening Comments
No Action	None	None	No action is taken.	Required for consideration by National Oil and Hazardous Substances Pollution Contingency Plan.
Risk and Hazard Management	Land Use Controls (LUCs)	LUCs	Restrict land use with a Deed Notice or Declaration of Environmental Restriction.	Restricting land use in the contaminated area via application of LUCs is an applicable and viable option.
Containment	Capping	Asphalt Cap	An impervious asphalt layer is paved on an aggregate base layer over the area of contamination. Asphalt capping is one of the most widely used engineering control measures in protecting human health and the environment from hazardous waste in subsurface.	Does not reduce toxicity or volume of contaminants but mitigates risk. Requires extensive State permitting, design and installation due to location in lowland coastal area. Requires long-term maintenance and limits future use. Capping technology could be used in conjunction with other components of a remedial action to ensure compliance with ARARs, such as a Deed Notice. Asphalt cap is applicable and retained for further evaluation.
Treatment	Physical	Solvent Extraction/Soil Washing	Contaminants sorbed onto fine soil particles are separated from bulk soil in an aqueous-based system based on particle size. The wash water may be augmented with a basic leaching agent, surfactant, pH adjustment, or chelating agent to help remove organics.	Appropriate remediation data must be collected to evaluate the applicability of soil washing and the chemicals (if any) that should be added to the washing liquid. Technology results in treated/waste material requiring disposal. Since there are other technologies more applicable to the site conditions, soil washing is not recommended and this approach is not retained for further evaluation.
		Electro kinetic	Electro kinetic is based on the application of a direct electric current of low intensity to the porous matrix to be decontaminated. The effect of the electric field induces the mobilization and transportation of contaminants through the porous matrix towards the electrodes, where they are collected, pumped out and treated.	Since the COCs are not readily biodegradable and relatively immobile, their elimination from soils cannot be achieved in an unenhanced electro kinetic treatment and in order to achieve an effective removal or elimination of contaminants from soils, their solubility has to be enhanced with the use of co-solvents, surfactants or any other chemical agent. In addition, the costs for installation of electrodes and power supply make this technology not cost-effective and it not recommended for further evaluation.

TABLE 9
INITIAL SCREENING OF TECHNOLOGIES FOR SOIL
PARCEL 83
FORT MONMOUTH, NEW JERSEY

General Response Actions	Remedial Technology	Process Options	Description	Screening Comments
Treatment	Chemical	Chemical Oxidation	Reduction/oxidation chemically converts hazardous contaminants to non-hazardous or less toxic compounds that are more stable, less mobile, and/or inert. The oxidizing agents most commonly used are ozone, hydrogen peroxide, hypochlorites, chlorine, and chlorine dioxide.	Success of technology is dependent on the viability of oxidant delivery, soil conditions and hydrogeology of the site. Would require pilot test to evaluate effectiveness of oxidant and multiple applications. Concentration of COCs present across a wide area would require impractical amounts of reagent to meet low cleanup levels.
	Biological	Phytoremediation	Direct use of living green plants for in situ removal, degradation, or containment of contaminants in soil.	Future land use includes residential and since technology would require long term maintenance it is impractical and not retained for further evaluation.
Source Removal	Excavation	Mechanical Excavation	Contaminated soil is excavated and properly disposed of. Excavated area is filled in with clean soil and restored to pre-construction conditions.	Removes soil and restores the excavated area.
Disposal	Offsite Disposal	Offsite Disposal	Transport and disposal of excavated soil at offsite permitted disposal facility.	Offsite disposal is necessary for the excavation alternative.

Process Option Retained During Evaluation

Process Option Screened Out During Evaluation

TABLE 10
EVALUATION OF PROCESS OPTIONS FOR SOIL
PARCEL 83
FORT MONMOUTH, NEW JERSEY

General Response Actions	Remedial Technology	Process Options	Ratings		
			Effectiveness	Implementability	Cost
No Action	None	None	Low; does not achieve RAOs.	High; no action is needed.	High; no cost.
Risk and Hazard Management	Land Use Controls (LUCs)	LUCs	Moderate; contamination not reduced. Effectiveness to reduce risk depends on continuing to limit access to soil.	High; readily implementable.	Moderate; minimal administrative, 5-year inspections and reporting costs.
Containment	Capping	Asphalt Cap	Moderate to High; provides protection by reducing direct contact with impacted soil; will require increased level of truck traffic entering and exiting the site for installation. Requires institutional controls and long-term O&M; would limit land reuse options; does not reduce toxicity, mobility, or volume of contamination.	Moderate; tying asphalt cap into existing grade and managing storm water will result in technical challenges. State and community, would need to accept impacted material remaining onsite.	Moderate; capital costs associated with cap and minimal costs associated with administrative fees; O&M will be required to retain integrity of cap and reporting requirements.
Source Removal	Excavation	Mechanical Excavation	High; removes all contaminated soil and backfills excavation with clean soil. Demonstrates ability to meet RAOs.	Moderate: technology well established. Approval, coordination and planning required.	Low; high capital costs and low O&M costs.

Ratings

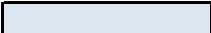
	High
	Moderate to High
	Moderate
	Moderate to Low
	Low

TABLE 11
CRITERIA FOR DETAILED EVALUATION OF REMEDIAL ALTERNATIVES
PARCEL 83
FORT MONMOUTH, NEW JERSEY

Criterion		How the Criterion is Applied
Threshold Criteria		
1	Overall Protection of Human Health and the Environment	Assesses the ability of a remedial alternative to eliminate, reduce, or control the risks associated with exposure pathways, including direct contact, potential migration, and risks to ecosystems.
2	Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)	Evaluates the potential of a remedial alternative to comply with chemical-specific, location-specific, and action-specific ARARs. Compliance with other to-be-considered (TBC) criteria is also evaluated, but is not mandatory.
Primary Balancing Criteria		
3	Long-Term Effectiveness and Permanence	Measures the ability of a remedial alternative to permanently protect human health and the environment.
4	Reduction of Toxicity, Mobility, or Volume Through Treatment	Evaluates the ability of a remedial alternative to permanently or significantly reduce the toxicity, mobility, and volume of the constituents, particularly through treatment.
5	Short-Term Effectiveness	Assesses the protection of human health and the environment during implementation of a remedial alternative.
6	Implementability	Evaluates technical feasibility and the difficulty of applying the remedial alternative at the site, the reliability of the technology, the unknowns associated with the remedial alternative, and the need for treatability studies. Assesses administrative requirements, including regulatory agency approval and the need for permits and waivers. Assesses mobilization needs and the accessibility of equipment and trained personnel required to implement the remedial alternative.
7	Cost	Assesses the capital, operation, and maintenance costs of each remedial alternative.
Modifying Criteria		
8	State Acceptance	Evaluates the technical and administrative issues and concerns the State may have regarding the remedial alternative.
9	Community Acceptance	Evaluates the issues and concerns the public may have regarding the remedial alternative.

Source: 40 CFR 300.430(e) (9) and 300.100(f) (1).

TABLE 12
SUMMARY OF COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES
PARCEL 83
FORT MONMOUTH, NEW JERSEY

Criteria	Alternative			
	1 ^a	2 ^b	3 ^c	4 ^d
Threshold Criteria				
Overall Protection of Human Health and the Environment	No	Yes	Yes	Yes
Compliance with ARARs	Not Applicable	Yes	Yes	Yes
Balancing Criteria				
Long-Term Effectiveness and Permanence	Low	Moderate	Moderate to High	High
Reduction of Toxicity, Mobility, or Volume by Treatment	Low	Low	Low	High
Short-Term Effectiveness	High	Moderate	Moderate to Low	Low
Implementability	Not Applicable	High	Moderate to Low	Low
Cost (Total Present Value)	\$0	\$558,000	\$3,335,000	\$5,396,000
Optional Evaluation Factor				
Remedial Time-Frame	0	>30 years	>30 years	2 years

^a No Action

^b Land Use Controls

^c Containment via Asphalt Capping with Alternative 2

^d Source Removal via Direct Excavation and Backfill

Ratings

High	
Moderate to High	
Moderate	
Moderate to Low	
Low	

FIGURES

Figure 1 – Parcel 83, 103, and 104 Site Location

Figure 2 – Parcel 83 Site Layout and Soil Sampling Locations

Figure 3 – Parcel 83 Sampling Locations and USEPA RSL Exceedances for VOCs, PCBs, and Metals

Figure 4 – Parcel 83 Sampling Locations and RDCSRS Exceedances for VOCs, PCBs, and Metals

Figure 5 – Parcel 83 Sampling Locations and USEPA RSL Exceedances for SVOCs

Figure 6 – Parcel 83 Sampling Locations and RDCSRS Exceedances for PAHs

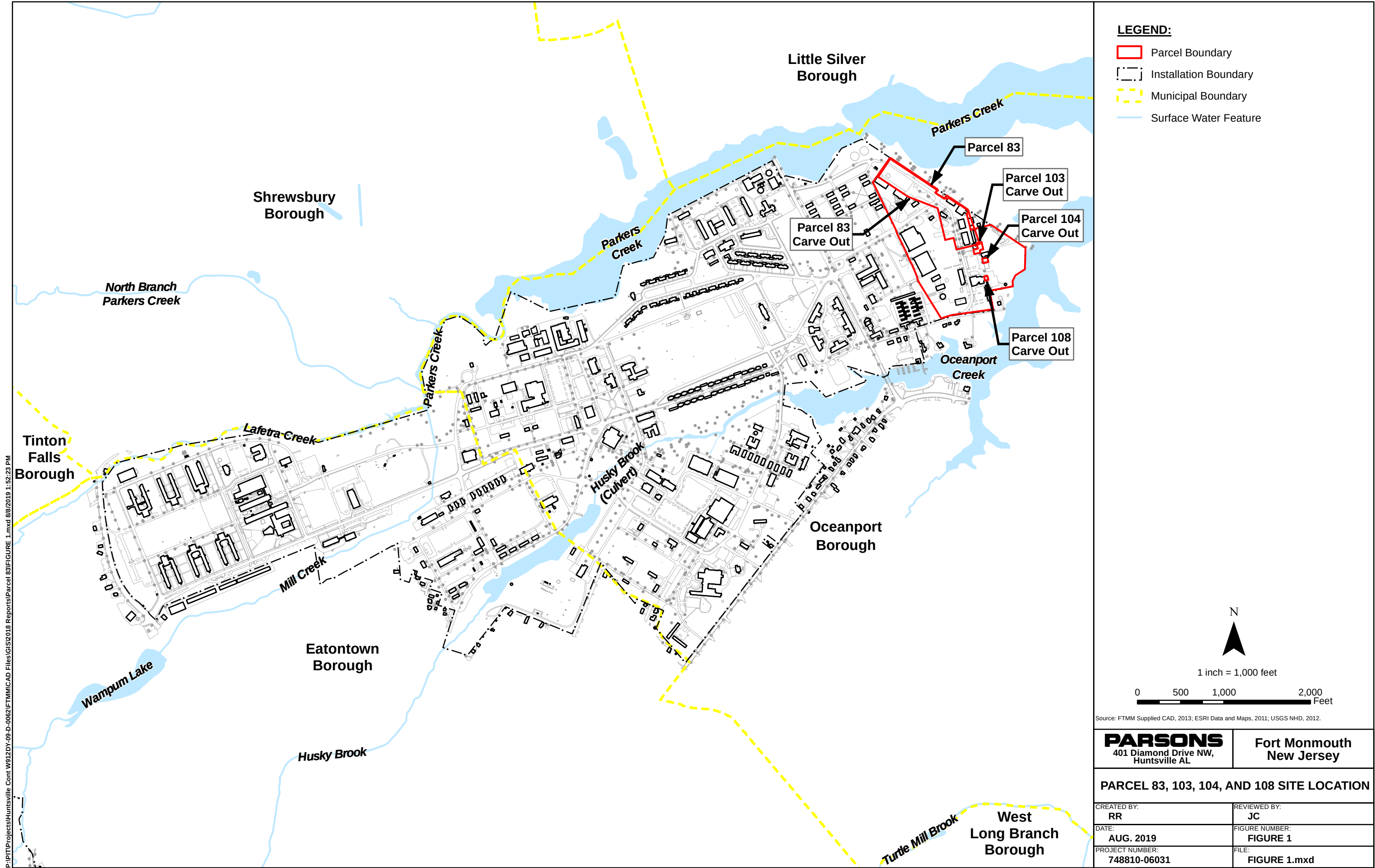
Figure 7 – Parcel 83 Site Layout and Groundwater Sampling Locations

Figure 8 – Parcel 83 Exposure Area with COCs

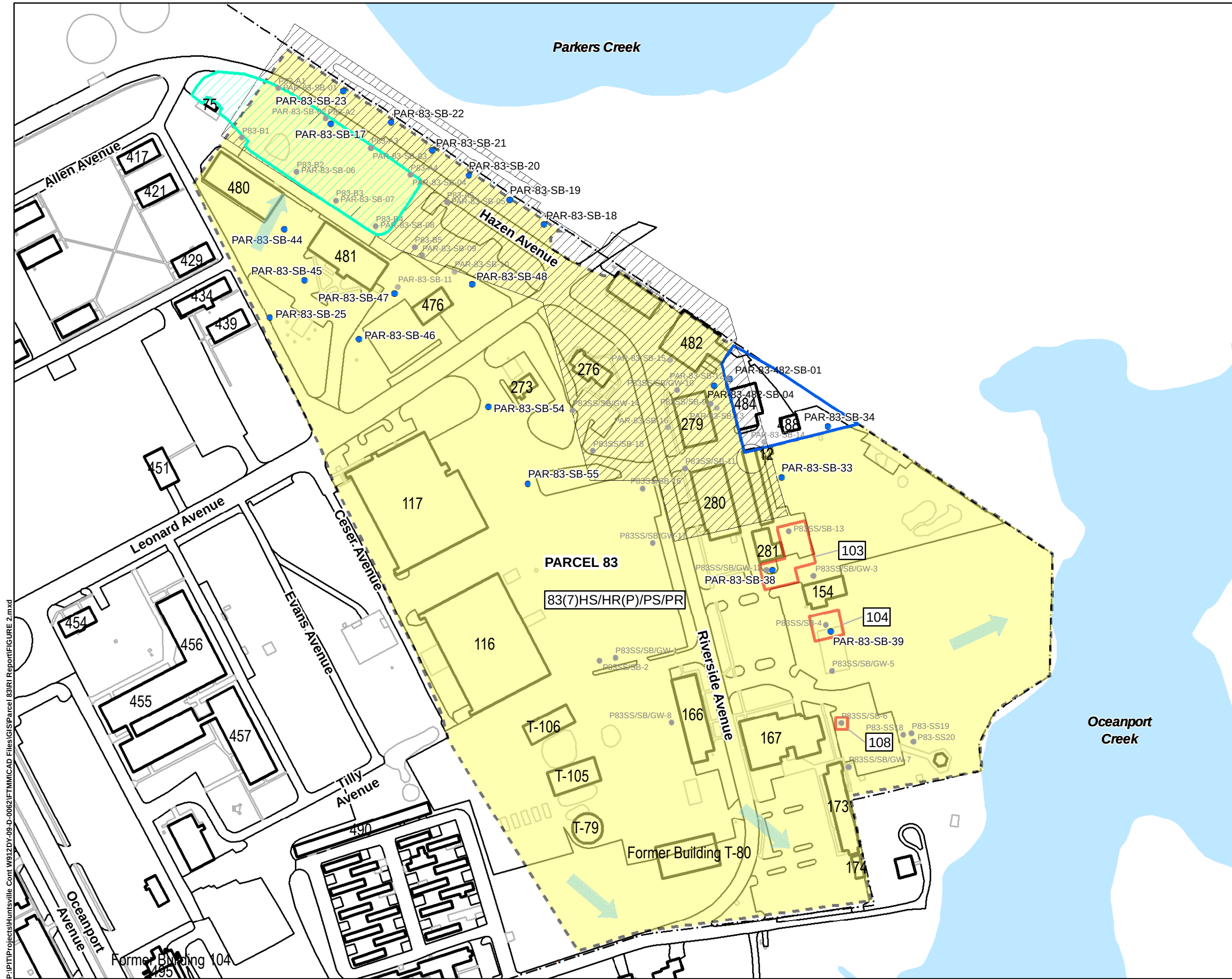
Figure 9 – Alternative 2 Conceptual Layout

Figure 10 – Alternative 3 Conceptual Layout

Figure 11 – Alternative 4 Conceptual Layout



P:\P\T\Projects\Huntsville Cont W912.DY-09-D-0062\FTMMCAD Files\GIS\2018 Reports\Parcel 83\FIGURE 1.mxd 8/8/2019 1:52:23 PM



- LEGEND:**
- Surface/Subsurface Sample Location (2017)
 - Historic Sample Locations (2007 and 2016)
 - Former Coal Storage
 - Parcel 83 Carve-Out (Approximate)
 - Parcel 83 Boundary
 - FTMM-57 Boundary
 - Parcel 103, 104, and 108 Boundaries
 - Installation Boundary
 - Surface Water Feature
 - Generalized Groundwater Flow Direction

BRAC Parcel Label Definitions

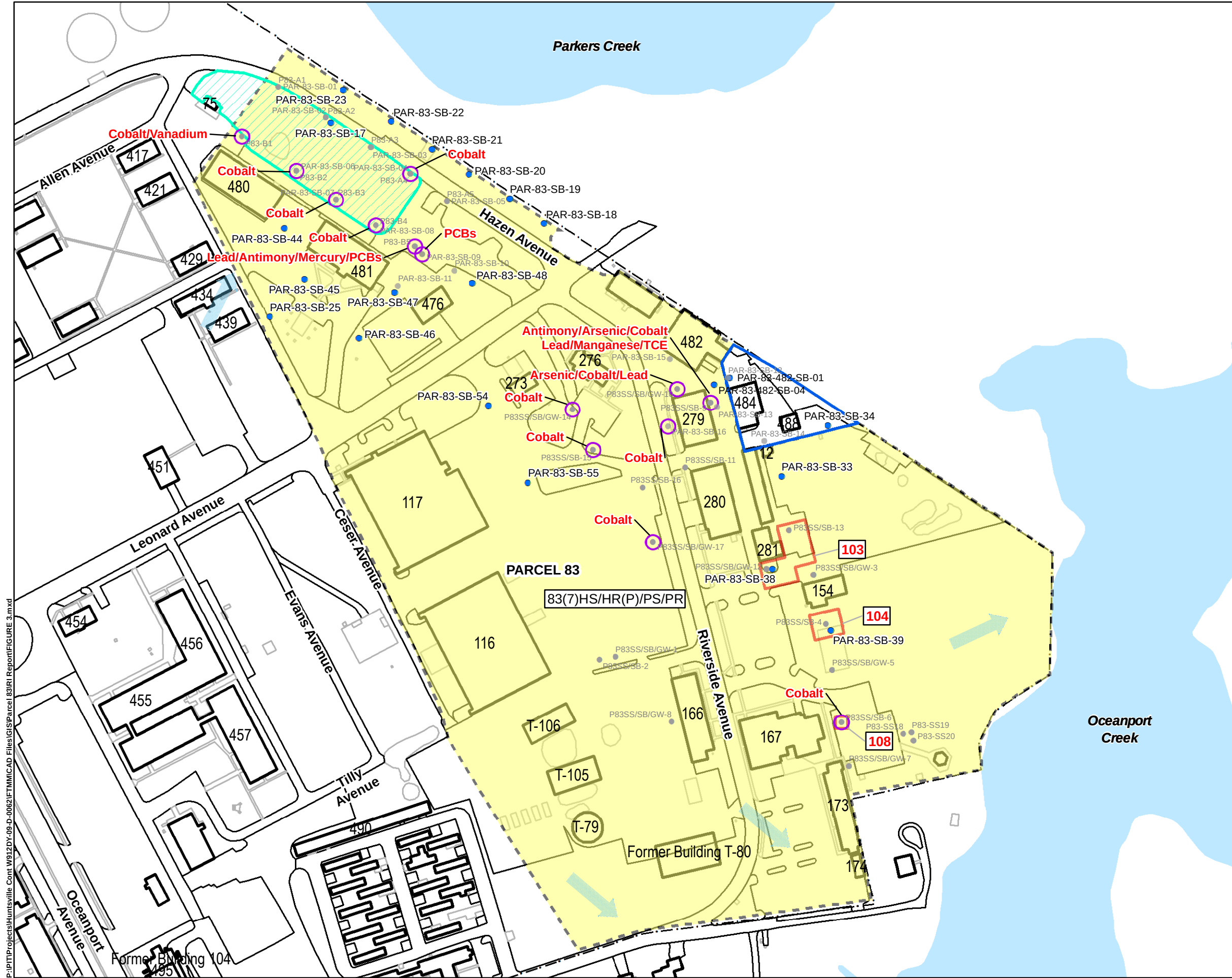
8(2)PS	Contaminant Description	Category Number	Parcel Number
HS	Hazardous Substance Storage		
HR	Hazardous Substance Release		
PS	Petroleum Storage		
PR	Petroleum Release		
(P)	Possible Release or Disposal		

1 inch = 200 feet

0 100 200 400 Feet

Source: FTMM Supplied CAD; Shaw Environmental 2008.

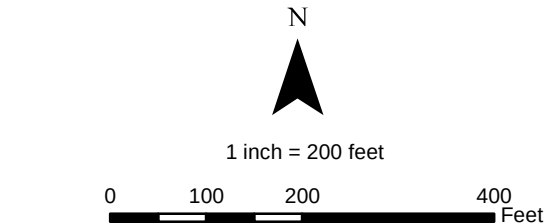
PARSONS 401 Diamond Drive NW, Huntsville AL	Fort Monmouth New Jersey
PARCEL 83 SITE LAYOUT AND SOIL SAMPLING LOCATIONS	
CREATED BY: RR	REVIEWED BY: AM
DATE: AUG. 2019	FIGURE NUMBER: FIGURE 2
PROJECT NUMBER: 748810-01000	FILE: FIGURE 2.mxd



LEGEND:

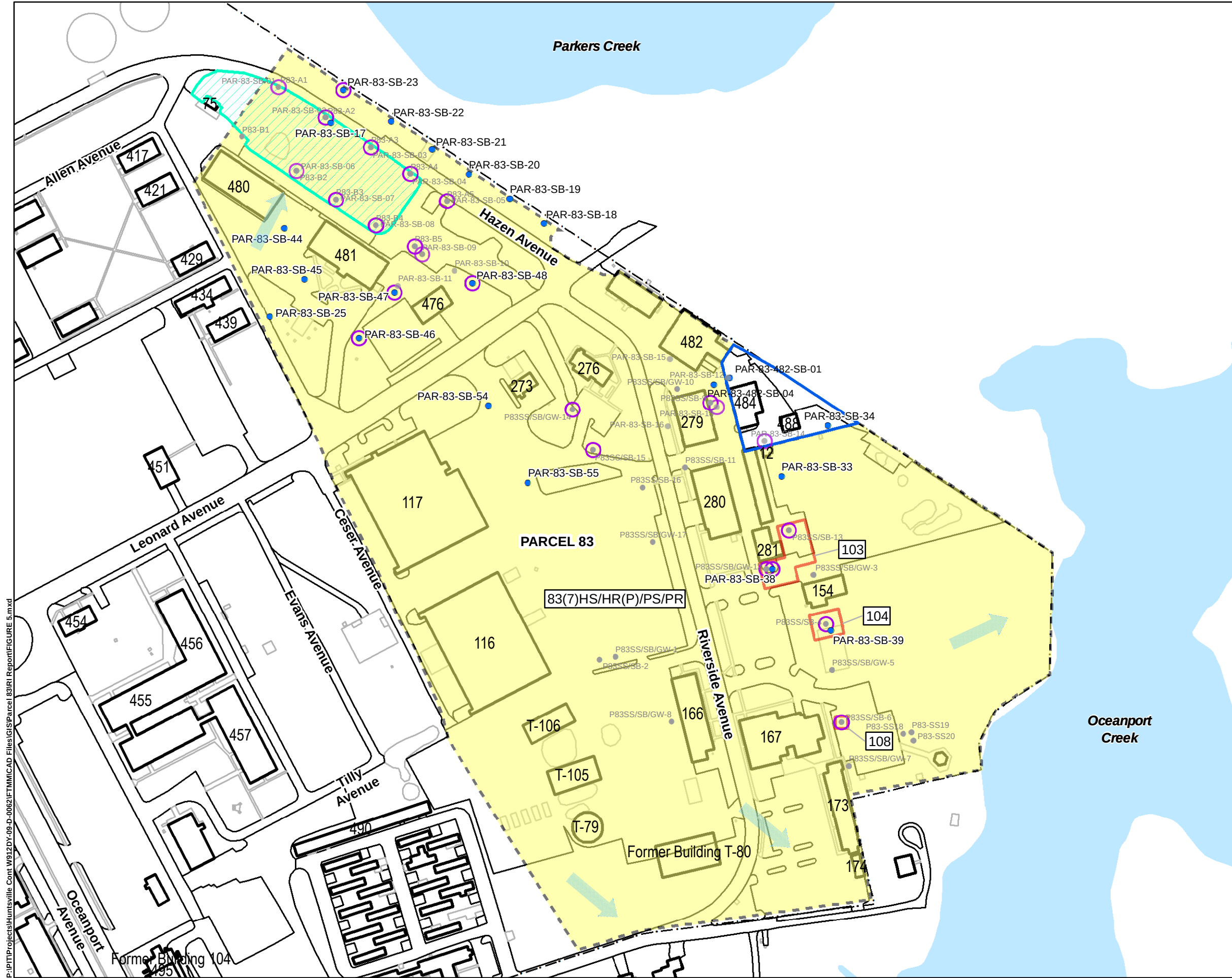
- Surface/Subsurface Sample Location (2017)
- Historic Sample Locations (2007 and 2016)
- Exceeds USEPA RSL (listed metals also exceed maximum background)
- Parcel 83 Boundary
- FTMM-57 Boundary
- Parcel 103, 104, and 108 Boundaries
- Installation Boundary
- Former Coal Storage
- Surface Water Feature
- Generalized Groundwater Flow Direction

BRAC Parcel Label Definitions	
8(2)PS	HS – Hazardous Substance Storage
Contaminant Description	HR – Hazardous Substance Release
	PS – Petroleum Storage
	PR – Petroleum Release
	(P) – Possible Release or Disposal
Category Number	
Parcel Number	



Source: FTMM Supplied CAD; Shaw Environmental 2008.

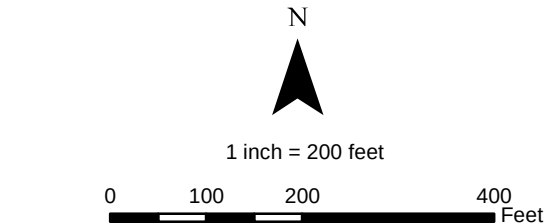
PARSONS 401 Diamond Drive NW, Huntsville AL	Fort Monmouth New Jersey
PARCEL 83 SAMPLING LOCATIONS AND USEPA RSL EXCEEDANCES FOR VOCs, PCBs, & METALS	
CREATED BY: RR	REVIEWED BY: AM
DATE: AUG. 2019	FIGURE NUMBER: FIGURE 3
PROJECT NUMBER: 748810-01000	FILE: FIGURE 3.mxd



LEGEND:

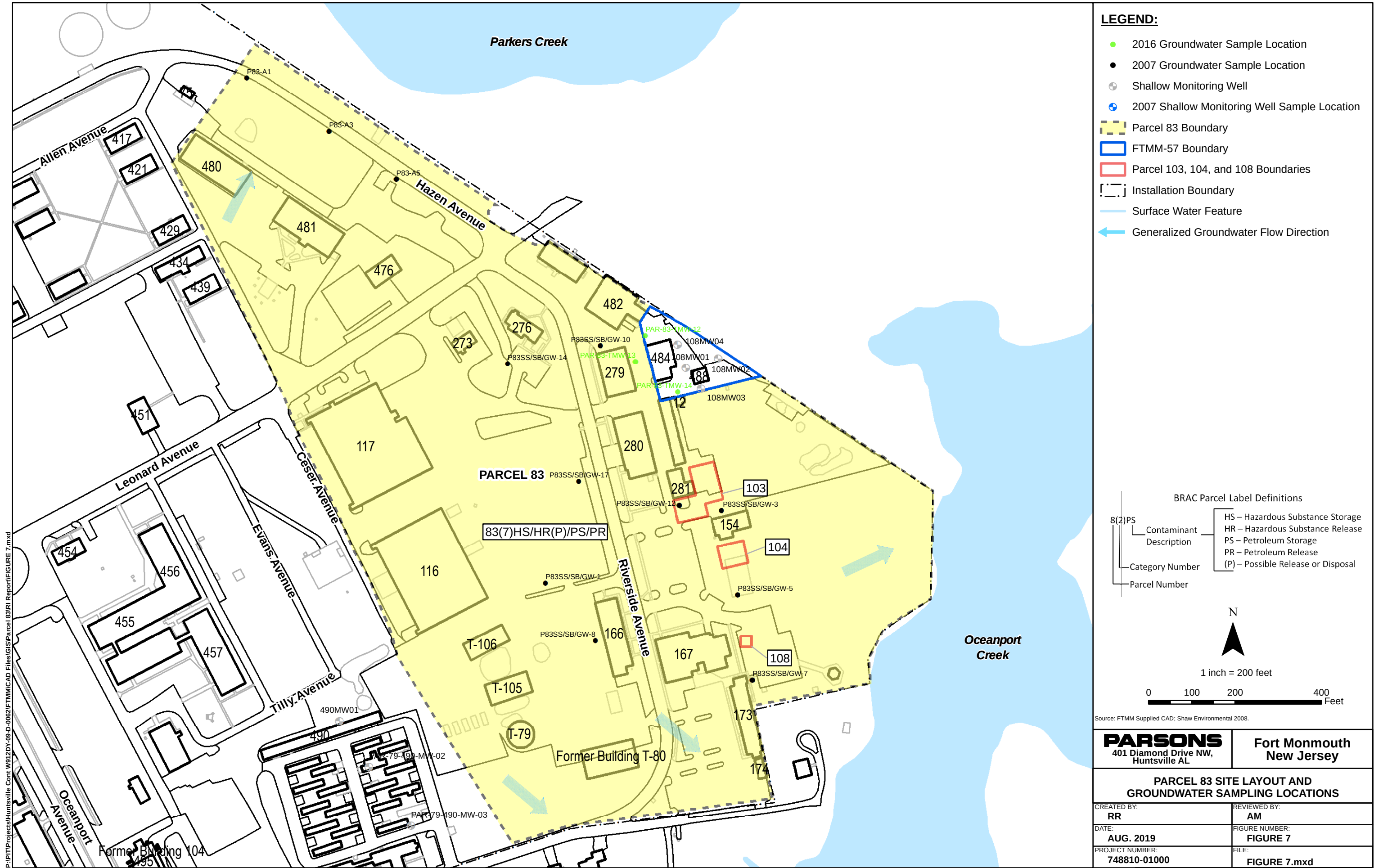
- Surface/Subsurface Sample Location (2017)
- Exceeds USEPA RSL for SVOCs
- Historic Sample Locations (2007 and 2016)
- Former Coal Storage
- Parcel 83 Boundary
- FTMM-57 Boundary
- Parcel 103, 104, and 108 Boundaries
- Installation Boundary
- Surface Water Feature
- Generalized Groundwater Flow Direction

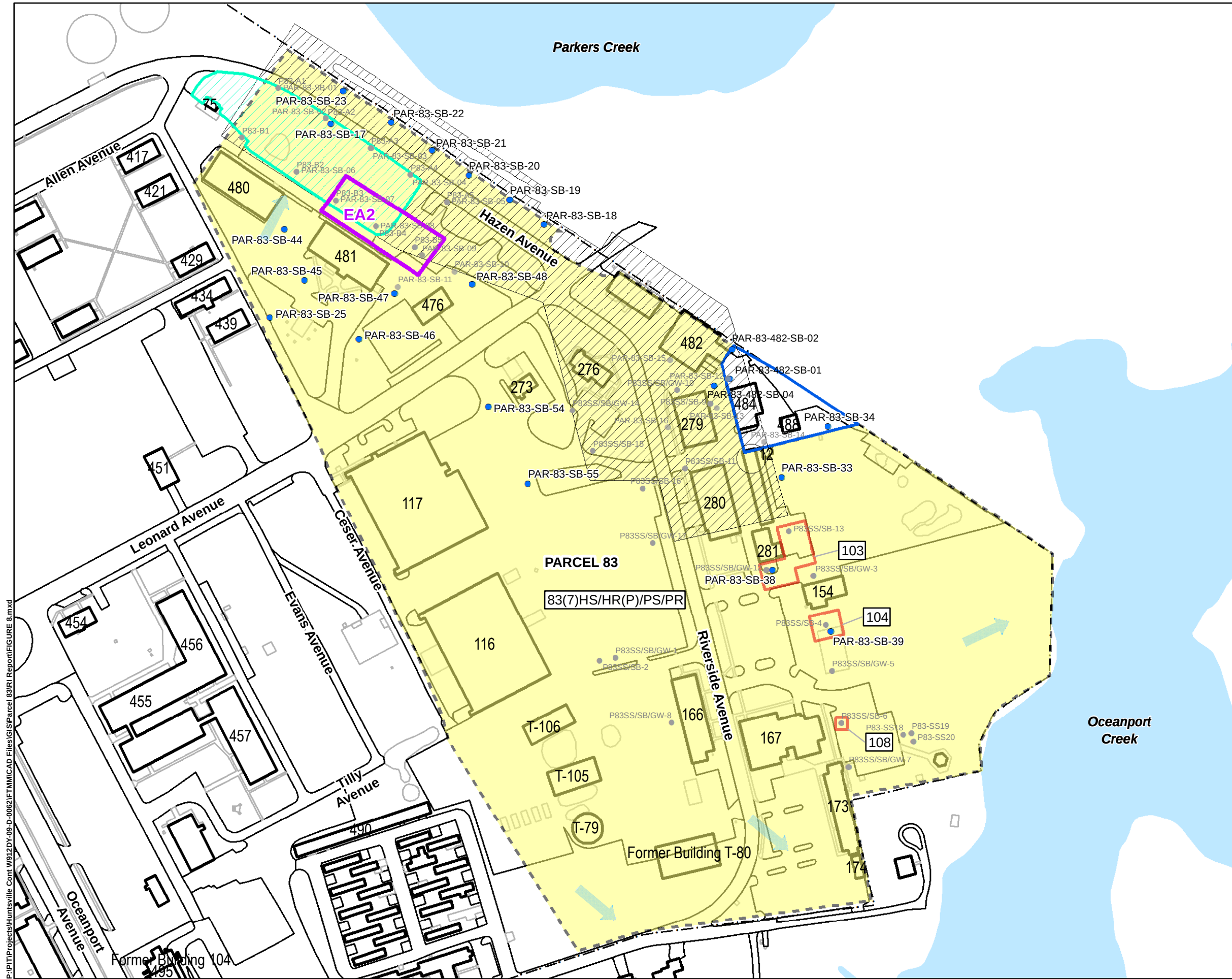
BRAC Parcel Label Definitions	
8(2)PS	HS – Hazardous Substance Storage
Contaminant Description	HR – Hazardous Substance Release
	PS – Petroleum Storage
	PR – Petroleum Release
	(P) – Possible Release or Disposal
Category Number	
Parcel Number	



Source: FTMM Supplied CAD; Shaw Environmental 2008.

PARSONS 401 Diamond Drive NW, Huntsville AL	Fort Monmouth New Jersey
PARCEL 83 SAMPLING LOCATIONS AND USEPA RSL EXCEEDANCES FOR SVOCs	
CREATED BY: RR	REVIEWED BY: AM
DATE: AUG. 2019	FIGURE NUMBER: FIGURE 5
PROJECT NUMBER: 748810-01000	FILE: FIGURE 5.mxd





LEGEND:

- Surface/Subsurface Sample Location (2017)
- Historic Sample Locations (2007 and 2016)
- Former Coal Storage Area
- Parcel 83 Carve-Out (Approximate)
- Parcel 83 Boundary
- FTMM-57 Boundary
- Parcel 103, 104, and 108 Boundaries
- Exposure Area
- Installation Boundary
- Surface Water Feature
- Generalized Groundwater Flow Direction

BRAC Parcel Label Definitions	
8(2)PS	HS – Hazardous Substance Storage
Contaminant	HR – Hazardous Substance Release
Description	PS – Petroleum Storage
Category Number	PR – Petroleum Release
Parcel Number	(P) – Possible Release or Disposal

N

1 inch = 200 feet

0 100 200 400 Feet

Source: FTMM Supplied CAD; Shaw Environmental 2008.

PARSONS
401 Diamond Drive NW,
Huntsville AL

Fort Monmouth
New Jersey

**PARCEL 83 EXPOSURE
AREA WITH COCs**

CREATED BY:

RR

REVIEWED BY:

AM

DATE:

JUN. 2020

FIGURE NUMBER:

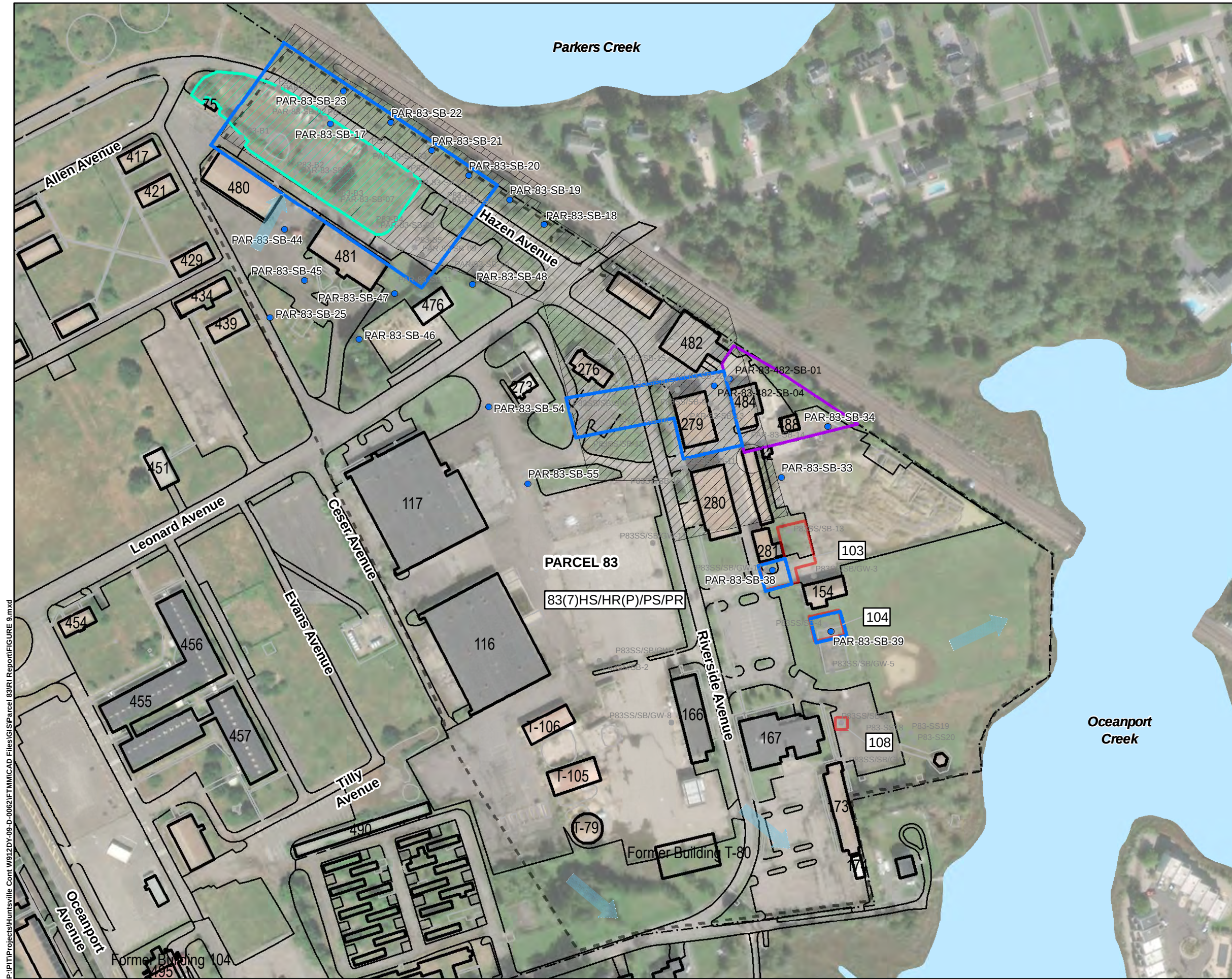
FIGURE 8

PROJECT NUMBER:

748810-01000

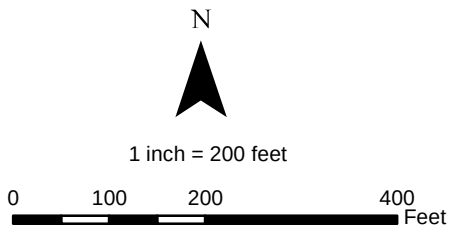
FILE:

FIGURE 8.mxd



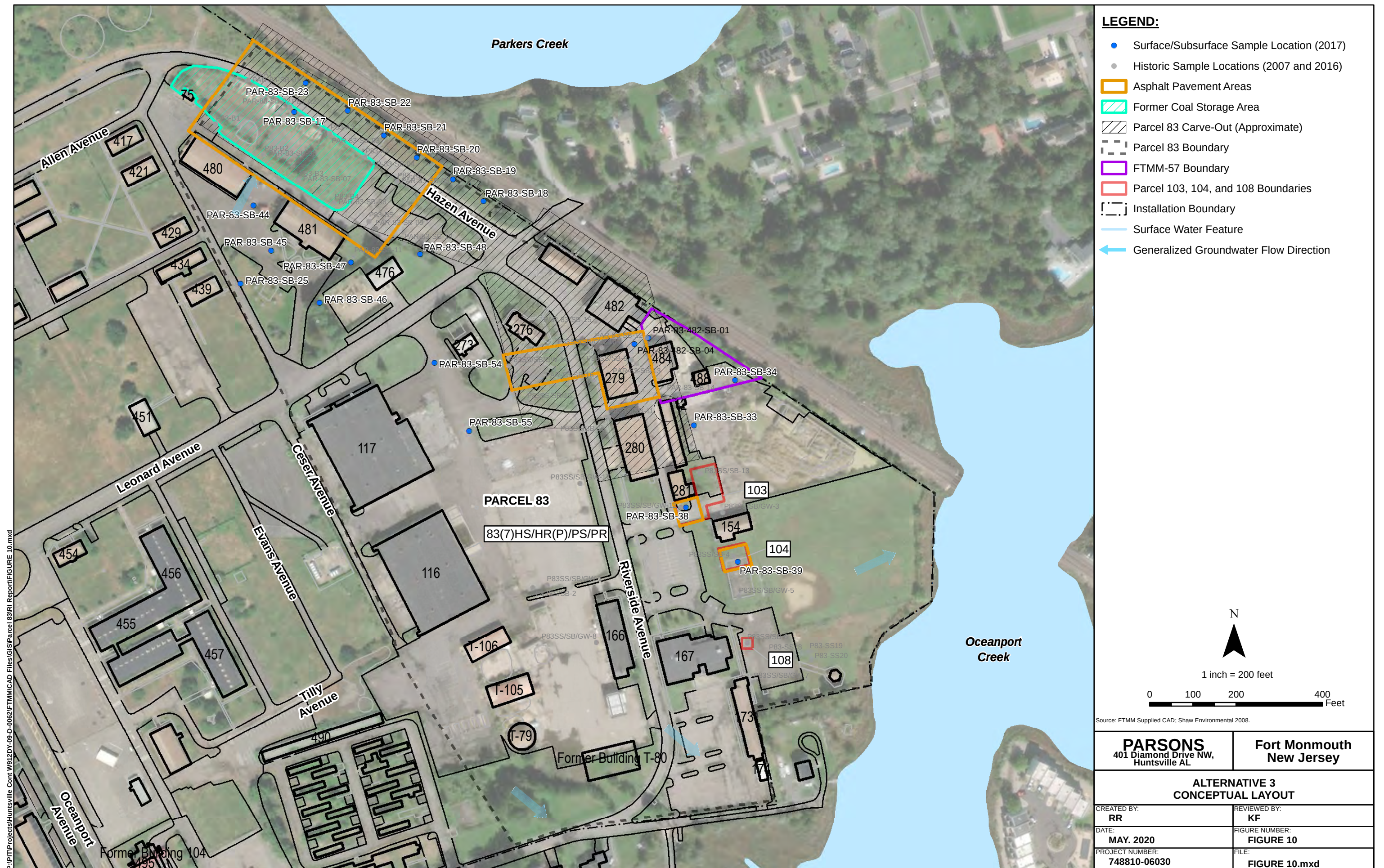
LEGEND:

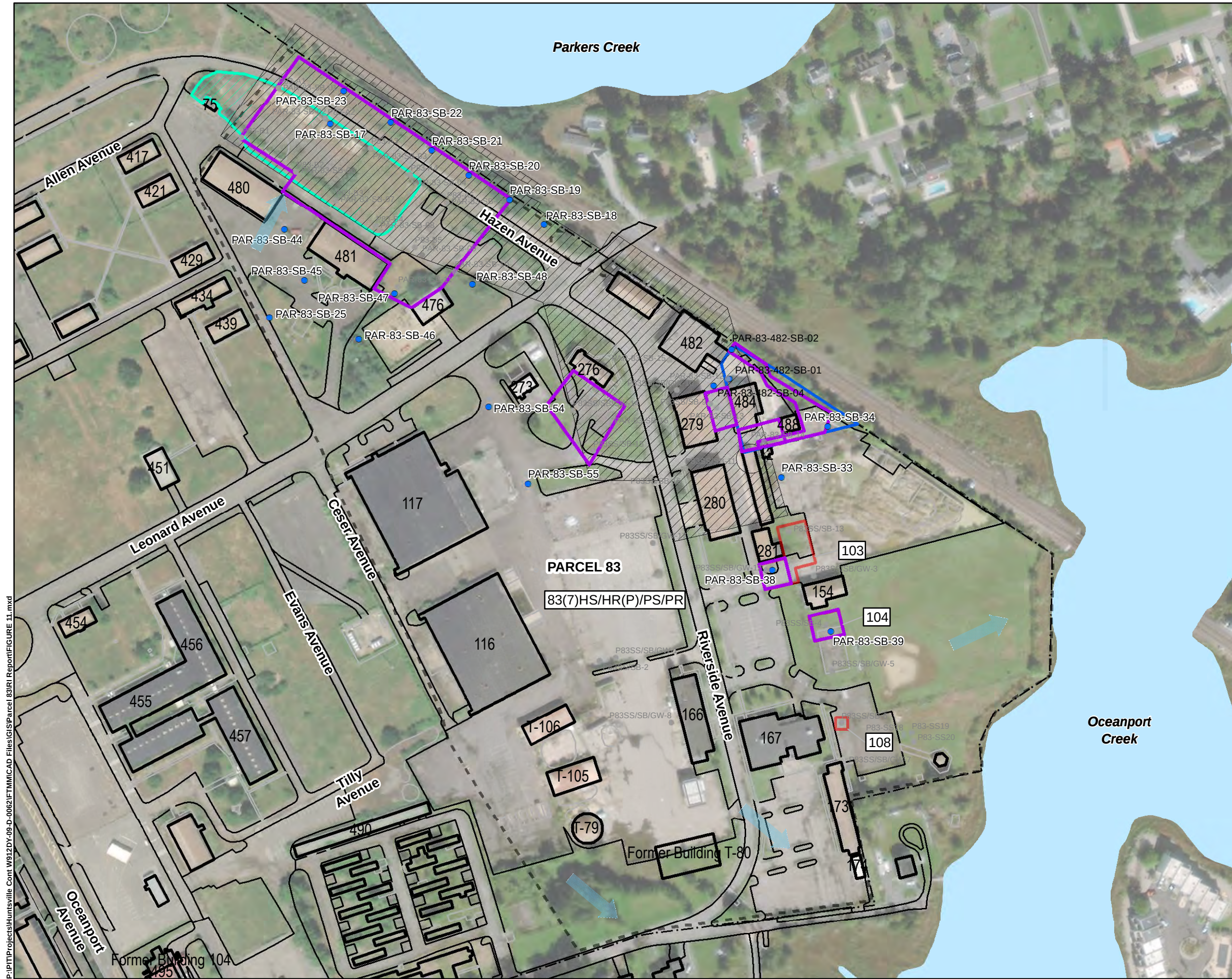
- Surface/Subsurface Sample Location (2017)
- Historic Sample Locations (2007 and 2016)
- Land Use Control Areas
- Former Coal Storage Area
- Parcel 83 Carve-Out (Approximate)
- Parcel 83 Boundary
- FTMM-57 Boundary
- Parcel 103, 104, and 108 Boundaries
- Installation Boundary
- Surface Water Feature
- Generalized Groundwater Flow Direction



Source: FTMM Supplied CAD; Shaw Environmental 2008.

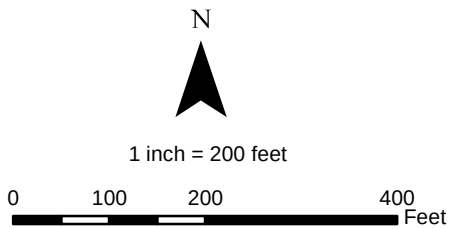
PARSONS 401 Diamond Drive NW, Huntsville AL		Fort Monmouth New Jersey	
ALTERNATIVE 2 CONCEPTUAL LAYOUT			
CREATED BY: RR		REVIEWED BY: KF	
DATE: APR. 2020		FIGURE NUMBER: FIGURE 9	
PROJECT NUMBER: 748810-06030		FILE: FIGURE 9.mxd	





- LEGEND:**
- Surface/Subsurface Sample Location (2017)
 - Historic Sample Locations (2007 and 2016)
 - ▭ Excavation Areas
 - ▨ Parcel 83 Carve-Out (Approximate)
 - ▨ Former Coal Storage
 - ▭ Parcel 83 Boundary
 - ▭ FTMM-57 Boundary
 - ▭ Parcel 103, 104, and 108 Boundaries
 - ▭ Installation Boundary
 - Surface Water Feature
 - Generalized Groundwater Flow Direction

NOTE:
Total 16,660 in-place cubic yards of soil, assuming 20% expansion = estimated 20,000 cubic yards.



Source: FTMM Supplied CAD; Shaw Environmental 2008.

PARSONS 401 Diamond Drive NW, Huntsville AL	Fort Monmouth New Jersey
ALTERNATIVE 4 CONCEPTUAL LAYOUT	
CREATED BY: RR	REVIEWED BY: KF
DATE: SEP. 2020	FIGURE NUMBER: FIGURE 11
PROJECT NUMBER: 748810-06030	FILE: FIGURE 11.mxd

APPENDICES

Appendix A	Regulatory Correspondence
Appendix B	Soil Boring Logs
Appendix C	Historical Information
Appendix D	Laboratory Analytical Reports and Data Tables
Appendix E	Data Validation Reports
Appendix F	Alternative Soil Remediation Standard Application
Appendix G	Human Health Risk Assessment
Appendix H	Remedial Alternatives Cost Estimates

APPENDIX A

Regulatory Correspondence

1. NJDEP letter to the Army dated 19 January 2018. Re: Remedial Action Type: Unrestricted Use, Scope of Remediation: Areas of Concern: Parcel 108, Monmouth County, SRP OI# G000000032
2. Army letter to NJDEP dated 11 December 2017. Subject: Unrestricted Use, No Further Action Request for Parcel 108, Site Investigation Report Addendum, Fort Monmouth, NJ, PI G000000032
3. NJDEP letter to the Army dated 27 February 2018. Re: Work Plan Addendum for Parcels 83, 103, and 104 dated February 2018. *Fort Monmouth, NJ, PI G000000032*
4. Army letter to NJDEP dated 25 August 2017. Re: Letter Work Plan Addendum for Parcels 83, 103, 104, and 108, *Fort Monmouth, NJ, PI G000000032*
5. NJDEP letter to the Army dated 22 December 2015. Re: Revision 1 Final Environmental Condition of Property Supplemental Phase II Site Investigation Work Plan Addendum for Parcels 34, 50, 51, 52, 66/97, 80, and 83 dated November 2015. *Fort Monmouth, NJ, PI G000000032*
6. NJDEP letter to the Army dated 16 June 2015. Re: Final Environmental Condition of Property Supplemental Phase II Site Investigation Work Plan Addendum for Parcels 34, 50, 51, 52, 66/97, 80, and 83 dated February 2015. *Fort Monmouth, NJ, PI G000000032*
7. NJDEP letter to the Army dated 10 July 2012. Re: March 2012 Army Response to NJDEP Correspondence dated 28 October 2008. *Fort Monmouth, NJ, PI G000000032*
8. Army letter to NJDEP dated 28 October 2008. Re: Draft Site Investigation Report, Fort Monmouth, NJ.
9. NJDEP letter to the Army dated 31 July 2018. Re: Remedial Action Type: Unrestricted Use, Scope of Remediation: Areas of Concern UST 482, Monmouth County, SRP PI# G000000032, RPC000001
10. NJDEP letter to the Army dated 8 June 2018. Re: Remedial Action Type: Unrestricted Use, Scope of Remediation: Areas of Concern: Parcel 83 UST 273 Dispenser Area, Monmouth County, SRP PI# G000000032, RPC000001
11. NJDEP letter to the Army dated 8 September 2016. Re: Response to NJDEP's October 2015 Comments on the July 20, 2015 No Further Action Request, Site Investigation Report Addendum for the ECP Parcel 83 Underground Storage Tanks, Fort Monmouth, Oceanport, Monmouth County, PI G000000032
12. Army letter to NJDEP dated 12 July 2016. Re: Response to NJDEP's 13 October 2015 Comments on the 30 July 2015 No Further Action Request Site Investigation Report Addendum for the ECP Parcel 83 Underground Storage Tanks, *Fort Monmouth, NJ, PI G000000032*
13. NJDEP letter to the Army dated 13 October 2015. Re: No Further Action Request Site Investigation Report Addendum for the ECP Parcel 83 Underground Storage Tanks. *Fort Monmouth, NJ, PI G000000032*
14. Army letter to NJDEP dated 30 July 2015. Re: No Further Action Request Site Investigation Report Addendum for the ECP Parcel 83 Underground Storage Tanks, *Fort Monmouth, NJ, PI G000000032*

Correspondence 1



State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Site Remediation and Waste Management Program
401 East State Street
Trenton, NJ 08625

PHIL MURPHY
Governor

SHEILA OLIVER
Lt. Governor

RAY BUKOWSKI
Acting Commissioner

January 19, 2018

Mr. William Colvin
BRAC Environmental Coordinator
OACSIM – U.S. Army Fort Monmouth
PO Box 148
Oceanport, NJ 07757

Approval

Re: **Remedial Action Type:** *Unrestricted Use*
Scope of Remediation: *Areas of Concern: Parcel 108*
Monmouth County
SRP PI# G000000032

Dear Mr. Colvin:

The New Jersey Department of Environmental Protection (Department) reviewed the information submitted on December 11, 2017 by the Department of the Army. The Department concurs with the Department of the Army that no additional action is necessary for Parcel 108 and boring P83-SB-6 within Parcel 83. It is therefore agreed all remedial actions are complete. The determination that the remedial action is complete is based upon information in the Department's case file, the report submitted by the Department of the Army, and the certified representations and information provided to the Department.

If you have any questions regarding this matter, please contact A. J. Joshi at (973) 656-4427.

Sincerely,

A handwritten signature in black ink, appearing to read "Gwen B. Zervas".

Gwen B. Zervas, P.E.
Section Chief

cc: James Moore, USACE
Cristina Grill, Parsons
Joe Fallon, FMERA
File



DEPARTMENT OF THE ARMY

OFFICE OF ASSISTANT CHIEF OF STAFF FOR INSTALLATION MANAGEMENT
U.S. ARMY FORT MONMOUTH
P.O. 148
OCEANPORT, NEW JERSEY 07757

Correspondence 2

11 December 2017

Mr. Ashish Joshi
New Jersey Department of Environmental Protection
Division of Remediation Management & Response
Bureau of Northern Field Operations
7 Ridgedale Avenue (2nd Floor)
Cedar Knolls, NJ 07927-1112

**Subject: Unrestricted Use, No Further Action Request for Parcel 108
Site Investigation Report Addendum
Fort Monmouth, NJ
PI G000000032**

Dear Mr. Joshi:

The Fort Monmouth Team has reviewed existing file information for Parcel 108 and prepared this addendum. The August 2016 *Final Finding of Suitability to Transfer (FOST), Phase 2 Parcels* for Fort Monmouth identified Parcel 108 as the area associated with soil boring P83-SB-6 within Parcel 83 (**Figure 1**). As reported in the *U.S. Army BRAC 2005 Site Investigation Report* (July 2008), the benzo(a)pyrene concentration (0.47 mg/kg) at P83-SB-6 exceeded the May 2012 NJDEP Residential Direct Contact Soil Remediation Standard (RDCSRS) of 0.2 mg/kg. The RDCSRS was updated 18 September 2017 and as a result, as shown on **Table 1**, the benzo(a)pyrene concentration no longer exceeds the RDCSRS (0.5 mg/kg).

The NJDEP Impact to Ground Water screening criteria for benzo(a)pyrene (0.2 mg/kg) is exceeded. No significant risk to groundwater is indicated considering: 1) an increase in this Impact to Ground Water screening criteria is expected commensurate with the increase in the updated RDCSRS; and 2) benzo(a)pyrene is relatively insoluble in water. Based on this addendum, we request Unrestricted Use, No Further Action approval for Parcel 108.

Thank you for reviewing this request; we look forward to the Department's approval and/or comments. Our technical Point of Contact is Kent Friesen at (732) 383-7201; kent.friesen@parsons.com. I can be reached at (732) 380-7064; william.r.colvin18.civ@mail.mil.

Sincerely,

William R. Colvin, PMP, CHMM, PG
BRAC Environmental Coordinator

Figure 1: Parcel 108 Location

Table 1: Detected Soil Sampling Results – Comparison to 2017 NJDEP Standards, Parcel 108

cc: Ashish Joshi, NJDEP (e-mail and 2 hard copies)
William Colvin, BEC (e-mail and 1 hard copy)
Joseph Pearson, Calibre (e-mail)
James Moore, USACE (e-mail)
Jim Kelly, USACE (e-mail)
Cris Grill, Parsons (e-mail)

Correspondence 3



State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Site Remediation and Waste Management Program
BUREAU OF FIELD OPERATIONS
7 RIDGEDALE AVENUE
Cedar Knolls, New Jersey 07927

PHIL MURPHY
Governor

CATHERINE R. McCABE
Acting Commissioner

SHEILA OLIVER
Lt. Governor

February 27, 2018

Mr. William R. Colvin
OACSIM – US Army Fort Monmouth
P O Box 148
Oceanport, NJ 07757

Re Work Plan Addendum for Parcels 83, 103 and 104 (Addendum)
Fort Monmouth
Oceanport, Monmouth County
Preferred ID: G000000032

Dear Mr. Colvin:

The New Jersey Department of Environmental Protection (Department) has completed review of the referenced report for Parcels 83, 103 and 104. This Addendum further delineates the previously conducted site investigation. Based on the review the Department approves the Addendum. Please note that this Addendum approval does not address Parcel 108.

Thank you and please feel free to contact me if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to be "A.J. Joshi", written over a circular stamp or seal.

A.J. Joshi

C: James Moore, USACE
Cristina Grill, Parsons
Joe Fallon, FMERA
File



DEPARTMENT OF THE ARMY

OFFICE OF ASSISTANT CHIEF OF STAFF FOR INSTALLATION MANAGEMENT
U.S. ARMY FORT MONMOUTH
P.O. 148
OCEANPORT, NEW JERSEY 07757

25 August 2017

Mr. Ashish Joshi
New Jersey Department of Environmental Protection
Division of Remediation Management & Response
Northern Bureau of Field Operations
7 Ridgedale Avenue (2nd Floor)
Cedar Knolls, New Jersey 07927-1112

**SUBJECT: Letter Work Plan Addendum for Parcels 83, 103, 104, and 108, Fort Monmouth, New Jersey
PI G000000032**

Dear Mr. Joshi:

This Letter Work Plan Addendum (LWPA) provides an overview of previous sample results and proposes additional soil sampling for the subject parcels located within the Main Post (MP) of Fort Monmouth (FTMM) (shown on **Figure 1**). The work performed under this LWPA will augment the work performed previously at the subject parcels: 1) as reported in the *U.S. Army BRAC 2005 Site Investigation Report, Fort Monmouth* (Army, 2008); and 2) the results from implementing the *April 2016 Revision 1 Environmental Condition of Property (ECP) Phase II Site Investigation (SI) Work Plan (WP) Addendum*, which was approved by the New Jersey Department of Environmental Protection (NJDEP) in December 2015 (letter provided in **Attachment A**).

The work performed in 2016 included groundwater and soil sampling. Three groundwater samples from temporary wells were collected for trichloroethene (TCE) analysis at PAR-83-SB-12, PAR-83-SB-13, and PAR-83-SB-14 as shown on **Figure 1**. As shown in the groundwater data presented in **Table 1**, there were no detections of TCE; the investigation of groundwater is considered complete. The 2016 investigation also included the collection of soil samples from 16 borings for volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs), lead, arsenic, and/or polychlorinated biphenyls (PCBs) analyses. As described in the following sections, the results of the analyses indicated that NJDEP Residential Direct Contact Soil Remediation Standards (RDCSRSSs) for PAHs were exceeded. This LWPA addresses the soil exceedances of the RDCSRSSs encountered in the 2016 investigation.

Parcel 83: Former 72 Area (Former Coal Storage Pad)

At the former 72 area (a former coal storage pad near Building 75), Geoprobe borings PAR-83-SB-01 through PAR-83-SB-09 were sampled to delineate exceedances of the RDCSRSSs by PAHs in soil (**Figure 2**). Soil boring logs are provided in **Attachment B**. Soil samples were collected at the ground surface (beneath the asphalt paving), at just above the water table (approximately 2 feet

bgs), and at a depth of approximately 3 feet bgs in accordance with the WP. Borings where PAHs were detected at concentrations exceeding the RDCSRS in 2007 or as confirmed by the 2016 data are circled on **Figure 2**. Soil sampling results are provided in **Table 2**.

PAHs concentrations in samples collected at borings PAR-83-SB-02, -03, -04, -05, -07, -08, and -09 in the Building 72 area exceeded the NJDEP RDCSRS. Vertical delineation was achieved at each boring except PAR-83-SB-02; therefore additional sampling for PAHs is proposed at 6.0 to 6.5 feet below ground surface (ft bgs) at new boring PAR-83-SB-17. To delineate horizontally, borings PAR-83-SB-18 through PAR-83-SB-32 and PAR-83-SB-44 through PAR-83-SB-48 will be sampled at the locations shown on **Figure 2**, with samples to be collected at the surface (0 to 0.5 ft below the concrete/asphalt and subbase), at 3.0 to 3.5 ft bgs, and at 6.0 to 6.5 ft bgs (hereinafter referred to as the “three routine depth intervals”). Soil samples from contingency borings PAR-83-SB-24 through PAR-83-SB-32 will be collected in the field and extracted for SVOC analysis by the lab, but then the extracts will be held by the laboratory for contingency analysis of PAHs pending exceedances of the RDCSRS in primary samples. A summary of the proposed sampling and analyses is presented in **Table 3**.

Soil samples from borings PAR-83-SB-09, -10, and -11 were analyzed to delineate for PCBs. The only PCB exceedance of the RDCSRS was at PAR-83-SB-09 in the surface (1-1.5 ft bgs) interval, and a deeper sample was analyzed at 2 to 2.5 ft bgs that did not exceed the RDCSRS. This result confirms the PCB exceedance at P83-B5, which is delineated by borings P83-A5, P83-B4, PAR-83-SB-10, and PAR-83-SB-11. No further sampling for PCBs is required.

Soil samples at boring PAR-83-SB-09 were also analyzed for lead to confirm the earlier exceedances of the RDCSRS for lead in the 2007 sample P83-B5. Two additional borings were also sampled to delineate lead south of P83-B5 (PAR-83-SB-10 and -11). The RDCSRS for lead was not exceeded in any of these 2016 samples and therefore lead in soil at this location is adequately delineated.

Parcel 83: Building 279 Area

In the vicinity of Building 279, a confirmation soil boring (PAR-83-SB-13) and two additional soil borings (PAR-83-SB-12 and -14) were installed to ensure delineation of VOCs (TCE), metals (lead and arsenic), and PAHs in soil (**Figure 1**). As shown in the attached boring logs (**Attachment B**), soil samples were collected at the surface and two additional subsurface locations at depths of approximately 1.5 to 2 and 2.5 to 3 ft bgs. The surface sample and deepest sample were analyzed as shown on **Table 2**. TCE was not detected in any of these soil samples. However, PAHs were detected at concentrations exceeding the RDCSRS in PAR-83-SB-14 at the ground surface, but was delineated vertically by the underlying 2.5 to 3.0 ft bgs soil sample. The exceedance at PAR-83-SB-14 is also horizontally delineated to the north by borings PAR-83-SB-12 and -13, and to the west by P83-SB-11.

The 2.5 to 3.0 ft bgs sample of boring PAR-83-SB-12 exceeded the Impact to Groundwater (IGW) Soil Screening Level for 2-methylnaphthalene. This area south of Building 482 will be evaluated further as described in the Army’s 2 August 2017 *Letter Work Plan Addendum for UST 482 Area*.

Two additional soil borings (PAR-83-SB-15 and -16) were sampled in the Building 279 area to address the SI exceedances for arsenic at P83-SB10 and arsenic and lead at P83-SB9 (**Figure 2**). Arsenic and lead detections in soil samples at PAR-83-SB-15 and -16 were all below the RDCSRS, and therefore delineation for arsenic and lead is complete.

Samples will be collected at proposed borings PAR-83-SB-33 and PAR-83-SB-34 at the three routine depth intervals (0 to 0.5 ft below pavement, 3.0 to 3.5 ft bgs, and 6.0 to 6.5 ft bgs) to delineate PAHs horizontally to the east and south of the RDCSRS exceedance at boring PAR-83-SB-14. Analysis at the two deeper soil intervals will be contingent on the results of the surface soil samples. Samples will also be collected from proposed borings PAR-83-SB-35 and PAR-83-SB-50 at the same routine depth intervals for contingent analysis based on the results at PAR-83-SB-33 and PAR-83-SB-34.

Parcel 103

Parcel 103 encompasses borings P83-SB-12 and P83-SB-13, where 2007 samples exceeded the RDCSRS for PAHs in surface soil. The exceedances are defined vertically by underlying samples. Parcel 103 is delineated horizontally to the southeast by P83-SB3. Additional soil borings are proposed at PAR-83-SB-36 and PAR-83-SB-38 to confirm these exceedances by sampling the three routine depth intervals (0 to 0.5 ft below pavement, 3.0 to 3.5 ft bgs, and 6.0 to 6.5 ft bgs). An additional step-out boring is proposed to the west at PAR-83-SB-37, to the north at PAR-83-SB-49, and to the east at PAR-83-SB-51 with soil samples collected from the three routine depth intervals (0 to 0.5 ft below pavement, 3.0 to 3.5 ft bgs, and 6.0 to 6.5 ft bgs) for contingent analysis based on the results at PAR-83-SB-36 and PAR-83-SB-38.

Parcel 104

Parcel 104 encompasses soil boring P83-SB-4, where a 2007 sample exceeded the RDCSRS for PAHs. The exceedance is delineated vertically by underlying samples. An additional soil boring is proposed at PAR-83-SB-39 to confirm this exceedance by sampling the three routine depth intervals (0 to 0.5 ft below pavement, 3.0 to 3.5 ft bgs, and 6.0 to 6.5 ft bgs). The sample is delineated horizontally to the north and south of Parcel 104 by P83-SB-3 and P83-SB-5. Step-out borings to the west and to the east are proposed at PAR-83-SB-40 and -41 to be collected from the three routine depth intervals (0 to 0.5 ft below pavement, 3.0 to 3.5 ft bgs, and 6.0 to 6.5 ft bgs) for contingent analysis based on the results at PAR-83-SB-39.

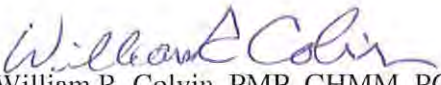
Parcel 108

Parcel 108 encompasses soil boring P83-SB-6, where a 2007 sample from 3-3.5 ft exceeded the RDCSRS for benzo(a)pyrene. A sample will be collected at proposed boring PAR-83-SB-42 at the routine depth intervals of 0 to 0.5 ft below pavement, 3.0 to 3.5 ft bgs, and 6.0 to 6.5 ft bgs to confirm the exceedance, and achieve vertical delineation if confirmed. The exceedance is delineated horizontally to the north and south by samples from P83-SB-5 and P83-SB-7. Step-out borings to the east, northwest and southwest are proposed at PAR-83-SB-43, PAR-83-SB-52, and PAR-83-SB-53 to be collected from the three routine depth intervals (0 to 0.5 ft below pavement,

3.0 to 3.5 ft bgs, and 6.0 to 6.5 ft bgs) for contingent analysis based on the results at PAR-83-SB-42.

Thank you for reviewing this LWPA. We look forward to your comments and approval prior to implementing this plan (currently scheduled to begin on 2 October 2017). Our technical Point of Contact is Kent Friesen who you may contact directly at 732-383-7201; kent.friesen@parsons.com. I can be reached at 732-380-7064; william.r.colvin18.civ@mail.mil.

Sincerely,


William R. Colvin, PMP, CHMM, PG
BRAC Environmental Coordinator

Attachments:

- Figure 1 Parcel 83 Layout and Sampling Locations
- Figure 2 Parcel 83 Proposed Sampling Locations
- Table 1 Ground Water Sampling Results – Comparison to NJDEP Ground Water Quality Standard, Site Parcel 83
- Table 2 Detected Soil Sampling Results – Comparison to NJDEP Standards, Parcel 83
- Table 3 Sampling Summary for Parcel 83 Letter Work Plan Addendum
- Attachment A – Correspondence
- Attachment B - Boring Logs

cc: Ashish Joshi, NJDEP (2 hard copies and email)
William Colvin (1 hard copy and e-mail)
Joseph Pearson, Calibre (e-mail)
James Moore, USACE (e-mail)
Jim Kelly, USACE (e-mail)
Cris Grill, Parsons (e-mail)

Correspondence 5



State of New Jersey

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Case Management
401 East State Street
P.O. Box 420/Mail Code 401-05F
Trenton, NJ 08625-0028
Phone #: 609-633-1455
Fax #: 609-633-1439

BOB MARTIN
Commissioner

December 22, 2015

John Occhipinti
BRAC Environmental Coordinator
OACSIM – U.S. Army Fort Monmouth
PO Box 148
Oceanport, NJ 07757

Re: **Revision 1 - Final Environmental Condition of Property Supplemental Phase II Site Investigation Work Plan Addendum for Parcels 34, 50, 51, 52, 66/97, 80 and 83 dated November 2015**
Fort Monmouth
Oceanport, Monmouth County
PI G000000032

Dear Mr. Occhipinti:

The New Jersey Department of Environmental Protection (Department) has completed review of the referenced report, received November 24, 2015, prepared by Parsons Government Services Inc. (Parsons), on behalf of the U.S. Army Engineering and Support Center, Huntsville (USAESCH). As indicated in the report, activities are to be performed with the goal of Decision Document acceptance in compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the National Contingency Plan (NCP), 40 CFR Part 300, and "to the extent possible to meet the requirements of New Jersey Administrative Code (NJAC) 7:26E Technical Requirements for Site Remediation", as well as support closure of environmental sites to facilitate transfer of real property.

The workplan describes Site Investigation activities to be performed at the ECP Parcels as indicated above; based upon the revisions included in the referenced submittal, the workplan is approved. Comments, however, are as follows:

Review of the revised document would have been more efficient if all modifications had been made discernible within the submittal in some manner. Although the correspondence which accompanied the workplan did note many areas of modifications and amendments, many others were found during a "side by side" comparison of the workplans, significantly slowing the review process.

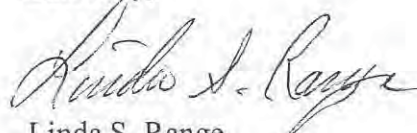
As has been noted in previous correspondence, all material, including tables, figures and maps to be utilized in the review of a submittal are to be included in paper form. Referencing the material as included on the CD is insufficient.

Maps/figures are to include not just sample locations, but also analytical results, in accordance with the Technical Requirements (e.g. Figures B1, G1). This, again, costs review time, as the previous results must be plotted during review to ensure adequate delineation locations/depths are proposed.

It is understood upcoming property transfer needs have necessitated the creation of additional parcel designations to address various areas of contamination while allowing other areas to transfer. A map of the site with each of the parcels noted has previously been received. A narrative description of each of these newly designated parcels would be very beneficial, however, including each parcel's size.

Please contact this office if you have any questions.

Sincerely,



Linda S. Range

C: Joe Pearson, Calibre
James Moore, USACE
Rick Harrison, FMERA
Joe Fallon, FMERA
Frank Barricelli, RAB

Correspondence 6



State of New Jersey

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Case Management
401 East State Street
P.O. Box 420/Mail Code 401-05F
Trenton, NJ 08625-0028
Phone #: 609-633-1455
Fax #: 609-633-1439

BOB MARTIN
Commissioner

June 16, 2015

John Occhipinti
BRAC Environmental Coordinator
OACSIM – U.S. Army Fort Monmouth
PO Box 148
Oceanport, NJ 07757

Re: *Final Environmental Condition of Property Supplemental Phase II Site Investigation
Work Plan Addendum for Parcels 34, 50, 51, 52, 66, 80 and 83 dated February 2015*
Fort Monmouth
Oceanport, Monmouth County
PI G000000032

Dear Mr. Occhipinti:

The New Jersey Department of Environmental Protection (Department) has completed review of the referenced report, received March 2, 2015, prepared by Parsons Government Services Inc. (Parsons), on behalf of the U.S. Army Engineering and Support Center, Huntsville (USAESCH). As indicated in the report, activities are to be performed with the goal of Decision Document acceptance in compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the National Contingency Plan (NCP), 40 CFR Part 300, and "to the extent possible to meet the requirements of New Jersey Administrative Code (NJAC) 7:26E Technical Requirements for Site Remediation", as well as support closure of environmental sites to facilitate transfer of real property.

The workplan describes Site Investigation activities to be performed at the ECP Parcels referenced above. Comments and questions are as follows:

Tables 3.1 and 3.2 also will require revision based upon the following comments.

Parcel 34/Building 2567/FTMM-58

Section 2.4.1, Page B4-line 2 – Although this office agrees with the statement "post excavation soil samples were collected...and analyzed for TPHCs, VOCs, and lead", review of historic

information appears to indicate elevated levels of benzene remain in the soil in the area of the dispenser island south of Building 2567. See additional detail under Section 3.2, below.

Section 2.5, Page B-7, line 21 – This statement regarding the removal of piping was amended via email to Wanda Green (copy to Rob Youhas and Joe Pearson) on June 18, 2013 1519 hrs. The report documenting the investigation of the piping, however, as you likely are aware, has not been received by this office.

Section 3.2 Sampling Plan – Although it is agreed the proposal is appropriate for the TBA in ground water, the referenced submittal considers only the issue of TBA in ground water (the proposal for two annual sampling events of monitor wells 2567MW01 and 2567MW03 was approved on July 3, 2014). However, as briefly discussed in a conference call on June 12, 2015, a review of historic information appears to indicate levels of benzene above both the residential and non-residential criteria/standard remain in numerous locations in the vicinity of the dispenser area south of Building 2567. The information was obtained from the October 28, 2005 RIR/RAW, including Figure 2-1 dated 6/9/94, which indicates levels of benzene remain up to 85 ppm. The June 2010 RAPR appears to omit reference to analytical results from the post excavation soil sampling performed in 1993 during removal of USTs 42 through 45, stating only the samples were analyzed for TPHC, VOCs, and lead, however, a copy of the September 2, 2010 PBR Request contained within the submittal's Appendix B referenced benzene remaining to 45 ppm. Pages i, 3-5 and 6-1 of the June 2010 RAPR also indicate the "remaining original UST dispenser island areas" would undergo assessment upon BRAC closure. It is understood available information is currently being evaluated to determine the status of the soils in this area. At this time, however, this office considers the soil in the area an unaddressed area of concern in need of additional delineation.

Parcel 50

Section 2.2.1 - FTMM-54 - Page C-2 lines 39 & 42 reference the year of the eleven tank removals as 2003, while page C-3, line 17 indicates removal of the eleven tanks was 1993, which appears correct.

Section 2.2.2 – FTMM-55 - Page C-5, line 11 – Waste oil UST No. 91533-193 is indicated as being NFAed in a January 10, 2003 letter. Although the tanks referenced on line 15 were found on the January 10, 2003 NJDEP NFA letter, that letter does not appear to reference UST No. 91533-193; no record of a letter of no further action for that tank could be located.

Section 3.2 Sampling Plan – As noted on page C-6, line 37, levels of TPHC remained in soil at the former location of UST No. 81533-64 at 16,200 and 11,900 ppm, at samples A and B, both at a depth of 5.5-6'. The proposal indicates horizontal delineation sampling is to be performed at locations A (16,200 ppm) and F (9,670 ppm), which is acceptable. Vertical delineation is also required. It is unclear, however, why sampling is not proposed at sample location B, as it does not appear to be vertically delineated.

The Department's EPH Protocol, http://www.nj.gov/dep/srp/guidance/srra/eph_protocol.pdf, is to be followed, with contingency samples collected/analyzed as required. As per EPH Methodology Version 3.0, the non-fractionation option is appropriate only if the EPH level is anticipated to be below 1,700 ppm. As this cannot be presumed, the "unfractionated EPH" does not appear to be the appropriate option.

Parcel 51

Section 2.5, Page D-5, line 40 and Page D-6, line 4 - The submittal indicates the UST questions contained in this office's July 10, 2012 letter are to be addressed under the UHOT program. This office looks forward to submittal of same.

Section 3.0 – With receipt of the additional clarification provided on page D-4, as well as the figure received on June 15, 2015, the questions noted in the Department's July 2012 letter relative to USTs 1123B and 1123C have been answered. It is agreed no additional action is necessary for UST 1123B. However, it is not agreed there are no COCs at Parcel 51. As indicated on line 11, 2-methylnaphthalene was found in the ground water at P51-G12 above the Ground Water Quality Standards (GWQS), as reported in the July 2008 SI. TPHC (collected due to elevated field screening readings) was also found in soil at that location at 6-6.5' at 7,487 ppm. Additional sampling is necessary.

Motor Pool Area – Although information regarding the 750 Motor Pool is not contained within this submittal, concerns regarding the area include, but are not limited to, adequate investigation of;

- Building 750 – UST 191 (15,000 gallon diesel) & UST192 (8000 gallon unleaded gasoline)
- two outdoor service pits for draining vehicle oil, the pipes from which discharged to a former oil water separator (OWS), north of garage bays
- current wash rack previously connected to former OWS, then to new OWS
- Building 753 – three hydraulic lifts and floor drain
- Building 754 – floor drain

Is FTMM 68/Building 700 not considered within Parcel 51?

Parcel 52/FTMM-53/Building 699 Gas Station

Section 1.0, Page E-1, line 8 – As many of the parcel narratives include, a listing of NJDEP correspondence by year is provided, which refers the reader back to *Section 5 References* to ascertain which document is being referenced. It does not include, however, this office's January 8, 2014 response to the September 2013 RI/FS Workplan, nor the May 6, 2014 response to the Army's April 22, 2014 response to same, in which delineation sampling was discussed and

the revised proposal accepted. Results of the investigation have not yet been received by this office.

Section 2.4, Previous Investigation and Historical Data – No mention is made of the 2000 gallon #2 fuel UST, 0081533-112, given an NFA designation in January of 2003, nor more particularly, of waste oil UST 0081533-197, a 1000 gallon waste oil UST removed in January of 1992 from east of UST-112, at which analytical results indicate TPHC to 11,600 ppm remains in soil. As acceptably indicated in the Army's April 22, 2014 response letter, Response C4, additional sampling was to be performed.

Section 2.4, Page E-5, lines 21-27 – It appears "IASL" (indoor air screening levels) may have been inadvertently used in the narrative, on lines 22, 26 and 27. These lines reference sub-slab results, the measure of which is against the SGSLs (Soil Gas Screening Levels), accurately referenced on lines 18, 20, 23, 25 and 25.

Section 2.5 Synthesis of Results, Correspondence and Data Gaps – As indicated above, the submittal does not appear to include the activities proposed in the September 2013 RI/FS Workplan, nor the followup communications.

Section 3.2 Sampling Plan – As indicated, above and through previous correspondence, additional delineation sampling is necessary.

Parcel 66

Section 1.0 & Section 2.5, Page F-3, line 15 – No mention appears to be made among the listed correspondence between NJDEP and FTMM of the *August 1, 2012 Proposed Soil Sampling and Delineation Plan for Electrical Substations at Building 2700 (Charles Wood Area) and Building 978 (Main Post)*, nor the September 10, 2012 NJDEP approval letter for delineation of the PCBs.

Section 2.2, Page F-1, line 20 – typo - It is believed FTMM-56 should read FTMM-66.

Section 2.2, Page F-2, lines 2-4 & Section 2.5 – The submittal references the ECP Report's Appendix A, stating, "no release or disposal of hazardous substances or petroleum products has occurred at Parcel 66...", and that Parcel 66 was assigned an ECP Category of 1. This office does not agree with same, as PCBs are noted present up to 0.84 ppm.

Section 3.2 Sampling Plan – The sampling as proposed on pages F-3 and F-4 is acceptable.

Parcel 80

Section 1.0, line 14 – For clarification, per the 2008 ECP Main Post map (Figure 19), FTMM-56 is also known as Parcel 84 (Building 80), a small ¼+ acre area designated within the larger Parcel 83.

Section 2.4 Previous Investigations and Historical Data – As previously indicated, the Weston report was not accepted by the Department as representative of background conditions at Fort Monmouth.

The section also references the July 10, 2012 letter, in which the NJDEP requested additional information regarding the basis for determination of the sample locations, i.e., were as-builts or other plans for the demolished buildings used to assist in locating former floor drains, septic systems, discharge points, etc, and therefore the boring locations. No rationale for sample location selection has been received; therefore a determination remains unavailable regarding the adequacy of the soil sampling performed.

Section 3.2 Sampling Plan – The proposal to further evaluate beryllium in ground water reported in the 2008 SI as indicated is acceptable.

Parcel 83

In October of 2008, the NJDEP requested depiction of all areas of concern (AOCs) on a site figure. Although a structures figure was submitted, no figure designating AOCs has been received.

Section 2.4, Page H-4 - As previously indicated, the Weston “background” report was not accepted by the Department. As regarding the elevated levels of arsenic (SB10A, SB9A), as acknowledged in Section 3.1, this office at this time does not agree these levels of arsenic are representative of naturally occurring conditions. Arsenic is currently considered a contaminant of concern, based on analytical findings at P83-SB9&10. As the NJDEP July 10, 2012 correspondence stated, although Fort Monmouth site soils are often associated with elevated levels of naturally occurring arsenic, the parcel specific soil analytical results, the lead to arsenic ratio, and the decrease of arsenic with depth at those locations exhibiting an elevated level do not appear to indicate the exceedences are naturally occurring, and must be investigated and included in a remedy.

Section 2.5, line 35 – The submittal indicates further information on the various USTs referenced in the July 10, 2012 letter are to be referred to the “UHOT Program”. Although not familiar with same, this office looks forward to receipt of additional information regarding the USTs.

Section 3.2 Sampling Plan – Sampling at the former Building 72 area to better define PAH exceedences, as proposed, is acceptable.

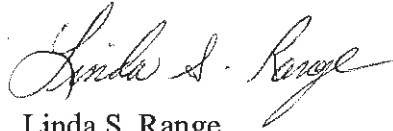
Section 3.2, lines 15, 16 – PCBs - Please ensure these delineation samples, include PCBs analyses, for delineation of the 0.8 ppm PCBs noted at P83-B5, 1-1.5’.

Section 3.2 – Building 279 – Although the proposed sampling locations are acceptable, they are inadequate to complete delineation. Arsenic remains undelineated at P83SB10. It is anticipated elevated levels of lead may be present west of P83SB9; what efforts for delineation

are planned? If location FTMM-83-SS-13 is considered a resample of P83SB9, it should be located within 10' feet of the original sample location.

Please contact this office if you have any questions.

Sincerely,

A handwritten signature in cursive script, reading "Linda S. Range".

Linda S. Range

C: Joe Pearson, Calibre
James Moore, USACE
Rick Harrison, FMERA
Joe Fallon, FMERA
Frank Barricelli, RAB



State of New Jersey

CHRIS CHRISTIE
Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Case Management
401 East State Street
P.O. Box 420/Mail Code 401-05F
Trenton, NJ 08625-0028
Phone #: 609-633-1455
Fax #: 609-633-1439

BOB MARTIN
Commissioner

KIM GUADAGNO
Lt. Governor

July 10, 2012

Wanda Green
BRAC Environmental Coordinator
OACSIM – U.S. Army Fort Monmouth
PO Box 148
Oceanport, NJ 07757

Re: March 2012 Army Response to NJDEP Correspondence Letter Dated October 28, 2008
Fort Monmouth, NJ
PI G000000032

Dear Ms. Green:

A review of the above referenced report, received March 27, 2012 and submitted in response to the Department's comments regarding the Draft Site investigation Report of July 21, 2008 by Shaw Environmental, Inc., has been completed by this office. Many of the parcel comments involved suspected USTs; in addition to that information provided in this submittal and the July 2008 SI, a review and comparison of Appendix G, Appendix O, and Figures 15 and 16 of the January 2007 ECP Report was conducted by this office in an attempt to ascertain the location and status of all tanks located within the parcels. Unless otherwise noted, comments and questions are provided only for each parcel referenced in the submittal and are generally presented by parcel.

Parcel 13 – Former Barracks (Buildings 2004-2016)

Geophysical surveys were performed, and sampling was conducted throughout that area at which USTs were known to or may have been present. No USTs were found; all soils analytical results were below cleanup criteria applicable to the site; no additional action for the parcel is necessary.

Parcel 14 – Former Buildings and Housing Area Northwest Portion of CWA

As indicated in the Department's correspondence of May 30, 2012, the geophysical surveys performed and sampling conducted throughout that area at which USTs were or may have been present were sufficient to adequately characterize the area. No USTs were found; all soils analytical results collected were below cleanup criteria applicable to the site. The parcel was re-categorized from Category 2 to Category 1.

Parcel 15 – Building 2700

Parcel 15 was issued a designation of No Further Action for soils and ground water, *exclusive of CW-1*, on May 9, 2012. Remediation efforts involving CW-1 continue.

Parcel 27 – Southwestern Corner CWA

The single outstanding issue at Parcel 27 was the USTs. As previously indicated, numerous USTs were removed from the parcel, however, additional documentation for same was required.

It is agreed fourteen (14) USTs have been removed and given NJDEP Closure Approval Letters/NFAs. Although it is understood Departmental approval may have been granted for an additional five USTs, as indicated on Page 6 of the referenced submittal and in Appendix G, please be advised this office does not have documentation confirming Closure Approval/NFA for the following USTs.

UST 2506-17	Reported NJDEP UST Closure Approval Date 7/10/98
UST 2624-34	Reported NJDEP UST Closure Approval Date 7/23/93
UST 2624-57	Reported NJDEP UST Closure Approval Date 9/21/95
UST 2624-58	Reported NJDEP UST Closure Approval Date 9/21/95
UST 2624-59	Reported NJDEP UST Closure Approval Date 9/21/95

Additionally, please provide information as to the status of the USTs noted in Appendix O at what appear to be Buildings 2566 and 2505, located just north of Building 2503?

Any sediment issues which may have resulted from parcel operations are to be addressed as part of the ongoing facility wide ecological assessment.

Parcel 28 – Former Eatontown Laboratory**Underground Storage Tanks**

Although this office is in agreement with the information submitted in regard to the majority of the USTs as noted on Parcel 28, questions remain on several, which are not considered as given a designation of NFA at this time.

As above, documentation for closure approval or NFA is not available for confirmation on the following USTs.

UST 2539-28	Reported NJDEP UST Closure Approval Date 3/31/93
UST 2539-64	Reported NJDEP UST Closure Approval Date 3/31/93
UST-2531-21	Reported NJDEP UST Closure Approval Date 8/29/00

UST 2542-29 and UST 2564-32 are reported as no release observed. A Standard Reporting Form and/or Site Assessment Compliance Statement were reported sent to us 11/22/91, however, no designation of NFA was granted, nor comments apparently generated.

Appendix O indicates three USTs within that area which underwent a geophysical survey between Building 2525 & Heliport Drive. The center UST appears to correlate to UST P28-8, which, based upon the investigation performed, warrants no further action. Although it is agreed no tanks remain in that area, please provide any record of their removal or indication as to evidence of a discharge upon removal. As previously discussed, a designation of NFA for USTs cannot be granted without sampling.

Septic Tanks & Leachfields

Leachfield East of Heliport Drive, South of Radiac Way – It is agreed the four test pits were adequate for characterization of the leachfield; no additional action is necessary for the leachfield. It does not appear, however, the suspected D-box/entirety of the septic system was investigated. Although they are not designed to hold liquids/sludges (but rather to distribute the liquids after the solids fall out into the holding tank), particularly as the structure apparently remains in place, additional information is required as to whether the structure could have been/functioned as a holding tank (field notes do reference it as a septic tank) which did contain solids or liquids which should have been sampled.

Septic System & Septic Tank A – Located off the northeast corner of Building 2525, a suspected septic tank was located via GPR scanning, as denoted as “A” on Figure 3.5-2 of the ECP Site Investigation. Sampling efforts, however, were performed only at the associated leachfield. What efforts were made to adequately characterize any holding tank contents of the actual septic tank, as required by the Tech Regulations in effect at the time of investigation (NJAC 7:26E-3.9(e)3)? As regarding the associated leachfield, a minimum of 4 samples is required. A single soil and single ground water sample is inadequate.

Septic System at Southeastern Corner of Parcel - For that septic system located in the southeastern corner of the parcel as sampled by P28-SB1, the findings/requirements noted in the above paragraph also apply.

Former Storage Areas/Possible Former Tank Pads – This area received a designation of NFA on March 29, 2012.

Parcel 34 – Building 2567/FTMM 58

Elevated levels of ground water contamination underwent treatment via a Permit-by-Rule approved in October of 2010. The Department most recently responded on March 7, 2012 approving monitoring via two rounds of seasonal high ground water analytical sampling.

As recently discussed, although piping was cleaned at the time of tank removal, it necessary to remove the piping and dispensing equipment/island.

Parcel 38 – Former Outdoor Pistol Range (1940-1955)

Although no exceedences were noted, Departmental comments indicated the surface soil sampling was not adequate due to the possibility the parcel soils had been re-worked; a ground water investigation was therefore required. The Army will be submitting the results of a ground water investigation in a future letter report to this office. If you wish to receive comments on anticipated frequency and locations of the ground water sampling points and methodology (ie low-flow), please submit the sampling plan prior to implementation.

Parcel 39 – Building 1150/Vail Hall

Previous comments indicated the soil exceedences, although permitted to remain in place with institutional controls (Deed Notice), must be compared to and delineated to the RDCSCC. The Army has agreed, in this submittal, to prepare a revised map indicating delineation boundaries to the more stringent criteria, as appropriate. A draft Deed Notice for same is to be submitted to this office for review and comment.

Any sediment issues which may have resulted from operations are to be addressed as part of the ongoing facility wide ecological assessment.

Parcel 43 – Building 1122 (Do-it-Yourself Auto Repair)

No comments based on submittal; Army acknowledges Department's March 18, 2011 comments; remedial efforts are ongoing.

Any sediment issues which may have resulted from parcel operations are to be addressed as part of the ongoing facility wide ecological assessment.

Parcel 49 – Former Squier Laboratory Complex

The Site Investigation indicated five surface soil samples contained base neutrals at concentrations above the NRDCSCC, while one sample contained PCBs above the NRDCSCC. The Department concurred with the recommendation of additional sampling for delineation purposes. The March 2012 submittal, however, specifies no sampling will be performed in regard to the BNs exceedences as they "are commonly detected in soil directly beneath asphalt pavement".

Base Neutrals (BNs)

Although it is agreed elevated levels of BN constituents related to asphalt rather than a discharge may be encountered beneath asphalt paving, it is not agreed sufficient information has been provided at this time to document each location at which BN exceedences are noted is unrelated to site operations. The previously approved proposal for additional sampling remains appropriate for each sample location at which exceedences were noted.

PCBs

Regarding PCBs, a re-sample is currently proposed in the location at which PCBs were noted to exceed the NRDCSCC, sample P49-SS8-A. As no Remedial Action Workplan for this parcel was previously approved, the Soil Remediation Standards (0.2 ppm) apply. As such, PCBs exceed the standard at three locations – P49-SB3-A and P49-SS7-A (which also exhibits the highest levels of BN contamination), in addition to SS8-A. Delineation to the most stringent standard is required.

Arsenic

A review of the site operations and the analytical data, including the horizontal and vertical distribution of the arsenic, the lead to arsenic ratio, as well as the presence of glauconitic soils indicate the arsenic encountered in this area is representative of naturally occurring levels.

Volatile Organics

It is agreed further discussion regarding volatile organics in ground water at the M-18 Landfill is to be discussed in a forthcoming Remedial Investigation Report for the landfill.

USTs

As with the above parcels, although many tanks have received a designation of NFA, several tanks do not have sufficient documentation to be designated same. These include:

- UST-293-67 – per Appendix G, report submitted 2/26/96; no Departmental response
- UST-290-193 - per Appendix G, report submitted October 1993, no Departmental response
- UST 283-59 – per Appendix G, reported Closure Approval 2/24/00; no confirmation available
- UST 283-58 - per Appendix G, no sampling was performed
- UST 296-69 – per Appendix G, report submitted 2/26/96; no Departmental response

For those USTs which Appendix G indicates reports were previously submitted and not responded to, unfortunately, this office has no record of same and re-submittal is required for comment.

Parcel 50 – IRP Sites FTMM-54, FTMM-55 & FTMM-61

The Army acknowledges the Department's August 14, 2007 letter, the comments of which are to be addressed via Remedial Investigation Report Addendums for FTMM-54 (Site 296), FTMM-55 (Site 290) and FTMM-61 (Site 283). Submittal dates were not indicated. This office will await submittal of same.

Parcel 51 – 750 Area, 500 Area, 600 Area, 1100 Area – Former Buildings

The geophysical survey and sampling conducted at portions of the parcel were insufficient to allow for determination of NFA for the USTs previously/currently located in the parcel. Further investigation conducted north of Building 750 revealed the presence of USTs UHOT 1123B and 1123C at the two northernmost previously identified anomalies. The USTs were subsequently removed, as was affected soil. Although it is indicated all soils were removed to below 1000 ppm TPH, Table 2 at Attachment D appears to indicate soils at sample 1123B East Wall at 8.5-9' contains TPH at 9832.44 ppm. Clarification is needed.

Although it is understood the additional investigation undertaken in June of 2009 revealed the presence of the two above referenced USTs located above Semaphore Ave, it is unclear what efforts were made to investigate the nine potential USTs/anomalies noted on Figure 3.12-2 south of Echo Avenue? Are they all to be included in the Building 750 submittal?

Additional questions regarding USTs within the parcel remain. As above, documentation for closure approval or NFA is not available for confirmation on the following USTs.

No geophysical surveys, sampling or at least reports appear to have been performed or submitted for the following USTs - UST 68, 635, 637, 642, 643, 645, 647, 648, 649, 650, 651, 652, 653, 654, 656-97, 656-98, 657-90, 658-100, 660, 662, 663, 665, 667, 689-102.

Appendix O indicates USTs which do not appear to be "closed" per Appendix G which were/are also present in areas outside the geophysical survey, including those at Building 676, several along Sherrill Avenue north of Building 600, east of Brewer Ave by Buildings 545 and 554, Building 555, and several by Building 557.

Although Appendix G indicates closure reports were submitted, it also indicates no Departmental response was received for the following USTs - UST-682-106, UST 656-104, UST 659-101, UST 114-1, UST 645-78, UST 789-126.

USTs 750 – report pending

UST 501-76 – Appendix G indicates NFAed July 10, 1998, however confirmation unavailable

UST 551-80 – Appendix G indicates NFAed August 29, 2000, however, confirmation unavailable

UST 695 – Appendix indicates NFA August 24, 2000, however, confirmation unavailable

Parcel 52 – Building 699 – Army Exchange Services Gas Station

No comments based on submittal; Army acknowledges Department's March 18, 2011 comments; remedial efforts are ongoing.

Parcel 57 – Former Coal Storage & Railroad Unloading – 800 Area

Three surface soil samples contained B/Ns at concentrations above the NRDCSCC. The Department concurred with the general recommendation to conduct additional sampling, and required the submittal of a Remedial Investigation Workplan. The March 2012 submittal, however, states the exceedences were related to the asphalt pavement under which the samples were collected.

As with Parcel 49, it is agreed elevated levels of BN constituents related to asphalt rather than a discharge may be encountered beneath asphalt paving. However, information has not been submitted to document these sample results are not reflective of site operations, particularly given the nature of operations in the area. Delineation is necessary.

PCBs analyses was required due to the proximity of the railroad tracks/unloading area, as indicated in the Department's June 15, 2007 letter, rather than historical operations at Parcel 57.

As PCBs are often associated with rail road tracks and spurs, analysis for same is appropriate and remains a requirement.

Ground Water

Although the previous proposal for delineation of ground water exceedences was approved, the current submittal indicates NFA is warranted due to naturally occurring background conditions. The Department is conducting further review of the information provided.

Parcel 61 - Building 1075 – Patterson Health Clinic

Soil sampling conducted at the parcel indicated elevated levels of three base neutral compounds in a soil sample collected beneath an area of former asphalt paving at the southeastern corner of Building 1075. The Department is in agreement the PAHs are not reflective of a discharge nor of operations performed at the site. No additional action for same is necessary.

As discussed, the analyses for PCBs as indicated in the Department's October 2008 correspondence is not required, based upon a review of areas of concern located within the parcel.

UST 1076-209 – Although Appendix G indicates the closure report was being prepared, recent conversation indicates no submittal of the report is anticipated as the tank was a "clean closure." This would, of course, not allow for comment or designation of NFA for this tank. Additionally, information previously submitted indicates this tank was installed at a location at which a leaking UST was removed and remediated. It does not appear closure information for that UST was submitted.

Parcel 69 – Building 900 – Former Vehicle Repair/Motor Pool

The previous Departmental comments indicated soil sampling was inadequate for designation of NFA as analytical parameters did not include PCBs. Although it is understood your position is that PCBs are not suspected to have been disposed of in the former waste oil AST at Building 900, the Technical Requirements for Site Remediation, both those in effect at the time of sampling, as well as those currently in effect, require the inclusion of PCBs in the analytical parameters for sampling of soil when waste oil is involved.

Regarding analytical parameters for sediment sampling, that will be addressed as part of the ongoing facility wide ecological assessment.

One ground water sample previously indicated an exceedence of PCE. Per this submittal, the Army plans to resample the ground water at the location of temporary well point P69GW-1. Previous Departmental correspondence, however, stated the submittal of a ground water remedial investigation workplan was required for NJDEP review and approval. If resampling of a single location, in anticipation of a "clean" result is performed, rather than several delineation sampling points, please ensure the resultant submittal includes adequate rationale/justification to confirm the area of greatest possible contamination was sufficiently targeted.

Two USTs were previously noted as within the parcel. UST 900-142 was granted Closure Approval Letter/NFA on July 10, 1998, while documentation for closure approval or NFA is not available for confirmation on the following UST:

UST 900-141 Reported NJDEP UST Closure Approval Date 7/10/98

Parcel 70 – Building 551 – Former Photoprocessing

The October 28, 2008 Departmental correspondence concurred with the recommendation for no further action. As a note however, we do not have a copy of the Appendix G referenced 8/29/00 Closure Approval Letter for UST 551-80

Parcel 76 – 200 Area, 300 Area – Former Barracks

A geophysical survey was performed throughout Parcel 76, with suspect USTs noted in the western portion of the parcel. Although sampling conducted within that western portion of the parcel indicated no exceedences of the applicable cleanup criteria, additional investigation was required regarding the possible USTs.

Additional evaluation was documented in the June 2011 Remedial Investigation and Closure Report, which references Incident #s 09-11-04-1553-32, 10-04-28-1333-57, 10-04-13-1710-23, 09-11-19-1710-57 and 10-01-06-1342-44 and the removal of UHOTS 544, 543, 542, 541, 540, 539 and 538. Affected soils were reported removed to below the 1000 ppm contingency analytical threshold; a ground water investigation was performed via the installation of four monitor wells as ground water was encountered in the excavations.

The adequacy of the investigations/remedial actions presented in the report submittal cannot be determined, as insufficient information has been provided. No information was contained in Appendices A through E, nor were any Figures included (this information was missing in many of the Attachment D reports, some of which was obtainable through previous submittals and information, some not). No comparison could be made of UST locations against geophysical anomalies, sample locations, or monitor well locations. A review of Table 2/Summary of Laboratory Analyses as a stand-alone document (without sampling location/result maps, further association between sample ID and tank) is insufficient to allow for documentation of soils removal to below the above stated 1000 ppm contingency analytical threshold, or even the 5100 ppm EPH standard at each tank, or to determine if the ground water investigation (placement of monitor wells) was adequate.

Additionally, although it is agreed no USTs appear to remain in the eastern portion of Parcel 76, no remedial documentation was submitted for those former tank locations as noted on Appendix O and Figure 15 of the January 2007 ECP Report in the eastern portion of Parcel 76, as follows:

UST-261-45	UST-262-46	UST-263-47	UST-264-48	UST-265-49
UST-266-50	UST-267-51	UST-268-52	UST-269-53(contamination per Appendix G)	

As previously discussed, a designation of no further action for these USTs cannot be issued without an investigation in accordance with the Technical Requirements for Site Remediation.

Parcel 79 – 400 Area Former Barracks

A geophysical survey was previously performed throughout the parcel, identifying potential USTs in only that portion as noted in Figure 3.19-1. Additional evaluation of the area encountered eight USTs, noted as UHOTs 437, 440, 441, 444, 445, 448 and 450 which were subsequently removed, while contamination was noted at Building 449. A ground water investigation is to be performed based upon the presence of ground water in the excavation. Additional comments regarding same will be forthcoming pending submittal.

As with Parcel 76, above, although it is agreed no USTs appear to remain, no remedial documentation was submitted for many of those former tank locations noted on Appendix O and Figure 15 of the January 2007 ECP Report at other areas of the parcel, and/or insufficient information currently exists to allow for designation of NFA.

North of Fisher Avenue

- UST-401-26 – per Appendix G, no samples were collected, no report submitted
- UST-411-28 – per Appendix G, report submitted 02/26/96, no Departmental response noted
- UST-416-32 – per Appendix G, no samples collected, no report submitted
- UST-421-37 – per Appendix G, report submitted 7/22/98, no Departmental response noted
- UST-423-39 – per Appendix G, report submitted 2/26/96, no Departmental response noted

South of Fisher Ave, North of Leonard Ave

- UST-430-45 – per Appendix G, report submitted 10/23/97, no Departmental response noted
- UST-447 – Not referenced on Appendix G; located east of grid sampling; sampling status unclear

South of Leonard Avenue

- UST-454-51 – Reported Closure Approval date 7/10/98 – no record of same
- UST-142-73 – per Appendix G, report submitted 10/23/97, no Departmental response received
- UST-142-13 – per Appendix G, report submitted 10/23/97, no Departmental response received
- UST-29-1 – per Appendix G, report submitted 11/22/91, no Departmental response noted
- UST-490-58 – per Appendix G, no sampling; “site closed by NJDEP”; no record of same
- UST-492-59 – Reported Closure Approval date 8/29/00 – no record of same
- UST-202-a – “clean closure”, no report submitted
- UST-202-b – per Appendix G, *30 tons of soil removed, report submittal pending*
- UST-202-21 – per Appendix G, TPH ND, no report submitted
- UST-202-22 – per Appendix G, TPH ND, no report submitted

Please submit documentation in accordance with the Tech Regs for each of the above to allow for comment/designation of NFA. For those which Appendix G indicates reports were previously submitted and not responded to, unfortunately, this office has no record of same and re-submittal is required.

Additionally, with the exception of the above referenced UST-454-51, and UST 475-52 (NFA 10/23/00), no documentation of sampling activities for that area shown on Appendix O extending from Tilly Avenue north to Leonard Avenue, previously shown to include approximately 22 USTs, appears to have been submitted.

Finally, please indicate what investigation, if any, has taken place at the two former and one current ASTs located north of Hazen Drive.

Parcel 80 – Former Buildings 105 & 106 - Photoprocessing

Prior to issuing a determination as to the adequacy of the soil sampling, additional information is required regarding the basis for establishment of the sample locations. Were as-builts or other plans available for the demolished buildings to assist in locating former floor drains, septic systems, discharge points, etc.?

Although the previous proposal for delineation of ground water exceedences was approved, the current submittal indicates NFA is warranted due to naturally occurring background conditions. The Department is conducting further review of the information provided.

Parcel 83 – Former Photoprocessing, Vehicle Maintenance, Coal Storage & Railroad Unloading, Maintenance Shops

The 2008 SI Report, Section 4.1.2, indicates “eight surface soil samples contained B/Ns at concentrations above the NJDEP NRDCSCC. Two surface soil samples contain lead at concentrations above the NJDEP NRDCSCC and MPBC. Further evaluation is recommended.”

While the exceedences at P83-SB9C were apparently not included in that statement, nor plotted, several PAH constituents were noted above the residential and non-residential criteria at 4.5-5'. Vertical delineation appears incomplete at this location.

Although this office does not as yet agree the PAH exceedences at this parcel are due to current/former asphalt (particularly at SB9 or B5), re-collection of the samples as proposed to assist in determining same is acceptable. The further evaluation must, of course, include all exceeded contaminant categories if the intent is to prove no discharge.

Trichloroethylene is reported on Table 3.21-4 of the SI Report above criteria at sample location P83-SB9B, at 5.8 ppm, at 1.5-2', with no discussion provided. Please provide same.

Metals exceedences were noted at three locations – SB10A, SB9A and B5A; this office considers location SB-10 to be above criteria for arsenic and lead (residential criteria is 400 ppm).

As regarding arsenic in soils, although it is agreed the site soils are often associated with elevated levels of naturally occurring arsenic, the parcel specific soil analytical results, the lead to arsenic ratio, and the decrease of arsenic with depth at those locations exhibiting an elevated level, do not appear to indicate the exceedences are naturally occurring, and must be included in a remedy.

As with the above parcels, although many tanks have received a designation of NFA, several tanks do not have sufficient documentation to be designated same. These include:

UST-421-37 – Per Appendix G, report submitted 10/23/97; no Departmental response
UST-273-65 - Per Appendix G, 6000 gallon gasoline tank still in use
UST-273-66 – Per Appendix G, 10000 gallon gasoline tank still in use
UST-273-67 – Per Appendix G, 10000 gal gasoline tank still in use
UST-117-72 – Per Appendix G, remedial action report completed July '98; status unknown
UST-108-7 – Per Appendix G, report submitted 2/26/96; no Departmental response
UST-108-60 through 64 – Per Appendix G, remediation efforts ongoing
UST-161-68 – Per Appendix G, waste oil tank RAR submitted 2/26/96, no response
UST-161-14 – Per Appendix G, RAR submitted 2/26/96, no Departmental response

Appendix O also includes several former USTs on the parcel which appear to have had no documentation of closure or investigation submitted, including those at Buildings 479, 66, 276, 485, 280, 281 and 167.

Electrical Substations

The October 28, 2008 correspondence indicated the need for establishment of a Deed Notice and engineering controls due to elevated levels of PCBs above the RDCSCC of 0.49 ppm. The March 2012 proposal is for resampling of the two locations at which results were above the criteria, with a letter report to follow. This is acceptable, however, please be advised a Deed Notice will be required for any soils left in place *within these two areas*, which exhibit a result of greater than 0.2 ppm PCBs. No engineering controls are required if all results are below 1 ppm.

Miscellaneous

Attachment E of the submittal references numerous letters from the NJDEP regarding UST closure approvals/NFAs, however, the letters dated July 23, 1993 and September 21, 1995 were not included in the submittal. Submittal of those two letters would be beneficial and appreciated.

Vapor Intrusion Investigation

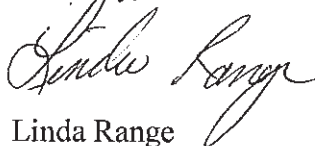
Submittal of the report is anticipated shortly.

Baseline Ecological Evaluation

Submittal of the amended report is anticipated shortly.

If you have any questions regarding this matter contact this office at (609) 984-6606.

Sincerely,



Linda Range
Bureau of Case Management

C: Joe Pearson, Calibre Systems
Rich Harrison, FMERA
Julie Carver, Matrix



State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
PUBLICLY FUNDED REMEDIATION ELEMENT
P.O. BOX 413
TRENTON, NJ 08625-0413

JON S. CORZINE
Governor

LISA P. JACKSON
Commissioner

Correspondence 8

October 28, 2008

Mr. Joseph Fallon, CHMM
Directorate of Public Works
ATTN: IMNE-MON-PWE
167 Riverside Ave.
Fort Monmouth, NJ 07703

RE: Draft Site Investigation Report
Fort Monmouth, NJ

Dear Mr. Fallon:

The NJDEP Division of Remediation Management & Response (DRMR) has reviewed the Draft Site Investigation Report dated July 21, 2008 by Shaw Environmental, Inc., which was prepared under Phase II of the Environmental Condition of Property (ECP) assessment of Fort Monmouth. Our comments are attached.

You or your staff may contact me at 609-633-0766 with any questions on the enclosed comments, or any other site remediation matters at Fort Monmouth.

Sincerely,

A handwritten signature in cursive script that reads "Larry Quinn".

Larry Quinn, P.E., CHMM, Site Manager
Bureau of Design and Construction

Attachment

NJDEP COMMENTS on
SITE INVESTIGATION REPORT
FORT MONMOUTH, NJ

General Comments

1. USTs at Parcels 14, 28, 51, 76, and 79. The recommendation of no further action (NFA) for the suspected underground storage tanks (USTs) is not acceptable to the NJDEP. The suspected USTs are subject to New Jersey regulations N.J.A.C. 7:26E – Technical Requirements for Site Remediation (the Technical Requirements). Under the Technical Requirements, Fort Monmouth is required to do at least the following in regard to the suspected USTs:
 - a) Verify the tank contents and collect a sample of any contents for analysis as specified at 7:26E-3.9(a)3.iii,
 - b) Collect and analyze at least 4 soil samples within 2 feet of each tank as specified at 7:26E-3.9(a)3.i,
 - c) Conduct a site investigation for ground water in accordance with 7:26E-3.7 and 3.4,
 - d) Implement remedial action and tank closure in accordance with 7:26E-6.3(b).

The soil and ground water sampling conducted during the Army's Site Investigation (SI) are a good starting point. However, since suspected USTs have been identified by geophysical surveys, the specific sampling requirements of 7:26E-3.4, 3.7, and 3.9 must now be followed.

The suspected USTs are **also** subject to N.J.A.C. 7:14B - Underground Storage Tanks. Under 7:14B-1.4(b)3, tanks of any size used to store heating oil for onsite consumption in a residential building (such as a barracks) are exempted from the requirements of the UST regulations. However, all other hazardous substance USTs of any size are regulated due to the aggregate volume provision found in the definition of "Tank capacity" in 7:14B-1.6. All confirmed regulated USTs at Fort Monmouth must be registered and closed in accordance with 7:14B.

2. Septic System at Parcel 28. Similarly, the recommendation of NFA for the septic tank, septic box, and septic piping at Parcel 28 is also unacceptable. The septic system components must be sampled as specified at 7:26E – 3.9(e)3 and the ground water sampling requirements of 7:26E-3.7 must also be followed.
3. Action Levels, page 2-14. Analytical results were compared to NJDEP criteria, specifically the non-residential direct contact soil cleanup criteria (NRDCSCC) and the impact-to-ground water soil cleanup criteria (IGWSCC). Subsequent to the start of the site investigation, NJDEP has promulgated new Soil Remediation Standards (SRS). The NJDEP has provided for a phase in period for the new SRS. If a Remedial Action Workplan (RAW) is submitted to the Department on or before December 2, 2008 (6 months after the June 2, 2008 promulgation date) then the

subsequent cleanup may be conducted using the previous SCC. However, any remedial actions not approved by NJDEP by the December 2, 2008 deadline must follow the new SRS. Detailed guidance can be found at the following website:
<http://www.nj.gov/dep/srp/guidance/rs/>.

4. Sediments at Parcels 15, 27, 28, 39, 43, 49, 61, and 69. NJDEP concurs with the recommendations to further evaluate sediments at these Parcels as part of a facility-wide baseline ecological evaluation. BEE
5. Indoor Air at Parcels 15, 34, 43, 50, and 52. NJDEP concurs with the recommendations to conduct one additional round of indoor air sampling at these Parcels.
6. Section 4.1.2, Surface and Subsurface Soil Investigations. This section discusses the results of soil sampling at multiple areas of concern (AOCs) relative to the NJDEP **Non-Residential** Direct Contact Soil Cleanup Criteria (NRDCSCC). Further evaluation of soil contamination is recommended at some, but not all, soil AOCs.

The future use of most Parcels at Fort Monmouth is not yet certain. Since future residential use is possible, **all** areas of soil contamination must be delineated to the **Residential** Direct Contact Soil Cleanup Criteria (RDCSCC). Remediation of soils by the Army to the NRDCSCC prior to property transfer would be acceptable, but deed notices would be required to document remaining soil contamination above the RDCSCC, and appropriate engineering controls must be implemented and documented.

*Delineate
to Res.*

*~~Exclude~~
Conclusion;
DER to
Non Res.*

Parcel-Specific Comments

Parcel 13 – Former Barracks (Buildings 2004-2016)

1. The recommendations of NFA for soil and ground water are acceptable based upon the sampling results and the results of the geophysical survey.

*Assessment
Part 13* 2. The Report states that no suspected USTs were located by the geophysical surveys, however it further indicates that no UST removals have been documented at the locations of numerous former barracks within Parcel 13. The Report should provide a possible explanation(s) for why no USTs were found.

*eg. Red property Records
Reviewer Concludes all
Subject Building was
heated by Coal or Gas.*

Parcel 14 – Northwest Portion of CWA

1. See General Comment #1 above.

Parcel 15 – Building 2700

1. The Report states that no suspected USTs were located by the geophysical surveys, however it further indicates that no UST removals have been documented at the locations of numerous former barracks within Parcel 15. The Report should provide a possible explanation(s) for why no USTs were found.
2. It is unclear why an NFA for ground water is being recommended when a ground water remediation is currently being implemented for the CW-1 area. If the Army wants to identify individual AOCs within Parcel 15 for an NFA designation, they should make that case for those individual AOCs.
3. The recommendation of NFA for soil is acceptable based upon the sampling results and the results of the geophysical survey.
4. The report states that well UST-2337-65 could not be located. If the well has been surveyed, an attempt shall be made to locate the well using the State Plane Coordinates.

Parcel 27 – Southwestern Corner CWA

1. The report states that numerous USTs were removed from this parcel and are summarized in the Phase I ECP Report. Appendix A of that document states that the Department sent UST closure approval letters for 7 of the 12 USTs that were removed, and that the Army is waiting for Department approval of the remaining 5 UST closures.

NFA for soil and ground water cannot be approved until documentation on all 12 USTs, including the closure reports for the remaining 5 USTs, are reviewed by the NJDEP project team. NJDEP requests that the Army provide a brief summary of the 7 USTs that received Department approval. This summary should include a figure showing the former UST locations and the soil and ground water sampling locations and results.

Parcel 28 - Former Eatontown Laboratory

1. See General Comment #2 above.
2. Former installation plans and figures show three separate septic tanks and leach fields and one underground transformer vault. These potential AOCs must be shown on Figure 3.5-1 to allow comparison with sample locations.

3. Figure 3.5-2 shows that only one suspected septic tank, one suspected septic distribution tank, and one suspected pipe were found. The Report should provide a possible explanation(s) for why the suspected three septic tanks and leach fields and one underground transformer vault weren't located.
4. There is no recommendation or proposal for the former storage areas and possible former tank pads.

Parcel 34 – Building 2567

No specific comments. NJDEP hopes to review the Remedial Investigation Report and Remedial Action Workplan (dated 10-28-05) on Building 2567 in the coming months.

Parcel 38 – Former Outdoor Pistol Range (1940-1955)

1. The NFA proposal is not acceptable. Since the site may have been re-worked, the surface soil sampling results are not a reliable indicator of potential ground water contamination, and a site investigation for ground water must be performed in accordance with 7:26E-3.7. Ground water samples should be analyzed for lead.

Parcel 39 - Building 1150 (Vail Hall)

1. The report states that no metal contaminants were detected in soil above the NJDEP NRDCSCC. The recommendation of NFA for soil is acceptable, however, soil contaminants must be compared to and delineated to the RDCSCC, so that a deed notice can be filed when necessary.

Parcel 43 – Building 1122 (Do-it-yourself Auto Repair)

No specific comments. NJDEP recently provided comments on reports specific to Building 1122.

Parcel 49 - Former Squier Laboratory Complex

1. NJDEP concurs with the recommendations to conduct additional sampling of surface soils to delineate contaminants above NJDEP criteria.
2. The proposal to add benzene and bromodichloromethane to the proposed CEA for the M-18 Landfill should be included in a future CEA proposal.

3. The SI Report must include some discussion regarding the source of the VOC contaminants in ground water or the remediation of the contamination, as required by N.J.A.C. 7:26E-3.13(b)4ii(1) and N.J.A.C. 7:26E-3.13(b)4ii(4).

Parcel 50, IRP Sites FTMM-54, FTMM-55 and FTMM-61

No specific comments. The comments previously provided by NJDEP on the M-18 Landfill, Building 296, and Building 290 sites in a letter dated August 14, 2007 need to be addressed.

Parcel 51 – 750 Area, 500 Area, 600 Area, 1100 Area – Former Buildings

1. See General Comment #1 above.

Parcel 52 – Building 699 - Army Exchange Services Gas Station

No specific comments. NJDEP hopes to begin reviewing the available Remedial Action Progress Reports on Building 699 in the coming months.

Parcel 57 – Former Coal Storage and Railroad Unloading – 800 Area

1. NJDEP concurs with the general recommendation to conduct additional soil and ground water sampling. A remedial investigation (RI) of ground water is required pursuant to N.J.A.C. 7:26E-4.4. A RI workplan for all proposed investigation work shall be submitted for NJDEP approval.
2. Previous NJDEP comments requested that the analytical parameters for soils include PCBs, due to reported historical coal storage and fuel unloading activities. The requested PCB analyses were not performed. Soil sample collection and analysis for PCBs must be included in the RI work plan.

Parcel 61 – Building 1075 - Patterson Health Clinic

1. NJDEP concurs with the recommendations to conduct additional soil sampling to evaluate base neutral contamination.
2. Previous NJDEP comments requested that the analytical parameters for soils include PCBs, due to reported historical coal storage and fuel unloading activities. The requested PCB analyses were not performed. Soil samples must be re-collected and analyzed for PCBs.

Parcel 69 - Building 900 Former Vehicle Repair/Motor Pool

1. The proposed NFA for soil is not acceptable. Sample analysis at this AOC should have included analysis for PCBs, due to the former waste oil tank, as stated in previous NJDEP comments. Soil samples must be re-collected and analyzed for PCBs.
2. All sediment samples collected adjacent to Parcel 69 must include PCB analysis.
3. NJDEP concurs with the recommendations to further evaluate ground water. Pursuant to N.J.A.C. 7:26E-4.4, a remedial investigation of ground water is required. An investigation workplan must be submitted for NJDEP review and approval.

Parcel 70 – Building 551 – Former Photoprocessing

1. NJDEP concurs with the recommendations for no further action (NFA).

Parcel 76 – 200 Area, 300 Area – Former Barracks

1. See General Comment #1 above.

Parcel 79 – 400 Area Former Barracks

1. See General Comment #1 above.

Parcel 80 – Former Buildings 105 and 106 – Photoprocessing

1. The footprint of the former building 105 and 106 should be shown on Figure 3.20-1. On the current Figure, it cannot be determined where the former buildings were located in relation to the Geoprobe borings, so NFA for soil can't be approved.
2. The NJDEP concurs with the recommendation for further evaluation of ground water. Pursuant to N.J.A.C. 7:26E-4.4, a remedial investigation of ground water is required. An RI workplan must be submitted for NJDEP review and approval.

Parcel 83 - Northeast MP

1. Former structures, buildings and other areas of concern are discussed in the text and in the tables but are not indicated on the Figure 3.21-1. All areas of concern, whether existing or former structures, must be depicted on the site figures.

2. The NFA proposal for ground water is acceptable, based on the ground water sampling results presented in the report.

Sanitary Sewer System

No comments.

Electrical Substations

1. As discussed in General Comment #6, a Deed Notice and engineering controls are required at the 2 locations where PCBs were found above the RDCSCC of 0.49 ppm.
-

REGULATORY CORRESPONDENCE CONCERNING
PARCEL 83 UNDERGROUND STORAGE TANKS

Correspondence 9



State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Site Remediation and Waste Management Program
BUREAU OF FIELD OPERATIONS
7 RIDGEDALE AVENUE
Cedar Knolls, New Jersey 07927

PHIL MURPHY
Governor

CATHERINE R. McCABE
Commissioner

SHEILA OLIVER
Lt. Governor

July 31, 2018

Mr. William Colvin
BRAC Environmental Coordinator
OACSIM – U.S. Army Fort Monmouth
PO Box 148
Oceanport, NJ 07757

Approval

Re: **Remedial Action Type:** *Unrestricted Use*
Scope of Remediation: *Areas of Concern: UST 482*
Monmouth County
SRP PI# G000000032
RPC000001

Dear Mr. Colvin:

The New Jersey Department of Environmental Protection (Department) reviewed the information submitted by the Department of the Army. The Department concurs with the Department of the Army that no additional action is necessary for UST 482; it is agreed all remedial actions are complete. The determination that the remedial action is complete is based upon information in the Department's case file, the Site Investigation Report submitted by the Department of the Army, and the certified representations and information provided to the Department.

If you have any questions regarding this matter, please contact A.J. Joshi at (973) 656-4427.

Sincerely,

A handwritten signature in dark ink, appearing to read "Gwen B. Zervas".

Gwen B. Zervas, P.E.
Section Chief

cc: James Moore, USACE
Cris Grill, Parsons
Joe Fallon, FMERA
File

Correspondence 10



State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Site Remediation and Waste Management Program

PHIL MURPHY
Governor

CATHERINE R. McCABE
Commissioner

SHEILA OLIVER
Lt. Governor

June 8, 2018

Mr. William Colvin
BRAC Environmental Coordinator
OACSIM – U.S. Army Fort Monmouth
PO Box 148
Oceanport, NJ 07757

Approval

Re: **Remedial Action Type:** *Unrestricted Use*
Scope of Remediation: *Areas of Concern: Parcel 83 UST 273 Dispenser Area*
Monmouth County
SRP PI# G000000032
RPC000001

Dear Mr. Colvin:

The New Jersey Department of Environmental Protection (Department) reviewed the information submitted by the Department of the Army. The Department concurs with the Department of the Army that no additional action is necessary for the Dispenser Area associated with the former underground storage tanks (USTs) at Building 273 Parcel 83; it is agreed all remedial actions are complete. The determination that the remedial action is complete is based upon information in the Department's case file, the Site Investigation Report submitted by the Department of the Army, and the certified representations and information provided to the Department.

If you have any questions regarding this matter, please contact A.J. Joshi at (973) 656-4427.

Sincerely,

A handwritten signature in black ink, appearing to read "Gwen B. Zervas".

Gwen B. Zervas, P.E.
Section Chief

cc: James Moore, USACE
Cris Grill, Parsons
Joe Fallon, FMERA
File

Correspondence 11



State of New Jersey

CHRIS CHRISTIE
Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Case Management
401 East State Street
P.O. Box 420/Mail Code 401-05F
Trenton, NJ 08625-0028
Phone #: 609-633-1455
Fax #: 609-633-1439

BOB MARTIN
Commissioner

KIM GUADAGNO
Lt. Governor

September 8, 2016

William Colvin
BRAC Environmental Coordinator
OACSIM – U.S. Army Fort Monmouth
PO Box 148
Oceanport, NJ 07757

Re: *Response to NJDEP's October 2015 Comments on the July 30, 2015 No Further Action Request, Site Investigation Report Addendum for the ECP Parcel 83 Underground Storage Tanks*
Fort Monmouth
Oceanport, Monmouth County
PI G000000032

Dear Mr. Colvin:

The New Jersey Department of Environmental Protection (Department) has completed review of the referenced letter submittal, prepared by the Department of the Army, received on July 18, 2016. The Department's comments relative to the submittal are provided below.

Comment A1

Buildings 66, 478, 479

The Department acknowledges the Army has no plans to conduct assessment/evaluation of USTs previously shown in the 1956 Fuel Storage map, Appendix O of the '07 ECP at former Buildings 66, 478 and 479. As these tanks have not been evaluated in accordance with the applicable regulations and guidance documents, the previous statement whereby the Department cannot comment as to the potential absence or presence of a petroleum discharge associated with those tanks remains applicable.

Comment A2

USTs 273 aka 0090001-65,66 & 67

It is understood both the USTs and piping were double walled/compliant with the release detection requirements and piping of N.J.A.C. 7:14B-6 as indicated in the submittal. Sampling of same also indicated no discharge associated with the USTs or piping at the time of their removal. It is not agreed the dispenser islands were adequately evaluated at the time;

additionally, use of the dispensers continued beyond the date of sampling, as the dispensers were operated with the ASTs which replaced the USTs, from 2008 until 2011. Although it is understood the Army does not intend to perform further assessment at the dispensers, the October 2015 NFA remains, not applicable to the dispenser islands.

Comment B

UST 80/FTMM-56

This office looks forward to receipt of the soil and ground water results.

Comment C

USTs 108-60 through 64/FTMM-57

This office looks forward to receipt of the soil and ground water results.

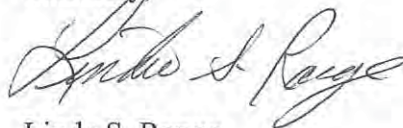
Comment D

UST 482-54/Parcel 93

The response acknowledging additional action is to be performed is acceptable.

Please contact this office with any questions.

Sincerely,

A handwritten signature in cursive script, appearing to read "Linda S. Range".

Linda S. Range

C: Jim Moore, USACE
Joe Pearson, Calibre
Rick Harrison, FMERA
Joe Fallon, FMERA



DEPARTMENT OF THE ARMY

OFFICE OF ASSISTANT CHIEF OF STAFF FOR INSTALLATION MANAGEMENT
U.S. ARMY FORT MONMOUTH
P.O. 148
OCEANPORT, NEW JERSEY 07757

Correspondence 12

July 12, 2016

Ms. Linda Range
New Jersey Department of Environmental Protection
Bureau of Case Management
401 East State Street
PO Box 420/Mail Code 401-05F
Trenton, NJ 08625-0028

Re: Response to NJDEP's October 13, 2015 Comments on the July 30, 2015 *No Further Action Request, Site Investigation Report Addendum for the ECP Parcel 83 Underground Storage Tanks, Fort Monmouth, NJ*
PI G000000032

Dear Ms. Range:

The Fort Monmouth team has reviewed the New Jersey Department of Environmental Protection (NJDEP) comments on the subject submittal for underground storage tanks (USTs) at ECP Parcel 83, as documented in your letter dated October 13, 2015. We appreciate this opportunity to work with you on Parcel 83 USTs. Responses to your comments are provided below, for your review and concurrence or further comments.

A. General Comments

A1. COMMENT: *Page 2 of 4 of the submittal indicates certain USTs specifically mentioned in previous NJDEP comments are not included in this submittal as there are no USTs associated with the particular buildings, specifically Buildings 66, 281 or 479. In reviewing this submittal, the UST referenced as near Building 281 appears to have been addressed via remedial activities at UST 108-7; see below for comment regarding same. USTs at (former) Buildings 66 and 479 (and 478) are shown in the 1956 Fuel Storage map, Appendix O, of the '07 ECP, as well as indicated as "high potential UHOTs" in Figure 2 of the July 2014 UHOT Investigation Report. Unless all tanks, former and/or current, have been evaluated in accordance with the applicable regulations and guidance documents, the NJDEP cannot comment as to the potential absence or presence of a petroleum discharge associated with those tanks.*

A1. RESPONSE: As discussed in the Parcel 83 USTs submittal, the Army has conducted a detailed review of available information to assess the presence of USTs within Parcel 83. Since there were no additional indications of USTs at Buildings 66, 478, and 479, the Army is not proposing additional assessment work at these locations. We concur that the UST near Building 281 is UST 108-7 (aka UST 108A) for which a NFA determination was received (NJDEP letter dated October 13, 2015).

A2. COMMENT: *As indicated in the submittal, numerous underground storage tanks (USTs) have previously received a designation of No Further Action (NFA) required. Based upon a review of the referenced submittal, it is also agreed NFA is necessary for the following USTs:*

- UST 49-76 & UST-49-77; #01-05-24-1004-1; each 5000 g gasoline (Attachment E)
- UST 63B aka UST 63-2; 1000 g #2 fuel (Attachment F)
- UST 108A aka 108-7; 1000 g #2 fuel (Attachment I)
- UST 116B aka UST 116-9; #97-04-10-1409-35; 1000 g #2 fuel; NFAed 10/23/00; ECP Parcel 85; additional sampling performed in May 2010 indicates NFA remains appropriate (Attachment J)
- UST 117C aka UST 117-72; #84-04-28-1944-21; 1000 g #2 fuel; ECP Parcel 86 (Attachment K)
- USTs 161 – Parcel 87 (Attachment L)
 - o UST 161-68; 550 g waste oil
 - o UST 161-14; 1000 g #2 fuel; #93-03-12-2158-30
- UST 167-18; 1000 g #2 diesel (Attachment M)
- USTs 273 aka 009001-65,66 & 67 (Attachment N)
 - o UST 273-65; 6000 g diesel
 - o UST 273-66; 10,000 gasoline
 - o UST 273-67; 10,000 g gasoline
 - o Note – the NFA is applicable to the USTs only, not the dispenser/s, which were reported as used with the AST fuel storage system which replaced USTs 273 until subsequent AST closure in 2011
- UST 483-55; #97-03-19-1359-16; previously NFAed 10/23/00; additional sampling performed in May 2010 indicates NFA remains appropriate (Attachment P)

A2: RESPONSE: Agreed. UST 273 had newer (1991) fiberglass tanks and piping with secondary containment, and was fully compliant with the release detection requirements for tanks (N.J.A.C 7:14B-6.5) and piping (7:14B-6.6). Further, the dispenser islands were less than 10 ft from the UST excavation, so any leakage from the dispenser area would likely have been detected in closure soil samples (which were clean). The Army is not proposing additional assessment work at the dispensers.

B. UST 80 aka 80-6 aka FTMM-56 – Parcel 84 (Attachment G)

B1. COMMENT: UST 80-6 was a #2 fuel tank which was granted an NFA by the Department on August 29, 2000. Ground water contamination at FTMM-56 unrelated to #2 fuel was monitored on a quarterly basis for many years. Submittal of analytical results from the additional round of ground water sampling as per the DEP's July 3, 2014 comment letter are pending.

B1. RESPONSE: We anticipate a future Army submittal concerning IRP site FTMM-56 (Building 80 Petroleum Release) that will summarize the soil and groundwater results.

C. USTs 108-60 through 64 aka FTMM-57 – Parcel 90

C1. COMMENT: Attachment H references five USTs which were removed in April of 1993, and lists just over a page with descriptive bullets of documents reported to include remedial activities relative to these USTs, concluding that reported results support site characterization work is complete. The submittal, however, includes no results; comments regarding adequacy of characterization and recommendations as to additional action are therefore not possible at this time.

C1. RESPONSE: We anticipate a future Army submittal concerning IRP site FTMM-57 (Building 108 UST Gasoline Release) that will summarize the soil and groundwater analytical results.

D. UST 482-54 – Parcel 93 (located within Parcel 83)

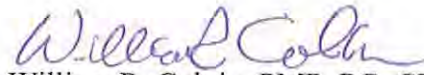
D1. COMMENT: *As regarding UST 482-54 (#94-08-11-1345-43), which was NFAed in January of 2003, Attachment O appears to indicate TPH contaminated soils remain at levels of 14,100 ppm and 29,400 ppm. As indicated in the email of October 9, 2015, clarification is requested, as a designation of NFA is not appropriate for contamination at this level.*

D1. RESPONSE: Historical information and recent (April 2016) field observations of elevated photoionization detector (PID) readings in a boring near UST 482-54 indicate that additional characterization of the former UST 482 area is warranted. Field sampling at the UST 482 area will be performed at the same time that additional sampling at Parcel 83 is performed (which will be described under separate cover).

We request your review of these responses regarding USTs at ECP Parcel 83. Additional submittals for FTMM-56 (Building 80), FTMM-57 (Building 108), and UST 482 are forthcoming, as indicated above. Other specific issues concerning known or suspected non-UST contamination of soil or groundwater at Parcel 83 will also be addressed under separate cover as described in the November 2015 (Revision 1) *Environmental Condition of Property Phase II Site Investigation Work Plan Addendum* (the ECP Work Plan Addendum).

The technical Point of Contact (POC) for this matter is Kent Friesen at (732) 383-7201 or by email at kent.friesen@parsons.com. Should you have any questions or require additional information, please contact me by phone at (732) 380-7064 or by e-mail at william.r.colvin18.civ@mail.mil.

Sincerely,



William R. Colvin, PMP, PG, CHMM
BRAC Environmental Coordinator

cc: Linda Range, NJDEP (e-mail and 3 hard copies)
Delight Balducci, HQDA ACSIM (e-mail)
Joseph Pearson, Calibre (e-mail)
James Moore, USACE (e-mail)
Jim Kelly, USACE (e-mail)
Cris Grill, Parsons (e-mail)

Correspondence 13



State of New Jersey

CHRIS CHRISTIE
Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Case Management
401 East State Street
P.O. Box 420/Mail Code 401-05F
Trenton, NJ 08625-0028
Phone #: 609-633-1455
Fax #: 609-633-1439

BOB MARTIN
Commissioner

KIM GUADAGNO
Lt. Governor

October 13, 2015

John Occhipinti
BRAC Environmental Coordinator
OACSIM – U.S. Army Fort Monmouth
PO Box 148
Oceanport, NJ 07757

Re: *No Further Action Request*
Site Investigation Report Addendum for the ECP Parcel 83 Underground Storage Tanks
Fort Monmouth
Oceanport, Monmouth County
PI G000000032

Dear Mr. Occhipinti:

The New Jersey Department of Environmental Protection (Department) has completed review of the referenced report, received August 4, 2015, prepared by Department of the Army Office of Assistant Chief of Staff for Installation Management to provide documentation of the location and status of all USTs identified within the parcel. The NJDEP comments regarding various constituents unrelated to the USTs previously noted in parcel soils are not addressed in this submittal.

Page 2 of 4 of the submittal indicates certain USTs specifically mentioned in previous NJDEP comments are not included in this submittal as there are no USTs associated with the particular buildings, specifically Buildings 66, 281 or 479. In reviewing this submittal, the UST referenced as near Building 281 appears to have been addressed via remedial activities at UST 108-7; see below for comment regarding same. USTs at (former) Buildings 66 and 479 (and 478) are shown in the 1956 Fuel Storage map, Appendix O, of the '07 ECP, as well as indicated as "high potential UHOTS" in Figure 2 of the *July 2014 UHOT Investigation Report*. Unless all tanks, former and/or current, have been evaluated in accordance with the applicable regulations and guidance documents, the NJDEP cannot comment as to the potential absence or presence of a petroleum discharge associated with those tanks.

As indicated in the submittal, numerous underground storage tanks (USTs) have previously received a designation of No Further Action (NFA) required. Based upon a review of the referenced submittal, it is also agreed NFA is necessary for the following USTs:

- UST 49-76 & UST-49-77; #01-05-24-1004-1; each 5000 g gasoline (Attachment E)
- UST 63B aka UST 63-2; 1000 g #2 fuel (Attachment F)
- UST 108A aka 108-7; 1000 g #2 fuel (Attachment I)
- UST 116B aka UST 116-9; #97-04-10-1409-35; 1000 g #2 fuel; NFAed 10/23/00; ECP Parcel 85; additional sampling performed in May 2010 indicates NFA remains appropriate (Attachment J)
- UST 117C aka UST 117-72; #84-04-28-1944-21; 1000 g #2 fuel; ECP Parcel 86 (Attachment K)
- USTs 161 – Parcel 87 (Attachment L)
 - UST 161-68; 550 g waste oil
 - UST 161-14; 1000 g #2 fuel; #93-03-12-2158-30
- UST 167-18; 1000 g #2 diesel (Attachment M)
- USTs 273 aka 009001-65,66 & 67 (Attachment N)
 - UST 273-65; 6000 g diesel
 - UST 273-66; 10,000 gasoline
 - UST 273-67; 10,000 g gasoline
 - Note – the NFA is applicable to the USTs only, not the dispenser/s, which were reported as used with the AST fuel storage system which replaced USTs 273 until subsequent AST closure in 2011
- UST 483-55; #97-03-19-1359-16; previously NFAed 10/23/00; additional sampling performed in May 2010 indicates NFA remains appropriate (Attachment P)

UST 80 aka 80-6 aka FTMM-56 - Parcel 84 (Attachment G)

UST 80-6 was a #2 fuel tank which was granted an NFA by the Department on August 29, 2000. Ground water contamination at FTMM-56 unrelated to #2 fuel was monitored on a quarterly basis for many years. Submittal of analytical results from the additional round of ground water sampling as per the DEP's July 3, 2014 comment letter are pending.

USTs 108-60 through 64 aka FTMM-57 – Parcel 90

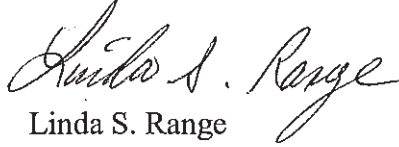
Attachment H references five USTs which were removed in April of 1993, and lists just over a page with descriptive bullets of documents reported to include remedial activities relative to these USTs, concluding that reported results support site characterization work is complete. The submittal, however, includes no results; comments regarding adequacy of characterization and recommendations as to additional action are therefore not possible at this time.

UST 482-54 – Parcel 93

As regarding UST 482-54 (#94-08-11-1345-43), which was NFAed in January of 2003, Attachment O appears to indicate TPH contaminated soils remain at levels of 14,100 ppm and 29,400 ppm. As indicated in the email of October 9, 2015, clarification is requested, as a designation of NFA is not appropriate for contamination at this level.

Please contact this office if you have any questions.

Sincerely,

A handwritten signature in cursive script that reads "Linda S. Range". The signature is fluid and elegant, with the first letters of each word being capitalized and prominent.

Linda S. Range

C: Joe Pearson, Calibre
Rick Harrison, FMERA
Joe Fallon, FMERA
James Moore, USACE
Frank Barricelli, RAB



DEPARTMENT OF THE ARMY

OFFICE OF ASSISTANT CHIEF OF STAFF FOR INSTALLATION MANAGEMENT
U.S. ARMY FORT MONMOUTH
P.O. 148
OCEANPORT, NEW JERSEY 07757

Correspondence 14

July 30, 2015

Ms. Linda Range
New Jersey Department of Environmental Protection
Case Manager
Bureau of Southern Field Operations
401 East State Street, 5th Floor
PO Box 407
Trenton, NJ 08625

**Re: No Further Action Request
Site Investigation Report Addendum for the ECP Parcel 83 Underground Storage Tanks
Fort Monmouth, NJ**

Attachments:

- A. Correspondence
- B. Site Layout Drawings of Parcel 83(Recent and Historical)
- C. Summary Table of Parcel 83 Underground Storage Tanks
- D. No Further Action Letters from NJDEP
- E. USTs 49-76 and 49-77 File Review, Report and Analyses
- F. UST 63B Report
- G. UST 80 File Review (FTMM-56)
- H. UST 108 File Review (FTMM-57)
- I. UST 108A Report
- J. UST 116B File Review and Analyses
- K. UST 117C File Review and Report
- L. USTs 161 Reports
- M. UST 167 Report
- N. USTs 273 File Review and Report
- O. UST 482 File Review and Analyses
- P. UST 483 File Review and Analyses

Previous Correspondence (provided in Attachment A):

1. NJDEP letter to the Army dated July 10, 2012, re: *March 2012 Army Response to NJDEP Correspondence Letter Dated October 28, 2008.*

Dear Ms. Range:

The U.S. Army Fort Monmouth (FTMM) has reviewed existing file information for underground storage tank (UST) sites at Fort Monmouth within Environmental Condition of Property (ECP) Parcel 83. The purpose of this submittal is to provide comprehensive documentation of the location and updated closure status of all USTs identified within this parcel. This information may be useful for the future Phase II property transfer. This submittal provides the information for Parcel 83 USTs as

requested by NJDEP in Correspondence 1 (provided in Attachment A). NJDEP's additional comments regarding various constituents previously detected in Parcel 83 soils (including PAHs, TCE, and metals) are addressed separately in the ECP Work Plan Addendum.

Several USTs specifically mentioned by NJDEP in the Correspondence 1 comments on Parcel 83 are not addressed in this submittal for the following reasons:

- UST 421-37 is located in Parcel 79, and therefore has been addressed in the Parcel 79 UST summary document that was submitted on 4/22/2015;
- There are no USTs associated with Buildings 66, 281 or 479.

Parcel 83 includes the eastern portion of the Main Post located east of Oceanport Avenue. Parcel 83 is bounded by Burns Avenue to the west, Riverside Avenue and the Fort boundary to the south, Oceanport Creek to the east, and the New Jersey Transit railroad tracks and Base boundary to the northeast (see recent and historical layout drawings presented in Attachment B). There are three designated Installation Restoration Program (IRP) sites located within the contiguous boundary of Parcel 83, as follows:

- FTMM-17 Pesticide Storage Building T-65 (also designated as ECP Parcel 88), which was approved by NJDEP for NFA in 1994, as reported in the 2007 ECP Report;
- FTMM-56 Building 80 Petroleum Release, which includes USTs that are discussed within this submittal; and
- FTMM-57 Building 108 UST Gasoline Release, which includes USTs that are discussed within this submittal.

ECP Parcels 84 through Parcel 94 are also located within the contiguous boundary of Parcel 83. ECP Parcel 88 is the designation for FTMM-17, while the remaining parcels within ECP Parcels 84 through 94 are assigned to specific USTs, which are further described herein.

The locations of the USTs within Parcel 83 are presented in Attachment B, and a summary table of these USTs is provided in Attachment C. Attachment C also includes the identification of both the IRP site designation and the ECP Parcel designation for UST, as applicable. All of the USTs identified within Parcel 83 have been removed. None of the Parcel 83 USTs were used for residential heating oil; however, approximately half of them were less than 2000 gallons in size and used to store heating oil for nonresidential buildings, and are therefore considered unregulated heating oil tanks (UHOTs).

Multiple USTs and UHOTs within Parcel 83 were previously approved for No Further Action (NFA) by NJDEP; documentation of this approval is provided in Attachment D, and referenced below. In these cases, there is generally a supporting investigation report that was previously submitted to NJDEP and that describes the basis for closure. For the sake of brevity, we have not included these reports for UHOTs where NFA has already been approved. However, these reports are available within the FTMM environmental records.

In the Attachment C table, the term "Case Closed" has been used (consistent with previous FTMM procedures) to indicate the Army previously determined that no further sampling or remedial actions were warranted for a specific UST site. "Case Open" indicates the Army previously determined that ongoing monitoring, reporting or possibly even remedial action was warranted. In contrast, "No Further Action" has been reserved for NJDEP approval that no further sampling or remedial actions are warranted. "Case Open" sites previously identified within Parcel 83 in Attachment C can now be considered as "Closed" by this submittal.

We are submitting the following documentation for the multiple USTs that were previously removed from the Parcel 83 Area, and we request a No Further Action determination for each site (sites that have been previously approved for NFA by NJDEP are highlighted in green):

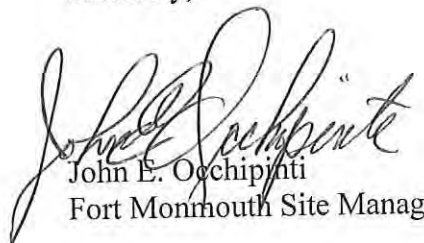
- UST 49 File Review summary, an investigation report, and additional analyses are presented in Attachment E.
- UST 63B investigation report is presented in Attachment F.
- UST 64A NFA was approved by NJDEP on 8/29/2000 (Attachment D).
- UST 64B NFA was approved by NJDEP on 10/23/2000 (Attachment D).
- UST 65A NFA was approved by NJDEP on 8/29/2000 (Attachment D).
- UST 80 NFA was approved by NJDEP on 8/29/2000 (Attachment D). This site was assigned IRP Site FTMM-56 and is subject to ongoing groundwater monitoring. A File Review summary is presented in Attachment G that describes the current site status; NFA for soils has been approved, but resolution of groundwater issues for this IRP site will be provided under separate cover.
- USTs at former Building 108 include five tanks that were assigned IRP Site FTMM-57. A File Review summary is presented in Attachment H that describes the current site status; further resolution for this IRP site will be provided under separate cover.
- UST 108A investigation report is presented in Attachment I; this heating oil tank is separate from the IRP Site FTMM-57 tanks, and therefore NFA is requested herein.
- UST 116A NFA was approved by NJDEP on 7/10/1998 (Attachment D).
- UST 116B NFA was approved by NJDEP on 10/23/2000 (Attachment D). Additional evaluation of this site was provided by FTMM in 2010, as presented in the File Review summary in Attachment J.
- UST 116C NFA was approved by NJDEP on 7/10/1998 (Attachment D).
- UST 117A NFA was approved by NJDEP on 7/10/1998 (Attachment D).
- UST 117B NFA was approved by NJDEP on 7/10/1998 (Attachment D).
- UST 117C File Review summary and investigation report is presented in Attachment K.
- USTs 90010-14 and 90010-68 at Building 161 were located adjacent to one another and were closed simultaneously; an investigation report is presented in Attachment L.
- UST 164 NFA was approved by NJDEP on 1/10/2003 (Attachment D).
- UST 165 NFA was approved by NJDEP on 2/24/2000 (Attachment D).
- UST 166 NFA was approved by NJDEP on 8/29/2000 (Attachment D). This site is generally understood to be part of IRP Site FTMM-56; see the summary memo for UST 80 (Attachment G).
- UST 167 investigation report is presented in Attachment M.
- UST 173 NFA was approved by NJDEP on 1/10/2003 (Attachment D).
- UST 197-2 NFA was approved by NJDEP on 2/24/2000 (Attachment D).
- USTs 273-65, 273-66, and 273-67 File Review summary and investigation report is presented in Attachment N.
- UST 276 NFA was approved by NJDEP on 10/23/2000 (Attachment D).
- UST 277 NFA was approved by NJDEP on 1/10/2003 (Attachment D).
- UST 280 NFA was approved by NJDEP on 10/23/2000 (Attachment D).
- UST 480 NFA was approved by NJDEP on 7/10/1998 (Attachment D).

- UST 482 NFA was approved by NJDEP on 1/10/2003 (Attachment D). Additional evaluation of this site was provided by FTMM in 2010 and 2011, as presented in the File Review summary in Attachment O.
- UST 483 NFA was approved by NJDEP on 10/23/2000 (Attachment D). Additional evaluation of this site was provided by FTMM in 2010, as presented in the File Review summary in Attachment P.
- UST 484 NFA was approved by NJDEP on 8/29/2000 (Attachment D).
- UST 485 NFA was approved by NJDEP on 8/29/2000 (Attachment D).

This information supports the conclusion that multiple UHOTs and USTs identified within Parcel 83 have been adequately addressed by previous environmental activities under the FTMM tank removal and assessment program. In summary, we submit that the Army has provided adequate due diligence with regards to the environmental condition of USTs and UHOTS within Parcel 83, and we request that NJDEP approve No Further Action for Parcel 83 USTs. IRP Sites FTMM-56 and FTMM-57, and additional non-UST soil constituents within Parcel 83 (as described in the ECP Work Plan Addendum), will be further addressed under separate cover.

The technical Point of Contact (POC) for this matter is Kent Friesen at (732) 383-7201 or by email at kent.friesen@parsons.com. Should you have any questions or require additional information, please contact me by phone at (732) 383-5104 or by email at john.e.occhipinti.civ@mail.mil.

Sincerely,



John E. Occhipinti
Fort Monmouth Site Manager

cc: Delight Balducci, HQDA ACSIM
Joseph Pearson, Calibre
James Moore, USACE
Cris Grill, Parsons

APPENDIX B

Soil Boring Logs

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>CW</u>		BORING/WELL ID: <u>PAR-83-SB-01</u>	
PROJECT NAME: FTMM - ECP					DRILLER: <u>JOE BARNAK</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: <u>Rain 50°F</u>		<u>Parcel 83</u>	
PROJECT NUMBER: 748810-					CONTRACTOR: East Coast Drilling, Inc. (ECDI)			
GROUNDWATER OBSERVATIONS					RIG TYPE: Geoprobe(R) 7822DT		LOCATION PLAN	
WATER LEVEL: <u>~2.5'</u>					DATE/TIME START: <u>4/4/16 0930</u>		Oceanport, New Jersey	
DATE: <u>4/4/16</u>					DATE/TIME FINISH: <u>4/4/16 0940</u>			
TIME: <u>0950</u>					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM: <u>845</u>					DROP OF HAMMER: <u>N/A</u>			
					TYPE OF HAMMER: <u>N/A</u>			
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0			<u>60/53</u>	<u>0</u>	0-3" Asphalt millings			
0.5-1					3-5" Asphalt millings, some f. rock frags.			
1					5"-11" moist, m. dense, grey MF SAND, trace silt, trace f gravel			
1.26-1.75								
2					11"-53" moist, loose, MC, Brown / orange-brown / dark grey, SAND, trace silt, trace f gravel		✓ saturated @ 21"	
2-2.5								
3								
4								
5					end of Boring @ 5'			
6								
7								
8								
9								
10								
Remarks:								
Sample Types					Consistency vs. Blowcount / Foot			
S - Split-Spoon					Granular (Sand & Gravel)			
U - Undisturbed Tube					Fine Grained (Silt & Clay)			
C - Rock Core					V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15			
A - Auger Cuttings					Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30			
					M. Dense: 10-30 M. Stiff: 4-8 Hard: >30			
					and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation			

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>ON</u>		BORING/WELL ID: <u>PAR-87-SB-02</u>	
PROJECT NAME: FTMM - ECP					DRILLER: <u>DOE BARNHART</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: <u>55°F RAIN</u>		<u>Parcel 83</u>	
PROJECT NUMBER: 748810-					CONTRACTOR: East Coast Drilling, Inc. (ECDI)			
GROUNDWATER OBSERVATIONS					RIG TYPE: Geoprobe(R) 7822DT		LOCATION PLAN	
WATER LEVEL: <u>2.5'</u>					DATE/TIME START: <u>4/4/16</u> <u>1000</u>		Oceanport, New Jersey	
DATE: <u>4/4/16</u>					DATE/TIME FINISH: <u>4/4/16</u> <u>1010</u>			
TIME: <u>1015</u>					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM:					DROP OF HAMMER: <u>N/A</u>			
TYPE OF HAMMER: <u>N/A</u>								
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0			80/57	0	0-2" topsoil, grass, & Rock Fragments			
					2-6" Concrete (crushed)			
1025	1	0.5-1.5			6-11" concrete and asphalt millings			
1030		1.8-2.0			11-30" moist, m. Dense, MC, grey			
1035	2	2.0-2.5			and brown SAND, trace silt, trace f gravel			
					30"-50" saturated, loose, MC, Brown			
3					orange-brown, grey SAND,			
					trace silt, trace f gravel			
4					30"-57" saturated, loose, MF,			
					Brown/grey/green mottled			
					SAND, little silt			
5					end of Boring @ 5'			
6								
7								
8								
9								
10								
Remarks:								
Sample Types				Consistency vs. Blowcount / Foot				
S - Split-Spoon				Granular (Sand & Gravel)				
U - Undisturbed Tube				Fine Grained (Silt & Clay)				
C - Rock Core				V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15				
A - Auger Cuttings				Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30				
				M. Dense: 10-30 M. Stiff: 4-8 Hard: >30				
				and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation				

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>UW</u>		BORING/WELL ID: <u>PAR-83-SB-03</u>	
PROJECT NAME: FTMM - ECP					DRILLER: <u>JOE BARNAK</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: <u>55°F RAIN</u>		<u>Parcel 83</u>	
PROJECT NUMBER: 748810-					CONTRACTOR: East Coast Drilling, Inc. (ECDI)			
GROUNDWATER OBSERVATIONS					RIG TYPE: Geoprobe(R) 7822DT		LOCATION PLAN	
WATER LEVEL: <u>~2.5'</u>					DATE/TIME START: <u>4/4/16 1025</u>		Oceanport, New Jersey	
DATE: <u>4/4/16</u>					DATE/TIME FINISH: <u>4/4/16 1040</u>			
TIME: <u>1045</u>					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM: <u>BGS</u>					DROP OF HAMMER: <u>N/A</u>			
					TYPE OF HAMMER: <u>N/A</u>			
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
<u>0.0</u>			<u>00/56</u>	<u>0</u>	<u>0-3" topsoil, grass, F Rock Frag</u>			
<u>0.1</u>	<u>1-1.5</u>				<u>3-10.5" crushed concrete, Asphalt millings, trace F SAND.</u>			
<u>1.00</u>	<u>1.5-2</u>				<u>11.5-30" moist, M. dense, M F SAND, trace silt, trace gravel</u>		<u>ms/m-sd</u>	
<u>1.05</u>	<u>2-2.5</u>				<u>30"-56" saturated, loose, M F Brown/grey/green mottled SAND, little silt</u>		<u>▽</u>	
<u>0.3</u>								
<u>0.4</u>								
<u>0.5</u>					<u>end of boring @ 5'</u>			
<u>6</u>								
<u>7</u>								
<u>8</u>								
<u>9</u>								
<u>0</u>								
Remarks:								
Sample Types				Consistency vs. Blowcount / Foot				
S - Split-Spoon				Granular (Sand & Gravel)				
U - Undisturbed Tube				Fine Grained (Silt & Clay)				
C - Rock Core				V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15				
A - Auger Cuttings				Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30				
				M. Dense: 10-30 M. Stiff: 4-8 Hard: >30				
				and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation				

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>W</u>		BORING/WELL ID: <u>PAR-83-B-04</u>	
PROJECT NAME: FTMM - ECP					DRILLER: <u>JOE</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: <u>55°F overcast</u>		<u>Parcel 83</u>	
PROJECT NUMBER: 748810-					CONTRACTOR: East Coast Drilling, Inc. (ECDI)			
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) 7822DT</u>		LOCATION PLAN	
WATER LEVEL: <u>~2.4'</u>					DATE/TIME START: <u>4/4/16 1100</u>		Oceanport, New Jersey	
DATE: <u>4/4/16</u>					DATE/TIME FINISH: <u>4/4/16 1115</u>			
TIME: <u>1100</u>					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM:					DROP OF HAMMER: <u>N/A</u>			
					TYPE OF HAMMER: <u>N/A</u>			
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADVI REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0			60/52	0	0-6" Top soil, concrete (crushed)			
1	0.5-1				6-10" Moist, dense, Brown m. grey mf SAND, little silt, trace F gravel			
2	1.25-1.75				10"-28" Moist, m. dense, grey/green mf SAND, little silt			
3	2-2.5				28"-52" Saturated, loose, grey/green mf SAND, little silt, trace clay			
4								
5					end of Boring @ 51'			
6								
7								
8								
9								
10								
Remarks:								
Sample Types				Consistency vs. Blowcount / Foot				
S - Split-Spoon				Granular (Sand & Gravel)				
U - Undisturbed Tube				Fine Grained (Silt & Clay)				
C - Rock Core				V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15				
A - Auger Cuttings				Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30				
				M. Dense: 10-30 M. Stiff: 4-8 Hard: >30				
				and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation				

Soil Boring Log

CLIENT: USACE	INSPECTOR: <u>UW</u>	BORING/WELL ID: <u>PAR-83-SB-07</u>
PROJECT NAME: FTMM - ECP	DRILLER: <u>JOE BARNIAK</u>	LOCATION DESCRIPTION
PROJECT LOCATION: FTMM Parcel	WEATHER: <u>55°F RAIN</u>	<u>Inlet 83</u>
PROJECT NUMBER: 748810-	CONTRACTOR: East Coast Drilling, Inc. (ECDI)	
GROUNDWATER OBSERVATIONS	RIG TYPE: Geoprobe(R) 7822DT	LOCATION PLAN
WATER LEVEL: <u>~ 2.75'</u>	DATE/TIME START: <u>4/4/16 1330</u>	Oceanport, New Jersey
DATE: <u>4/4/16</u>	DATE/TIME FINISH: <u>4/4/16 1345</u>	
TIME: <u>1400</u>	WEIGHT OF HAMMER: <u>N/A</u>	
MEAS. FROM:	DROP OF HAMMER: <u>N/A</u>	
	TYPE OF HAMMER: <u>N/A</u>	

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADVI REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
1400 0	0-0.5		60/56	0	0-1" grass, mf Brown SAND		
1405 1	1.25-1.75				1-8" moist, loose, MF, Dark Brown SAND, little silt		
1410 2					8"-14" moist, loose, gray/Brown, MC SAND, little f gravel		
3	2.25-2.75				14"-33" moist, Dense, gray/comp-Brown/Brown, mf SAND, some silt trace clay		
4					33"-56" saturated, m. Dense, green-gray mf SAND, some silt, little clay		
5					end of Boring @ 5'		
6							
7							
8							
9							
10							

Remarks:

Sample Types

S - Split-Spoon
 U - Undisturbed Tube
 C - Rock Core
 A - Auger Cuttings

Consistency vs. Blowcount / Foot

Granular (Sand & Gravel)		Fine Grained (Silt & Clay)	
V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15
Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30
M. Dense: 10-30		M. Stiff: 4-8	Hard: >30

and - 35-50%
 some - 20-35%
 little - 10-20%
 trace - <10%

moisture, density, color, gradation

Soil Boring Log

CLIENT: USACE PROJECT NAME: FTMM - ECP PROJECT LOCATION: FTMM Parcel PROJECT NUMBER: 748810-					INSPECTOR: CW DRILLER: JOE BARNAK WEATHER: 55°F RAIN CONTRACTOR: East Coast Drilling, Inc. (ECDI)					BORING/WELL ID: PAR-89-SB-08 LOCATION DESCRIPTION: Parcel 83															
GROUNDWATER OBSERVATIONS WATER LEVEL: -3.0 DATE: 4/4/16 TIME: MEAS. FROM:					RIG TYPE: Geoprobe(R) 7822DT DATE/TIME START: 4/4/16 1350 DATE/TIME FINISH: 4/4/16 1400 WEIGHT OF HAMMER: N/A DROP OF HAMMER: N/A TYPE OF HAMMER: N/A					LOCATION PLAN: Oceanport, New Jersey															
DEPTH (feet)	SAMPLE ID.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS																		
0	0.0		60/57	0	0-5" Rock fragments, grass, trace mf gravel, trace c sand	I																			
1	0.5-1				5"-17" moist, loose, Brown, MC SAND, some F gravel, some rock frags, trace coal fragments.																				
2	1.25-2.75				17"-24" moist, m. dense, gray/Brown MF SAND, trace F gravel, trace silt																				
3	2.5-3				24"-37" moist, m. dense, light Brown/gray/brn/brown mf SAND, little silt, trace F gravel																				
4					37-57" saturated, sand																				
5					End of Boring @ 5'																				
6																									
7																									
8																									
9																									
10																									
Remarks:																									
Sample Types S - Split-Spoon U - Undisturbed Tube C - Rock Core A - Auger Cuttings				Consistency vs. Blowcount / Foot <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th colspan="2">Granular (Sand & Gravel)</th> <th colspan="2">Fine Grained (Silt & Clay)</th> </tr> <tr> <td>V. Loose: 0-4</td> <td>Dense: 30-50</td> <td>V. Soft: <2</td> <td>Stiff: 8-16</td> </tr> <tr> <td>Loose: 4-10</td> <td>V. Dense: >50</td> <td>Soft: 2-4</td> <td>V. Stiff: 15-30</td> </tr> <tr> <td>M. Dense: 10-30</td> <td></td> <td>M. Stiff: 4-8</td> <td>Hard: > 30</td> </tr> </table>				Granular (Sand & Gravel)		Fine Grained (Silt & Clay)		V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-16	Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30	M. Dense: 10-30		M. Stiff: 4-8	Hard: > 30	and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation	
Granular (Sand & Gravel)		Fine Grained (Silt & Clay)																							
V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-16																						
Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30																						
M. Dense: 10-30		M. Stiff: 4-8	Hard: > 30																						

Soil Boring Log

CLIENT: USACE	INSPECTOR: CW	BORING/WELL ID: PAP-83-1B-01
PROJECT NAME: FTMM - ECP	DRILLER: JUE BARNHART	LOCATION DESCRIPTION
PROJECT LOCATION: FTMM Parcel	WEATHER: 55° A RAIN	Paved 83
PROJECT NUMBER: 748810-	CONTRACTOR: East Coast Drilling, Inc. (ECDI)	
GROUNDWATER OBSERVATIONS	RIG TYPE: Geoprobe(R)7822DT	LOCATION PLAN
WATER LEVEL: ~3.25	DATE/TIME START: 4/4/16 1415	Oceanport, New Jersey
DATE: 4/4/16	DATE/TIME FINISH: 4/4/16 1430	
TIME: 1445	WEIGHT OF HAMMER: N/A	
MEAS. FROM:	DROP OF HAMMER: N/A	
	TYPE OF HAMMER: N/A	

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			60/58	6	0-12" Asphalt, crushed Asphalt, some Rock fragments		
1440	1-1.5				12"-24" moist, grey, m. dense, MF grey sand, little silt,		
1445	2-2.5				24"-58" moist, Brown/orange-brown/grey, MF SAND, little silt		
1450	2.75-3.25				saturated w 39"		
4							
5							
6							
7							
8							
9							
10							

Remarks:

Sample Types	Consistency vs. Blowcount / Foot			
	Granular (Sand & Gravel)		Fine Grained (Silt & Clay)	
S -- Spill-Spoon	V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15
U -- Undisturbed Tube	Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30
C -- Rock Core	M. Dense: 10-30		M. Stiff: 4-8	Hard: >30
A -- Auger Cuttings				

moisture, density, color, gradation

Soil Boring Log

CLIENT: USACE					INSPECTOR: L.W.		BORING/WELL ID: PAR-83-5B-10	
PROJECT NAME: FTMM - ECP					DRILLER: JOE BARNAK		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: 35° + Windy		Parcel 83	
PROJECT NUMBER: 748810-					CONTRACTOR: East Coast Drilling, Inc. (ECDI)			
GROUNDWATER OBSERVATIONS					RIG TYPE: Geoprobe(R) 7822DT		LOCATION PLAN	
WATER LEVEL: -3					DATE/TIME START: 4/5/16 0850		Oceanport, New Jersey	
DATE: 4/5/16					DATE/TIME FINISH: 4/5/16 0905			
TIME: 0915					WEIGHT OF HAMMER: N/A			
MEAS. FROM: BGS					DROP OF HAMMER: N/A			
					TYPE OF HAMMER: N/A			
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0910 0	0-0.5		60/4	0	0-1" grass/roots, trace of gravel			
0915 1	1.25-1.75				1-12" loose, brown, mf, sand, little + gravel, little silt, trace grass			
0970 2	2.5-3				12"-36" moist, m-dense, mf, brown/grey-brown/grey sand, little silt, trace of gravel			
3					36"-54" saturated, sand			
4								
5					end of boring @ 5'			
6								
7								
8								
9								
10								
Remarks:								
Sample Types				Consistency vs. Blowcount / Foot				
S - Split-Spoon				Granular (Sand & Gravel)				
U - Undisturbed Tube				Fine Grained (Silt & Clay)				
C - Rock Core				V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15				
A - Auger Cuttings				Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30				
				M. Dense: 10-30 M. Stiff: 4-8 Hard: >30				
				and - 35-60% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation				

Soil Boring Log

CLIENT: USACE					INSPECTOR: CW		BORING/WELL ID: PAR-83-28-11	
PROJECT NAME: FTMM - ECP					DRILLER: Joe BARNAK		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: 35°F Windy		Pwell 83	
PROJECT NUMBER: 748810-					CONTRACTOR: East Coast Drilling, Inc. (ECDI)			
GROUNDWATER OBSERVATIONS					RIG TYPE: Geoprobe(R) 7822DT		LOCATION PLAN	
WATER LEVEL: ~3.3'					DATE/TIME START: 4/5/16		Oceanport, New Jersey	
DATE: 4/5/16					DATE/TIME FINISH: 4/5/16			
TIME: 0935					WEIGHT OF HAMMER: N/A			
MEAS. FROM:					DROP OF HAMMER: N/A			
					TYPE OF HAMMER: N/A			
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0935 0	0-0.5		60%		0-0.5" grass/roots 0.5-11" down			
0940 1	1.5-2				11"-17" brown/grey MC SAND, some crushed rock frags, fine silt			
0945 2	2.8-3.3				17-40" moist, M. dense, mt, brown/orange-brown/grey sand, little silt trace & gravel			
3					40"-57" saturated, SWR			
4					end of Boring @ 5'			
5								
6								
7								
8								
9								
10								
Remarks:								
Sample Types				Consistency vs. Blowcount / Foot				
S - Split-Spoon				Granular (Sand & Gravel)				
U - Undisturbed Tube				Fine Grained (Silt & Clay)				
C - Rock Core				V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15				
A - Auger Cuttings				Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30				
				M. Dense: 10-30 M. Stiff: 4-8 Hard: >30				
				and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation				

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>Ch</u>		BORING/WELL ID: <u>PAR-83-5B-12</u>	
PROJECT NAME: <u>FTMM - ECP</u>					DRILLER: <u>JOE BARWAK</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: <u>FTMM Parcel</u>					WEATHER: <u>35°F Windy</u>		<u>Level 83</u>	
PROJECT NUMBER: <u>748810-</u>					CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>			
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) 7822DT</u>		LOCATION PLAN	
WATER LEVEL: <u>~3'</u>					DATE/TIME START: <u>1025 4/5/16</u>		Oceanport, New Jersey	
DATE: <u>4/5/16</u>					DATE/TIME FINISH: <u>1650 4/5/16</u>			
TIME: <u>1055</u>					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM: <u>865</u>					DROP OF HAMMER: <u>N/A</u>			
					TYPE OF HAMMER: <u>N/A</u>			
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0			60/46	0	0-12" concrete			
1	1-1.5			0	12"-27" moist, grey-green, MF, M. Dense SAND, little silt, little F gravel			
2	1.85-2.3			0	27"-46" moist, grey-green, MF, M. Dense SAND, some silt, little clay			
3	2.5-3			138	* saturated @ 37"			
4				56.5	46"-60" NR			
5				19.0				
6				NR				
7				NR				
8				60/60	0-44" SAA			
9				24.0	44"-60" wet, grey-green/orange-brown mottled, MF, M. Dense, SAND, trace silt, trace clay			
10				44.2				
				5.7				
				2.1				
				0				
				0				
				0				
				0				
				0				
				0				
				0				
Remarks:								
Sample Types				Consistency vs. Blowcount / Foot				
S - Split-Spoon				Granular (Sand & Gravel)				
U - Undisturbed Tube				Fine Grained (Silt & Clay)				
C - Rock Core				V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15				
A - Auger Cuttings				Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30				
				M. Dense: 10-30 M. Stiff: 4-8 Hard: >30				
				and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation				

1108

1105

1110

Soil Boring Log

CLIENT: USACE PROJECT NAME: FTMM - ECP PROJECT LOCATION: FTMM Parcel PROJECT NUMBER: 748810-					INSPECTOR: CW DRILLER: TUE BARNAK WEATHER: 38°F Windy CONTRACTOR: East Coast Drilling, Inc. (ECDI)		BORING/WELL ID: 216-83-SB-13 LOCATION DESCRIPTION: Parcel 83																
GROUNDWATER OBSERVATIONS WATER LEVEL: ~3' DATE: 4/5/16 TIME: 1255 MEAS. FROM: BGS					RIG TYPE: Geoprobe(R) 7822DT DATE/TIME START: 4/5/16 1230 DATE/TIME FINISH: 4/5/16 1250 WEIGHT OF HAMMER: N/A DROP OF HAMMER: N/A TYPE OF HAMMER: N/A		LOCATION PLAN Oceanport, New Jersey																
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS																
0			60/40	6	0-3" Asphalt																		
1245	0.5-1				3-5" Crushed Asphalt/rock																		
1					5-18" moist grey/green, m. sand,																		
1255	1.5-2				mf SAND, little f																		
2					gravel, little f rock																		
1300	2.5-3				frags, trace silt, trace																		
3					m. rock frags																		
4					18-40" moist, grey-green, mf, m.																		
					dense SAND, little silt,																		
					trace clay																		
					Saturated @ 35'																		
5			60/60	0	0-23" SAA																		
6					23-40" wet, green-grey/Brown																		
					mottled mf SAND,																		
7					trace silt, trace clay																		
8																							
9																							
10					end of Boring @ 16'																		
Remarks:																							
Sample Types S - Split-Spoon U - Undisturbed Tube C - Rock Core A - Auger Cuttings				Consistency vs. Blowcount / Foot <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th colspan="2">Granular (Sand & Gravel)</th> <th colspan="2">Fine Grained (Silt & Clay)</th> </tr> <tr> <td>V. Loose: 0-4</td> <td>Dense: 30-50</td> <td>V. Soft: <2</td> <td>Stiff: 8-15</td> </tr> <tr> <td>Loose: 4-10</td> <td>V. Dense: >50</td> <td>Soft: 2-4</td> <td>V. Stiff: 15-30</td> </tr> <tr> <td>M. Dense: 10-30</td> <td></td> <td>M. Stiff: 4-8</td> <td>Hard: >30</td> </tr> </table>				Granular (Sand & Gravel)		Fine Grained (Silt & Clay)		V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15	Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30	M. Dense: 10-30		M. Stiff: 4-8	Hard: >30
Granular (Sand & Gravel)		Fine Grained (Silt & Clay)																					
V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15																				
Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30																				
M. Dense: 10-30		M. Stiff: 4-8	Hard: >30																				
				and - 35-50% coarse - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation																			

Soil Boring Log

CLIENT: USACE PROJECT NAME: FTMM - ECP PROJECT LOCATION: FTMM Parcel PROJECT NUMBER: 748810-					INSPECTOR: <u>NW</u> DRILLER: <u>JAE BARNAK</u> WEATHER: CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u> RIG TYPE: <u>Geoprobe(R) 7822DT</u> DATE/TIME START: <u>4/5/16 1300</u> DATE/TIME FINISH: <u>4/5/16 1315</u> WEIGHT OF HAMMER: <u>N/A</u> DROP OF HAMMER: <u>N/A</u> TYPE OF HAMMER: <u>N/A</u>		BORING/WELL ID: <u>PAP-83-SB-14</u> LOCATION DESCRIPTION: <u>Parcel 83</u> LOCATION PLAN: <u>Oceanport, New Jersey</u>	
GROUNDWATER OBSERVATIONS WATER LEVEL: <u>~3.1'</u> DATE: <u>4/5/16</u> TIME: <u>1320</u> MEAS. FROM: <u>BGS</u>								
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0			60/2	0	0-3" asphalt			
1330	0.5-1			0	3-6" Asphalt millings, some rock frags			
1				20.6	6"-15" moist, M. dense, Brown,			
1335	1.5-2			0	MF SAND, little f gravel,			
2				0	trace silt			
1340	2.5-3			1.7	15"-17" moist, MF SAND and			
3				0	dark wood chunks/debris,			
				0	odor			
4				0	17"-38" moist, M. dense, grey-green			
				0	MF SAND, some silt, little			
				0	clay			
5			60/60		38"-52" SAA, saturated			
					0-10" SAA			
6					10"-60" saturated, loose, light Brown/			
					light grey, MC SAND, little			
7					silt, trace f gravel			
8								
9								
10								
Remarks:								
Sample Types					Consistency vs. Blowcount / Foot			
S - Split-Spoon					Granular (Sand & Gravel)			
U - Undisturbed Tube					Fine Grained (Silt & Clay)			
C - Rock Core					V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15			
A - Auger Cuttings					Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30			
					M. Dense: 10-30 M. Stiff: 4-8 Hard: >30			
					and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation			

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>Ch</u>		BORING/WELL ID: <u>PAF-83-5B-45</u>	
PROJECT NAME: FTMM - ECP					DRILLER: <u>JOB BARNAK</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER:		<u>Parcel 85</u>	
PROJECT NUMBER: 748810-					CONTRACTOR: East Coast Drilling, Inc. (ECDI)		LOCATION PLAN	
GROUNDWATER OBSERVATIONS					RIG TYPE: Geoprobe(R) 7822DT		Oceanport, New Jersey	
WATER LEVEL: <u>~ 3.3'</u>					DATE/TIME START: <u>4/5/16 1335</u>			
DATE: <u>4/5/16</u>					DATE/TIME FINISH: <u>4/5/16 1350</u>			
TIME: <u>1405</u>					WEIGHT OF HAMMER: N/A			
MEAS. FROM: <u>RGS</u>					DROP OF HAMMER: N/A			
TYPE OF HAMMER: N/A								
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0			60/60	0	0-6" Asphalt and Asphalt millings			
1400	0.5-1				6"-14" moist, Brown-orange, m. dense, MC SAND, little silt, trace rock frags			
1								
2					14-50" moist, green-grey, mf m. dense, SAND, some silt, trace clay			
3	3-3.5				saturated @ 39"			
4								
5			60/60	0	0-19" SAA, wet			
1410	5.5-6				19"-60" wet, light brown/green-grey, mf, m. dense, SAND, some silt, little clay			
6								
7								
8								
9								
10								
Remarks:								
Sample Types				Consistency vs. Blowcount / Foot				
S - Split-Spoon				Granular (Sand & Gravel)				
U - Undisturbed Tube				Fine Grained (Silt & Clay)				
C - Rock Core				V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15				
A - Auger Cuttings				Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30				
				M. Dense: 10-30 M. Stiff: 4-8 Hard: >30				
				and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation				

Soil Boring Log

CLIENT: USACE PROJECT NAME: FTMM - ECP PROJECT LOCATION: FTMM Parcel PROJECT NUMBER: 748810-					INSPECTOR: CW DRILLER: JOE BARNAK WEATHER: 38°F clear CONTRACTOR: East Coast Drilling, Inc. (ECDI)		BORING/WELL ID: PAP-83-53-16 LOCATION DESCRIPTION: Parcel 83 LOCATION PLAN: Oceanport, New Jersey																		
GROUNDWATER OBSERVATIONS WATER LEVEL: ~3.4' DATE: 4/5/16 TIME: 1445 MEAS. FROM:					RIG TYPE: Geoprobe(R)7822DT DATE/TIME START: 4/5/16 1415 DATE/TIME FINISH: 4/5/16 1430 WEIGHT OF HAMMER: N/A DROP OF HAMMER: N/A TYPE OF HAMMER: N/A																				
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS																		
1445 0.0	0-0.5		60/51	0	0-1" glass/roots																				
0.1					1"-5" moist, m. dense, mf, Brown SAND, little silt, little gravel																				
0.2					5"-19" moist, m. dense, mf, Brown SAND, little silt, trace gravel																				
1450 0.3	3-3.5				19"-51" moist, m. dense, mf, Brown/grey/orange Brown mottled SAND, some silt trace clay - saturated @ 40"																				
0.4																									
0.5			60/60	0	0-60 wet, SAA																				
1455 0.6	5.5-6																								
0.7																									
0.8																									
0.9																									
1.0																									
Remarks:																									
Sample Types S - Split-Spoon U - Undisturbed Tube C - Rock Core A - Auger Cuttings				Consistency vs. Blowcount / Foot <table border="1"> <tr> <th colspan="2">Granular (Sand & Gravel)</th> <th colspan="2">Fine Grained (Silt & Clay)</th> </tr> <tr> <td>V. Loose: 0-4</td> <td>Dense: 30-50</td> <td>V. Soft: <2</td> <td>Stiff: 8-15</td> </tr> <tr> <td>Loose: 4-10</td> <td>V. Dense: >50</td> <td>Soft: 2-4</td> <td>V. Stiff: 15-30</td> </tr> <tr> <td>M. Dense: 10-30</td> <td></td> <td>M. Stiff: 4-8</td> <td>Hard: >30</td> </tr> </table>				Granular (Sand & Gravel)		Fine Grained (Silt & Clay)		V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15	Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30	M. Dense: 10-30		M. Stiff: 4-8	Hard: >30	and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation	
Granular (Sand & Gravel)		Fine Grained (Silt & Clay)																							
V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15																						
Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30																						
M. Dense: 10-30		M. Stiff: 4-8	Hard: >30																						

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>Tom HORN</u>		BORING/WELL ID: <u>PAR-83-SB-17</u>	
PROJECT NAME: FTMM - ECP					DRILLER: <u>ECDI WELLS REVE</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: <u>OVERCAST, 53°F</u>		ASPHALT	
PROJECT NUMBER: 748810-					CONTRACTOR: East Coast Drilling, Inc. (ECDI)		LOCATION PLAN	
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) Z822DT</u> <u>6610 DT</u>		Oceanport, New Jersey	
WATER LEVEL: <u>-</u>					DATE/TIME START: <u>11-14-17</u> / <u>1135</u>			
DATE: <u>-</u>					DATE/TIME FINISH: <u>11-14-17</u> / <u>1145</u>			
TIME: <u>-</u>					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM:					DROP OF HAMMER: <u>N/A</u>			
					TYPE OF HAMMER: <u>N/A</u>			
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADVI REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0	PAR-83-SB-17	36	60		DEA BUCK VF-C SAND AND F-M ANGULAR GRAVEL ORANGE-TAN VF-M SAND MOIST			
1					LT GRAY-BROWN VF SAND MOIST MOD DENSE			
2					LT GREENISH-GRAY MOD LOOSE VF-F SAND WET.			
3								
4					NO RECOVERY			
5			<u>48</u>	<u>60</u>	LT. GREENISH GRAY MOD SOFT SANDY SILT, WET			
6	<u>PAR-83-SB-17</u> <u>6-6.5'</u>				WET LT. GRAY GREEN MOD DENSE SILTY SAND		<u>1155</u>	
7								
8								
9					NO RECOVERY			
10					END OF BORING			
Remarks:								
Sample Types				Consistency vs. Blowcount / Foot				
S - Split-Spoon				Granular (Sand & Gravel) Fine Grained (Silt & Clay)				
U - Undisturbed Tube				V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15				
C - Rock Core				Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30				
A - Auger Cuttings				M. Dense: 10-30 M. Stiff: 4-8 Hard: >30				
				and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation				

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>TOM HORN</u>		BORING/WELL ID: <u>PAR-B3-SB-18</u>	
PROJECT NAME: <u>FTMM - ECP</u>					DRILLER: <u>EDI WELLS REENT</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: <u>FTMM Parcel</u>					WEATHER: <u>OVERCAST, 53°F</u>		<u>GRASSY AREA</u>	
PROJECT NUMBER: <u>748810-</u>					CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>		LOCATION PLAN	
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) 7022DT</u>		<u>6610 DT</u>	
WATER LEVEL: <u>-</u>					DATE/TIME START: <u>11-14-17</u>		Oceanport, New Jersey	
DATE: <u>-</u>					DATE/TIME FINISH: <u>11-14-17</u>			
TIME: <u>-</u>					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM: <u>-</u>					DROP OF HAMMER: <u>N/A</u>			
TYPE OF HAMMER: <u>N/A</u>								

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0	<u>PAR-B3-SB-18-0-0.5</u>	<u>48/60</u>		<u>0.0</u>	<u>DRY DK BROWN MOD DENSE SILTY SAND AND M-C GRAVEL, GRASS ROOTS</u>		<u>1040</u>
				<u>0.0</u>	<u>TANGY - DK-BROWN MOD DENSE SILTY SAND MOIST</u>		
1				<u>0.0</u>	<u>MOIST, V STIFF LT ORANGE-TAN - BROWN SANDY SILT,</u>		
2							
3	<u>PAR-B3-SB-18-3-3.5</u>				<u>MOIST, V DENSE LT GRAYISH-GREEN SILTY SAND</u>		<u>1045</u>
4					<u>NO RECOVERY</u>		
5		<u>38/60</u>		<u>0.0</u>	<u>WET ORANGE TAN MOD DENSES AND V.F GRAVEL</u>		<u>1050</u>
6	<u>PAR-B3-SB-18-6-6.5</u>				<u>WET TAN-LT ORANGE-TAN MOD DENSE V.F - C SAND</u>		
7					<u>NO RECOVERY</u>		
8					<u>NO RECOVERY</u>		
9					<u>NO RECOVERY</u>		
10					<u>END OF BORING</u>		

Remarks:

Sample Types	Consistency vs. Blowcount / Foot			
S -- Split-Spoon	Granular (Sand & Gravel)		Fine Grained (Silt & Clay)	
U -- Undisturbed Tube	V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15
C -- Rock Core	Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30
A -- Auger Cuttings	M. Dense: 10-30		M. Stiff: 4-8	Hard: >30

and - 35-50%
some - 20-35%
little - 10-20%
trace - <10%
moisture, density, color, gradation

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>TOM MORAN</u>		BORING/WELL ID: <u>PAR-83-SB-18</u>	
PROJECT NAME: FTMM - ECP					DRILLER: <u>ECDI WELLS REEVE</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: <u>P. CLOUDY, 50°F</u>		<u>GRASSY AREA</u>	
PROJECT NUMBER: 748810-					CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>		LOCATION PLAN	
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) Z822BT 6610BT</u>		Oceanport, New Jersey	
WATER LEVEL: <u>—</u>					DATE/TIME START: <u>11-14-17 / 0900</u>			
DATE: <u>—</u>					DATE/TIME FINISH: <u>11-14-17 / 0905</u>			
TIME: <u>—</u>					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM: <u>—</u>					DROP OF HAMMER: <u>N/A</u>			
					TYPE OF HAMMER: <u>N/A</u>			
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
* 0	<u>PAR-83-SB-18-0-0.5</u>		<u>48/60</u>	<u>0.0</u>	<u>DRY BLEN F-M SAND, LITTLE SILT, GRASSROOTS</u>		<u>0905</u>	
				<u>0.0</u>	<u>MOIST - DARK - REDDISH-BROWN MOD. DENSE SILTY SAND</u>			
1				<u>0.0</u>	<u>TR. MICA.</u>			
				<u>0.0</u>				
2				<u>0.0</u>				
				<u>0.0</u>				
* 3	<u>PAR-83-SB-18-3-3.5</u>			<u>0.0</u>			<u>0910</u>	
				<u>0.0</u>				
4					<u>NO RECOVERY</u>			
5				<u>0.0</u>	<u>MOIST, LIGHT-REDDISH BROWN SANDY SILT MOD SOFT, TR. CLAY</u>			
				<u>0.0</u>	<u>WE + MOD. DENSE - DK REDDISH-BROWN SAND, TR SILT</u>		<u>0915</u>	
* 6	<u>PAR-83-SB-18-6-6.5</u>	<u>48/60</u>		<u>0.0</u>	<u>WE + MOD. DENSE - DK REDDISH-BROWN SAND, TR SILT</u>			
				<u>0.0</u>	<u>SOFT, LIGHT-ORANGE-TAN SANDY SILT, TR CLAY.</u>			
7				<u>0.0</u>				
				<u>0.0</u>				
8				<u>0.0</u>				
				<u>0.0</u>				
9								
10					<u>END OF BORING</u>			
Remarks:								
Sample Types				Consistency vs. Blowcount / Foot				
S -- Split-Spoon				Granular (Sand & Gravel)				
U -- Undisturbed Tube				Fine Grained (Silt & Clay)				
C -- Rock Core				V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15				
A -- Auger Cuttings				Loose: 4-10 V. Dense: >60 Soft: 2-4 V. Stiff: 15-30				
				M. Dense: 10-30 M. Stiff: 4-8 Hard: >30				
				and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation				

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>TOM WORN</u>		BORING/WELL ID: <u>PAR-83-SB-2B</u>	
PROJECT NAME: FTMM - ECP					DRILLER: <u>ECDI WELLS SERVICE</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: <u>P. CLOUD, 50°F</u>		<u>GRASSY AREA</u>	
PROJECT NUMBER: 748810-					CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>		LOCATION PLAN	
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) 7822DT 66/10 DT</u>		Oceanport, New Jersey	
WATER LEVEL: _____					DATE/TIME START: <u>11-14-17 / 0910</u>		DATE/TIME FINISH: <u>11-14-17 / 0915</u>	
DATE: _____					WEIGHT OF HAMMER: <u>N/A</u>		DROP OF HAMMER: <u>N/A</u>	
TIME: _____					TYPE OF HAMMER: <u>N/A</u>			
MEAS. FROM: _____								
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0	<u>PAR-83-SB-20-0-0.5</u>	<u>48/60</u>		0.0	<u>MOD DENSE LT REDDISH BROWN SILTY SAND</u>		<u>0930</u>	
				0.0	<u>SOME F-M REDDISH GRAY, GRASS ROOTS</u>			
1				0.0	<u>DRY, MOD DENSE REDDISH-BROWN SILTY SAND</u>			
				0.0	<u>AND F-C REDDISH GRAVEL.</u>			
2				0.0	<u>MOIST V. DENSE DK BROWN - DK GRAY</u>			
				0.0	<u>SAND, TR. MICA.</u>			
3	<u>PAR-83-SB-20-3-3.5</u>			0.0	<u>MOD DENSE LT REDDISH BROWN SILTY SAND</u>		<u>0935</u>	
				0.2	<u>MOD DENSE LT REDDISH BROWN SILTY SAND</u>			
4				2800	<u>NO RECOVERY</u>			
				2800	<u>NO RECOVERY</u>			
5		<u>36/60</u>		0.0	<u>MODIST, MOD SOFT REDDISH-ORANGE-GRAY</u>			
				0.0	<u>SANDY SILT.</u>			
6	<u>PAR-83-SB-20-6-6.5</u>			0.0	<u>WET ORANGE-TAN-BROWN, VF SAND</u>		<u>0940</u>	
				0.0	<u>LITTLE SILT, TR CLAY</u>			
7				0.0				
				0.0				
8								
9					<u>NO RECOVERY</u>			
10					<u>END OF BORING</u>			

Remarks:

Sample Types	Consistency vs. Blowcount / Foot		
S -- Split-Spoon	Granular (Sand & Gravel)	Fine Grained (Silt & Clay)	and - 35-50%
U -- Undisturbed Tube	V. Loose: 0-4 Dense: 30-50	V. Soft: <2 Stiff: 8-15	some - 20-35%
C -- Rock Core	Loose: 4-10 V. Dense: >50	Soft: 2-4 V. Stiff: 15-30	little - 10-20%
A -- Auger Cuttings	M. Dense: 10-30	M. Stiff: 4-8 Hard: >30	trace - <10%
			moisture, density, color, gradation

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>TOM HORN</u>		BORING/WELL ID: <u>PAR-83-SB-24</u>	
PROJECT NAME: FTMM - ECP					DRILLER: <u>ECDI Wells Reconn</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: <u>PARTLY CLOUDY, SDF</u>		<u>GRASSY AREA</u>	
PROJECT NUMBER: 748810-					CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>		LOCATION PLAN	
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) 7822DT 6610 DT</u>		Oceanport, New Jersey	
WATER LEVEL: <u>—</u>					DATE/TIME START: <u>11-14-17/0930</u>			
DATE: <u>—</u>					DATE/TIME FINISH: <u>11-14-17/0940</u>			
TIME: <u>—</u>					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM: <u>—</u>					DROP OF HAMMER: <u>N/A</u>			
TYPE OF HAMMER: <u>N/A</u>								
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0	<u>PAR-83-SB-24-0-0.5</u>	<u>48/66</u>		0.0	<u>DRY GRAY BROWN SAND, SOME SILT, SOME F-C GRAVEL, LITTLE SILT, LITTLE GRASS ROOTS</u>		<u>0955</u>	
				0.0	<u>DRY, BRN STIFF SILTY SAND, AND F-M BANNED GRAVEL, SOME CLAY</u>			
1				0.0	<u>DENSE DRY GRAY-BLACK SILTY SAND, SOME F-M GRAVEL (BANNED), MICACIOUS, DRY</u>			
				0.0	<u>DRY V. STIFF ORANGE-TAN BROWN VF SAND, SOME CLAY,</u>			
				0.0				
3	<u>PAR-83-SB-24-3-3.5</u>			0.0			<u>1000</u>	
				0.0				
4								
					<u>NO RECOVERY</u>			
5		<u>36/66</u>		0.0	<u>MOIST, LT TAN ORANGE-BROWN MOD DENSE SILTY SAND.</u>			
				0.0				
6	<u>PAR-83-SB-24-6-6.5</u>			0.0			<u>1005</u>	
				0.0	<u>WET LT GRAY-ORANGE BROWN MOD SOFT SANDY SILT,</u>			
7				0.0				
				0.0				
8								
					<u>NO RECOVERY</u>			
9								
10					<u>END OF BORING</u>			
Remarks:								
Sample Types				Consistency vs. Blowcount / Foot				
S -- Split-Spoon				Granular (Sand & Gravel)				
U -- Undisturbed Tube				Fine Grained (Silt & Clay)				
C -- Rock Core				V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15				
A -- Auger Cuttings				Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30				
				M. Dense: 10-30 M. Stiff: 4-8 Hard: >30				
				and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation				

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>TOM HORN</u>		BORING/WELL ID: <u>PAR-83-SB-22</u>	
PROJECT NAME: FTMM - ECP					DRILLER: <u>ECDI WELLS REVE</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: <u>OVERCAST, 52°F</u>		GRASSY AREA	
PROJECT NUMBER: 748810					CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>		LOCATION PLAN	
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) 7020T 6610 DT</u>		Oceanport, New Jersey	
WATER LEVEL: <u>—</u>					DATE/TIME START: <u>11-14-17 / 0950</u>			
DATE: <u>—</u>					DATE/TIME FINISH: <u>11-14-17 / 1000</u>			
TIME: <u>—</u>					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM: <u>—</u>					DROP OF HAMMER: <u>N/A</u>			
TYPE OF HAMMER: <u>N/A</u>								
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
* 0	PAR-83-SB-22-0-0.5	48/66	0.0	0.0	DRY ORANGE-BROWN SILTY SAND, LOOSE, TR m SUBANGULAR GRAVEL, GRASS, ROOTS		1030	
			0.0	0.0	DRY, LT ORANGE-TAN-BROWN, med DENSE SAND, LITTLE SILT			
1			0.0	0.0				
			0.0	0.0				
2			0.0	0.0				
			0.0	0.0				
* 3	PAR-83-SB-22-3-3.5		0.0	0.0	DRY, V. STIFF LIGHT ORANGE-GRAY-TAN SANDY SILT, some CLAY,		1035	
			0.0	0.0				
4					NO RECOVERY			
5		51/60	0.0	0.0	WET LIGHT-GRAY TAN-ORANGE-TAN LOOSE SILTY SAND			
			0.0	0.0				
* 6	PAR-83-SB-22-6-6.5		0.0	0.0			1040	
			0.0	0.0				
7			0.0	0.0				
			0.0	0.0				
8			0.0	0.0				
			0.0	0.0	WET LIGHT-GRAY-ORANGE TAN STIFF SANDY SILT, some CLAY			
9			0.0	0.0				
					NO RECOVERY			
10					END OF BORING			
Remarks:								
Sample Types				Consistency vs. Blowcount / Foot				
S - Split-Spoon				Granular (Sand & Gravel)				
U - Undisturbed Tube				Fine Grained (Silt & Clay)				
C - Rock Core				V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15				
A - Auger Cuttings				Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30				
				M. Dense: 10-30 M. Stiff: 4-8 Hard: >30				
				and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation				

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>TOM HORN</u>		BORING/WELL ID: <u>PAR 83-SB-23</u>	
PROJECT NAME: <u>FTMM - ECP</u>					DRILLER: <u>ECDI WELLS REPAIR</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: <u>FTMM Parcel</u>					WEATHER: <u>OVERCAST, 55°F</u>		<u>GRASSY AREA</u>	
PROJECT NUMBER: <u>748810-</u>					CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>		LOCATION PLAN	
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R)-7822DF, 6610 DT</u>		Oceanport, New Jersey	
WATER LEVEL: _____					DATE/TIME START: <u>11-14-17 / 1005</u>			
DATE: _____					DATE/TIME FINISH: <u>11-14-17 / 1015</u>			
TIME: _____					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM: _____					DROP OF HAMMER: <u>N/A</u>			
TYPE OF HAMMER: <u>N/A</u>								
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
* 0	<u>PAR-83-SB-23-0-0.5</u>		<u>54/60</u>	<u>844/10</u>	<u>DRY DARK BROWN MOD LOOSE SILTY SAND LITTLE F. GRAVEL, GLASS ROADS</u>		<u>1105</u>	
				<u>1.2</u>	<u>DRY DK BROWN-BLUE SANDY SILT, SOME F. GRAVEL, DCU</u>			
1				<u>1.5</u>	<u>MOIST, REDDISH-LT BROWN VF SAND</u>			
				<u>12.0</u>	<u>LITTLE SILT. SLIGHT PETROLEUM</u>			
2				<u>23.0</u>	<u>ODOR</u>			
				<u>76.0</u>				
* 3	<u>PAR-83-SB-23-3-3.5</u>			<u>2010</u>	<u>MOIST MOD STIFF GREEN-GRAY-GREEN SANDY SILT. STRONG PETROLEUM LIKE ODOR.</u>		<u>1110</u>	
				<u>72.0</u>				
4				<u>304.0</u>				
				<u>760.0</u>	<u>NO RECOVERY</u>			
* 5	<u>PAR-83-SB-23-5-5.5</u>		<u>48/60</u>	<u>866.0</u>	<u>WET MOD STIFF GREEN-GRAY-GREEN SANDY SILT. STRONG PETROLEUM LIKE ODOR</u>		<u>1120</u>	
				<u>331.0</u>				
* 6	<u>PAR-83-SB-23-6-6.5</u>			<u>121.0</u>			<u>1125</u>	
				<u>201</u>				
7				<u>342.0</u>	<u>WET MOTTLED GRAY-GREEN AND REDDISH-BROWN MOD DENSE SILTY SAND. STRONG PETROLEUM LIKE ODOR.</u>			
				<u>251.0</u>				
8				<u>107.0</u>				
				<u>96.3</u>				
9				<u>82.4</u>				
				<u>86.0</u>	<u>NO RECOVERY</u>			
10					<u>END OF BORING</u>			
Remarks: <u>SAMPLE AT 5-5.5' FOR BPH/NAPHTHALENE AND 2-METHYLNAPHTHALENE</u>								
<u>COLLECTED IN ADDITION TO PHS SAMPLES DUE TO HIGH READINGS</u>								
Sample Types				Consistency vs. Blowcount / Foot				
S -- Split-Spoon				Granular (Sand & Gravel)				
U -- Undisturbed Tube				V. Loose: 0-4 Dense: 30-50				
C -- Rock Core				V. Soft: <2 Stiff: 8-15				
A -- Auger Cuttings				Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30				
				M. Dense: 10-30 M. Stiff: 4-8 Hard: >30				
				and - 35-50% some - 20-35% little - 10-20% trace - <10%				
				moisture, density, color, gradation				

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>Tom Horn</u>		BORING/WELL ID: <u>PAR-83-SB-24</u>	
PROJECT NAME: FTMM - ECP					DRILLER: <u>ECDI WILLIS REENE</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: <u>P. CLOUDY 48°F</u>		<u>ASPHALT</u>	
PROJECT NUMBER: 748810-					CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>		LOCATION PLAN	
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) 7822DT- C610 DT</u>		Oceanport, New Jersey	
WATER LEVEL:					DATE/TIME START: <u>11-15-17/0815</u>			
DATE:					DATE/TIME FINISH: <u>11-15-17/0835</u>			
TIME:					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM:					DROP OF HAMMER: <u>N/A</u>			
TYPE OF HAMMER: <u>N/A</u>								
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0			42/60	0.0	DRY ASPHALT RUBBLE - DK GRN			
				0.0	ANGULAR F-C GRAVEL			
1				0.0	DRY SUB BASE MATERIAL, BLACK -			
				0.0	GRAN BLACK VF-C ANGULAR GRAVEL			
					AND SILT SAND			
2	PAR-83-SB-24- 2-2.5			0.0	MOIST DR-GRN - OLIVE MOD STIFF		0905	
				0.0	SANDY SILT, TR. CLAY			
3	PAR-83-SB-24- 3-3.5			0.0			0910	
4					NO REWORK			
5			40/60		WET MOD SOFT DR. OLIVE GRN SANDY SILT			
6	PAR-83-SB-24- 6-6.5						0915	
					WET MOD DENSE OLIVE-BROWN			
7					SILT SAND, LITTLE FTH ROUNDER			
					GRAVEL			
8								
9					NO REWORK			
10					end of boring			
Remarks:								
Sample Types					Consistency vs. Blowcount / Foot			
S -- Split-Spoon					Granular (Sand & Gravel)			
U -- Undisturbed Tube					Fine Grained (Silt & Clay)			
C -- Rock Core					V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15			
A -- Auger Cuttings					Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30			
					M. Dense: 10-30 M. Stiff: 4-6 Hard: >30			
					and - 35-50% some - 20-35% little - 10-20% trace - <10%			
					moisture, density, color, gradation			

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>TOM HORN</u>		BORING/WELL ID: <u>PAR-B3-SB-25</u>	
PROJECT NAME: FTMM - ECP					DRILLER: <u>ECDI WILSON REYN</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: <u>CLAR, 50°F</u>		GRASSY AREA	
PROJECT NUMBER: 748810-					CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>		LOCATION PLAN	
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) 7822DT-6610DT</u>		Oceanport, New Jersey	
WATER LEVEL: <u>---</u>					DATE/TIME START: <u>11-15-17 / 0855</u>			
DATE: <u>---</u>					DATE/TIME FINISH: <u>11-15-17 / 0905</u>			
TIME: <u>---</u>					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM: <u>---</u>					DROP OF HAMMER: <u>N/A</u>			
					TYPE OF HAMMER: <u>N/A</u>			
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0	<u>PAR-B3-SB-25-0-0.5</u>	<u>48/60</u>		0.0	<u>DRY DK BROWN SILTY SAND, SOME CANADIAN GRAVEL, TR GRASS, ROOTS</u>		0920	
				0.0	<u>DRY CONCRETE RUBBLE - E GRAVEL</u>			
1				0.0	<u>MOIST REDDISH-ORANGE BROWN V. DENSE SILTY SAND</u>			
				0.0				
2				0.0	<u>OLIVE-GREEN GREEN-GRAY</u>			
				27.0	<u>MOD DENSE SILTY SAND</u>			
					<u>STRONG PETROLEUM-LIKE ODOR.</u>			
3	<u>PAR-B3-SB-25-3-3.5</u>			104.0			0925	
				74.0				
4					<u>NO RECOVERY</u>			
5		<u>60/60</u>		62.0	<u>WET, OLIVE GREEN-GRAY</u>			
				48.0	<u>MOD SOFT SANDY SILT</u>			
	<u>PAR-B3-SB-25-6-6.5</u>			31.0	<u>PETROLEUM LIKE ODOR</u>		0930	
				28.0				
7				25.0				
				20.0				
8				18.0	<u>WET, REDDISH-OLIVE BROWN</u>			
				16.0	<u>MOD DENSE SILTY SAND.</u>			
9				12.0				
				10.0				
10					<u>end of boring</u>			
Remarks:								
Sample Types					Consistency vs. Blowcount / Foot			
S - Split-Spoon					Granular (Sand & Gravel)			
U - Undisturbed Tube					Fine Grained (Silt & Clay)			
C - Rock Core					V. Loose: 0-4 Dense: 30-50			
A - Auger Cuttings					V. Soft: <2 Stiff: 8-15			
					Loose: 4-10 V. Dense: >50			
					Soft: 2-4 V. Stiff: 15-30			
					M. Stiff: 4-8 Hard: >30			
					end - 35-50%			
					some - 20-35%			
					fine - 10-20%			
					trace - <10%			
					moisture, density, color, gradation			

Soil Boring Log

CLIENT: <u>USACE</u> PROJECT NAME: <u>FTMM - ECP</u> PROJECT LOCATION: <u>FTMM Parcel</u> PROJECT NUMBER: <u>748810-</u>					INSPECTOR: <u>TOM HORN</u> DRILLER: <u>ECDI Wells Revere</u> WEATHER: <u>Clear, 50°F</u> CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u> RIG TYPE: <u>Geoprobe(R) 7822DT 6610 DT</u>		BORING/WELL ID: <u>PAR-83-SB-26</u> LOCATION DESCRIPTION: <u>GRASSY AREA</u> LOCATION PLAN: <u>Oceanport, New Jersey</u>		
GROUNDWATER OBSERVATIONS WATER LEVEL: <u>-</u> DATE: <u>-</u> TIME: <u>-</u> MEAS. FROM: <u>-</u>					DATE/TIME START: <u>11-15-17 / 0910</u> DATE/TIME FINISH: <u>11-15-17 / 0920</u> WEIGHT OF HAMMER: <u>N/A</u> DROP OF HAMMER: <u>N/A</u> TYPE OF HAMMER: <u>N/A</u>				
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS		
0	PAR-83-SB-26-0-0.5	54/60		0.0	DRY DK-BROWN silty ^{moist dense} SILTY SAND, some F-M SUB-ROUNDED GRAVEL.		0940		
1				0.0	moist dense DK REDDISH-BROWN SAND, LITTLE SILT.				
2				0.0					
3	PAR-83-SB-26-3-3.5			0.0	moist, v. STIFF OLIVE-GRAY SILT, LITTLE CLAY.		0945		
4				0.0	NO RECOVERY				
5		42/60		0.0	WET, SOFT OLIVE-GREEN-GRAY SILT, LITTLE SAND				
6	PAR-83-SB-26-6-6.5			0.0			0950		
7				0.0	WET V DENSE OLIVE-GRAY-BROWN SILTY SAND				
8				0.0					
9					NO RECOVERY				
10					end of boring				
Remarks:									
Sample Types S -- Split-Spoon U -- Undisturbed Tube C -- Rock Core A -- Auger Cuttings				Consistency vs. Blowcount / Foot Granular (Sand & Gravel) V. Loose: 0-4 Dense: 30-50 Loose: 4-10 V. Dense: >50 M. Dense: 10-30				Fine Grained (Silt & Clay) V. Soft: <2 Stiff: 8-15 Soft: 2-4 V. Stiff: 15-30 M. Stiff: 4-8 Hard: >30	
				end - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation					

Soil Boring Log

CLIENT: <u>USACE</u>	INSPECTOR: <u>TOM NOBEN</u>	BORING/WELL ID: <u>PAR-B3-SB-27</u>
PROJECT NAME: <u>FTMM - ECP</u>	DRILLER: <u>ECDI WELLS REVERE</u>	LOCATION DESCRIPTION
PROJECT LOCATION: <u>FTMM Parcel</u>	WEATHER: <u>PARTLY CLOUDY</u>	<u>GRASSY AREA</u>
PROJECT NUMBER: <u>748810-</u>	CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>	LOCATION PLAN
GROUNDWATER OBSERVATIONS	RIG TYPE: <u>Geoprobe(R)-7822BF 6610 DT</u>	Oceanport, New Jersey
WATER LEVEL: <u>-</u>	DATE/TIME START: <u>11-15-17/0925</u>	
DATE: <u>-</u>	DATE/TIME FINISH: <u>11-15-17/0935</u>	
TIME: <u>-</u>	WEIGHT OF HAMMER: <u>N/A</u>	
MEAS. FROM:	DROP OF HAMMER: <u>N/A</u>	
	TYPE OF HAMMER: <u>N/A</u>	

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0	PAR-B3-SB- 27-0-0.5	48/ 60	48/60	0.0	DRY DK BROWN SILTY SAND, GR GRASS ROOTS		1000
1				0.0	MOIST REDDISH-BROWN MOD. DENSE SILTY SAND		
2				0.0	MOIST MOD STIFF REDDISH- GRAY BROWN SANDY SILT		
3	PAR-B3-SB- 27-3-3.5			0.0			1005
4				0.0			
5				0.0	NO RECOVERY		
6		36/ 60	36/60	0.0	WET MOD LOOSE REDDISH-GRAY-BROWN SILTY SAND, SOME F-M SUBROUND GRAVEL		1010
7				0.0	WET, V. DENSE OILY-GRAY-BROWN SILTY SAND,		
8				0.0			
9				0.0	NO RECOVERY		
10				0.0	end of boring		

Remarks:

Sample Types	Consistency vs. Blowcount / Foot			
	Granular (Sand & Gravel)		Fine Grained (Silt & Clay)	
S - Split-Spoon	V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15
U - Undisturbed Tube	Loose: 4-10	V. Dense: >50	Soft 2-4	V. Stiff: 15-30
C - Rock Core	M. Dense: 10-30		M. Stiff: 4-8	Hard: >30
A - Auger Cuttings				

and - 35-50%
 some - 20-35%
 fines - 10-20%
 trace - <10%
 moisture, density, color, gradation

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>TOM HORN</u>		BORING/WELL ID: <u>PAR-83-SB-28</u>	
PROJECT NAME: FTMM - ECP					DRILLER: <u>ECDI WILLIS REEVE</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: <u>CLOUDY, 50°F</u>		GRASSY AREA	
PROJECT NUMBER: 748810-					CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>		LOCATION PLAN	
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) 7022DT 6610 DT</u>		Oceanport, New Jersey	
WATER LEVEL: <u> </u>					DATE/TIME START: <u>11-15-17 / 1000</u>		DATE/TIME FINISH: <u>11-15-17 / 1010</u>	
DATE: <u> </u>					WEIGHT OF HAMMER: <u>N/A</u>		DROP OF HAMMER: <u>N/A</u>	
TIME: <u> </u>					TYPE OF HAMMER: <u>N/A</u>			
MEAS. FROM: <u> </u>								
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0	<u>PAR-83-SB-28-0-0.5</u>		<u>60/60</u>		<u>DRY DK GRAY - BROWN SILTY SAND AND VF GRAVEL, TR BRKS ROOTS MOIST, REDDISH C. SAND (CRUSHED BRICK)</u>		<u>1020</u>	
1								
2					<u>MOIST, DK REDDISH - BROWN VF SAND, LITTLE SILT.</u>			
3	<u>PAR-83-SB-28-3-3.5</u>				<u>MOIST V. DENSE OLIVE - ORANGE BROWN SILTY SAND AND M ROUNDED GRAVEL</u>		<u>1025</u>	
4								
5			<u>36/60</u>		<u>WET V. DENSE OLIVE - ORANGE BROWN SILTY SAND, SOME F GRAVEL</u>		<u>1030</u>	
6	<u>PAR-83-SB-28-6-6.5</u>				<u>WET V STIFF LT GRAY OLIVE SANDY SILT</u>			
7								
8								
9					<u>NO RE WORK</u>			
10					<u>end of boring</u>			
Remarks:								
Sample Types		Consistency vs. Blowcount / Foot						
S -- Split-Spoon		Granular (Sand & Gravel)				Fine Grained (Silt & Clay)		
U -- Undisturbed Tube		V. Loose: 0-4 Dense: 30-50				V. Soft: <2 Stiff: 8-15		
C -- Rock Core		Loose: 4-10 V. Dense: >50				Soft: 2-4 V. Stiff: 15-30		
A -- Auger Cuttings		M. Dense: 10-30				M. Stiff: 4-8 Hard: >30		
						and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation		

Soil Boring Log

CLIENT: USACE PROJECT NAME: FTMM - ECP PROJECT LOCATION: FTMM Parcel PROJECT NUMBER: 748810-					INSPECTOR: <u>TOM HORN</u> DRILLER: <u>ECDI WELLS</u> WEATHER: <u>CLOUDY, 52°F</u> CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u> RIG TYPE: <u>Geoprobe(R) 7822DT</u> DATE/TIME START: <u>11-15-17 / 1025</u> DATE/TIME FINISH: <u>11-15-17 / 035</u> WEIGHT OF HAMMER: <u>N/A</u> DROP OF HAMMER: <u>N/A</u> TYPE OF HAMMER: <u>N/A</u>		BORING/WELL ID: <u>PAR-83-SB-20</u> LOCATION DESCRIPTION: <u>ASPHALT</u> LOCATION PLAN: <u>Oceanport, New Jersey</u>																
GROUNDWATER OBSERVATIONS WATER LEVEL: _____ DATE: _____ TIME: _____ MEAS. FROM: _____																							
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS																
0	PAR-83-SB-20		48/60		DRY ASPHALT RUBBLE (C. ANGULAR GRANUL)																		
1					DRY DE GRAY (SUB BASE) MOD LOOSE SILTY SAND AND M-C GRNCL, TR CRUSHED BRICK																		
2	PAR-83-SB-29-1.5				MOIST OLIVE-GRAY BROWN MOD STIFF SANDY SILT.		1040																
3	PAR-83-SB-29-3-3.5				↓		1045																
4					NO RECOVERY																		
5			36/60		WET DK ORANGE BROWN LOOSE F-C SAND, LITTLE SILT		1050																
6	PAR-83-SB-29-6-6.5				WET LIGHT TAN ORANGE-VE-C SAND TR. SILT																		
7																							
8																							
9					NO RECOVERY																		
10					end of boring																		
Remarks:																							
Sample Types S -- Split-Spoon U -- Undisturbed Tube C -- Rock Core A -- Auger Cuttings					Consistency vs. Blowcount / Foot <table border="1"> <tr> <th colspan="2">Granular (Sand & Gravel)</th> <th colspan="2">Fine Grained (SR & Clay)</th> </tr> <tr> <td>V. Loose: 0-4</td> <td>Dense: 30-50</td> <td>V. Soft: <2</td> <td>Stiff: 8-15</td> </tr> <tr> <td>Loose: 4-10</td> <td>V. Dense: >50</td> <td>Soft: 2-4</td> <td>V. Stiff: 15-30</td> </tr> <tr> <td>M. Dense: 10-30</td> <td></td> <td>M. Stiff: 4-8</td> <td>Hard: >30</td> </tr> </table>			Granular (Sand & Gravel)		Fine Grained (SR & Clay)		V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15	Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30	M. Dense: 10-30		M. Stiff: 4-8	Hard: >30
Granular (Sand & Gravel)		Fine Grained (SR & Clay)																					
V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15																				
Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30																				
M. Dense: 10-30		M. Stiff: 4-8	Hard: >30																				
					end - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation																		

Soil Boring Log

CLIENT: USACE PROJECT NAME: FTMM - ECP PROJECT LOCATION: FTMM Parcel PROJECT NUMBER: 748810-					INSPECTOR: Tom TOR # DRILLER: ECDI WELLS REVE WEATHER: Cloudy, 52°F CONTRACTOR: East Coast Drilling, Inc. (ECDI) RIG TYPE: Geoprobe(R) T822DT 6610 DT DATE/TIME START: 11-15-17 / 1040 DATE/TIME FINISH: 11-15-17 / 1055 WEIGHT OF HAMMER: N/A DROP OF HAMMER: N/A TYPE OF HAMMER: N/A		BORING/WELL ID: PAR-83-SB-30 LOCATION DESCRIPTION: GRASSY AREA LOCATION PLAN: Oceanport, New Jersey	
GROUNDWATER OBSERVATIONS								
WATER LEVEL: _____								
DATE: _____								
TIME: _____								
MEAS. FROM: _____								
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0	PAR-83-SB-30-0-2.5	42/60		0.0	DRY LT. BROWN-BROWN VF-F SAND, TR SILT TR CLAY/ROOTS		1100	
1				0.0	DRY V. STIFF REDDISH-BROWN SANDY SILT, LITTLE CLAY.			
2				0.0	MOIST MED. SOFT REDDISH-BROWN SANDY SILT, TR CLAY MICACIOUS			
3	PAR-83-SB-30-3-2.5			0.0			1105	
4				0.0	NO RECOVERY			
5		36/60		0.0	WET LT. ORANGE BROWN MED DENSE SAND, LITTLE SILT, TR VF GRAVEL.		1110	
6	PAR-83-SB-30-6-6.5			0.0	WET YELLOW-TAN-ORANGE DENSE VF-C SAND			
7				0.0				
8				0.0				
9					NO RECOVERY			
10					end of boring			

Remarks:

Sample Types	Consistency vs. Blowcount / Foot				
S -- Split-Spoon	Granular (Sand & Gravel)		Fine Grained (Silt & Clay)		and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation
U -- Undisturbed Tube	V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15	
C -- Rock Core	Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30	
A -- Auger Cuttings	M. Dense: 10-30		M. Stiff: 4-8	Hard: >30	

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>TOM HORN</u>		BORING/WELL ID: <u>PAR-83-SB-31</u>	
PROJECT NAME: <u>FTMM - ECP</u>					DRILLER: <u>ECO1 WELLS REVE</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: <u>FTMM Parcel</u>					WEATHER: <u>cloudy, 52°F</u>		<u>GRASSY AREA</u>	
PROJECT NUMBER: <u>748810-</u>					CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>		LOCATION PLAN	
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) 782ZDT 6610 PT</u>		Oceanport, New Jersey	
WATER LEVEL: <u>-</u>					DATE/TIME START: <u>11-15-17 / 1055</u>			
DATE: <u>-</u>					DATE/TIME FINISH: <u>11-15-17 / 1105</u>			
TIME: <u>-</u>					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM: <u>-</u>					DROP OF HAMMER: <u>N/A</u>			
TYPE OF HAMMER: <u>N/A</u>								
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0	<u>PAR-83-SB-31-0-0.5</u>	<u>48/60</u>		<u>0.0</u>	<u>DRY, BROWN, SILTY SAND, TR. GRASS/ROOTS</u>		<u>1115</u>	
1				<u>0.0</u>	<u>MOIST VERY STIFF LT ORANGE BROWN SANDY SILT</u>			
2				<u>0.0</u>				
3	<u>PAR-83-SB-31-3-3.5</u>			<u>0.0</u>	<u>MOIST DK OLIVE BROWN V. DENSE SILTY SAND</u>		<u>1120</u>	
4				<u>0.0</u>	<u>NO RECOVERY</u>			
5		<u>36/60</u>		<u>0.0</u>	<u>WET DK REDDISH-BROWN-TAN SILTY SAND, TR. GRAVEL</u>			
6	<u>PAR-83-SB-31-6-6.5</u>			<u>0.0</u>	<u>WET LT REDDISH-ORANGE-TAN MF-C SAND</u>		<u>1125</u>	
7				<u>0.0</u>				
8				<u>0.0</u>				
9					<u>NO RECOVERY</u>			
10					<u>end of boring</u>			
Remarks:								
Sample Types					Consistency vs. Blowcount / Foot			
S - Split-Spoon					Granular (Sand & Gravel)			
U - Undisturbed Tube					Fine Grained (Silt & Clay)			
C - Rock Core					V. Loose: 0-4 Dense: 30-50			
A - Auger Cuttings					V. Soft <2 Stiff: 8-15			
					Loose: 4-10 V. Dense: >50			
					Soft: 2-4 V. Stiff: 15-30			
					M. Dense: 10-30			
					M. Stiff: 4-8 Hard: >30			
					end - 35-50%			
					some - 20-35%			
					little - 10-20%			
					trace - <10%			
					moisture, density, color, gradation			

Soil Boring Log

CLIENT: <u>USACE</u> PROJECT NAME: <u>FTMM - ECP</u> PROJECT LOCATION: <u>FTMM Parcel</u> PROJECT NUMBER: <u>748810-</u>					INSPECTOR: <u>TOM HORN</u> DRILLER: <u>ECDI WELLS REEVE</u> WEATHER: <u>CLOUDY, 52°F</u> CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u> RIG TYPE: <u>Geoprobe(R) 7622DT - 6610DT</u> DATE/TIME START: <u>11-15-17 / 1110</u> DATE/TIME FINISH: <u>11-15-17 / 1120</u> WEIGHT OF HAMMER: <u>N/A</u> DROP OF HAMMER: <u>N/A</u> TYPE OF HAMMER: <u>N/A</u>		BORING/WELL ID: <u>PAR-83-SB-32</u> LOCATION DESCRIPTION: <u>GRASSY AREA</u> LOCATION PLAN: <u>Oceanport, New Jersey</u>		
GROUNDWATER OBSERVATIONS WATER LEVEL: <u>—</u> DATE: <u>—</u> TIME: <u>—</u> MEAS. FROM: <u>—</u>									
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS		
0	PAR-83-SB-32-0-0.5	42/60		0.0	DRY GRAY BROWN SILTY SAND		1130		
1				0.0	MOIST, VF TAN SAND				
				0.0	TRACE WHITE CLAY LENSES				
2				0.0					
				0.0					
3	PAR-83-SB-32-3-3.5			0.0			1135		
4					NO RECOVERY				
5		42/60		0.0	WET, VF TAN - GRAY SAND				
				0.0	WET TAN-BROWN VF SAND, TR 11				
6	PAR-83-SB-32-6-6.5			0.0	SUB ROUNDED GRAVEL				
				0.0	WET, LIGHT YELLOW-TAN SAND		1140		
7				0.0					
				0.0					
8				0.0					
9					NO RECOVERY				
10					end of boring				
Remarks:									
Sample Types S -- Split-Spoon U -- Undisturbed Tube C -- Rock Core A -- Auger Cuttings				Consistency vs. Blowcount / Foot Granular (Sand & Gravel) V. Loose: 0-4 Dense: 30-50 Loose: 4-10 V. Dense: >50 M. Dense: 10-30				Fine Grained (Silt & Clay) V. Soft: <2 Stiff: 8-15 Soft: 2-4 V. Stiff: 15-30 M. Stiff: 4-8 Hard: >30	
				and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation					

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>TOM HORN</u>		BORING/WELL ID: <u>PAR-83-SB-33</u>	
PROJECT NAME: FTMM - ECP					DRILLER: <u>ECDI WELLS REAVE</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: <u>CLOUDY, 55°F</u>		<u>ASPHALT</u>	
PROJECT NUMBER: 748810-					CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>		LOCATION PLAN	
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) 2822BT 66100T</u>		Oceanport, New Jersey	
WATER LEVEL: _____					DATE/TIME START: <u>11-15-17/1320</u>			
DATE: _____					DATE/TIME FINISH: <u>11-15-17/1330</u>			
TIME: _____					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM: _____					DROP OF HAMMER: <u>N/A</u>			
TYPE OF HAMMER: <u>N/A</u>								
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADW/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0			36/60	1.4	DRY (ADJACENT RUBBLE) F-C ANGLULAR DK GREEN GRAVEL, SOME F-C SAND V. DENSE			
				0.0	DRY (SUBBASE) BLACK-GRAY V. DENSE SILTY SAND AND ANGLULAR GRAVEL			
1				0.0	DRY REDDISH-GRAY-BLACK (BRICK RUBBLE) V. DENSE			
				0.0				
2	PAR-83-SB-33-2-2.5			0.0	MOIST V. DENSE OLIVE-DARK-GRAY SILTY SAND		1335 (+DUPLICATE)	
				0.0				
3	PAR-83-SB-33-3-3.5						1340	
					NO RECOVERY			
4								
5			48/60	0.0	WET V. SOFT DK OLIVE GRAY SANDY SILT			
				0.0				
6	PAR-83-SB-33-6-6.5			0.0			1345	
				0.0	WET V. DENSE REDDISH-ORANGE BROWN SILTY SAND			
7				0.0				
				0.0				
8				0.0	WET LT GRAY ORANGE TAN MOD STIFF SANDY SILT			
				0.0				
9								
					NO RECOVERY			
10					end of boring			
Remarks:								
Sample Types				Consistency vs. Blowcount / Foot				
S - Split Spoon				Granular (Sand & Gravel)				
U - Undisturbed Tube				Fine Grained (Silt & Clay)				
C - Rock Core				V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15				
A - Auger Cuttings				Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30				
				M. Dense: 10-30 M. Stiff: 4-8 Hard: >30				
				and - 35-50% somo - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation				

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>TOM HORN</u>		BORING/WELL ID: <u>PAR-83-SB-34</u>	
PROJECT NAME: FTMM - ECP					DRILLER: <u>ECDI WELLS REVE</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: <u>OVERCAST 50° WINDY</u>		<u>ASPHALT</u>	
PROJECT NUMBER: 748810-					CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>			
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) 7822DT</u>		LOCATION PLAN	
WATER LEVEL: <u>-</u>					DATE/TIME START: <u>11-15-17 / 1355</u>		Oceanport, New Jersey	
DATE: <u>-</u>					DATE/TIME FINISH: <u>11-15-17 / 1405</u>			
TIME: <u>-</u>					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM: <u>-</u>					DROP OF HAMMER: <u>N/A</u>			
TYPE OF HAMMER: <u>N/A</u>								
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0			40/60	0.0	DRY (ASPHALT RUBBLE) F-C ANGULAR GREEN-BLACK GRAVEL, DENSE			
				0.0				
1				0.0	DRY (SUBBASE) F-C DENSE BLACK - GREEN TO DARK - REDDISH BROWN (BRICK RUBBLE)			
				0.0	DRY SILTY SAND			
* 2	PAR-83-SB- 34-2-2.5			0.0	MOIST DK GREEN-OLIVE SOFT SANDY SILT		1425	
				0.0				
* 3	PAR-83-SB- 34-3-3.5			0.0			1430	
4					NO RECOVERY			
5			36/60	0.0	WET OLIVE - BROWN V. SOFT SANDY SILT.			
				0.0				
* 6	PAR-83-SB- 34-6-6.5			0.0	WET OLIVE GRAY BROWN MOP. STIFF SANDY SILT, SOME CLAY		1435	
				0.0				
7				0.0				
				0.0				
8					NO RECOVERY			
9								
10					end of boring			
Remarks:								
Sample Types					Consistency vs. Blowcount / Foot			
S -- Split-Spoon					Granular (Sand & Gravel)			
U -- Undisturbed Tube					Fine Grained (Silt & Clay)			
C -- Rock Core					V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15			
A -- Auger Cuttings					Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30			
					M. Dense: 10-30 M. Stiff: 4-8 Hard: >30			
					and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation			

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>TOM HORN</u>		BORINGWELL ID: <u>PAR-83-SB-35</u>	
PROJECT NAME: <u>FTMM - ECP</u>					DRILLER: <u>ECDI WELLS REVE</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: <u>FTMM Parcel</u>					WEATHER: <u>CLOUDY, 50°</u>		<u>ASPHALT</u>	
PROJECT NUMBER: <u>748810-</u>					CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>			
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) 7822DT-66100+</u>		LOCATION PLAN	
WATER LEVEL: <u> </u>					DATE/TIME START: <u>11-15-17 / 1340</u>		Oceanport, New Jersey	
DATE: <u> </u>					DATE/TIME FINISH: <u>11-15-17 / 1350</u>			
TIME: <u> </u>					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM: <u> </u>					DROP OF HAMMER: <u>N/A</u>			
TYPE OF HAMMER: <u>N/A</u>								
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0			<u>48/60</u>	<u>0.0</u>	<u>DRY (ASPHALT RUBBLE) F-C ANGRY</u>			
				<u>0.0</u>	<u>BLACK-GRAY GRAVEL.</u>			
1				<u>0.0</u>	<u>DRY (SUBBASE) F-C BLACK-GRAY</u>			
				<u>0.0</u>	<u>TO-READS H-B RUNN (CRUSHED BRICK) F-M</u>			
					<u>SAND AND GRAVEL</u>			
* 2	<u>PAR-83-SB-35-</u>			<u>0.0</u>	<u>MOIST GRAY-OLIVE MOD.</u>		<u>1355</u>	
	<u>2.5</u>			<u>0.0</u>	<u>MOD DENSE SILTY SAND</u>			
* 3	<u>PAR-83-SB-</u>			<u>0.0</u>	<u> </u>		<u>1400</u>	
	<u>35-3-3.5</u>			<u>0.0</u>	<u>MOIST REDDISH-GRAY-BROWN DENSE</u>			
					<u>SILTY SAND SOME F ROUNDED GRAVEL</u>			
4					<u>NO RECOVERY</u>			
5			<u>36/60</u>	<u>0.0</u>	<u>WET MOD SOFT GRAY-OLIVE SANDY</u>			
				<u>0.0</u>	<u>SILT</u>			
* 6	<u>PAR-83-SB-</u>			<u>0.0</u>	<u> </u>		<u>1405</u>	
	<u>35-6-6.5</u>			<u>0.0</u>	<u>WET LIGHT ORANGE-TAN-BROWN</u>			
				<u>0.0</u>	<u>MOD STIFF SANDY SILT.</u>			
7				<u>0.0</u>				
				<u>0.0</u>				
8					<u>NO RECOVERY</u>			
9								
10					<u>end of boring</u>			
Remarks:								
Sample Types				Consistency vs. Blowcount / Foot				
S -- Split-Spoon				Granular (Sand & Gravel)				
U -- Undisturbed Tube				Fine Grained (Silt & Clay)				
C -- Rock Core				V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15				
A -- Auger Cuttings				Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30				
				M. Dense: 10-30 M. Stiff: 4-8 Hard: >30				
				and - 35-50%				
				some - 20-35%				
				little - 10-20%				
				trace - <10%				
				moisture, density, color, gradation				

Soil Boring Log

CLIENT: USACE					INSPECTOR: TOM HORN		BORING/WELL ID: PAC-83-SB-37	
PROJECT NAME: FTMM - ECP					DRILLER: ECDI WELLS REEVE		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: CLOUDY, 50°F		ASPHALT	
PROJECT NUMBER: 748810-					CONTRACTOR: East Coast Drilling, Inc. (ECDI)			
GROUNDWATER OBSERVATIONS					RIG TYPE: Geoprobe(R) 7822DT 6610DT		LOCATION PLAN	
WATER LEVEL: -					DATE/TIME START: 11-16-17 / 0925		Oceanport, New Jersey	
DATE: -					DATE/TIME FINISH: 11-16-17 / 0935			
TIME: -					WEIGHT OF HAMMER: N/A			
MEAS. FROM: -					DROP OF HAMMER: N/A			
					TYPE OF HAMMER: N/A			
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL		STRATA	COMMENTS
0			48/60		DRY (ASPHALT) GRAY-BLACK F-C AVERAGE GRAVEL			
1	PAC-83-SB-37-1-1.5				DRY (SUBBASE) BLACK-GRAY F-C SAND, TR F-M AVERAGE GRAVEL			0935
2					MOIST DK OLIVE DENSE SILTY SAND			
3	PAC-83-SB-37-3-3.5				MOIST, DK-ORANGE - TAN SAND LITTLE SILT.			0940
4					NO RECOVER,			
5			60/60	60/60	WET MOD SOFT LT-GRAY-ORANGE-TAN SANDY SILT			
6	PAC-83-SB-37-6-6.5							0945
7					WET LT ORANGE GRAY TAN DENSE SILTY SAND AND F-M ROUNDED GRAVEL			
8					WET LT OLIVE - TAN - GRAY DENSE SILTY SAND			
9								
10					end of boring			

Remarks:

Sample Types

S -- Spt-Spoon

U -- Undisturbed Tube

C -- Rock Core

A -- Auger Cuttings

Consistency vs. Blowcount / Foot

Granular (Sand & Gravel)

V. Loose: 0-4

Dense: 30-50

Loose: 4-10

V. Dense: >50

M. Dense: 10-30

Fine Grained (Silt & Clay)

V. Soft: <2

Soft: 2-4

M. Stiff: 4-8

Stiff: 8-16

V. Stiff: 15-30

Hard: >30

and - 35-50%

some - 20-35%

little - 10-20%

trace - <10%

moisture, density, color, gradation

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>TOM HORN</u>		BORING/WELL ID: <u>PAR-83-SB-38</u>	
PROJECT NAME: FTMM - ECP					DRILLER: <u>ECDI WILL REVE</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: <u>OVERCAST 50° F WINDY</u>		GRASSY AREA	
PROJECT NUMBER: 748810-					CONTRACTOR: East Coast Drilling, Inc. (ECDI)		LOCATION PLAN	
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) 7822DT</u>		Oceanport, New Jersey	
WATER LEVEL: <u>---</u>					DATE/TIME START: <u>11-15-17 / 1415</u>			
DATE: <u>---</u>					DATE/TIME FINISH: <u>11-15-17 / 1425</u>			
TIME: <u>---</u>					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM: <u>---</u>					DROP OF HAMMER: <u>N/A</u>			
					TYPE OF HAMMER: <u>N/A</u>			
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADVI REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0	PAR-83-SB-38-0-0.5	36/60		0.0	DRY DK BROWN MED DENSE SILTY SAND, LITTLE F. GRAVEL		1455	
1				0.0	MOIST DK GRAY - BLACK V DENSE SILTY SAND AND F. GRAVEL			
2				0.0				
3	PAR-83-SB-38-3-3.5			0.0	MOIST DK GRAY OLIVE V STIFF SANDY SILT		1500	
4					NO RECOVERY			
5		36/60		0.0	WET SOFT DK GRAY - OLIVE SANDY SILT			
6	PAR-83-SB-38-6-6.5			0.0	WET TAN GRAY-ORANGE-BROWN MED DENSE SILTY SAND		1505	
7				0.0	WET OR - ORANGE-TAN DENSE SAND			
8				0.0	WET LIGHT - GRAY - ORANGE-TAN DENSE SAND, LITTLE F. GRAVEL			
9					NO RECOVERY			
10					end of boring			
Remarks:								
Sample Types				Consistency vs. Blowcount / Foot				
S - Split-Spoon				Granular (Sand & Gravel)				
U - Undisturbed Tube				Fine Grained (Silt & Clay)				
C - Rock Core				V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15				
A - Auger Cuttings				Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30				
				M. Dense: 10-30 M. Stiff: 4-8 Hard: >30				
				and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation				

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>TOM HORN</u>		BORING/WELL ID: <u>PAR-83-SB-39</u>	
PROJECT NAME: FTMM - ECP					DRILLER: <u>ECDI WELLS REEVE</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: <u>OVCRAST, 50°F</u>		<u>ASPHALT</u>	
PROJECT NUMBER: 748810-					CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>			
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) 7822DT</u>		LOCATION PLAN	
WATER LEVEL: <u>—</u>					DATE/TIME START: <u>11-16-17 / 0945</u>		Oceanport, New Jersey	
DATE: <u>—</u>					DATE/TIME FINISH: <u>11-16-17 / 0955</u>			
TIME: <u>—</u>					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM: <u>—</u>					DROP OF HAMMER: <u>N/A</u>			
					TYPE OF HAMMER: <u>N/A</u>			
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0			<u>48/60</u>	<u>0.0</u>	<u>DRY BLACK-GRAY (ASPHALT) F-C</u>			
				<u>0.0</u>	<u>GRAVEL V. DENSE</u>			
				<u>0.0</u>	<u>DRY GRAY-BLACK (SUB BASE) VF-M</u>			
1				<u>0.0</u>	<u>GRAVEL V. DENSE</u>			
				<u>0.0</u>				
* 2	<u>PAR-83-SB-39-2-2.5</u>			<u>0.0</u>	<u>MOIST V. DENSE OLIVE GRAY</u>		<u>1005</u>	
				<u>0.0</u>	<u>SILTY SAND</u>		<u>DUP/Q/A</u>	
* 3	<u>PAR-83-SB-39-3-3.5</u>			<u>0.0</u>	<u>MOIST V. STIFF OLIVE GRAY</u>		<u>1010</u>	
				<u>0.0</u>	<u>SANDY SILT, LITTLE CLAY</u>			
4								
					<u>NO RECOVERY</u>			
5			<u>48/60</u>	<u>0.0</u>	<u>WET LT GRAY LT BROWN LOOSE</u>			
				<u>0.0</u>	<u>SILTY SAND</u>			
* 6	<u>PAR-83-SB-39-6-6.5</u>		<u>48/60</u>	<u>0.0</u>			<u>1015</u>	
				<u>0.0</u>	<u>WET LT OLIVE LT. TAN</u>			
7				<u>0.0</u>	<u>STIFF DENSE SILTY SAND</u>			
				<u>0.0</u>				
8				<u>0.0</u>				
				<u>0.0</u>				
9								
					<u>NO RECOVERY</u>			
10					<u>End of boring</u>			
Remarks:								
Sample Types				Consistency vs. Blowcount / Foot				
S - Split-Spoon				Granular (Sand & Gravel)				
U - Undisturbed Tube				Fine Grained (Silt & Clay)				
C - Rock Core				V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15				
A - Auger Cuttings				Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 16-30				
				M. Dense: 10-30 M. Stiff: 4-8 Hard: >30				
				and - 35-50% some - 20-35% little - 10-20% trace - <10%				
				moisture, density, color, gradation				

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>TOM HORN</u>		BORING/WELL ID: <u>PAR-83-SB-40</u>	
PROJECT NAME: FTMM - ECP					DRILLER: <u>ECDI WELLS REEVE</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: <u>overcast, 50°</u>			
PROJECT NUMBER: 748810-					CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>			
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) 7822DT 6610DT</u>		LOCATION PLAN	
WATER LEVEL:					DATE/TIME START: <u>11-16-17 / 0935</u>		Oceanport, New Jersey	
DATE:					DATE/TIME FINISH: <u>11-16-17 / 0945</u>			
TIME:					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM:					DROP OF HAMMER: <u>N/A</u>			
TYPE OF HAMMER: <u>N/A</u>								
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0			48/60	0.0	RM (ASPHALT) M-C G-RAVEL BLACK-GRAY V. DENSE			
1	PAR-83-SB-40-1-1.5			0.0	PRY (SUBBASE) F-M GRAVEL AND M-C SAND, DENSE MOIST OLIVE-GRAY, DENSE M-C SAND, TR SILT, TR M SUBGRADED GRAVEL		0950	
2				0.0	MOIST LT TAN OLIVE GRAY V. DENSE SILTY SAND			
3	PAR-83-SB-40-3-3.5			0.0	WET V. STIFF LT OLIVE-DK-GRAY SANDY SILT		0955	
4					NO RECOVERY			
5			48/60		WET TAN-OLIVE V DENSE SILTY SAND			
6	PAR-83-SB-40-6-6.5						1000	
7					WET, DENSE LT REDDISH-BLACK LT TAN SAND, LITTLE SILT.			
8								
9					NO RECOVERY			
10					end of boring			
Remarks:								
Sample Types					Consistency vs. Blowcount / Foot			
S - Split-Spoon					Granular (Sand & Gravel)		Fine Grained (Silt & Clay)	
U - Undisturbed Tube					V. Loose: 0-4		V. Soft: <2	
C - Rock Core					Dense: 30-50		Stiff: 8-15	
A - Auger Cuttings					Loose: 4-10		Soft: 2-4	
					V. Dense: >50		V. Stiff: 15-30	
					M. Dense: 10-30		M. Stiff: 4-8	
							Hard: >30	
							end - 35-50%	
							some - 20-35%	
							little - 10-20%	
							trace - <10%	
							moisture, density, color, gradation	

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>TOM HORN</u>		BORING/WELL ID: <u>PAR-83-SB-41</u>	
PROJECT NAME: FTMM - ECP					DRILLER: <u>ECDI WELLS REEVE</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER:		<u>GRASSY AREA</u>	
PROJECT NUMBER: 748810-					CONTRACTOR: East Coast Drilling, Inc. (ECDI)		LOCATION PLAN	
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) 7822DT 6610DT</u>		Oceanport, New Jersey	
WATER LEVEL:					DATE/TIME START: <u>11/16/17/1000</u>			
DATE:					DATE/TIME FINISH: <u>11/16/17/1015</u>			
TIME:					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM:					DROP OF HAMMER: <u>N/A</u>			
					TYPE OF HAMMER: <u>N/A</u>			
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADVI REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0	<u>PAR-83-SB-41-0-0.5</u>	<u>48/60</u>		0.0	<u>MOIST OLIVE-BROWN LOOSE SILTY SAND AND FINE ROUNDED GRAVEL</u>		<u>1035</u>	
				0.0	<u>MOIST OLIVE TAN MOD STIFF SANDY SILT</u>			
1				0.0				
				0.0	<u>MOIST OLIVE - GRAY - TAN</u>			
2				0.0	<u>STIFF SILT, SOME VF-F SAND</u>			
				0.0				
3	<u>PAR-83-SB-41-3-3.5</u>			0.0			<u>1040</u>	
				0.0				
4					<u>NO RECORD</u>			
5		<u>48/60</u>		0.0	<u>MOIST OLIVE-GRAY TAN</u>			
				0.0	<u>STIFF SILT, SOME VF-F SAND</u>			
6	<u>PAR-83-SB-41-6-6.5</u>			0.0			<u>1045</u>	
				0.0	<u>LT REDDISH - ORANGE V DENSE SILTY SAND</u>			
7				0.0				
				0.0	<u>OLIVE - GRAY WET MOD SOFT SANDY SILT</u>			
8				0.0				
				0.0				
9					<u>NO RECORD</u>			
10					<u>end of boring</u>			
Remarks:								
Sample Types					Consistency vs. Blowcount / Foot			
S - Split-Spoon					Granular (Sand & Gravel)			
U - Undisturbed Tube					Fine Grained (Silt & Clay)			
C - Rock Core					V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15			
A - Auger Cuttings					Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30			
					M. Dense: 10-30 M. Stiff: 4-8 Hard: >30			
					and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation			

Soil Boring Log

CLIENT: USACE					INSPECTOR: Tom Horn		BORING/WELL ID: PAR-83-SB-44	
PROJECT NAME: FTMM - ECP					DRILLER: ECDI WALLS REEVE		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: OVERCAST, 55°F		ASPHALT	
PROJECT NUMBER: 748810-					CONTRACTOR: East Coast Drilling, Inc. (ECDI)		LOCATION PLAN	
GROUNDWATER OBSERVATIONS					RIG TYPE: Geoprobe(R) 7822DT		Oceanport, New Jersey	
WATER LEVEL: -					DATE/TIME START: 11-14-17 / 1300			
DATE: -					DATE/TIME FINISH: 11-14-17 / 1310			
TIME: -					WEIGHT OF HAMMER: N/A			
MEAS. FROM: -					DROP OF HAMMER: N/A			
					TYPE OF HAMMER: N/A			
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0			40/60	5.6	ASPHALT, DRY DK GRAY ANGULAR GRAVEL			
1	PAR-83-SB-44-1-1.5'			1.0	MOIST, V. STIFF SANDY SILT AND F-M ROUNDED GRAVEL.		1305	
				0.0				
2				0.0				
				0.0	MOIST OLIVE - GRAY MOD STIFF SANDY SILT, LITTLE CLAY		1310	
3	PAR-83-SB-44-3-3.5'			0.0	NO RECOVERY			
4								
5			36/40	0.0	WET, OLIVE GRAY SOFT SANDY SILT, TRACE CLAY			
				0.0				
6	PAR-83-SB-44-6-6.5'			0.0	WET OLIVE - GRAY AND SOFT SANDY SILT, LITTLE CLAY		1315	
				0.0				
7				0.0				
				0.0				
8								
					NO RECOVERY			
9								
10					END OF BORING			
Remarks:								
Sample Types					Consistency vs. Blowcount / Foot			
S - Split-Spoon					Granular (Sand & Gravel)			
U - Undisturbed Tube					Fine Grained (Silt & Clay)			
C - Rock Core					V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15			
A - Auger Cuttings					Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30			
					M. Dense: 10-30 M. Stiff: 4-8 Hard: >30			
					and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation			

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>TOM HORN</u>		BORING/WELL ID: <u>PAR 83-SB-45</u>	
PROJECT NAME: FTMM - ECP					DRILLER: <u>ECPI WELLS REEVE</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: <u>CLEAR, 58°F</u>		ASPHALT	
PROJECT NUMBER: 748810-					CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>			
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) 2822DT 6610 D.F.</u>		LOCATION PLAN	
WATER LEVEL: <u>---</u>					DATE/TIME START: <u>11-14-17 / 1315</u>		Oceanport, New Jersey	
DATE: <u>---</u>					DATE/TIME FINISH: <u>11-14-17 / 1330</u>			
TIME: <u>---</u>					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM: <u>---</u>					DROP OF HAMMER: <u>N/A</u>			
					TYPE OF HAMMER: <u>N/A</u>			
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0			<u>48/60</u>	<u>5.2</u>	<u>DRY BLACK-GRAY VF-C SAND AND F-m GRAVEL, ASPHALT.</u>			
				<u>3.1</u>				
1				<u>1.0</u>	<u>MOD SOFT GREENISH GREEN-TAN SANDY SILT</u>		<u>1330</u>	
	<u>PAR-83-SB-45-1.5-2</u>			<u>1.0</u>				
2				<u>1.0</u>				
				<u>3.7</u>				
3				<u>12.2</u>			<u>1335</u>	
	<u>PAR-83-SB-45-3-3.5</u>			<u>6.5</u>				
4					<u>NO FLOW</u>			
5			<u>60/60</u>	<u>0.0</u>	<u>WET GRAY-GREENISH-BROWN MOD DENSE SILTY SAND, AND F GRAVEL.</u>			
				<u>0.0</u>				
6				<u>0.0</u>	<u>WET MOTTLED ORANGE-TAN-BROWN AND GRAY-TAN BROWN DENSE SILTY SAND</u>		<u>1340</u>	
	<u>PAR-83-SB-45-6-6.5</u>			<u>0.0</u>				
7				<u>0.0</u>				
				<u>0.0</u>				
8				<u>0.0</u>				
				<u>0.0</u>				
9				<u>0.0</u>				
				<u>0.0</u>				
10					<u>END OF BORING</u>			

Remarks:

Sample Types	Consistency vs. Blowcount / Foot				
S - Split-Spoon	Granular (Sand & Gravel)		Fine Grained (Silt & Clay)		sand - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation
U - Undisturbed Tube	V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15	
C - Rock Core	Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30	
A - Auger Cuttings	M. Dense: 10-30		M. Stiff: 4-8	Hard: >30	

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>TOM HORN</u>		BORING/WELL ID: <u>PAR-83-SB-46</u>	
PROJECT NAME: FTMM - ECP					DRILLER: <u>ECDI WELLS REEVE</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: <u>PARTLY CLOUDY, 55°F</u>		<u>GRASSY AREA</u>	
PROJECT NUMBER: 748810-					CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>		LOCATION PLAN	
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) 7822DT 6610 DT</u>		Oceanport, New Jersey	
WATER LEVEL: <u> </u>					DATE/TIME START: <u>11-14-17 / 1340</u>			
DATE: <u> </u>					DATE/TIME FINISH: <u>11-14-17 / 1355</u>			
TIME: <u> </u>					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM: <u> </u>					DROP OF HAMMER: <u>N/A</u>			
TYPE OF HAMMER: <u>N/A</u>								

DEPTH (feet)	SAMPLE ID.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0	<u>PAR-83-SB-46-0-0.5</u>	<u>48/60</u>		0.0	<u>DK BROWN - REDDISH BROWN SAND / DRUM</u>		<u>1410</u>
				0.0	<u>YELLOW - GREENISH TAN BROWN, MOIST MOD LOOSE.</u>		
1				0.0	<u>V. STIFF LT YELLOW GREENISH TAN SANDY SILT MOIST</u>		
				0.0			
2				0.0			
				0.0			
3	<u>PAR-83-SB-46-0-0.5</u>			0.0			<u>1415</u>
				0.0			
4							
					<u>NO RECOVERY</u>		
5		<u>48/60</u>		0.0	<u>WET V. DENSE GREENISH TAN</u>		
				0.0	<u>SILTY SAND</u>		
6	<u>PAR-83-SB-46-6-6.5</u>			0.0			<u>1420</u>
				0.0			
7				0.0	<u>WET REDDISH - ORANGE</u>		
					<u>V DENSE SILTY SAND, SOME</u>		
8					<u>M. ROUNDED GRAVEL</u>		
					<u>WET + V. STIFF CLAYEY SILT</u>		
9							
					<u>NO RECOVERY</u>		
10					<u>END OF BORING</u>		

Remarks:

Sample Types	Consistency vs. Blowcount / Foot				
S - Split Spoon	Granular (Sand & Gravel)		Fine Grained (Silt & Clay)		
U - Undisturbed Tube	V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15	and - 35-50%
C - Rock Core	Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 16-30	some - 20-35%
A - Auger Cuttings	M. Dense: 10-30		M. Stiff: 4-8	Hard: >30	little - 10-20%
					trace - <10%
					moisture, density, color, gradation

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>TOM HORN</u>		BORING/WELL ID: <u>PAR-83-SB-47</u>	
PROJECT NAME: FTMM - ECP					DRILLER: <u>EAD1 WELLS REEVE</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: <u>OVERCAST, 53°F</u>		<u>GRASSY AREA</u>	
PROJECT NUMBER: 748810-					CONTRACTOR: East Coast Drilling, Inc. (ECDI)		LOCATION PLAN	
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) 7822DT-6610DT</u>		Oceanport, New Jersey	
WATER LEVEL: <u>—</u>					DATE/TIME START: <u>11-14-17 / 1420</u>			
DATE: <u>—</u>					DATE/TIME FINISH: <u>11-14-17 / 1440</u>			
TIME: <u>—</u>					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM: <u>—</u>					DROP OF HAMMER: <u>N/A</u>			
					TYPE OF HAMMER: <u>N/A</u>			
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0	<u>PAR-83-SB-47-0-0.5</u>	<u>60/60</u>		0.0	<u>DK BROWN LOOSE SILETY SAND, TR M GRNCL, GRASS, ROOTS, DRY</u>		<u>1440</u>	
				0.0	<u>MOIST YELLOW ORANGE TAN DENSE SILTY SAND, SOME F M GRNCL</u>			
1				0.0	<u>DENSE GREENISH-GRAY -</u>			
				0.0	<u>BROWN VF - F SAND, TR SILT.</u>			
2				0.0	<u>MOIST -</u>			
				0.0	<u>↓</u>			
3	<u>PAR-83-SB-47-3-3.5</u>			0.0	<u>V. STIFF GREENISH-YELLOW-BROWN SANDY SILT, MOIST.</u>		<u>1445</u>	
				0.0				
4				0.0				
				0.0				
5		<u>60/60</u>		0.0	<u>MOD STIFF MOIST LIGHT -</u>			
				0.0	<u>GREENISH TAN SANDY SILT</u>			
6	<u>PAR-83-SB-47-6-6.5</u>			0.0	<u>SOME CLAY, WET.</u>		<u>1450</u>	
				0.0	<u>↓</u>			
7				0.0				
				0.0				
8				0.0	<u>WET V. DENSE ORANGE -</u>			
				0.0	<u>TAN - BROWN SILTY SAND</u>			
9				0.0	<u>↓</u>			
10					<u>END OF BORING</u>			
Remarks:								
Sample Types				Consistency vs. Blowcount / Foot				
S - Split-Spoon				Granular (Sand & Gravel)				
U - Undisturbed Tube				Fine Grained (Silt & Clay)				
C - Rock Core				V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15				
A - Auger Cuttings				Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30				
				M. Dense: 10-30 M. Stiff: 4-8 Hard: >30				
				and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation				

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>TOM HORN</u>		BORING/WELL ID: <u>PAR-B3-SB-48</u>	
PROJECT NAME: <u>FTMM - ECP</u>					DRILLER: <u>ECDI WELLS REENT</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: <u>FTMM Parcel</u>					WEATHER: <u>OVERCAST, 50°F</u>		<u>GRASSY AREA</u>	
PROJECT NUMBER: <u>748810-</u>					CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>		LOCATION PLAN	
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) 7822BT 6610 DT</u>		Oceanport, New Jersey	
WATER LEVEL: <u>—</u>					DATE/TIME START: <u>11/14/17 11405</u>			
DATE: <u>—</u>					DATE/TIME FINISH: <u>11-14-17 11415</u>			
TIME: <u>—</u>					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM: <u>—</u>					DROP OF HAMMER: <u>N/A</u>			
					TYPE OF HAMMER: <u>N/A</u>			
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
* 0	<u>PAR-B3-SB-48-0-0.5</u>	<u>60/60</u>		0.0	<u>DRY, DK BROWN STIFF SANDY SILT, TR GRASS, ROOTS.</u>		<u>1520</u>	
				0.0	<u>MOIST REDDISH-ORANGE-TAN</u>			
1				0.0	<u>VF-C SAND, TR F GRAVEL</u>			
				0.0				
2				0.0				
				0.0	<u>MOIST - VERY DENSE</u>			
				0.0	<u>OLIVE-GRAY-BROWN SILTY</u>			
* 3	<u>PAR-B3-SB-48-3-3.5</u>			0.0	<u>SAND, TR F GRAVEL</u>		<u>1515</u>	
				0.0				
4				0.0	<u>MOIST DK REDDISH-BROWN</u>			
				0.0	<u>MOD DENSE SILTY SAND, LITTLE</u>			
				0.0	<u>F-M ROUNDED GRAVEL</u>			
5		<u>60/60</u>		0.0	<u>S.A.A</u>			
				0.0				
* 6	<u>PAR-B3-SB-48-6-6.5</u>			0.0			<u>1510</u>	
				0.0				
7				0.0	<u>WET ORANGE TAN MOD LOOSE</u>			
				0.0	<u>F-C SAND AND VF-F</u>			
				0.0	<u>GRAVEL.</u>			
				0.0	<u>WET MOD DENSE LIGHT-</u>			
9				0.0	<u>GRAY-YELLOW TAN F-C</u>			
				0.0	<u>SAND, TR F GRAVEL.</u>			
10					<u>End of Boring</u>			
Remarks:								
Sample Types				Consistency vs. Blowcount / Foot				
S -- Split-Spoon				Granular (Sand & Gravel)				
U -- Undisturbed Tube				Fine Grained (Silt & Clay)				
C -- Rock Core				V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15				
A -- Auger Cuttings				Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30				
				M. Dense: 10-30 M. Stiff: 4-8 Hard: >30				
				and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation				

Soil Boring Log

CLIENT: USACE					INSPECTOR: TOM HORN		BORING/WELL ID: PAR-83-SB-49	
PROJECT NAME: FTMM - ECP					DRILLER: ECDI WELLS REEVE		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: OVERCAST / LT. RAIN 50°F		ASPHALT	
PROJECT NUMBER: 748810-					CONTRACTOR: East Coast Drilling, Inc. (ECDI)			
GROUNDWATER OBSERVATIONS					RIG TYPE: Geoprobe(R) 7822DT 6610DT		LOCATION PLAN	
WATER LEVEL: 7					DATE/TIME START: 11-16-17 / 0910		Oceanport, New Jersey	
DATE: 1					DATE/TIME FINISH: 11-16-17 / 0920			
TIME: 1					WEIGHT OF HAMMER: N/A			
MEAS. FROM: 1					DROP OF HAMMER: N/A			
					TYPE OF HAMMER: N/A			
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0			48/60	0.0	DRY (ASPHALT) GRAY-BLACK FINE SANDS AND GRAVEL, V. DENSE			
1	PAR-83-SB-49-1-1.5			0.0	DRY (SUB BASE) V. DENSE GRAY-BLACK SILTY SAND AND VF-F GRAVEL		0915	
				0.0	MOIST OLIVE GRAY V. DENSE SILTY SAND			
2				0.0				
				0.0	MOIST REDDISH ORANGE TAN V. DENSE SAND, SOME SILT		0920	
3	PAR-83-SB-49-3-3.5			0.0				
				0.0				
4					NO RECOVERY			
5			48/60	0.0	WET DENSE OLIVE GRAY SILTY SAND			
				0.0				
6	PAR-83-SB-49-6-6.5			0.0			0925	
				0.0				
7				0.0				
				0.0	WET V. STIFF LIGHT-ORANGE TAN SANDY SILT			
8				0.0				
				0.0				
9					NO RECOVERY			
10					END OF BORING			
Remarks:								
Sample Types					Consistency vs. Blowcount / Foot			
S -- Split Spoon					Granular (Sand & Gravel)			
U -- Undisturbed Tube					Fine Grained (Silt & Clay)			
C -- Rock Core					V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15			
A -- Auger Cuttings					Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30			
					M. Dense: 10-30 M. Stiff: 4-8 Hard: >30			
					and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation			

Soil Boring Log

CLIENT: USACE					INSPECTOR: <u>TOM NORN</u>		BORING/WELL ID: <u>PAR-83-SB-50</u>	
PROJECT NAME: <u>FTMM - ECP</u>					DRILLER: <u>ECDI WELLS REEVE</u>		LOCATION DESCRIPTION	
PROJECT LOCATION: <u>FTMM Parcel</u>					WEATHER: <u>PARTLY CLOUDY, 55°F</u>		<u>ASPHALT</u>	
PROJECT NUMBER: <u>748810-</u>					CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>		LOCATION PLAN	
GROUNDWATER OBSERVATIONS					RIG TYPE: <u>Geoprobe(R) 6610 DT</u>		Oceanport, New Jersey	
WATER LEVEL: <u> </u>					DATE/TIME START: <u>11-15-17 / 1305</u>			
DATE: <u> </u>					DATE/TIME FINISH: <u>11-15-17 / 1315</u>			
TIME: <u> </u>					WEIGHT OF HAMMER: <u>N/A</u>			
MEAS. FROM: <u> </u>					DROP OF HAMMER: <u>N/A</u>			
					TYPE OF HAMMER: <u>N/A</u>			
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0	<u>PAR-83-SB-50-1.5-2</u>	<u>42/60</u>		2.5	<u>DRY (ASPHALT AND SUBGRADE MATERIAL)</u>			
				1.0	<u>BLACK ANGULAR GRAVEL, LITTLE M-C SAND,</u>			
1				0.0	<u>DRY REDDISH-BLACK (BRICK RUBBLE)</u>			
	<u>PAR-83-SB-50-1.5-2</u>			0.0	<u>MOIST, DARK GRAY-OLIVE MOD DENSE SILTY SAND</u>		<u>1320</u>	
2				0.0				
				0.0				
3	<u>PAR-83-SB-50-3-3.5</u>			0.0	<u>MOIST REDDISH-ORANGE BROWN, DENSE SILTY SAND AND F-M ROUNDED GRAVEL</u>		<u>1325</u>	
4					<u>NO RECOVERY</u>		<u>+</u>	
5		<u>42/60</u>		0.0	<u>WET SOFT REDDISH-ORANGE SANDY SILT</u>			
				0.0				
6	<u>PAR-83-SB-50-6-6.5</u>			0.0			<u>1330</u>	
				0.0				
7				0.0	<u>MOD DENSE WET REDDISH-GREEN ORANGE SILTY SAND</u>			
				0.0				
8				0.0				
9					<u>NO RECOVERY</u>			
10					<u>end of boring</u>			
Remarks:								
Sample Types					Consistency vs. Blowcount / Foot			
S - Split Spoon					Granular (Sand & Gravel)			
U - Undisturbed Tube					Fine Grained (Silt & Clay)			
C - Rock Core					V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15			
A - Auger Cuttings					Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30			
					M. Dense: 10-30 M. Stiff: 4-8 Hard: >30			
					end - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation			

Soil Boring Log

CLIENT: USACE					INSPECTOR: TOM HORN		BORING/WELL ID: PAR-83-SB-54	
PROJECT NAME: FTMM - ECP					DRILLER: ECDI WELLS REEVE		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: CLOUDY, 52°F WINDY		ASPHALT	
PROJECT NUMBER: 748810-					CONTRACTOR: East Coast Drilling, Inc. (ECDI)			
GROUNDWATER OBSERVATIONS					RIG TYPE: Geoprobe(R) 7822DT 6610DT		LOCATION PLAN	
WATER LEVEL: —					DATE/TIME START: 11-16-17 / 1050		Oceanport, New Jersey	
DATE: —					DATE/TIME FINISH: 11-16-17 / 1100			
TIME: —					WEIGHT OF HAMMER: N/A			
MEAS. FROM: —					DROP OF HAMMER: N/A			
					TYPE OF HAMMER: N/A			
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0			60/60	0.1	DRY, BLACK-GRAY (ASPHALT) M-C ANNUAL GRAVEL			
				0.0	DRY - BLACK GRAY (SUBBASE) F-C SAND			
* 1	PAR-83-SB-54-1-1.5			0.0	MOIST DRY along U. DENSE SILTY SAND		1125	
				0.0				
2				0.0				
				0.0				
* 3	PAR-83-SB-54-3-3.5			0.0			1130	
				0.0				
4				0.0				
				0.0				
5			48/60	0.0	MOIST-DRY ORANGE U DENSE SILTY SAND AND M. POWDER GRAVEL			
				0.0	S A A			
				0.0				
* 6	PAR-83-SB-54-6-6.5			0.0	WET LIGHT - TAN LIGHT-ORANGE VF - C SAND		1135	
				0.0				
7				0.0				
				0.0				
8				0.0				
				0.0				
9								
10					NO RECORD End of boring			
Remarks:								
Sample Types					Consistency vs. Blowcount / Foot			
S - Split-Spoon					Granular (Sand & Gravel)		and - 35-50%	
U - Undisturbed Tube					V. Loose: 0-4 Dense: 30-50		some - 20-35%	
C - Rock Core					V. Soft: <2 Stiff: 8-15		fine - 10-20%	
A - Auger Cuttings					Loose: 4-10 V. Dense: >50		trace - <10%	
					M. Dense: 10-30		moisture, density, color, gradation	
					M. Stiff: 4-8			
					Hard: >30			

Soil Boring Log

CLIENT: USACE					INSPECTOR: TOM HORN		BORINGWELL ID: PAR-83-SB-55	
PROJECT NAME: FTMM - ECP					DRILLER: ECDI WELLS REEVE		LOCATION DESCRIPTION	
PROJECT LOCATION: FTMM Parcel					WEATHER: CLOUDY, 52°F		ASPHALT	
PROJECT NUMBER: 748810-					CONTRACTOR: East Coast Drilling, Inc. (ECDI)			
GROUNDWATER OBSERVATIONS					RIG TYPE: Geoprobe(R) 7822DT 6610DT		LOCATION PLAN	
WATER LEVEL: —					DATE/TIME START: 11-6-17 / 1035		Oceanport, New Jersey	
DATE: —					DATE/TIME FINISH: 11-16-17 / 1045			
TIME: —					WEIGHT OF HAMMER: N/A			
MEAS. FROM: —					DROP OF HAMMER: N/A			
					TYPE OF HAMMER: N/A			
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS	
0			60/60		DRY BLACK GRAY (ASPHALT) FC ANGULAR GRAVEL			
					DRY BLACK GRAY (SUB-BASE) FC SAND SOME F GRAVEL			
1	PAR-83-SB-55-1-1.5				MOIST DK ORANGE DENSE SILTY SAND		1110	
2								
3	PAR-83-SB-55-3-3.5						1115	
4								
5			48/60		MOIST MOD DENSE OLIVE GRAY BROWN SILTY SAND			
6	PAR-83-SB-55-6-6.5						1120	
7					WET MOD STIFF LT GRAY-ORANGE TAN SANDY SILT			
8								
9					NO RECOVER			
10					end of boring			
Remarks:								
Sample Types				Consistency vs. Blowcount / Foot				
S - Split-Spoon				Granular (Sand & Gravel)				
U - Undisturbed Tube				Fine Grained (Silt & Clay)				
C - Rock Core				V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15				
A - Auger Cuttings				Loose: 4-10 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30				
				M. Dense: 10-30 M. Stiff: 4-8 Hard: >30				
				and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation				

BORING LOG						BORING NUMBER: P83-A1	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation			JOB NUMBER: 124976	
			LOCATION: Main Post, FTMM, NJ			CLIENT: USACE	
			CONTRACTOR: TVS			DRILLER: Frank Accorsi	
				FIELD REP: C.A			
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/14/07		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet): 3.0'		
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS		PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0			100%	GW	0-0.5' Gravel, Black 0.5-3' Sandy Clay with gravel, Tan Brown/Green		0.0
1	A1-A	0-0.5'		SM/GW			
2	A1-B	1.5-2.0'			3' Sand, Tan Brown, wet		0.0
3	A1-C	2.5-3.0'		SP			
4					End of Exploration		
4							
5							
6							
7							
8							
8							
9							
10							
11							
12							
12							
13							
14							
15							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig					SURFACE ELEVATION:		
TEMPORARY WELL INSTALLED: Yes					START DATE: 12/14/2007		
RISER FROM: NA TO: NA SCREEN FROM: 3' TO: 8'					END DATE: 12/14/2007		
NOTES:							
PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

BORING LOG						BORING NUMBER: P83-A2	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation			JOB NUMBER: 124976	
			LOCATION: Main Post, FTMM, NJ			CLIENT: USACE	
			CONTRACTOR: TVS			DRILLER: Frank Accorsi	
				FIELD REP: C.A			
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/14/07		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet): 4.0'		
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS	PID ppm	
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0			100%		0-0.5' asphalt, gravel 0.5-2' Gravel with sand, Tan Brown/Orange		
1	A2-A	0.5-1.0'		GW		0.0	
2	A2-B	1.5-2.0'				0.0	
3				SM	2.1-coal seam 2.3-4' Silty Sand, Green/Tan Brown, wet		
4	A2-C	3.5-4.0'					
4							
5					End of Exploration		
6							
7							
8							
8							
9							
10							
11							
12							
12							
13							
14							
15							
16							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig TEMPORARY WELL INSTALLED: No RISER FROM: NA TO: NA SCREEN FROM: NA TO: NA					SURFACE ELEVATION: START DATE: 12/14/2007 END DATE: 12/14/2007		
NOTES: PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

BORING LOG						BORING NUMBER: P83-A3	
SHAW ENVIRONMENTAL & INFRASTRUCTURE				PROJECT: US Army BRAC 2005 Site Investigation LOCATION: Main Post, FTMM, NJ		JOB NUMBER: 124976	
						CLIENT: USACE	
				CONTRACTOR: TVS		DRILLER: Frank Accorsi FIELD REP: C.A	

	SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER			
TYPE	Geoprobe MacroCore		---	DATE 12/14/07			
SIZE (ID)	2"		---				
HAMMER WEIGHT	NA		---	Groundwater Depth (feet):		3.5'	
HAMMER FALL	NA		---				

SAMPLE					DESCRIPTION OF MATERIALS	PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol		
0			100%		0-0.5' asphalt, gravel 0.5-1' Sand and Gravel 1-4' Sandy Clay, Green, wet	0.0
1	A3-A	0.5-1.0'		GW SM		0.0
2	A3-B	1.5-2.0'				0.0
3						
4	A3-C	3-3.5'			End of Exploration	
4						
5						
6						
7						
8						
8						
9						
10						
11						
12						
12						
13						
14						
15						
16						

DRILLING RIG TYPE: Truck-mounted Geoprobe Rig				SURFACE ELEVATION:			
TEMPORARY WELL INSTALLED: Yes				START DATE: 12/14/2007			
RISER FROM: NA TO: NA SCREEN FROM: 3' TO: 8'				END DATE: 12/14/2007			

NOTES: PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable						
--	--	--	--	--	--	--

BORING LOG						BORING NUMBER: P83-A4	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation			JOB NUMBER: 124976	
			LOCATION: Main Post, FTMM, NJ			CLIENT: USACE	
			CONTRACTOR: TVS			DRILLER: Frank Accorsi	
				FIELD REP: C.A			
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/14/07		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet): 3.5'		
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS		PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0			100%		0-0.5' asphalt, gravel 0.5-2' Gravel with sand, Tan Brown/Orange		0.0
1	A4-A	0.5-1.0'		GW			
2	A4-B	1.5-2.0'		SM			
3							
4	A4-C	3-3.5'			2-4' Silty Sand, Green/Tan Brown, wet		0.0
4							
5							
6							
7					End of Exploration		
8							
8							
9							
10							
11							
12							
12							
13							
14							
15							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig					SURFACE ELEVATION:		
TEMPORARY WELL INSTALLED: No					START DATE: 12/14/2007		
RISER FROM: NA TO: NA SCREEN FROM: NA TO: NA					END DATE: 12/14/2007		
NOTES:							
PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

BORING LOG						BORING NUMBER: P83-A5	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation			JOB NUMBER: 124976	
			LOCATION: Main Post, FTMM, NJ			CLIENT: USACE	
			CONTRACTOR: TVS			DRILLER: Frank Accorsi	
				FIELD REP: C.A			
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/14/07		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet): 6.5'		
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS	PID ppm	
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0			100%	SM	0-1' Silty Sand, Grey 1-4' Silty Sand, Tan Brown/Green		
	A5-A	0-0.5'				0.0	
1				SM			
2	A5-B	1.5-2.0'				0.0	
3							
4							
4				SM	4-6.5' Silty Sand, Tan Brown/Green 6.5-8' Sand and Silt with gravel, Brown, wet	0.0	
5							
6							
	A5-C	6-6.5'		SM/GP			
7							
8					End of Exploration		
8							
9							
10							
11							
12							
12							
13							
14							
15							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig					SURFACE ELEVATION:		
TEMPORARY WELL INSTALLED: Yes					START DATE: 12/14/2007		
RISER FROM: NA TO: NA SCREEN FROM: 5' TO: 10'					END DATE: 12/14/2007		
NOTES:							
PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

BORING LOG						BORING NUMBER: P83-B1	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation			JOB NUMBER: 124976	
			LOCATION: Main Post, FTMM, NJ			CLIENT: USACE	
			CONTRACTOR: TVS			DRILLER: Frank Accorsi	
					FIELD REP: C.A		
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/14/07		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet): 2.5'		
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS		PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0			100%	GP	0-0.5' Gravel and Sand, Black 0.5-2' Gravel and fines, Grey/Green		0.0
1	B1-A	0-0.5'		GM			
2	B1-B	1.5-2.0'			2-2.25' coal 2.25-2.5' granite and fines, white 2.5-4' Fines with Gravel, Grey Green/Brown, wet		0.0
3	B1-C	2-2.5'		GM			
4					End of Exploration		
4							
5							
6							
7							
8							
8							
9							
10							
11							
12							
12							
13							
14							
15							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig					SURFACE ELEVATION:		
TEMPORARY WELL INSTALLED: No					START DATE: 12/14/2007		
RISER FROM: NA TO: NA SCREEN FROM: NA TO: NA					END DATE: 12/14/2007		
NOTES:							
PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

BORING LOG						BORING NUMBER: P83-B1	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation			JOB NUMBER: 124976	
			LOCATION: Main Post, FTMM, NJ			CLIENT: USACE	
			CONTRACTOR: TVS			DRILLER: Frank Accorsi	
				FIELD REP: C.A			
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/14/07		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet): 3.0'		
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS	PID ppm	
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0			100%	SM	0-1' Sandy Silt		
	B2-A	0-0.5'				0.0	
1					1-1.25' coal		
				SM	1.25-3.75' Silt and Sand, Tan/Green, wet		
2	B2-B	1.5-2.0'				0.0	
3	B2-C	2.5-3.0'					
				SM	3.75-4' Sand and Silt, Dark Brown, wet		
4					End of Exploration		
4							
5							
6							
7							
8							
8							
9							
10							
11							
12							
12							
13							
14							
15							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig					SURFACE ELEVATION:		
TEMPORARY WELL INSTALLED: No					START DATE: 12/14/2007		
RISER FROM: NA TO: NA SCREEN FROM: NA TO: NA					END DATE: 12/14/2007		
NOTES:							
PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

BORING LOG						BORING NUMBER: P83-B3	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation			JOB NUMBER: 124976	
			LOCATION: Main Post, FTMM, NJ			CLIENT: USACE	
			CONTRACTOR: TVS			DRILLER: Frank Accorsi	
				FIELD REP: C.A			
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/15/07		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet): 3.5'		
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS		PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0	B3-A	0-0.5'	100%	SM	0-0.5' Sand and Silt with organics, Dark Brown 0.5-1' incinerator ash 1' coal layer 1.25-2.5' Sandy Silt 2.5' coal layer 2.5-4' Sandy Silt, Green/Tan, wet End of Exploration		
1							0.0
2							
	B3-B	1.5-2.0'					
3							0.0
4							
	B3-C	3-3.5'					
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig					SURFACE ELEVATION:		
TEMPORARY WELL INSTALLED: No					START DATE: 12/15/2007		
RISER FROM: NA TO: NA SCREEN FROM: NA TO: NA					END DATE: 12/15/2007		
NOTES:							
PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

BORING LOG						BORING NUMBER: P83-B4	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation LOCATION: Main Post, FTMM, NJ CONTRACTOR: TVS			JOB NUMBER: 124976	
						CLIENT: USACE	
			DRILLER: Frank Accorsi FIELD REP: C.A				
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/15/07		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet): 6.0'		
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS	PID ppm	
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0			100%	SM	0-0.5' Sand with silt with organics, Brown 0.5-1.5' Gravel and Sand, coal 1.5-4' Silt and Sand, Tan Grey		
1	B4-A	0-0.5'		GW		0.0	
2				SM			
3						0.0	
4							
4				SM/GP	4-6.5' Silty Sand with gravel, Tan Brown 6.5-8' Sand, Orange, wet End of Exploration	0.0	
5							
6	B4-C	5.5-6.0'		SP			
7							
8							
8							
9							
10							
11							
12							
12							
13							
14							
15							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig TEMPORARY WELL INSTALLED: No RISER FROM: NA TO: NA SCREEN FROM: NA TO: NA					SURFACE ELEVATION: START DATE: 12/15/2007 END DATE: 12/15/2007		
NOTES: PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

BORING LOG						BORING NUMBER: P83-B5	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation			JOB NUMBER: 124976	
			LOCATION: Main Post, FTMM, NJ			CLIENT: USACE	
			CONTRACTOR: TVS			DRILLER: Frank Accorsi	
				FIELD REP: C.A			
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/15/07		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet): 7.5'		
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS		PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0			100%		0-1' Asphalt		
1				SM			0.0
	B5-A	1-1.5'					
2	B5-B	1.5-2.0'		SM/GP			0.0
3					2-4' Silty Sand with gravel, Tan Brown		
4							
4				SM/GP			0.0
5							
6							
				SP	4-6.5' Silty Sand with gravel, Tan Brown		
7							
	B5-C	7-7.5'					
8							
8					6.5-8' Sand, Orange, wet		
9							
10							
11							
12							
					End of Exploration		
12							
13							
14							
15							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig					SURFACE ELEVATION:		
TEMPORARY WELL INSTALLED: No					START DATE: 12/15/2007		
RISER FROM: NA TO: NA SCREEN FROM: NA TO: NA					END DATE: 12/15/2007		
NOTES:							
PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

BORING LOG						BORING NUMBER: P83-SB1	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation			JOB NUMBER: 124976	
			LOCATION: Main Post, FTMM, NJ			CLIENT: USACE	
			CONTRACTOR: TVS			DRILLER: Frank Accorsi	
				FIELD REP: C.A			
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/19/07'		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet):		5.5'
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS		PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0			100%	SP	0-1' Sand with gravel, Brown		
	SB1-A	0-0.5'					
1				SM/GP			
					1-2.5' Silty Sand with gravel, Green Grey		
2	SB1-B	1.5-2.0'					
				SW	2.5-4' Sand, Brown		0.0
3							
4					4-8' Sand, Brown		
				SW			
4							
					wet		0.0
5	SB1-C	5-5.5'					
6					End of Exploration		
7							
8							
8							
9							
10							
11							
12							
12							
13							
14							
15							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig					SURFACE ELEVATION:		
TEMPORARY WELL INSTALLED: Yes					START DATE: 12/19/2007		
RISER FROM: NA TO: NA SCREEN FROM: 5' TO: 10'					END DATE: 12/19/2007		
NOTES:							
PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

BORING LOG						BORING NUMBER: P83-SB2	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation			JOB NUMBER: 124976	
			LOCATION: Main Post, FTMM, NJ			CLIENT: USACE	
			CONTRACTOR: TVS			DRILLER: Frank Accorsi	
				FIELD REP: C.A			
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/19/07'		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet):		5.5'
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS		PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0			100%	SW	0-1' Sand with gravel, Yellow		
	SB2-A	0-0.5'					
1				SM			
					1-2' Sand and Silt, Grey with Red		
2	SB2-B	1.5-2.0'		SW			
3					2-4' Sand, Brown/Yellow		
4							
4				SW	4-8' Sand, Brown		0.0
5							
	SB2-C	5-5.5'			wet		
6							
7					End of Exploration		
8							
8							
9							
10							
11							
12							
12							
13							
14							
15							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig					SURFACE ELEVATION:		
TEMPORARY WELL INSTALLED: No					START DATE: 12/19/2007		
RISER FROM: NA TO: NA SCREEN FROM: NA TO: NA					END DATE: 12/19/2007		
NOTES:							
PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

BORING LOG						BORING NUMBER: P83-SB3	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation			JOB NUMBER: 124976	
			LOCATION: Main Post, FTMM, NJ			CLIENT: USACE	
			CONTRACTOR: TVS			DRILLER: Frank Accorsi	
				FIELD REP: C.A			
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/17/07'		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet):		4.0'
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS		PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0			100%		0-1' asphalt		
1				SM			0.0
	SB3-A	1-1.5'		SM			
2	SB3-B	1.5-2.0'					
3					1-1.5' Sand and Silt, Brown Yellow 1.5-4' Silty Sand, Green/Grey, wet		0.0
4							
4	SB3-C	3.5-4.0'					
4					End of Exploration		
5							
6							
7							
8							
8							
9							
10							
11							
12							
12							
13							
14							
15							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig					SURFACE ELEVATION:		
TEMPORARY WELL INSTALLED: Yes					START DATE: 12/17/2007		
RISER FROM: NA TO: NA SCREEN FROM: 4' TO: 9'					END DATE: 12/17/2007		
NOTES:							
PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

BORING LOG						BORING NUMBER: P83-SB4	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation LOCATION: Main Post, FTMM, NJ CONTRACTOR: TVS			JOB NUMBER: 124976	
						CLIENT: USACE	
			DRILLER: Frank Accorsi FIELD REP: C.A				

		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/17/07'		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet):		4.0'
HAMMER FALL		NA		---			

SAMPLE					DESCRIPTION OF MATERIALS	PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol		
0			100%	SM	0-0.5' Silty Sand and organics 0.5-3' Sand and Silt, Black	0.0
1	SB4-A	0-0.5'		SM		
2						
3	SB4-B	1.5-2.0'			3-4' Silty Clay with sand, Green/Grey, wet	0.0
4				CL/SP		
4	SB4-C	3.5-4.0'				
4					End of Exploration	
5						
6						
7						
8						
8						
9						
10						
11						
12						
12						
13						
14						
15						
16						

DRILLING RIG TYPE: Truck-mounted Geoprobe Rig				SURFACE ELEVATION:	
TEMPORARY WELL INSTALLED: No				START DATE: 12/17/2007	
RISER FROM: NA TO: NA SCREEN FROM: NA TO: NA				END DATE: 12/17/2007	

NOTES: PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable	
--	--

BORING LOG						BORING NUMBER: P83-SB5	
SHAW ENVIRONMENTAL & INFRASTRUCTURE				PROJECT: US Army BRAC 2005 Site Investigation LOCATION: Main Post, FTMM, NJ		JOB NUMBER: 124976	
						CLIENT: USACE	
				CONTRACTOR: TVS		DRILLER: Frank Accorsi FIELD REP: C.A	

		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/18/07'		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet):		3.5'
HAMMER FALL		NA		---			

SAMPLE					DESCRIPTION OF MATERIALS	PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol		
0			100%	SM	0-0.75' Sandy Silt with organics 0.75-4' Silty Sand, Green Brown, little gravel	0.0
1	SB5-A	0-0.5'		SM		
2						
3	SB5-B	1.5-2.0'				
4						
4					wet End of Exploration	
5						
6						
7						
8						
8						
9						
10						
11						
12						
12						
13						
14						
15						
16						
16						

DRILLING RIG TYPE: Truck-mounted Geoprobe Rig				SURFACE ELEVATION:			
TEMPORARY WELL INSTALLED: Yes				START DATE: 12/18/2007			
RISER FROM: NA TO: NA SCREEN FROM: 4' TO: 9'				END DATE: 12/18/2007			

NOTES: PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable						
--	--	--	--	--	--	--

BORING LOG						BORING NUMBER: P83-SB6	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation			JOB NUMBER: 124976	
			LOCATION: Main Post, FTMM, NJ			CLIENT: USACE	
			CONTRACTOR: TVS			DRILLER: Frank Accorsi	
				FIELD REP: C.A			
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/18/07'		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet):		3.5'
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS		PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0			100%	GM	0-1.5' Quartz Gravel and Silty Sand		
	SB6-A	0-0.5'					0.0
1				SM	1.5-4' Silty Sand, Green Grey		
2	SB6-B	1.5-2.0'					0.0
3							
4	SB6-C	3-3.5'			wet End of Exploration		
4							
5							
6							
7							
8							
8							
9							
10							
11							
12							
12							
13							
14							
15							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig					SURFACE ELEVATION:		
TEMPORARY WELL INSTALLED: Yes					START DATE: 12/18/2007		
RISER FROM: NA TO: NA SCREEN FROM: 4' TO: 9'					END DATE: 12/18/2007		
NOTES:							
PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

BORING LOG						BORING NUMBER: P83-SB7	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation			JOB NUMBER: 124976	
			LOCATION: Main Post, FTMM, NJ			CLIENT: USACE	
			CONTRACTOR: TVS			DRILLER: Frank Accorsi	
				FIELD REP: C.A			
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/18/07'		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet):		2.5'
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS		PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0			100%	SM	0-1' Silty Sand and organics, Dark Brown 1-2.5' Silty Sand, Tan Brown 2.5-4' Gravel, wet End of Exploration		
	SB7-A	0-0.5'					0.0
1				SM			
2	SB7-B	1.5-2.0'					0.0
	SB7-C	2-2.5'		GW			
3							
4							
4							
5							
6							
7							
8							
8							
9							
10							
11							
12							
12							
13							
14							
15							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig					SURFACE ELEVATION:		
TEMPORARY WELL INSTALLED: Yes					START DATE: 12/18/2007		
RISER FROM: NA TO: NA SCREEN FROM: 4' TO: 9'					END DATE: 12/18/2007		
NOTES:							
PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

BORING LOG						BORING NUMBER: P83-SB8	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation			JOB NUMBER: 124976	
			LOCATION: Main Post, FTMM, NJ			CLIENT: USACE	
			CONTRACTOR: TVS			DRILLER: Frank Accorsi	
				FIELD REP: C.A			
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/19/07'		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet):		4.0'
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS		PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0			100%	GW	0-1' Sand and Gravel, Tan Grey 1-2' Sand and crushed Gravel, Black 2-3' Sand, Red Brown 3-4' Sandy Silt Clay, Grey/Green, wet End of Exploration		
	SB8-A	0-0.5'					0.0
1				SW/GP			
2	SB8-B	1.5-2.0'		SW		0.0	
3				CL			
4	SB8-C	3.5-4.0'					
4							
5							
6							
7							
8							
8							
9							
10							
11							
12							
12							
13							
14							
15							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig					SURFACE ELEVATION:		
TEMPORARY WELL INSTALLED: Yes					START DATE: 12/19/2007		
RISER FROM: NA TO: NA SCREEN FROM: 4' TO: 9'					END DATE: 12/19/2007		
NOTES:							
PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

BORING LOG						BORING NUMBER: P83-SB9	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation			JOB NUMBER: 124976	
			LOCATION: Main Post, FTMM, NJ			CLIENT: USACE	
			CONTRACTOR: TVS			DRILLER: Frank Accorsi	
					FIELD REP: C.A		
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/17/07'		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet):		4.5'
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS		PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0			100%		0-1' asphalt 1-2' Sand, Red Brown 2-4' no recovery		0.0
1	SB9-A	0.5-1.0'		SP			
2	SB9-B	1.5-2.0'					
3							
4							
4				SM	4-8' Silty Sand, Green wet		0.0
5	SB9-C	4.5-5.0'					
6							
7	SB10-D	6.5-7.0'					
8							
8					End of Exploration		
9							
10							
11							
12							
12							
13							
14							
15							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig					SURFACE ELEVATION:		
TEMPORARY WELL INSTALLED: No					START DATE: 12/17/2007		
RISER FROM: NA TO: NA SCREEN FROM: NA TO: NA					END DATE: 12/17/2007		
NOTES:							
PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

BORING LOG						BORING NUMBER: P83-SB10	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation			JOB NUMBER: 124976	
			LOCATION: Main Post, FTMM, NJ			CLIENT: USACE	
			CONTRACTOR: TVS			DRILLER: Frank Accorsi	
					FIELD REP: C.A		
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/15/07'		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet):		5.5'
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS		PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0			100%	SM/GP	0-0.5' Silty Sand and Gravel, Black 0.5-2' Silty Sand, Green/Tan 2-4' no recovery		
	SB10-A	0-0.5'		SM			0.0
1							
2	SB10-B	1.5-2.0'					0.0
3							
4							
4			100%	SM	4-8' Silty Sand, Black Green, strong petroleum odor wet		20.0
5							
6	SB10-C	5-5.5'					45.0
7	SB10-D	6.5-7.0'					
8					End of Exploration		
8							
9							
10							
11							
12							
12							
13							
14							
15							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig					SURFACE ELEVATION:		
TEMPORARY WELL INSTALLED: Yes					START DATE: 12/15/2007		
RISER FROM: NA TO: NA SCREEN FROM: 4' TO: 9'					END DATE: 12/15/2007		
NOTES:							
PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

BORING LOG						BORING NUMBER: P83-SB11	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation			JOB NUMBER: 124976	
			LOCATION: Main Post, FTMM, NJ			CLIENT: USACE	
			CONTRACTOR: TVS			DRILLER: Frank Accorsi	
				FIELD REP: C.A			
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/18/07'		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet):		3.5'
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS		PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0			100%	SM	0-1.5' Silty Sand, organics, Dark Brown		
	SB11-A	0-0.5'					0.0
1				GW			
2	SB11-B	1.5-2.0'		SM	1.5' Gravel 1.6-4' Silty Sand, Brown/Green		0.0
3							
	SB11-C	3-3.5'			wet End of Exploration		
4							
4							
5							
6							
7							
8							
8							
9							
10							
11							
12							
12							
13							
14							
15							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig					SURFACE ELEVATION:		
TEMPORARY WELL INSTALLED: No					START DATE: 12/18/2007		
RISER FROM: NA TO: NA SCREEN FROM: NA TO: NA					END DATE: 12/18/2007		
NOTES:							
PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

BORING LOG						BORING NUMBER: P83-SB12	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation			JOB NUMBER: 124976	
			LOCATION: Main Post, FTMM, NJ			CLIENT: USACE	
			CONTRACTOR: TVS			DRILLER: Frank Accorsi	
				FIELD REP: C.A			
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/17/07'		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet):		3.5'
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS		PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0			100%	GW	0-1' Sand and Gravel 1' coal, sand 1.25-2.5' Sandy Silt, Green/Orange 2.5-4' Silty Sand, Green/Grey, wet		0.0
1	SB12-A	0-0.5'					
2	SB12-B	1.5-2.0'		SM			0.0
3				SM			
4	SB12-C	3-3.5'			End of Exploration		
4							
5							
6							
7							
8							
8							
9							
10							
11							
12							
12							
13							
14							
15							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig					SURFACE ELEVATION:		
TEMPORARY WELL INSTALLED: Yes					START DATE: 12/17/2007		
RISER FROM: NA TO: NA SCREEN FROM: 4' TO: 9'					END DATE: 12/17/2007		
NOTES:							
PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

BORING LOG						BORING NUMBER: P83-SB13	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation			JOB NUMBER: 124976	
			LOCATION: Main Post, FTMM, NJ			CLIENT: USACE	
			CONTRACTOR: TVS			DRILLER: Frank Accorsi	
				FIELD REP: C.A			
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/17/07'		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet):		4.0'
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS		PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0			100%	SM	0-1.5' Silty Sand and organics		
	SB13-A	0-0.5'					0.0
1							
				SM/GP			
2	SB13-B	1.5-2.0'			1.5-4' Silty Sand with gravel, wet		0.0
3							
4							
4	SB13-C	3.5-4.0'			End of Exploration		
4							
5							
6							
7							
8							
9							
10							
11							
12							
12							
13							
14							
15							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig					SURFACE ELEVATION:		
TEMPORARY WELL INSTALLED: No					START DATE: 12/17/2007		
RISER FROM: NA TO: NA SCREEN FROM: NA TO: NA					END DATE: 12/17/2007		
NOTES:							
PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

BORING LOG						BORING NUMBER: P83-SB14	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation			JOB NUMBER: 124976	
			LOCATION: Main Post, FTMM, NJ			CLIENT: USACE	
			CONTRACTOR: TVS			DRILLER: Frank Accorsi	
				FIELD REP: C.A			
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/18/07'		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet):		3.5'
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS		PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0			100%	SP	0-0.5' Sand and organics, Brown 0.5-1.5' Sand, Black, Gravel, White		0.0
1	SB14-A	0-0.5'		SW/GW			
2				SP			
2	SB14-B	1.5-2.0'					
3				SM	1.5-2.5' Sand and ash, Black 2.5-3.5' Sands with silt, Brown		0.0
3							
4	SB14-C	3-3.5'		SP	3.5-4' Sand, Red, wet End of Exploration		
4							
4							
5							
6							
7							
8							
8							
9							
10							
11							
12							
12							
13							
14							
15							
16							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig					SURFACE ELEVATION:		
TEMPORARY WELL INSTALLED: Yes					START DATE: 12/18/2007		
RISER FROM: NA TO: NA SCREEN FROM: 4' TO: 9'					END DATE: 12/18/2007		
NOTES:							
PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

BORING LOG						BORING NUMBER: P83-SB15	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation			JOB NUMBER: 124976	
			LOCATION: Main Post, FTMM, NJ			CLIENT: USACE	
			CONTRACTOR: TVS			DRILLER: Frank Accorsi	
				FIELD REP: C.A			
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/18/07'		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet):		3.5'
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS		PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0			100%	SM	0-0.5' Sand and Silt and organics, Brown 0.5-0.75' Sand, Black 0.75-1' Sand, Red Orange 1-2.5' Silty Sand, Green Brown 2.5-4' Silty Sand, Yellow Brown wet End of Exploration		
	SB15-A	0-0.5'		SP			0.0
1				SW			
				SM			
2	SB15-B	1.5-2.0'					0.0
				SM			
3							
	SB15-C	3-3.5'					
4							
4							
5							
6							
7							
8							
8							
9							
10							
11							
12							
12							
13							
14							
15							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig					SURFACE ELEVATION:		
TEMPORARY WELL INSTALLED: No					START DATE: 12/18/2007		
RISER FROM: NA TO: NA SCREEN FROM: NA TO: NA					END DATE: 12/18/2007		
NOTES:							
PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

BORING LOG						BORING NUMBER: P83-SB16	
SHAW ENVIRONMENTAL & INFRASTRUCTURE				PROJECT: US Army BRAC 2005 Site Investigation LOCATION: Main Post, FTMM, NJ		JOB NUMBER: 124976	
						CLIENT: USACE	
				CONTRACTOR: TVS		DRILLER: Frank Accorsi FIELD REP: C.A	

		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/19/07'		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet):		2.5'
HAMMER FALL		NA		---			

SAMPLE					DESCRIPTION OF MATERIALS	PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol		
0			100%	SW/GW	0-1.5' Sand and Gravel, Black/Brown 1.5-2' Silty Sand, and granite Gravel, Black/Green 2-4' Silty Sand, Green Brown, wet	0.0
	SB16-A	0-0.5'				
1				SM/GM		
2	SB16-B	1.5-2.0'		SM		
	SB16-C	2-2.5'				
3						
4					End of Exploration	
4						
5						
6						
7						
8						
8						
9						
10						
11						
12						
12						
13						
14						
15						
16						

DRILLING RIG TYPE: Truck-mounted Geoprobe Rig				SURFACE ELEVATION:	
TEMPORARY WELL INSTALLED: No				START DATE: 12/19/2007	
RISER FROM: NA	TO: NA	SCREEN FROM: NA	TO: NA	END DATE: 12/19/2007	

NOTES: PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable	
--	--

BORING LOG						BORING NUMBER: P83-SB17	
SHAW ENVIRONMENTAL & INFRASTRUCTURE			PROJECT: US Army BRAC 2005 Site Investigation			JOB NUMBER: 124976	
			LOCATION: Main Post, FTMM, NJ			CLIENT: USACE	
			CONTRACTOR: TVS			DRILLER: Frank Accorsi	
					FIELD REP: C.A		
		SAMPLER	CASING	CORE BARREL	DEPTH OF GROUNDWATER		
TYPE		Geoprobe MacroCore		---	DATE 12/19/07'		
SIZE (ID)		2"		---			
HAMMER WEIGHT		NA		---	Groundwater Depth (feet):		6.0'
HAMMER FALL		NA		---			
SAMPLE					DESCRIPTION OF MATERIALS		PID ppm
DEPTH (feet)	No.	DEPTH	REC	USC Symbol			
0			100%	SP/GW	0-0.5' Sand and Gravel, Black 0.5-1' Silty Sand with gravel, Green Grey 1-3.75' Silty Sand, Green Grey		
	SB17-A	0-0.5'		SM/GW			0.0
1				SM			
2	SB17-B	1.5-2.0'			3.75-4' Sand, Brown Orange		0.0
3				SP			
4					4-8' Sand, Brown Orange		
				SP			0.0
4							
5					wet		
6	SB17-C	5.5-6.0'					
7					End of Exploration		
8							
8							
9							
10							
11							
12							
12							
13							
14							
15							
16							
DRILLING RIG TYPE: Truck-mounted Geoprobe Rig					SURFACE ELEVATION:		
TEMPORARY WELL INSTALLED: Yes					START DATE: 12/19/2007		
RISER FROM: NA TO: NA SCREEN FROM: 6' TO: 11'					END DATE: 12/19/2007		
NOTES:							
PID measurements were taken in 6" intervals Depths measured from ground surface NA=not applicable							

APPENDIX C

Historical Information

This page intentionally left blank.

3.21 Parcel 83 – Northeast MP – Former Photoprocessing, Former Vehicle Maintenance, Former Coal Storage and Railroad Unloading, Maintenance Shops

3.21.1 Site Description

This parcel is located in the northeastern portion of the MP and is associated with numerous current and former industrial processes and motor pool operations, including: former vehicle wash platforms; former photoprocessing and printing plants; current and former vehicle maintenance areas; former heating plants; former refrigerant repair; former coal storage; and current and former carpentry, plumbing, and electrical shops.

Historic motor pool operations associated with this parcel include activities at former Bldg 44; former Bldgs 64, 159, 161, and 163; and Bldg 166. Former building locations are depicted on Plan No. 504 – Sanitary Sewer System (1944) provided in **Appendix G**. Former Bldg 44 was a motor vehicle maintenance and repair facility per the 1980 Installation Assessment (40). The building was located directly east of the southeast corner of Bldg 116. No other information was obtained for this former building during record searches. Former Bldg 64, located north of Bldg 167, was identified as a motor vehicle and heavy equipment repair facility in the 1950s (16,25). Former Bldgs 159, 159a, 159b were the roads and grounds shop with motor vehicle and large equipment repair facilities located in the northeast corner of the MP behind Bldgs 167 and 173. U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) archive reports noted motor pool operations in this building including testing and tuning of engines, cleaning of parts with kerosene, steam cleaning using alkali products, acetylene welding, and general automotive maintenance (24,25). Former Bldgs 161 and 163 served as the Post transportation motor pool and were located directly south of Bldg 159. USACHPPM archives noted motor pool operations in this building, including testing and tuning engines, battery charging, acetylene welding, parts cleaning with kerosene, and outdoor steam cleaning of vehicles with alkaline cleaners (16,24,25,41). Bldg 166 was formerly a motor vehicle repair shop for maintenance and repair of large diesel engines, including charging and filling of batteries with sulfuric acid.

Former Bldg 197 was utilized for lawn mower repair, and a 1993 USAEHA air report lists a TCE parts cleaner having been present at this facility (35). Bldg 197 was formerly located across the street from Bldg 280 in the northern portion of the MP.

Bldg 279 is a former vehicle repair shop and currently houses heating, ventilation, and air conditioning (HVAC) and plumbing shops. The HVAC portion of the building is where vehicle maintenance was formerly conducted. Operations described included vehicle testing and repair, parts cleaning and battery charging (15,16,24,25,30,39). Motor Pool operations included former waste oil ASTs and TCE parts cleaners. All TCE parts cleaners were eliminated from use (MP and CWA) in February 1994 under Environmental Program Requirements Project FM0094F088.

Historically, Bldg 280 has been used as a carpentry shop in support of post maintenance. The building has also been used as a paint shop including use and storage of paint thinner, lead-based paint, oil-based paint, aerosol paint cans, and aerosol solvent cans. According to the 1999 chemical inventory, this building also housed a welding shop. Machining, grinding, welding, soldering, and blacksmithing have also been reported in Bldg 280 since the 1950s (15,24). At the time of the 2006 VSIs, Bldg 280 was still utilized as carpentry and metals/welding shops.

Bldg 281 was used for repairing refrigerant-containing equipment from the 1950s into the 1970s. Chemicals utilized included carbon tetrachloride, Freon (and other refrigerants), methyl chloride, sulfur dioxide, Varsol, and methyl chloroform (trichloroethane). Bldg 281 also housed a machine shop where machining and blacksmithing was performed, and silver brazing occasionally using cadmium-containing brazing wire was reported in 1973.

Bldg 483 was historically used for soldering and parts cleaning using organic solvents and dry cleaning fluid. Bldg 483 was demolished prior to 1997. Bldg 485 was used for the cleaning and repair of electrical equipment. Historical operational use of the building included using organic solvents (15,16,25,39). Bldg 485 was demolished in 1997 (42).

Solvents were previously used for cleaning vehicle parts at various locations throughout FTMM. Both the military and its contractors operated solvent parts cleaners. These solvent parts cleaners consisted of a tank and sink with a nozzle. The military used Super Agitine in its parts cleaners, while the contractor used Siloo Tyme II. Each parts cleaner held about 30 gallons of fluid, which was reused until it needed changing. Fluid changes occurred every 4 months to every 3 years depending on location and usage (35).

The potential for a release to the environment from shop operations includes the use of solvents, petroleum products, and metals when waste handling procedures may not have been sufficiently protective to preclude a release to the environment. Additional information pertaining to this parcel can be found in Section 3.3, Section 3.4.1.1, Table 3-3, Section 4.3.2.1.1, Section 4.3.2.1.2, Section 4.3.2.1.3, Section 4.3.2.1.7, Section 5.1.1, Section 5.1.1.2, Section 5.1.1.2.1, Section 5.1.1.2.3, Section 5.2.1, Section 5.4.2, Section 5.5.2, Section 5.8, Section 5.12, Section 5.13.1, Section 5.13.3, Section 5.13.8, Table 5-2, Table 5-5, Table 5-16, Appendix E, Appendix G, and Appendix J of the Phase I ECP (1).

Historic site plans, aerial photographs, and information obtained during personnel interviews indicate a coal storage area formerly existed adjacent to the RR in the northern-most portion of the Parcel 83 in the vicinity of Bldg 75. The potential coal storage area was identified along the RR line in aerial photographs taken in 1940, 1947, 1969, 1970, and 1974.

Electrical transformers were previously stored in an area east of Bldg 173 in the early to mid-1990s. The transformers were either new or in workable condition and classified as

Non-PCB. All transformers were removed from the area in the mid-1990s, but no environmental sampling has been conducted in the area.

Data gaps identified to be investigated in Parcel 83 include potential historic releases from former motor vehicle maintenance and repair facilities (Bldg 166 and former Bldgs 44, 64, 159, 161, 163, 197, and 483), previous shop activities (Bldgs 279, 280, 281, and former Bldg 485), the previous coal storage area, and the former electrical transformer storage location east of Bldg 173.

3.21.2 Previous Investigations

Specific activities and buildings identified in this parcel have not been previously investigated.

3.21.3 Site Investigation Sampling

The following soil and groundwater sampling was conducted in order to determine the impact of historic building operations in the area of former vehicle maintenance and shop facilities. See **Table 3.21-1** for a summary of field activities and **Figure 3.21-1** for sample locations.

Geoprobe® Investigation

Soil and groundwater samples were collected in December 2007 throughout Parcel 83. A total of 27 surface and 33 subsurface soil samples (including five duplicate samples) were collected from 27 distinct Geoprobe® borings (**Figure 3.21-1**). Surface soil samples for non-VO analysis were collected from the 0- to 6-inch interval bgs. For borings located in paved areas, non-VO surface soil samples were collected from the 0- to 6-inch interval directly below the pavement sub-base. Surface soil samples collected for VO analysis were collected from the 18- to 24-inch bgs interval. Subsurface soil samples were collected from the 6-inch interval directly above the water table. Field screening of soil boring cores was conducted using a PID/FID meter. Olfactory evidence of impacted soil was noted at boring location P83-SB10 and one additional subsurface sample P83-SB10-D was collected.

A total of 14 groundwater samples (including two duplicate samples) were collected from 12 distinct temporary wells that were installed with the Geoprobe® rig (**Figure 3.21-1**), and one groundwater sample was collected from existing well 161MW01. Temporary wells were installed downgradient of site-specific AOCs and were constructed of PVC with 5 ft of factory-slotted screen.

Surface Soil Investigation

Surface soil samples were collected in December 2007 in Parcel 83. Samples were collected in order to determine if any contamination exists from potential electrical transformer releases. A total of four surface soil samples were collected from four distinct hand augered borings located east of Bldg 173 at a former electrical transformer

storage location (**Figure 3.21-1**). Surface soil samples for non-VO analysis were collected from the 0- to 6-inch interval bgs.

Table 3.21-1 presents a summary of all field activities, and all sample locations are provided on **Figure 3.21-1**. A summary of sampling activities, including sample IDs, collection dates, analytical parameters, and methods of analysis, is provided in **Table 3.21-2**.

Table 3.21-1
Parcel 83 Sampling Location, Rationale and Analytical

Sample Location	Sample Media	Sample Location Rationale	Analytical Suite
83SS-A1 through 83SS-B5 (10 samples)	Surface soil	Soil samples were collected from the 0- to 6-inch bgs interval from the Geoprobe® soil boring grid (conducted on 100-ft centers) to investigate the former coal storage location. If the sample location was paved, the sample was collected from the 0- to 6-inch interval below the pavement sub-base.	TCL+30 (w/o pesticides), TAL Metals
83SB-A1 through 83SB-B5 (12 samples – includes 2 duplicate samples)	Subsurface soil	Soil samples were collected from the 6-inch interval directly above the water table (depths ranging from 2.0 to 6.0 ft bgs) from each Geoprobe® soil boring in the grid (conducted on 100-ft centers) to investigate the former coal storage location. Field screening of the entire Geoprobe® soil core was conducted using PID and FID meters.	TCL+30 (w/o pesticides), TAL Metals
83GW-A1, A3, A5 (4 samples – includes 1 duplicate sample)	Groundwater	Groundwater samples were collected from the specified Geoprobe® soil borings in the grid to investigate the former location of coal storage.	TCL+30 (w/o pesticides/PCBs), TAL Metals
83SS-1 and 2 (2 samples)	Surface soil	Soil samples were collected from the 0- to 6-inch bgs interval from Geoprobe® borings located in the vicinity of former Bldg 44 – motor vehicle maintenance and repair facility.	TCL+30 (w/o pesticides), TAL Metals
83SB-1 and 2 (3 samples – includes 1 duplicate sample)	Subsurface soil	Soil samples collected from the 6-inch interval directly above the water table (depth 5.0 to 5.5 ft bgs) from Geoprobe® borings located in the vicinity of former Bldg 44 – motor vehicle maintenance and repair facility. Field screening of the entire Geoprobe® soil core was conducted using PID and FID meters.	TCL+30 (w/o pesticides), TAL Metals
83GW-1 (2 samples – includes 1 duplicate sample)	Groundwater	A groundwater sample was collected from the vicinity of former Bldg 44 – motor vehicle maintenance and repair facility.	TCL+30 (w/o pesticides/PCBs), TBA

Sample Location	Sample Media	Sample Location Rationale	Analytical Suite
83SS-3:7 (5 samples)	Surface soil	Soil samples were collected from the 0- to 6-inch bgs interval from Geoprobe® borings located south of Bldg 159 and east of Bldgs 167 and 173 to evaluate previous motor repair and fueling activities at former Bldgs 64, 159, 161 and 163.	TCL+30 (w/o pesticides), TAL Metals
83SB-3 through 83SB-7 (6 samples – includes 1 duplicate sample)	Subsurface soil	Soil samples were collected from the 6-inch interval directly above the water table (depths ranging from 2.5 to 4.0 ft bgs) from Geoprobe® borings located south of Bldg 159 and east of Bldgs 167 and 173 to evaluate previous motor repair and fueling activities at former Bldgs 64, 159, 161, and 163. Field screening of the entire Geoprobe® soil core was conducted using PID/FID meters.	TCL+30 (w/o pesticides), TAL Metals
83GW-3, 5, 7 and monitoring well 161MW01 (4 samples)	Groundwater	Groundwater samples were collected from the vicinity of former motor repair and fueling activities at former Bldgs 64, 159, 161 and 163.	TCL+30 (w/o pesticides/PCBs), TBA 161MW01 also included PCBs but not pesticides
83SS-8 (1 sample)	Surface soil	A soil sample was collected from the 0- to 6-inch bgs interval from Geoprobe® borings located directly east of service door entrance to Bldg 166 to evaluate potential release from historical motor vehicle maintenance and repair activities that occurred in the building.	TCL+30 (w/o pesticides), TAL Metals
83SB-8 (1 sample)	Subsurface soil	A soil sample was collected from the 6-inch interval directly above the water table (depth 3.5 to 4.0 ft bgs) from Geoprobe® borings located directly east of service door entrance to Bldg 166 to evaluate potential release from historical motor vehicle maintenance and repair activities that occurred in the building. Field screening of the entire Geoprobe® soil core was conducted using PID/FID meters.	TCL+30 (w/o pesticides), TAL Metals
83GW-8 (1 sample)	Groundwater	A groundwater sample was collected from a Geoprobe® boring located directly east of service door entrance to Bldg 166 to evaluate potential release from historical motor vehicle maintenance and repair activities that occurred in the building.	TCL+30 (w/o pesticides/PCBs), TBA
83SS-9:11 (3 samples)	Surface soil	Soil samples were collected from the 0- to 6-inch bgs interval from Geoprobe® borings located in vicinity of service entrances to Bldgs 279 and 280 to evaluate potential releases from previous vehicle maintenance and shop activities.	TCL+30 (w/o pesticides), TAL Metals

Sample Location	Sample Media	Sample Location Rationale	Analytical Suite
83SB-9, 10, and 11 (4 samples)	Subsurface soil	Soil samples were collected from the 6-inch interval directly above the water table (depths ranging from 3.0 to 7.0 ft bgs) from Geoprobe® borings located in vicinity of service entrances to Bldgs 279 and 280 to evaluate potential releases from previous vehicle maintenance and shop activities. Field screening of the entire Geoprobe® soil core was conducted using PID/FID meters.	TCL+30 (w/o pesticides), TAL Metals
83GW-10 (1 sample)	Groundwater	A groundwater sample was collected from a Geoprobe® boring located in vicinity of service entrances to Bldg 279 to evaluate potential releases from previous vehicle maintenance and shop activities.	TCL+30 (w/o pesticides/PCBs), TBA
83SS-12 and 13 (2 samples)	Surface soil	Soil samples were collected from the 0- to 6-inch bgs interval from Geoprobe® borings located in vicinity of Bldg 281 and former Bldg 485 to evaluate potential releases from previous HVAC maintenance and solvent cleaning activities.	TCL+30 (w/o pesticides), TAL Metals
83SB-12 and 13 (2 samples)	Subsurface soil	Soil samples were collected from the 6-inch interval directly above the water table (depths ranging from 3.0 to 4.0 ft bgs) from Geoprobe® borings located in vicinity of Bldg 281 and former Bldg 485 to evaluate potential releases from previous HVAC maintenance and solvent cleaning activities. Field screening of the entire Geoprobe® soil core was conducted using PID/FID meters.	TCL+30 (w/o pesticides), TAL Metals
83GW-12 (1 sample)	Groundwater	A groundwater sample was collected from a Geoprobe® boring located in vicinity of Bldg 281 and former Bldg 485 to evaluate potential releases from previous HVAC maintenance and solvent cleaning activities.	TCL+30 (w/o pesticides/PCBs)
83SS-14 through 83SS-17 (4 samples)	Surface soil	Soil samples were collected from the 0- to 6-inch bgs interval from Geoprobe® borings located in vicinity of former Bldgs 197 and 483 to evaluate potential releases from previous engine maintenance and solvent cleaning activities.	TCL+30 (w/o pesticides), TAL Metals
83SB-14 through 83SB-17 (5 samples – includes 1 duplicate sample)	Subsurface soil	Soil samples were collected from the 6-inch interval directly above the water table (depths ranging from 2.0 to 6.0 ft bgs) from Geoprobe® borings located in vicinity of former Bldgs 197 and 483 to evaluate potential releases from previous engine maintenance and solvent cleaning activities. Field screening of the entire Geoprobe® soil core was conducted using PID/FID meters.	TCL+30 (w/o pesticides), TAL Metals

Sample Location	Sample Media	Sample Location Rationale	Analytical Suite
83GW-14, 83GW-17 (2 samples)	Groundwater	Groundwater samples were collected from Geoprobe® borings located in vicinity of former Bldgs 197 and 483 to evaluate potential releases from previous engine maintenance solvent cleaning activities.	TCL+30 (w/o pesticides/PCBs), TBA
83SS-18 through 83SS-21 (4 samples)	Surface soil	Soil samples were collected from the 0- to 6-inch bgs interval to investigate the former electrical transformer storage location east of Bldg 173.	PCBs, TPHC

Geoprobe® Investigation Results

Soil

As summarized in **Table 3.21-4**, a total of nine VOs, 25 B/Ns, and 21 metals were detected in Parcel 83 soil samples. The VOs were detected at concentrations below the NJDEP NRDCSCC. Four of the 25 B/Ns detected in soil (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, and dibenz[a,h]anthracene) were detected in nine soil samples (P83-A1-A, P83-A2-A, P83-A3-A, P83-A4-A, P83-B3-A, P83-B5-A, P83-SB4-A, P83-SB9-C, and P83-SB12-A) at concentrations exceeding NJDEP NRDCSCC and their respective MPBC. Of the 21 metals detected, two (arsenic and lead) were detected at concentrations exceeding NJDEP NRDCSCC and their respective MPBC. The parent material at FTMM is glauconitic soil of the Tinton and Red Bank sands and their fluvially- and tidally-reworked equivalents (47). Total arsenic levels in glauconite-bearing soils in New Jersey have been reported to range up to 131 mg/kg, with a median concentration of 30 mg/kg (21). Anthropogenic influences on arsenic levels in the soil include the use of pesticides and herbicides. Arsenic was a common constituent of herbicides and pesticides in the past. As a result of these natural and anthropogenic influences, arsenic is not considered a COC in soil. One metal (lead) and four B/Ns (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, and dibenzo[a]anthracene) are identified as COCs in soil at Parcel 83.

Groundwater

As shown in **Table 3.21-5**, seven VOs were detected in Parcel 83 groundwater samples. All seven VOs (acetone, carbon disulfide, 1,2-dichloroethane, MTBE, TBA, toluene, and xylenes) were detected at concentrations below the NJDEP GWQC.

A total of 13 B/Ns were detected in Parcel 83 groundwater samples. Of the 13 B/Ns detected, bis(2-ethylhexyl)phthalate was the only compound detected above the GWQC of 3 µg/L. It was detected in P83-A1 at a concentration of 5.00 µg/L and in the duplicate sample from this location P83-A1DUP at a concentration of 4.00 µg/L. A commonly used plasticizer, bis(2-ethylhexyl)phthalate, is present in a wide variety of plastic products, is commonly detected in field and laboratory QC samples, and was detected

at a low concentration in the field and method blanks associated with P83-A1. Therefore, it is not considered a COC in groundwater at Parcel 83.

A total of 18 metals were detected in Parcel 83 groundwater samples. Of the 18 metals detected, five (aluminum, arsenic, iron, manganese, and sodium) were detected above the respective GWQC.

Four common, naturally occurring metal constituents, aluminum, iron, manganese, and sodium, were detected in Parcel 83 groundwater samples. Due to the naturally elevated levels of these native metals in the groundwater, aluminum, iron, and manganese are not considered COCs.

Arsenic was detected at a concentration exceeding the NJDEP GWQC of 3 µg/L in one sample, P83-A1 DUP (5.04 µg/L). The other groundwater sample collected at this location had an arsenic detection below the GWQC. The arsenic concentrations did not exceed the MPBC of 89.3 µg/L. In addition, arsenic is associated with the native glauconitic sands (48). The elevated arsenic concentrations in the native soil in turn influence the arsenic levels in groundwater. Thus, arsenic is not considered a COC in groundwater.

Surface Soil (hand auger) Investigation Results

Surface soil samples collected via hand auger were analyzed for PCBs and TPHC.

As summarized in **Table 3.21-3**, TPHC was detected in three of the four surface soil samples. TPHC was detected at concentrations below the NJDEP NRDCSCC and RDCSCC in all three surface soil samples. No PCBs were detected in the four samples.

3.21.4 Summary and Conclusions

Further evaluation is recommended for COCs identified in soil (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, dibenz[a,h]anthracene, and lead). No COCs were identified in groundwater within Parcel 83. Benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, and dibenz[a,h]anthracene are PAHs. PAHs are contained in asphalt and are commonly detected in soil under asphalt pavement. Re-collection of samples at locations that are currently paved and/or were paved in the past will be conducted as part of the further evaluation to determine if the PAHs detected in soil are attributable to asphalt.

**Table 3.21-2
Parcel 83 Sample and Analytical Summary**

Media	Type	Field Sample #	Sample Date	Sample Time	Begin Depth	End Depth	TPHC	VO+15	BN+15	PCBs	TAL Metals	Cyanide	Mercury	Ammonia/ Nitrate/ Nitrite	COMMENTS/VARIANCES
BLANK	TRIP	TRIP BLANK-SO	12/14/07	-	--	--		X							
SOIL	GEOPROBE	P83-A1-A	12/14/07	8:20	0.0	0.5			X	X	X				
SOIL	GEOPROBE	P83-A1-B	12/14/07	8:25	1.5	2.0		X							
SOIL	GEOPROBE	P83-A1-C	12/14/07	8:30	2.5	3.0		X	X	X	X				
SOIL	GEOPROBE	P83-A2-A	12/14/07	9:40	0.5	1.0			X	X	X				Sample depth in field documentation was recorded from top of soil. Reported bgs depths adjusted to account for surface asphalt and sub-base.
SOIL	GEOPROBE	P83-A2-B	12/14/07	9:50	1.5	2.0		X							
SOIL	GEOPROBE	P83-A2-C	12/14/07	10:00	3.5	4.0		X	X	X	X				Sample depth in field documentation was recorded from top of soil. Reported bgs depths adjusted to account for surface asphalt and sub-base.
SOIL	GEOPROBE	P83-A3-A	12/14/07	10:40	0.5	1.0			X	X	X				Sample depth in field documentation was recorded from top of soil. Reported bgs depths adjusted to account for surface asphalt and sub-base.
SOIL	GEOPROBE	P83-A3-B	12/14/07	10:50	1.5	2.0		X							
SOIL	GEOPROBE	P83-A3-C	12/14/07	11:00	3.0	3.5		X	X	X	X				Sample depth in field documentation was recorded from top of soil. Reported bgs depths adjusted to account for surface asphalt and sub-base.
SOIL	GEOPROBE	P83-A4-A	12/14/07	11:35	0.0	0.5			X	X	X				
SOIL	GEOPROBE	P83-A4-B	12/14/07	11:45	1.5	2.0		X							
SOIL	GEOPROBE	P83-A4-C	12/14/07	11:55	3.0	3.5		X	X	X	X				
SOIL	GEOPROBE	P83-A5-A	12/14/07	12:20	0.0	0.5			X	X	X				
SOIL	GEOPROBE	P83-A5-B	12/14/07	12:30	1.5	2.0		X							
SOIL	GEOPROBE	P83-A5-C	12/14/07	12:40	6.0	6.5		X	X	X	X				
SOIL	GEOPROBE	P83-B1-A	12/14/07	13:50	0.0	0.5			X	X	X				
SOIL	GEOPROBE	P83-B1-B	12/14/07	14:00	1.5	2.0		X							
SOIL	GEOPROBE	P83-B1-C	12/14/07	14:10	2.0	2.5		X	X	X	X				
SOIL	GEOPROBE	P83-B1-C DUPLICATE	12/14/07	14:10	2.0	2.5		X	X	X	X				
BLANK	FIELD	FIELD BLANK-SO	12/14/07	14:20	--	--		X	X	X	X				
SOIL	GEOPROBE	P83-B2-A	12/14/07	14:40	0.0	0.5			X	X	X				
SOIL	GEOPROBE	P83-B2-B	12/14/07	14:50	1.5	2.0		X							
SOIL	GEOPROBE	P83-B2-C	12/14/07	15:00	2.5	3.0		X	X	X	X				

**Table 3.21-2
Parcel 83 Sample and Analytical Summary**

Media	Type	Field Sample #	Sample Date	Sample Time	Begin Depth	End Depth	TPHC	VO+15	BN+15	PCBs	TAL Metals	Cyanide	Mercury	Ammonia/ Nitrate/ Nitrite	COMMENTS/VARIANCES
SOIL	GEOPROBE	P83-B3-A	12/15/07	8:40	0.0	0.5			X	X	X				
SOIL	GEOPROBE	P83-B3-B	12/15/07	8:50	1.5	2.0		X							
SOIL	GEOPROBE	P83-B3-C	12/15/07	9:00	3.0	3.5		X	X	X	X				
BLANK	TRIP	TRIP BLANK	12/15/07	-	--	--		X							
SOIL	GEOPROBE	P83-B4-A	12/15/07	9:30	0.0	0.5			X	X	X				
SOIL	GEOPROBE	P83-B4-B	12/15/07	9:40	1.5	2.0		X							
SOIL	GEOPROBE	P83-B4-C	12/15/07	9:50	5.5	6.0		X	X	X	X				
SOIL	GEOPROBE	P83-B5-A	12/15/07	10:30	1.0	1.5			X	X	X				Sample depth in field documentation was recorded from top of soil. Reported bgs depths adjusted to account for surface asphalt and sub-base.
SOIL	GEOPROBE	P83-B5-B	12/15/07	10:40	1.5	2.0		X							
SOIL	GEOPROBE	P83-B5-C	12/15/07	10:50	7.0	7.5		X	X	X	X				Sample depth in field documentation was recorded from top of soil. Reported bgs depths adjusted to account for surface asphalt and sub-base.
SOIL	GEOPROBE	P83-B5-C DUPLICATE	12/15/07	10:50	7.0	7.5		X	X	X	X				Sample depth in field documentation was recorded from top of soil. Reported bgs depths adjusted to account for surface asphalt and sub-base.
SOIL	GEOPROBE	P83-SB10-A	12/15/07	11:50	0.0	0.5			X	X	X				
SOIL	GEOPROBE	P83-SB10-B	12/15/07	12:00	1.5	2.0		X							
SOIL	GEOPROBE	P83-SB10-C	12/15/07	12:10	5.0	5.5		X	X	X	X				
SOIL	GEOPROBE	P83-SB10-D	12/15/07	12:20	6.5	7.0		X	X	X	X				TPHC collected due to elevated field screening results.
BLANK	FIELD	FIELD BLANK	12/15/07	12:15	--	--		X	X	X	X				Mercury analyzed out of holding time.
BLANK	TRIP	TRIP BLANK-SO	12/17/07	8:30	--	--		X							
BLANK	FIELD	FIELD BLANK-SO	12/17/07	16:00	--	--		X	X	X	X				
SOIL	GEOPROBE	P83-SB9-A	12/17/07	10:50	1.0	1.5			X	X	X				Sample depth in field documentation was recorded from top of soil. Reported bgs depths adjusted to account for surface asphalt and sub-base.
SOIL	GEOPROBE	P83-SB9-B	12/17/07	11:00	1.5	2.0		X							
SOIL	GEOPROBE	P83-SB9-C	12/17/07	11:10	4.5	5.0		X	X	X	X				Sample depth in field documentation was recorded from top of soil. Reported bgs depths adjusted to account for surface asphalt and sub-base.
SOIL	GEOPROBE	P83-SB13-A	12/17/07	11:40	0.0	0.5			X	X	X				
SOIL	GEOPROBE	P83-SB13-B	12/17/07	11:50	1.5	2.0		X							

**Table 3.21-2
Parcel 83 Sample and Analytical Summary**

Media	Type	Field Sample #	Sample Date	Sample Time	Begin Depth	End Depth	TPHC	VO+15	BN+15	PCBs	TAL Metals	Cyanide	Mercury	Ammonia/ Nitrate/ Nitrite	COMMENTS/VARIANCES
SOIL	GEOPROBE	P83-SB13-C	12/17/07	12:00	3.5	4.0		X	X	X	X				
SOIL	GEOPROBE	P83-SB12-A	12/17/07	13:40	0.0	0.5			X	X	X				
SOIL	GEOPROBE	P83-SB12-B	12/17/07	13:50	1.5	2.0		X							
SOIL	GEOPROBE	P83-SB12-C	12/17/07	14:00	3.0	3.5		X	X	X	X				
SOIL	GEOPROBE	P83-SB3-A	12/17/07	14:30	1.0	1.5			X	X	X				Sample depth in field documentation was recorded from top of soil. Reported bgs depths adjusted to account for surface asphalt and sub-base.
SOIL	GEOPROBE	P83-SB3-B	12/17/07	14:40	1.5	2.0		X							
SOIL	GEOPROBE	P83-SB3-C	12/17/07	14:50	3.5	4.0		X	X	X	X				Sample depth in field documentation was recorded from top of soil. Reported bgs depths adjusted to account for surface asphalt and sub-base.
SOIL	GEOPROBE	P83-SB3-C DUPLICATE	12/17/07	14:50	3.5	4.0		X	X	X	X				Sample depth in field documentation was recorded from top of soil. Reported bgs depths adjusted to account for surface asphalt and sub-base.
SOIL	GEOPROBE	P83-SB4-A	12/17/07	15:30	0.0	0.5			X	X	X				
SOIL	GEOPROBE	P83-SB4-B	12/17/07	15:40	1.5	2.0		X							
SOIL	GEOPROBE	P83-SB4-C	12/17/07	15:50	3.5	4.0		X	X	X	X				
BLANK	TRIP	TRIP BLANK-AQ	12/17/07	6:30	--	--		X							
BLANK	FIELD	FIELD BLANK-AQ	12/17/07	7:30	--	--		X	X		X				
GW	GEOPROBE	P83-A1	12/17/07	8:00	3.0	8.0		X	X		X				
GW	GEOPROBE	P83-A1 DUPLICATE	12/17/07	8:00	3.0	8.0		X	X		X				
GW	GEOPROBE	P83-A3	12/17/07	8:30	3.0	8.0		X	X		X				
GW	GEOPROBE	P83-A5	12/17/07	9:00	5.0	10.0		X	X		X				
BLANK	TRIP	TRIP BLANK	12/18/07	8:30	--	--		X							
BLANK	FIELD	FIELD BLANK	12/18/07	15:55	--	--		X	X	X	X				TPHC field blank not collected.
SOIL	GEOPROBE	P83-SB11-A	12/18/07	8:45	0.0	0.5			X	X	X				
SOIL	GEOPROBE	P83-SB11-B	12/18/07	8:55	1.5	2.0		X							
SOIL	GEOPROBE	P83-SB11-C	12/18/07	9:05	3.0	3.5		X	X	X	X				
SOIL	GEOPROBE	P83-SB5-A	12/18/07	10:50	0.0	0.5			X	X	X				
SOIL	GEOPROBE	P83-SB5-B	12/18/07	11:00	1.5	2.0		X							
SOIL	GEOPROBE	P83-SB5-C	12/18/07	11:10	3.0	3.5		X	X	X	X				
SOIL	GEOPROBE	P83-SB6-A	12/18/07	11:30	0.0	0.5			X	X	X				

**Table 3.21-2
Parcel 83 Sample and Analytical Summary**

Media	Type	Field Sample #	Sample Date	Sample Time	Begin Depth	End Depth	TPHC	VO+15	BN+15	PCBs	TAL Metals	Cyanide	Mercury	Ammonia/ Nitrate/ Nitrite	COMMENTS/VARIANCES
SOIL	GEOPROBE	P83-SB6-B	12/18/07	11:40	1.5	2.0		X							
SOIL	GEOPROBE	P83-SB6-C	12/18/07	11:50	3.0	3.5		X	X	X	X				
SOIL	GEOPROBE	P83-SB7-A	12/18/07	12:10	0.0	0.5			X	X	X				
SOIL	GEOPROBE	P83-SB7-B	12/18/07	12:20	1.5	2.0		X							
SOIL	GEOPROBE	P83-SB7-C	12/18/07	12:30	2.5	3.0		X	X	X	X				
SOIL	GEOPROBE	P83-SB14-A	12/18/07	14:45	0.0	0.5			X	X	X				
SOIL	GEOPROBE	P83-SB14-B	12/18/07	14:55	1.5	2.0		X							
SOIL	GEOPROBE	P83-SB14-C	12/18/07	15:05	3.0	3.5		X	X	X	X				
SOIL	GEOPROBE	P83-SB14-C DUPLICATE	12/18/07	15:05	3.0	3.5		X	X	X	X				
SOIL	GEOPROBE	P83-SB15-A	12/18/07	15:30	0.0	0.5			X	X	X				
SOIL	GEOPROBE	P83-SB15-B	12/18/07	15:40	1.5	2.0		X							
SOIL	GEOPROBE	P83-SB15-C	12/18/07	15:50	3.0	3.5		X	X	X	X				
SOIL	HAND AUGER	P83-SS21	12/18/07	13:15	0.0	0.5	X			X					
SOIL	HAND AUGER	P83-SS20	12/18/07	13:25	0.0	0.5	X			X					
SOIL	HAND AUGER	P83-SS19	12/18/07	13:35	0.0	0.5	X			X					
SOIL	HAND AUGER	P83-SS18	12/18/07	13:45	0.0	0.5	X			X					
BLANK	TRIP	TRIP BLANK	12/19/07	8:50	--	--		X							
BLANK	FIELD	FIELD BLANK	12/19/07	16:00	--	--		X	X	X	X				
SOIL	GEOPROBE	P83-SB16-A	12/19/07	8:30	0.0	0.5			X	X	X				
SOIL	GEOPROBE	P83-SB16-B	12/19/07	8:40	1.5	2.0		X							
SOIL	GEOPROBE	P83-SB16-C	12/19/07	8:50	2.0	2.5		X	X	X	X				
SOIL	GEOPROBE	P83-SB17-A	12/19/07	9:15	0.0	0.5			X	X	X				
SOIL	GEOPROBE	P83-SB17-B	12/19/07	9:25	1.5	2.0		X							
SOIL	GEOPROBE	P83-SB17-C	12/19/07	9:35	5.5	6.0		X	X	X	X				
SOIL	GEOPROBE	P83-SB1-A	12/19/07	10:20	0.0	0.5			X	X	X				
SOIL	GEOPROBE	P83-SB1-B	12/19/07	10:30	1.5	2.0		X							
SOIL	GEOPROBE	P83-SB1-C	12/19/07	10:40	5.0	5.5		X	X	X	X				
SOIL	GEOPROBE	P83-SB1-C DUPLICATE	12/19/07	10:40	5.0	5.5		X	X	X	X				
SOIL	GEOPROBE	P83-SB2-A	12/19/07	11:30	0.0	0.5			X	X	X				
SOIL	GEOPROBE	P83-SB2-B	12/19/07	11:40	1.5	2.0		X							

**Table 3.21-2
Parcel 83 Sample and Analytical Summary**

Media	Type	Field Sample #	Sample Date	Sample Time	Begin Depth	End Depth	TPHC	VO+15	BN+15	PCBs	TAL Metals	Cyanide	Mercury	Ammonia/ Nitrate/ Nitrite	COMMENTS/VARIANCES
SOIL	GEOPROBE	P83-SB2-C	12/19/07	11:50	5.0	5.5		X	X	X	X				
SOIL	GEOPROBE	P83-SB8-A	12/19/07	13:10	0.0	0.5			X	X	X				
SOIL	GEOPROBE	P83-SB8-B	12/19/07	13:20	1.5	2.0		X							
SOIL	GEOPROBE	P83-SB8-C	12/19/07	13:30	3.5	4.0		X	X	X	X				
BLANK	TRIP	TRIP BLANK-AQ	12/20/07	8:00	--	--		X							
BLANK	FIELD	FIELD BLANK-AQ	12/20/07	10:00	--	--		X	X	X					
GW	GEOPROBE	P83-GW-1	12/20/07	10:30	5.0	10.0		X	X						
GW	GEOPROBE	P83-GW-1 DUPLICATE	12/20/07	10:30	5.0	10.0		X	X						
GW	GEOPROBE	P83-GW-3	12/20/07	11:00	4.0	9.0		X	X						
GW	GEOPROBE	P83-GW-5	12/20/07	11:30	4.0	9.0		X	X						
GW	GEOPROBE	P83-GW-7	12/20/07	12:00	4.0	9.0		X	X						
GW	GEOPROBE	P83-GW-8	12/20/07	13:30	4.0	9.0		X	X						
GW	GEOPROBE	P83-GW-10	12/20/07	14:00	4.0	9.0		X	X						
GW	GEOPROBE	P83-GW-12	12/20/07	14:30	4.0	9.0		X	X						
GW	GEOPROBE	P83-GW-14	12/20/07	15:00	4.0	9.0		X	X						
GW	GEOPROBE	P83-GW-17	12/20/07	15:30	6.0	11.0		X	X						
GW	MONITORING WELL	161-MW-01	12/20/07	16:00	5.2	15.2		X	X	X					

X = Sample analyzed for the indicated analytical parameter suite

Table 3.21-3
Fort Monmouth Phase II Site Investigation, Parcel 83
Summary of TPHC Detected in Soil (mg/kg)

Sample ID	Lab ID	Sample Date	Depth (ft. bgs)	Result	MDL	NJDEP NRDCSCC ² (mg/kg)	NJDEP IGWSCC ³ (mg/kg)
P83-SS18	7054025	12/18/07	0.0-0.5	181	81	10000	10000
P83-SS19	7054024	12/18/07	0.0-0.5	111	82	10000	10000
P83-SS20	7054023	12/18/07	0.0-0.5	117	77	10000	10000

¹ NJDEP Residential Direct Contact Soil Cleanup Criteria (NRDCSCC) per NJAC 7:26D, 1999.

² NJDEP Non-Residential Direct Contact Soil Cleanup Criteria (NRDCSCC) per NJAC 7:26D, 1999.

³ NJDEP Impact to Groundwater Soil Cleanup Criteria (IGWSCC) per NJAC 7:26D, 1999.

DUP = Duplicate sample.

ft. bgs = Feet below ground surface.

MDL = Method detection limit

mg/kg = milligram per kilogram.

Table 3.21-4
Fort Monmouth Phase II Site Investigation, Parcel 83
Summary of Analytical Parameters Detected in Soil (mg/kg)

Chemical	Sample ID: Lab ID: Date Sampled: Depth (ft. bgs):		Analytical Results														
			P83-A1-A	P83-A1-B	P83-A1-C	P83-A2-A	P83-A2-B	P83-A2-C	P83-A3-A	P83-A3-B	P83-A3-C	P83-A4-A	P83-A4-B	P83-A4-C	P83-A5-A	P83-A5-B	P83-A5-C
			7053203	7053204	7053205	7053206	7053207	7053208	7053209	7053210	7053211	7053212	7053213	7053214	7053215	7053216	7053217
			12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007
Chemical	NRDCSCC ²	IGWSCC ³	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatiles																	
Acetone	1000	100	NT	0.280 U	0.290 U	NT	0.260 JB	1.300 B	NT	1.300 B	0.170 JB	NT	0.320 B	0.370 B	NT	0.460 B	0.220 JB
Benzene	13	1	NT	0.280 U	0.290 U	NT	0.270 U	0.300 U	NT	0.280 U	0.280 U	NT	0.250 U	0.280 U	NT	0.290 U	0.290 U
Carbon disulfide	NLE	NLE	NT	0.280 U	0.290 U	NT	0.270 U	0.300 U	NT	0.280 U	0.280 U	NT	0.250 U	0.280 U	NT	0.023 J	0.290 U
1,2-Dichloroethane	24	1	NT	0.280 U	0.290 U	NT	0.270 U	0.300 U	NT	0.280 U	0.280 U	NT	0.250 U	0.280 U	NT	0.290 U	0.290 U
Ethylbenzene	1000	100	NT	0.280 U	0.290 U	NT	0.270 U	0.300 U	NT	0.280 U	0.280 U	NT	0.250 U	0.280 U	NT	0.290 U	0.290 U
Methylene Chloride	210	1	NT	0.280 U	0.290 U	NT	0.270 U	0.300 U	NT	0.280 U	0.280 U	NT	0.250 U	0.280 U	NT	0.290 U	0.290 U
Toluene	1000	500	NT	0.280 U	0.290 U	NT	0.270 U	0.300 U	NT	0.280 U	0.280 U	NT	0.250 U	0.280 U	NT	0.029 J	0.290 U
Trichloroethylene	54	1	NT	0.280 U	0.290 U	NT	0.270 U	0.300 U	NT	0.280 U	0.280 U	NT	0.250 U	0.280 U	NT	0.290 U	0.290 U
Xylenes (Total)	1000	67	NT	0.850 U	0.880 U	NT	0.800 U	0.890 U	NT	0.830 U	0.830 U	NT	0.740 U	0.840 U	NT	0.860 U	0.870 U
Semi-Volatiles																	
Acenaphthene	10000	100	1.100 U	NT	1.100 U	0.120 J	NT	1.100 U	0.530 J	NT	1.200 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U
Acenaphthylene	NLE	NLE	1.500	NT	1.100 U	1.300	NT	1.100 U	0.550 J	NT	1.200 U	0.810 J	NT	1.200 U	0.065 J	NT	1.200 U
Anthracene	10000	100	1.200	NT	1.100 U	1.200	NT	1.100 U	1.100	NT	1.200 U	0.810 J	NT	0.075 J	0.110 J	NT	1.200 U
Benzo[a]anthracene	4	500	7.000	NT	0.110 J	5.500	NT	0.075 J	2.22	NT	0.110 J	4.100	NT	0.230 J	0.530 J	NT	1.200 U
Benzo[a]pyrene	0.66	100	7.500	NT	0.120 J	5.000	NT	1.100 U	1.900	NT	0.100 J	3.700	NT	0.210 J	0.440 J	NT	1.200 U
Benzo[b]fluoranthene	4	50	9.700	NT	0.160 J	7.700	NT	1.100 U	2.900	NT	0.180 J	5.000	NT	0.280 J	0.940 J	NT	1.200 U
Benzo[g,h,i]perylene	NLE	NLE	3.400	NT	1.100 U	1.700	NT	1.100 U	0.600 J	NT	1.200 U	1.600	NT	1.200 U	1.100 U	NT	1.200 U
Benzo[k]fluoranthene	4	500	3.800	NT	0.052 J	2.400	NT	1.100 U	0.860 J	NT	1.200 U	2.000	NT	0.092 J	0.230 J	NT	1.200 U
bis(2-chloroethyl)ether	3	10	1.100 U	NT	1.100 U	1.100 U	NT	1.100 U	1.100 U	NT	1.200 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U
bis(2-Ethylhexyl)phthalate	210	100	1.100 U	NT	0.290 J	0.330 J	NT	0.330 J	0.350 J	NT	0.310 J	1.200 U	NT	0.370 J	0.380 J	NT	0.270 J
Butyl benzyl phthalate	10000	100	1.100 U	NT	1.100 U	1.100 U	NT	1.100 U	1.100 U	NT	1.200 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U
4-Chloroaniline	4200	NLE	1.100 U	NT	1.100 U	1.100 U	NT	1.100 U	1.100 U	NT	1.200 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U
Chrysene	40	500	8.600	NT	0.150 J	6.500	NT	0.096 J	2.500	NT	0.150 J	5.000	NT	0.320 J	0.740 J	NT	1.200 U
Dibenz[a,h]anthracene	0.66	100	1.100 U	NT	1.100 U	0.680 J	NT	1.100 U	1.100 U	NT	1.200 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U
Dibenzofuran	NLE	NLE	1.100 U	NT	1.100 U	0.087 J	NT	1.100 U	0.380 J	NT	1.200 U	1.200 U	NT	1.200 U	0.075 J	NT	1.200 U
Diethyl phthalate	10000	50	1.100 U	NT	1.100 U	1.100 U	NT	1.100 U	1.100 U	NT	1.200 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U
Di-n-butylphthalate	10000	100	1.200 B	NT	1.100 U	1.100 U	NT	1.100 U	1.100 U	NT	1.200 U	0.360 JB	NT	1.200 U	1.100 U	NT	1.200 U
Di-n-octyl phthalate	10000	100	1.100 U	NT	1.100 U	1.100 U	NT	1.100 U	1.100 U	NT	1.200 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U
Fluoranthene	10000	100	8.700	NT	0.150 J	9.400	NT	0.140 J	4.600	NT	0.260 J	7.100	NT	0.530 J	1.000 J	NT	1.200 U
Fluorene	10000	100	1.100 U	NT	1.100 U	0.087 J	NT	1.200 U	1.100 J	NT	1.200 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U
Indeno[1,2,3-cd]pyrene	4	500	3.100	NT	1.100 U	1.700	NT	1.100 U	0.510 J	NT	1.200 U	1.400	NT	1.200 U	0.190 J	NT	1.200 U
2-Methylnaphthalene	NLE	NLE	1.100 U	NT	1.100 U	0.200 J	NT	1.100 U	0.640 J	NT	1.200 U	1.200 U	NT	1.200 U	0.270 J	NT	1.200 U
Naphthalene	4200	100	0.260 J	NT	1.100 U	0.280 J	NT	1.100 U	0.300 J	NT	1.200 U	0.250 J	NT	0.250 J	0.250 J	NT	1.200 U
Phenanthrene	NLE	NLE	2.220	NT	1.100 U	3.000	NT	1.100 U	5.000	NT	0.260 J	2.600	NT	0.380 J	0.570 J	NT	1.200 U
Pyrene	10000	100	12.000	NT	0.210 J	13.000	NT	0.160 J	6.200	NT	0.320 J	9.300	NT	0.700 J	1.100 J	NT	1.200 U
PCBs																	
Aroclor 1260	2	50	0.0041 U	NT	0.0041 U	0.0041 U	NT	0.0042 U	0.0042 U	NT	0.0040 U	0.0040 U	NT	0.0041 U	0.0041 U	NT	0.0042 U
Metals																	
Aluminum	NLE	NLE	11200 B	NT	8860 B	5880 B	NT	5400 B	5520 B	NT	10900 B	6810 B	NT	14700 B	8300 B	NT	17200 B
Antimony	340	NLE	0.438 U	NT	0.449 U	0.433 U	NT	0.438 U	0.424 U	NT	0.421 U	0.463 U	NT	0.485 U	0.479 U	NT	0.429 U
Arsenic	20	NLE	16.0	NT	4.63	3.59	NT	2.77	2.77	NT	6.49	7.04	NT	9.15	7.49	NT	9.99
Barium	47000	NLE	34.2 B	NT	14.4 B	18.0 B	NT	22.2 B	18.3 B	NT	21.1 B	26.0 B	NT	59.6 B	124 B	NT	22.0 B
Beryllium	140	NLE	1.08	NT	1.22	0.184	NT	0.766	0.341	NT	1.35	0.410	NT	1.68	0.927	NT	2.39
Cadmium	100	NLE	0.042 U	NT	0.043 U	0.289 B	NT	0.042 U	0.217 B	NT	0.040 U	0.660	NT	0.443	0.707	NT	0.760
Calcium	NLE	NLE	889 B	NT	490 B	10400 B	NT	837 B	1490 B	NT	1060 B	2970 B	NT	1880 B	2060 B	NT	1730 B
Chromium (Total)	NLE	NLE	103 B	NT	102 B	17.3 B	NT	40.1 B	33.8 B	NT	110 B	35.9 B	NT	98.2 B	65.5 B	NT	171 B
Cobalt	NLE	NLE	0.353	NT	0.639	1.77	NT	0.605	0.952	NT	0.629	4.15	NT	1.28	2.15	NT	2.19
Copper	45000	NLE	18.8 B	NT	5.72 B	18.0 B	NT	3.05 B	17.8 B	NT	4.62 B	52.2 B	NT	8.36 B	34.5 B	NT	5.95 B
Iron	NLE	NLE	39800 B	NT	40000 B	11000 B	NT	18500 B	13400 B	NT	45500 B	19100	NT	39900	27200	NT	72900
Lead	800	NLE	18.6	NT	0.363 U	11.7	NT	2.17	35.2	NT	0.935	95.8	NT	7.79	252	NT	0.347 U
Magnesium	NLE	NLE	4300 B	NT	4140 B	1300 B	NT	1610 B	1280 B	NT	4520 B	3340 B	NT	5170 B	2920 B	NT	8770 B
Manganese	NLE	NLE	22.5 B	NT	29.8 B	52.1 B	NT	56.9 B	44.9 B	NT	32.0 B	127 B	NT	86.0 B	76.0 B	NT	49.0 B
Mercury	270	NLE	0.107 U	NT	0.108 U	0.111 U	NT	0.114 U	0.112 U	NT	0.116 U	0.118 U	NT	0.114 U	0.13	NT	0.110 U
Nickel (Soluble Salts)	2400	NLE	7.11	NT	5.80	6.73	NT	4.08	6.21	NT	5.76	0.661 U	NT	8.82 B	9.23 B	NT	16.8 B
Potassium	NLE	NLE	9600	NT	9870	710	NT	3300	2060	NT	10700	1970 B	NT	10000 B	5830 B	NT	20100 B
Selenium	3100	NLE	0.646 U	NT	0.663 U	0.640 U	NT	0.647 U	0.626 U	NT	0.622 U	0.683 U	NT	0.716 U	0.707 U	NT	0.633 U
Sodium	NLE	NLE	37.939 U	NT	38.914 U	37.559 U	NT	37.979 U	36.747 U	NT	36.52 U	40.086 U	NT	42.037 U	41.486 U	NT	37.168 U
Vanadium	7100	NLE	52.4	NT	53.3	20.5	NT	28.1	24.0	NT	59.1	49.5	NT	57.6	40.5	NT	92.1
Zinc	1500	NLE	67.5	NT	54.6	299	NT	35.6	193	NT	47.4	230 B	NT	61.6 B	199 B	NT	74.8 B

¹ NJDEP Residential Direct Contact Soil Cleanup Criteria per NJAC 7:26D, 1999. Beryllium, Copper and Lead criteria per NJAC 7:26D, 2008.

² NJDEP Non-Residential Direct Contact Soil Cleanup Criteria per NJAC 7:26D, 1999. Beryllium, Copper and Lead criteria per NJAC 7:26D, 2008.

³ NJDEP Impact to Groundwater Soil Cleanup Criteria per NJAC 7:26D, 1999.

DUP = Duplicate Sample.

ft. bgs = Feet below ground surface.

NLE = No limit established.

Bold = Analyte was detected.

Shaded = Concentration exceeds level of concern. (Surface soil compared to NRDCSCC. Subsurface soil compared to IGWSCC when available, otherwise compared to NRDCSCC).

B = The compound was found in the associated method blank as well as in the sample.

D = Sample was diluted.

E = The compound's concentration exceeds the calibration range of the instrument for that specific analysis.

J = Mass spec and retention time data indicate the presence of a compound however the result is less than the MDL but greater than zero.

U = The compound was analyzed for but not detected.

NT = Not tested.

mg/kg = milligram per kilogram.

Table 3.21-4
Fort Monmouth Phase II Site Investigation, Parcel 83
Summary of Analytical Parameters Detected in Soil (mg/kg)

Chemical	Sample ID: Lab ID: Date Sampled: Depth (ft. bgs):		Analytical Results														
			P83-B1-A	P83-B1-B	P83-B1-C	P83-B1-C DUP	P83-B2-A	P83-B2-B	P83-B2-C	P83-B3-A	P83-B3-B	P83-B3-C	P83-B4-A	P83-B4-B	P83-B4-C	P83-B5-A	P83-B5-B
			7053218	7053219	7053220	7053202	7053222	7053223	7053224	7053401	7053402	7053403	7053406	7053407	7053408	7053409	7053410
			12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/14/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007
	NRDCSCC ²	IGWSCC ³	0.0-0.5	1.5-2.0	2.0-2.5	2.0-2.5	0.0-0.5	1.5-2.0	2.5-3.0	0.0-0.5	1.5-2.0	3.0-3.5	0.0-0.5	1.5-2.0	5.5-6.0	1.0-1.5	1.5-2.0
Chemical	NRDCSCC ²	IGWSCC ³	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatiles																	
Acetone	1000	100	NT	0.580 B	0.280 U	0.340 U	NT	0.500 B	0.150 JB	NT	0.880	1.200	NT	1.300	1.300	NT	1.200
Benzene	13	1	NT	0.330	0.280 U	0.340 U	NT	0.300 U	0.310 U	NT	0.260 U	0.300 U	NT	0.015 J	0.280 U	NT	0.270 U
Carbon disulfide	NLE	NLE	NT	0.015 J	0.280 U	0.340 U	NT	0.300 U	0.310 U	NT	0.260 U	0.300 U	NT	0.270 U	0.280 U	NT	0.270 U
1,2-Dichloroethane	24	1	NT	0.260 U	0.280 U	0.340 U	NT	0.300 U	0.310 U	NT	0.260 U	0.300 U	NT	0.270 U	0.280 U	NT	0.270 U
Ethylbenzene	1000	100	NT	0.220 J	0.280 U	0.340 U	NT	0.300 U	0.310 U	NT	0.260 U	0.300 U	NT	0.023 J	0.280 U	NT	0.270 U
Methylene Chloride	210	1	NT	0.260 U	0.280 U	0.340 U	NT	0.300 U	0.310 U	NT	0.260 U	0.300 U	NT	0.270 U	0.280 U	NT	0.270 U
Toluene	1000	500	NT	1.200	0.280 U	0.340 U	NT	0.300 U	0.038 J	NT	0.260 U	0.300 U	NT	0.067 J	0.280 U	NT	0.270 U
Trichloroethylene	54	1	NT	0.260 U	0.280 U	0.340 U	NT	0.300 U	0.310 U	NT	0.260 U	0.300 U	NT	0.270 U	0.280 U	NT	0.270 U
Xylenes (Total)	1000	67	NT	1.400	0.850 U	1.020 U	NT	0.910 U	0.920 U	NT	0.790 U	0.910 U	NT	0.307 J	0.840 U	NT	0.800 U
Semi-Volatiles																	
Acenaphthene	10000	100	1.000 U	NT	1.200 U	1.100 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.200 U	1.000 U	NT
Acenaphthylene	NLE	NLE	1.000 U	NT	1.200 U	1.100 U	0.140 J	NT	1.200 U	0.072 J	NT	1.200 U	1.200 U	NT	1.200 U	0.130 J	NT
Anthracene	10000	100	1.000 U	NT	1.200 U	1.100 U	0.100 J	NT	1.200 U	0.110 J	NT	1.200 U	1.200 U	NT	1.200 U	0.140 J	NT
Benzo[a]anthracene	4	500	1.000 U	NT	1.200 U	0.130 J	0.500 J	NT	1.200 U	0.770 J	NT	1.200 U	0.250 J	NT	0.100 J	0.690 J	NT
Benzo[a]pyrene	0.66	100	1.000 U	NT	1.200 U	0.110 J	1.200 U	NT	1.200 U	0.730 J	NT	1.200 U	0.270 J	NT	1.200 U	0.680 J	NT
Benzo[b]fluoranthene	4	50	1.000 U	NT	0.120 J	0.160 J	1.000 J	NT	1.200 U	1.300	NT	1.200 U	0.480 J	NT	0.140 J	1.000 J	NT
Benzo[g,h,i]perylene	NLE	NLE	1.000 U	NT	1.200 U	1.100 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.200 U	1.000 U	NT
Benzo[k]fluoranthene	4	500	1.000 U	NT	1.200 U	0.072 J	1.200 U	NT	1.200 U	0.410 J	NT	1.200 U	0.130 J	NT	1.200 U	0.710 J	NT
bis(2-chloroethyl)ether	3	10	1.000 U	NT	1.200 U	1.100 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.200 U	0.240 J	NT
bis(2-Ethylhexyl)phthalate	210	100	0.740 J	NT	0.310 J	1.100 U	0.510 J	NT	0.300 J	0.480 JB	NT	0.410 JB	0.500 JB	NT	0.180 JB	0.660 JB	NT
Butyl benzyl phthalate	10000	100	1.000 U	NT	1.200 U	1.100 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.200 U	1.000 U	NT
4-Chloroaniline	4200	NLE	1.000 U	NT	1.200 U	1.100 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.200 U	1.000 U	NT
Chrysene	40	500	1.000 U	NT	0.100 J	0.180 J	0.850 J	NT	1.200 U	0.970 J	NT	1.200 U	0.290 J	NT	0.100 J	0.970 J	NT
Dibenz[a,h]anthracene	0.66	100	1.000 U	NT	1.200 U	1.100 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.200 U	1.000 U	NT
Dibenzofuran	NLE	NLE	1.000 U	NT	1.200 U	1.100 U	0.240 J	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.200 U	0.070 J	NT
Diethyl phthalate	10000	50	1.000 U	NT	1.200 U	1.100 U	1.200 U	NT	1.200 U	1.100 U	NT	0.073 JB	1.200 U	NT	1.200 U	1.000 U	NT
Di-n-butylphthalate	10000	100	1.000 U	NT	1.200 U	2.22 B	1.200 U	NT	1.200 U	0.460 JB	NT	0.460 JB	0.290 JB	NT	0.760 JB	0.410 JB	NT
Di-n-octyl phthalate	10000	100	1.000 U	NT	1.200 U	1.100 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.200 U	1.000 U	NT
Fluoranthene	10000	100	1.000 U	NT	0.190 J	0.280 J	0.710 J	NT	1.200 U	1.300	NT	1.200 U	0.390 J	NT	0.200 J	1.000 J	NT
Fluorene	10000	100	1.000 U	NT	1.200 U	1.100 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.200 U	1.000 U	NT
Indeno[1,2,3-cd]pyrene	4	500	1.000 U	NT	1.200 U	1.100 U	1.200 U	NT	1.200 U	0.260 J	NT	1.200 U	1.200 U	NT	1.200 U	1.000 U	NT
2-Methylnaphthalene	NLE	NLE	0.190 J	NT	1.200 U	1.100 U	0.860 J	NT	1.200 U	0.230 J	NT	1.200 U	1.200 U	NT	1.200 U	0.140 J	NT
Naphthalene	4200	100	0.090 J	NT	1.200 U	1.100 U	0.550 J	NT	1.200 U	0.160 J	NT	1.200 U	1.200 U	NT	1.200 U	0.140 J	NT
Phenanthrene	NLE	NLE	0.100 J	NT	0.090 J	0.130 J	0.910 J	NT	1.200 U	0.520 J	NT	1.200 U	0.120 J	NT	0.160 J	0.760 J	NT
Pyrene	10000	100	1.000 U	NT	0.190 J	0.290 J	1.900	NT	1.200 U	1.700	NT	1.200 U	0.500 J	NT	0.210 J	1.500	NT
PCBs																	
Aroclor 1260	2	50	0.0042 U	NT	0.0041 U	0.0041 U	0.0041 U	NT	0.0041 U	0.0041 U	NT	0.0041 U	0.0041 U	NT	0.0040 U	0.80	NT
Metals																	
Aluminum	NLE	NLE	15800 B	NT	9660 B	8880 B	10400 B	NT	13500 B	8880 B	NT	12800 B	8910 B	NT	18500 B	11300 B	NT
Antimony	340	NLE	0.435 U	NT	0.443 U	0.465 U	0.543 U	NT	0.440 U	0.423 U	NT	0.501 U	0.463 U	NT	0.48 U	6.50	NT
Arsenic	20	NLE	4.87	NT	13.4	9.69	10.8	NT	7.93	7.12	NT	6.41	6.04	NT	5.93	7.34	NT
Barium	47000	NLE	28.3 B	NT	34.3 B	35.5 B	52.1 B	NT	18.4 B	81.4 B	NT	32.5 B	33.7 B	NT	24.6 B	182 B	NT
Beryllium	140	NLE	0.282	NT	1.03	0.996	0.931	NT	1.88	0.752	NT	1.63	0.582	NT	1.91	0.942	NT
Cadmium	100	NLE	0.564	NT	0.312	0.044 U	0.709	NT	0.633	1.01	NT	0.277	0.445	NT	0.476	3.15	NT
Calcium	NLE	NLE	12800 B	NT	875 B	757 B	2490 B	NT	947 B	8590 B	NT	430 B	3620 B	NT	2320 B	979 B	NT
Chromium	NLE	NLE	29.4 B	NT	80.4 B	80.5 B	83.3 B	NT	150 B	28.4 B	NT	105 B	45.1 B	NT	168 B	105 B	NT
Cobalt	NLE	NLE	10.1	NT	0.571	0.824	2.78	NT	1.83	5.07	NT	1.13	1.31	NT	1.25	2.06	NT
Copper	45000	NLE	61.8 B	NT	10.4 B	10.1 B	39.4 B	NT	15.3 B	109 B	NT	10.4 B	33.0 B	NT	8.35 B	2930 EB	NT
Iron	NLE	NLE	23000	NT	38700	36400 B	31800	NT	56800	16200	NT	46500	18700	NT	62900	38400	NT
Lead	800	NLE	7.95	NT	15.5	17.1	111	NT	0.869	103	NT	1.47	45.2	NT	1.57	972	NT
Magnesium	NLE	NLE	8580 B	NT	4050 B	3760 B	3240 B	NT	6730 B	4450 B	NT	5350 B	2190 B	NT	8360 B	3240 B	NT
Manganese	NLE	NLE	266 B	NT	24.7 B	16.4 B	122 B	NT	44.7 B	292 B	NT	32.3 B	111 B	NT	55.2 B	110 B	NT
Mercury	270	NLE	0.105 U	NT	0.108 U	0.114 U	0.119 U	NT	0.115 U	0.110 U	NT	0.118 U	0.112 U	NT	0.114 U	4.06	NT
Nickel	2400	NLE	23.2 B	NT	5.52 B	7.25	12.0 B	NT	20.2 B	18.7 B	NT	7.41 B	9.75 B	NT	7.96 B	46.1 B	NT
Potassium	NLE	NLE	1800 B	NT	8460 B	8330	5020 B	NT	14900 B	1540 B	NT	11600 B	3430 B	NT	18000 B	6820 B	NT
Selenium	3100	NLE	0.642 U	NT	0.654 U	0.686 U	0.802 U	NT	0.649 U	0.624 U	NT	0.739 U	0.684 U	NT	0.708 U	0.669 U	NT
Sodium	NLE	NLE	1390 B	NT	38.387 U	40.273 U	47.093 U	NT	38.122 U	36.662 U	NT	43.403 U	40.166 U	NT	41.585 U	39.258 U	NT
Vanadium	7100	NLE	123	NT	49.8	45.9	60.2	NT	73.8	34.5	NT	58.0	47.8	NT	92.7	44.8	NT
Zinc	1500	NLE	41.0 B	NT	39.0 B	46.9	136 B	NT	112 B	148 B	NT	59.5 B	77.8 B	NT	64.8 B	1100 B	NT

¹ NJDEP Residential Direct Contact Soil Cleanup Criteria per NJAC 7:26D, 1999. Beryllium, Copper and Lead criteria per NJAC 7:26D, 2008.

² NJDEP Non-Residential Direct Contact Soil Cleanup Criteria per NJAC 7:26D, 1999. Beryllium, Copper and Lead criteria per NJAC 7:26D, 2008.

³ NJDEP Impact to Groundwater Soil Cleanup Criteria per NJAC 7:26D, 1999.

DUP = Duplicate Sample.

ft. bgs = Feet below ground surface.

NLE = No limit established.

Bold = Analyte was detected.

Shaded = Concentration exceeds level of concern. (Surface soil compared to NRDCSCC. Subsurface soil compared to IGWSCC when available, otherwise compared to NRDCSCC).

B = The compound was found in the associated method blank as well as in the sample.

D = Sample was diluted.

E = The compound's concentration exceeds the calibration range of the instrument for that specific analysis.

J = Mass spec and retention time data indicate the presence of a compound however the result is less than the MDL but greater than zero.

U = The compound was analyzed for but not detected.

NT = Not tested.

mg/kg = milligram per kilogram.

Table 3.21-4
Fort Monmouth Phase II Site Investigation, Parcel 83
Summary of Analytical Parameters Detected in Soil (mg/kg)

Chemical	Sample ID: Lab ID: Date Sampled: Depth (ft. bgs):		Analytical Results														
			P83-B5-C	P83-B5-C DUP	P83-SB1-A	P83-SB1-B	P83-SB1-C	P83-SB1-C DUP	P83-SB2-A	P83-SB2-B	P83-SB2-C	P83-SB3-A	P83-SB3-B	P83-SB3-C	P83-SB3-C DUP	P83-SB4-A	P83-SB4-B
			7053411	7053405	7054710	7054711	7054712	7054703	7054713	7054714	7054715	7053613	7053614	7053615	7053602	7053616	7053617
			12/15/2007	12/15/2007	12/19/2007	12/19/2007	12/19/2007	12/18/2007	12/19/2007	12/19/2007	12/19/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007
	NRDCSCC ²	IGWSCC ³	7.0-7.5	7.0-7.5	0.0-0.5	1.5-2.0	5.0-5.5	5.0-5.5	0.0-0.5	1.5-2.0	5.0-5.5	1.0-1.5	1.5-2.0	3.5-4.0	3.5-4.0	0.0-0.5	1.5-2.0
			Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatiles																	
Acetone	1000	100	1.200	1.500	NT	0.710	0.270 U	1.000	NT	0.250 U	0.280 U	NT	3.200 B	3.300 B	3.100 B	NT	3.000 B
Benzene	13	1	0.270 U	0.380 U	NT	0.250 U	0.270 U	0.300 U	NT	0.250 U	0.280 U	NT	0.250 U	0.260 U	0.270 U	NT	0.250 U
Carbon disulfide	NLE	NLE	0.270 U	0.380 U	NT	0.250 U	0.270 U	0.300 U	NT	0.250 U	0.280 U	NT	0.250 U	0.260 U	0.270 U	NT	0.250 U
1,2-Dichloroethane	24	1	0.270 U	0.380 U	NT	0.250 U	0.270 U	0.300 U	NT	0.250 U	0.280 U	NT	0.250 U	0.260 U	0.270 U	NT	0.250 U
Ethylbenzene	1000	100	0.270 U	0.380 U	NT	0.250 U	0.270 U	0.300 U	NT	0.250 U	0.280 U	NT	0.250 U	0.036 J	0.270 U	NT	0.028 J
Methylene Chloride	210	1	0.270 U	0.380 U	NT	0.250 U	0.270 U	0.300 U	NT	0.250 U	0.280 U	NT	0.073 JB	0.077 JB	0.089 JB	NT	0.056 JB
Toluene	1000	500	0.270 U	0.033 J	NT	0.250 U	0.270 U	0.300 U	NT	0.250 U	0.280 U	NT	0.250 U	0.022 J	0.270 U	NT	0.250 U
Trichloroethylene	54	1	0.270 U	0.380 U	NT	0.250 U	0.270 U	0.300 U	NT	0.250 U	0.280 U	NT	0.250 U	0.260 U	0.270 U	NT	0.250 U
Xylenes (Total)	1000	67	0.810 U	1.150 U	NT	0.760 U	0.810 U	0.900 U	NT	0.750 U	0.850 U	NT	0.740 U	0.050 J	0.060 J	NT	0.047 J
Semi-Volatiles																	
Acenaphthene	10000	100	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.100 U	NT
Acenaphthylene	NLE	NLE	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	0.310 J	NT
Anthracene	10000	100	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	0.280 J	NT
Benzo[a]anthracene	4	500	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.800	NT
Benzo[a]pyrene	0.66	100	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.900	NT
Benzo[b]fluoranthene	4	50	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	3.100	NT
Benzo[g,h,i]perylene	NLE	NLE	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	0.710 J	NT
Benzo[k]fluoranthene	4	500	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.100 J	NT
bis(2-chloroethyl)ether	3	10	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.100 U	NT
bis(2-Ethylhexyl)phthalate	210	100	0.160 JB	0.410 JB	0.200 JB	NT	0.180 JB	0.120 JB	0.120 JB	NT	0.210 JB	0.240 JB	NT	0.290 JB	1.200 U	0.240 JB	NT
Butyl benzyl phthalate	10000	100	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.100 U	NT
4-Chloroaniline	4200	NLE	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	1.100 U	NT	1.200 U	0.470 J	1.100 U	NT
Chrysene	40	500	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.900	NT
Dibenz[a,h]anthracene	0.66	100	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.100 U	NT
Dibenzofuran	NLE	NLE	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.100 U	NT
Diethyl phthalate	10000	50	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.100 U	NT
Di-n-butylphthalate	10000	100	0.580 JB	0.290 JB	0.084 JB	NT	0.061 JB	1.200 U	1.000 U	NT	0.059 JB	0.510 JB	NT	1.300 B	0.380 JB	0.750 JB	NT
Di-n-octyl phthalate	10000	100	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	0.092 J	NT	0.090 J	1.200 U	1.100 U	NT
Fluoranthene	10000	100	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	1.100 U	NT	1.200 U	0.059 J	2.220	NT
Fluorene	10000	100	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.100 U	NT
Indeno[1,2,3-cd]pyrene	4	500	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	0.690 J	NT
2-Methylnaphthalene	NLE	NLE	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	1.100 U	NT	1.300	1.200	1.100 U	NT
Naphthalene	4200	100	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	1.100 U	NT	1.600	1.300	1.100 U	NT
Phenanthrene	NLE	NLE	0.091 J	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	1.100 U	NT	0.088 J	0.081 J	0.490 J	NT
Pyrene	10000	100	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.200 U	1.000 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	3.200	NT
PCBs																	
Aroclor 1260	2	50	0.0041 U	0.0039 U	0.004 U	NT	0.0042 U	0.0041 U	0.0040 U	NT	0.0040 U	0.0040 U	NT	0.0041 U	0.0040 U	0.0040 U	NT
Metals																	
Aluminum	NLE	NLE	19400 B	18500 B	8360 B	NT	15000 B	15000 B	5530 B	NT	13600 B	9120 B	NT	13800 B	12400 B	10700 B	NT
Antimony	340	NLE	0.485 U	0.483 U	0.434 U	NT	0.448 U	0.48 U	0.472 U	NT	0.498 U	0.422 U	NT	0.476 U	0.468 U	0.490 U	NT
Arsenic	20	NLE	10.3	10.8	3.07	NT	10.2	10.2	3.13	NT	11.4	5.09	NT	8.03	7.93	11.6	NT
Barium	47000	NLE	24.4 B	23.8 B	16.6 B	NT	24.1 B	22.6 B	9.06 B	NT	22.2 B	20.5 B	NT	43.3 B	38.0 B	33.1 B	NT
Beryllium	140	NLE	2.68	2.57	0.228	NT	2.06	2.10	0.191	NT	1.74	0.379	NT	1.40	1.22	0.647	NT
Cadmium	100	NLE	0.862	0.874	0.105	NT	0.312	0.250	0.045 U	NT	0.0789	0.196 B	NT	0.370 B	0.352 B	0.307 B	NT
Calcium	NLE	NLE	725 B	741 B	471 B	NT	407 B	430 B	289 B	NT	544 B	335 B	NT	1710 B	1320 B	2250 B	NT
Chromium	NLE	NLE	207 B	202 B	23.6	NT	157	156	22.0	NT	136	91.9	NT	78.3	71.8	37.9	NT
Cobalt	NLE	NLE	2.16	2.27	0.849	NT	1.57	1.88	0.359 U	NT	1.68	0.321 U	NT	0.510	0.507	1.31	NT
Copper	45000	NLE	9.46 B	10.4 B	5.95 B	NT	6.43 B	7.27 B	6.04 B	NT	5.92 B	5.86 B	NT	8.57 B	8.44 B	14.9 B	NT
Iron	NLE	NLE	83200	80300	10400 B	NT	59600 B	61800 B	10700	NT	52700	17300 B	NT	35900 B	32000 B	24400 B	NT
Lead	800	NLE	0.392 U	0.391 U	5.57	NT	0.363 U	0.389 U	4.18	NT	0.403 U	3.57	NT	11.8	12.2	35.2	NT
Magnesium	NLE	NLE	10200 B	9470 B	626 B	NT	6800 B	7030 B	537	NT	5730	1080 B	NT	4100 B	3690 B	1950 B	NT
Manganese	NLE	NLE	32.0 B	30.2 B	39.2 B	NT	50.5 B	52.7 B	29.8 B	NT	51.9 B	23.3	NT	66.8	59.6	90.8	NT
Mercury	270	NLE	0.107 U	0.113 U	0.103 U	NT	0.117 U	0.112 U	0.118 U	NT	0.112 U	0.095 U	NT	0.104 U	0.105 U	0.107 U	NT
Nickel	2400	NLE	8.96 B	9.70 B	3.70	NT	7.32	7.65	3.09	NT	6.57	11.6	NT	9.17	11.3	9.44	NT
Potassium	NLE	NLE	23900 B	22200 B	1190 B	NT	16700 B	16900 B	844 B	NT	13000 B	2200	NT	7860	6830	2650	NT
Selenium	3100	NLE	0.716 U	0.713 U	0.641 U	NT	0.662 U	0.709 U	0.696 U	NT	0.735 U	0.623 U	NT	0.703 U	0.691 U	0.723 U	NT
Sodium	NLE	NLE	42.017 U	41.831 U	37.606 U	NT	38.884 U	41.602 U	40.873 U	NT	43.13 U	62.0 B	NT	475 B	581 B	42.434 U	NT
Vanadium	7100	NLE	104	99													

¹ NJDEP Residential Direct Contact Soil Cleanup Criteria per NJAC 7:26D, 1999. Beryllium, Copper and Lead criteria per NJAC 7:26D, 2008.

² NJDEP Non-Residential Direct Contact Soil Cleanup Criteria per NJAC 7:26D, 1999. Beryllium, Copper and Lead criteria per NJAC 7:26D, 2008.

³ NJDEP Impact to Groundwater Soil Cleanup Criteria per NJAC 7:26D, 1999.

DUP = Duplicate Sample.

ft. bgs = Feet below ground surface.

NLE = No limit established.

Bold = Analyte was detected.

Shaded = Concentration exceeds level of concern. (Surface soil compared to NRDCSCC. Subsurface soil compared to IGWSCC when available, otherwise compared to NRDCSCC).

B = The compound was found in the associated method blank as well as in the sample.

D = Sample was diluted.

E = The compound's concentration exceeds the calibration range of the instrument for that specific analysis.

J = Mass spec and retention time data indicate the presence of a compound however the result is less than the MDL but greater than zero.

U = The compound was analyzed for but not detected.

NT = Not tested.

mg/kg = milligram per kilogram.

Table 3.21-4
Fort Monmouth Phase II Site Investigation, Parcel 83
Summary of Analytical Parameters Detected in Soil (mg/kg)

Chemical	Sample ID: Lab ID: Date Sampled: Depth (ft. bgs):		Analytical Results														
			P83-SB4-C	P83-SB5-A	P83-SB5-B	P83-SB5-C	P83-SB6-A	P83-SB6-B	P83-SB6-C	P83-SB7-A	P83-SB7-B	P83-SB7-C	P83-SB8-A	P83-SB8-B	P83-SB8-C	P83-SB9-A	P83-SB9-B
			7053618	7054007	7054008	7054009	7054010	7054011	7054012	7054013	7054014	7054015	7054716	7054717	7054718	7053604	7053605
			12/17/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/19/2007	12/19/2007	12/19/2007	12/17/2007	12/17/2007
			3.5-4.0	0.0-0.5	1.5-2.0	3.0-3.5	0.0-0.5	1.5-2.0	3.0-3.5	0.0-0.5	1.5-2.0	2.5-3.0	0.0-0.5	1.5-2.0	3.5-4.0	1.0-1.5	1.5-2.0
	NRDCSCC ²	IGWSCC ³	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatiles																	
Acetone	1000	100	3.800 B	NT	0.110 J	0.110 J	NT	0.076 J	0.270 U	NT	0.150 J	0.180 J	NT	0.300 U	0.290 U	NT	5.000 B
Benzene	13	1	0.280 U	NT	0.320 U	0.290 U	NT	0.250 U	0.270 U	NT	0.240 U	0.270 U	NT	0.300 U	0.290 U	NT	0.390 U
Carbon disulfide	NLE	NLE	0.280 U	NT	0.320 U	0.290 U	NT	0.250 U	0.270 U	NT	0.240 U	0.270 U	NT	0.098 J	0.290 U	NT	0.390 U
1,2-Dichloroethane	24	1	0.280 U	NT	0.320 U	0.290 U	NT	0.250 U	0.270 U	NT	0.240 U	0.270 U	NT	0.330	0.290 U	NT	0.390 U
Ethylbenzene	1000	100	0.280 U	NT	0.320 U	0.290 U	NT	0.250 U	0.320 U	NT	0.240 U	0.270 U	NT	0.300 U	0.290 U	NT	0.390 U
Methylene Chloride	210	1	0.068 JB	NT	0.320 U	0.290 U	NT	0.250 U	0.270 U	NT	0.240 U	0.270 U	NT	0.300 U	0.290 U	NT	0.120 JB
Toluene	1000	500	0.280 U	NT	0.320 U	0.290 U	NT	0.250 U	0.270 U	NT	0.240 U	0.270 U	NT	0.300 U	0.290 U	NT	0.390 U
Trichloroethylene	54	1	0.280 U	NT	0.320 U	0.290 U	NT	0.250 U	0.270 U	NT	0.240 U	0.270 U	NT	0.300 U	0.290 U	NT	5.800
Xylenes (Total)	1000	67	0.850 U	NT	0.790 U	0.870 U	NT	0.760 U	0.820 U	NT	0.720 U	0.810 U	NT	0.900 U	0.870 U	NT	1.160 U
Semi-Volatiles																	
Acenaphthene	10000	100	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT
Acenaphthylene	NLE	NLE	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT
Anthracene	10000	100	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT
Benzo[a]anthracene	4	500	1.100 U	0.062 J	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	0.093 J	1.100 U	NT	1.200 U	0.240 J	NT
Benzo[a]pyrene	0.66	100	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT	0.470 J	1.200 U	NT	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT
Benzo[b]fluoranthene	4	50	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT
Benzo[g,h,i]perylene	NLE	NLE	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT
Benzo[k]fluoranthene	4	500	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT
bis(2-chloroethyl)ether	3	10	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT
bis(2-Ethylhexyl)phthalate	210	100	1.100 U	0.510 J	NT	0.430 J	1.100 U	NT	0.410 J	0.390 J	NT	0.440 J	0.220 JB	NT	0.150 JB	0.390 JB	NT
Butyl benzyl phthalate	10000	100	1.100 U	0.220 J	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT
4-Chloroaniline	4200	NLE	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT
Chrysene	40	500	1.100 U	0.089 J	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	0.120 J	1.100 U	NT	1.200 U	0.360 J	NT
Dibenz[a,h]anthracene	0.66	100	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT
Dibenzofuran	NLE	NLE	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT
Diethyl phthalate	10000	50	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT
Di-n-butylphthalate	10000	100	0.350 J	0.084 JB	NT	0.220 JB	0.530 JB	NT	0.250 JB	0.280 JB	NT	0.091 JB	0.074 JB	NT	1.200 U	0.920 JB	NT
Di-n-octyl phthalate	10000	100	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT
Fluoranthene	10000	100	0.054 J	0.110 J	NT	1.200 U	0.140 J	NT	1.200 U	0.096 J	NT	0.170 J	1.100 U	NT	1.200 U	0.490 J	NT
Fluorene	10000	100	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT
Indeno[1,2,3-cd]pyrene	4	500	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT
2-Methylnaphthalene	NLE	NLE	1.100 U	1.100 U	NT	1.200 U	0.370 J	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT
Naphthalene	4200	100	1.100 U	1.100 U	NT	1.200 U	0.180 J	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U	NT	1.200 U	1.100 U	NT
Phenanthrene	NLE	NLE	1.100 U	1.100 U	NT	1.200 U	0.170 J	NT	1.200 U	1.200 U	NT	0.094 J	1.100 U	NT	1.200 U	0.290 J	NT
Pyrene	10000	100	1.100 U	0.140 J	NT	1.200 U	0.280 J	NT	1.200 U	0.130 J	NT	0.180 J	1.100 U	NT	1.200 U	0.580 J	NT
PCBs																	
Aroclor 1260	2	50	0.0041 U	0.0041 U	NT	0.0041 U	0.0041 U	NT	0.0041 U	0.0041 U	NT	0.0041 U	0.0040 U	NT	0.0042 U	0.0040 U	NT
Metals																	
Aluminum	NLE	NLE	16900 B	9970 B	NT	12100 B	5070 B	NT	12900 B	5250 B	NT	10800 B	9520 B	NT	18700 B	17500 B	NT
Antimony	340	NLE	0.459 U	0.418 U	NT	0.467 U	1.85	NT	0.492 U	0.472 U	NT	0.479 U	0.414 U	NT	0.453 U	8.42	NT
Arsenic	20	NLE	9.24	5.85	NT	8.74	5.65	NT	7.41	4.40	NT	8.94	6.18	NT	10.0	27.6	NT
Barium	47000	NLE	53.1 B	23.3 B	NT	41.3 B	78.0 B	NT	44.8 B	19.4 B	NT	33.1 B	21.7 B	NT	38.6 B	357 B	NT
Beryllium	140	NLE	1.44	1.27	NT	1.12	0.442	NT	0.960	0.397	NT	0.940	0.440	NT	1.52	1.38	NT
Cadmium	100	NLE	0.384 B	0.216	NT	0.113	0.335	NT	0.0591	0.152	NT	0.0948	0.403	NT	0.287	0.896 B	NT
Calcium	NLE	NLE	2280 B	1460 B	NT	1360 B	1550 B	NT	1090 B	1650 B	NT	2320 B	1050 B	NT	1330 B	16300 B	NT
Chromium	NLE	NLE	89.6	99.9	NT	61.4	20.9	NT	54.1	33.4	NT	94.9	53.7	NT	104	55.6	NT
Cobalt	NLE	NLE	0.350 U	1.82	NT	0.596	3.33	NT	0.629	0.359 U	NT	0.364	1.98	NT	1.17	7.35	NT
Copper	45000	NLE	11.7 B	21.1 B	NT	8.76 B	118 B	NT	6.65 B	11.0 B	NT	27.0 B	29.3 B	NT	9.52 B	1370 B	NT
Iron	NLE	NLE	37300 B	37700 B	NT	27100 B	17900 B	NT	21800 B	13000 B	NT	27800 B	17400	NT	51100	36600 B	NT
Lead	800	NLE	8.74	20.5	NT	15.5	103	NT	14.4	16.0	NT	27.7	44.1	NT	4.15	1300	NT
Magnesium	NLE	NLE	4490 B	4110 B	NT	3030 B	775 B	NT	2480 B	1290 B	NT	3900 B	1270	NT	4990	3310 B	NT
Manganese	NLE	NLE	75.5	51.5 B	NT	142 B	69.5 B	NT	69.5 B	60.6 B	NT	48.1 B	42.4 B	NT	104 B	230	NT
Mercury	270	NLE	0.105 U	0.113 U	NT	0.115 U	0.16	NT	0.110 U	0.118 U	NT	0.111 U	0.097 U	NT	0.107 U	0.110 U	NT
Nickel	2400	NLE	9.56	6.91	NT	6.20	11.9	NT	7.61	3.59	NT	5.86	5.91	NT	8.19	31.0	NT
Potassium	NLE	NLE	8740	9390 B	NT	4910 B	1300 B	NT	3280 B	2320 B	NT	6910 B	2400 B	NT	12900 B	3260	NT
Selenium	3100	NLE	0.677 U	0.617 U	NT	0.689 U	0.636 U	NT	0.727 U	0.696 U	NT	0.707 U	0.611 U	NT	0.669 U	1.32 B	NT
Sodium	NLE	NLE	39.769 U	36.221 U	NT	40.462 U	37.365 U	NT	306 B	40.873 U	NT	41.505 U	35.851 U	NT	39.303 U	35.868 U	NT
Vanadium	7100	NLE	58.5	61.1	NT	41.9	21.9	NT	39.2	23.6	NT	54.2	47.8	NT	71.3	53.8	NT
Zinc	1500	NLE	56.4	107 B	NT	47.5 B	63.2 B	NT	43.7 B	45.7 B	NT	61.3 B	58.2 B	NT	51.1 B	393	NT

¹ NJDEP Residential Direct Contact Soil Cleanup Criteria per NJAC 7:26D, 1999. Beryllium, Copper and Lead criteria per NJAC 7:26D, 2008.

² NJDEP Non-Residential Direct Contact Soil Cleanup Criteria per NJAC 7:26D, 1999. Beryllium, Copper and Lead criteria per NJAC 7:26D, 2008.

³ NJDEP Impact to Groundwater Soil Cleanup Criteria per NJAC 7:26D, 1999.

DUP = Duplicate Sample.

ft. bgs = Feet below ground surface.

NLE = No limit established.

Bold = Analyte was detected.

Shaded = Concentration exceeds level of concern. (Surface soil compared to NRDCSCC. Subsurface soil compared to IGWSCC when available, otherwise compared to NRDCSCC).

B = The compound was found in the associated method blank as well as in the sample.

D = Sample was diluted.

E = The compound's concentration exceeds the calibration range of the instrument for that specific analysis.

J = Mass spec and retention time data indicate the presence of a compound however the result is less than the MDL but greater than zero.

U = The compound was analyzed for but not detected.

NT = Not tested.

mg/kg = milligram per kilogram.

Table 3.21-4
Fort Monmouth Phase II Site Investigation, Parcel 83
Summary of Analytical Parameters Detected in Soil (mg/kg)

Chemical	Sample ID: Lab ID: Date Sampled: Depth (ft. bgs):		Analytical Results														
			P83-SB9-C	P83-SB10-A	P83-SB10-B	P83-SB10-C	P83-SB10-D	P83-SB11-A	P83-SB11-B	P83-SB11-C	P83-SB12-A	P83-SB12-B	P83-SB12-C	P83-SB13-A	P83-SB13-B	P83-SB13-C	P83-SB14-A
			7053606	7053412	7053413	7053414	7053415	7054004	7054005	7054006	7053610	7053611	7053612	7053607	7053608	7053609	7054016
			12/17/2007	12/15/2007	12/15/2007	12/15/2007	12/15/2007	12/18/2007	12/18/2007	12/18/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/18/2007
Chemical	Depth (ft. bgs):		4.5-5.0	0.0-0.5	1.5-2.0	5.0-5.5	6.5-7.0	0.0-0.5	1.5-2.0	3.0-3.5	0.0-0.5	1.5-2.0	3.0-3.5	0.0-0.5	1.5-2.0	3.5-4.0	0.0-0.5
	NRDCSCC ²	IGWSCC ³	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatiles																	
Acetone	1000	100	4.300 B	NT	1.000	1.000	1.100	NT	0.081 J	0.092 J	NT	4.200 B	3.400 B	NT	4.100 B	3.700 B	NT
Benzene	13	1	0.260 U	NT	0.240 U	0.270 U	0.250 U	NT	0.260 U	0.270 U	NT	0.340 U	0.016 J	NT	0.300 U	0.280 U	NT
Carbon disulfide	NLE	NLE	0.260 U	NT	0.240 U	0.270 U	0.250 U	NT	0.260 U	0.270 U	NT	0.340 U	0.270 U	NT	0.300 U	0.280 U	NT
1,2-Dichloroethane	24	1	0.260 U	NT	0.240 U	0.270 U	0.250 U	NT	0.260 U	0.270 U	NT	0.340 U	0.270 U	NT	0.300 U	0.280 U	NT
Ethylbenzene	1000	100	0.260 U	NT	0.240 U	0.270 U	0.250 U	NT	0.260 U	0.270 U	NT	0.340 U	0.077 J	NT	0.300 U	0.020 J	NT
Methylene Chloride	210	1	0.055 JB	NT	0.240 U	0.023 J	0.250 U	NT	0.260 U	0.270 U	NT	0.110 JB	0.072 JB	NT	0.093 JB	0.099 JB	NT
Toluene	1000	500	0.260 U	NT	0.240 U	0.270 U	0.250 U	NT	0.260 U	0.270 U	NT	0.340 U	0.110 J	NT	0.300 U	0.061 J	NT
Trichloroethylene	54	1	0.260 U	NT	0.240 U	0.270 U	0.250 U	NT	0.260 U	0.270 U	NT	0.340 U	0.270 U	NT	0.300 U	0.280 U	NT
Xylenes (Total)	1000	67	0.780 U	NT	0.720 U	0.800 U	0.760 U	NT	0.790 U	0.810 U	NT	1.020 U	0.294 J	NT	0.890 U	0.063 J	NT
Semi-Volatiles																	
Acenaphthene	10000	100	0.160 J	1.100 U	NT	0.210 J	0.440 J	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U
Acenaphthylene	NLE	NLE	0.140 J	1.100 U	NT	1.100 U	1.100 U	1.200 U	NT	1.200 U	0.230 J	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U
Anthracene	10000	100	0.920 J	1.100 U	NT	1.100 U	0.310 J	1.200 U	NT	1.200 U	0.400 J	NT	1.200 U	0.097 J	NT	1.100 U	0.210 J
Benzo[a]anthracene	4	500	2.800	1.100 U	NT	1.100 U	1.100 U	1.200 U	NT	1.200 U	2.400	NT	1.200 U	0.410 J	NT	0.180 J	0.200 J
Benzo[a]pyrene	0.66	100	2.400	1.100 U	NT	1.100 U	1.100 U	1.200 U	NT	1.200 U	2.000	NT	1.200 U	0.350 J	NT	0.160 J	0.250 J
Benzo[b]fluoranthene	4	50	3.500	1.100 U	NT	1.100 U	1.100 U	1.200 U	NT	1.200 U	3.000	NT	1.200 U	0.610 J	NT	0.260 J	0.410 J
Benzo[g,h,i]perylene	NLE	NLE	0.900 J	1.100 U	NT	1.100 U	1.100 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U
Benzo[k]fluoranthene	4	500	1.300	1.100 U	NT	1.100 U	1.100 U	1.200 U	NT	1.200 U	1.200	NT	1.200 U	0.160 J	NT	0.120 J	0.180 J
bis(2-chloroethyl)ether	3	10	1.000 U	1.100 U	NT	1.100 U	1.100 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U
bis(2-Ethylhexyl)phthalate	210	100	0.250 JB	1.100 U	NT	1.100 U	1.100 U	1.200 U	NT	0.350 J	0.480 JB	NT	0.280 JB	0.240 JB	NT	0.220 JB	0.430 J
Butyl benzyl phthalate	10000	100	1.000 U	1.100 U	NT	1.100 U	1.100 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U
4-Chloroaniline	4200	NLE	1.000 U	1.100 U	NT	1.100 U	1.100 U	1.200 U	NT	1.200 U	1.200 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U
Chrysene	40	500	2.900	1.100 U	NT	1.100 U	1.100 U	0.120 J	NT	1.200 U	2.500	NT	1.200 U	0.510 J	NT	0.260 J	0.250 J
Dibenz[a,h]anthracene	0.66	100	1.000 U	1.100 U	NT	1.100 U	1.100 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U
Dibenzofuran	NLE	NLE	0.140 J	1.100 U	NT	0.180 J	1.100 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U
Diethyl phthalate	10000	50	1.000 U	1.100 U	NT	1.100 U	1.100 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U
Di-n-butylphthalate	10000	100	0.490 JB	0.850 JB	NT	0.300 JB	0.580 JB	0.330 JB	NT	0.280 JB	0.670 JB	NT	0.850 JB	0.760 JB	NT	0.800 JB	0.079 JB
Di-n-octyl phthalate	10000	100	1.000 U	1.100 U	NT	1.100 U	1.100 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	0.092 J	1.100 U
Fluoranthene	10000	100	5.500	0.190 J	NT	1.100 U	0.760 J	0.160 J	NT	1.200 U	3.400	NT	1.200 U	0.850 J	NT	0.340 J	0.280 J
Fluorene	10000	100	0.210 J	1.100 U	NT	0.190 J	0.330 J	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U
Indeno[1,2,3-cd]pyrene	4	500	0.950 J	1.100 U	NT	1.100 U	1.100 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U
2-Methylnaphthalene	NLE	NLE	1.000 U	4.300	NT	1.100 J	1.100 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U
Naphthalene	4200	100	1.000 U	2.220	NT	1.100 U	1.100 U	1.200 U	NT	1.200 U	1.100 U	NT	1.200 U	1.200 U	NT	1.100 U	1.100 U
Phenanthrene	NLE	NLE	3.200	0.360 J	NT	0.470 J	0.600 J	0.080 J	NT	1.200 U	1.400	NT	0.073 J	0.470 J	NT	0.200 J	0.210 J
Pyrene	10000	100	6.300	0.350 J	NT	1.100 U	0.610 J	0.190 J	NT	1.200 U	6.500	NT	0.078 J	0.950 J	NT	0.400 J	0.360 J
PCBs																	
Aroclor 1260	2	50	0.0041 U	0.0040 U	NT	0.0039 U	0.0039 U	0.20	NT	0.0041 U	0.0039 U	NT	0.0040 U	0.0040 U	NT	0.0042 U	0.07
Metals																	
Aluminum	NLE	NLE	9100 B	7040 B	NT	24600 B	15600 B	12700 B	NT	16800 B	7970 B	NT	19100 B	16000 B	NT	19100 B	6480 B
Antimony	340	NLE	0.419 U	2.64	NT	0.431 U	0.428 U	0.460 U	NT	0.460 U	0.434 U	NT	0.462 U	0.460 U	NT	0.433 U	0.417 U
Arsenic	20	NLE	6.09	27.1	NT	9.81	11.9	8.96	NT	9.50	5.13	NT	8.73	12.8	NT	9.88	5.22
Barium	47000	NLE	45.2 B	148 B	NT	54.1 B	27.2 B	44.8 B	NT	25.6 B	61.3 B	NT	45.6 B	53.0 B	NT	67.3 B	23.8 B
Beryllium	140	NLE	0.498	0.539	NT	1.73	1.38	1.18	NT	2.07	0.312	NT	1.60	1.27	NT	2.02	0.295
Cadmium	100	NLE	0.344 B	1.08	NT	0.627	0.613	0.222	NT	0.353	0.467 B	NT	0.422 B	0.520 B	NT	0.716 B	0.207
Calcium	NLE	NLE	5990 B	3210 B	NT	1140 B	486 B	1670 B	NT	2080 B	39400 B	NT	1750 B	2970 B	NT	2060 B	590 B
Chromium	NLE	NLE	33.6	41.8 B	NT	125 B	105 B	73.7	NT	156	21.5	NT	97.4	81.1	NT	149	23.9
Cobalt	NLE	NLE	0.985	4.96	NT	0.876	3.68	1.78	NT	1.82	1.44	NT	1.71	0.725	NT	1.78	0.317 U
Copper	45000	NLE	12.6 B	244 B	NT	7.17 B	6.60 B	23.8 B	NT	6.77 B	44.0 B	NT	7.87 B	21.4 B	NT	13.1 B	11.8 B
Iron	NLE	NLE	17300 B	24600	NT	49800	47800	33300 B	NT	66600 B	14100 B	NT	45300 B	37200 B	NT	67000 B	16700 B
Lead	800	NLE	14.4	401	NT	2.72	1.13	49.9	NT	0.754	63.0	NT	4.24	44.4	NT	62.8	25.7
Magnesium	NLE	NLE	3270 B	1840 B	NT	6520 B	5170 B	3620 B	NT	7130 B	3730 B	NT	4950 B	4120 B	NT	7330 B	719 B
Manganese	NLE	NLE	113	53.1 B	NT	99.5 B	62.4 B	119 B	NT	35.3 B	177	NT	174	151	NT	89.0	51.4 B
Mercury	270	NLE	0.097 U	0.113 U	NT	0.104 U	0.108 U	0.121 U	NT	0.104 U	0.098 U	NT	0.116 U	0.107 U	NT	0.101 U	0.11
Nickel	2400	NLE	9.42	13.3 B	NT	9.34 B	7.75 B	8.87	NT	7.65	12.7	NT	13.9	13.1	NT	9.41	4.51
Potassium	NLE	NLE	2100	1800 B	NT	12600 B	11300 B	6720 B	NT	16100 B	1210	NT	7370	7910	NT	16500	1210 B
Selenium	3100	NLE	0.619 U	0.657 U	NT	0.637 U	0.632 U	0.679 U	NT	0.680 U	0.640 U	NT	0.683 U	0.679 U	NT	0.640 U	0.615 U
Sodium	NLE	NLE	36.33 U	68.8 B	NT	37.391 U	37.122 U	39.868 U	NT	39.898 U	37.577 U	NT	40.074 U	39.869 U	NT	37.554 U	36.115 U
Vanadium	7100	NLE	36.9	27.4	NT	81.1	76.6	52.5	NT	81.8	32.8	NT	64.0	60.4	NT	88.5	30.9
Zinc	1500	NLE	38.9	49.6 B	NT	51.2 B	47.9 B	82.2 B	NT	65.9 B	116	NT	66.7	97.5	NT	113	52.0 B

¹ NJDEP Residential Direct Contact Soil Cleanup Criteria per NJAC 7:26D, 1999. Beryllium, Copper and Lead criteria per NJAC 7:26D, 2008.

² NJDEP Non-Residential Direct Contact Soil Cleanup Criteria per NJAC 7:26D, 1999. Beryllium, Copper and Lead criteria per NJAC 7:26D, 2008.

³ NJDEP Impact to Groundwater Soil Cleanup Criteria per NJAC 7:26D, 1999.

DUP = Duplicate Sample.

ft. bgs = Feet below ground surface.

NLE = No limit established.

Bold = Analyte was detected.

Shaded = Concentration exceeds level of concern. (Surface soil compared to NRDCSCC. Subsurface soil compared to IGWSCC when available, otherwise compared to NRDCSCC).

B = The compound was found in the associated method blank as well as in the sample.

D = Sample was diluted.

E = The compound's concentration exceeds the calibration range of the instrument for that specific analysis.

J = Mass spec and retention time data indicate the presence of a compound however the result is less than the MDL but greater than zero.

U = The compound was analyzed for but not detected.

NT = Not tested.

mg/kg = milligram per kilogram.

Table 3.21-4
Fort Monmouth Phase II Site Investigation, Parcel 83
Summary of Analytical Parameters Detected in Soil (mg/kg)

Chemical	Sample ID: Lab ID: Date Sampled: Depth (ft. bgs):		Analytical Results											
			P83-SB14-B	P83-SB14-C	P83-SB14-C DUP	P83-SB15-A	P83-SB15-B	P83-SB15-C	P83-SB16-A	P83-SB16-B	P83-SB16-C	P83-SB17-A	P83-SB17-B	P83-SB17-C
			7054017	7054018	7054003	7054019	7054020	7054021	7054704	7054705	7054706	7054707	7054708	7054709
			12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/18/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007
	NRDCSCC ²	IGWSCC ³	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatiles														
Acetone	1000	100	0.200 J	0.370 U	0.330 U	NT	0.930	0.270 U	NT	1.200	0.290 U	NT	0.280 U	0.260 U
Benzene	13	1	0.300 U	0.370 U	0.330 U	NT	0.290 U	0.270 U	NT	0.310 U	0.290 U	NT	0.280 U	0.260 U
Carbon disulfide	NLE	NLE	0.300 U	0.370 U	0.330 U	NT	0.039 J	0.270 U	NT	0.310 U	0.290 U	NT	0.280 U	0.260 U
1,2-Dichloroethane	24	1	0.300 U	0.370 U	0.330 U	NT	0.290 U	0.270 U	NT	0.310 U	0.290 U	NT	0.280 U	0.260 U
Ethylbenzene	1000	100	0.300 U	0.370 U	0.330 U	NT	0.290 U	0.270 U	NT	0.310 U	0.290 U	NT	0.280 U	0.260 U
Methylene Chloride	210	1	0.300 U	0.370 U	0.330 U	NT	0.290 U	0.270 U	NT	0.310 U	0.290 U	NT	0.280 U	0.260 U
Toluene	1000	500	0.300 U	0.370 U	0.330 U	NT	0.290 U	0.270 U	NT	0.310 U	0.290 U	NT	0.280 U	0.260 U
Trichloroethylene	54	1	0.300 U	0.370 U	0.330 U	NT	0.290 U	0.270 U	NT	0.310 U	0.290 U	NT	0.280 U	0.260 U
Xylenes (Total)	1000	67	0.900 U	1.120 U	0.980 U	NT	0.870 U	0.810 U	NT	0.920 U	0.860 U	NT	0.850 U	0.780 U
Semi-Volatiles														
Acenaphthene	10000	100	NT	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.100 U	NT	1.100 U	1.100 U	NT	1.100 U
Acenaphthylene	NLE	NLE	NT	0.130 J	0.340 J	1.100 U	NT	1.200 U	1.100 U	NT	1.100 U	1.100 U	NT	1.100 U
Anthracene	10000	100	NT	0.095 J	0.091 J	0.060 J	NT	1.200 U	1.100 U	NT	1.100 U	1.100 U	NT	1.100 U
Benzo[a]anthracene	4	500	NT	0.550 J	0.570 J	0.290 J	NT	1.200 U	1.100 U	NT	1.100 U	1.100 U	NT	1.100 U
Benzo[a]pyrene	0.66	100	NT	0.580 J	0.730 J	0.310 J	NT	1.200 U	1.100 U	NT	1.100 U	1.100 U	NT	1.100 U
Benzo[b]fluoranthene	4	50	NT	0.720 J	1.100 J	0.500 J	NT	1.200 U	1.100 U	NT	1.100 U	1.100 U	NT	1.100 U
Benzo[g,h,i]perylene	NLE	NLE	NT	0.500 J	0.530 J	1.100 U	NT	1.200 U	1.100 U	NT	1.100 U	1.100 U	NT	1.100 U
Benzo[k]fluoranthene	4	500	NT	0.310 J	0.420 J	1.100 U	NT	1.200 U	1.100 U	NT	1.100 U	1.100 U	NT	1.100 U
bis(2-chloroethyl)ether	3	10	NT	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.100 U	NT	1.100 U	1.100 U	NT	1.100 U
bis(2-Ethylhexyl)phthalate	210	100	NT	0.470 J	1.200 U	0.520 J	NT	0.260 J	1.100 U	NT	0.140 JB	0.200 JB	NT	0.210 JB
Butyl benzyl phthalate	10000	100	NT	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.100 U	NT	1.100 U	1.100 U	NT	1.100 U
4-Chloroaniline	4200	NLE	NT	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.100 U	NT	1.100 U	1.100 U	NT	1.100 U
Chrysene	40	500	NT	0.570 J	0.800 J	0.370 J	NT	1.200 U	0.260 J	NT	1.100 U	1.100 U	NT	1.100 U
Dibenz[a,h]anthracene	0.66	100	NT	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.100 U	NT	1.100 U	1.100 U	NT	1.100 U
Dibenzofuran	NLE	NLE	NT	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.100 U	NT	1.100 U	1.100 U	NT	1.100 U
Diethyl phthalate	10000	50	NT	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.100 U	NT	1.100 U	1.100 U	NT	1.100 U
Di-n-butylphthalate	10000	100	NT	0.280 JB	0.380 JB	0.270 JB	NT	0.310 JB	1.100 U	NT	0.055 JB	0.110 JB	NT	0.068 JB
Di-n-octyl phthalate	10000	100	NT	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.100 U	NT	1.100 U	1.100 U	NT	1.100 U
Fluoranthene	10000	100	NT	0.690 J	0.580 J	0.480 J	NT	1.200 U	0.240 J	NT	1.100 U	0.086 J	NT	1.100 U
Fluorene	10000	100	NT	1.200 U	1.200 U	1.100 U	NT	1.200 U	1.100 U	NT	1.100 U	1.100 U	NT	1.100 U
Indeno[1,2,3-cd]pyrene	4	500	NT	0.440 J	0.520 J	1.100 U	NT	1.200 U	1.100 U	NT	1.100 U	1.100 U	NT	1.100 U
2-Methylnaphthalene	NLE	NLE	NT	1.200 U	1.200 U	1.100 U	NT	1.200 U	0.250 J	NT	1.100 U	1.100 U	NT	1.100 U
Naphthalene	4200	100	NT	1.200 U	1.200 U	1.100 U	NT	1.200 U	0.160 J	NT	1.100 U	1.100 U	NT	1.100 U
Phenanthrene	NLE	NLE	NT	0.240 J	0.100 J	0.170 J	NT	1.200 U	0.230 J	NT	1.100 U	1.100 U	NT	1.100 U
Pyrene	10000	100	NT	0.800 J	0.800 J	0.670 J	NT	1.200 U	0.290 J	NT	1.100 U	0.094 J	NT	1.100 U
PCBs														
Aroclor 1260	2	50	NT	0.0040 U	0.0041 U	0.0041 U	NT	0.0041 U	0.0041 U	NT	0.0042 U	0.0041 U	NT	0.0039 U
Metals														
Aluminum	NLE	NLE	NT	19000 B	16900 B	8030 B	NT	19800 B	6520 B	NT	17000 B	17100 B	NT	9680 B
Antimony	340	NLE	NT	0.458 U	0.433 U	0.436 U	NT	0.476 U	0.421 U	NT	0.451 U	0.443 U	NT	0.428 U
Arsenic	20	NLE	NT	10.2	8.87	4.51	NT	14.3	4.17	NT	7.93	9.08	NT	8.88
Barium	47000	NLE	NT	45.6 B	43.2 B	50.9 B	NT	32.5 B	50.7 B	NT	46.5 B	53.9 B	NT	19.5 B
Beryllium	140	NLE	NT	1.84	1.82	0.0474	NT	1.90	0.497	NT	1.52	1.88	NT	0.983
Cadmium	100	NLE	NT	0.366	0.154	0.426	NT	0.377	0.276	NT	0.129	0.429	NT	0.118
Calcium	NLE	NLE	NT	1830 B	1960 B	5490 B	NT	1410 B	3300 B	NT	1020 B	1410 B	NT	326 B
Chromium	NLE	NLE	NT	138	130	203	NT	136	21.4	NT	107	124	NT	60.2
Cobalt	NLE	NLE	NT	1.97	2.64	1.50	NT	3.25	2.66	NT	1.99	3.24	NT	0.938
Copper	45000	NLE	NT	13.6 B	16.8 B	39.9 B	NT	9.34 B	39.5 B	NT	7.24 B	8.35 B	NT	4.28 B
Iron	NLE	NLE	NT	55600 B	52500	25300 B	NT	64400 B	15700 B	NT	43300 B	52700 B	NT	35800 B
Lead	800	NLE	NT	9.67	12.5	15.5	NT	2.23	55.1	NT	1.51	10.3	NT	0.498
Magnesium	NLE	NLE	NT	6150 B	6030 B	2670 B	NT	6850 B	835 B	NT	5070 B	5740 B	NT	2320 B
Manganese	NLE	NLE	NT	126 B	158 B	1240 B	NT	87.2 B	51.7 B	NT	136 B	90.8 B	NT	83.6 B
Mercury	270	NLE	NT	0.108 U	0.111 U	0.116 U	NT	0.115 U	0.107 U	NT	0.115 U	0.104 U	NT	0.105 U
Nickel	2400	NLE	NT	9.23	9.94	7.76	NT	11.1	12.0	NT	10.4	12.5	NT	5.82
Potassium	NLE	NLE	NT	12900 B	12300 B	2400 B	NT	13300 B	1440 B	NT	9040 B	13000 B	NT	5190 B
Selenium	3100	NLE	NT	0.677 U	0.639 U	0.644 U	NT	0.702 U	0.621 U	NT	0.666 U	0.655 U	NT	0.632 U
Sodium	NLE	NLE	NT	39.729 U	37.506 U	37.78 U	NT	41.224 U	36.446 U	NT	39.087 U	38.426 U	NT	37.117 U
Vanadium	7100	NLE	NT	82.5	75.7	37.3	NT	84.6	39.4	NT	65.9	74.9	NT	60.9
Zinc	1500	NLE	NT	79.2 B	81.8 B	173 B	NT	150 B	54.4 B	NT	63.5 B	83.3 B	NT	40.3 B

¹ NJDEP Residential Direct Contact Soil Cleanup Criteria per NJAC 7:26D, 1999. Beryllium, Copper and Lead criteria per NJAC 7:26D, 2008.

² NJDEP Non-Residential Direct Contact Soil Cleanup Criteria per NJAC 7:26D, 1999. Beryllium, Copper and Lead criteria per NJAC 7:26D, 2008.

³ NJDEP Impact to Groundwater Soil Cleanup Criteria per NJAC 7:26D, 1999.

DUP = Duplicate Sample.

ft. bgs = Feet below ground surface.

NLE = No limit established.

Bold = Analyte was detected.

Shaded = Concentration exceeds level of concern. (Surface soil compared to NRDCSCC. Subsurface soil compared to IGWSCC when available, otherwise compared to NRDCSCC).

B = The compound was found in the associated method blank as well as in the sample.

D = Sample was diluted.

E = The compound's concentration exceeds the calibration range of the instrument for that specific analysis.

J = Mass spec and retention time data indicate the presence of a compound however the result is less than the MDL but greater than zero.

U = The compound was analyzed for but not detected.

NT = Not tested.

mg/kg = milligram per kilogram.

Table 3.21-5
Fort Monmouth Phase II Site Investigation, Parcel 83
Summary of Analytical Parameters Detected in Groundwater (µg/L)

Chemical	Sample ID: Lab ID: Date Sampled: Screened Interval (ft. bgs):	Analytical Results								
		P83-161MW-01	P83-A1	P83-A1 DUP	P83-A3	P83-A5	P83GW-1	P83GW-1 DUP	P83GW-3	P83GW-5
		7055713	7053804	7053803	7053805	7053806	7055704	7055703	7055705	7055706
		12/20/2007	12/17/2007	12/17/2007	12/17/2007	12/17/2007	12/20/2007	12/20/2007	12/20/2007	12/20/2007
	Quality Criteria ¹	Results	Results	Results	Results	Results	Results	Results	Results	Results
Volatiles										
Acetone	6000	0.85 U	0.85 U	0.85 U	0.85 U	0.85 U	0.85 U	0.85 U	0.85 U	0.85 U
Carbon disulfide	700	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.20 J	0.44 U
1,2-Dichloroethane	2	0.30 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
Methyl tertiary butyl ether (MTBE)	70	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	1.03	0.23 U
Tertiary butyl alcohol	100	1.82 U	1.82 U	1.82 U	1.82 U	1.82 U	1.82 U	1.82 U	23.38	1.82 U
Toluene	600	0.27 U	0.27 U	0.27 U	0.84	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U
Xylenes (Total)	1000	0.49 U	0.49 U	0.49 U	0.24 J	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U
Semi-Volatiles										
Acenaphthene	400	10 U	11 U	11 U	1 J	10 U	10 U	10 U	10 U	10 U
Anthracene	2000	10 U	11 U	11 U	0.40 J	10 U	10 U	10 U	10 U	10 U
bis(2-Ethylhexyl)phthalate	3	10 U	5 JB	4 JB	10 U	0.60 JB	2 JB	10 U	0.90 JB	1 JB
Dibenzofuran	NLE	10 U	11 U	11 U	0.70 J	10 U	10 U	10 U	10 U	10 U
Diethyl phthalate	6000	10 U	11 U	11 U	0.50 JB	10 U	10 U	10 U	10 U	10 U
Di-n-butyl phthalate	700	10 U	4 JB	1 JB	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-octyl phthalate	100	0.50 JB	1 J	1 J	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	300	10 U	11 U	11 U	0.50 J	10 U	10 U	10 U	10 U	10 U
Fluorene	300	10 U	11 U	11 U	2 J	10 U	10 U	10 U	10 U	10 U
2-Methylnaphthalene	30	10 U	11 U	11 U	4 J	10 U	10 U	10 U	10 U	10 U
Naphthalene	300	10 U	11 U	11 U	5 J	10 U	10 U	10 U	10 U	10 U
Phenanthrene	NLE	10 U	11 U	11 U	3 J	10 U	10 U	10 U	10 U	10 U
Pyrene	200	10 U	0.50 J	11 U	0.40 J	10 U	10 U	10 U	10 U	10 U
Metals										
Aluminum	200	NT	2460 B	1440 B	1710 B	884 B	NT	NT	NT	NT
Arsenic	3	NT	2.70 U	5.04	2.70 U	2.70 U	NT	NT	NT	NT
Barium	6000	NT	58.7	107	26.1	16.3	NT	NT	NT	NT
Beryllium	1	NT	0.794	0.788	0.437	0.132	NT	NT	NT	NT
Cadmium	4	NT	0.358	0.672	0.20 U	0.219	NT	NT	NT	NT
Calcium	NLE	NT	16000 B	27700 B	5710 B	17800 B	NT	NT	NT	NT
Chromium (Total)	70	NT	6.13 B	2.57 B	10 B	2.37 B	NT	NT	NT	NT
Cobalt	100*	NT	1.50	2.08	0.20 U	0.805	NT	NT	NT	NT
Copper	1300	NT	12.1	13.8	5.76	3.34	NT	NT	NT	NT
Iron	300	NT	3520	3860	11100	516	NT	NT	NT	NT
Magnesium	NLE	NT	1290	2050	626	2520	NT	NT	NT	NT
Manganese	50	NT	89 B	140 B	113 B	18.1 B	NT	NT	NT	NT
Nickel (Soluble Salts)	100	NT	4 B	6.43 B	0.56 B	3.16 B	NT	NT	NT	NT
Potassium	NLE	NT	2290 B	3230 B	281 B	1050 B	NT	NT	NT	NT
Selenium	40	NT	5.34 B	4.76 B	2.70 U	7.16 B	NT	NT	NT	NT
Sodium	50000	NT	90000	94800	4630	18500	NT	NT	NT	NT
Vanadium	NLE	NT	20.5	9.07	25.9	1.75	NT	NT	NT	NT
Zinc	2000	NT	120	142	9.55	13.1	NT	NT	NT	NT

¹ Higher of Practical Quantitation Limits (PQLs) & Groundwater Quality Criterion (GWQC) per NJAC 7:9-6, 2005 (* Interim GWQC).

DUP = Duplicate Sample.

ft. bgs = Feet below ground surface.

NLE = No limit established.

Bold = Analyte was detected.

Shaded = Concentration exceeds Quality Criteria.

µg/L = micrograms per liter.

B = The compound was found in the associated method blank as well as in the sample.

D = Sample was diluted.

E = The compound's concentration exceeds the calibration range of the instrument for that specific analysis.

J = Mass spec and retention time data indicate the presence of a compound however the result is less than the MDL but greater than zero.

U = The compound was analyzed for but not detected.

NT = Not tested.

Table 3.21-5
Fort Monmouth Phase II Site Investigation, Parcel 83
Summary of Analytical Parameters Detected in Groundwater (µg/L)

Chemical	Sample ID: Lab ID: Date Sampled: Depth (ft. bgs):	Analytical Results					
		P83GW-7	P83GW-8	P83GW-10	P83GW-12	P83GW-14	P83GW-17
		7055707	7055708	7055709	7055710	7055711	7055712
		12/20/2007	12/20/2007	12/20/2007	12/20/2007	12/20/2007	12/20/2007
	Quality Criteria ¹	Results	Results	Results	Results	Results	Results
Volatiles							
Acetone	6000	0.85 U	1.65	2.31	1.63	1.33	0.85 U
Carbon disulfide	700	0.44 U	0.44 U	0.66	0.44 U	0.44 U	0.44 U
1,2-Dichloroethane	2	0.33 U	1.81	0.33 U	0.33 U	0.33 U	0.33 U
Methyl tertiary butyl ether (MTBE)	70	0.23 U	0.77	0.23 U	0.23 U	0.23 U	0.23 U
Tertiary butyl alcohol	100	1.82 U	1.82 U	1.82 U	1.82 U	1.82 U	1.82 U
Toluene	600	0.27 U	0.27 U	0.46	0.27 U	0.27 U	0.27 U
Xylenes (Total)	1000	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U
Semi-Volatiles							
Acenaphthene	400	10 U	10 U	10 U	10 U	10 U	10 U
Anthracene	2000	10 U	10 U	10 U	10 U	10 U	10 U
bis(2-Ethylhexyl)phthalate	3	2 JB	0.60 JB	10 U	10 U	0.70 JB	0.90 JB
Dibenzofuran	NLE	10 U	10 U	10 U	10 U	10 U	10 U
Diethyl phthalate	6000	10 U	10 U	10 U	10 U	10 U	0.50 J
Di-n-butyl phthalate	700	10 U	0.40 J	10 U	10 U	10 U	10 U
Di-n-octyl phthalate	100	1 JB	10 U	10 U	0.80 JB	0.50 JB	0.50 JB
Fluoranthene	300	10 U	10 U	10 U	10 U	10 U	10 U
Fluorene	300	10 U	10 U	10 U	10 U	10 U	10 U
2-Methylnaphthalene	30	10 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	300	10 U	10 U	10 U	10 U	10 U	10 U
Phenanthrene	NLE	10 U	10 U	10 U	10 U	10 U	10 U
Pyrene	200	10 U	10 U	10 U	10 U	10 U	10 U
Metals							
Aluminum	200	NT	NT	NT	NT	NT	NT
Arsenic	3	NT	NT	NT	NT	NT	NT
Barium	6000	NT	NT	NT	NT	NT	NT
Beryllium	1	NT	NT	NT	NT	NT	NT
Cadmium	4	NT	NT	NT	NT	NT	NT
Calcium	NLE	NT	NT	NT	NT	NT	NT
Chromium	70	NT	NT	NT	NT	NT	NT
Cobalt	100*	NT	NT	NT	NT	NT	NT
Copper	1300	NT	NT	NT	NT	NT	NT
Iron	300	NT	NT	NT	NT	NT	NT
Magnesium	NLE	NT	NT	NT	NT	NT	NT
Manganese	50	NT	NT	NT	NT	NT	NT
Nickel	100	NT	NT	NT	NT	NT	NT
Potassium	NLE	NT	NT	NT	NT	NT	NT
Selenium	40	NT	NT	NT	NT	NT	NT
Sodium	50000	NT	NT	NT	NT	NT	NT
Vanadium	NLE	NT	NT	NT	NT	NT	NT
Zinc	2000	NT	NT	NT	NT	NT	NT

¹ Higher of Practical Quantitation Limits (PQLs) & Groundwater Quality Criterion (GWQC) per NJAC 7:9-6 (* Interim GWQC).

DUP = Duplicate Sample.

ft. bgs = Feet below ground surface.

NLE = No limit established.

Bold = Analyte was detected.

Shaded = Concentration exceeds Quality Criteria.

µg/L = micrograms per liter.

B = The compound was found in the associated method blank as well as in the sample.

D = Sample was diluted.

E = The compound's concentration exceeds the calibration range of the instrument for that specific analysis.

J = Mass spec and retention time data indicate the presence of a compound however the result is less than the MDL but greater than zero.

U = The compound was analyzed for but not detected.

NT = Not tested.

APPENDIX D

Laboratory Analytical Reports and Data Tables

APPENDIX E

Data Validation Reports

DATA VALIDATION REPORT FOR PARCEL 83

FORT MONMOUTH, OCEANPORT, MONMOUTH COUNTY, NEW JERSEY

**BRAC 05 Facility
Contract W912DY-09-D-0062
Task Order: 0012, Project No. 369857**

Submitted To:
**U.S. Army Engineering and Support Center
Huntsville, Alabama**
and
U.S. Army Corps of Engineers, New York District



Prepared By:
PARSONS
401 Diamond Dr. NW, Huntsville, AL 35806

**Revision No. 0
March 2018**

TABLE OF CONTENTS

SECTION 1 DATA USABILITY SUMMARY.....	1-1
1.1 Sampling and Chain-of-Custody.....	1-1
1.2 Laboratory Data Packages	1-1
1.3 Laboratory Analytical Methods	1-1
1.3.1 PAH Organic Analysis.....	1-2
1.3.2 EPH Analysis	1-2
1.3.3 Metals Analysis.....	1-2
SECTION 2 DATA VALIDATION REPORT	2-1
2.1 Soil Samples.....	2-1
2.1.1 PAHs	2-1
2.1.2 Total Unfractionated and Fractionated EPH.....	2-2
2.1.3 Arsenic	2-3

LIST OF ATTACHMENTS

Attachment A Validated Laboratory Data
--

SECTION 1 DATA USABILITY SUMMARY

Soil samples were collected from the Parcel 83 site in Oceanport, New Jersey on November 14, 2017 through November 16, 2017. Analytical results from these samples were validated and reviewed by Parsons for usability with respect to the following requirements:

- 2013 FTMM Sampling and Analysis Plan (SAP); and
- Department of Defense (DoD) Quality Systems Manual (QSM)

The analytical laboratory for this project was ALS Environmental (ALS) in Middletown, Pennsylvania. This laboratory is certified to conduct project analyses through the New Jersey Department of Environmental Protection (NJDEP) and DoD Environmental Laboratory Approval Program (ELAP).

1.1 SAMPLING AND CHAIN-OF-CUSTODY

The samples were collected, properly preserved, shipped under a COC record, and received at ALS within one day of sampling. All samples were received intact and in good condition at the laboratory.

1.2 LABORATORY DATA PACKAGES

The laboratory data package turnaround time, defined as the time from sample receipt by the laboratory to receipt of the analytical data packages by Parsons, was 31-58 days for the samples.

The laboratory data packages received from ALS were paginated, complete, and overall were of good quality. Comments on specific quality control (QC) and other requirements are discussed in detail in Section 2.

1.3 LABORATORY ANALYTICAL METHODS

The soil samples were collected from the site and analyzed for polynuclear aromatic hydrocarbons (PAHs), total unfractionated extractable petroleum hydrocarbons (EPH), fractionated EPAH, and arsenic. Summaries of issues concerning these laboratory analyses are presented in Subsections 1.3.1 through 1.3.3. The data qualifications resulting from the data validation review and statements on the laboratory analytical precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS) are discussed for each analytical method in Section 2. The laboratory data were reviewed and may be qualified with the following validation flags:

- "U" - not detected at the value given,
- "UJ" - estimated and not detected at the value given,
- "J" - estimated at the value given,
- "J+" - estimated biased high at the value given,
- "J-" - estimated biased low at the value given,
- "B" - compound detected in the sample at a concentration less than or equal to 5 times (10 times for common lab contaminants) the blank,
- "N" - presumptive evidence at the value given, and

"R" - unusable value.

The validated laboratory data were tabulated and are presented in Attachment A.

1.3.1 PAH Organic Analysis

Soil samples were analyzed for PAHs using the USEPA SW-846 8270D analytical method. Certain reported results for these samples were qualified as estimated based upon field duplicate precision. The reported PAH analytical results were considered 100% complete (i.e., usable) for the project data. PARCCS requirements were met.

1.3.2 EPH Analysis

Soil samples were analyzed for total unfractionated EPH or fractionated EPH using the NJEPH analytical method. Certain reported results for the EPH samples were qualified as estimated based upon surrogate recoveries and laboratory duplicate precision. The reported EPH analytical results were considered 100% complete (i.e., usable) for the project data. PARCCS requirements were met.

1.3.3 Metals Analysis

Soil samples collected from the site were analyzed for arsenic using the USEPA SW-846 6020A analytical method. The reported results for these samples did not require qualification resulting from data validation. The reported metals results were considered 100% complete (i.e., usable) for the data presented by ALS. PARCCS requirements were met.

SECTION 2 DATA VALIDATION REPORT

2.1 SOIL SAMPLES

Data review has been completed for data packages generated by ALS containing soil samples collected from the site. These samples were contained within sample delivery groups (SDGs) PQF101, PQF102, PQF103, PQF104, PQF108, and PQF109. All of these samples were properly preserved, shipped under a COC record, and received intact by the analytical laboratory. The validated laboratory data were tabulated and are presented in Attachment A.

Data validation was performed for all samples in accordance with the project SAP and DoD QSM. This data validation and usability report is presented by analysis type.

2.1.1 PAHs

The following items were reviewed for compliancy in the PAH analysis:

- Custody documentation
- Holding times
- Surrogate recoveries
- Matrix spike/matrix spike duplicate (MS/MSD) precision and accuracy
- Laboratory control sample (LCS) recoveries
- Laboratory method blank and equipment blank contamination
- Initial calibrations
- Verification calibrations
- Internal standard recoveries
- Field duplicate precision
- Sample result verification and identification
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols with the exception of MS/MSD precision and accuracy and field duplicate precision as discussed below.

MS/MSD Precision and Accuracy

All MS/MSD precision (relative percent difference; RPD) and accuracy (percent recovery; %R) measurements were considered acceptable and within QC limits for designated spiked project samples with the exception of the high MS accuracy results for benzo(a)pyrene (131%R; QC limit 45-129%R), benzo(b)fluoranthene (158%R; QC limit 45-132%R), chrysene (132%R; QC limit 50-124%R), fluoranthene (135%R; QC limit 50-127%R), and pyrene (154%R; QC limit 47-127%R) during the spiked analyses of sample PAR-83-SB-23-0-0.5. Validation qualification of this parent sample was not required.

Field Duplicate Precision

All field duplicate precision results were considered acceptable with the exception all positive results associated with the field duplicate pair PAR-83-SB-23-0-0.5 and PAR-83-SB-123-0-0.5 except for naphthalene, phenanthrene, and dibenz(a,h)anthracene. Therefore, the positive results for these samples were considered estimated and qualified “J”.

Usability

All PAH sample results for the soil samples were considered usable following data validation.

Summary

The quality assurance objectives for measurement data included considerations for precision, accuracy, representativeness, completeness, comparability, and sensitivity. The PAH data presented by ALS were 100% complete with all data considered usable and valid. The validated data are tabulated and presented in Attachment A.

2.1.2 Total Unfractionated and Fractionated EPH

The following items were reviewed for compliancy in the EPH analysis:

- Custody documentation
- Holding times
- Surrogate recoveries
- Matrix spike/matrix spike duplicate (MS/MSD) precision and accuracy
- Laboratory control sample (LCS) recoveries
- Laboratory method blank contamination
- Initial calibrations
- Verification calibrations
- Internal standard recoveries
- Laboratory duplicate precision
- Field duplicate precision
- Sample result verification and identification
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols with the exception of surrogate recoveries, blank contamination, and laboratory duplicate precision as discussed below.

Surrogate Recoveries

All sample surrogate recoveries were considered acceptable and within QC limits with the exception of the low surrogate recovery for o-terphenyl (QC limit 40-140%R) in aromatic EPH samples PAR-83-SB-23-5-5.5 (2%R) and PAR-83-SB-25-3-3.5 (39.8%R); the low surrogate recovery for 2-bromonaphthalene (QC limit 40-140%R) in aromatic EPH sample PAR-83-SB-23-

5-5.5 (0%R); the low surrogate recovery for 2-fluorobiphenyl (QC limit 40-140%R) in aromatic EPH sample PAR-83-SB-23-5-5.5 (0%R); and the low surrogate recovery for 1-chlorooctadecane in aliphatic EPH sample PAR-83-SB-25-6-6.5 (23.4%R). Therefore, the associated EPH results were considered estimated, possibly biased low, with positive results qualified “J-” and nondetected results qualified “UJ” for the affected samples.

Blank Contamination

The laboratory method blank associated with the project samples in SDG PQF103 contained aliphatic C21-C40, aromatic C10-C12, aromatic C16-C21, and aromatic C21-C36 greater than ½ LOQ at concentrations of 19.9, 0.29, 0.31, and 3.7 mg/kg, respectively. Validation qualification of the project samples was not required.

Laboratory Duplicate Precision

All laboratory duplicate precision results were considered acceptable and less than 40%RPD (50%RPD for total unfractionated) with the exception of the precision for aromatic C10-C12 (74%RPD), aromatic C12-C16 (92%RPD), aromatic C16-C21 (83.8%RPD), aliphatic C9-C12 (102%RPD), aliphatic C12-C16 (107%RPD), aliphatic C16-C21 (110%RPD), and total unfractionated EPH (79%RPD) associated with sample PAR-83-SB-25-6-6.5. Therefore, results for these parameters were considered estimated with positive results qualified “J” and nondetected results qualified “UJ” for the affected sample.

Usability

All EPH sample results for the soil samples were considered usable following data validation.

Summary

The quality assurance objectives for measurement data included considerations for precision, accuracy, representativeness, completeness, comparability, and sensitivity. The EPH data presented by ALS were 100% complete with all data considered usable and valid. The validated data are tabulated and presented in Attachment A.

2.1.3 Arsenic

The following items were reviewed for compliancy in the arsenic analysis:

- Custody documentation
- Holding times
- Initial and continuing calibration verifications
- Initial and continuing calibration blank, and laboratory preparation blank contamination
- Matrix spike/matrix spike duplicate (MS/MSD) recoveries
- Laboratory duplicate precision
- Laboratory control sample (LCS) recoveries
- Serial dilutions
- Interference check sample recoveries
- Field duplicate precision
- Sample result verification and identification

- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols.

Usability

All arsenic results for the soil samples were considered usable following data validation.

Summary

The quality assurance objectives for measurement data included considerations for precision, accuracy, representativeness, completeness, comparability, and sensitivity. The arsenic data for the soil samples presented by ALS were 100% complete (i.e., usable). The validated laboratory data are tabulated and presented in Attachment A.

ATTACHMENT A
VALIDATED LABORATORY DATA

Validated Laboratory Data
FTMM - Parcel 83
November 2017 Soil Sampling

Loc ID	NJ Residential Direct Contact SRS	PAR-83-SB-17		PAR-83-SB-18		PAR-83-SB-19	
Sample ID		PAR-83-SB-17-6-6.5		PAR-83-SB-18-0-0.5		PAR-83-SB-19-0-0.5	
Sample Date		11/14/2017		11/14/2017		11/14/2017	
Semivolatile Organic Compounds (mg/kg)							
Acenaphthene	3400	0.022	J	< 0.07		< 0.068	
Acenaphthylene		0.028	J	< 0.07		< 0.068	
Anthracene	17000	0.041	J	< 0.07		< 0.068	
Benzo(a)anthracene	5	0.15		0.02	J	0.013	J
Benzo(a)pyrene	0.5	0.11	J	0.023	J	0.017	J
Benzo(b)fluoranthene	5	0.14		0.035	J	0.015	J
Benzo(ghi)perylene	380000	0.09	J	0.024	J	0.013	J
Benzo(k)fluoranthene	45	0.056	J	< 0.07		< 0.068	
Chrysene	450	0.15		< 0.07		< 0.068	
Dibenz(a,h)anthracene	0.5	0.024	J	< 0.07		< 0.068	
Fluoranthene	2300	0.26		0.034	J	0.024	J
Fluorene	2300	0.02	J	< 0.07		< 0.068	
Indeno(1,2,3-cd)pyrene	5	0.076	J	0.02	J	< 0.068	
Naphthalene	6	< 0.087		< 0.07		< 0.068	
Phenanthrene		0.12	J	0.015	J	0.017	J
Pyrene	1700	0.38		0.031	J	0.03	J
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)							
C10-C12 Aromatics		NA		NA		NA	
C12-C16 Aliphatics		NA		NA		NA	
C12-C16 Aromatics		NA		NA		NA	
C16-C21 Aliphatics		NA		NA		NA	
C16-C21 Aromatics		NA		NA		NA	
C21-C36 Aromatics		NA		NA		NA	
C21-C40 Aliphatics		NA		NA		NA	
C9-C12 Aliphatics		NA		NA		NA	
EPH (C9-C40)		NA		NA		NA	
Total Aliphatics		NA		NA		NA	
Total Aromatics		NA		NA		NA	
Total EPH		NA		NA		NA	
Inorganics (mg/kg)							
Arsenic	19	NA		NA		NA	
Wet Chemistry - Moisture							
Moisture (percent)		23.6		7.6		7.1	
Percent Solids (percent)		76.4		92.4		92.9	

Validated Laboratory Data
FTMM - Parcel 83
November 2017 Soil Sampling

Loc ID	NJ Residential Direct Contact SRS	PAR-83-SB-20		PAR-83-SB-21		PAR-83-SB-22	
Sample ID		PAR-83-SB-20-0-0.5	PAR-83-SB-120-0-0.5	PAR-83-SB-21-0-0.5		PAR-83-SB-22-0-0.5	
Sample Date		11/14/2017	11/14/2017	11/14/2017		11/14/2017	
Semivolatile Organic Compounds (mg/kg)							
Acenaphthene	3400	< 0.071	< 0.097	< 0.075		< 0.074	
Acenaphthylene		< 0.071	< 0.097	0.026 J		< 0.074	
Anthracene	17000	< 0.071	< 0.097	0.028 J		< 0.074	
Benzo(a)anthracene	5	0.036 J	< 0.097	0.079 J		< 0.074	
Benzo(a)pyrene	0.5	0.032 J	< 0.097	0.084 J		< 0.074	
Benzo(b)fluoranthene	5	0.041 J	0.013 J	0.15		< 0.074	
Benzo(ghi)perylene	380000	0.023 J	< 0.097	0.068 J		< 0.074	
Benzo(k)fluoranthene	45	0.018 J	< 0.097	0.041 J		< 0.074	
Chrysene	450	0.04 J	< 0.097	0.11 J		< 0.074	
Dibenz(a,h)anthracene	0.5	< 0.071	< 0.097	0.018 J		< 0.074	
Fluoranthene	2300	0.058 J	0.023 J	0.15		< 0.074	
Fluorene	2300	< 0.071	< 0.097	< 0.075		< 0.074	
Indeno(1,2,3-cd)pyrene	5	0.018 J	< 0.097	0.069 J		< 0.074	
Naphthalene	6	< 0.071	< 0.097	0.016 J		< 0.074	
Phenanthrene		0.025 J	< 0.097	0.065 J		< 0.074	
Pyrene	1700	0.059 J	0.025 J	0.15		< 0.074	
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)							
C10-C12 Aromatics		NA	NA	NA		NA	
C12-C16 Aliphatics		NA	NA	NA		NA	
C12-C16 Aromatics		NA	NA	NA		NA	
C16-C21 Aliphatics		NA	NA	NA		NA	
C16-C21 Aromatics		NA	NA	NA		NA	
C21-C36 Aromatics		NA	NA	NA		NA	
C21-C40 Aliphatics		NA	NA	NA		NA	
C9-C12 Aliphatics		NA	NA	NA		NA	
EPH (C9-C40)		NA	NA	NA		NA	
Total Aliphatics		NA	NA	NA		NA	
Total Aromatics		NA	NA	NA		NA	
Total EPH		NA	NA	NA		NA	
Inorganics (mg/kg)							
Arsenic	19	NA	NA	NA		NA	
Wet Chemistry - Moisture							
Moisture (percent)		9.9	32.4	14.1		12.6	
Percent Solids (percent)		90.1	67.6	85.9		87.4	

Validated Laboratory Data
FTMM - Parcel 83
November 2017 Soil Sampling

Loc ID	NJ Residential Direct Contact SRS	PAR-83-SB-23									
Sample ID		PAR-83-SB-23-0-0.5		PAR-83-SB-123-0-0.5		PAR-83-SB-23-3-3.5		PAR-83-SB-23-5-5.5		PAR-83-SB-23-6-6.5	
Sample Date		11/14/2017		11/14/2017		11/14/2017		11/14/2017		11/14/2017	
Semivolatile Organic Compounds (mg/kg)											
Acenaphthene	3400	< 0.075		< 0.073		< 0.078		NA		< 0.076	
Acenaphthylene		0.077 J		0.25 J		< 0.078		NA		< 0.076	
Anthracene	17000	0.07 J		0.21 J		< 0.078		NA		< 0.076	
Benzo(a)anthracene	5	0.22 J		0.52 J		< 0.078		NA		< 0.076	
Benzo(a)pyrene	0.5	0.27 J		0.62 J		< 0.078		NA		< 0.076	
Benzo(b)fluoranthene	5	0.37 J		0.81 J		< 0.078		NA		< 0.076	
Benzo(ghi)perylene	380000	0.19 J		0.4 J		< 0.078		NA		< 0.076	
Benzo(k)fluoranthene	45	0.15 J		0.29 J		< 0.078		NA		< 0.076	
Chrysene	450	0.24 J		0.63 J		< 0.078		NA		< 0.076	
Dibenz(a,h)anthracene	0.5	0.057 J		0.1 J		< 0.078		NA		< 0.076	
Fluoranthene	2300	0.32 J		0.73 J		< 0.078		NA		< 0.076	
Fluorene	2300	< 0.075		< 0.073		< 0.078		NA		< 0.076	
Indeno(1,2,3-cd)pyrene	5	0.17 J		0.4 J		< 0.078		NA		< 0.076	
Naphthalene	6	0.19		0.11 J		< 0.078		NA		< 0.076	
Phenanthrene		0.22		0.24		< 0.078		NA		< 0.076	
Pyrene	1700	0.36 J		0.92 J		< 0.078		NA		< 0.076	
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)											
C10-C12 Aromatics		NA		NA		NA		< 1.1 UJ		NA	
C12-C16 Aliphatics		NA		NA		NA		23.1		NA	
C12-C16 Aromatics		NA		NA		NA		< 1.1 UJ		NA	
C16-C21 Aliphatics		NA		NA		NA		< 1.1		NA	
C16-C21 Aromatics		NA		NA		NA		0.37 J		NA	
C21-C36 Aromatics		NA		NA		NA		0.72 J		NA	
C21-C40 Aliphatics		NA		NA		NA		0.74 J		NA	
C9-C12 Aliphatics		NA		NA		NA		89.2		NA	
EPH (C9-C40)		NA		NA		NA				NA	
Total Aliphatics		NA		NA		NA		113		NA	
Total Aromatics		NA		NA		NA		1.2 J		NA	
Total EPH		NA		NA		NA		NA		NA	
Inorganics (mg/kg)											
Arsenic	19	NA		NA		NA		NA		NA	
Wet Chemistry - Moisture											
Moisture (percent)		11		10.2		16.1		14.2		16.8	
Percent Solids (percent)		89		89.8		83.9		85.8		83.2	

Validated Laboratory Data
FTMM - Parcel 83
November 2017 Soil Sampling

Loc ID	NJ Residential Direct Contact SRS	PAR-83-SB-25				PAR-83-SB-33				PAR-83-SB-34	
Sample ID		PAR-83-SB-25-3-3.5		PAR-83-SB-25-6-6.5		PAR-83-SB-33-2-2.5		PAR-83-SB-133-2-2.5		PAR-83-SB-34-2-2.5	
Sample Date		11/15/2017		11/15/2017		11/15/2017		11/15/2017		11/15/2017	
Semivolatile Organic Compounds (mg/kg)											
Acenaphthene	3400	NA		NA		< 0.076		< 0.075		0.11	J
Acenaphthylene		NA		NA		< 0.076		< 0.075		< 0.083	
Anthracene	17000	NA		NA		< 0.076		< 0.075		< 0.083	
Benzo(a)anthracene	5	NA		NA		0.011	J	< 0.075		0.011	J
Benzo(a)pyrene	0.5	NA		NA		< 0.076		0.012	J	< 0.083	
Benzo(b)fluoranthene	5	NA		NA		0.015	J	0.014	J	0.014	J
Benzo(ghi)perylene	380000	NA		NA		< 0.076		0.012	J	< 0.083	
Benzo(k)fluoranthene	45	NA		NA		< 0.076		< 0.075		< 0.083	
Chrysene	450	NA		NA		< 0.076		< 0.075		< 0.083	
Dibenz(a,h)anthracene	0.5	NA		NA		< 0.076		< 0.075		< 0.083	
Fluoranthene	2300	NA		NA		0.016	J	0.03	J	0.018	J
Fluorene	2300	NA		NA		< 0.076		< 0.075		0.029	J
Indeno(1,2,3-cd)pyrene	5	NA		NA		< 0.076		< 0.075		< 0.083	
Naphthalene	6	NA		NA		< 0.076		< 0.075		< 0.083	
Phenanthrene		NA		NA		< 0.076		0.011	J	0.02	J
Pyrene	1700	NA		NA		0.019	J	0.022	J	0.017	J
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)											
C10-C12 Aromatics		25.7	J-	0.75	J	NA		NA		NA	
C12-C16 Aliphatics		575		7.1	J	NA		NA		NA	
C12-C16 Aromatics		340		4.8	J	NA		NA		NA	
C16-C21 Aliphatics		211		3.6	J	NA		NA		NA	
C16-C21 Aromatics		598		8.5	J	NA		NA		NA	
C21-C36 Aromatics		83.9	J-	5.4		NA		NA		NA	
C21-C40 Aliphatics		55.3		20.3	J-	NA		NA		NA	
C9-C12 Aliphatics		169		2.5	J	NA		NA		NA	
EPH (C9-C40)		3,150		54	J	NA		NA		NA	
Total Aliphatics		1,010		33.4	J-	NA		NA		NA	
Total Aromatics		1,050		19.4		NA		NA		NA	
Total EPH		2,060		52.8		NA		NA		NA	
Inorganics (mg/kg)											
Arsenic	19	NA		NA		5.2		5.8		4	
Wet Chemistry - Moisture											
Moisture (percent)		18.2		19.1		15.6		15.4		20.6	
Percent Solids (percent)		81.8		80.9		84.4		84.6		79.4	

Validated Laboratory Data
FTMM - Parcel 83
November 2017 Soil Sampling

Loc ID	NJ Residential Direct Contact SRS	PAR-83-SB-37						PAR-83-SB-38					
Sample ID		PAR-83-SB-37-1-1.5		PAR-83-SB-37-3-3.5		PAR-83-SB-37-6-6.5		PAR-83-SB-38-0-0.5		PAR-83-SB-138-0-0.5			
Sample Date		11/16/2017		11/16/2017		11/16/2017		11/15/2017		11/15/2017			
Semivolatile Organic Compounds (mg/kg)													
Acenaphthene	3400	NA		NA		NA		< 0.079		0.02	J		
Acenaphthylene		NA		NA		NA		0.018	J	0.04	J		
Anthracene	17000	NA		NA		NA		0.045	J	0.089	J		
Benzo(a)anthracene	5	NA		NA		NA		0.2		0.35			
Benzo(a)pyrene	0.5	NA		NA		NA		0.22		0.35			
Benzo(b)fluoranthene	5	NA		NA		NA		0.3		0.49			
Benzo(ghi)perylene	380000	NA		NA		NA		0.14		0.2			
Benzo(k)fluoranthene	45	NA		NA		NA		0.09	J	0.18			
Chrysene	450	NA		NA		NA		0.21		0.36			
Dibenz(a,h)anthracene	0.5	NA		NA		NA		0.038	J	0.064	J		
Fluoranthene	2300	NA		NA		NA		0.41		0.63			
Fluorene	2300	NA		NA		NA		0.012	J	0.018	J		
Indeno(1,2,3-cd)pyrene	5	NA		NA		NA		0.14		0.21			
Naphthalene	6	NA		NA		NA		< 0.079		0.02	J		
Phenanthrene		NA		NA		NA		0.18		0.27			
Pyrene	1700	NA		NA		NA		0.36		0.55			
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)													
C10-C12 Aromatics		NA		NA		NA		NA		NA			
C12-C16 Aliphatics		NA		NA		NA		NA		NA			
C12-C16 Aromatics		NA		NA		NA		NA		NA			
C16-C21 Aliphatics		NA		NA		NA		NA		NA			
C16-C21 Aromatics		NA		NA		NA		NA		NA			
C21-C36 Aromatics		NA		NA		NA		NA		NA			
C21-C40 Aliphatics		NA		NA		NA		NA		NA			
C9-C12 Aliphatics		NA		NA		NA		NA		NA			
EPH (C9-C40)		NA		NA		NA		NA		NA			
Total Aliphatics		NA		NA		NA		NA		NA			
Total Aromatics		NA		NA		NA		NA		NA			
Total EPH		NA		NA		NA		NA		NA			
Inorganics (mg/kg)													
Arsenic	19	NA		NA		NA		NA		NA			
Wet Chemistry - Moisture													
Moisture (percent)		16		12.4		14.5		17.6		16.4			
Percent Solids (percent)		84		87.6		85.5		82.4		83.6			

Validated Laboratory Data
FTMM - Parcel 83
November 2017 Soil Sampling

Loc ID	NJ Residential Direct Contact SRS	PAR-83-SB-39							
Sample ID		PAR-83-SB-39-2-2.5		PAR-83-SB-139-2-2.5		PAR-83-SB-39-3-3.5		PAR-83-SB-39-6-6.5	
Sample Date		11/16/2017		11/16/2017		11/16/2017		11/16/2017	
Semivolatile Organic Compounds (mg/kg)									
Acenaphthene	3400	< 0.076		< 0.076		NA		NA	
Acenaphthylene		< 0.076		< 0.076		NA		NA	
Anthracene	17000	< 0.076		< 0.076		NA		NA	
Benzo(a)anthracene	5	0.013 J		< 0.076		NA		NA	
Benzo(a)pyrene	0.5	0.013 J		0.02 J		NA		NA	
Benzo(b)fluoranthene	5	0.019 J		0.038 J		NA		NA	
Benzo(ghi)perylene	380000	< 0.076		0.016 J		NA		NA	
Benzo(k)fluoranthene	45	< 0.076		0.014 J		NA		NA	
Chrysene	450	< 0.076		< 0.076		NA		NA	
Dibenz(a,h)anthracene	0.5	< 0.076		< 0.076		NA		NA	
Fluoranthene	2300	0.022 J		0.035 J		NA		NA	
Fluorene	2300	< 0.076		< 0.076		NA		NA	
Indeno(1,2,3-cd)pyrene	5	< 0.076		0.016 J		NA		NA	
Naphthalene	6	< 0.076		< 0.076		NA		NA	
Phenanthrene		< 0.076		0.016 J		NA		NA	
Pyrene	1700	0.019 J		0.033 J		NA		NA	
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)									
C10-C12 Aromatics		NA		NA		NA		NA	
C12-C16 Aliphatics		NA		NA		NA		NA	
C12-C16 Aromatics		NA		NA		NA		NA	
C16-C21 Aliphatics		NA		NA		NA		NA	
C16-C21 Aromatics		NA		NA		NA		NA	
C21-C36 Aromatics		NA		NA		NA		NA	
C21-C40 Aliphatics		NA		NA		NA		NA	
C9-C12 Aliphatics		NA		NA		NA		NA	
EPH (C9-C40)		NA		NA		NA		NA	
Total Aliphatics		NA		NA		NA		NA	
Total Aromatics		NA		NA		NA		NA	
Total EPH		NA		NA		NA		NA	
Inorganics (mg/kg)									
Arsenic	19	NA		NA		NA		NA	
Wet Chemistry - Moisture									
Moisture (percent)		12.2		12		14		17.7	
Percent Solids (percent)		87.8		88		86		82.3	

Validated Laboratory Data
 FTMM - Parcel 83
 November 2017 Soil Sampling

Loc ID	NJ Residential Direct Contact SRS	PAR-83-SB-40					
Sample ID		PAR-83-SB-40-1-1.5		PAR-83-SB-40-3-3.5		PAR-83-SB-40-6-6.5	
Sample Date		11/16/2017		11/16/2017		11/16/2017	
Semivolatile Organic Compounds (mg/kg)							
Acenaphthene	3400	NA		NA		NA	
Acenaphthylene		NA		NA		NA	
Anthracene	17000	NA		NA		NA	
Benzo(a)anthracene	5	NA		NA		NA	
Benzo(a)pyrene	0.5	NA		NA		NA	
Benzo(b)fluoranthene	5	NA		NA		NA	
Benzo(ghi)perylene	380000	NA		NA		NA	
Benzo(k)fluoranthene	45	NA		NA		NA	
Chrysene	450	NA		NA		NA	
Dibenz(a,h)anthracene	0.5	NA		NA		NA	
Fluoranthene	2300	NA		NA		NA	
Fluorene	2300	NA		NA		NA	
Indeno(1,2,3-cd)pyrene	5	NA		NA		NA	
Naphthalene	6	NA		NA		NA	
Phenanthrene		NA		NA		NA	
Pyrene	1700	NA		NA		NA	
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)							
C10-C12 Aromatics		NA		NA		NA	
C12-C16 Aliphatics		NA		NA		NA	
C12-C16 Aromatics		NA		NA		NA	
C16-C21 Aliphatics		NA		NA		NA	
C16-C21 Aromatics		NA		NA		NA	
C21-C36 Aromatics		NA		NA		NA	
C21-C40 Aliphatics		NA		NA		NA	
C9-C12 Aliphatics		NA		NA		NA	
EPH (C9-C40)		NA		NA		NA	
Total Aliphatics		NA		NA		NA	
Total Aromatics		NA		NA		NA	
Total EPH		NA		NA		NA	
Inorganics (mg/kg)							
Arsenic	19	NA		NA		NA	
Wet Chemistry - Moisture							
Moisture (percent)		10.5		18.6		17.5	
Percent Solids (percent)		89.5		81.4		82.5	

Validated Laboratory Data
FTMM - Parcel 83
November 2017 Soil Sampling

Loc ID	NJ Residential Direct Contact SRS	PAR-83-SB-41						PAR-83-SB-44		PAR-83-SB-45	
Sample ID		PAR-83-SB-41-0-0.5		PAR-83-SB-41-3-3.5		PAR-83-SB-41-6-6.5		PAR-83-SB-44-1-1.5		PAR-83-SB-45-1.5-2	
Sample Date		11/16/2017		11/16/2017		11/16/2017		11/14/2017		11/14/2017	
Semivolatile Organic Compounds (mg/kg)											
Acenaphthene	3400	NA		NA		NA		< 0.07		< 0.079	
Acenaphthylene		NA		NA		NA		0.031 J		< 0.079	
Anthracene	17000	NA		NA		NA		< 0.07		< 0.079	
Benzo(a)anthracene	5	NA		NA		NA		0.012 J		< 0.079	
Benzo(a)pyrene	0.5	NA		NA		NA		0.044 J		< 0.079	
Benzo(b)fluoranthene	5	NA		NA		NA		0.03 J		< 0.079	
Benzo(ghi)perylene	380000	NA		NA		NA		0.042 J		< 0.079	
Benzo(k)fluoranthene	45	NA		NA		NA		0.014 J		< 0.079	
Chrysene	450	NA		NA		NA		0.017 J		< 0.079	
Dibenz(a,h)anthracene	0.5	NA		NA		NA		< 0.07		< 0.079	
Fluoranthene	2300	NA		NA		NA		0.0097 J		0.019 J	
Fluorene	2300	NA		NA		NA		< 0.07		< 0.079	
Indeno(1,2,3-cd)pyrene	5	NA		NA		NA		0.038 J		< 0.079	
Naphthalene	6	NA		NA		NA		< 0.07		< 0.079	
Phenanthrene		NA		NA		NA		0.012 J		0.015 J	
Pyrene	1700	NA		NA		NA		0.03 J		0.02 J	
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)											
C10-C12 Aromatics		NA		NA		NA		NA		NA	
C12-C16 Aliphatics		NA		NA		NA		NA		NA	
C12-C16 Aromatics		NA		NA		NA		NA		NA	
C16-C21 Aliphatics		NA		NA		NA		NA		NA	
C16-C21 Aromatics		NA		NA		NA		NA		NA	
C21-C36 Aromatics		NA		NA		NA		NA		NA	
C21-C40 Aliphatics		NA		NA		NA		NA		NA	
C9-C12 Aliphatics		NA		NA		NA		NA		NA	
EPH (C9-C40)		NA		NA		NA		NA		NA	
Total Aliphatics		NA		NA		NA		NA		NA	
Total Aromatics		NA		NA		NA		NA		NA	
Total EPH		NA		NA		NA		NA		NA	
Inorganics (mg/kg)											
Arsenic	19	NA		NA		NA		NA		NA	
Wet Chemistry - Moisture											
Moisture (percent)		13.3		24.1		7.1		6.5		17.8	
Percent Solids (percent)		86.7		75.9		92.9		93.5		82.2	

Validated Laboratory Data
FTMM - Parcel 83
November 2017 Soil Sampling

Loc ID	NJ Residential Direct Contact SRS	PAR-83-SB-46		PAR-83-SB-47		PAR-83-SB-48					
Sample ID		PAR-83-SB-46-0-0.5		PAR-83-SB-47-0-0.5		PAR-83-SB-48-0-0.5		PAR-83-SB-48-3-3.5		PAR-83-SB-48-6-6.5	
Sample Date		11/14/2017		11/14/2017		11/14/2017		11/14/2017		11/14/2017	
Semivolatile Organic Compounds (mg/kg)											
Acenaphthene	3400	< 0.08		< 0.073		< 0.087		NA		NA	
Acenaphthylene		0.044 J		0.096 J		0.038 J		NA		NA	
Anthracene	17000	0.025 J		0.048 J		0.034 J		NA		NA	
Benzo(a)anthracene	5	0.11 J		0.21		0.22		NA		NA	
Benzo(a)pyrene	0.5	0.13		0.19		0.24		NA		NA	
Benzo(b)fluoranthene	5	0.18		0.22		0.32		NA		NA	
Benzo(ghi)perylene	380000	0.093 J		0.13		0.15		NA		NA	
Benzo(k)fluoranthene	45	0.068 J		0.076 J		0.12 J		NA		NA	
Chrysene	450	0.13		0.23		0.21		NA		NA	
Dibenz(a,h)anthracene	0.5	0.026 J		0.039 J		0.048 J		NA		NA	
Fluoranthene	2300	0.18		0.19		0.38		NA		NA	
Fluorene	2300	< 0.08		0.015 J		< 0.087		NA		NA	
Indeno(1,2,3-cd)pyrene	5	0.088 J		0.12		0.15		NA		NA	
Naphthalene	6	0.019 J		0.017 J		0.056 J		NA		NA	
Phenanthrene		0.11 J		0.055 J		0.19		NA		NA	
Pyrene	1700	0.22		0.31		0.37		NA		NA	
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)											
C10-C12 Aromatics		NA		NA		NA		NA		NA	
C12-C16 Aliphatics		NA		NA		NA		NA		NA	
C12-C16 Aromatics		NA		NA		NA		NA		NA	
C16-C21 Aliphatics		NA		NA		NA		NA		NA	
C16-C21 Aromatics		NA		NA		NA		NA		NA	
C21-C36 Aromatics		NA		NA		NA		NA		NA	
C21-C40 Aliphatics		NA		NA		NA		NA		NA	
C9-C12 Aliphatics		NA		NA		NA		NA		NA	
EPH (C9-C40)		NA		NA		NA		NA		NA	
Total Aliphatics		NA		NA		NA		NA		NA	
Total Aromatics		NA		NA		NA		NA		NA	
Total EPH		NA		NA		NA		NA		NA	
Inorganics (mg/kg)											
Arsenic	19	NA		NA		NA		NA		NA	
Wet Chemistry - Moisture											
Moisture (percent)		18.5		10.5		25.8		14.1		14.7	
Percent Solids (percent)		81.5		89.5		74.2		85.9		85.3	

Validated Laboratory Data
FTMM - Parcel 83
November 2017 Soil Sampling

Loc ID	NJ Residential Direct Contact SRS	PAR-83-SB-54					
Sample ID		PAR-83-SB-54-1-1.5		PAR-83-SB-54-3-3.5		PAR-83-SB-54-6-6.5	
Sample Date		11/16/2017		11/16/2017		11/16/2017	
Semivolatile Organic Compounds (mg/kg)							
Acenaphthene	3400	< 0.076		< 0.077		< 0.069	
Acenaphthylene		< 0.076		< 0.077		< 0.069	
Anthracene	17000	< 0.076		< 0.077		< 0.069	
Benzo(a)anthracene	5	0.034 J		< 0.077		< 0.069	
Benzo(a)pyrene	0.5	0.041 J		< 0.077		< 0.069	
Benzo(b)fluoranthene	5	0.057 J		< 0.077		< 0.069	
Benzo(ghi)perylene	380000	0.036 J		< 0.077		< 0.069	
Benzo(k)fluoranthene	45	0.016 J		< 0.077		< 0.069	
Chrysene	450	0.03 J		< 0.077		< 0.069	
Dibenz(a,h)anthracene	0.5	< 0.076		< 0.077		< 0.069	
Fluoranthene	2300	0.036 J		< 0.077		< 0.069	
Fluorene	2300	< 0.076		< 0.077		< 0.069	
Indeno(1,2,3-cd)pyrene	5	0.037 J		< 0.077		< 0.069	
Naphthalene	6	< 0.076		< 0.077		< 0.069	
Phenanthrene		< 0.076		< 0.077		< 0.069	
Pyrene	1700	0.036 J		< 0.077		< 0.069	
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)							
C10-C12 Aromatics		NA		NA		NA	
C12-C16 Aliphatics		NA		NA		NA	
C12-C16 Aromatics		NA		NA		NA	
C16-C21 Aliphatics		NA		NA		NA	
C16-C21 Aromatics		NA		NA		NA	
C21-C36 Aromatics		NA		NA		NA	
C21-C40 Aliphatics		NA		NA		NA	
C9-C12 Aliphatics		NA		NA		NA	
EPH (C9-C40)		NA		NA		NA	
Total Aliphatics		NA		NA		NA	
Total Aromatics		NA		NA		NA	
Total EPH		NA		NA		NA	
Inorganics (mg/kg)							
Arsenic	19	NA		NA		NA	
Wet Chemistry - Moisture							
Moisture (percent)		11.6		17.1		7.2	
Percent Solids (percent)		88.4		82.9		92.8	

Validated Laboratory Data
FTMM - Parcel 83
November 2017 Soil Sampling

Loc ID	NJ Residential Direct Contact SRS	PAR-83-SB-55					
Sample ID		PAR-83-SB-55-1-1.5		PAR-83-SB-55-3-3.5		PAR-83-SB-55-6-6.5	
Sample Date		11/16/2017		11/16/2017		11/16/2017	
Semivolatile Organic Compounds (mg/kg)							
Acenaphthene	3400	< 0.074		< 0.074		< 0.072	
Acenaphthylene		< 0.074		< 0.074		< 0.072	
Anthracene	17000	< 0.074		< 0.074		< 0.072	
Benzo(a)anthracene	5	0.021 J		< 0.074		< 0.072	
Benzo(a)pyrene	0.5	0.02 J		< 0.074		< 0.072	
Benzo(b)fluoranthene	5	0.03 J		< 0.074		< 0.072	
Benzo(ghi)perylene	380000	0.017 J		< 0.074		< 0.072	
Benzo(k)fluoranthene	45	< 0.074		< 0.074		< 0.072	
Chrysene	450	0.018 J		< 0.074		< 0.072	
Dibenz(a,h)anthracene	0.5	< 0.074		< 0.074		< 0.072	
Fluoranthene	2300	0.026 J		< 0.074		< 0.072	
Fluorene	2300	< 0.074		< 0.074		< 0.072	
Indeno(1,2,3-cd)pyrene	5	0.02 J		< 0.074		< 0.072	
Naphthalene	6	< 0.074		< 0.074		< 0.072	
Phenanthrene		0.012 J		< 0.074		< 0.072	
Pyrene	1700	0.023 J		< 0.074		< 0.072	
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)							
C10-C12 Aromatics		NA		NA		NA	
C12-C16 Aliphatics		NA		NA		NA	
C12-C16 Aromatics		NA		NA		NA	
C16-C21 Aliphatics		NA		NA		NA	
C16-C21 Aromatics		NA		NA		NA	
C21-C36 Aromatics		NA		NA		NA	
C21-C40 Aliphatics		NA		NA		NA	
C9-C12 Aliphatics		NA		NA		NA	
EPH (C9-C40)		NA		NA		NA	
Total Aliphatics		NA		NA		NA	
Total Aromatics		NA		NA		NA	
Total EPH		NA		NA		NA	
Inorganics (mg/kg)							
Arsenic	19	NA		NA		NA	
Wet Chemistry - Moisture							
Moisture (percent)		13.9		14.9		10.6	
Percent Solids (percent)		86.1		85.1		89.4	

APPENDIX F

Alternative Soil Remediation Standard Application



Instructions

Site Name: Parcel 83

Program Interest Number: G000000032

APPENDIX G

Human Health Risk Assessment

**HUMAN HEALTH RISK ASSESSMENT
FORT MONMOUTH
PARCEL 83
FORMER INDUSTRIAL AND
VEHICLE RELATED ACTIVITIES AND
PARCELS 103, 104, AND 108-PAHS IN SI SAMPLES**

June 2020

TABLE OF CONTENTS

	Page
SECTION 1 INTRODUCTION	1-1
1.1 Overall Introduction	1-1
1.2 Site Description	1-1
1.3 Data Evaluation	1-2
1.3.1 Selection of Constituents of Potential Concern.....	1-2
SECTION 2 HUMAN HEALTH RISK ASSESSMENT	2-1
2.1 Risk Assessment Process	2-1
2.2 Identification of Constituents of Potential Concern	2-1
2.2.1 Selection of Constituents of Potential Concern.....	2-1
2.2.2 Constituents of Potential Concern Results	2-1
2.3 Exposure Assessment	2-1
2.3.1 Conceptual Site Model	2-2
2.3.2 Estimation of Exposure Point Concentrations	2-5
2.3.3 Estimation of Human Intake	2-5
2.4 Toxicity Assessment	2-15
2.5 Risk Characterization	2-16
2.5.1 Noncancer Hazard Estimation.....	2-16
2.5.2 Cancer Risk Estimation.....	2-17
2.5.3 Cumulative Risk and Hazard Index Estimation	2-17
2.5.4 Lead Hazard	2-18
2.5.5 Risk Characterization Results	2-19
2.5.6 Risk Assessment Uncertainties	2-23
2.6 Conclusions	2-27
SECTION 3 REFERENCES	3-1
 ATTACHMENTS	
G.1 ProUCL Supporting Documentation	
G.2 IEUBK Output	

LIST OF TABLES *(Tables located at the end of this document)*

Table G.2.1	Summary of Receptors and Exposure Scenarios
Table G.2.2	Soil Exposure Parameters
Table G.2.3	Benzo(a)Pyrene-Equivalent Surface Soil (0-2 Ft)
Table G.2.4	Benzo(a)Pyrene-Equivalent Subsurface Soil (2-15 Ft)
Table G.2.5	Surface Soil Exposure Point Concentrations
Table G.2.6	Combined Surface Soil and Subsurface Soil Exposure Point Concentrations
Table G.2.7	Particulate Emission Factor and Volatilization Factor Exposure Parameters

Table G.2.8	Calculation of Particulate Emission Factor
Table G.2.9	Calculation of Volatilization Factor
Table G.2.10	Toxicity Values
Table G.2.11	Chemical-Specific Parameters
Table G.2.12	Risk and Hazard Estimates -- Incidental Ingestion of Surface Soil (0-2'), UU/UE Receptor, Exposure Area 1
Table G.2.13	Mutagenic Mode of Action -- Incidental Ingestion of Surface Soil (0-2') , UU/UE Receptor, Exposure Area 1
Table G.2.14	Risk and Hazard Estimates -- Dermal Contact with Surface Soil (0-2') , UU/UE Receptor, Exposure Area 1
Table G.2.15	Mutagenic Mode of Action -- Dermal Contact with Surface Soil (0-2'), UU/UE Receptor, Exposure Area 1
Table G.2.16	Risk and Hazard Estimates -- Inhalation of Volatiles/Fugitive Dust from Surface Soil (0-2') , UU/UE Receptor, Exposure Area 1
Table G.2.17	Mutagenic Mode of Action -- Inhalation of Volatiles/Fugitive Dust from Surface Soil (0-2'), UU/UE Receptor, Exposure Area 1
Table G.2.18	Human Health Risk Evaluation Summary for Surface Soil (0-2'), UU/UE Receptor, Exposure Area 1
Table G.2.19	Target Organs and Toxic Critical Effects for Segregated Hazard Indices for Surface Soil (0-2'), UU/UE Receptor, Exposure Area 1
Table G.2.20	Noncancer Hazards Separated by Target Organ for Surface Soil (0-2'), UU/UE Receptor, Exposure Area 1
Table G.2.21	Risk and Hazard Estimates -- Incidental Ingestion of Surface Soil (0-2'), UU/UE Receptor, Exposure Area 2
Table G.2.22	Mutagenic Mode of Action -- Incidental Ingestion of Surface Soil (0-2') , UU/UE Receptor, Exposure Area 2
Table G.2.23	Risk and Hazard Estimates -- Dermal Contact with Surface Soil (0-2') , UU/UE Receptor, Exposure Area 2
Table G.2.24	Mutagenic Mode of Action -- Dermal Contact with Surface Soil (0-2'), UU/UE Receptor, Exposure Area 2
Table G.2.25	Risk and Hazard Estimates -- Inhalation of Volatiles/Fugitive Dust from Surface Soil (0-2') , UU/UE Receptor, Exposure Area 2
Table G.2.26	Mutagenic Mode of Action -- Inhalation of Volatiles/Fugitive Dust from Surface Soil (0-2'), UU/UE Receptor, Exposure Area 2
Table G.2.27	Human Health Risk Evaluation Summary for Surface Soil (0-2'), UU/UE Receptor, Exposure Area 2
Table G.2.28	Target Organs and Toxic Critical Effects for Segregated Hazard Indices for Surface Soil (0-2'), UU/UE Receptor, Exposure Area 2
Table G.2.29	Noncancer Hazards Separated by Target Organ for Surface Soil (0-2'), UU/UE Receptor, Exposure Area 2
Table G.2.30	Risk and Hazard Estimates -- Incidental Ingestion of Surface Soil (0-2'), UU/UE Receptor, Exposure Area 3
Table G.2.31	Mutagenic Mode of Action -- Incidental Ingestion of Surface Soil (0-2') , UU/UE Receptor, Exposure Area 3
Table G.2.32	Risk and Hazard Estimates -- Dermal Contact with Surface Soil (0-2') , UU/UE Receptor, Exposure Area 3

Table G.2.33	Mutagenic Mode of Action -- Dermal Contact with Surface Soil (0-2'), UU/UE Receptor, Exposure Area 3
Table G.2.34	Risk and Hazard Estimates -- Inhalation of Volatiles/Fugitive Dust from Surface Soil (0-2') , UU/UE Receptor, Exposure Area 3
Table G.2.35	Mutagenic Mode of Action -- Inhalation of Volatiles/Fugitive Dust from Surface Soil (0-2'), UU/UE Receptor, Exposure Area 3
Table G.2.36	Human Health Risk Evaluation Summary for Surface Soil (0-2'), UU/UE Receptor, Exposure Area 3
Table G.2.37	Target Organs and Toxic Critical Effects for Segregated Hazard Indices for Surface Soil (0-2'), UU/UE Receptor, Exposure Area 3
Table G.2.38	Noncancer Hazards Separated by Target Organ for Surface Soil (0-2'), UU/UE Receptor, Exposure Area 3
Table G.2.39	Risk and Hazard Estimates -- Incidental Ingestion of Surface Soil (0-2'), Utility Worker
Table G.2.40	Risk and Hazard Estimates -- Dermal Contact with Surface Soil (0-2') , Utility Worker
Table G.2.41	Risk and Hazard Estimates -- Inhalation of Volatiles/Fugitive Dust from Surface Soil (0-2') , Utility Worker
Table G.2.42	Human Health Risk Evaluation Summary for Surface Soil (0-2'), Utility Worker
Table G.2.43	Risk and Hazard Estimates -- Incidental Ingestion of Surface Soil (0-2'), Outdoor Worker
Table G.2.44	Risk and Hazard Estimates -- Dermal Contact with Surface Soil (0-2') , Outdoor Worker
Table G.2.45	Risk and Hazard Estimates -- Inhalation of Volatiles/Fugitive Dust from Surface Soil (0-2') , Outdoor Worker
Table G.2.46	Human Health Risk Evaluation Summary for Surface Soil (0-2'), Outdoor Worker
Table G.2.47	Risk and Hazard Estimates -- Incidental Ingestion of Surface Soil (0-2'), Recreational User
Table G.2.48	Mutagenic Mode of Action -- Incidental Ingestion of Surface Soil (0-2') , Recreational User
Table G.2.49	Risk and Hazard Estimates -- Dermal Contact with Surface Soil (0-2') , Recreational User
Table G.2.50	Mutagenic Mode of Action -- Dermal Contact with Surface Soil (0-2'), Recreational User
Table G.2.51	Risk and Hazard Estimates -- Inhalation of Volatiles/Fugitive Dust from Surface Soil (0-2') , Recreational User
Table G.2.52	Mutagenic Mode of Action -- Inhalation of Volatiles/Fugitive Dust from Surface Soil (0-2'), Recreational User
Table G.2.53	Human Health Risk Evaluation Summary for Surface Soil (0-2'), Recreational User
Table G.2.54	Risk and Hazard Estimates -- Incidental Ingestion of Combined Surface and Subsurface Soil (0-15'), UU/UE Receptor
Table G.2.55	Mutagenic Mode of Action -- Incidental Ingestion of Combined Surface and Subsurface Soil (0-15') , UU/UE Receptor
Table G.2.56	Risk and Hazard Estimates -- Dermal Contact with Combined Surface and Subsurface Soil (0-15') , UU/UE Receptor
Table G.2.57	Mutagenic Mode of Action -- Dermal Contact with Combined Surface and Subsurface Soil (0-15'), UU/UE Receptor
Table G.2.58	Risk and Hazard Estimates -- Inhalation of Volatiles/Fugitive Dust from Combined Surface and Subsurface Soil (0-15') , UU/UE Receptor

Table G.2.59	Mutagenic Mode of Action -- Inhalation of Volatiles/Fugitive Dust from Combined Surface and Subsurface Soil (0-15'), UU/UE Receptor
Table G.2.60	Human Health Risk Evaluation Summary for Combined Surface and Subsurface Soil (0-15'), UU/UE Receptor
Table G.2.61	Target Organs and Toxic Critical Effects for Segregated Hazard Indices for Combined Surface and Subsurface Soil (0-15'), UU/UE Receptor
Table G.2.62	Noncancer Hazards Separated by Target Organ for Combined Surface and Subsurface Soil (0-15'), UU/UE Receptor
Table G.2.63	Risk and Hazard Estimates -- Incidental Ingestion of Combined Surface and Subsurface Soil (0-15'), UU/UE Receptor
Table G.2.64	Mutagenic Mode of Action -- Incidental Ingestion of Combined Surface and Subsurface Soil (0-15') , UU/UE Receptor
Table G.2.65	Risk and Hazard Estimates -- Dermal Contact with Combined Surface and Subsurface Soil (0-15') , UU/UE Receptor
Table G.2.66	Mutagenic Mode of Action -- Dermal Contact with Combined Surface and Subsurface Soil (0-15'), UU/UE Receptor
Table G.2.67	Risk and Hazard Estimates -- Inhalation of Volatiles/Fugitive Dust from Combined Surface and Subsurface Soil (0-15') , UU/UE Receptor
Table G.2.68	Mutagenic Mode of Action -- Inhalation of Volatiles/Fugitive Dust from Combined Surface and Subsurface Soil (0-15'), UU/UE Receptor
Table G.2.69	Human Health Risk Evaluation Summary for Combined Surface and Subsurface Soil (0-15'), UU/UE Receptor
Table G.2.70	Target Organs and Toxic Critical Effects for Segregated Hazard Indices for Combined Surface and Subsurface Soil (0-15'), UU/UE Receptor
Table G.2.71	Noncancer Hazards Separated by Target Organ for Combined Surface and Subsurface Soil (0-15'), UU/UE Receptor
Table G.2.72	Risk and Hazard Estimates -- Incidental Ingestion of Combined Surface and Subsurface Soil (0-15'), UU/UE Receptor
Table G.2.73	Mutagenic Mode of Action -- Incidental Ingestion of Combined Surface and Subsurface Soil (0-15') , UU/UE Receptor
Table G.2.74	Risk and Hazard Estimates -- Dermal Contact with Combined Surface and Subsurface Soil (0-15') , UU/UE Receptor
Table G.2.75	Mutagenic Mode of Action -- Dermal Contact with Combined Surface and Subsurface Soil (0-15'), UU/UE Receptor
Table G.2.76	Risk and Hazard Estimates -- Inhalation of Volatiles/Fugitive Dust from Combined Surface and Subsurface Soil (0-15') , UU/UE Receptor
Table G.2.77	Mutagenic Mode of Action -- Inhalation of Volatiles/Fugitive Dust from Combined Surface and Subsurface Soil (0-15'), UU/UE Receptor
Table G.2.78	Human Health Risk Evaluation Summary for Combined Surface and Subsurface Soil (0-15'), UU/UE Receptor
Table G.2.79	Target Organs and Toxic Critical Effects for Segregated Hazard Indices for Combined Surface and Subsurface Soil (0-15'), UU/UE Receptor
Table G.2.80	Noncancer Hazards Separated by Target Organ for Combined Surface and Subsurface Soil (0-15'), UU/UE Receptor
Table G.2.81	Risk and Hazard Estimates -- Incidental Ingestion of Combined Surface and Subsurface Soil (0-15'), Utility Worker

Table G.2.82	Risk and Hazard Estimates -- Dermal Contact with Combined Surface and Subsurface Soil (0-15'), Utility Worker
Table G.2.83	Risk and Hazard Estimates -- Inhalation of Volatiles/Fugitive Dust from Combined Surface and Subsurface Soil (0-15'), Utility Worker
Table G.2.84	Human Health Risk Evaluation Summary for Combined Surface and Subsurface Soil (0-15'), Utility Worker
Table G.2.85	Summary of Risk and Hazard for Soil

LIST OF FIGURES (*Figures located at the end of this document*)

Figure G.2.1	Conceptual Site Model Diagram for Parcel 83
Figure G.2.2	Soil Exposure Areas for Parcel 83

ACRONYMS AND ABBREVIATIONS

µg	microgram
ADAF	Age Dependent Adjustment Factor
ALM	adult lead model
atm	atmosphere
ATSDR	Agency for Toxic Substances and Disease Registry
BaP	benzo(a)pyrene
bgs	below ground surface
C _a	contaminant concentration in air
CDC	Centers for Disease Control and Prevention
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COPC	constituent of potential concern
C _{sat}	chemical-specific soil saturation
CSM	conceptual site model
DAD	dermal absorbed dose
dL	deciliter
EC(air)	exposure concentration in air
EPC	exposure point concentration
ELCR	excess lifetime cancer risk
ft	feet
FS	Feasibility Study
g	gram
GIABS	gastrointestinal absorption factors
HEAST	Health Effects Assessment Tables
Hg	mercury
HHRA	human health risk assessment
HI	hazard index
HQ	hazard quotient
IEUBK	Integrated Exposure Uptake Biokinetic
IRIS	Integrated Risk Information System
IUR	inhalation unit risk
kg	kilogram
LOAEL	lowest observed adverse effect level
m ³	cubic meters
mg	milligram
mm	millimeter
MOA	mode of action
MP	Main Post
MRL	Minimal Risk Level
NCP	National Contingency Plan
N.J.A.C.	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NOAEL	no observed adverse effect level
OAF	oral absorption factors

ACRONYMS AND ABBREVIATIONS *(continued)*

OEHHA	Office of Environmental Health Hazard Assessment
OSWER	Office of Solid Waste Emergency Response
PAH	polycyclic aromatic hydrocarbon
Pb	lead
PbB	blood lead
PEF	particulate emission factor
PPRTV	Provisional Peer Reviewed Toxicity Value
Q/C	Site-Specific Dispersion Model
RAGS	Risk Assessment Guidance for Superfund
RCRA	Resource Conservation and Recovery Act
RfC	reference concentration
RfD	reference dose
RfD _d	dermal reference dose
RfD _o	oral reference dose
RI	Remedial Investigation
RME	reasonable maximum exposure
RPF	relative potency factor
RSL	Regional Screening Levels
s	second
SF	slope factor
SF _d	dermal slope factor
SF _o	oral slope factor
THQ	target hazard quotient
TR	target risk
TRSR	Technical Requirements for Site Remediation
UCL	upper confidence limit
USEPA	United States Environmental Protection Agency
UST	underground storage tank
UU/UE	unlimited use and unrestricted exposure
VF	volatilization factor

This Page Intentionally Left Blank

SECTION 1

INTRODUCTION

1.1 Overall Introduction

This risk assessment is part of the Remedial Investigation (RI) Report for Parcel 83 Former Industrial and Vehicle Activities and Parcels 103, 104, and 108 – PAHs in SI Samples (Parcel 83) at Fort Monmouth, New Jersey. Specific activities that are being performed under this project include:

1. Performance of RIs and Feasibility Studies (FS), and preparation of RI/FS reports to achieve acceptance of Decision Documents in compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) Part 300 and to the extent possible to meet the substantive remedial requirements of New Jersey Administrative Code (N.J.A.C.) 7:26E Technical Requirements for Site Remediation (TRSR); and
2. Support for the closure of environmental sites to facilitate the efficient transfer of real property to other parties.

This risk assessment was conducted according to the Final Human Health Risk Assessment Work Plan for RI/FS at Fort Monmouth Army Installation, Non-Landfill Sites (Parsons, 2015).

Section 1 of this risk assessment is a brief introduction including a description of the site and the data evaluation for the human health risk assessment. Section 2 describes the human health risk assessment (HHRA) and Section 3 presents the references used in the preparation of this document. Tables and figures referenced in this report follow Section 3.

1.2 Site Description

Parcel 83 is located in the northeastern portion of the Main Post. Parcel 83 was associated with numerous former industrial processes and motor pool operations. Multiple fuel oil underground storage tanks (USTs) were once present at or near Parcel 83. Parcel 83 is 35.3 acres in size and has previously been divided into multiple areas for field investigations: the former motor vehicle maintenance and repair facilities at Building 166 and former Buildings 44, 64, 159, 161, 163, 197, and 483; the previous shop activities at Building 279, 280, 281, and former building 485; the previous coal storage area around the vicinity of Building 75; and the former electrical transformer storage location east of Building 173. A smaller 8.2 acre area was subsequently re-categorized in the 2016 Finding of Suitability to Transfer (FOST) and designated as the Parcel 83 “carve-out” of environmental concern. Parcel 103, Parcel 104, and Parcel 108 were designated in the 2017 work plan based on PAHs in soil identified in the 2008 SI Report.

A substantial portion of the Parcel 83 vicinity is currently covered by Buildings 116, 117, 154, 166, 167, 273, 276, 279, 280, 281, 476, 480, 481, 482, T-79, T-105, and T-106. Asphalt pavement for parking areas and roads covers approximately half of the parcel and a relatively small portion (less than 20 percent) consists of landscaped areas. The site is currently unoccupied. Future land use includes open space, residential, and possibly commercial or institutional use according to the FTMM Reuse and Redevelopment Plan (EDAW, 2008 and FMERA, 2019).

The soil at Parcel 83 consists primarily of silty sand that is light gray to gray and orange-reddish-brown to at least five feet (ft) below ground surface (bgs). In some borings, deeper soils below five ft bgs consist of wet, olive-gray greenish-tan sand with traces of clay. Indications of fill (concrete, coal, wood, debris, and asphalt) were observed in several borings at varying depths from the ground surface to 3.5 ft bgs.

Groundwater wells have been installed within Parcel 83 associated with IRP site FTMM-56 (near Building 166), UST 65A and UST 161 (near Building 167) (these wells were subsequently abandoned in 2018), and IRP site FTMM-57. The depth to groundwater at FTMM-57 ranged from approximately 3.6 to 8.8 ft bgs during the most recent groundwater monitoring event in October 2015. Based on an earlier groundwater modeling study (Brinkerhoff, 2010), groundwater flows approximately northeast in the northern portion of Parcel 83, and approximately southeast in the southern portion of Parcel 83.

1.3 Data Evaluation

Parcel 83 has previously been sampled by others as well as by Parsons in 2016 and 2017. The available sampling data are summarized in the RI Report. Sample data associated with Parcel 83 includes surface and subsurface soil samples. Soil samples were collected in areas where it was expected that soil contamination could be present.

Chemical results with final validation qualifiers of any letter other than “U,” “UJ,” or “R” were considered detected and suitable for use in risk assessment; therefore “J” and “J-” qualified data results were used in the risk assessment (United States Environmental Protection Agency [USEPA], 1989). “EB” and “JB” qualified data results were included in the risk assessment data set, as recommended by USEPA, but will be considered not detected (USEPA, 1989).

1.3.1 Selection of Constituents of Potential Concern

Constituents of potential concern (COPCs) in soil were identified by comparing the maximum detected concentration of each analyte to the USEPA Resident Soil Regional Screening Levels (RSL) (Target Risk [TR] = 1×10^{-6} and Target Hazard Quotient [THQ] = 0.1) (USEPA, 2019a). The THQ of 0.1 was used during screening and selection of COPCs to account for cumulative effects of non-carcinogenic chemicals. The results of the COPC identification process are presented in the RI Report. For the purposes of the risk assessment (i.e., because different receptors may be exposed to different soil intervals), COPCs in soil were identified for surface soil (0 to 2 feet bgs) and for combined surface and subsurface soil (0 to 15 feet bgs).

It should be noted that only residential screening values were used in determining COPCs for this risk assessment, although a number of evaluated site receptors (e.g., onsite worker, construction worker) do not conform to a conventional residential site use pattern. Developing one COPC list for all receptors based on residential screening values is very conservative; it ensures that every site chemical that could possibly contribute to risk or hazard is considered.

The process used, and the results of the COPC identification process, are presented in the RI Report.

SECTION 2

HUMAN HEALTH RISK ASSESSMENT

2.1 Risk Assessment Process

The HHRA provides an evaluation of the potential risks to human health posed by chemicals detected in surface soil and combined surface and subsurface soil associated with Parcel 83 at the Former Fort Monmouth. As presented in USEPA guidance documents, the HHRA is a four-step evaluation process which includes:

- Data evaluation and identification of COPCs;
- Exposure assessment;
- Toxicity assessment; and
- Risk characterization.

Each of these steps is discussed in detail in the following subsections.

2.2 Identification of Constituents of Potential Concern

2.2.1 Selection of Constituents of Potential Concern

Concentrations of detected chemicals were compared to screening levels to identify COPCs. COPCs were selected by comparing the maximum concentration of each detected analyte in soil samples to selected screening levels. Generally, those analytes that are present at concentrations greater than screening levels were retained as COPCs for further evaluation; chemicals detected at concentrations less than these screening levels were not considered COPCs. The screening process is presented in Section 1.3 above and in Section 4 of the RI Report.

2.2.2 Constituents of Potential Concern Results

Surface Soil (0 to 2 feet bgs): As shown on Table 4 of the RI Report, trichloroethene, 1-methylnaphthalene, 2-methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene (BaP), benzo(b)fluoranthene, bis(2-chloroethyl)ether, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, Aroclor-1254, Aroclor-1260, antimony, arsenic, cobalt, lead, manganese, mercury, and vanadium are identified as COPCs in soil. Of these COPCs, trichloroethene, benzo(a)anthracene, BaP, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene are considered mutagens by the USEPA (USEPA, 2019a).

Combined Surface and Subsurface Soil (0 to 15 feet bgs): As shown on Table 4 of the RI Report, trichloroethene, 1-methylnaphthalene, 2-methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene (BaP), benzo(b)fluoranthene, bis(2-chloroethyl)ether, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, Aroclor-1254, Aroclor-1260, antimony, arsenic, cobalt, lead, manganese, mercury, and vanadium are identified as COPCs in soil. Of these COPCs, trichloroethene, benzo(a)anthracene, BaP, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene are considered mutagens by the USEPA (USEPA, 2019a).

2.3 Exposure Assessment

The exposure assessment consists of three main elements:

1. Evaluation of exposure pathways and identification of receptors;
2. Estimation of exposure point concentrations (EPCs); and

3. Estimation of human intake.

The RA evaluates the reasonable maximum exposure (RME), as defined by USEPA (1993a). The RME is designed to be a measure of “high-end” exposure. USEPA (2004a) describes the selection of exposure parameters to support the RME as follows:

In comparison with the average exposure, the “high end” exposure estimate is defined as the highest exposure that is reasonably expected to occur at a site but that is still within the range of possible exposures, referred to as the RME (USEPA, 1989). According to the Guidance on Risk Characterization for Risk Managers and Risk Assessors (USEPA, 1992), risk assessors should approach the estimation of the RME by identifying the most sensitive exposure parameters. The sensitivity of a parameter generally refers to its impact on the exposure estimates, which correlates with the degree of variability of the parameter values. Parameters with a high degree of variability in the distribution of parameter values are likely to have a greater impact on the range of risk estimates than those with low variability. For one or a few of the sensitive parameters, the maximum or near-maximum values should be used, with central tendency or average values used for all other parameters. The high-end estimates are based, in some cases, on statistically based criteria (95th or 90th percentiles), and in others, on best professional judgment. In general, exposure duration, exposure frequency, and contact rate are likely to be the most sensitive parameters in an exposure assessment (USEPA, 1989).

2.3.1 Conceptual Site Model

2.3.1.1 Evaluation of Exposure Pathways and Identification of Receptors

A conceptual site model (CSM) is used to qualitatively define the type of potential exposures to contaminants at or migrating from a site (i.e., to systematically evaluate the effect of chemicals in relevant media on potential receptors). The CSM describes onsite release points, affected physical media, types of contaminant transport and fate mechanisms that may be involved at the site, each group of potentially exposed populations or receptors, and how each receptor group may contact site-related contamination. The CSM is used to summarize existing site characterization data, including assumptions about land, groundwater and surface water use, and to complete a qualitative exposure pathway assessment. A CSM diagram has been developed for Parcel 83 and is presented in **Figure G.2.1**.

2.3.1.2 Evaluation of Exposure Pathways and Identification of Receptors

An exposure pathway evaluation describes how a receptor could be exposed to COPCs at, or migrating from, a site. A potentially complete exposure pathway consists of four necessary elements:

- A source and mechanism of chemical release;
- An environmental transport medium;
- A point of potential contact with a receptor; and
- A feasible route of exposure at the exposure point.

The potentially complete exposure pathways and receptors at Parcel 83 are identified in this section. The site-specific CSM (**Figure G.2.1**) identifies the exposure pathways and receptors that are present at specific sites. Consistent with Risk Assessment Guidance for Superfund (RAGS) (USEPA, 1989), current and future land-use scenarios were considered for the site.

The surface water and sediment exposure pathways are incomplete for all human receptors because there is no surface water or sediment present within Parcel 83. The ingestion of biota pathways are incomplete

for all human receptors because there is no source of biota for human ingestion. The groundwater exposure pathways are incomplete for all human receptors because there are no COPCs in groundwater.

Volatile compounds in groundwater may migrate upwards and be discharged to ambient (i.e., outdoor) air where receptors at the site may be exposed to them via inhalation. Additionally, inhalation of vapors migrating from groundwater to indoor air would be evaluated. Volatile compounds are operationally defined as those COPCs with a Henry's Law constant greater than or equal to 1×10^{-5} atm-m³ per mole or a vapor pressure greater than or equal to 1 mm Hg (USEPA, 2019b). These pathways are incomplete because there are no COPCs in groundwater.

The site-specific CSM for potential human exposures is depicted in **Figure G.2.1**, and is formulated according to applicable guidance, with the use of professional judgment and site-specific information on land use, water use, contaminant sources, release mechanisms, routes of migration, potential exposure points, potential routes of exposure, and potential receptor groups associated with the site. In accordance with the site-specific CSM, risk was quantitatively or qualitatively evaluated for the following potential human exposure scenarios:

- **Current/Future receptors under the unlimited use and unrestricted exposure (UU/UE) scenario:** There is currently no residential use at Parcel 83, but the site zoning includes residential use (EDAW, 2008 and FMERA, 2019). To quantify exposure and risk under the UU/UE scenario (hereafter UU/UE receptors), the most conservative exposures are those that are consistent with a residential exposure scenario (i.e., an exposure scenario that considers long-term exposure of both children and adults to potentially contaminated environmental media). For UU/UE receptors the HHRA evaluates exposure over a 6-year span as a child and a 20-year span as an adult.
 - Potential exposure of UU/UE receptors to COPCs in surface soil (0 to 2 feet bgs) and combined surface and subsurface soil (0 to 15 feet bgs) by incidental ingestion, dermal contact, and inhalation of ambient dust and vapors in ambient air is evaluated. This HHRA did not quantify exposure associated with vapor intrusion of volatile chemicals in soil into indoor air.
- **Current/Future Outdoor Workers (e.g., landscaping personnel, maintenance workers):** This scenario represents those workers that are present within the area. Outdoor workers are expected to perform any necessary maintenance or landscaping activities resulting in long-term exposure to potentially contaminated media (e.g., exposure duration 25 years), several days of the week (e.g., exposure frequency 225 days/year).
 - Potential exposure of outdoor workers to COPCs in surface soil (0 to 2 feet bgs) by incidental ingestion, dermal contact, and inhalation of ambient dust and vapors in ambient air is evaluated. Outdoor workers are not expected to encounter soil greater than 2 feet bgs, therefore, exposure to subsurface soil is not evaluated for outdoor workers at Parcel 83.
- **Current / Future Recreational Users:** This scenario represents adolescent and adult receptors that may use only those sites designated for passive open space for recreational purposes.
 - Potential exposure of current/future recreational users to COPCs in surface soil (0 to 2 feet bgs) by incidental ingestion, dermal contact, and inhalation of ambient dust and vapors in ambient air, in part as an adolescent (aged 6-<16 years) and in part as an adult, is evaluated. Recreational users are not expected to encounter

subsurface soil (2 to 15 feet bgs). Therefore, exposure to subsurface soil is an incomplete pathway.

- **Current/Future Utility Workers:** This scenario is expected to represent utility workers that would typically be involved in a single short-term excavation project at a given location, such as would be expected to be associated with repair or installation of utility lines. It is not expected that the same crew would return to the same location to conduct additional repair, installation, or maintenance of underground utility lines.
 - Potential exposure of utility workers to combined surface and subsurface soil (0 to 15 feet bgs) through incidental ingestion, dermal contact, and inhalation of ambient dust and vapors in ambient air is evaluated.

The exposure scenarios selected for evaluation are anticipated to account for the range of reasonably anticipated exposures under current and future conditions at the site. The scenarios selected are sufficiently conservative to adequately address other less common scenarios for soil. Specifically, the UU/UE receptor is protective of school, medical, and administrative users (i.e., institutional users), and the outdoor worker is protective of the indoor worker.

A summary of the relevant receptors and exposure scenarios is provided in **Table G.2.1**.

The exposure assumptions used for estimating chemical intake for soil are presented in **Table G.2.2**.

2.3.1.3 Exposure Area

An exposure area is the area over which sampling data are aggregated for estimation of risk. The size and location of the exposure area is commensurate with the assumed activity patterns of each specific receptor. Exposure areas for different receptors may overlap, that is, the UU/UE receptors would be expected to be exposed to an area of less than a half acre in size, while outdoor workers would be expected to be exposed to a larger area. The exposure areas are defined considering the results of the source area investigation (e.g., the center point of the most contaminated areas) and activity patterns of the potential receptors being evaluated. Locations of the highest detected concentrations within Parcel 83 have been evaluated spatially to determine best placement of exposure area boundaries for the HHRA, to ensure that the highest detected concentrations are evaluated in the HHRA.

Three Exposure Areas of approximately 0.5 acres (i.e. representing the approximate size of a residential lot) were evaluated for the UU/UE receptor exposed to soil, based on the areas at the site with the highest concentrations of COPCs that would be most likely to pose an unacceptable risk. The remaining receptors were assumed to access the entire site. **Figure G.2.2** shows the soil Exposure Areas for Parcel 83.

Exposure Area 1 includes the highest concentrations of TCE, 2-methylnaphthalene, antimony, arsenic, lead, and manganese in surface soil and combined surface and subsurface soil and the highest concentration of 1-methylnaphthalene in combined surface and subsurface soil. Exposure Area 1 includes the following sample locations: PAR-83-SB-12, PAR-83-SB-13, PAR-83-SB-16, PAR-83-482-SB-01, PAR-83-482-SB-04, P83-SS/SB-9, P83-SS/SB/GW-10, and P83-SS/SB-11.

Exposure Area 2 includes the highest concentrations of bis(2-chloroethyl)ether, carcinogenic PAHs (as represented by the BaP-equivalent concentration), Aroclor-1254, Aroclor-1260, and mercury in surface soil and combined surface and subsurface soil and the highest concentration of 1-methylnaphthalene in surface soil. Exposure Area 2 includes the following sample locations: P83-B3, P83-B4, P83-B5, PAR-83-SB-07, PAR-83-SB-08, and PAR-83-SB-09.

Exposure Area 3 includes the highest concentrations of cobalt and vanadium and the second highest concentration of carcinogenic PAHs (as represented by the BaP-equivalent concentration) in surface soil and combined surface and subsurface soil. Exposure Area 3 includes the following sample locations: P83-A1, P83-A2, P83-B1, P83-B2, PAR-83-SB-01, PAR-83-SB-02, PAR-83-SB-06, and PAR-83-SB-17.

2.3.2 Estimation of Exposure Point Concentrations

EPCs are the concentrations of chemicals in a given medium to which a receptor may be exposed at a specific location known as the "exposure point." EPCs are estimated using a combination of available analytical data and fate and transport modeling data to represent the RME that is expected to occur at the site. Initial EPCs for soil are the maximum detected concentration of each analyte. If the preliminary evaluation indicates that an unacceptable cumulative risk or hazard index would be calculated, then 95% upper confidence limits (UCL) are calculated for those COPCs contributing significantly to the risk/hazard (i.e., greater than 25% of the cumulative risk/hazard) and the risk is estimated using the 95% UCL on the mean as the EPC for those analytes. If there is an insufficient sample size within the exposure area to calculate a 95% UCL (less than eight samples) or there was only one detection in the exposure area, the maximum detected concentration was kept as the EPC. In all cases, the EPC for lead is the arithmetic mean concentration for lead in soil (USEPA, 2007a).

The data tables present results for all samples, including primary and duplicate samples and are included in the Summary RI Report. The "best value" sample result of all primary and duplicate results were used to determine the EPC. If both values represent detected concentrations, then the highest detected concentration (i.e., the most conservative) was considered the "best value" for use in the risk assessment. If one value represents a detected concentration and one value is qualified as not detected, then the detected value was considered the best value and was retained in the risk assessment. If both values are qualified as not detected, the highest reported U flagged value was retained.

Polycyclic aromatic hydrocarbons (PAH) found in environmental samples are almost always present in complex mixtures. Therefore, a consideration of the risks associated with exposure to the entire suite of carcinogenic PAHs was considered. BaP is the most researched carcinogenic PAH, and the carcinogenicity of other PAHs is determined relative to BaP. A Relative Potency Factor (RPF) approach was used to calculate a BaP-equivalent concentration (USEPA, 1993b). A BaP-equivalent concentration was calculated for the carcinogenic PAHs by multiplying the individual results for the carcinogenic PAH (benzo(a)anthracene, BaP, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene) by the RPF for each sample, and summing the values. The RPFs for each carcinogenic PAH are shown in **Tables G.2.3 and G.2.4**. BaP-equivalent concentrations were calculated for surface soil and combined surface and subsurface soil. The maximum calculated BaP-equivalent concentration for each soil profile was selected for use as the EPC.

EPCs for risk estimation were calculated for each receptor type as follows:

- Soil EPCs for the combined surface and subsurface soil exposure scenario for the UU/UE and utility worker were calculated by aggregating analytical data collected from the exposure area for combined surface and subsurface soil (0-15 feet bgs).
- Surface soil EPCs for all receptor scenarios were estimated from the analytical data collected from the exposure area for surface soil (0-2 feet bgs).

Soil EPCs are shown in **Tables G.2.5 and G.2.6**.

2.3.3 Estimation of Human Intake

Human intake, expressed as milligrams of chemical per kilogram of body weight per day (mg/kg-day), is obtained by multiplying the EPC by exposure factors specific to an exposure scenario. The resultant intake is multiplied by a carcinogenic slope factor or divided by a noncarcinogenic reference dose to derive the carcinogenic risks and noncarcinogenic hazards associated with potential exposures from the site.

The following general equation (USEPA, 1989) is used to quantify the intake of COPCs by potential receptors:

$$Intake = \frac{(C)(CR)(EF)(ED)}{(BW)(AT)}$$

Where:

C	=	Chemical concentration in medium (mg/kg)
CR	=	Contact rate (amount/unit time)
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (years)
BW	=	Body weight (kg)
AT	=	Averaging time (days), for noncarcinogens, equal to ED x 365 days/year; for carcinogens, equal to 70 year assumed lifespan x 365 days/year)

In accordance with USEPA guidance (1989), human intake for carcinogens is calculated differently from those for noncarcinogens. For carcinogens, human intake is averaged over an assumed lifetime of 70 years, because cancer is considered to be a non-threshold phenomenon, and multiple individual chemical exposures which could result in the development of cancer are accrued over a lifetime. The probability of developing cancer is believed to be proportional to the duration and intensity of exposure. That is to say, the probability of developing cancer is proportional to the dose of chemical absorbed into the body, the frequency of exposure, and the duration of exposure.

For cancer assessments that require evaluation of multiple age groups simultaneously, such as UU/UE receptors and recreational users, age-adjusted factors are used to account for the periods of an individual's life spent as a child or adolescent and as an adult. For UU/UE receptors, inputs consistent with residential exposure were used to calculate intakes for carcinogens, and it is assumed that exposure would occur in part as a child (aged 0-<6 years) and the remainder as an adult (the subsequent 20 years). For recreational users, it is assumed that exposure would occur in part as an adolescent (aged 6-<16 years) and in part as an adult (aged 16-<30 years). The age-adjusted factor ($Factor_{adj}$) encompasses the contact rate, exposure duration, and body weight in all cancer assessments for which a portion of the exposure would be expected to occur as a child or adolescent (subscripted "adl") and a portion as an adult, as these are the exposure parameters that are expected to differ between children, adolescents, and adults. This factor is calculated as follows:

$$Factor_{adj} = \left[\frac{(ED_{adl \text{ or } child})(CR_{adl \text{ or } child})}{(BW_{adl \text{ or } child})} \right] + \left[\frac{(ED_{adult})(CR_{adult})}{(BW_{adult})} \right]$$

Where:

$ED_{adl \text{ or } child}$	=	Adolescent or child exposure duration (years)
$CR_{adl \text{ or } child}$	=	Adolescent or child contact rate (amount/unit time)
ED_{adult}	=	Total exposure duration of both adult and child (years)
CR_{adult}	=	Adult contact rate (amount/unit time)
$BW_{adl \text{ or } child}$	=	Adolescent or child body weight (kg)
BW_{adult}	=	Adult body weight (kg)

Outdoor workers and utility workers are included only as adult receptors. Therefore, an age-adjusted factor is not used for these receptors to estimate carcinogenic intake.

For noncarcinogens, the intake is averaged only over the duration of exposure. This reflects the assumption that noncarcinogenic effects have a toxicity threshold. Adverse health effects could result if the toxicity threshold were exceeded for a period of time corresponding to the exposure duration. Conversely, intake of a chemical below the toxicity threshold for a period of time corresponding to the exposure duration would not be expected to result in adverse health effects in the receptor. Therefore, intake is calculated separately for different age groups for noncarcinogens.

Appropriate exposure factors were used to calculate pathway-specific intake factors for all complete pathways at the site. When appropriate, site-specific information was used to develop reasonable yet conservative exposure factors. When neither site-specific information nor default values were available, best professional judgment was used to select appropriate exposure parameters. The equations for calculating both carcinogenic and noncarcinogenic intake of non-mutagenic COPCs are provided in the following subsections. The calculation of human intake of mutagenic COPCs is discussed below in Subsection 2.3.3.2.

2.3.3.1 Intake Equations for Soil

Soil Ingestion

The following equations (USEPA, 1989) will be used to calculate the intake (expressed as mg/kg-day) associated with the incidental ingestion of COPCs in soil. The exposure parameter values, definition and units, and source of the value for the inputs as described in the equations below are shown for each receptor in **Table G.2.2**.

Intakes from incidental ingestion of noncarcinogenic COPCs in soil, as applicable, were calculated for the UU/UE receptors (adult and child separately), outdoor workers, utility workers, and recreational users (adult and adolescent separately) as:

$$Ingestion = \frac{(C_s) (IRS) (EF) (ED) (CF_s)(FI)}{(AT) (BW)}$$

Where:	C _s	=	Contaminant concentration in soil (mg/kg)
	IRS	=	Ingestion rate soil (mg/day) - for adult, adolescent, or child receptors, as applicable
	EF	=	Exposure frequency (days/year)
	ED	=	Exposure duration (years) - for adult, adolescent, or child receptors, as applicable
	CF _s	=	Conversion factor for soil (1E-06 kg/mg)
	FI	=	Fraction soil ingested from source (unitless)
	AT	=	Averaging time (days) - for noncarcinogens, equal to ED x 365 days/year
	BW	=	Body weight (kg) - for adult, adolescent, or child receptors, as applicable

For scenarios that require evaluation of multiple age groups simultaneously, such as for UU/UE receptors and recreational users, the carcinogenic age-adjusted intake from incidental ingestion is calculated as:

$$Ingestion_{age-adj} = \frac{(C_s) (IFS_{adj}) (EF) (CF_s) (FI)}{(AT)}$$

Where:

$$IFS_{adj} = \left(\frac{(ED_{adl\ or\ child})(IRS_{adl\ or\ child})}{(BW_{adl\ or\ child})} \right) + \left(\frac{(ED_{adult})(IRS_{adult})}{(BW_{adult})} \right)$$

Where:	C_s	=	Contaminant concentration in soil (mg/kg)
	IFS_{adj}	=	Age-adjusted soil ingestion factor (mg-year/kg-day)
	IRS_{adult}	=	Ingestion rate soil (mg /day) - adult
	IRS_{adl}	=	Ingestion rate soil (mg /day) - adolescent
	IRS_{child}	=	Ingestion rate soil (mg /day) - child
	EF	=	Exposure frequency (days/year)
	ED_{adult}	=	Exposure duration (years) - adult
	ED_{adl}	=	Exposure duration (years) - adolescent
	ED_{child}	=	Exposure duration (years) - child
	CF_s	=	Conversion factor for soil (1E-06 kg/mg)
	FI	=	Fraction soil ingested from source (unitless)
	AT	=	Averaging time (days) - for carcinogens, equal to 70-year lifetime x 365 days/year
	BW_{adult}	=	Body weight (kg) - adult
	BW_{adl}	=	Body weight (kg) - adolescent
	BW_{child}	=	Body weight (kg) - child

Dermal Contact with Soil

The following equations (USEPA, 2004a) were used to calculate the dermal absorbed dose (DAD) (expressed as mg/kg-day) from dermal contact with COPCs in soil. The exposure parameter values, definition and units, and source of the value for the inputs as described in the equations below are shown for each receptor in **Table G.2.2**.

Intakes from dermal contact of noncarcinogenic COPCs in soil, as applicable, were calculated for UU/UE receptors (adult and child separately), outdoor workers, utility workers, and recreational users (adult and adolescent separately) as:

$$DAD = \frac{(DA_{event})(EF)(ED)(EV)(SA)}{(AT)(BW)}$$

Where the absorbed dose per event (DA_{event}), in milligrams per square centimeter per event (mg/cm²-event), will be estimated as follows (USEPA, 2004a):

$$DA_{event} = (C_s)(CF_s)(AF)(ABS_d)$$

Where:	DA_{event}	=	Absorbed dose per event (mg/cm ² -event) – for adult, adolescent, or child receptors, as applicable
	EF	=	Exposure frequency (days/year)
	ED	=	Exposure duration (years) – for adult, adolescent, or child receptors, as applicable
	EV	=	Event frequency (events/day)
	SA	=	Exposed skin surface area available for contact (cm ²) – for adult, adolescent, or child receptors, as applicable

AT	= Averaging time (days) - for noncarcinogens, equal to ED x 365 days/year
BW	= Body weight (kg) – for adult, adolescent, or child receptors, as applicable
Cs	= Contaminant concentration in soil (mg/kg)
CFs	= Conversion factor for soil (1E-06 kg/mg)
AF	= Adherence factor of soil to skin (mg/cm ²) – for adult, adolescent, or child receptors, as applicable
ABS _d	= Dermal absorption fraction (unitless)

For scenarios that require evaluation of multiple age groups simultaneously, such as UU/UE receptors and recreational users, the carcinogenic age-adjusted intake from dermal contact will be calculated as:

$$DAD_{age-adj} = \frac{(C_s) (SFS_{adj}) (ABS_d) (EF) (EV) (CF_s)}{(AT)}$$

Where:

$$SFS_{adj} = \left(\frac{(ED_{adl\ or\ child}) (AF_{adl\ or\ child}) (SA_{adl\ or\ child})}{(BW_{adl\ or\ child})} \right) + \left(\frac{(ED_{adult}) (AF_{adult}) (SA_{adult})}{(BW_{adult})} \right)$$

Where:	Cs	= Contaminant concentration in soil (mg/kg)
	SFS _{adj}	= Age-adjusted dermal exposure factor (mg-year/kg-day)
	ABS _d	= Dermal absorption fraction (unitless)
	EF	= Exposure frequency (days/year)
	EV	= Event frequency (events/day)
	CFs	= Conversion factor for soil (1E-06 kg/mg)
	AT	= Averaging time (days) - for carcinogens, equal to 70-year lifetime x 365 days/year
	ED _{adult}	= Exposure duration (years) - adult
	ED _{adl}	= Exposure duration (years) - adolescent
	ED _{child}	= Exposure duration (years) - child
	AF _{adult}	= Adherence factor of soil to skin (mg/cm ²) - adult
	AF _{adl}	= Adherence factor of soil to skin (mg/cm ²) - adolescent
	AF _{child}	= Adherence factor of soil to skin (mg/cm ²) - child
	SA _{adult}	= Exposed skin surface area available for contact (cm ²) – adult
	SA _{adl}	= Exposed skin surface area available for contact (cm ²) - adolescent
	SA _{child}	= Exposed skin surface area available for contact (cm ²) - child
	BW _{adult}	= Body weight (kg) - adult
	BW _{adl}	= Body weight (kg) - adolescent
	BW _{child}	= Body weight (kg) - child

Inhalation of Particulates and Vapors from Soil

The following equations (USEPA, 2009a) were used to calculate the exposure concentration in air (EC[air]) (expressed as micrograms per cubic meter [µg/m³]) associated with the inhalation of COPCs in soil. The exposure parameter values, definition and units, and source of the value for the inputs as described in the equations below are shown for each receptor in **Table G.2.2**.

The EC(air) from soil particulates or vapors emitted from soil into ambient air were calculated for UU/UE receptors (adult and child separately for noncarcinogenic COPCs), utility workers, outdoor workers, and recreational users (adult and adolescent separately for noncarcinogenic COPCs).

The EC(air) of soil particulates and vapors emitted from soil are calculated for noncarcinogenic and carcinogenic compounds as:

$$EC(air) = \frac{(C_a) (ET) (EF) (ED)}{(AT)}$$

For exposure scenarios where a receptor would be exposed to both ambient dust and vapors in air, the contaminant concentration in air (C_a), expressed in $\mu\text{g}/\text{m}^3$, is estimated using the following equation derived from USEPA RSL User's Guide (2019c):

$$C_a = (C_s) (1000 \mu\text{g}/\text{mg}) \left(\frac{1}{PEF} + \frac{1}{VF} \right)$$

Where:	C_a	=	Contamination concentration in air ($\mu\text{g}/\text{m}^3$)
	ET	=	Exposure time (hours/day)
	EF	=	Exposure frequency (days/year)
	ED	=	Exposure duration (years); calculated as 6 years as child plus 20 years as adult (UU/UE exposure receptors) and 10 years as adolescent plus 14 years as adult (recreational user)
	AT	=	Averaging time (days) - for noncarcinogens, equal to ED x 365 days/year; for carcinogens, equal to 70-year lifetime x 365 days/year
	C_s	=	Chemical concentration in soil (mg/kg)
	PEF	=	Particulate emission factor (m^3/kg)
	VF	=	Chemical-specific volatilization factor (m^3/kg)

For COPCs that are not volatile, there is no VF. Thus, there is no contribution to the EC(air) from volatilization, and the EC(air) is based solely on resuspension of soil particulates such as at Parcel 83. For exposure scenarios where a receptor would be exposed to ambient dust, but not vapors (e.g., inorganic compounds) in air, the contaminant concentration in air (C_a), expressed in $\mu\text{g}/\text{m}^3$, was estimated using the following equation derived from USEPA RSL User's Guide (2019c):

$$C_a = (C_s) (1000 \mu\text{g}/\text{mg}) \left(\frac{1}{PEF} \right)$$

Where:	C_a	=	Contamination concentration in air ($\mu\text{g}/\text{m}^3$)
	C_s	=	Chemical concentration in soil (mg/kg)
	PEF	=	Particulate emission factor (m^3/kg)

The air concentrations of COPCs were modeled to determine the inhalation exposure concentration. The particulate emission factor (PEF) relates the concentration of COPCs in soil with the concentration of dust particles in the air. This PEF relates to dust generated from open sources, which is termed "fugitive" because it is not discharged into the atmosphere in a confined flow stream. The volatilization factor (VF) is used to define the relationship between the concentration of the COPCs in soil and the flux of the

volatilized COPCs to air. Dispersion models are used to determine the dispersion of COPCs in the atmosphere, reduced to a single site-specific dispersion model (Q/C) term which represents the inverse of the mean concentration at the center of the square source (expressed in gram per square meter per second [g/m²-s] per kg/m³), based on regional climatic zones, source area, and nearest city. For FTMM, the Q/C value is based on Zone VIII, Philadelphia, Pennsylvania, and a 0.5 acre source area. The default exposure parameter values for the inputs as described in the PEF and VF equations below are shown in **Table G.2.7**.

The PEF, in m³/kg, is estimated using the following equation (USEPA, 2002; 2019c) see **Table G.2.8**:

$$PEF = (Q/C) \left(\frac{3,600 \text{ seconds/hour}}{(0.036) (1 - V) \left((U_m/U_t)^3 \right) [F(x)]} \right)$$

Where: Q/C = Inverse of mean concentration at center of square source area (g/m²-s per kg/m³)
V = Fraction of vegetative cover (unitless)
U_m = Mean annual wind speed (meter[s] per second [m/s])
U_t = Equivalent threshold value of wind speed at 7 m (m/s)
F(x) = Function dependent on U_m/U_t derived using Cowherd et al. (1985) (unitless)

The VF is estimated using the following equation (USEPA, 2002, 2019c) see **Table G.2.9**.

$$VF = \frac{(Q/C) \left(((3.14) (D_A) (T))^{1/2} \right) (10^{-4} \text{ m}^2/\text{cm}^2)}{((2) (\rho_b) (D_A))}$$

Where:

$$D_A = \frac{\left[(\theta_a^{10/3}) (D_i) (H') + (\theta_w^{10/3}) (D_w) \right] / n^2}{((\rho_b) (K_d)) + \theta_w + ((\theta_a) (H'))}$$

Where: VF = Chemical-specific volatilization factor (m³/kg)
Q/C = Inverse of mean concentration at center of square source area (g/m²-s per kg/m³)
D_A = Apparent diffusivity (cm²/s)
T = Exposure interval(s)
ρ_b = Dry soil bulk density (g/cm³)
θ_a = Air-filled soil porosity (L_{air}/L_{soil}) = n- θ_w
D_i = Diffusivity in air (cm²/s)
H' = Henry's law constant (unitless)
θ_w = Water-filled soil porosity (L_{water}/L_{soil})
D_w = Diffusivity in water (cm²/s)

n	=	Total soil porosity ($L_{\text{pore}}/L_{\text{soil}}$), calculated as $1 - (\rho_b / \rho_s)$
K_d	=	Soil-water partition coefficient (cm^3/g) (calculated as $K_{OC} \times f_{OC}$)
K_{OC}	=	Soil organic carbon-water partition coefficient (cm^3/g)
f_{OC}	=	Organic carbon content of soil (g/g)
ρ_s	=	Soil particle density (g/cm^3)

In addition, soil saturation must be considered when calculating the VF (USEPA, 1996). Soil saturation corresponds to the COPC concentration in soil at which the adsorptive limits of the soil particles, the solubility limits of the soil pore water, and saturation of soil pore air have been reached. Above this concentration, the COPC in soil may be present in free phase. Chemical-specific soil saturation (C_{sat}) concentrations must be compared with the concentration of each volatile soil COPC because a basic principle of the VF calculation is not applicable when free-phase contaminants are present. Therefore, the VF is applicable only if the soil COPC concentration is equal to or less than the soil saturation concentration. Soil saturation concentrations (**Table G.2.11**) were obtained from the USEPA RSL Chemical-specific Parameter Tables (2019d).

If the soil COPC concentration is greater than the soil saturation concentration, the following equation is used to calculate the contaminant concentration in air, C_a ($\mu\text{g}/\text{m}^3$):

$$C_a = \left[(C_s) \left(\frac{1,000\mu\text{g}}{\text{mg}} \right) \left(\frac{1}{\text{PEF}} \right) \right] + \left[(C_{\text{sat}}) \left(\frac{1,000\mu\text{g}}{\text{mg}} \right) \left(\frac{1}{\text{VF}} \right) \right]$$

The soil saturation concentration is not calculated for chemicals that are solid at room temperature (e.g., naphthalene). If the soil COPC concentration is less than or equal to the soil saturation concentration, or if the volatile is solid at room temperature, C_a would be calculated the same as for a receptor exposed to both ambient dust and vapors in air.

Where:	C_s	=	Chemical concentration in soil (mg/kg)
	C_{sat}	=	Soil saturation concentration (mg/kg)
	PEF	=	Particulate emission factor (m^3/kg)
	VF	=	Chemical-specific volatilization factor (m^3/kg)

2.3.3.2 Calculation of Intake for Mutagenic COPCs

If a chemical has been determined to cause cancer by a mutagenic mode of action (MOA), USEPA has noted that it is possible that exposures to that chemical in early life may result in higher lifetime cancer risks than an adult exposure of comparable duration (USEPA, 2007b). Therefore, if chemical-specific data on susceptibility from early life exposures are available and have been used to develop cancer slope factors (SFs) or inhalation unit risks (IURs) that specifically address any potential for differential potency in early life stages, the derived SFs/IURs were used in lieu of Age Dependent Adjustment Factors (ADAFs) (discussed below). For example, the Integrated Risk Information System (IRIS) assessment of vinyl chloride provides two sets of SFs/IURs, one that accounts for exposure occurring during early life and one that accounts for exposure occurring later in life.

In assessing the risk for which a mutagenic MOA has been identified by USEPA, default ADAFs were applied for those chemical lacking chemical-specific data on susceptibility from early life exposures. The *Supplemental Guidance for Assessing Cancer Susceptibility from Early Life Exposure to Carcinogens* (USEPA, 2005a) recommends the following default ADAFs:

- 10-fold adjustment for exposures during the first two years of life

- 3-fold adjustment for exposures from ages 2 to <16 years of age
- No adjustment for exposures after turning 16 years of age

These ADAFs are used to prorate the toxicity factors for the respective age ranges, to account for more or less sensitivity during that life stage. For example, there is assumed by default to be 10-fold greater sensitivity over the first two years of life than for an equivalent level of exposure after turning 16 years of age. Consideration of early life stage exposure was limited to the UU/UE receptor and recreational user scenarios. Because the adolescent recreational user is 6 to <16 years of age, only the three-fold adjustment is used in the calculations for intake of mutagenic COPCs.

Table G.2.10 identifies mutagens present in soil. The following mutagenic COPCs were identified:

- Surface Soil: benzo(a)anthracene, BaP, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene, collectively evaluated as a BaP-equivalent and trichloroethene.
- Combined Surface and Subsurface Soil: benzo(a)anthracene, BaP, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene, collectively evaluated as a BaP-equivalent and trichloroethene.

Carcinogenic PAHs were evaluated using the cancer slope factor for BaP, the most thoroughly studied of the carcinogenic PAHs. The evaluation is conducted using a BaP-equivalent concentration that considers an aggregate concentration of seven carcinogenic PAHs as described in Subsection 2.3.2.

For mutagenic COPCs, the following equations were used:

Incidental Ingestion of Soil. The following equation (USEPA, 1989; 2005a) is used to calculate the intake in mg/kg-day for mutagenic COPCs :

For UU/UE receptors:

$$Intake = \frac{C_s \times \left(\frac{(ED_{0-2} \times IRS_c) \times 10}{BW_c} + \frac{(ED_{2-6} \times IRS_c) \times 3}{BW_c} + \frac{(ED_{6-16} \times IRS_a) \times 3}{BW_a} + \frac{(ED_{16-30} \times IRS_a) \times 1}{BW_a} \right) \times EF \times 10^{-6} kg/mg}{AT}$$

And for recreational users:

$$Intake = \frac{C_s \times \left(\frac{(ED_{6-16} \times IRS_{adl}) \times 3}{BW_{adl}} + \frac{(ED_{16-30} \times IRS_a) \times 1}{BW_a} \right) \times EF \times 10^{-6} kg/mg}{AT}$$

where:

- C_s = chemical concentration in soil (mg/kg)
- ED_{0-2} = exposure duration, 0 to 2 years of age (years)
- ED_{2-6} = exposure duration, 2 to 6 years of age (years)
- ED_{6-16} = exposure duration, 6 to 16 years of age (years)
- ED_{16-30} = exposure duration, 16 to 30 years of age (years)
- IRS_c = child soil ingestion rate (mg/day)
- IRS_{adl} = adolescent soil ingestion rate (mg/day)
- IRS_a = adult soil ingestion rate (mg/day)
- BW_c = child body weight (kg)

BW_{adl} = adolescent body weight (kg)
BW_a = adult body weight (kg)
EF = exposure frequency (days/year)
AT = averaging time (days)

Dermal Contact with Soil. The following equations (USEPA, 2004a; 2005a) are used to calculate the intake from dermal contact with mutagenic COPCs in soil:

For UU/UE receptors:

$$DAD = \frac{C_s \times \left(\frac{(ED_{0-2} \times AF_c \times SA_c) \times 10}{BW_c} + \frac{(ED_{2-6} \times AF_c \times SA_c) \times 3}{BW_c} + \frac{(ED_{6-16} \times AF_a \times SA_a) \times 3}{BW_a} + \frac{(ED_{16-30} \times AF_a \times SA_a) \times 1}{BW_a} \right) \times ABS \times EF \times 10^{-6} \text{ kg/mg}}{AT}$$

And for recreational users:

$$DAD = \frac{C_s \times \left(\frac{(ED_{6-16} \times AF_{adl} \times SA_{adl}) \times 3}{BW_{adl}} + \frac{(ED_{16-30} \times AF_a \times SA_a) \times 1}{BW_a} \right) \times ABS \times EF \times 10^{-6} \text{ kg/mg}}{AT}$$

where:

DAD = dermally absorbed dose (mg/kg-day)
C_s = chemical concentration in soil (mg/kg)
ED₀₋₂ = exposure duration, 0 to 2 years of age (years)
ED₂₋₆ = exposure duration, 2 to 6 years of age (years)
ED₆₋₁₆ = exposure duration, 6 to 16 years of age (years)
ED₁₆₋₃₀ = exposure duration, 16 to 30 years of age (years)
AF_c = child soil-to-skin adherence factor (mg/cm²-day)
AF_{adl} = adolescent soil-to-skin adherence factor (mg/cm²-day)
AF_a = adult soil-to-skin adherence factor (mg/cm²-day)
SA_c = child exposed skin surface area (cm²)
SA_{adl} = adolescent exposed skin surface area (cm²)
SA_a = adult exposed skin surface area (cm²)
BW_c = child body weight (kg)
BW_{adl} = adolescent body weight (kg)
BW_a = adult body weight (kg)
ABS = absorption fraction (unitless)
EF = exposure frequency (days/year)

Inhalation of Fugitive Dusts or Vapors. The following equations (USEPA, 2005a; 2009a) are used to calculate the exposure concentrations of other mutagenic COPCs associated with inhalation of fugitive dust or vapor emissions from soil for UU/UE receptors:

$$EC(air) = \frac{C_a \times ET \times EF \times [(ED_{0-2} \times 10) + (ED_{2-6} \times 3) + (ED_{6-16} \times 3) + (ED_{16-30} \times 1)]}{AT}$$

where:

$$C_a = C_s \times 1,000 \mu\text{g}/\text{mg} \times \left[\frac{1}{VF} + \frac{1}{PEF} \right]$$

where:

EC(air)	=	exposure concentration, air ($\mu\text{g}/\text{m}^3$)
C_a	=	contaminant concentration in air ($\mu\text{g}/\text{m}^3$)
C_s	=	COPC concentration in soil (mg/kg)
ET	=	exposure time as a fraction of the day spent at the site (unitless)
EF	=	exposure frequency (days/year)
ED ₀₋₂	=	exposure duration, 0 to 2 years of age (years)
ED ₂₋₆	=	exposure duration, 2 to 6 years of age (years)
ED ₆₋₁₆	=	exposure duration, 6 to 16 years of age (years)
ED ₁₆₋₃₀	=	exposure duration, 16 to 30 years of age (years)
AT	=	averaging time (days)
VF	=	chemical-specific volatilization factor (m^3/kg)
PEF	=	particulate emission factor (m^3/kg)

The exposure assumptions used to estimate exposures as listed in the equations above are presented in **Table G.2.2**.

2.4 Toxicity Assessment

The most recently available toxicity data were used to calculate carcinogenic risk and noncarcinogenic hazard. The toxicity criteria (SF, IUR, reference doses [RfD]), and reference concentrations [RfC]) were selected using the hierarchy below, in accordance with USEPA guidance (USEPA, 2019c):

1. USEPA Integrated Risk Information System (IRIS) on-line database (USEPA, 2019e)
2. USEPA's Provisional Peer Reviewed Toxicity Values (PPRTVs) (USEPA, 2019f)
3. Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels (MRL) (ATSDR, 2019)
4. California Office of Environmental Health Hazard Assessment's (OEHHA) Toxicity Criteria Database (OEHHA, 2019)
5. USEPA's PPRTV screening toxicity values in appendices to certain PPRTV assessments (USEPA, 2019f)
6. USEPA's Health Effects Assessment Tables (HEAST) (USEPA, 1997)

Because this hierarchy is consistent with USEPA guidance and the hierarchy USEPA uses to calculate RSLs, the RSL tables (USEPA, 2019a) are used to select the toxicity criteria for this risk assessment (**Table G.2.10**).

USEPA has not developed toxicity values specific to the dermal absorption pathway. However, dermal toxicity values have been derived from the oral toxicity values as described in USEPA's most recent dermal risk assessment guidance (USEPA, 2004a).

Toxicity values provided by USEPA reflect administered-dose values, that is, they represent concentrations that will be protective following ingestion or inhalation. The dermal route of exposure, however, evaluates the toxicity of concentrations of chemicals in the blood (absorbed). Therefore, the absorbed-dose concentrations identified for dermal exposure must be compared to absorbed-dose toxicity

values. The absorbed-dose toxicity values are derived by applying oral absorption factors (OAFs) to administered-dose toxicity values. The OAFs used in the human health RA are obtained from the USEPA RSL tables (USEPA, 2019a), where they are referred to as GIABS (gastrointestinal absorption factors).

2.5 Risk Characterization

The final step in the risk assessment process is risk characterization. The purpose of the risk characterization step is to 1) review the results from the exposure and toxicity assessments; 2) quantitatively estimate the potential for carcinogenic (i.e., risk) and noncarcinogenic (i.e., hazard) effects; and 3) assess and discuss uncertainties associated with each of the aforementioned steps. To characterize potential noncarcinogenic effects, estimated exposure concentrations of COPCs were compared with their respective toxicity values. To characterize potential carcinogenic effects, the incremental probability of an individual developing cancer over a lifetime was calculated from estimated exposure concentrations and chemical-specific dose/response information (i.e., carcinogenic toxicity factors).

For each COPC having available toxicity values, a carcinogenic risk (for carcinogens) and hazard quotient (HQ) estimate (for noncarcinogens) was calculated as described below. Each COPC was included in the cumulative risk calculations. The carcinogenic and noncarcinogenic results and risk summaries by pathway and receptor for current and future receptors exposed to site media are presented.

2.5.1 Noncancer Hazard Estimation

Potential health hazards associated with exposure to noncarcinogenic compounds were evaluated by calculating a HQ. The potential HQ is calculated as the ratio of the intake (via ingestion) or DAD (via dermal contact) to the oral reference dose (RfD_o) or dermal reference dose (RfD_d), respectively, as follows (USEPA, 1989):

$$HQ = \text{Intake} / \text{RfD}_o$$

$$HQ = \text{DAD} / \text{RfD}_d$$

where:

HQ	= Noncancer hazard quotient (unitless)
Intake	= Chronic daily ingestion averaged over the exposure duration (mg/kg-day)
RfD _o	= Oral reference dose (mg/kg-day)
DAD	= Dermally absorbed dose (mg/kg-day)
RfD _d	= Dermal reference dose (mg/kg-day)

For noncancer effects by inhalation exposure, the following equation is used (USEPA, 2009a):

$$HQ_{inh} = \frac{EC \text{ (air)}}{(RfC \times 1,000 \frac{\mu g}{mg})}$$

where:

HQ _{inh}	= Noncancer hazard quotient from inhalation (unitless)
EC (air)	= Exposure concentration in air (μg/m ³)
RfC	= Noncancer reference concentration (mg/m ³)

The noncarcinogenic HQ assumes that there is a level of exposure (i.e., a threshold represented by the RfD or RfC) below which it is unlikely for even sensitive populations to experience adverse health effects

(USEPA, 1989). If the EPC exceeds this threshold, there may be concern for potential noncarcinogenic effects. In other words, if the estimated daily intake for any single COPC is greater than its RfD or RfC, the HQ will exceed 1. An HQ that exceeds 1 indicates that there is a potential for adverse health effects associated with exposure to that COPC.

The supporting calculations are provided on the hazard calculation spreadsheets provided at the end of this report.

2.5.2 Cancer Risk Estimation

Individual cancer risk is calculated as the product of exposure (intake for ingestion and DAD for dermal contact) to a constituent (in mg/kg-day) and the SF (SF_o for ingestion and SF_d for dermal contact) for that constituent (in mg/kg-day)⁻¹, as follows (USEPA, 1989):

$$Risk = Intake \times SF_o$$

$$Risk = DAD \times SF_d$$

where:

- Risk = Excess lifetime cancer risk (unitless probability)
- Intake = Chronic daily ingestion averaged over a lifetime (mg/kg-day)
- SF_o = Oral cancer slope factor (mg/kg-day)⁻¹
- DAD = Dermal absorbed dose (mg/kg-day)
- SF_d = Dermal cancer slope factor (mg/kg-day)⁻¹

Inhalation risk is calculated by multiplying the exposure concentration by the IUR. Inhalation risk is estimated by using the following formula (USEPA, 2009a):

$$Risk_{inh} = EC (air) \times IUR$$

where:

- Risk_{inh} = Excess lifetime cancer risk from inhalation (unitless probability)
- EC(air) = Exposure concentration in air (µg/m³)
- IUR = Inhalation unit risk (µg/m³)⁻¹

Each SF is accompanied by a weight-of-evidence classification, which considers the available data for a chemical in order to evaluate the likelihood that the chemical is a potential human carcinogen. The evidence is characterized separately for studies in humans and studies in laboratory animals as sufficient, limited, inadequate, no data, or evidence of noncarcinogenicity. For the purposes of this evaluation, the potential for unacceptable human health risk is identified when the multi-constituent aggregate risk for the direct-contact pathways exceeds an excess lifetime cancer risk (ELCR) of 1 x 10⁻⁴. The supporting calculations are provided on the risk calculation spreadsheets provided at the end of this report.

2.5.3 Cumulative Risk and Hazard Index Estimation

Each COPC was included in the cumulative risk and hazard index (HI) calculations.

An HI is calculated to assess the potential for noncarcinogenic effects posed by more than one constituent. The HI approach assumes that simultaneous sub-threshold exposures to several constituents across all media and pathways of exposure could result in an adverse health effect. The greater the magnitude of an HI, the greater is the chance that the HI's associated toxicological endpoint will be realized and occur at the site. The HI is equal to the sum of the HQs, and is calculated as follows (USEPA, 1989):

$$HI = \sum HQ_i$$

where: HI = Hazard index (unitless)
HQ_i = Hazard quotient for the ith constituent (unitless)

For the purposes of this evaluation, the potential for unacceptable human health risk is identified when the multi-constituent aggregate risk for the direct-contact pathways exceeds a noncancer HI of 1 (USEPA, 1989).

The following equation is used to calculate the cumulative noncarcinogenic hazard across multiple exposure pathways (USEPA, 1989):

$$Cumulative\ HI = HI_T(inhalation) + HI_T(dermal) + HI_T(ingestion)$$

Cancer risk from exposure to multiple carcinogens and multiple pathways is assumed to be additive, based on the *Guidelines for Carcinogen Risk Assessment* (USEPA, 2005b). The following equation will be used to calculate the total risk from exposure to multiple substances (USEPA, 1989):

$$Risk_T = \sum Risk_i$$

where: Risk_T = Total Risk for multiple constituents per exposure pathway (unitless)
Risk_i = Risk for the ith constituent (unitless)

The following equation is used to calculate the cumulative carcinogenic risk across multiple exposure pathways (USEPA, 1989):

$$Cumulative\ Cancer\ Risk = Risk_T(inhalation) + Risk_T(dermal) + Risk_T(ingestion)$$

2.5.4 Lead Hazard

Potential risks from lead concentrations were evaluated using methods different from those used for other carcinogens and noncarcinogens, because the end point for lead evaluation is a blood lead level, rather than a carcinogenic risk or HQ. There is not a reference dose or cancer slope factor for lead (USEPA, 2019d). Therefore, lead is not included in the cumulative risk calculations. Lead was evaluated using the USEPA Integrated Exposure Uptake Biokinetic (IEUBK) model for children (USEPA, 2010). This model estimates potential blood lead (PbB) concentrations (µg-Pb per deciliter [dL]-blood) based on assumed exposures to lead in environmental media. As recommended in USEPA guidance (USEPA, 2007a), this model was run using the arithmetic mean concentration for lead in soil and the default exposure parameters in the models. Exposure to lead was evaluated using a step-wise approach, evaluating the most sensitive receptor (UU/UE child receptor) first.

USEPA currently sets the level of concern for blood-lead levels at 10 µg/dL (USEPA, 2007a). Therefore, the USEPA level of concern for blood-lead levels of 10 µg/dL will be used for comparison to estimated blood-lead levels. Up until May 2012, the Centers for Disease Control and Prevention (CDC) had defined an elevated blood lead level as equal to or greater than 10 µg/dL for children under 6 years of age. However, more recent scientific evidence on adverse effects of blood lead levels below 10 µg/dL in children have been noted and CDC has adopted a "reference value" for lead based on the 97.5th percentile of the blood lead level distribution in U.S. children aged 1–5 years, which currently is 5 µg/dL.

The IEUBK model was used to estimate potential exposure of UU/UE child receptors to lead. The IEUBK model is designed to model a child's total exposure to lead, including exposure to lead in air, water, soil, diet, and other sources to predict PbB levels in children 7 years of age or less (USEPA, 2007a). Therefore,

since children are the most sensitive receptor, the estimated potential PbB concentrations modeled using the IEUBK model are protective of the other receptors on-site including adult UU/UE receptors. If the modeled PbB levels in children had been greater than the level of concern, the USEPA (2003; 2009b) adult lead model (ALM) would have been used to estimate an allowable average concentration of lead in soil for the exposure areas where current/future adult utility workers, outdoor workers, and recreational users (including the adolescent recreational user) may be exposed.

The IEUBK model evaluates an integrated exposure, including the contribution of lead in soil to total exposure. Site-specific soil exposure concentrations were used in the model. The soil lead EPC for the IEUBK model is the EPC for lead in the surface soil samples (USEPA, 2007a). The IEUBK model includes assumptions regarding baseline concentrations of lead in air, diet, drinking water, and maternal blood to evaluate total exposure. The model provides default assumptions regarding intake of lead from these various environmental media and will be run using the default exposure parameters provided in the model (USEPA, 2007a). Model outputs are included as **Attachment G.2**.

Since the toxicokinetics of lead are well understood, lead is regulated based on PbB concentration. USEPA has determined that childhood PbB concentrations at or above 10 µg/dL present risks to children's health. The modeled PbB concentrations are compared to the PbB level of concern of 10 µg/dL (USEPA, 2007a). USEPA's risk reduction goal for contaminated sites is to limit the probability of a child's PbB concentration exceeding 10 µg/dL (the P10) to 5% or less. Therefore, the USEPA Office of Solid Waste Emergency Response (OSWER) has established a health protection goal that young children exposed to lead at their residences should not encounter a risk of more than five percent of exceeding a PbB level of 10 µg/dL (see Revised Interim Soil Lead (Pb) Guidance for CERCLA Sites and RCRA Corrective Action Facilities (USEPA, 1994); see also, Clarification to the 1994 Revised Interim Soil Lead (Pb) Guidance for CERCLA Sites and RCRA Corrective Action Facilities (USEPA, 1998)). Based on USEPA's current approach, PbB concentrations less than 10 µg/dL do not require further management of the risk associated with exposure to lead.

2.5.5 Risk Characterization Results

The primary objective of this HHRA was to quantitatively characterize the human health risk associated with current and reasonably expected future exposure to contaminated media at Parcel 83. As discussed in Section 2.3.1, all potentially complete exposure scenarios and pathways were either directly or indirectly evaluated. In the latter case, exposures of relatively lesser magnitude were addressed through the evaluation of more protective exposure scenarios (e.g., the evaluation of lead exposure to children using the IEUBK model is protective of adults exposed to lead). The exposure pathways were outlined in Section 2.3.1 and were also shown on the CSM diagram (**Figure G.2.1**). Site-specific carcinogenic risks and noncarcinogenic hazards were estimated for receptors, exposure pathways, and COPCs per the methods described previously in this report. The results of the risk characterization are presented in this section.

2.5.5.1 Surface Soil Risk Characterization

To determine the risk/hazard associated with exposure to contaminants in surface soil at Parcel 83, surface soil samples (0 to 2 feet bgs) were evaluated. As described in the RI Report, the following COPCs were identified in surface soil: trichloroethene, 1-methylnaphthalene, 2-methylnaphthalene, benzo(a)anthracene, BaP, benzo(b)fluoranthene, bis(2-chloroethyl)ether, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, Aroclor-1254, Aroclor-1260, antimony, arsenic, cobalt, lead, manganese, mercury, and vanadium. Since benzo(a)anthracene, BaP, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene were identified as COPCs, all seven carcinogenic PAHs were retained for consideration in the risk assessment. The EPC for the BaP-equivalent is described in Subsection 2.3.2 of this report and the EPC for the BaP-equivalent calculation is shown in **Tables G.2.3 and G.2.4**. Because BaP is the most studied of the carcinogenic PAHs, the BaP-equivalent was evaluated using the SF

associated with BaP. The pathway specific, receptor specific, and cumulative risks/hazards for each Exposure Area are summarized in **Tables G.2.12 through G.2.53**.

2.5.5.1.1 Carcinogenic Risk

UU/UE Receptors

The cumulative carcinogenic risk for UU/UE receptors for Exposure Areas 1 through 3 are respectively estimated to be 7×10^{-5} (Exposure Area 1, **Table G.2.18**), 2×10^{-4} (Exposure Area 2, **Table G.2.27**), and 8×10^{-5} (Exposure Area 3, **Table G.2.36**), which for Exposure Area 1 and Exposure Area 3 are less than 1×10^{-4} , the upper end of the USEPA's acceptable incremental cancer risk range. The cumulative carcinogenic risk for Exposure Area 2 is estimated to be 2×10^{-4} , which is greater than 1×10^{-4} , the upper end of the USEPA's acceptable incremental cancer risk range. This risk is wholly attributable to exposure to carcinogenic PAHs in surface soil as represented by the BaP-equivalent concentration. The risk estimate includes evaluation of exposure to contaminants in surface soil via incidental ingestion, dermal contact, and inhalation of particulates and vapors.

Utility Workers

The cumulative carcinogenic risk for future utility workers is estimated to be 3×10^{-7} (**Table G.2.42**), which is less than 1×10^{-4} , the upper end of the USEPA's acceptable incremental cancer risk range. The risk estimate includes evaluation of exposure to contaminants in surface soil via incidental ingestion, dermal contact, and inhalation of particulates and vapors during construction and excavation activities.

Outdoor Workers

The cumulative carcinogenic risk for outdoor workers is estimated to be 2×10^{-5} (**Table G.2.46**), which is less than 1×10^{-4} , the upper end of the USEPA's acceptable incremental cancer risk range. The risk estimate includes evaluation of exposure to contaminants in surface soil via incidental ingestion, dermal contact, and inhalation of particulates and vapors during maintenance or landscaping activities.

Recreational Users

The cumulative carcinogenic risk for recreational users is estimated to be 6×10^{-6} (**Table G.2.53**), which is less than 1×10^{-4} , the upper end of the USEPA's acceptable incremental cancer risk range. The risk estimate includes evaluation of exposure to contaminants in surface soil via ingestion, dermal contact, and inhalation of particulates and vapors during recreational activities.

2.5.5.1.2 Noncarcinogenic Hazard

UU/UE Receptors

The HIs for both child and adult UU/UE receptors are as follows: Exposure Area 1: child (3) and adult (1) (**Table G.2.18**), Exposure Area 2: child (3) and adult (0.7) (**Table G.2.27**), and Exposure Area 3: child (2) and adult (0.3) (**Table G.2.36**). The HIs are less than or equal to 1 for adult UU/UE receptors for all Exposure Areas. The HIs for the UU/UE child receptor in all three Exposure Areas are greater than 1. The individual HQs are all less than 1. Since the total HIs of each Exposure Area were greater than 1, the hazards were evaluated by target organ (USEPA, 1989). The critical toxic effects and target organs are listed in **Tables G.2.19, G.2.28, and G.2.37** for each of the COPCs at each of the Exposure Areas respectively. As shown in **Tables G.2.20, G.2.29, and G.2.38**, segregated HIs were less than or equal to 1 for the target organs at all three Exposure Areas. The HI includes evaluation of exposure to contaminants in surface soil via incidental ingestion, dermal contact, and inhalation of particulates and vapors.

Utility Workers

The HI for utility workers (0.1) is less than 1 (**Table G.2.42**). The HI includes evaluation of exposure to contaminants in surface soil via incidental ingestion, dermal contact, and inhalation of particulates and vapors during construction and excavation activities.

Outdoor Workers

The HI for outdoor workers (0.5) is less than 1 (**Table G.2.46**). The HI includes evaluation of exposure to contaminants in surface soil via incidental ingestion, dermal contact, and inhalation of particulates and vapors during maintenance or landscaping activities.

Recreational Users

The HI for both adolescent (0.1) and adult (0.04) recreational users is less than 1 (**Table G.2.53**). The HI includes evaluation of exposure to contaminants in surface soil via incidental ingestion, dermal contact, and inhalation of particulates and vapors during recreational activities.

2.5.5.1.3 Lead Hazard

UU/UE Receptors

The IEUBK model was used to estimate potential exposure of UU/UE child receptors to lead. The highest modeled PbB levels in children for each Exposure Area were 5.0 µg/dL for Exposure Area 1, 4.4 µg/dL for Exposure Area 2, and 1.4 µg/dL for Exposure Area 3 which are all less than both the USEPA level of concern for blood-lead levels of 10 µg/dL and the current CDC reference value for blood-lead levels of 5 µg/dL. The estimated potential PbB concentrations modeled using the IEUBK model are protective of the other receptors on-site including adult UU/UE receptors.

Utility Workers, Outdoor Workers, and Recreational Users

The estimated potential PbB concentrations modeled using the IEUBK model are protective of the other receptors on-site including utility workers, outdoor workers, and recreational users.

2.5.5.2 Combined Surface and Subsurface Soil Risk Characterization

To determine the risk/hazard associated with exposure to contaminants in combined surface and subsurface soil at Parcel 83, surface and subsurface soil samples (0 to 15 feet bgs) were evaluated. As described in the RI Report, the following COPCs were identified in the combined surface and subsurface soil: trichloroethene, 1-methylnaphthalene, 2-methylnaphthalene, benzo(a)anthracene, BaP, benzo(b)fluoranthene, bis(2-chloroethyl)ether, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, Aroclor-1254, Aroclor-1260, antimony, arsenic, cobalt, lead, manganese, mercury, and vanadium.. Since benzo(a)anthracene, BaP, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene were identified as COPCs, all seven carcinogenic PAHs were retained for consideration in the risk assessment. The EPC for the BaP-equivalent is described in Subsection 2.3.2 of this report and the EPC for the BaP-equivalent calculation is shown in **Tables G.2.3 and G.2.4**. Because BaP is the most studied of the carcinogenic PAHs, the BaP-equivalent was evaluated using the SF associated with BaP. The pathway specific, receptor specific, and cumulative risks/hazards are summarized in **Tables G.2.54 through G.2.84**.

2.5.5.2.1 Carcinogenic Risk

UU/UE Receptors

The cumulative carcinogenic risk for UU/UE receptors for Exposure Areas 1 through 3 are estimated to be 6×10^{-5} (Exposure Area 1, **Table G.2.60**), 1×10^{-4} (Exposure Area 2, **Table G.2.69**), and 6×10^{-5} (Exposure Area 3, **Table G.2.78**), which are all less than or equal to 1×10^{-4} , the upper end of the

USEPA's acceptable incremental cancer risk range. The risk includes evaluation of exposure to contaminants in combined surface and subsurface soil via incidental ingestion, dermal contact, and inhalation of particulates and vapors, as the UU/UE receptor is expected to be exposed to surface soil as well as subsurface soil that has been brought to the surface as a result of excavation activities.

Utility Workers

The cumulative carcinogenic risk for utility workers is estimated to be 3×10^{-7} (**Table G.2.84**), which is less than 1×10^{-4} , the upper end of the USEPA's acceptable incremental cancer risk range. The risk includes evaluation of exposure to contaminants in combined surface and subsurface soil via incidental ingestion, dermal contact, and inhalation of particulates and vapors during construction and excavation activities.

2.5.5.2.2 Noncarcinogenic Hazard

UU/UE Receptors

The HIs for both child and adult UU/UE receptors are as follows: Exposure Area 1: child (3) and adult (1) (**Table G.2.60**), Exposure Area 2: child (2) and adult (0.5) (**Table G.2.69**), Exposure Area 3: child (2) and adult (0.2) (**Table G.2.78**). The HIs are less than or equal to 1 for adult UU/UE receptors for all Exposure Areas. The HIs for the UU/UE child receptor in all three Exposure Areas are greater than 1. The individual HQs are all less than 1. Since the total HIs of each Exposure Area were greater than 1, the hazards were evaluated by target organ (USEPA, 1989). The critical toxic effects and target organs are listed in **Tables G.2.61, G.2.70, and G.2.79** for each of the COPCs at each of the Exposure Areas respectively. As shown in **Tables G.2.62, G.2.71, and G.2.80**, segregated HIs were less than or equal to 1 for the target organs at all three Exposure Areas. The HIs include evaluation of exposure to contaminants in combined surface and subsurface soil via incidental ingestion, dermal contact, and inhalation of particulates and vapors, as the UU/UE receptor is expected to be exposed to surface soil as well as subsurface soil that has been brought to the surface as a result of excavation activities.

Utility Workers

The HI for utility workers (0.1) is less than 1 (**Table G.2.84**). The HI includes evaluation of hazards associated with exposure to contaminants in combined surface and subsurface soil via incidental ingestion, dermal contact, and inhalation of particulates and vapors during construction and excavation activities.

2.5.5.2.3 Lead Hazard

UU/UE Receptors

The IEUBK model was used to estimate potential exposure of UU/UE child receptors to lead. The highest modeled PbB levels in children for each Exposure Area were 2.8 µg/dL for Exposure Area 1, 2.6 µg/dL for Exposure Area 2, and 1.2 µg/dL for Exposure Area 3 which are all less than both the USEPA level of concern for blood-lead levels of 10 µg/dL and the current CDC reference value for blood-lead levels of 5 µg/dL. The estimated potential PbB concentrations modeled using the IEUBK model are protective of the other receptors on-site including adult UU/UE receptors.

Utility Workers

The estimated potential PbB concentrations modeled using the IEUBK model are protective of the other receptors on-site including utility workers.

2.5.6 Risk Assessment Uncertainties

All human health risk assessments involve use of assumptions, professional judgments, and imperfect data to varying degrees, which result in uncertainty in the final estimates of risk. Risk assessment in general is often based on conservative assumptions and scenarios. Uncertainty can be introduced into a health risk assessment at every step of the process outlined in this document. Uncertainties are present in a risk assessment because it requires integration of the following:

- Release of constituents into the environment, and the areal and vertical distribution of these materials in soil and groundwater;
- Fate and transport of constituents in a variety of different and variable environments by processes that are often poorly understood or too complex to quantify accurately;
- Potential for adverse health effects in humans based on extrapolations from animal studies; and
- Probability of adverse effects in a human population that is highly variable with respect to genetics, age, activity level, and lifestyle.

This section qualitatively describes the inherent and site-specific uncertainties of the assessments process.

2.5.6.1 Uncertainty in Data Collection and Evaluation

The analysis of uncertainties focuses on determining whether the available data are representative of contaminant concentrations and site conditions, and whether features of sampling, analyses, or statistical treatment of the data result in an over- or underestimation of potential risk.

The use of the maximum detected concentration introduces uncertainty into the risk assessment, since the use of one analytical result likely does not accurately represent the concentration of the constituent that a receptor would be exposed throughout the exposure duration. In cases where the analyte is infrequently detected, the use of the maximum concentration will likely overestimate the actual EPC, resulting in an overestimate of the risk. In cases with few total samples, the use of the maximum detected concentration can either over- or underestimate the EPC depending on the distribution of the actual concentrations in the medium of concern.

Initial EPCs are the maximum detected concentration of each analyte. If an unacceptable cumulative risk or hazard index is calculated, 95% UCL are calculated for those COPCs contributing significantly to the risk/hazard (i.e., greater than 25% of the cumulative risk/hazard) and the risk is estimated using the 95% UCL on the mean as the EPC for those analytes. If there was an insufficient sample size to calculate a 95% UCL (less than eight samples), the maximum detected concentration was kept as the EPC. USEPA has researched how to determine the appropriate method for calculating a 95%UCL based on the data distribution, data set size, skewness, and percentage of non-detect observations. The ProUCL output included in **Attachment G.1** states, “Suggestions regarding the selection of a 95% UCL are provided to help the user select the most appropriate 95% UCL.” ProUCL generates UCLs using all available methods for each data set, regardless of the appropriateness of the method. The results listed under “Suggested UCLs to Use” are the results recommended by ProUCL based on data size, data distribution, and skewness of the data set, as well as the results of simulation studies. Where more than one result was listed in the ProUCL output in “Suggested UCLs to Use”, the most conservative (highest) of the recommended “Suggested UCLs to Use” was selected for use as the EPC. This is a default selection made without regard to scientific validity. The use of the most conservative UCL may overestimate the EPC and, therefore, the risk. In addition, the 95% UCL for each EPC includes data over time, and may overestimate the risk if the concentration of constituents in soil is naturally attenuating.

Chemicals that were never detected in any samples were eliminated from the risk assessment. It is possible that some chemicals that were eliminated from consideration in the risk assessment may have actually been present in samples at concentrations lower than the sample quantitation limit. If chemicals

that were eliminated from the risk assessment were actually present in the environmental medium, the cumulative risk could be underestimated. Detection limits greater than human health screening criteria have the potential to underestimate the risk associated with exposure to COPCs. However, the sampling plan attempted to reduce this uncertainty through the use of a consistent analytical approach as well as a biased sampling approach. Since samples were collected from areas most likely to be contaminated based on the understanding of past site activities, it is unlikely that chemicals were present at health-significant levels and not detected in at least one sample.

The following analytes were never detected, but had reporting limits greater than the human health screening criteria in combined surface and subsurface soil (0-15 ft bgs) in at least one sample within Parcel 83:

- 1,1,2-Trichloroethane
- 1,2,3-Trichloropropane
- 1,2-Dibromo-3-chloropropane
- 1,2-Dibromoethane
- 1,2-Dichloropropane
- Bromodichloromethane
- Chloroform
- Vinyl chloride

The following analytes were never detected, but had reporting limits greater than the human health screening criteria in groundwater in at least one sample within Parcel 83:

- Trichloroethene

The VOCs in subsurface soil that were never detected but had a reporting limit greater than the human health screening criteria, had a reporting limit greater than the human health screening criteria in only one sample (PAR-83-SB-12 from 2.5-3 feet bgs). All other samples collected had a reporting limit for these VOCs that was less than the human health screening value.

Trichloroethene (TCE) in groundwater was never detected but had a reporting limit greater than the human health screening criteria. However, the reporting limit was the limit of quantitation (LOQ). The maximum detection limit (MDL) of 0.22 µg/L is less than the USEPA RSL of 0.28 µg/L. Therefore, it can be reasonably assumed that TCE is not present in concentrations greater than the human health screening criteria.

Similarly, chemicals that were detected at concentrations less than the selected screening criteria were eliminated from the risk assessment. It is possible that some of these chemicals may have been present at greater concentrations in areas that were not sampled, thus underestimating the potential exposure concentrations. However, the sampling plan attempted to reduce this uncertainty through the use of a consistent analytical approach as well as a biased sampling approach. Since samples were collected from areas identified in the conceptual site model as areas most likely to be contaminated based on the understanding of past site activities, it is unlikely that any chemicals were present at health-significant levels and not detected.

All aluminum, copper, and manganese detections were B flagged and therefore treated as not detected. However, due to the nature of metals in soil it is likely that aluminum, copper, and manganese are present in the soil. This may underestimate the overall risk. However, the measured concentrations of aluminum, copper, and manganese, although B-flagged, are all less than the USEPA RSL based on an HQ=1, and therefore it is unlikely that they would contribute significantly to the overall risk.

It should be noted that only residential screening values were used in determining COPCs for this risk assessment, although a number of site receptors evaluated (e.g., onsite worker, construction worker) do not conform to a conventional residential site use pattern. Developing one COPC list for all receptors based on residential screening values is very conservative; it ensures that every site chemical that could possibly contribute to risk or hazard is considered.

Steady-state conditions (i.e., the observed concentrations remain the same in the environmental media for the foreseeable future) were assumed for evaluation of potential future exposures. The assumption of steady-state conditions may tend to overestimate long-term exposure and health risk because contaminant concentrations may decline over time due to natural dissipation processes (e.g., biological and chemical degradation) or dilution through transport processes. In some cases, depending on the contaminant and/or the release mechanisms involved, steady-state assumptions could potentially underestimate risk (e.g., breakdown products that are more toxic than the parent compound or a continuous source contributing to contamination in another medium).

2.5.6.2 Uncertainty in Exposure Assessment

The risk assessment estimates are conditional on actual and potential exposure pathways identified at the site. If exposure does not occur, no risks are present. Furthermore, the risk assessment process does not factor in the probability of exposure occurring.

Current land uses and characterization of the site's current physical setting provided the basis for predicting future land use at and in the vicinity of the site. The assumption of steady-state conditions was also used in predicting future contaminant concentrations. As discussed in Section 2.5.5.1, this assumption would tend to overestimate potential future exposure levels because concentrations of chemicals may decline with time.

There is also some concern as to how well an exposure scenario approximates the actual conditions that a receptor may be exposed to at a given site. Potential human exposures could deviate from those used in the risk assessment through differences in exposure frequency, contact rates, exposure durations, body weight, and life span. Each of these factors has a degree of uncertainty associated with it that could over- or underestimate risk.

Evaluation of risk for the UU/UE receptor includes calculation of the risk to children. Other sensitive subpopulations such as elderly people, pregnant or nursing women, and people with chronic illnesses were not specifically evaluated in this risk assessment. These subpopulations may be more sensitive to certain chemical exposures. However, USEPA generally considers sensitive subpopulations when developing toxicity factors. Whenever possible, exposure assumptions were made to protect sensitive subpopulations (e.g., the mutagenic mode of action evaluation). Additionally, there are no day care or school facilities, healthcare facilities, nursing homes, retirement communities, or residential areas with children onsite currently.

This HHRA did not quantify exposure associated with vapor intrusion of volatile chemicals in soil into indoor air. However, it did quantify exposure to volatile chemicals in outdoor air. Should volatile contamination be present beneath existing or future buildings, the exposure assessment can underestimate exposure to contaminants in indoor air, and thus underestimate risk. The amount of this underestimate cannot be calculated.

2.5.6.3 Uncertainty in Toxicity Assessment

Some uncertainty is also inherent in the toxicity values used in the risk assessment. Carcinogenic SFs and route-specific values were derived only for compounds that have been shown to cause an increased incidence of tumors in either human or animal studies. This dose-response curve is then assumed to be linear at low doses (e.g., those found in situations of environmental contamination) and is used to predict tumor incidence at low exposure levels. When an animal study is used, the final SF is adjusted to account for extrapolation of animal data to humans. If the studies used to derive the SF were conducted for less than the life span of the test organism, the final SF had also been adjusted to reflect risk associated with lifetime exposure.

The SF is generally an upper 95th percentile confidence limit of the probability of a response based on experimental animal data in the multistage model. This means that the site-specific chemical risk is not likely to exceed the risk estimate derived through the model and is likely to be less than the predicted risk.

The chronic RfD for a compound is based on studies where either human or animal populations were exposed to a given compound by a given route of exposure for a major portion of the life span (as a USEPA guideline, seven years to a lifetime; USEPA, 1989). RfDs are derived by determining dose-specific effect levels from available quantitative studies and applying uncertainty factors to the most appropriate effect level to determine an RfD for humans. Uncertainty factors are generally applied as multiples of 10 to represent specific areas of uncertainty in the data. Typically, an uncertainty factor of 100 to 1,000 is used in the professional judgment of uncertainties. General uncertainties in the derivation of RfDs may be associated with factors such as (1) variations in the general population (to protect sensitive receptors), (2) extrapolation of animal data to humans, (3) use of a subchronic study versus a chronic study to determine the no-observed-adverse-effect level (NOAEL), or (4) use of a lowest-observed-adverse-effect level (LOAEL) versus a NOAEL. Both the uncertainty and modifying factors are conservative in nature and tend to overestimate risk.

Although the most current toxicity values assigned by USEPA are used in the risk assessment, these values may not be available for all compounds. The toxicity classification of a chemical may be under review or not available. If data are lacking, the chemical may not be accounted for in the estimates of potential risk. The use of a surrogate may either over or underestimate the risk associated with exposure to this chemical, as the toxicity between the compound and its surrogate may vary.

2.5.6.4 Uncertainty in Estimating Chemical Risk

The expression of the potential risk associated with contaminants detected at the site is a result of the combined steps of data evaluation, exposure assessment, and toxicity assessment. This combination can magnify the uncertainties present in these steps of the risk assessment process.

In assessing the risk for which a mutagenic MOA has been identified by USEPA, default ADAFs were applied for those chemicals lacking chemical-specific data on susceptibility from early life exposures. The *Supplemental Guidance for Assessing Cancer Susceptibility from Early Life Exposure to Carcinogens* (USEPA, 2005a) recommends the following default ADAFs:

- 10-fold adjustment for exposures during the first two years of life
- 3-fold adjustment for exposures from ages 2 to <16 years of age
- No adjustment for exposures after turning 16 years of age

These ADAFs are used to prorate the toxicity factors for the respective age ranges, to account for more or less sensitivity during that life stage. For example, there is assumed by default to be 10-fold greater sensitivity over the first two years of life than for an equivalent level of exposure after turning 16 years of age.

Other COPCs could theoretically function under a mutagenic MOA, and not be identified as such by USEPA. In these situations, the risk associated with early life exposures may be underestimated.

Additional uncertainties are incorporated into the risk assessment when exposures to several substances are summed. Exposure to multiple chemicals may result in interactions between the chemicals in ways that may not be predictable. The assumption is that exposure to multiple chemicals is additive, that is, the carcinogenic risk or hazard quotient for each chemical is simply added together to estimate the cumulative risk or hazard. However, in reality some constituents may produce a synergistic effect, where the risk associated with exposure to these chemicals is actually greater than the sum of the carcinogenic risk or HQs. In such a case, the risk assessment will underestimate the risk. In other cases, some chemicals may interact antagonistically, such that the risk associated with exposure to these chemicals is

less than the sum of the carcinogenic risk or HQs. In these cases, the risk assessment will overestimate the risk associated with exposure to these chemicals.

2.6 Conclusions

This HHRA was conducted to evaluate the potential for human health impacts as a result of potential exposures to chemicals in soil at Parcel 83 at the former Fort Monmouth.

The cumulative carcinogenic risks and noncarcinogenic hazards estimated for the potential receptors at the site are as follows (**Table G.2.85**):

- UU/UE receptors exposed to surface soil, combined surface and subsurface soil and outdoor air: The cumulative carcinogenic risks in surface soil and combined surface and subsurface soil are less than or equal to 1×10^{-4} , the upper end of the USEPA's acceptable incremental cancer risk range in every Exposure Area except surface soil in Exposure Area 2 where the cumulative risk of 2×10^{-4} is greater than 1×10^{-4} , the upper end of the USEPA's acceptable incremental cancer risk range. This risk is wholly attributable to exposure to carcinogenic PAHs in soil as represented by the BaP-equivalent concentration in surface soil.

The HI for surface soil and combined surface and subsurface soil are less than or equal to 1 for all Exposure Areas, for the UU/UE adult receptor. The HI for the UU/UE child receptor in Exposure Area 1 is 3 in surface soil and 3 in combined surface and subsurface soil, in Exposure Area 2 is 3 in surface soil and 2 in combined surface and subsurface soil, and in Exposure Area 3 is 2 in surface soil and 2 in combined surface and subsurface soil which are all greater than 1. The individual HQs are all less than 1. Since the total HI was greater than 1, the hazards were separated by target organ. The segregated HIs were less than or equal to 1 for the target organs.

The highest modeled PbB levels in children for each Exposure Area were all less than both the USEPA level of concern for blood-lead levels of 10 µg/dL and the current CDC reference value for blood-lead levels of 5 µg/dL. The estimated potential PbB concentrations modeled using the IEUBK model are protective of the other receptors on-site including adult UU/UE receptors

- Utility workers exposed to surface soil and combined surface and subsurface soil: The cumulative carcinogenic risk for utility worker exposure to surface soil (3×10^{-7}) and combined surface and subsurface soil (3×10^{-7}) are less than 1×10^{-4} , the upper end of the USEPA's acceptable incremental cancer risk range. The HI for utility workers is less than 1 for exposure to surface soil (HI=0.1) and combined surface and subsurface soil (HI=0.1).
- Outdoor workers exposed to surface soil: The cumulative carcinogenic risk for outdoor worker exposure to surface soil (2×10^{-5}) is less than 1×10^{-4} , the upper end of the USEPA's acceptable incremental cancer risk range. The HI for outdoor workers is less than 1 for exposure to surface soil (HI=0.5).
- Recreational users exposed to surface soil: The cumulative carcinogenic risk for recreational users exposure to surface soil (6×10^{-6}) is less than 1×10^{-4} , the upper end of the USEPA's acceptable incremental cancer risk range. The recreational user HI_{adult} for exposure to surface soil is 0.1 and the HI_{adult} is 0.04, which are less than 1.

SECTION 3

REFERENCES

- ATSDR, 2019. Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels (MRL) July. Available at: <http://www.atsdr.cdc.gov/mrls/mrllist.asp>
- Cowherd, C., Muleski, G., Englehart, P., and D. Gillette. 1985. Rapid Assessment of Exposure to Particulate Emissions from Surface Soil. EPA/600/8-85/002. U.S. Environmental Protection Agency. Office of Health and Environmental Assessment, Washington, DC. (http://www.epa.gov/superfund/health/conmedia/soil/pdfs/ssg_main.pdf).
- EDAW, Inc., 2008. *Fort Monmouth Reuse and Redevelopment Plan, Final Plan*. Prepared for Fort Monmouth Economic Revitalization Planning Authority. August 22.
- Fort Monmouth Economic Revitalization Authority (FMERA), 2019. E-mail from David Nuse to William Colvin; re: Parcel 83 - Future Land Use. May 9.
- Office of Environmental Health Hazard Assessment (OEHHA). 2019. Toxicity Criteria Database. Available at: <http://oehha.ca.gov/tcdb/index.asp>.
- Parsons, 2015 Final Human Health Risk Assessment Work Plan for RI/FS at Fort Monmouth Army Installation, Non-Landfill Sites (Parsons, 2015).
- USEPA. 1989. *Risk Assessment Guidance for Superfund (RAGS). Volume 1, Human Health Evaluation Manual. Part A, Interim Final*. EPA/540/1-89/002. Office of Emergency and Remedial Response. December.
- USEPA. 1992. Guidance on Risk Characterization for Risk Managers and Risk Assessors. Memorandum. February 26.
- USEPA, 1993a. Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure. Draft. Available at: http://www.lm.doe.gov/cercla/documents/fernald_docs/cat/112317.pdf.
- USEPA, 1993b. Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons. Office of Research and Development, U.S. Environmental Protection Agency, EPA/600/R-92/089. July.
- USEPA, 1994. Memorandum: OSWER Directive, Revised Interim Soil Lead Guidance of CERCLA Sites and RCRA Corrective Action Facilities. OSWER Directive 9355.4-12. August. (<http://www.epa.gov/superfund/lead/products/oswerdir.pdf>).
- USEPA. 1996. *Soil Screening Guidance: Users Guide*. EPA540/R-96/018. Office of Emergency and Remedial Response. Washington, D.C. PB96-963505. July.
- USEPA. 1997. Health Effects Assessment Tables (HEAST). Available at: <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=2877>.
- USEPA, 1998. Memorandum: OSWER Directive: Clarification to the 1994 Revised Interim Soil lead (Pb) Guidance for CERCLA Sites and RCRA Corrective Action Facilities. OSWER Directive: 9200.4-27P. (<http://www.epa.gov/superfund/lead/products/oswer98.pdf>).
- USEPA, 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. December 2002.

- USEPA, 2003. Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil, EPA-540-R-03-001, OSWER Dir #9285.7-5. December 1996/updated January 2003. (<http://www.epa.gov/superfund/health/contaminants/lead/products/adultpb.pdf>)
- USEPA. 2004a. *Risk Assessment Guidance for Superfund. Volume I, Human Health Evaluation Manual. Part E, Supplemental Guidance for Dermal Risk Assessment.* Final. OSWER 9285.7-02EP.
- USEPA, 2004b. User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings. Office of Emergency and Remedial Response. February, 2004. http://www.epa.gov/sites/production/files/2015-09/documents/2004_0222_3phase_users_guide.pdf
- USEPA, 2005a. *Supplemental Guidance for Assessing Cancer Susceptibility from Early Life Exposure to Carcinogens.* EPA/630/R-03/003F. March. http://www.epa.gov/ttnatw01/childrens_supplement_final.pdf
- USEPA, 2005b. *Guidelines for Carcinogen Risk Assessment.* EPA/630/P-03/001F. March. http://www.epa.gov/sites/production/files/2013-09/documents/cancer_guidelines_final_3-25-05.pdf
- USEPA, 2007a. User's Guide for the Integrated Exposure Uptake Biokinetic Model for lead in Children (IEUBK), Window. Office of Superfund Remediation, 9285.7-42. May. (<https://semspub.epa.gov/work/HQ/176289.pdf>)
- USEPA, 2007b. Framework for Determining a Mutagenic Mode of Action for Carcinogenicity: Using EPA's 2005 *Cancer Guidelines and Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens.* EPA 120/\$-07/002-A. External Peer Review Draft. September 2007. <http://archive.epa.gov/osa/mmoaframework/web/pdf/mmoa-erd-final-83007.pdf>
- USEPA, 2009a. *Risk Assessment Guidance for Superfund: Volume I Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment).* Final. January.
- USEPA, 2009b. Update of the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters. OSWER 9200.2-82. June. (<http://www.epa.gov/superfund/health/contaminants/lead/products/almupdate.pdf>).
- USEPA, 2010. Integrated Exposure Update Biokinetic Model for Lead in Children, Windows ® version (IEUBKwin v1.1 build 11). February 2010. (<http://www.epa.gov/superfund/lead/products.htm#ieubk>).
- USEPA, 2011. Exposure Factors Handbook, 2011 Edition. Office of Research and Development, National Center for Environmental Assessment. EPA/600/R-09/052F. September.
- USEPA, 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. February 6, 2014. Available at: <http://semspub.epa.gov/work/03/2218732.pdf>.
- USEPA, 2019a. USEPA Residential Regional Screening Levels, Risk-Based Screening Tables, TR=1E-06, THQ=0.1. <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables>
- USEPA, 2019b. Vapor Intrusion Screening Levels Calculator, Version 3.5, May 2019. Available at: <https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-levels-visls>

- USEPA, 2019c. Regional Screening Table User's Guide, May, 2019. <https://www.epa.gov/risk/regional-screening-levels-rsls-users-guide>
- USEPA, 2019d. USEPA Chemical Specific Supporting Tables, Regional Screening Levels. <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables>
- USEPA, 2019e. *Integrated Risk Information System (IRIS)* Available at: <http://www.epa.gov/iris/>.
- USEPA, 2019f. Provisional Peer Reviewed Toxicity Values (PPRTVs). Available at: <http://hhpprtv.ornl.gov/>.

This Page Intentionally Left Blank

TABLES

Table G.2.1
SUMMARY OF RECEPTORS AND EXPOSURE SCENARIOS
Parcel 83
Fort Monmouth, New Jersey

Media	Unrestricted Use/ Unrestricted Exposure	Outdoor Worker (Current/Future)	Utility Worker (Current/Future)	Recreational Adolescent (Current/Future)	Recreational Adult (Current/Future)
Surface Soil	Quantified	Quantified	Quantified	Quantified	Quantified
Frequency of Exposure	Full time	Full time	One month project	Visit once a week	Visit once a week
Duration of Exposure	Long-Term	Long-Term	One project	Years from ages 6-<16	Adult Exposure
Subsurface Soil	Quantified	No Exposure	Quantified	No Exposure	No Exposure
Frequency of Exposure	Full time	Full time	One month project	Visit once a week	Visit once a week
Duration of Exposure	Long-Term	Long-Term	One project	Years from ages 6-<16	Adult Exposure
Outdoor Air	Quantified	Quantified	Quantified	Quantified	Quantified
Frequency of Exposure	Full time	Full time	One month project	Visit once a week	Visit once a week
Duration of Exposure	Long-Term	Long-Term	One project	Years from ages 6-<16	Adult Exposure
Indoor Air	No exposure	No Exposure	No Exposure	No Exposure	No Exposure
Frequency of Exposure	Full time	Full time	One month project	Visit once a week	Visit once a week
Duration of Exposure	Long-Term	Long-Term	One project	Years from ages 6-<16	Adult Exposure

Table G.2.2 Soil Exposure Parameters

Abbreviation	Parameter	Units	UU/UE Receptor	Sources	Rationale	Outdoor Worker	Sources	Rationale	Utility Worker	Sources	Rationale	Recreational User	Sources	Rationale
THQ	Target Hazard Quotient	unitless	1	USEPA, 2017c	USEPA RSL Users Guide, Table 1	1	USEPA, 2017c	USEPA RSL Users Guide, Table 1	1	USEPA, 2017c	USEPA RSL Users Guide, Table 1	1	USEPA, 2017c	USEPA RSL Users Guide, Table 1
AT _{nc}	Averaging Time – noncarcinogens	days	7,300 (adult) 2,190 (child)	USEPA, 1989	Exhibit 6-9; Period over which exposure is averaged; ED expressed in days (20 years adult x 365 days or 6 years child x 365 days)	9,125	USEPA, 1989	Exhibit 6-9; Period over which exposure is averaged; ED expressed in days (25 years x 365 days)	365	USEPA, 2014	Source references USEPA, 1989, page 6-23; ED expressed in days (1 year x 365 days)	5,110 (adult) 3,650 (adl)	USEPA, 1989	Exhibit 6-9; Period over which exposure is averaged; ED expressed in days (14 years adult x 365 days or 10 years adl x 365 days)
AT _c	Averaging Time – carcinogens	days	25,550	USEPA, 2014 as “lifetime”	70-year lifetime expressed in days (70 years x 365 days)	25,550	USEPA, 2014 as “lifetime”	70-year lifetime expressed in days (70 years x 365 days)	25,550	USEPA, 2014 as “lifetime”	70-year lifetime expressed in days (70 years x 365 days)	25,550	USEPA, 2014 as “lifetime”	70-year lifetime expressed in days (70 years x 365 days)
ED	Exposure Duration	years	20 (adult) 6 (child)	USEPA, 2014	Adult: ED _r (26 years) – ED _{child} (6 years) where ED _r is derived from USEPA, 2011 Table 16-108; 90th percentile for current residence time. Child: Source references USEPA, 1991a, Pages 6 and 15	25	USEPA, 2014	Source references USEPA, 1991a, Page 15; RME scenario for industrial worker	1	USEPA, 2002	Exhibit 5-1; USEPA, default value for construction workers	14 (adult) 10 (adl)	Professional judgment	Adult: Represents the number of years returning to the same location as an adult, assumes 16 to <30 years of age Adl: Represents the number of years returning to the same location as an adolescent; assumes 6 to <16 years of age

Table G.2.2 (Continued) Soil Exposure Parameters														
Abbreviation	Parameter	Units	UU/UE Receptor	Sources	Rationale	Outdoor Worker	Sources	Rationale	Utility Worker	Sources	Rationale	Recreational User	Sources	Rationale
BW	Body Weight	kg	80 (adult) 15 (child)	USEPA, 2014	Adult: Source references USEPA, 2011, Table 8-3; weighted mean values for adults 21 to 78 Child: Source references USEPA, 2011, Table 8-1; weighted average of mean body weights (birth to <6 years	80	USEPA, 2014	Source references USEPA, 2011, Table 8-3; weighted mean values for adults 21 – 78	80	USEPA, 2014	Source references USEPA, 2011, Table 8-3; weighted mean values for adults 21 – 78	80 (adult) 44 (adl)	Adult: USEPA, 2014 Adl: USEPA, 2011	Adult: Source references USEPA, 2011, Table 8-3; weighted mean values for adults 21 to 78 years of age Adl: Table 8-3, mean of body weights for 6 to <11 and 11 to <16 years
EF	Exposure Frequency	days/year	350	USEPA, 2014	Source references USEPA, 1991 (pg. 15); Resident RME scenario	225	USEPA, 2014	Source references USEPA, 1991, page 15, outdoor worker RME scenario	30	Professional judgment	Assumes project of one month duration	50	Professional judgment	Assumes recreational user on site once per week every week of the year, except for 2 weeks vacation
IRS	Soil Ingestion Rate	mg/day	100 (adult) 200 (child)	USEPA, 2014	Adult: Source references USEPA, 1991a (pp. 6 and 15); for resident Child: Source references U.S. EPA 2011 (Table 5-1 "upper-bound values" accounting for both soil and dust ingestion	100	USEPA, 2014	Source references USEPA, 1991, page 15, same as adult resident	330	USEPA, 2017c	Source references USEPA, 2002, Exhibit 5-1, USEPA recommended value for construction worker	50 (adult) 100 (adl)	USEPA, 2011	Adult: Table 5-1, General Population Central Tendency, Adult soil and dust ingestion Adl: Table 5-1, General Population Central Tendency, soil and dust ingestion for 6 to <21 years of age
EV	Event Frequency	events/day	1	USEPA, 2004a	Exhibit 3-5, residential RME scenario	1	USEPA, 2004a	Exhibit 3-5, industrial RME scenario	1	USEPA, 2004a	Exhibit 3-5, industrial RME scenario	1	Professional judgment	Recreational users are expected to be onsite one event per day

Table G.2.2 (Continued) Soil Exposure Parameters														
Abbreviation	Parameter	Units	UU/UE Receptor	Sources	Rationale	Outdoor Worker	Sources	Rationale	Utility Worker	Sources	Rationale	Recreational User	Sources	Rationale
FI	Fraction Ingested	unitless	1	USEPA, 1989, page 6-39	Assumes that all of contaminated soil contacted is from the site	1	USEPA, 1989, page 6-39	Assumes that all of contaminated soil contacted is from the site	1	USEPA, 1989, page 6-39	Assumes that all of contaminated soil contacted is from the site	1	USEPA, 1989, page 6-39	Assumes that all of contaminated soil contacted is from the site
CF _s	Conversion Factor-soil	kg/mg	1E-06	USEPA, 1989	Exhibit 6-14	1E-06	USEPA, 1989	Exhibit 6-14	1E-06	USEPA, 1989	Exhibit 6-14	1E-06	USEPA, 1989	Exhibit 6-14
GIABS	Gastrointestinal Absorption Factor (also, OAF = Oral Absorption Factor)	unitless	Chemical-specific	USEPA, 2017g	Fraction of contaminant absorbed in gastrointestinal tract	Chemical-specific	USEPA, 2017g	Fraction of contaminant absorbed in gastrointestinal tract	Chemical-specific	USEPA, 2017g	Fraction of contaminant absorbed in gastrointestinal tract	Chemical-specific	USEPA, 2017g	Fraction of contaminant absorbed in gastrointestinal tract
SA	Exposed Skin Surface Area	cm ²	6,032 (adult) 2,690 (child)	USEPA, 2014	Adult: Source references USEPA, 2011, Tables 7-2 and 7-12; weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, 21+ years. Child: Source references Tables 7-2 and 7-8; weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, birth to < 6 years)	3,470	USEPA, 2014	Source references USEPA, 2011, Table 7-2; weighted average of mean values for head, hands, and forearms (male and female adults); assumes wearing shoes and long pants	3,470	USEPA, 2014	Source references USEPA, 2011, Table 7-2; weighted average of mean values for head, hands, and forearms (male and female adults); assumes wearing shoes and long pants	3,470 (adult) 2,160 (adl)	USEPA, 2014; USEPA, 2011	Adult: Source references USEPA, 2011, Table 7-2; weighted average of mean values for head, hands, and forearms (male and female adults); assume wearing shoes and long pants Adl: Table 7-2, weighted average of mean values for head, hands, and arms (mean value for arm times 45% to account for forearm) (Age 6 to <16 years of age); assume wearing shoes and long pants

Table G.2.2 (Continued) Soil Exposure Parameters														
Abbreviation	Parameter	Units	UU/UE Receptor	Sources	Rationale	Outdoor Worker	Sources	Rationale	Utility Worker	Sources	Rationale	Recreational User	Sources	Rationale
AF	Adherence Factor	mg/cm ²	0.07 (adult) 0.2 (child)	USEPA, 2014	Adult and child: Source references USEPA, 2004 (Exhibit 3-5)	0.12 ⁽¹⁾	USEPA, 2014	Source references USEPA, 2011, Table 7-2, Table 7-20 and Section 7.2.2; arithmetic mean of weighted average of body part-specific (hands, forearms, and face) mean adherence factors for adult commercial/ industrial activities	0.20	USEPA, 2011	Table 7-2, Table 7-20 and Section 7.2.2; arithmetic mean of weighted average of body part-specific (hands, forearms, and face) mean adherence factors for adult utility worker number 1	0.09 (adult) 0.04 (adl) ⁽¹⁾	USEPA, 2011	Adult: Table 7-2, Table 7-20 and Section 7.2.2; arithmetic mean of weighted average of body part-specific (hands, forearms, and face) mean adherence factors for adult Gardener number 1 Adl: Table 7-2, Table 7-4, and Section 7.2.2; arithmetic mean of weighted average of body part-specific (hands, forearms, face, mean adherence factors for child playing outdoor sports
ABS _d	Dermal Absorption Factor	unitless	Chemical-specific	USEPA, 2017g	Fraction of contaminant absorbed dermally; USPEA RSL Summary Table -	Chemical-specific	USEPA, 2017g	Fraction of contaminant absorbed dermally; USPEA RSL Summary Table-	Chemical-specific	USEPA, 2017g	Fraction of contaminant absorbed dermally; USPEA RSL Summary Table -	Chemical-specific	USEPA, 2017g	Fraction of contaminant absorbed dermally; USPEA RSL Summary Table -
ET	Exposure Time	hour/day	24	USEPA, 2014	The whole day	8	USEPA, 2014	The work day	8	USEPA, 2014	The work day	2	Professional judgment	Assumes recreational users on site for two hours each event
VF	Volatilization Factor-soil	m ³ /kg	Chemical Specific	USEPA, 2002, 2017c	Calculated using inputs in Table 4 of this document	Chemical Specific	USEPA, 2002, 2017c	Calculated using inputs in Table 4 of this document	Chemical Specific	USEPA, 2002, 2017c	Calculated using inputs in Table 4 of this document	Chemical specific	USEPA, 2002, 2017c	Calculated using inputs in Table 4 of this document

Table G.2.2 (Continued) Soil Exposure Parameters														
Abbreviation	Parameter	Units	UU/UE Receptor	Sources	Rationale	Outdoor Worker	Sources	Rationale	Utility Worker	Sources	Rationale	Recreational User	Sources	Rationale
PEF	Particulate Emission Factor	m³/kg	3.23E-09	USEPA, 2002, 2017c	Calculated using inputs in Table 4 of this document	3.23E-09	USEPA, 2002, 2017c	Calculated using inputs in Table 4 of this document	3.23E-09	USEPA, 2002, 2017c	Calculated using inputs in Table 4 of this document	3.23E-09	USEPA, 2002, 2017c	Calculated using inputs in Table 4 of this document
⁽¹⁾ Adherence factor (AF) users calculated as USEPA, 2011, Section 7.2.2. The AF values for adults are from USEPA Table 7-20 and the Surface Areas (SA) are from USEPA Table 7-2. The AF values for adolescents are from USEPA Table 7-4, outdoor sports for children, and the Surface Areas (SA) are from USEPA Table 7-2. The weighted AF for each receptor is calculated as $[AF_{\text{weighted}} = (AF_{\text{hands}})(SA_{\text{hands}}) + (AF_{\text{face}})(SA_{\text{head}}) + (AF_{\text{arms}})(SA_{\text{arms}}) / (SA_{\text{hands}} + SA_{\text{head}} + SA_{\text{arms}})]$. Note that the SA_{arms} is multiplied by 45% to account for only the forearms.														

Table G.2.3
BENZO(A)PYRENE-EQUIVALENT SURFACE SOIL (0-2 FT)
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	PAR-83-SB-01-0.5-1		PAR-83-SB-101-0.5-1		PAR-83-SB-02-1-1.5		PAR-83-SB-02-1.5-2	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.051	0.0051	0.068	0.0068	0.015	0.0015	0.22	0.022
Benzo(a)pyrene	1	0.055	0.055	0.077	0.077	0.018	0.018	0.23	0.23
Benzo(b)fluoranthene	0.1	0.069	0.0069	0.11	0.011	0.022	0.0022	0.3	0.03
Benzo(k)fluoranthene	0.01	0.025	0.00025	0.033	0.00033	0.0082	0.000082	0.1	0.001
Chrysene	0.001	0.059	0.000059	0.08	0.00008	0.016	0.000016	0.24	0.00024
Dibenz(a,h)anthracene	1	0.011	0.011	0.015	0.015	0.004 J	0.004	0.04	0.04
Indeno(1,2,3-cd)pyrene	0.1	0.045	0.0045	0.066	0.0066	0.014	0.0014	0.21	0.021
BaP Equivalent			0.083		0.12		0.027		0.34

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.3
BENZO(A)PYRENE-EQUIVALENT SURFACE CONCENTRATIONS
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	PAR-83-SB-102-1.5-2		PAR-83-SB-03-1-1.5		PAR-83-SB-03-1.5-2		PAR-83-SB-04-0.5-1	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	1.4	0.14	3.4 J	0.34	0.22	0.022	1.2	0.12
Benzo(a)pyrene	1	1.4	1.4	4 J	4	0.26	0.26	1.3	1.3
Benzo(b)fluoranthene	0.1	1.9	0.19	4.6 J	0.46	0.31	0.031	1.7	0.17
Benzo(k)fluoranthene	0.01	0.66	0.0066	1.5 J	0.015	0.11	0.0011	0.57	0.0057
Chrysene	0.001	1.4	0.0014	3.7 J	0.0037	0.25	0.00025	1.2	0.0012
Dibenz(a,h)anthracene	1	0.23	0.23	0.63 J	0.63	0.043	0.043	0.25	0.25
Indeno(1,2,3-cd)pyrene	0.1	1.1	0.11	2.7 J	0.27	0.2	0.02	1.1	0.11
BaP Equivalent			2.1		5.7		0.38		2.0

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.3
BENZO(A)PYRENE-EQUIVALENT SURFACE CONCENTRATIONS
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	PAR-83-SB-04-1.25-1.75		PAR-83-SB-05-0.75-1.25		PAR-83-SB-05-1.75-2.25		PAR-83-SB-06-0.3-0.8	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.0077 J	0.00077	1.1	0.11	0.013	0.0013	0.15	0.015
Benzo(a)pyrene	1	0.0064 J	0.0064	1.2	1.2	0.012	0.012	0.16	0.16
Benzo(b)fluoranthene	0.1	0.0077 J	0.00077	1.4	0.14	0.016	0.0016	0.22	0.022
Benzo(k)fluoranthene	0.01	0.0034 J	0.000034	0.55	0.0055	0.006 J	0.00006	0.076	0.00076
Chrysene	0.001	0.006 J	0.000006	1.2	0.0012	0.012	0.000012	0.2	0.0002
Dibenz(a,h)anthracene	1	0.0078	0.0078	0.2	0.2	0.0037 J	0.0037	0.033	0.033
Indeno(1,2,3-cd)pyrene	0.1	0.0057 J	0.00057	0.93	0.093	0.01	0.001	0.15	0.015
BaP Equivalent			0.016		1.7		0.020		0.25

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.3
BENZO(A)PYRENE-EQUIVALENT SURFAC
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	PAR-83-SB-06-1.5-2		PAR-83-SB-07-0-0.5		PAR-83-SB-07-1.25-1.75		PAR-83-SB-08-0.5-1	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.0081	0.00081	12	1.2	0.013	0.0013	1.8	0.18
Benzo(a)pyrene	1	0.0086	0.0086	12	12	0.012	0.012	1.6	1.6
Benzo(b)fluoranthene	0.1	0.011	0.0011	15	1.5	0.016	0.0016	2.2	0.22
Benzo(k)fluoranthene	0.01	0.0042 J	0.000042	5.6	0.056	0.0062 J	0.000062	0.72	0.0072
Chrysene	0.001	0.0079	0.0000079	12	0.012	0.013	0.000013	1.7	0.0017
Dibenz(a,h)anthracene	1	0.0027 J	0.0027	2	2	0.003 J	0.003	0.3	0.3
Indeno(1,2,3-cd)pyrene	0.1	0.0068 J	0.00068	9.4	0.94	0.012	0.0012	1.4	0.14
BaP Equivalent			0.014		18		0.019		2.4

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.3
BENZO(A)PYRENE-EQUIVALENT SURFAC
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	PAR-83-SB-08-1.25-1.75		PAR-83-SB-09-1-1.5		PAR-83-SB-12-1-1.5		PAR-83-SB-13-0.5-1	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.13	0.013	0.7	0.07	0.0061 J	0.00061	0.17	0.017
Benzo(a)pyrene	1	0.13	0.13	0.79	0.79	0.0079 U	0.0079	0.2	0.2
Benzo(b)fluoranthene	0.1	0.17	0.017	1.4	0.14	0.0097	0.00097	0.32	0.032
Benzo(k)fluoranthene	0.01	0.055	0.00055	0.41	0.0041	0.0043 J	0.000043	0.085	0.00085
Chrysene	0.001	0.17	0.00017	1	0.001	0.0069 J	0.0000069	0.28	0.00028
Dibenz(a,h)anthracene	1	0.023	0.023	0.14	0.14	0.0071 U	0.0071	0.034	0.034
Indeno(1,2,3-cd)pyrene	0.1	0.1	0.01	0.49	0.049	0.0063 J	0.00063	0.12	0.012
BaP Equivalent			0.19		1.2		0.017		0.30

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.3
BENZO(A)PYRENE-EQUIVALENT SURFAC
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	PAR-83-SB-14-0.5-1		PAR-83-SB-18-0-0.5		PAR-83-SB-19-0-0.5		PAR-83-SB-20-0-0.5	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.62	0.062	0.02 J	0.002	0.013 J	0.0013	0.036 J	0.0036
Benzo(a)pyrene	1	0.73	0.73	0.023 J	0.023	0.017 J	0.017	0.032 J	0.032
Benzo(b)fluoranthene	0.1	0.92	0.092	0.035 J	0.0035	0.015 J	0.0015	0.041 J	0.0041
Benzo(k)fluoranthene	0.01	0.33	0.0033	0.07 U	0.0007	0.068 U	0.00068	0.018 J	0.00018
Chrysene	0.001	0.63	0.00063	0.07 U	0.00007	0.068 U	0.000068	0.04 J	0.00004
Dibenz(a,h)anthracene	1	0.086	0.086	0.07 U	0.07	0.068 U	0.068	0.071 U	0.071
Indeno(1,2,3-cd)pyrene	0.1	0.4	0.04	0.02 J	0.002	0.068 U	0.0068	0.018 J	0.0018
BaP Equivalent			1.0		0.10		0.095		0.11

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.3
BENZO(A)PYRENE-EQUIVALENT SURFAC
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	PAR-83-SB-120-0-0.5		PAR-83-SB-21-0-0.5		PAR-83-SB-22-0-0.5		PAR-83-SB-23-0-0.5	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.097 U	0.0097	0.079 J	0.0079	0.074 U	0.0074	0.22 J	0.022
Benzo(a)pyrene	1	0.097 U	0.097	0.084 J	0.084	0.074 U	0.074	0.27 J	0.27
Benzo(b)fluoranthene	0.1	0.013 J	0.0013	0.15	0.015	0.074 U	0.0074	0.37 J	0.037
Benzo(k)fluoranthene	0.01	0.097 U	0.00097	0.041 J	0.00041	0.074 U	0.00074	0.15 J	0.0015
Chrysene	0.001	0.097 U	0.000097	0.11 J	0.00011	0.074 U	0.000074	0.24 J	0.00024
Dibenz(a,h)anthracene	1	0.097 U	0.097	0.018 J	0.018	0.074 U	0.074	0.057 J	0.057
Indeno(1,2,3-cd)pyrene	0.1	0.097 U	0.0097	0.069 J	0.0069	0.074 U	0.0074	0.17 J	0.017
BaP Equivalent			0.22		0.13		0.17		0.40

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.3
BENZO(A)PYRENE-EQUIVALENT SURFAC
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	PAR-83-SB-123-0-0.5		PAR-83-SB-38-0-0.5		PAR-83-SB-138-0-0.5		PAR-83-SB-44-1-1.5	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.52 J	0.052	0.2	0.02	0.35	0.035	0.012 J	0.0012
Benzo(a)pyrene	1	0.62 J	0.62	0.22	0.22	0.35	0.35	0.044 J	0.044
Benzo(b)fluoranthene	0.1	0.81 J	0.081	0.3	0.03	0.49	0.049	0.03 J	0.003
Benzo(k)fluoranthene	0.01	0.29 J	0.0029	0.09 J	0.0009	0.18	0.0018	0.014 J	0.00014
Chrysene	0.001	0.63 J	0.00063	0.21	0.00021	0.36	0.00036	0.017 J	0.000017
Dibenz(a,h)anthracene	1	0.1 J	0.1	0.038 J	0.038	0.064 J	0.064	0.07 U	0.07
Indeno(1,2,3-cd)pyrene	0.1	0.4 J	0.04	0.14	0.014	0.21	0.021	0.038 J	0.0038
BaP Equivalent			0.90		0.32		0.52		0.12

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.3
BENZO(A)PYRENE-EQUIVALENT SURFAC
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	PAR-83-SB-45-1.5-2		PAR-83-SB-46-0-0.5		PAR-83-SB-47-0-0.5		PAR-83-SB-48-0-0.5	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.079 U	0.0079	0.11 J	0.011	0.21	0.021	0.22	0.022
Benzo(a)pyrene	1	0.079 U	0.079	0.13	0.13	0.19	0.19	0.24	0.24
Benzo(b)fluoranthene	0.1	0.079 U	0.0079	0.18	0.018	0.22	0.022	0.32	0.032
Benzo(k)fluoranthene	0.01	0.079 U	0.00079	0.068 J	0.00068	0.076 J	0.00076	0.12 J	0.0012
Chrysene	0.001	0.079 U	0.000079	0.13	0.00013	0.23	0.00023	0.21	0.00021
Dibenz(a,h)anthracene	1	0.079 U	0.079	0.026 J	0.026	0.039 J	0.039	0.048 J	0.048
Indeno(1,2,3-cd)pyrene	0.1	0.079 U	0.0079	0.088 J	0.0088	0.12	0.012	0.15	0.015
BaP Equivalent			0.18		0.19		0.28		0.36

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.3
BENZO(A)PYRENE-EQUIVALENT SURFAC
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	PAR-83-SB-54-1-1.5		PAR-83-SB-55-1-1.5		P83-A1-A (0-0.5)		P83-A2-A (0.5-1)	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.034 J	0.0034	0.021 J	0.0021	7	0.7	5.5	0.55
Benzo(a)pyrene	1	0.041 J	0.041	0.02 J	0.02	7.5	7.5	5	5
Benzo(b)fluoranthene	0.1	0.057 J	0.0057	0.03 J	0.003	9.7	0.97	7.7	0.77
Benzo(k)fluoranthene	0.01	0.016 J	0.00016	0.074 U	0.00074	3.8	0.038	2.4	0.024
Chrysene	0.001	0.03 J	0.00003	0.018 J	0.000018	8.6	0.0086	6.5	0.0065
Dibenz(a,h)anthracene	1	0.076 U	0.076	0.074 U	0.074	1.1 U	1.1	0.68 J	0.68
Indeno(1,2,3-cd)pyrene	0.1	0.037 J	0.0037	0.02 J	0.002	3.1	0.31	1.7	0.17
BaP Equivalent			0.13		0.10		11		7.2

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.3
BENZO(A)PYRENE-EQUIVALENT SURFACE CONCENTRATIONS
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	P83-A3-A (0.5-1)		P83-A4-A (0-0.5)		P83-A5-A (0-0.5)		P83-B1-A (0-0.5)	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	2.22	0.222	4.1	0.41	0.53 J	0.053	1 U	0.1
Benzo(a)pyrene	1	1.9	1.9	3.7	3.7	0.44 J	0.44	1 U	1
Benzo(b)fluoranthene	0.1	2.9	0.29	5	0.5	0.94 J	0.094	1 U	0.1
Benzo(k)fluoranthene	0.01	0.86 J	0.0086	2	0.02	0.23 J	0.0023	1 U	0.01
Chrysene	0.001	2.5	0.0025	5	0.005	0.74 J	0.00074	1 U	0.001
Dibenz(a,h)anthracene	1	1.1 U	1.1	1.2 U	1.2	1.1 U	1.1	1 U	1
Indeno(1,2,3-cd)pyrene	0.1	0.51 J	0.051	1.4	0.14	0.19 J	0.019	1 U	0.1
BaP Equivalent			3.6		6.0		1.7		2.3

Notes:

⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).

⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.

J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)

U = analyte not detected above method detection limit (MDL).

Table G.2.3
BENZO(A)PYRENE-EQUIVALENT SURFACE CONCENTRATIONS
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	P83-B2-A (0-0.5)		P83-B3-A (0-0.5)		P83-B4-A (0-0.5)		P83-B5-A (1-1.5)	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.5 J	0.05	0.77 J	0.077	0.25 J	0.025	0.69 J	0.069
Benzo(a)pyrene	1	1.2 U	1.2	0.73 J	0.73	0.27 J	0.27	0.68 J	0.68
Benzo(b)fluoranthene	0.1	1 J	0.1	1.3	0.13	0.48 J	0.048	1 J	0.1
Benzo(k)fluoranthene	0.01	1.2 U	0.012	0.41 J	0.0041	0.13 J	0.0013	0.71 J	0.0071
Chrysene	0.001	0.85 J	0.00085	0.97 J	0.00097	0.29 J	0.00029	0.97 J	0.00097
Dibenz(a,h)anthracene	1	1.2 U	1.2	1.1 U	1.1	1.2 U	1.2	1 U	1
Indeno(1,2,3-cd)pyrene	0.1	1.2 U	0.12	0.26 J	0.026	1.2 U	0.12	1 U	0.1
BaP Equivalent			2.7		2.1		1.7		2.0

Notes:

⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).

⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.

J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)

U = analyte not detected above method detection limit (MDL).

Table G.2.3
BENZO(A)PYRENE-EQUIVALENT SURFAC
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	P83-P83-SS/SB/GW-10 (0-0.5)		P83-SS/SB-11 (0-0.5)		P83-SS/SB/GW-12 (0-0.5)		P83-SS/SB-13 (0-0.5)	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	1.1 U	0.11	0.095 J	0.0095	2.4	0.24	0.41 J	0.041
Benzo(a)pyrene	1	1.1 U	1.1	1.2 U	1.2	2	2	0.35 J	0.35
Benzo(b)fluoranthene	0.1	1.1 U	0.11	0.13 J	0.013	3	0.3	0.61 J	0.061
Benzo(k)fluoranthene	0.01	1.1 U	0.011	0.054 J	0.00054	1.2	0.012	0.16 J	0.0016
Chrysene	0.001	1.1 U	0.0011	0.12 J	0.00012	2.5	0.0025	1.2 U	0.0012
Dibenz(a,h)anthracene	1	1.1 U	1.1	1.2 U	1.2	1.1 U	1.1	1.2 U	1.2
Indeno(1,2,3-cd)pyrene	0.1	1.1 U	0.11	1.2 U	0.12	1.1 U	0.11	1.2 U	0.12
BaP Equivalent			2.5		2.5		3.8		1.8

Notes:

⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).

⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.

J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)

U = analyte not detected above method detection limit (MDL).

Table G.2.3
BENZO(A)PYRENE-EQUIVALENT SURFAC
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	P83-SS/SB/GW-14 (0-0.5)		P83-SS/SB-15 (0-0.5)		P83-SS/SB-16 (0-0.5)		P83-SS/SB/GW-17 (0-0.5)	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.2 J	0.02	0.29 J	0.029	1.1 U	0.11	1.1 U	0.11
Benzo(a)pyrene	1	0.25 J	0.25	0.31 J	0.31	1.1 U	1.1	1.1 U	1.1
Benzo(b)fluoranthene	0.1	0.41 J	0.041	0.5 J	0.05	1.1 U	0.11	1.1 U	0.11
Benzo(k)fluoranthene	0.01	0.18 J	0.0018	1.1 U	0.011	1.1 U	0.011	1.1 U	0.011
Chrysene	0.001	0.25 J	0.00025	0.37 J	0.00037	0.26 J	0.00026	1.1 U	0.0011
Dibenz(a,h)anthracene	1	1.1 U	1.1	1.1 U	1.1	1.1 U	1.1	1.1 U	1.1
Indeno(1,2,3-cd)pyrene	0.1	1.1 U	0.11	1.1 U	0.11	1.1 U	0.11	1.1 U	0.11
BaP Equivalent			1.5		1.6		2.5		2.5

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.3
BENZO(A)PYRENE-EQUIVALENT SURFAC
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	P83-SS/SB/GW-1 (0-0.5)		P83-SS/SB-2 (0-0.5)		P83-SS/SB/GW-3 (1-1.5)		P83-SS/SB-4 (0-0.5)	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	1.1 U	0.11	1 U	0.1	1.1 U	0.11	1.8	0.18
Benzo(a)pyrene	1	1.1 U	1.1	1 U	1	1.1 U	1.1	1.9	1.9
Benzo(b)fluoranthene	0.1	1.1 U	0.11	1 U	0.1	1.1 U	0.11	3.1	0.31
Benzo(k)fluoranthene	0.01	1.1 U	0.011	1 U	0.01	1.1 U	0.011	1.1 J	0.011
Chrysene	0.001	1.1 U	0.0011	1 U	0.001	1.1 U	0.0011	1.9	0.0019
Dibenz(a,h)anthracene	1	1.1 U	1.1	1 U	1	1.1 U	1.1	1.1 U	1.1
Indeno(1,2,3-cd)pyrene	0.1	1.1 U	0.11	1 U	0.1	1.1 U	0.11	0.69 J	0.069
BaP Equivalent			2.5		2.3		2.5		3.6

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.3
BENZO(A)PYRENE-EQUIVALENT SURFACE CONCENTRATIONS
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	P83-SS/SB/GW-5 (0-0.5)		P83-SS/SB-6 (0-0.5)		P83-SS/SB/GW-7 (0-0.5)		P83-SS/SB/GW-8 (0-0.5)	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.062 J	0.0062	1.1 U	0.11	1.2 U	0.12	1.1 U	0.11
Benzo(a)pyrene	1	1.1 U	1.1	1.1 U	1.1	1.2 U	1.2	1.1 U	1.1
Benzo(b)fluoranthene	0.1	1.1 U	0.11	1.1 U	0.11	1.2 U	0.12	1.1 U	0.11
Benzo(k)fluoranthene	0.01	1.1 U	0.011	1.1 U	0.011	1.2 U	0.012	1.1 U	0.011
Chrysene	0.001	0.089 J	0.000089	1.1 U	0.0011	1.2 U	0.0012	1.1 U	0.0011
Dibenz(a,h)anthracene	1	1.1 U	1.1	1.1 U	1.1	1.2 U	1.2	1.1 U	1.1
Indeno(1,2,3-cd)pyrene	0.1	1.1 U	0.11	1.1 U	0.11	1.2 U	0.12	1.1 U	0.11
BaP Equivalent			2.4		2.5		2.8		2.5

Notes:

⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).

⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.

J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)

U = analyte not detected above method detection limit (MDL).

Table G.2.3
BENZO(A)PYRENE-EQUIVALENT SURFACE CONCENTRATIONS
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	P83-SS/SB-09 (1-1.5)		PAR-83-482-SB-01 (0.5-1)		PAR-83-482-SB-01 (1.5-2)	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.24 J	0.024	0.073 U	0.0073	0.078 U	0.0078
Benzo(a)pyrene	1	1.1 U	1.1	0.073 U	0.073	0.078 U	0.078
Benzo(b)fluoranthene	0.1	1.1 U	0.11	0.0082 J	0.00082	0.078 U	0.0078
Benzo(k)fluoranthene	0.01	1.1 U	0.011	0.073 U	0.00073	0.078 U	0.00078
Chrysene	0.001	0.36 J	0.00036	0.073 U	0.000073	0.078 U	0.000078
Dibenz(a,h)anthracene	1	1.1 U	1.1	0.073 U	0.073	0.078 U	0.078
Indeno(1,2,3-cd)pyrene	0.1	1.1 U	0.11	0.073 U	0.0073	0.078 U	0.0078
BaP Equivalent			2.5		0.16		0.18

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.4
BENZO(A)PYRENE-EQUIVALENT SUBSURFACE SOIL (2-15 FT)
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	PAR-83-SB-01-2-2.5		PAR-83-SB-01-10.25-10.75		PAR-83-SB-02-2-2.5		PAR-83-SB-03-2-2.5	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.012	0.0012	0.048	0.0048	0.52	0.052	0.11	0.011
Benzo(a)pyrene	1	0.012	0.012	0.059	0.059	0.57	0.57	0.12	0.12
Benzo(b)fluoranthene	0.1	0.018	0.0018	0.094	0.0094	0.73	0.073	0.15	0.015
Benzo(k)fluoranthene	0.01	0.0062 J	0.000062	0.029	0.00029	0.24	0.0024	0.048	0.00048
Chrysene	0.001	0.014	0.000014	0.067	0.000067	0.58	0.00058	0.12	0.00012
Dibenz(a,h)anthracene	1	0.0038 J	0.0038	0.015	0.015	0.097	0.097	0.021	0.021
Indeno(1,2,3-cd)pyrene	0.1	0.014	0.0014	0.061	0.0061	0.47	0.047	0.098	0.0098
BaP Equivalent			0.020		0.095		0.84		0.18

Notes:

⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).

⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.

J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)

U = analyte not detected above method detection limit (MDL).

Table G.2.4
BENZO(A)PYRENE-EQUIVALENT SUBSU
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	PAR-83-SB-04-2-2.5		PAR-83-SB-05-1.75-2.25		PAR-83-SB-05-2.5-3		PAR-83-SB-06-2.5-3	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.022	0.0022	0.013	0.0013	0.0026 J	0.00026	0.0041 J	0.00041
Benzo(a)pyrene	1	0.029	0.029	0.012	0.012	0.0027 J	0.0027	0.0045 J	0.0045
Benzo(b)fluoranthene	0.1	0.039	0.0039	0.016	0.0016	0.0077 U	0.00077	0.007 J	0.0007
Benzo(k)fluoranthene	0.01	0.012	0.00012	0.006 J	0.00006	0.0077 U	0.000077	0.0025 J	0.000025
Chrysene	0.001	0.022	0.000022	0.012	0.000012	0.0077 U	0.0000077	0.0033 J	0.0000033
Dibenz(a,h)anthracene	1	0.0064 J	0.0064	0.0037 J	0.0037	0.0077 U	0.0077	0.0081 U	0.0081
Indeno(1,2,3-cd)pyrene	0.1	0.033	0.0033	0.01	0.001	0.0077 U	0.00077	0.0069 J	0.00069
BaP Equivalent			0.045		0.020		0.012		0.014

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.4
BENZO(A)PYRENE-EQUIVALENT SUBSU
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	PAR-83-SB-07-2.25-2.75		PAR-83-SB-08-2.5-3		PAR-83-SB-09-2-2.5		PAR-83-SB-09-2.75-3.25	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.013	0.0013	0.0035 J	0.00035	0.0059 J	0.00059	0.0027 J	0.00027
Benzo(a)pyrene	1	0.013	0.013	0.008 U	0.008	0.0048 J	0.0048	0.0078 U	0.0078
Benzo(b)fluoranthene	0.1	0.018	0.0018	0.008 U	0.0008	0.0085	0.00085	0.0078 U	0.00078
Benzo(k)fluoranthene	0.01	0.0061 J	0.000061	0.008 U	0.00008	0.0027 J	0.000027	0.0078 U	0.000078
Chrysene	0.001	0.014	0.000014	0.008 U	0.000008	0.0067 J	0.0000067	0.0078 U	0.0000078
Dibenz(a,h)anthracene	1	0.0027 J	0.0027	0.008 U	0.008	0.0075 U	0.0075	0.0078 U	0.0078
Indeno(1,2,3-cd)pyrene	0.1	0.012	0.0012	0.008 U	0.0008	0.0054 J	0.00054	0.0078 U	0.00078
BaP Equivalent			0.020		0.018		0.014		0.018

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.4
BENZO(A)PYRENE-EQUIVALENT SUBSU
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	PAR-83-SB-12-2.5-3		PAR-83-SB-13-2.5-3		PAR-83-SB-14-2.5-3		PAR-83-SB-17-6-6.5	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.17 J	0.017	0.048	0.0048	0.017	0.0017	0.15	0.015
Benzo(a)pyrene	1	0.39 U	0.39	0.043	0.043	0.014 U	0.014	0.11 J	0.11
Benzo(b)fluoranthene	0.1	0.39 U	0.039	0.049	0.0049	0.02	0.002	0.14	0.014
Benzo(k)fluoranthene	0.01	0.39 U	0.0039	0.019	0.00019	0.0064 J	0.000064	0.056 J	0.00056
Chrysene	0.001	0.39 U	0.00039	0.046	0.000046	0.012	0.000012	0.15	0.00015
Dibenz(a,h)anthracene	1	0.39 U	0.39	0.0071 J	0.0071	0.0081 U	0.0081	0.024 J	0.024
Indeno(1,2,3-cd)pyrene	0.1	0.39 U	0.039	0.029	0.0029	0.0081 U	0.00081	0.076 J	0.0076
BaP Equivalent			0.88		0.063		0.027		0.17

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.4
BENZO(A)PYRENE-EQUIVALENT SUBSU
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	PAR-83-SB-23-3-3.5		PAR-83-SB-23-6-6.5		PAR-83-SB-33-2-2.5		PAR-83-SB-133-2-2.5	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.078 U	0.0078	0.076 U	0.0076	0.011 J	0.0011	0.075 U	0.0075
Benzo(a)pyrene	1	0.078 U	0.078	0.076 U	0.076	0.076 U	0.076	0.012 J	0.012
Benzo(b)fluoranthene	0.1	0.078 U	0.0078	0.076 U	0.0076	0.015 J	0.0015	0.014 J	0.0014
Benzo(k)fluoranthene	0.01	0.078 U	0.00078	0.076 U	0.00076	0.076 U	0.00076	0.075 U	0.00075
Chrysene	0.001	0.078 U	0.000078	0.076 U	0.000076	0.076 U	0.000076	0.075 U	0.000075
Dibenz(a,h)anthracene	1	0.078 U	0.078	0.076 U	0.076	0.076 U	0.076	0.075 U	0.075
Indeno(1,2,3-cd)pyrene	0.1	0.078 U	0.0078	0.076 U	0.0076	0.076 U	0.0076	0.075 U	0.0075
BaP Equivalent			0.18		0.18		0.16		0.10

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.4
BENZO(A)PYRENE-EQUIVALENT SUBSU
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	PAR-83-SB-34-2-2.5		PAR-83-SB-39-2-2.5		PAR-83-SB-139-2-2.5		PAR-83-SB-54-3-3.5	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.011 J	0.0011	0.013 J	0.0013	0.076 U	0.0076	0.077 U	0.0077
Benzo(a)pyrene	1	0.083 U	0.083	0.013 J	0.013	0.02 J	0.02	0.077 U	0.077
Benzo(b)fluoranthene	0.1	0.014 J	0.0014	0.019 J	0.0019	0.038 J	0.0038	0.077 U	0.0077
Benzo(k)fluoranthene	0.01	0.083 U	0.00083	0.076 U	0.00076	0.014 J	0.00014	0.077 U	0.00077
Chrysene	0.001	0.083 U	0.000083	0.076 U	0.000076	0.076 U	0.000076	0.077 U	0.000077
Dibenz(a,h)anthracene	1	0.083 U	0.083	0.076 U	0.076	0.076 U	0.076	0.077 U	0.077
Indeno(1,2,3-cd)pyrene	0.1	0.083 U	0.0083	0.076 U	0.0076	0.016 J	0.0016	0.077 U	0.0077
BaP Equivalent			0.18		0.10		0.11		0.18

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.4
BENZO(A)PYRENE-EQUIVALENT SUBSU
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	PAR-83-SB-54-6-6.5		PAR-83-SB-55-3-3.5		PAR-83-SB-55-6-6.5		P83-A1-C (2.5-3)	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.069 U	0.0069	0.074 U	0.0074	0.072 U	0.0072	0.11 J	0.011
Benzo(a)pyrene	1	0.069 U	0.069	0.074 U	0.074	0.072 U	0.072	0.12 J	0.12
Benzo(b)fluoranthene	0.1	0.069 U	0.0069	0.074 U	0.0074	0.072 U	0.0072	0.16 J	0.016
Benzo(k)fluoranthene	0.01	0.069 U	0.00069	0.074 U	0.00074	0.072 U	0.00072	0.052 J	0.00052
Chrysene	0.001	0.069 U	0.000069	0.074 U	0.000074	0.072 U	0.000072	0.15 J	0.00015
Dibenz(a,h)anthracene	1	0.069 U	0.069	0.074 U	0.074	0.072 U	0.072	1.1 U	1.1
Indeno(1,2,3-cd)pyrene	0.1	0.069 U	0.0069	0.074 U	0.0074	0.072 U	0.0072	1.1 U	0.11
BaP Equivalent			0.16		0.17		0.17		1.4

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.4
BENZO(A)PYRENE-EQUIVALENT SUBSU
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	P83-A2-C (3.5-4)		P83-A3-C (3-3.5)		P83-A4-C (3-3.5)		P83-A5-C (6-6.5)	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.75 J	0.075	0.11 J	0.011	0.23 J	0.023	1.2 U	0.12
Benzo(a)pyrene	1	1.1 U	1.1	0.1 J	0.1	0.21 J	0.21	1.2 U	1.2
Benzo(b)fluoranthene	0.1	1.1 U	0.11	0.18 J	0.018	0.28 J	0.028	1.2 U	0.12
Benzo(k)fluoranthene	0.01	1.1 U	0.011	1.2 U	0.012	0.092 J	0.00092	1.2 U	0.012
Chrysene	0.001	0.096 J	0.000096	0.15 J	0.00015	0.32 J	0.00032	1.2 U	0.0012
Dibenz(a,h)anthracene	1	1.1 U	1.1	1.2 U	1.2	1.2 U	1.2	1.2 U	1.2
Indeno(1,2,3-cd)pyrene	0.1	1.1 U	0.11	1.2 U	0.12	1.2 U	0.12	1.2 U	0.12
BaP Equivalent			2.5		1.5		1.6		2.8

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.4
BENZO(A)PYRENE-EQUIVALENT SUBSU
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	P83-B1-C (2-2.5)		P83-B1-C DUP (2-2.5)		P83-B2-C (2.5-3)		P83-B3-C (3-3.5)	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	1.2 U	0.12	0.13 J	0.013	1.2 U	0.12	1.2 U	0.12
Benzo(a)pyrene	1	1.2 U	1.2	0.11 J	0.11	1.2 U	1.2	1.2 U	1.2
Benzo(b)fluoranthene	0.1	0.12 J	0.012	0.16 J	0.016	1.2 U	0.12	1.2 U	0.12
Benzo(k)fluoranthene	0.01	1.2 U	0.012	0.072 J	0.00072	1.2 U	0.012	1.2 U	0.012
Chrysene	0.001	0.1 J	0.0001	0.18 J	0.00018	1.2 U	0.0012	1.2 U	0.0012
Dibenz(a,h)anthracene	1	1.2 U	1.2	1.1 U	1.1	1.2 U	1.2	1.2 U	1.2
Indeno(1,2,3-cd)pyrene	0.1	1.2 U	0.12	1.1 U	0.11	1.2 U	0.12	1.2 U	0.12
BaP Equivalent			2.7		1.3		2.8		2.8

Notes:

⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).

⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.

J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)

U = analyte not detected above method detection limit (MDL).

Table G.2.4
BENZO(A)PYRENE-EQUIVALENT SUBSU
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	P83-B4-C (5.5-6)		P83-B5-C (7-7.5)		P83-B5-C DUP (7-7.5)		P83-P83-SS/SB/GW-10 (5-5.5)	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.1 J	0.01	1.2 U	0.12	1.2 U	0.12	1.1 U	0.11
Benzo(a)pyrene	1	1.2 U	1.2	1.2 U	1.2	1.2 U	1.2	1.1 U	1.1
Benzo(b)fluoranthene	0.1	0.14 J	0.014	1.2 U	0.12	1.2 U	0.12	1.1 U	0.11
Benzo(k)fluoranthene	0.01	1.2 U	0.012	1.2 U	0.012	1.2 U	0.012	1.1 U	0.011
Chrysene	0.001	0.1 J	0.0001	1.2 U	0.0012	1.2 U	0.0012	1.1 U	0.0011
Dibenz(a,h)anthracene	1	1.2 U	1.2	1.2 U	1.2	1.2 U	1.2	1.1 U	1.1
Indeno(1,2,3-cd)pyrene	0.1	1.2 U	0.12	1.2 U	0.12	1.2 U	0.12	1.1 U	0.11
BaP Equivalent			2.6		2.8		2.8		2.5

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.4
BENZO(A)PYRENE-EQUIVALENT SUBSU
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	P83-P83-SS/SB/GW-10 (6.5-7)		P83-SS/SB-11 (3-3.5)		P83-SS/SB/GW-12 (3-3.5)		P83-SS/SB-13 (3.5-4)	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	1.1 U	0.11	1.2 U	0.12	1.2 U	0.12	0.18 J	0.018
Benzo(a)pyrene	1	1.1 U	1.1	1.2 U	1.2	1.2 U	1.2	0.16 J	0.16
Benzo(b)fluoranthene	0.1	1.1 U	0.11	1.2 U	0.12	1.2 U	0.12	0.26 J	0.026
Benzo(k)fluoranthene	0.01	1.1 U	0.011	1.2 U	0.012	1.2 U	0.012	0.12 J	0.0012
Chrysene	0.001	1.1 U	0.0011	1.2 U	0.0012	1.2 U	0.0012	0.26 J	0.00026
Dibenz(a,h)anthracene	1	1.1 U	1.1	1.2 U	1.2	1.2 U	1.2	1.1 U	1.1
Indeno(1,2,3-cd)pyrene	0.1	1.1 U	0.11	1.2 U	0.12	1.2 U	0.12	1.1 U	0.11
BaP Equivalent			2.5		2.8		2.8		1.4

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.4
BENZO(A)PYRENE-EQUIVALENT SUBSU
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	P83-SS/SB/GW-14 (3-3.5)		P83-SS/SB/GW-14 DUP (3-3.5)		P83-SS/SB-15 (3-3.5)		P83-SS/SB-16 (2-2.5)	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.55 J	0.055	0.57 J	0.057	1.2 U	0.12	1.1 U	0.11
Benzo(a)pyrene	1	0.58 J	0.58	0.73 J	0.73	1.2 U	1.2	1.1 U	1.1
Benzo(b)fluoranthene	0.1	0.72 J	0.072	1.1 J	0.11	1.2 U	0.12	1.1 U	0.11
Benzo(k)fluoranthene	0.01	0.31 J	0.0031	0.42 J	0.0042	1.2 U	0.012	1.1 U	0.011
Chrysene	0.001	0.57 J	0.00057	0.8 J	0.0008	1.2 U	0.0012	1.1 U	0.0011
Dibenz(a,h)anthracene	1	1.2 U	1.2	1.2 U	1.2	1.2 U	1.2	1.1 U	1.1
Indeno(1,2,3-cd)pyrene	0.1	0.44 J	0.044	0.52 J	0.052	1.2 U	0.12	1.1 U	0.11
BaP Equivalent			2.0		2.2		2.8		2.5

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.4
BENZO(A)PYRENE-EQUIVALENT SUBSU
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	P83-SS/SB/GW-17 (5.5-6)		P83-SS/SB/GW-1 DUP (5-5.5)		P83-SS/SB/GW-1 (5-5.5)		P83-SS/SB-2 (5-5.5)	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	1.1 U	0.11	1.2 U	0.12	1.2 U	0.12	1.2 U	0.12
Benzo(a)pyrene	1	1.1 U	1.1	1.2 U	1.2	1.2 U	1.2	1.2 U	1.2
Benzo(b)fluoranthene	0.1	1.1 U	0.11	1.2 U	0.12	1.2 U	0.12	1.2 U	0.12
Benzo(k)fluoranthene	0.01	1.1 U	0.011	1.2 U	0.012	1.2 U	0.012	1.2 U	0.012
Chrysene	0.001	1.1 U	0.0011	1.2 U	0.0012	1.2 U	0.0012	1.2 U	0.0012
Dibenz(a,h)anthracene	1	1.1 U	1.1	1.2 U	1.2	1.2 U	1.2	1.2 U	1.2
Indeno(1,2,3-cd)pyrene	0.1	1.1 U	0.11	1.2 U	0.12	1.2 U	0.12	1.2 U	0.12
BaP Equivalent			2.5		2.8		2.8		2.8

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.4
BENZO(A)PYRENE-EQUIVALENT SUBSU
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	P83-SS/SB/GW-3 (3.5-4)		P83-SS/SB/GW-3 DUP (3.5-4)		P83-SS/SB-4 (3.5-4)		P83-SS/SB/GW-5 (3-3.5)	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	1.2 U	0.12	1.2 U	0.12	1.1 U	0.11	1.2 U	0.12
Benzo(a)pyrene	1	1.2 U	1.2	1.2 U	1.2	1.1 U	1.1	1.2 U	1.2
Benzo(b)fluoranthene	0.1	1.2 U	0.12	1.2 U	0.12	1.1 U	0.11	1.2 U	0.12
Benzo(k)fluoranthene	0.01	1.2 U	0.012	1.2 U	0.012	1.1 U	0.011	1.2 U	0.012
Chrysene	0.001	1.2 U	0.0012	1.2 U	0.0012	1.1 U	0.0011	1.2 U	0.0012
Dibenz(a,h)anthracene	1	1.2 U	1.2	1.2 U	1.2	1.1 U	1.1	1.2 U	1.2
Indeno(1,2,3-cd)pyrene	0.1	1.2 U	0.12	1.2 U	0.12	1.1 U	0.11	1.2 U	0.12
BaP Equivalent			2.8		2.8		2.5		2.8

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.4
BENZO(A)PYRENE-EQUIVALENT SUBSU
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	P83-SS/SB-6 (3-3.5)		P83-SS/SB/GW-7 (2.5-3)		P83-SS/SB/GW-8 (3.5-4)		P83-SS/SB-09 (4.5-5)	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	1.2 U	0.12	0.093 J	0.0093	1.2 U	0.12	2.8	0.28
Benzo(a)pyrene	1	0.47 J	0.47	1.1 U	1.1	1.2 U	1.2	2.4	2.4
Benzo(b)fluoranthene	0.1	1.2 U	0.12	1.1 U	0.11	1.2 U	0.12	3.5	0.35
Benzo(k)fluoranthene	0.01	1.2 U	0.012	1.1 U	0.011	1.2 U	0.012	1.3	0.013
Chrysene	0.001	1.2 U	0.0012	0.12 J	0.00012	1.2 U	0.0012	2.9	0.0029
Dibenz(a,h)anthracene	1	1.2 U	1.2	1.1 U	1.1	1.2 U	1.2	1 U	1
Indeno(1,2,3-cd)pyrene	0.1	1.2 U	0.12	1.1 U	0.11	1.2 U	0.12	0.95 J	0.095
BaP Equivalent			2.0		2.4		2.8		4.1

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.4
BENZO(A)PYRENE-EQUIVALENT SUBSU
Parcel 83
Fort Monmouth, New Jersey

	Sample ID	PAR-83-482-SB-01-7.5-8	
Analyte	Relative Potency Factors ⁽¹⁾	Concentration ⁽²⁾ (mg/kg)	B(a)P-Equivalent Concentration (mg/kg)
Benzo(a)anthracene	0.1	0.082 U	0.0082
Benzo(a)pyrene	1	0.082 U	0.082
Benzo(b)fluoranthene	0.1	0.082 U	0.0082
Benzo(k)fluoranthene	0.01	0.082 U	0.00082
Chrysene	0.001	0.082 U	0.000082
Dibenz(a,h)anthracene	1	0.082 U	0.082
Indeno(1,2,3-cd)pyrene	0.1	0.082 U	0.0082
BaP Equivalent			0.19

Notes:

- ⁽¹⁾ Relative Potency Factors as described in Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (USEPA, 1993a).
- ⁽²⁾ Concentration in soil sample. If not detected, then the maximum method detection limit used to calculate B(a)P-equivalent.
- J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
- U = analyte not detected above method detection limit (MDL).

Table G.2.5
SURFACE SOIL EXPOSURE POINT CONCENTRATIONS
Parcel 83
Fort Monmouth, New Jersey

		Parcel 83				Exposure Area 1			
CAS Number ⁽¹⁾	COPC ⁽²⁾	Maximum Surface Soil Exposure Point Concentration (mg/kg)	95% UCL Surface Soil Exposure Point Concentration (mg/kg)	Selected Surface Soil Concentration ⁽³⁾ (mg/kg)	Source (Max or UCL)	Maximum Surface Soil Exposure Point Concentration (mg/kg)	95% UCL Surface Soil Exposure Point Concentration (mg/kg)	Selected Surface Soil Concentration ⁽³⁾ (mg/kg)	Source (Max or UCL)
VOCs									
79-01-6	Trichloroethene	5.8	NC	5.8	Max	5.8	NC	5.8	Max
SVOCs									
90-12-0	1-Methylnaphthalene	0.32 J	NC	0.32 J	Max	0.054	NC	0.054	Max
91-57-6	2-Methylnaphthalene	4.3	NC	4.3	Max	4.3	NC	4.3	Max
111-44-4	Bis(2-chloroethyl)ether	0.24 J	NC	0.24 J	Max	1.2 U	NC	1.2 U	Max
Polycyclic Aromatic Hydrocarbons									
50-32-8	BaP Equivalent	18	NC	18	Max	2.5	1.5	1.5	UCL
PCBs									
11097-69-1	Aroclor-1254	0.22 J	NC	0.22 J	Max	NA	NC	NA	NA
11096-82-5	Aroclor-1260	0.8	NC	0.8	Max	0.2	NC	0.2	Max
Inorganics									
7440-36-0	Antimony	8.42	NC	8.42	Max	8.42	NC	8.42	Max
7440-38-2	Arsenic	27.6	NC	27.6	Max	27.6	21.0	21.0	UCL
7439-92-1	Lead	1300	NC	1300	Max	1300	333	333	Mean ⁽⁴⁾
7440-48-4	Cobalt	10.1	NC	10.1	Max	7.35	NC	7.35	Max
7439-96-5	Manganese	230	NC	230	Max	230	NC	230	Max
7439-97-6	Mercury	4.06	NC	4.06	Max	0.121 U	NC	0.121 U	Max
7440-62-2	Vanadium	123	NC	123	Max	53.8	NC	53.8	Max

⁽¹⁾ CAS = Chemical Abstracts Service number.

⁽²⁾ COPC = Constituent of potential concern.

⁽³⁾ The selected soil concentration will be the maximum detected concentration (max) or the 95% upper confidence limit (UCL). If the 95% UCL is greater than the maximum detected concentration, the maximum detected concentration will be used. ProUCL version 5.1 used to calculate 95% UCLs.

⁽⁴⁾ The selected soil concentration will be the arithmetic mean.

J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)

U = Analyte not detected at concentration greater than the RL. The RL is shown as the value.

Table G.2.5
SURFACE SOIL EXPOSURE POINT CONCENTRATIONS
Parcel 83
Fort Monmouth, New Jersey

		Exposure Area 2				Exposure Area 3			
CAS Number ⁽¹⁾	COPC ⁽²⁾	Maximum Surface Soil Exposure Point Concentration (mg/kg)	95% UCL Surface Soil Exposure Point Concentration (mg/kg)	Selected Surface Soil Concentration ⁽³⁾ (mg/kg)	Source (Max or UCL)	Maximum Surface Soil Exposure Point Concentration (mg/kg)	95% UCL Surface Soil Exposure Point Concentration (mg/kg)	Selected Surface Soil Concentration ⁽³⁾ (mg/kg)	Source (Max or UCL)
VOCs									
79-01-6	Trichloroethene	0.27 U	NC	0.27 U	Max	0.3 U	NC	0.3 U	Max
SVOCs									
90-12-0	1-Methylnaphthalene	0.32 J	NC	0.32 J	Max	0.036	NC	0.036	Max
91-57-6	2-Methylnaphthalene	0.29 J	NC	0.29 J	Max	0.86 J	NC	0.86 J	Max
111-44-4	Bis(2-chloroethyl)ether	0.24 J	NC	0.24 J	Max	1.2 U	NC	1.2 U	Max
Polycyclic Aromatic Hydrocarbons									
50-32-8	BaP Equivalent	18	17	17	UCL	11	5.1	5.1	UCL
PCBs									
11097-69-1	Aroclor-1254	0.22 J	NC	0.22 J	Max	NA	NC	NA	NA
11096-82-5	Aroclor-1260	0.8	NC	0.8	Max	0.0042 U	NC	0.0042 U	Max
Inorganics									
7440-36-0	Antimony	6.5	NC	6.5	Max	0.543 U	NC	0.543 U	Max
7440-38-2	Arsenic	7.34	NC	7.34	Max	16	NC	16	Max
7439-92-1	Lead	972	284	284	Mean ⁽⁴⁾	111	37	37	Mean ⁽⁴⁾
7440-48-4	Cobalt	5.07	NC	5.07	Max	10.1	NC	10.1	Max
7439-96-5	Manganese	292 U	NC	292 U	Max	266 U	NC	266 U	Max
7439-97-6	Mercury	4.06	NC	4.06	Max	0.119 U	NC	0.119 U	Max
7440-62-2	Vanadium	47.8	NC	47.8	Max	123	NC	123	Max

⁽¹⁾ CAS = Chemical Abstracts Service number.

⁽²⁾ COPC = Constituent of potential concern.

⁽³⁾ The selected soil concentration will be the maximum detected concentration (max) or the 95% upper confidence limit (UCL). If the 95% UCL is greater than the maximum detected concentration, the maximum detected concentration will be used. ProUCL version 5.1 used to calculate 95% UCLs.

⁽⁴⁾ The selected soil concentration will be the arithmetic mean.

J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)
U = Analyte not detected at concentration greater than the RL.
The RL is shown as the value.

Table G.2.6
COMBINED SURFACE SOIL AND SUBSURFACE SOIL EXPOSURE POINT CONCENTRATIONS
Parcel 83
Fort Monmouth, New Jersey

		Parcel 83				Exposure Area 1			
CAS Number ⁽¹⁾	COPC ⁽²⁾	Maximum Surface Soil Exposure Point Concentration (mg/kg)	95% UCL Surface Soil Exposure Point Concentration (mg/kg)	Selected Surface Soil Concentration ⁽³⁾ (mg/kg)	Source (Max or UCL)	Maximum Surface Soil Exposure Point Concentration (mg/kg)	95% UCL Surface Soil Exposure Point Concentration (mg/kg)	Selected Surface Soil Concentration ⁽³⁾ (mg/kg)	Source (Max or UCL)
VOCs									
79-01-6	Trichloroethene	5.8	NC	5.8	Max	5.8	NC	5.8	Max
SVOCs									
90-12-0	1-Methylnaphthalene	31	NC	31	Max	31	NC	31	Max
91-57-6	2-Methylnaphthalene	53	NC	53	Max	53	146	53	Max
111-44-4	Bis(2-chloroethyl)ether	0.24 J	NC	0.24 J	Max	1.2 U	NC	1.2 U	Max
Polycyclic Aromatic Hydrocarbons									
50-32-8	BaP Equivalent	18	NC	18	Max	4.1	1.8	1.8	UCL
PCBs									
11097-69-1	Aroclor-1254	0.22 J	NC	0.22 J	Max	NA	NC	NA	NA
11096-82-5	Aroclor-1260	0.8	NC	0.8	Max	0.2	NC	0.2	Max
Inorganics									
7440-36-0	Antimony	8.42	NC	8.42	Max	8.42	NC	8.42	Max
7440-38-2	Arsenic	27.6	NC	27.6	Max	27.6	13.2	13.2	UCL
7439-92-1	Lead	1300	NC	1300	Max	1300	146	146	Mean ⁽⁴⁾
7440-48-4	Cobalt	10.1	NC	10.1	Max	7.35	NC	7.35	Max
7439-96-5	Manganese	230	NC	230	Max	230	NC	230	Max
7439-97-6	Mercury	4.06	NC	4.06	Max	0.121 U	NC	0.121 U	Max
7440-62-2	Vanadium	123	NC	123	Max	81.8	NC	81.8	Max

⁽¹⁾ CAS = Chemical Abstracts Service number.

⁽²⁾ COPC = Constituent of potential concern.

⁽³⁾ The selected soil concentration will be the maximum detected concentration (max) or the 95% upper confidence limit (UCL). If the 95% UCL is greater than the maximum detected concentration, the maximum detected concentration will be used. ProUCL version 5.1 used to calculate 95% UCLs.

⁽⁴⁾ The selected soil concentration will be the arithmetic mean.

J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)

U = Analyte not detected at concentration greater than the RL. The RL is shown as the value.

Table G.2.6
COMBINED SURFACE SOIL AND SUBSURFACE SOIL
Parcel 83
Fort Monmouth, New Jersey

		Exposure Area 2				Exposure Area 3			
CAS Number ⁽¹⁾	COPC ⁽²⁾	Maximum Surface Soil Exposure Point Concentration (mg/kg)	95% UCL Surface Soil Exposure Point Concentration (mg/kg)	Selected Surface Soil Concentration ⁽³⁾ (mg/kg)	Source (Max or UCL)	Maximum Surface Soil Exposure Point Concentration (mg/kg)	95% UCL Surface Soil Exposure Point Concentration (mg/kg)	Selected Surface Soil Concentration ⁽³⁾ (mg/kg)	Source (Max or UCL)
VOCs									
79-01-6	Trichloroethene	0.38 U	NC	0.38 U	Max	0.34 U	NC	0.34 U	Max
SVOCs									
90-12-0	1-Methylnaphthalene	0.32 J	NC	0.32 J	Max	0.036	NC	0.036	Max
91-57-6	2-Methylnaphthalene	0.29 J	NC	0.29 J	Max	0.86 J	NC	0.86 J	Max
111-44-4	Bis(2-chloroethyl)ether	0.24 J	NC	0.24 J	Max	1.2 U	NC	1.2 U	Max
Polycyclic Aromatic Hydrocarbons									
50-32-8	BaP Equivalent	18	7.9	7.9	UCL	11	4.2	4.2	UCL
PCBs									
11097-69-1	Aroclor-1254	0.22 J	NC	0.22 J	Max	NA	NC	NA	NA
11096-82-5	Aroclor-1260	0.8	NC	0.8	Max	0.0042 U	NC	0.0042 U	Max
Inorganics									
7440-36-0	Antimony	6.5	NC	6.5	Max	0.543 U	NC	0.543 U	Max
7440-38-2	Arsenic	10.8	NC	10.8	Max	16	11.3	11.3	UCL
7439-92-1	Lead	972	129	129	Mean ⁽⁴⁾	111	21	21	Mean ⁽⁴⁾
7440-48-4	Cobalt	5.07	NC	5.07	Max	10.1	NC	10.1	Max
7439-96-5	Manganese	292 U	NC	292 U	Max	266 U	NC	266 U	Max
7439-97-6	Mercury	4.06	NC	4.06	Max	0.119 U	NC	0.119 U	Max
7440-62-2	Vanadium	104	NC	104	Max	123	NC	123	Max

⁽¹⁾ CAS = Chemical Abstracts Service number.

⁽²⁾ COPC = Constituent of potential concern.

⁽³⁾ The selected soil concentration will be the maximum detected concentration (max) or the 95% upper confidence limit (UCL). If the 95% UCL is greater than the maximum detected concentration, the maximum detected concentration will be used. ProUCL version 5.1 used to calculate 95% UCLs.

⁽⁴⁾ The selected soil concentration will be the arithmetic mean.

J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)

U = Analyte not detected at concentration greater than the RL. The RL is shown as the value.

Table G.2.7
PARTICULATE EMISSION FACTOR AND VOLATILIZATION FACTOR EXPOSURE PARAMETERS
Parcel 83
Fort Monmouth, New Jersey

Abbreviation	Parameter	Units	All Receptors	Sources	Rationale
Q/C	Inverse of mean concentration at center of square source area for Philadelphia, Pennsylvania	$\text{g/m}^2\text{-s per kg/m}^3$	87.36898	USEPA, 2014b	Source references USEPA, 2002, Exhibit D-2
V	Fraction of vegetative cover	unitless	0.5	USEPA, 2014b	Source references USEPA, 2002, Equation 4-5
U _m	Mean annual wind speed	m/s	4.69	USEPA, 2014b	Source references USEPA, 2002, Equation 4-5
U _t	Equivalent threshold value of wind speed at 7m	m/s	11.32	USEPA, 2014b	Source references USEPA, 2002, Equation 4-5
F(x)	Function Dependent on U _m /U _t	unitless	0.194	USEPA, 2014b, Cowherd et. al. 1985	Source references USEPA, 2002, Equation 4-5
D _A	Apparent diffusivity	cm^2/s	Chemical-specific	USEPA, 2014b	Source references USEPA, 2002, Equation 4-8
T	Exposure interval	seconds	9.50E+08	USEPA, 2002	USEPA, 2002, Equation 4-8
ρ _b	Dry soil bulk density	g/cm^3	1.5	USEPA, 2014b	Source references USEPA, 2002, Equation 4-8
θ _a	Air-filled Soil Porosity (calculated as n - θ _w)	L _{air} /L _{soil}	0.28	USEPA, 2014b	Source references USEPA, 2002, Equation 4-8
n	Total Soil Porosity	L _{pore} /L _{soil}	0.43	USEPA, 2014b	Source references USEPA, 2002, Equation 4-8
θ _w	Water-filled Soil Porosity	L _{water} /L _{soil}	0.15	USEPA, 2014b	Source references USEPA, 2002, Equation 4-8
ρ _s	Soil particle density	g/cm^3	2.65	USEPA, 2014b	Source references USEPA, 2002, Equation 4-8
D _i	Diffusivity in Air	$\text{cm}^2/\text{second}$	Chemical-specific	USEPA, 2015c	--
H'	Henry's law constant	dimensionless	Chemical-specific	USEPA, 2015c	--
D _w	Diffusivity in Water	$\text{cm}^2/\text{second}$	Chemical-specific	USEPA, 2015c	--
K _d	Soil-water Partition Coefficient	L/kg	Chemical-specific	USEPA, 2015c	Calculated as K _{OC} X f _{OC}
K _{OC}	Soil organic carbon-water Partition Coefficient	L/kg	Chemical-specific	USEPA, 2015c	--
f _{OC}	Organic Carbon Content of Soil	g/g	0.006	USEPA, 2014b	Source references USEPA, 2002, Equation 4-8

Table G.2.8
CALCULATION OF PARTICULATE EMISSION FACTOR
Parcel 83
Fort Monmouth, New Jersey

Parameters				Equation
Parameter	Abbreviation	Value	Units	
Inverse of mean concentration at center of square source area ⁽¹⁾	Q/C	87.37	g/m ² -s per kg/m ³	$PEF = Q/C \times \frac{3,600s/hr}{0.036 \times (1-V) \times (U_m/U_t)^3 \times F(x)}$
Fraction of vegetative cover	V	0.5	unitless	
Mean annual wind speed	U _m	4.69	m/s	
Equivalent threshold value of wind speed at 7m	U _t	11.32	m/s	
Function Dependent on Um /Ut	F(x)	0.194	unitless	
Particulate emission factor	PEF	1.27E+09	m ³ /kg	

Notes:

⁽¹⁾ Nearest city with air dispersion model data and Q/C value is Philadelphia, PA.

Table G.2.9
CALCULATION OF VOLATILIZATION FACTOR
Parcel 83
Fort Monmouth, New Jersey

Parameters	Abbreviation	Value	Units	Equations
Inverse of mean concentration at center of square source area ⁽¹⁾				
	Q/C	87.37	g/m ² -s per kg/m ³	
Apparent diffusivity	D _a	chemical specific	cm ² per s	
Exposure interval	T	9.50E+08	s	
Dry soil bulk density	ρ _b	1.50	g/cm ³	
Air-filled Soil Porosity (calculated as n - θ _w)	θ _a	0.28	L _{air} /L _{soil}	
Total Soil Porosity	n	0.43	L _{pore} /L _{soil}	
Soil particle density	ρ _s	2.65	g/cm ³	
Water-filled Soil Porosity	θ _w	0.15	L _{water} /L _{soil}	
Diffusivity in Air	D _i	Chemical-specific	cm ² /s	
Henry's law constant	H'	Chemical-specific	unitless	
Diffusivity in Water	D _w	Chemical-specific	cm ² /s	
Soil-water Partition Coefficient	K _d	Chemical-specific	cm ³ /g	
Soil organic carbon-water Partition Coefficient	K _{OC}	Chemical-specific	cm ³ /g	
Organic Carbon Content of Soil	f _{OC}	0.006	g/g	

$$VF = (Q / C) \left(\frac{((3.14)(D_A)(T))^{1/2}}{((2)(\rho_b)(D_A))} \right) (10^{-4} m^2 / cm^2)$$

where:

$$D_A = \frac{\left[\left(\left(\theta_a^{10/3} \right) (D_i) (H') \right) + \left(\left(\theta_w^{10/3} \right) (D_w) \right) \right] / n^2}{((\rho_b)(K_d)) + \theta_w + ((\theta_a)(H'))}$$

where:

$$\theta_a = n - \theta_w$$

where, for organics:

$$K_d = (K_{OC})(f_{OC})$$
$$n = 1 - \left(\rho_b / \rho_s \right)$$

			Henry's Law Constant (H') ⁽⁴⁾ (unitless)	Diffusivity in Water (D _w) ⁽⁴⁾ (cm ² /s)	Soil-water Partition Coefficient (K _d) ⁽⁴⁾ (cm ³ /g)	Soil Organic Carbon-water Partition Coefficient (K _{OC}) ⁽⁴⁾ (cm ³ /g)	D _A (cm ² /s)	Volatilization Factor (VF) (m ³ /kg)
COPC ⁽²⁾	CAS Number ⁽³⁾	Diffusivity in Air (D _i) ⁽⁴⁾ (cm ² /s)						
VOCs								
Trichloroethene	79-01-6	6.87E-02	4.03E-01	1.02E-05	3.64E-01	6.07E+01	2.7E-03	3.1E+03
SVOCs								
1-Methylnaphthalene	90-12-0	5.28E-02	2.10E-02	7.85E-06	1.52E+01	2.53E+03	3.8E-06	8.2E+04
2-Methylnaphthalene	91-57-6	5.24E-02	2.12E-02	7.78E-06	1.49E+01	2.48E+03	3.8E-06	8.1E+04
Bis(2-chloroethyl)ether	111-44-4	5.67E-02	6.95E-04	8.71E-06	1.93E-01	3.22E+01	7.1E-06	5.9E+04
Polycyclic Aromatic Hydrocarbons								
BaP Equivalent	50-32-8	4.76E-02	1.87E-05	5.56E-06	3.52E+03	5.87E+05	2.3E-11	3.3E+07
PCBs								
Aroclor-1254	11097-69-1	2.37E-02	1.16E-02	6.10E-06	7.83E+02	1.31E+05	1.8E-08	1.2E+06
Aroclor-1260	11096-82-5	2.20E-02	1.37E-02	5.61E-06	2.10E+03	3.50E+05	7.5E-09	1.8E+06
Inorganics								
Antimony	7440-36-0	--	--	--	4.50E+01	--	--	--
Arsenic	7440-38-2	--	--	--	2.90E+01	--	--	--
Cobalt	7440-48-4	--	--	--	4.50E+01	--	--	--
Manganese	7439-96-5	--	--	--	6.50E+01	--	--	--
Mercury	7439-97-6	3.07E-02	3.52E-01	6.30E-06	5.20E+01	--	1.1E-05	4.9E+04
Vanadium	7440-62-2	--	--	--	1.00E+03	--	--	--

Notes:
⁽¹⁾ Nearest city with air dispersion model data and Q/C value is Philadelphia, PA.
⁽²⁾ COPC = Constituent of potential concern.
⁽³⁾ CAS = Chemical Abstracts Service number. For Extractable/Volatile Petroleum Hydrocarbons, the CAS number is the Total Petroleum Hydrocarbon consistent with the USEPA RSLs that was used for the calculation.

⁽⁴⁾ Values consistent with the USEPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites (TR = 1E-06; THQ = 1.0), Chemical Specific Parameters Supporting Table, June 2017. Available at: <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-june-2017>.

-- = toxicity data not available.

Table G.2.10
TOXICITY VALUES
Parcel 83
Fort Monmouth, New Jersey

					Ingestion					Dermal Contact		Inhalation				
CAS Number ⁽¹⁾	Analyte	Volatile Organic Compound (Yes/No)	Mutagenic Compound (Yes/No)	ABS _d ⁽²⁾ (unitless)	RfD _o ⁽²⁾ (mg/kg-day)	Reference	Sfo ⁽²⁾ ((mg/kg-day) ⁻¹)	Reference	GIABS ⁽²⁾ (unitless)	RfD _d ⁽³⁾ (mg/kg-day)	SF _d ⁽³⁾ ((mg/kg-day) ⁻¹)	RfC _i ⁽²⁾ (mg/m ³)	Reference	IUR ⁽²⁾ ((μg/m ³) ⁻¹)	Reference	C _{sat} ⁽²⁾ (mg/kg)
VOCs																
79-01-6	Trichloroethene	Yes	Yes	--	5.00E-04	I	4.6E-02	I	1	5.00E-04	4.6E-02	2.00E-03	I	4.10E-06	I	692
SVOCs																
90-12-0	1-Methylnaphthalene	Yes	No	0.13	7.00E-02	A	2.9E-02	P	1	7.00E-02	2.9E-02	--		--		394
91-57-6	2-Methylnaphthalene	Yes	No	0.13	4.00E-03	I	--		1	4.00E-03	--	--		--		--
111-44-4	Bis(2-chloroethyl)ether	Yes	No	--	--		1.1E+00	I	1	--	1.1E+00	--		3.30E-04	I	5050
Polycyclic Aromatic Hydrocarbons																
50-32-8	BaP Equivalent	No	Yes	0.13	3.00E-04	I	1.0E+00	I	1	3.00E-04	1.0E+00	2.00E-06	I	6.00E-04	I	--
PCBs																
11097-69-1	Aroclor-1254	Yes	No	0.14	2.00E-05	I	2.0E+00	G	1	2.00E-05	2.0E+00	--		5.70E-04	G	--
11096-82-5	Aroclor-1260	Yes	No	0.14	--		2.0E+00	G	1	--	2.0E+00	--		5.70E-04	G	--
Inorganics																
7440-36-0	Antimony	No	No	--	4.00E-04	I	--		0.15	6.00E-05	--	--		--		--
7440-38-2	Arsenic	No	No	0.03	3.00E-04	I	1.5E+00	I	1	3.00E-04	1.5E+00	1.50E-05	C	4.30E-03	I	--
7440-48-4	Cobalt	No	No	--	3.00E-04	P	--		1	3.00E-04	--	6.00E-06	P	9.00E-03	P	--
7439-96-5	Manganese	No	No	--	1.40E-01	I	--		1	1.40E-01	--	5.00E-05	I	--		--
7439-97-6	Mercury	Yes	No	--	--		--		1	--	--	3.00E-04	I	--		3.13
7440-62-2	Vanadium	No	No	--	5.00E-03	G	--		0.026	1.30E-04	--	1.00E-04	A	--		--

⁽¹⁾ CAS = Chemical Abstracts Service number.

⁽²⁾ ABSd is the recommended dermal absorption fraction of contaminants in soil. Sfo is the oral slope factor. RfDo is the oral slope reference dose. GIABS is the oral absorption factor of analytes that are absorbed in the intestinal tract. RfCi in the inhalation reference dose. IUR is the inhalation slope factor. Csat is the inhalation sat is the soil saturation concentration. All values are consistent with the USEPA RSLs for Chemical Contaminants at Superfund Sites (TR = 1E-06; THQ = 1.0), Summary Table, June 2017. Available at: <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-june-2017>.

⁽³⁾ RfD_d is the dermal reference dose and is based on the absorbed dose. The RFD_d is calculated as RfD_o*GIABS. SFd is the dermal slope factor and is based on absorbed dose. The SFd is calculated as Sfo / GIABS.

-- = toxicity data not available or analyte not in USEPA RSL table.

References:
A = ATSDR
C = Cal EPA
I = IRIS
J = New Jersey Department of Environmental Protection. See Section 5.6 of the RSL User Guide
P= PPRTV
S = RSL User Guide, Section 5.3
X= PPRTV Appendix
H = HEAST

Table G.2.11
CHEMICAL-SPECIFIC PARAMETERS
Parcel 83
Fort Monmouth, New Jersey

		Volatility Parameters ⁽¹⁾					Diffusivity in Air and Water ⁽¹⁾			Partition Coefficients ⁽¹⁾				Water Solubility ⁽¹⁾		Tapwater Dermal Parameters ⁽¹⁾					
Analyte	CAS #	H [*] (unitless)	HLC (atm- m ³ /mole)	H [*] and HLC Ref	Vapor Pressure	VP Ref	Dia (cm ² /s)	Diw (cm ² /s)	Dia Ref	K _d (L/kg)	K _d Ref	K _{oc} (L/kg)	K _{oc} Ref	S (mg/L)	S Ref	B (unitless)	τ _{event} (hr/event)	t* (hr)	K _p (cm/hr)	KPREF	
Volatile Organic Compounds																					
Trichloroethene	79-01-6	4.03E-01	9.85E-03	PHYSPROP	6.90E+01	PHYSPROP	6.87E-02	1.02E-05	WATER9(U.S.EPA,2001)	--	--	6.07E+01	EPI	1.28E+03	PHYSPROP	5.11E-02	5.72E-01	1.37E+00	1.16E-02	EPI	1
Semivolatile Organic Compounds																					
1-Methylnaphthalene	90-12-0	2.10E-02	5.14E-04	PHYSPROP	6.70E-02	PHYSPROP	5.28E-02	7.85E-06	WATER9(U.S.EPA,2001)	--	--	2.53E+03	EPI	2.58E+01	PHYSPROP	4.27E-01	6.58E-01	1.58E+00	9.31E-02	EPI	1
2-Methylnaphthalene	91-57-6	2.12E-02	5.18E-04	PHYSPROP	5.50E-02	PHYSPROP	5.24E-02	7.78E-06	WATER9(U.S.EPA,2001)	--	--	2.48E+03	EPI	2.46E+01	PHYSPROP	4.21E-01	6.58E-01	1.58E+00	9.17E-02	EPI	1
Bis(2-chloroethyl)ether	111-44-4	6.95E-04	1.70E-05	EPI	1.55E+00	PHYSPROP	5.67E-02	8.71E-06	WATER9(U.S.EPA,2001)	--	--	3.22E+01	EPI	1.72E+04	PHYSPROP	8.19E-03	6.65E-01	1.60E+00	1.78E-03	EPI	1
Polycyclic Aromatic Hydrocarbons																					
BaP Equivalent	50-32-8	1.87E-05	4.57E-07	PHYSPROP	5.49E-09	EPI	4.76E-02	5.56E-06	WATER9(U.S.EPA,2001)	--	--	5.87E+05	EPI	1.62E-03	PHYSPROP	4.36E+00	2.72E+00	1.18E+01	7.13E-01	EPI	1
PCBs																					
Aroclor-1254	11097-69-1	1.16E-02	2.83E-04	PHYSPROP	7.71E-05	PHYSPROP	2.37E-02	6.10E-06	WATER9(U.S.EPA,2001)	--	--	1.31E+05	EPI	4.30E-02	PHYSPROP	5.22E+00	7.08E+00	3.11E+01	7.51E-01	EPI	1
Aroclor-1260	11096-82-5	1.37E-02	3.36E-04	PHYSPROP	4.05E-05	PHYSPROP	2.20E-02	5.61E-06	WATER9(U.S.EPA,2001)	--	--	3.50E+05	EPI	1.44E-02	PHYSPROP	7.54E+00	1.72E+01	7.71E+01	9.86E-01	EPI	1
Inorganics																					
Antimony	7440-36-0	--	--	--	0.00E+00	NIOSH	--	--	--	4.50E+01	SSL	--	--	--	--	4.24E-03	5.05E-01	1.21E+00	1.00E-03	RAGSE	1
Arsenic	7440-38-2	--	--	--	--	--	--	--	--	2.90E+01	SSL	--	--	--	--	3.33E-03	2.76E-01	6.63E-01	1.00E-03	RAGSE	1
Cobalt	7440-48-4	--	--	--	0.00E+00	NIOSH	--	--	--	4.50E+01	BAES	--	--	--	--	1.18E-03	2.25E-01	5.40E-01	4.00E-04	RAGSE	1
Manganese	7439-96-5	--	--	--	0.00E+00	NIOSH	--	--	--	6.50E+01	BAES	--	--	--	--	2.85E-03	2.14E-01	5.13E-01	1.00E-03	RAGSE	1
Mercury	7439-97-6	3.52E-01	8.62E-03	PHYSPROPVP/S	1.96E-03	PHYSPROP	3.07E-02	6.30E-06	WATER9(U.S.EPA,2001)	5.20E+01	SSL	--	--	6.00E-02	PHYSPROP	5.45E-03	1.40E+00	3.35E+00	1.00E-03	RAGSE	1
Vanadium	7440-62-2	--	--	--	--	--	--	--	--	1.00E+03	SSL	--	--	--	--	2.75E-03	2.03E-01	4.87E-01	1.00E-03	RAGSE	1

⁽¹⁾ Values will be consistent with the USEPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites (TR = 1E-06; THQ = 1.0), Chemical Specific Parameters Supporting Table, June 2017. Available at: <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-june-2017>.

⁽²⁾ FA values consistent with the USEPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites (TR = 1E-06; THQ = 1.0), Residential Tapwater Table, June 2017. Available at: <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-june-2017>.

Table G.2.12
RISK AND HAZARD ESTIMATES – INCIDENTAL INGESTION OF SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 1
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions				Equations
Receptor	UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units	
COPC Concentration in Soil	C _s	chemical-specific	mg/kg	
Soil Ingestion Rate - adult	IRS _{adult}	100	mg/day	
Soil Ingestion Rate - child	IRS _{child}	200	mg/day	
Age-adjusted soil ingestion factor	IFS _{adj}	105	(mg-year)/(kg-day)	
Exposure Frequency	EF	350	days/year	
Exposure Duration - adult	ED _{adult}	20	years	
Exposure Duration - child	ED _{child}	6	years	
Conversion Factor-soil	CF _s	0.000001	kg/mg	
Averaging Time – carcinogens	AT _c	25550	days	
Averaging Time – noncarcinogens, child	AT _{nc} - child	2190	days	
Averaging Time – noncarcinogens, adult	AT _{nc} - adult	7300	days	
Oral Slope Factor	SF _o	chemical-specific	(mg/kg-day) ⁻¹	
Body Weight - adult	BW _{adult}	80	kg	
Body Weight - child	BW _{child}	15	kg	
Fraction Ingested	FI	1	unitless	
Oral Reference Dose	RfD _o	chemical-specific	mg/kg-day	

Incidental ingestion of carcinogenic COPCs in soil for multiple age groups simultaneously:

$$Ingestion_{age-adj} = \frac{(C_s)(IFS_{adj})(EF)(CF_s)(FI)}{(AT_c)}$$

where:

$$IFS_{adj} = \frac{(ED_{child})(IRS_{child})}{(BW_{child})} + \frac{(ED_{adult})(IRS_{adult})}{(BW_{adult})}$$

Incidental ingestion of noncarcinogenic COPCs in soil for separate age groups:

$$Ingestion = \frac{(C_s)(IRS)(EF)(ED)(CF_s)(FI)}{(AT_{nc})(BW)}$$

Carcinogenic Risk:

$$Risk = (Ingestion)(SF_o)$$

Noncarcinogenic Hazard:

$$HQ = Ingestion/RfD_o$$

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	Carcinogenic Ingestion _{age-adj} (mg/kg-day)	Noncarcinogenic Ingestion - Child (mg/kg-day)	Noncarcinogenic Ingestion - Adult (mg/kg-day)	SFo ⁽⁴⁾ (mg/kg-day) ⁻¹	RfDo ⁽⁴⁾ (mg/kg-day)	Cancer Risk	% of Total	Hazard Quotient - Child	% of Total	Hazard Quotient - Adult	% of Total
Volatile Organic Compounds														
Trichloroethene	79-01-6	5.8	Max	3.8E-05 ⁽⁶⁾	0.000074	0.0000070	4.6E-02	5.0E-04	1.8E-06	3.1%	0.15	8.0%	0.014	8.0%
Semivolatile Organic Compounds														
1-Methylnaphthalene	90-12-0	0.054	Max	7.8E-08	0.00000069	0.000000065	2.9E-02	7.0E-02	2.3E-09	0.0039%	0.000010	0.00053%	0.00000092	0.00053%
2-Methylnaphthalene	91-57-6	4.3	Max	--	0.000055	0.0000052	--	4.0E-03	--	--	0.014	0.74%	0.0013	0.74%
Bis(2-chloroethyl)ether	111-44-4	1.2	U	Max	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons														
BaP-equivalent ⁽⁵⁾	50-32-8	1.5	UCL	9.9E-06 ⁽⁶⁾	0.000019	0.0000018	1.0E+00	3.0E-04	9.9E-06	17%	0.064	3.4%	0.0060	3.4%
PCBs														
Aroclor-1260	11096-82-5	0.2	Max	2.9E-07	--	--	2.0E+00	--	5.8E-07	1.0%	--	--	--	--
Inorganics														
Antimony	7440-36-0	8.42	Max	--	0.00011	0.000010	--	4.0E-04	--	--	0.27	14%	0.025	14%
Arsenic	7440-38-2	21	UCL	3.0E-05	0.00027	0.000025	1.5E+00	3.0E-04	4.5E-05	79%	0.89	48%	0.084	48%
Cobalt	7440-48-4	7.35	Max	--	0.000094	0.0000088	--	3.0E-04	--	--	0.31	17%	0.029	17%
Manganese	7439-96-5	230	Max	--	0.0029	0.00028	--	1.4E-01	--	--	0.021	1.1%	0.0020	1.1%
Mercury	7439-97-6	0.121	U	Max	--	--	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	53.8	Max	--	0.00069	0.000064	--	5.0E-03	--	--	0.14	7.4%	0.013	7.4%
Pathway Sums:									Cancer Risk		Hazard Index		Hazard Index	
									6E-05	100%	2	100%	0.2	100%

⁽¹⁾ COPC = Constituent of potential concern.
⁽²⁾ CAS = Chemical Abstracts Service number.
⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.
⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.
⁽⁵⁾ See Table G.2.4 for B(a)P-equivalent calculation.
⁽⁶⁾ See Table G.2.14 for mutagenic mode of action ingestion intake calculation and risk calculation.
-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.13
MUTAGENIC MODE OF ACTION – INCIDENTAL INGESTION OF SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 1
Parcel 83
Fort Monmouth, New Jersey

Risk Equation

$$Ingestion = \frac{C_s \times \left(\frac{((ED_{0-2})(IRS_{child})(10))}{BW_{child}} + \frac{((ED_{2-6})(IRS_{child})(3))}{BW_{child}} + \frac{((ED_{6-16})(IRS_{adult})(3))}{BW_{adult}} + \frac{((ED_{16-30})(IRS_{adult})(1))}{BW_{adult}} \right) \times EF \times CF_s}{AT_c}$$

Mutagenic Risk: $Risk = (Ingestion)(SF_o)$

Exposure Assumptions			
Receptor UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units
COPC Concentration in Soil (C _s)	C _s	chemical-specific	mg/kg
Soil Ingestion Rate - adult	IRS _{adult}	100	mg/day
Soil Ingestion Rate - child	IRS _{child}	200	mg/day
Exposure Frequency	EF	350	days/year
Exposure Duration, 0 to 2 years of age	ED ₀₋₂	2	years
Exposure Duration, 2 to 6 years of age	ED ₂₋₆	4	years
Exposure Duration, 6 to 16 years of age	ED ₆₋₁₆	10	years
Exposure Duration, 16 to 30 years of age	ED ₁₆₋₃₀	14	years
Conversion Factor-soil	CF _s	0.000001	kg/mg
Averaging Time – carcinogens	AT _c	25550	days
Oral Slope Factor	SF _o	chemical-specific	(mg/kg-day) ⁻¹
Body Weight - adult	BW _{adult}	80	kg
Body Weight - child	BW _{child}	15	kg

COPC ⁽¹⁾	CAS Number ⁽²⁾	Cs ⁽³⁾ (mg/kg)	Carcinogenic Ingestion (mg/kg-day)	SFo ⁽⁴⁾ (mg/kg-day) ⁻¹	Cancer Risk
Trichloroethene	79-01-6	5.8	3.8E-05	4.6E-02	1.8E-06
BaP-equivalent ⁽⁵⁾	50-32-8	1.5	9.9E-06	1.0E+00	9.9E-06

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.

⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁵⁾ See Table G.2.4 for B(a)P-equivalent calculation.

Table G.2.14
RISK AND HAZARD ESTIMATES – DERMAL CONTACT WITH SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 1
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions			
Receptor			
UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units
COPC Concentration in Soil	C _s	chemical-specific	mg/kg
Exposure Frequency	EF	350	days/year
Exposure Duration - adult	ED _{adult}	20	years
Exposure Duration - child	ED _{child}	6	years
Event Frequency	EV	1	events/day
Exposed Skin Surface Area - adult	SA _{adult}	6032	cm ²
Exposed Skin Surface Area - child	SA _{child}	2690	cm ²
Age-adjusted dermal contact factor	SFS _{adj}	321	(mg-year)/(kg-event)
Adherence Factor - adult	AF _{adult}	0.07	mg/cm ²
Adherence Factor - child	AF _{child}	0.2	mg/cm ²
Dermal Absorption Factor	ABS _d	chemical-specific	unitless
Averaging Time – carcinogens	AT _c	25550	days
Averaging Time – noncarcinogens, child	AT _{nc} - child	2190	days
Averaging Time – noncarcinogens, adult	AT _{nc} - adult	7300	days
Oral Slope Factor Adjusted for GI Absorption	SF _d	chemical-specific	(mg/kg-day) ⁻¹
Body Weight - adult	BW _{adult}	80	kg
Body Weight - child	BW _{child}	15	kg
Oral Reference Dose Adjusted for GI Absorption	RfD _d	chemical-specific	mg/kg-day
Conversion Factor-soil	CF _s	0.000001	kg/mg
Fraction of contaminant absorbed in gastrointestinal tract	GIABS	chemical-specific	unitless
Dermal Absorbed Dose	DAD	chemical-specific	mg/kg-day
Absorbed dose per event	DA _{event}	chemical-specific	mg/cm ² -event

Equations

Dermal absorbed dose for carcinogenic COPCs in soil for multiple age groups simultaneously:

$$DAD = \frac{(C_s)(SFS_{adj})(ABS_d)(EF)(EV)(CF)}{(AT)}$$

where:

$$SFS_{adj} = \frac{(ED_{child})(AF_{child})(SA_{child})}{(BW_{child})} + \frac{(ED_{adult})(AF_{adult})(SA_{adult})}{(BW_{adult})}$$

Dermal absorbed dose of noncarcinogenic COPCs in soil for separate age groups:

$$DAD = \frac{(DA_{event})(EF)(ED)(EV)(SA)}{(BW)(AT)}$$

where:

$$DA_{event} = (C_s)(CF_s)(AF)(ABS_d)$$

Carcinogenic Risk:

$$Risk = (DAD)(SF_d)$$

where:

$$SF_d = SF_o / GIABS$$

Noncarcinogenic Hazard:

$$HQ = DAD / Rf_d$$

where:

$$RfD_d = (RfD_o)(GIABS)$$

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	ABS _d ⁽⁴⁾ (unitless)	SF _d ⁽⁴⁾ (mg/kg-day) ⁻¹	RfD _d ⁽⁴⁾ (mg/kg-day)	Carcinogenic DAD (mg/kg-day)	Noncarcinogenic DAD - Child (mg/kg-day)	Noncarcinogenic DAD - Adult (mg/kg-day)	Cancer Risk	% of Total	Hazard Quotient - Child	% of Total	Hazard Quotient - Adult	% of Total
Volatile Organic Compounds															
Trichloroethene	79-01-6	5.8	Max	--	4.6E-02	5.0E-04	-- ⁽⁶⁾	--	--	--	--	--	--	--	--
Semivolatile Organic Compounds															
1-Methylnaphthalene	90-12-0	0.054	Max	0.13	2.9E-02	7.0E-02	3.1E-08	2.4E-07	3.6E-08	8.9E-10	0.011%	0.0000034	0.0035%	0.00000051	0.0035%
2-Methylnaphthalene	91-57-6	4.3	Max	0.13	--	4.0E-03	--	1.9E-05	2.8E-06	--	--	0.0048	4.8%	0.00071	4.8%
Bis(2-chloroethyl)ether	111-44-4	1.2	U	Max	--	1.1E+00	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons															
BaP-equivalent ⁽⁵⁾	50-32-8	1.5	UCL	0.13	1.0E+00	3.0E-04	3.7E-06 ⁽⁶⁾	6.7E-06	9.9E-07	3.7E-06	46%	0.022	22%	0.0033	22%
PCBs															
Aroclor-1260	11096-82-5	0.2	Max	0.14	2.0E+00	--	1.2E-07	--	--	2.5E-07	3.0%	--	--	--	--
Inorganics															
Antimony	7440-36-0	8.42	Max	--	--	6.0E-05	--	--	--	--	--	--	--	--	--
Arsenic	7440-38-2	21	UCL	0.03	1.5E+00	3.0E-04	2.8E-06	2.2E-05	3.2E-06	4.2E-06	51%	0.072	73%	0.011	73%
Cobalt	7440-48-4	7.35	Max	--	--	3.0E-04	--	--	--	--	--	--	--	--	--
Manganese	7439-96-5	230	Max	--	--	1.4E-01	--	--	--	--	--	--	--	--	--
Mercury	7439-97-6	0.121	U	Max	--	--	--	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	53.8	Max	--	--	1.3E-04	--	--	--	--	--	--	--	--	--
										Cancer Risk		Hazard Index		Hazard Index	
Pathway Sums:										8E-06	100%	0.1	100%	0.01	100%

⁽¹⁾ COPC = Constituent of potential concern.
⁽²⁾ CAS = Chemical Abstracts Service number.
⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.
⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.
⁽⁵⁾ See Table G.2.4 for B(a)P-equivalent calculation.
⁽⁶⁾ See Table G.2.16 for mutagenic mode of action dermal contact calculation and risk calculation.
-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.15
MUTAGENIC MODE OF ACTION -- DERMAL CONTACT WITH SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 1
Parcel 83
Fort Monmouth, New Jersey

$$DAD = \frac{(C_s) \left(\frac{((ED_{0-2})(AF_{child})(SA_{child}))(10))}{BW_{child}} + \frac{((ED_{2-6})(AF_{child})(SA_{child}))(3))}{BW_{child}} + \frac{((ED_{6-16})(AF_{adult})(SA_{adult}))(3))}{BW_{adult}} + \frac{((ED_{16-30})(AF_{adult})(SA_{adult}))(1))}{BW_{adult}} \right) (ABS)(EF)(CF)}{AT_c}$$

Mutagenic Risk: $Risk = (DAD)(SF_d)$

Exposure Assumptions			
Receptor			
UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units
COPC Concentration in Soil	Cs	chemical-specific	mg/kg
Adherence Factor - adult	AF _{adult}	0.07	mg/cm2
Adherence Factor - child	AF _{child}	0.2	mg/cm2
Exposed Skin Surface Area - adult	SA _{adult}	6032	cm2
Exposed Skin Surface Area - child	SA _{child}	2690	cm2
Dermal Absorption Factor	ABS	chemical-specific	unitless
Exposure Frequency	EF	350	days/year
Exposure Duration, 0 to 2 years of age	ED ₀₋₂	2	years
Exposure Duration, 2 to 6 years of age	ED ₂₋₆	4	years
Exposure Duration, 6 to 16 years of age	ED ₆₋₁₆	10	years
Exposure Duration, 16 to 30 years of age	ED ₁₆₋₃₀	14	years
Conversion Factor-soil	CF _s	0.000001	kg/mg
Averaging Time – carcinogens	AT _c	25550	days
Body Weight - adult	BW _{adult}	80	kg
Body Weight - child	BW _{child}	15	kg
Dermal Absorbed Dose	DAD	chemical-specific	mg/kg-day
Oral Slope Factor Adjusted for GI Absorption	SF _d	chemical-specific	(mg/kg-day) ⁻¹

COPC ⁽¹⁾	CAS Number ⁽²⁾	Cs ⁽³⁾ (mg/kg)	ABS ⁽⁴⁾ (unitless)	Carcinogenic DAD (mg/kg-day)	SF _d (mg/kg-day) ⁻¹	Cancer Risk
Trichloroethene	79-01-6	5.8	--	--	4.6E-02	--
BaP-equivalent ⁽⁵⁾	50-32-8	1.5	1.3E-01	3.7E-06	1.0E+00	3.7E-06

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.

⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁵⁾ See Table G.2.4 for B(a)P-equivalent calculation.

Table G.2.16
RISK AND HAZARD ESTIMATES – INHALATION OF VOLATILES/FUGITIVE DUST FROM SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 1
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions				Equations
Receptor	UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units	
COPC concentration in air (C _a)	C _a	chemical-specific	µg/m ³	
COPC concentration in surface soil (C _s)	C _s	chemical-specific	mg/kg	
Exposure Frequency	EF	350	days/year	
Exposure Duration - inhalation	ED _{inh}	26	years	
Exposure Time	ET	1	unitless	
Averaging Time - carcinogens	AT _c	25550	days	
Averaging Time - noncarcinogens, inhalation	AT _{nc - inh}	9490	days	
Inhalation Unit Risk	IUR	chemical-specific	(µg/m ³) ⁻¹	
				$EC(air) = \frac{(C_a)(ET)(EF)(ED_{inh})}{(AT)}$
				Where for inorganics, C _a calculated as:
				$C_a = (C_s) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{PEF} \right)$
				Where for organics with C _s ≤ C _{sat} , or if no C _{sat} , C _a calculated as:
				$C_a = (C_s) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{VF} + \frac{1}{PEF} \right)$
				Where for organics with C _s > C _{sat} , C _a calculated as:
				$C_a = \left[(C_s) \left(1000 \frac{\mu g}{mg} \right) \left(\frac{1}{PEF} \right) \right] + \left[(C_{sat}) \left(1000 \frac{\mu g}{mg} \right) \left(\frac{1}{VF} \right) \right]$
Inhalation Reference Concentration	RfC	chemical-specific	mg/m ³	
Volatilization Factor	VF	chemical-specific	m ³ /kg	
Particulate emission factor ⁽¹⁾	PEF	1.27E+09	m ³ /kg	
Soil saturation	C _{sat}	chemical-specific	mg/kg	
Exposure concentration in air	EC(air)	chemical-specific	µg/m ³	

$$Risk = [EC(air)](IUR)$$

$$HQ = \frac{EC(air)}{(RfC) \left(1,000 \frac{\mu g}{mg} \right)}$$

COPC ⁽²⁾	CAS Number ⁽³⁾	C _s ⁽⁴⁾ (mg/kg)	UCL or Max	C _{sat} ⁽⁵⁾ (mg/kg)	Is C _s ≤ C _{sat} ?	Volatilization Factor ⁽⁶⁾ (m ³ /kg)	C _a (µg/m ³)	Carcinogenic EC(air) (µg/m ³)	Noncarcinogenic EC(air) (µg/m ³)	IUR ⁽⁵⁾ (µg/m ³) ⁻¹	RfC _i ⁽⁵⁾ (mg/m ³)	Cancer Risk	% of Total	Hazard Quotient	% of Total
Volatile Organic Compounds															
Trichloroethene	79-01-6	5.8	Max	6.9E+02	Yes	3.1E+03	1.9E+00	2.0E+00 ⁽⁸⁾	1.8E+00	4.1E-06	2.0E-03	8.0E-06	99%	0.90	97%
Semivolatile Organic Compounds															
1-Methylnaphthalene	90-12-0	0.054	Max	3.9E+02	Yes	8.2E+04	6.6E-04	--	--	--	--	--	--	--	--
2-Methylnaphthalene	91-57-6	4.3	Max	--	--	8.1E+04	5.3E-02	--	--	--	--	--	--	--	--
Bis(2-chloroethyl)ether	111-44-4	1.2	U	--	--	5.9E+04	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons															
BaP-equivalent ⁽⁵⁾	50-32-8	1.5	UCL	--	--	3.3E+07	4.7E-05	4.9E-05 ⁽⁸⁾	4.5E-05	6.0E-04	2.0E-06	2.9E-08	0.36%	0.022	2.4%
PCBs															
Aroclor-1260	11096-82-5	0.2	Max	--	--	1.8E+06	1.1E-04	3.9E-05	--	5.7E-04	--	2.2E-08	0.27%	--	--
Inorganics															
Antimony	7440-36-0	8.42	Max	--	--	--	6.6E-06	--	--	--	--	--	--	--	--
Arsenic	7440-38-2	21	UCL	--	--	--	1.7E-05	5.9E-06	1.6E-05	4.3E-03	1.5E-05	2.5E-08	0.31%	0.0011	0.11%
Cobalt	7440-48-4	7.35	Max	--	--	--	5.8E-06	2.1E-06	5.6E-06	9.0E-03	6.0E-06	1.9E-08	0.23%	0.00093	0.10%
Manganese	7439-96-5	230	Max	--	--	--	1.8E-04	--	1.7E-04	--	5.0E-05	--	--	0.0035	0.37%
Mercury	7439-97-6	0.121	U	--	--	4.9E+04	--	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	53.8	Max	--	--	--	4.2E-05	--	4.1E-05	--	1.0E-04	--	--	0.00041	0.044%
Pathway Sums:												Cancer Risk		Hazard Index	
												8E-06	100%	0.93	100%

⁽¹⁾ PEF calculated as shown in Table G.2.9.
⁽²⁾ COPC = Constituent of potential concern.
⁽³⁾ CAS = Chemical Abstracts Service number.
⁽⁴⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.
⁽⁵⁾ Human Health Toxicity Values shown in Table G.2.11.
⁽⁶⁾ See Table G.2.10 for VF calculation.
⁽⁷⁾ See Table G.2.4 for B(a)P-equivalent calculation.
⁽⁸⁾ See Table G.2.18 for mutagenic mode of action inhalation calculation and risk calculation.
-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.17
MUTAGENIC MODE OF ACTION -- INHALATION OF VOLATILES/FUGITIVE DUST FROM SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 1
Parcel 83
Fort Monmouth, New Jersey

Equations

$$EC(air) = \frac{(C_a)(ET)(EF)[((ED_{0-2})(10)) + ((ED_{2-6})(3)) + ((ED_{6-16})(3)) + ((ED_{6-30})(1))]}{AT_c}$$

where: $C_a = (C_s)(1,000 \mu g / mg) \left(\frac{1}{VF} + \frac{1}{PEF} \right)$

$$Mutagenic Risk_{inh} = [(EC(air))(IUR)]$$

Exposure Assumptions			
Receptor UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units
COPC in air	C _a	chemical-specific	μg/m ³
COPC Concentration in Soil	C _s	chemical-specific	mg/kg
Exposure Frequency	EF	350	days/year
Exposure Duration, 0 to 2 years of age	ED ₀₋₂	2	years
Exposure Duration, 2 to 6 years of age	ED ₂₋₆	4	years
Exposure Duration, 6 to 16 years of age	ED ₆₋₁₆	10	years
Exposure Duration, 16 to 30 years of age	ED ₁₆₋₃₀	14	years
Exposure Time	ET	1	unitless
Averaging Time – carcinogens	AT _c	25550	days
Inhalation Unit Risk	IUR	chemical-specific	(μg/m ³) ⁻¹
Volatilization Factor (VF)	VF	chemical-specific	m ³ /kg
Particulate emission factor (PEF) ⁽¹⁾	PEF	1.27E+09	m ³ /kg
Exposure concentration in air	EC(air)	chemical-specific	μg/m ³

COPC ⁽²⁾	CAS Number ⁽³⁾	C _s ⁽⁴⁾ (mg/kg)	Volatilization Factor ⁽⁵⁾ (m ³ /kg)	C _a (μg/m ³)	Carcinogenic EC(air) (μg/m ³)	IUR ⁽⁶⁾ (μg/m ³) ⁻¹	Cancer Risk
Trichloroethene	79-01-6	5.8	3.1E+03	1.9E+00	2.0E+00	4.1E-06	8.0E-06
BaP-equivalent ⁽⁷⁾	50-32-8	1.5	3.3E+07	4.7E-05	4.9E-05	6.0E-04	2.9E-08

⁽¹⁾ PEF calculated as shown in Table G.2.9.

⁽²⁾ COPC = Constituent of potential concern.

⁽³⁾ CAS = Chemical Abstracts Service number.

⁽⁴⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.

⁽⁵⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁶⁾ See Table G.2.10 for VF calculation.

⁽⁷⁾ See Table G.2.4 for B(a)P-equivalent calculation.

Table G.2.18
HUMAN HEALTH RISK EVALUATION SUMMARY FOR SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 1
Parcel 83
Fort Monmouth, New Jersey

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	Age -adjusted Ingestion Carcinogenic Risk	Age-adjusted Dermal Carcinogenic Risk	Age-adjusted Inhalation Carcinogenic Risk	Total Carcinogenic Risk	Child Ingestion Hazard Quotient	Child Dermal Hazard Quotient	Adult Ingestion Hazard Quotient	Adult Dermal Hazard Quotient	Inhalation Hazard Quotient	Total Hazard Quotient - Child	Total Hazard Quotient - Adult
Volatile Organic Compounds														
Trichloroethene	79-01-6	5.8	Max	1.8E-06	--	8.0E-06	1E-05	0.15	--	0.014	--	0.90	1	0.9
Semivolatile Organic Compounds														
1-Methylnaphthalene	90-12-0	0.054	Max	2.3E-09	8.9E-10	--	3E-09	0.000010	0.0000034	0.00000092	0.00000051	--	0.00001	0.000001
2-Methylnaphthalene	91-57-6	4.3	Max	--	--	--	--	0.014	0.0048	0.0013	0.00071	--	0.02	0.002
Bis(2-chloroethyl)ether	111-44-4	1.2	U	Max	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons														
BaP-equivalent ⁽⁴⁾	50-32-8	1.5	UCL	9.9E-06	3.7E-06	2.9E-08	1E-05	0.064	0.022	0.0060	0.0033	0.022	0.1	0.03
PCBs														
Aroclor-1260	11096-82-5	0.2	Max	5.8E-07	2.5E-07	2.2E-08	8E-07	--	--	--	--	--	--	--
Inorganics														
Antimony	7440-36-0	8.42	Max	--	--	--	--	0.27	--	0.025	--	--	0.3	0.03
Arsenic	7440-38-2	21	UCL	4.5E-05	4.2E-06	2.5E-08	5E-05	0.89	0.072	0.084	0.011	0.0011	1	0.1
Cobalt	7440-48-4	7.35	Max	--	--	1.9E-08	2E-08	0.31	--	0.029	--	0.00093	0.3	0.03
Manganese	7439-96-5	230	Max	--	--	--	--	0.021	--	0.0020	--	0.0035	0.02	0.01
Mercury	7439-97-6	0.121	U	Max	--	--	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	53.8	Max	--	--	--	--	0.14	--	0.013	--	0.00041	0.1	0.01
Pathway Risk				6E-05	8E-06	8E-06	--	2	0.1	0.2	0.01	0.9	--	--
Total Risk												Hazard Index		
7E-05												3		
												1		

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.

⁽⁴⁾ See Table G.2.4 for B(a)P-equivalent calculation.

-- Risk/hazard not calculated because toxicity value was not available.

Table G.2.19
TARGET ORGANS AND TOXIC CRITICAL EFFECTS FOR SEGREGATED HAZARD INDICES FOR SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 1
Parcel 83
Fort Monmouth, New Jersey

Constituent	Child Ingestion + Dermal Hazard Index (1)	Inhalation Hazard Index (1)	Ingestion + Dermal			Inhalation		
			Target Organ	Toxic Critical Effect	Source	Target Organ	Toxic Critical Effect	Source
Trichloroethene	0.1	0.9	Heart	Increased fetal cardiac malformations in Sprague-Dawley rats	IRIS	Thymus	Decreased thymus weight in female B6C3F1 mice (immunotoxicity)	IRIS
1-Methylnaphthalene	0.00001	--	Respiratory	Increased incidence of pulmonary alveolar proteinosis	ATSDR Final	--	--	--
2-Methylnaphthalene	0.02	--	Lungs	Pulmonary alveolar proteinosis	IRIS	--	--	--
Bis(2-chloroethyl)ether	--	--	--	--	--	--	--	--
Benzo(a)pyrene [B(a)P Equivalent Concentration]	0.09	0.02	Developmental	Neurobehavioral changes	IRIS	Developmental	Decreased embryo/fetal survival	IRIS
Aroclor-1260	--	--	--	--	--	--	--	--
Antimony	0.3	--	Whole body	Longevity, blood glucose, and cholesterol	IRIS	--	--	--
Arsenic	1	0.001	Cardiovascular and Dermal	Hyperpigmentation, keratosis and possible vascular complications	IRIS	--	--	--
Cobalt	0.3	0.0009	Thyroid	Decreased iodine uptake	PPRTV Current	Respiratory Tract; Lung	Irritation; Decreased function	PPRTV Current
Manganese	0.02	0.003	Nervous	CNS effects	IRIS	Nervous	Impairment of neurobehavioral function	IRIS
Mercury	--	--	--	--	--	Nervous	Hand tremor; increases in memory disturbances; slight subjective and objective evidence of autonomic dysfunction	IRIS
Vanadium	0.1	0.0004	Dermal	Decreased hair cystine	SURROGAT E. See Vanadium Pentoxide. MW contribution adjustment.	Respiratory	hyperplasia of alveolar and bronchiolar epithelium, degeneration and hyperplasia of epiglottis epithelium, and goblet cell hyperplasia in nasal respiratory epithelium	ATSDR Final

(1) See Table G.2.19 for hazard indices.

(2) ATSDR - Agency for Toxic Substances and Disease Registry (<http://www.atsdr.cdc.gov/>)

IRIS - Integrated Risk Information System (<http://www.epa.gov/IRIS/>)

PPRTV - Provisional Peer Reviewed Toxicity Values for Superfund (<http://hhpprtv.onml.gov/>)

Table G.2.20
NONCANCER HAZARDS SEPARATED BY TARGET ORGAN FOR SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 1
Parcel 83
Fort Monmouth, New Jersey

Target Organ	Constituent Groupings for Ingestion + Dermal Exposure Pathways	Ingestion + Dermal Hazard Index ⁽¹⁾	Constituent Groupings for Inhalation Exposure Pathways	Inhalation Hazard Index ⁽¹⁾	Summed Segregated Hazard Index ⁽²⁾
Cardiovascular system	Trichloroethene	0.1	N/A	N/A	1
	Arsenic	1			
Dermal	Arsenic	1	N/A	N/A	1
	Vanadium	0.1			
Develomental	BaP	0.09	BaP	0.02	0.1
Nervous	Manganese	0.02	Manganese	0.003	0.02
			Mercury	--	
Respiratory system	1-Methylnaphthalene	0.00001	Cobalt	0.0009	0.02
	2-Methylnaphthalene	0.02	Vanadium	0.0004	
Thymus	N/A	N/A	Trichloroethene	0.9	0.9
Thyroid	Cobalt	0.3	N/A	N/A	0.3
Whole Body	Antimony	0.3	N/A	N/A	0.3

⁽¹⁾ See Table G.2.20.

⁽²⁾ Sum of the ingestion+dermal and inhalation hazard indices for the applicable target organ.

-- Hazard not calculated because analyte was not detected at the exposure area.

N/A - Not applicable. Does not have a toxicity value for the exposure pathway.

Table G.2.21
RISK AND HAZARD ESTIMATES – INCIDENTAL INGESTION OF SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 2
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions				Equations
Receptor	UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units	
COPC Concentration in Soil	C _s	chemical-specific	mg/kg	
Soil Ingestion Rate - adult	IRS _{adult}	100	mg/day	
Soil Ingestion Rate - child	IRS _{child}	200	mg/day	
Age-adjusted soil ingestion factor	IFS _{adj}	105	(mg-year)/(kg-day)	
Exposure Frequency	EF	350	days/year	
Exposure Duration - adult	ED _{adult}	20	years	
Exposure Duration - child	ED _{child}	6	years	
Conversion Factor-soil	CF _s	0.000001	kg/mg	
Averaging Time – carcinogens	AT _c	25550	days	
Averaging Time – noncarcinogens, child	AT _{nc} - child	2190	days	
Averaging Time – noncarcinogens, adult	AT _{nc} - adult	7300	days	
Oral Slope Factor	SF _o	chemical-specific	(mg/kg-day) ⁻¹	
Body Weight - adult	BW _{adult}	80	kg	
Body Weight - child	BW _{child}	15	kg	
Fraction Ingested	FI	1	unitless	
Oral Reference Dose	RfD _o	chemical-specific	mg/kg-day	

Incidental ingestion of carcinogenic COPCs in soil for multiple age groups simultaneously:

$$Ingestion_{age-adj} = \frac{(C_s)(IFS_{adj})(EF)(CF_s)(FI)}{(AT_c)}$$

where:

$$IFS_{adj} = \frac{(ED_{child})(IRS_{child})}{(BW_{child})} + \frac{(ED_{adult})(IRS_{adult})}{(BW_{adult})}$$

Incidental ingestion of noncarcinogenic COPCs in soil for separate age groups:

$$Ingestion = \frac{(C_s)(IRS)(EF)(ED)(CF_s)(FI)}{(AT_{nc})(BW)}$$

Carcinogenic Risk:

$$Risk = (Ingestion)(SF_o)$$

Noncarcinogenic Hazard:

$$HQ = Ingestion/RfD_o$$

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	Carcinogenic Ingestion _{age-adj} (mg/kg-day)	Noncarcinogenic Ingestion - Child (mg/kg-day)	Noncarcinogenic Ingestion - Adult (mg/kg-day)	SFo ⁽⁴⁾ (mg/kg-day) ⁻¹	RfDo ⁽⁴⁾ (mg/kg-day)	Cancer Risk	% of Total	Hazard Quotient - Child	% of Total	Hazard Quotient - Adult	% of Total	
Volatile Organic Compounds															
Trichloroethene	79-01-6	0.27	U	Max	-- ⁽⁶⁾	--	--	--	--	--	--	--	--	--	
Semivolatile Organic Compounds															
1-Methylnaphthalene	90-12-0	0.32	J	Max	4.6E-07	0.0000041	0.00000038	2.9E-02	7.0E-02	1.3E-08	0.010%	0.000058	0.0034%	0.0000055	0.0034%
2-Methylnaphthalene	91-57-6	0.29	J	Max	--	0.0000037	0.00000035	--	4.0E-03	--	0.00093	0.054%	0.000087	0.054%	
Bis(2-chloroethyl)ether	111-44-4	0.24	J	Max	3.5E-07	--	--	1.1E+00	--	3.8E-07	0.29%	--	--	--	
Polycyclic Aromatic Hydrocarbons															
BaP-equivalent ⁽⁵⁾	50-32-8	17		UCL	1.1E-04 ⁽⁶⁾	0.00022	0.000020	1.0E+00	3.0E-04	1.1E-04	85%	0.72	42%	0.068	42%
PCBs															
Aroclor-1254	11097-69-1	0.22	J	Max	3.2E-07	0.0000028	0.00000026	2.0E+00	2.0E-05	6.3E-07	0.48%	0.14	8.2%	0.013	8.2%
Aroclor-1260	11096-82-5	0.8		Max	1.2E-06	--	--	2.0E+00	--	2.3E-06	1.8%	--	--	--	--
Inorganics															
Antimony	7440-36-0	6.5		Max	--	0.000083	0.0000078	--	4.0E-04	--	--	0.21	12%	0.019	12%
Arsenic	7440-38-2	7.34		Max	1.1E-05	0.000094	0.0000088	1.5E+00	3.0E-04	1.6E-05	12%	0.31	18%	0.029	18%
Cobalt	7440-48-4	5.07		Max	--	0.000065	0.0000061	--	3.0E-04	--	0.22	13%	0.020	13%	
Manganese	7439-96-5	292	U	Max	--	--	--	--	--	--	--	--	--	--	--
Mercury	7439-97-6	4.06		Max	--	--	--	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	47.8		Max	--	0.00061	0.000057	--	5.0E-03	--	0.12	7.1%	0.011	7.1%	
Pathway Sums:									Cancer Risk		Hazard Index		Hazard Index		
									1E-04	100%	2	100%	0.2	100%	

⁽¹⁾ COPC = Constituent of potential concern.
⁽²⁾ CAS = Chemical Abstracts Service number.
⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.
⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.
⁽⁵⁾ See Table G.2.4 for B(a)P-equivalent calculation.
⁽⁶⁾ See Table G.2.23 for mutagenic mode of action ingestion intake calculation and risk calculation.
-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.22
MUTAGENIC MODE OF ACTION – INCIDENTAL INGESTION OF SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 2
Parcel 83
Fort Monmouth, New Jersey

Risk Equation

$$Ingestion = \frac{C_s \times \left(\frac{((ED_{0-2})(IRS_{child})(10))}{BW_{child}} + \frac{((ED_{2-6})(IRS_{child})(3))}{BW_{child}} + \frac{((ED_{6-16})(IRS_{adult})(3))}{BW_{adult}} + \frac{((ED_{16-30})(IRS_{adult})(1))}{BW_{adult}} \right) \times EF \times CF_s}{AT_c}$$

Mutagenic Risk: $Risk = (Ingestion)(SF_o)$

Exposure Assumptions			
Receptor UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units
COPC Concentration in Soil (C _s)	C _s	chemical-specific	mg/kg
Soil Ingestion Rate - adult	IRS _{adult}	100	mg/day
Soil Ingestion Rate - child	IRS _{child}	200	mg/day
Exposure Frequency	EF	350	days/year
Exposure Duration, 0 to 2 years of age	ED ₀₋₂	2	years
Exposure Duration, 2 to 6 years of age	ED ₂₋₆	4	years
Exposure Duration, 6 to 16 years of age	ED ₆₋₁₆	10	years
Exposure Duration, 16 to 30 years of age	ED ₁₆₋₃₀	14	years
Conversion Factor-soil	CF _s	0.000001	kg/mg
Averaging Time – carcinogens	AT _c	25550	days
Oral Slope Factor	SF _o	chemical-specific	(mg/kg-day) ⁻¹
Body Weight - adult	BW _{adult}	80	kg
Body Weight - child	BW _{child}	15	kg

COPC ⁽¹⁾	CAS Number ⁽²⁾	Cs ⁽³⁾ (mg/kg)	Carcinogenic Ingestion (mg/kg-day)	SFo ⁽⁴⁾ (mg/kg-day) ⁻¹	Cancer Risk
Trichloroethene	79-01-6	0.3	1.8E-06	4.6E-02	8.2E-08
BaP-equivalent ⁽⁵⁾	50-32-8	17.0	1.1E-04	1.0E+00	1.1E-04

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.

⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁵⁾ See Table G.2.4 for B(a)P-equivalent calculation.

Table G.2.23
RISK AND HAZARD ESTIMATES – DERMAL CONTACT WITH SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 2
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions			
Receptor	UU/UE RECEPTOR		
Parameter	Abbreviation	Value	Units
COPC Concentration in Soil	C _s	chemical-specific	mg/kg
Exposure Frequency	EF	350	days/year
Exposure Duration - adult	ED _{adult}	20	years
Exposure Duration - child	ED _{child}	6	years
Event Frequency	EV	1	events/day
Exposed Skin Surface Area - adult	SA _{adult}	6032	cm ²
Exposed Skin Surface Area - child	SA _{child}	2690	cm ²
Age-adjusted dermal contact factor	SFS _{adj}	321	(mg-year)/(kg-event)
Adherence Factor - adult	AF _{adult}	0.07	mg/cm ²
Adherence Factor - child	AF _{child}	0.2	mg/cm ²
Dermal Absorption Factor	ABS _d	chemical-specific	unitless
Averaging Time – carcinogens	AT _c	25550	days
Averaging Time – noncarcinogens, child	AT _{nc} - child	2190	days
Averaging Time – noncarcinogens, adult	AT _{nc} - adult	7300	days
Oral Slope Factor Adjusted for GI Absorption	SF _d	chemical-specific	(mg/kg-day) ⁻¹
Body Weight - adult	BW _{adult}	80	kg
Body Weight - child	BW _{child}	15	kg
Oral Reference Dose Adjusted for GI Absorption	RfD _d	chemical-specific	mg/kg-day
Conversion Factor-soil	CF _s	0.000001	kg/mg
Fraction of contaminant absorbed in gastrointestinal tract	GIABS	chemical-specific	unitless
Dermal Absorbed Dose	DAD	chemical-specific	mg/kg-day
Absorbed dose per event	DA _{event}	chemical-specific	mg/cm ² -event

Equations

Dermal absorbed dose for carcinogenic COPCs in soil for multiple age groups simultaneously:

$$DAD = \frac{(C_s)(SFS_{adj})(ABS_d)(EF)(EV)(CF)}{(AT)}$$

where:

$$SFS_{adj} = \frac{(ED_{child})(AF_{child})(SA_{child})}{(BW_{child})} + \frac{(ED_{adult})(AF_{adult})(SA_{adult})}{(BW_{adult})}$$

Dermal absorbed dose of noncarcinogenic COPCs in soil for separate age groups:

$$DAD = \frac{(DA_{event})(EF)(ED)(EV)(SA)}{(BW)(AT)}$$

where:

$$DA_{event} = (C_s)(CF_s)(AF)(ABS_d)$$

Carcinogenic Risk:

$$Risk = (DAD)(SF_d)$$

where:

$$SF_d = SF_o / GIABS$$

Noncarcinogenic Hazard:

$$HQ = DAD / Rf_d$$

where:

$$RfD_d = (RfD_o)(GIABS)$$

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	ABS _d ⁽⁴⁾ (unitless)	SF _d ⁽⁴⁾ (mg/kg-day) ⁻¹	RfD _d ⁽⁴⁾ (mg/kg-day)	Carcinogenic DAD (mg/kg-day)	Noncarcinogenic DAD - Child (mg/kg-day)	Noncarcinogenic DAD - Adult (mg/kg-day)	Cancer Risk	% of Total	Hazard Quotient - Child	% of Total	Hazard Quotient - Adult	% of Total
Volatile Organic Compounds															
Trichloroethene	79-01-6	0.27	U	Max	--	4.6E-02	5.0E-04	-- ⁽⁶⁾	--	--	--	--	--	--	--
Semivolatile Organic Compounds															
1-Methylnaphthalene	90-12-0	0.32	J	Max	0.13	2.9E-02	7.0E-02	1.8E-07	1.4E-06	2.1E-07	5.3E-09	0.012%	0.000020	0.0062%	0.0000030
2-Methylnaphthalene	91-57-6	0.29	J	Max	0.13	--	4.0E-03	--	1.3E-06	1.9E-07	--	--	0.00032	0.10%	0.000048
Bis(2-chloroethyl)ether	111-44-4	0.24	J	Max	--	1.1E+00	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons															
BaP-equivalent ⁽⁵⁾	50-32-8	17		UCL	0.13	1.0E+00	3.0E-04	4.2E-05 ⁽⁶⁾	7.6E-05	1.1E-05	4.2E-05	94%	0.25	76%	0.037
PCBs															
Aroclor-1254	11097-69-1	0.22	J	Max	0.14	2.0E+00	2.0E-05	1.4E-07	1.1E-06	1.6E-07	2.7E-07	0.61%	0.053	16%	0.0078
Aroclor-1260	11096-82-5	0.8		Max	0.14	2.0E+00	--	4.9E-07	--	--	9.8E-07	2.2%	--	--	--
Inorganics															
Antimony	7440-36-0	6.5		Max	--	--	6.0E-05	--	--	--	--	--	--	--	--
Arsenic	7440-38-2	7.34		Max	0.03	1.5E+00	3.0E-04	9.7E-07	7.6E-06	1.1E-06	1.5E-06	3.3%	0.025	7.6%	0.0037
Cobalt	7440-48-4	5.07		Max	--	--	3.0E-04	--	--	--	--	--	--	--	--
Manganese	7439-96-5	292	U	Max	--	--	1.4E-01	--	--	--	--	--	--	--	--
Mercury	7439-97-6	4.06		Max	--	--	--	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	47.8		Max	--	--	1.3E-04	--	--	--	--	--	--	--	--
Pathway Sums:										Cancer Risk		Hazard Index		Hazard Index	
										4E-05	100%	0.3	100%	0.05	100%

⁽¹⁾ COPC = Constituent of potential concern.
⁽²⁾ CAS = Chemical Abstracts Service number.
⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.
⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.
⁽⁵⁾ See Table G.2.4 for B(a)P-equivalent calculation.
⁽⁶⁾ See Table G.2.25 for mutagenic mode of action dermal contact calculation and risk calculation.
-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.24
MUTAGENIC MODE OF ACTION -- DERMAL CONTACT WITH SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 2
Parcel 83
Fort Monmouth, New Jersey

Equations

$$DAD = \frac{(C_s) \left(\frac{((ED_{0-2})(AF_{child})(SA_{child})(10))}{BW_{child}} + \frac{((ED_{2-6})(AF_{child})(SA_{child})(3))}{BW_{child}} + \frac{((ED_{6-16})(AF_{adult})(SA_{adult})(3))}{BW_{adult}} + \frac{((ED_{16-30})(AF_{adult})(SA_{adult})(1))}{BW_{adult}} \right) (ABS)(EF)(CF)}{AT_c}$$

Mutagenic Risk: $Risk = (DAD)(SF_d)$

Exposure Assumptions			
Receptor UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units
COPC Concentration in Soil	Cs	chemical-specific	mg/kg
Adherence Factor - adult	AF _{adult}	0.07	mg/cm2
Adherence Factor - child	AF _{child}	0.2	mg/cm2
Exposed Skin Surface Area - adult	SA _{adult}	6032	cm2
Exposed Skin Surface Area - child	SA _{child}	2690	cm2
Dermal Absorption Factor	ABS	chemical-specific	unitless
Exposure Frequency	EF	350	days/year
Exposure Duration, 0 to 2 years of age	ED ₀₋₂	2	years
Exposure Duration, 2 to 6 years of age	ED ₂₋₆	4	years
Exposure Duration, 6 to 16 years of age	ED ₆₋₁₆	10	years
Exposure Duration, 16 to 30 years of age	ED ₁₆₋₃₀	14	years
Conversion Factor-soil	CF _s	0.000001	kg/mg
Averaging Time -- carcinogens	AT _c	25550	days
Body Weight - adult	BW _{adult}	80	kg
Body Weight - child	BW _{child}	15	kg
Dermal Absorbed Dose	DAD	chemical-specific	mg/kg-day
Oral Slope Factor Adjusted for GI Absorption	SF _d	chemical-specific	(mg/kg-day) ⁻¹

COPC ⁽¹⁾	CAS Number ⁽²⁾	Cs ⁽³⁾ (mg/kg)	ABS ⁽⁴⁾ (unitless)	Carcinogenic DAD (mg/kg-day)	SF _d (mg/kg-day) ⁻¹	Cancer Risk
Trichloroethene	79-01-6	0.3	--	--	4.6E-02	--
BaP-equivalent ⁽⁵⁾	50-32-8	17.0	1.3E-01	4.2E-05	1.0E+00	4.2E-05

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.

⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁵⁾ See Table G.2.4 for B(a)P-equivalent calculation.

Table G.2.25
RISK AND HAZARD ESTIMATES – INHALATION OF VOLATILES/FUGITIVE DUST FROM SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 2
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions		Equations	
Receptor	UU/UE RECEPTOR		
Parameter	Abbreviation	Value	Units
COPC concentration in air (C _a)	C _a	chemical-specific	µg/m ³
COPC concentration in surface soil (C _s)	C _s	chemical-specific	mg/kg
Exposure Frequency	EF	350	days/year
Exposure Duration - inhalation	ED _{inh}	26	years
Exposure Time	ET	1	unitless
Averaging Time – carcinogens	AT _c	25550	days
Averaging Time - noncarcinogens, inhalation	AT _{nc - inh}	9490	days
Inhalation Unit Risk	IUR	chemical-specific	(µg/m ³) ⁻¹
Inhalation Reference Concentration	RfC	chemical-specific	mg/m ³
Volatilization Factor	VF	chemical-specific	m ³ /kg
Particulate emission factor ⁽¹⁾	PEF	1.27E+09	m ³ /kg
Soil saturation	C _{sat}	chemical-specific	mg/kg
Exposure concentration in air	EC(air)	chemical-specific	µg/m ³

Exposure concentration in air for soil particulates and vapors emitted from soil for carcinogens and noncarcinogens:

$$EC(air) = \frac{(C_a)(ET)(EF)(ED_{inh})}{(AT)}$$

Where for inorganics, C_a calculated as:

$$C_a = (C_s) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{PEF} \right)$$

Where for organics with C_s ≤ C_{sat}, or if no C_{sat}, C_a calculated as:

$$C_a = (C_s) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{VF} + \frac{1}{PEF} \right)$$

Risk = [EC(air)](IUR)

Exposure concentration in air for soil particulates and vapors emitted from soil for carcinogens and noncarcinogens:

$$EC(air) = \frac{(C_a)(ET)(EF)(ED_{inh})}{(AT)}$$

Where for inorganics, C_a calculated as:

$$C_a = (C_s) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{PEF} \right)$$

Where for organics with $C_s \leq C_{sat}$, or if no C_{sat} , C_a calculated as:

$$C_a = (C_s) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{VF} + \frac{1}{PEF} \right)$$

Where for organics with $C_s > C_{sat}$, C_a calculated as:

$$C_a = \left[(C_s) \left(1000 \frac{\mu g}{mg} \right) \left(\frac{1}{PEF} \right) \right] + \left[(C_{sat}) \left(1000 \frac{\mu g}{mg} \right) \left(\frac{1}{VF} \right) \right]$$

$$Risk = [EC(air)](IUR)$$

$$HQ = \frac{EC(air)}{(RfC)\left(1,000 \frac{\mu g}{mg}\right)}$$

COPC ⁽²⁾	CAS Number ⁽³⁾	C _s ⁽⁴⁾ (mg/kg)	UCL or Max	C _{sat} ⁽⁵⁾ (mg/kg)	Is C _a ≤ C _{sat} ?	Volatilization Factor ⁽⁶⁾ (m ³ /kg)	C _a (μg/m ³)	Carcinogenic EC(air) (μg/m ³)	Noncarcinogenic EC(air) (μg/m ³)	IUR ⁽⁵⁾ (μg/m3) ⁻¹	RfC _i ⁽⁵⁾ (mg/m ³)	Cancer Risk	% of Total	Hazard Quotient	% of Total
Volatile Organic Compounds															
Trichloroethene	79-01-6	0.27	U	Max	--	--	3.1E+03	--	-- ⁽⁸⁾	--	--	--	--	--	--
Semivolatile Organic Compounds															
1-Methylnaphthalene	90-12-0	0.32	J	Max	3.9E+02	Yes	8.2E+04	3.9E-03	--	--	--	--	--	--	--
2-Methylnaphthalene	91-57-6	0.29	J	Max	--	--	8.1E+04	3.6E-03	--	--	--	--	--	--	--
Bis(2-chloroethyl)ether	111-44-4	0.24	J	Max	5.1E+03	Yes	5.9E+04	4.0E-03	1.4E-03	--	3.3E-04	--	4.7E-07	50%	--
Polycyclic Aromatic Hydrocarbons															
BaP-equivalent ⁽⁵⁾	50-32-8	17	UCL	--	--	3.3E+07	5.3E-04	5.5E-04 ⁽⁸⁾	5.1E-04	6.0E-04	2.0E-06	3.3E-07	35%	0.25	55%
PCBs															
Aroclor-1254	11097-69-1	0.22	J	Max	--	--	1.2E+06	1.9E-04	6.7E-05	--	5.7E-04	--	3.8E-08	4.0%	--
Aroclor-1260	11096-82-5	0.8	Max	--	--	1.8E+06	4.4E-04	1.6E-04	--	5.7E-04	--	8.8E-08	9.3%	--	--
Inorganics															
Antimony	7440-36-0	6.5	Max	--	--	--	5.1E-06	--	--	--	--	--	--	--	--
Arsenic	7440-38-2	7.34	Max	--	--	--	5.8E-06	2.1E-06	5.6E-06	4.3E-03	1.5E-05	8.9E-09	0.93%	0.00037	0.080%
Cobalt	7440-48-4	5.07	Max	--	--	--	4.0E-06	1.4E-06	3.8E-06	9.0E-03	6.0E-06	1.3E-08	1.3%	0.00064	0.14%
Manganese	7439-96-5	292	U	Max	--	--	--	--	--	--	--	--	--	--	--
Mercury	7439-97-6	4.06	Max	3.1E+00	No	4.9E+04	6.4E-02	--	6.2E-02	--	3.0E-04	--	--	0.21	45%
Vanadium	7440-62-2	47.8	Max	--	--	--	3.8E-05	--	3.6E-05	--	1.0E-04	--	--	0.00036	0.079%
Pathway Sums:												Cancer Risk 1E-06	100%	Hazard Index 0.5	100%

- (1) PEF calculated as shown in Table G.2.9.
- (2) COPC = Constituent of potential concern.
- (3) CAS = Chemical Abstracts Service number.
- (4) COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration.
- (5) Human Health Toxicity Values shown in Table G.2.11.
- (6) See Table G.2.10 for VF calculation.
- (7) See Table G.2.4 for B(a)P-equivalent calculation.
- (8) See Table G.2.27 for mutagenic mode of action inhalation calculation and risk calculation.

-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.26
MUTAGENIC MODE OF ACTION -- INHALATION OF VOLATILES/FUGITIVE DUST FROM SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 2
Parcel 83
Fort Monmouth, New Jersey

Equations

$$EC(air) = \frac{(C_a)(ET)(EF)[((ED_{0-2})(10)) + ((ED_{2-6})(3)) + ((ED_{6-16})(3)) + ((ED_{6-30})(1))]}{AT_c}$$

where: $C_a = (C_s)(1,000 \mu g / mg) \left(\frac{1}{VF} + \frac{1}{PEF} \right)$

$$Mutagenic Risk_{inh} = [(EC(air))(IUR)]$$

Exposure Assumptions			
Receptor UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units
COPC in air	C _a	chemical-specific	μg/m ³
COPC Concentration in Soil	C _s	chemical-specific	mg/kg
Exposure Frequency	EF	350	days/year
Exposure Duration, 0 to 2 years of age	ED ₀₋₂	2	years
Exposure Duration, 2 to 6 years of age	ED ₂₋₆	4	years
Exposure Duration, 6 to 16 years of age	ED ₆₋₁₆	10	years
Exposure Duration, 16 to 30 years of age	ED ₁₆₋₃₀	14	years
Exposure Time	ET	1	unitless
Averaging Time – carcinogens	AT _c	25550	days
Inhalation Unit Risk	IUR	chemical-specific	(μg/m ³) ⁻¹
Volatilization Factor (VF)	VF	chemical-specific	m ³ /kg
Particulate emission factor (PEF) ⁽¹⁾	PEF	1.27E+09	m ³ /kg
Exposure concentration in air	EC(air)	chemical-specific	μg/m ³

COPC ⁽²⁾	CAS Number ⁽³⁾	C _s ⁽⁴⁾ (mg/kg)	Volatilization Factor ⁽⁵⁾ (m ³ /kg)	C _a (μg/m ³)	Carcinogenic EC(air) (μg/m ³)	IUR ⁽⁶⁾ (μg/m ³) ⁻¹	Cancer Risk
Trichloroethene	79-01-6	0.3	3.1E+03	8.7E-02	9.1E-02	4.1E-06	3.7E-07
BaP-equivalent ⁽⁷⁾	50-32-8	17.0	3.3E+07	5.3E-04	5.5E-04	6.0E-04	3.3E-07

⁽¹⁾ PEF calculated as shown in Table G.2.9.

⁽²⁾ COPC = Constituent of potential concern.

⁽³⁾ CAS = Chemical Abstracts Service number.

⁽⁴⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.

⁽⁵⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁶⁾ See Table G.2.10 for VF calculation.

⁽⁷⁾ See Table G.2.4 for B(a)P-equivalent calculation.

Table G.2.27
HUMAN HEALTH RISK EVALUATION SUMMARY FOR SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 2
Parcel 83
Fort Monmouth, New Jersey

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)		UCL or Max	Age -adjusted Ingestion Carcinogenic Risk	Age-adjusted Dermal Carcinogenic Risk	Age-adjusted Inhalation Carcinogenic Risk	Total Carcinogenic Risk	Child Ingestion Hazard Quotient	Child Dermal Hazard Quotient	Adult Ingestion Hazard Quotient	Adult Dermal Hazard Quotient	Inhalation Hazard Quotient	Total Hazard Quotient - Child	Total Hazard Quotient - Adult
Volatile Organic Compounds															
Trichloroethene	79-01-6	0.27	U	Max	--	--	--	--	--	--	--	--	--	--	--
Semivolatile Organic Compounds															
1-Methylnaphthalene	90-12-0	0.32	J	Max	1.3E-08	5.3E-09	--	2E-08	0.000058	0.000020	0.0000055	0.0000030	--	0.00008	0.000008
2-Methylnaphthalene	91-57-6	0.29	J	Max	--	--	--	--	0.00093	0.00032	0.000087	0.000048	--	0.001	0.0001
Bis(2-chloroethyl)ether	111-44-4	0.24	J	Max	3.8E-07	--	4.7E-07	9E-07	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons															
BaP-equivalent ⁽⁴⁾	50-32-8	17		UCL	1.1E-04	4.2E-05	3.3E-07	2E-04	0.72	0.25	0.068	0.037	0.25	1	0.4
PCBs															
Aroclor-1254	11097-69-1	0.22	J	Max	6.3E-07	2.7E-07	3.8E-08	9E-07	0.14	0.053	0.013	0.0078	--	0.2	0.02
Aroclor-1260	11096-82-5	0.8		Max	2.3E-06	9.8E-07	8.8E-08	3E-06	--	--	--	--	--	--	--
Inorganics															
Antimony	7440-36-0	6.5		Max	--	--	--	--	0.21	--	0.019	--	--	0.2	0.02
Arsenic	7440-38-2	7.34		Max	1.6E-05	1.5E-06	8.9E-09	2E-05	0.31	0.025	0.029	0.0037	0.00037	0.3	0.03
Cobalt	7440-48-4	5.07		Max	--	--	1.3E-08	1E-08	0.22	--	0.020	--	0.00064	0.2	0.02
Manganese	7439-96-5	292	U	Max	--	--	--	--	--	--	--	--	--	--	--
Mercury	7439-97-6	4.06		Max	--	--	--	--	--	--	--	--	0.21	0.2	0.2
Vanadium	7440-62-2	47.8		Max	--	--	--	--	0.12	--	0.011	--	0.00036	0.1	0.01
Pathway Risk					1E-04	4E-05	1E-06	--	2	0.3	0.2	0.05	0.5	--	--
								Total Risk	2E-04						
													Hazard Index	3	0.7

⁽¹⁾ COPC = Constituent of potential concern.
⁽²⁾ CAS = Chemical Abstracts Service number.
⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.
⁽⁴⁾ See Table G.2.4 for B(a)P-equivalent calculation.
-- Risk/hazard not calculated because toxicity value was not available.

Table G.2.27
HUMAN HEALTH RISK EVALUATION SUMMARY FOR SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 2
Parcel 83
Fort Monmouth, New Jersey

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)		UCL or Max	Age -adjusted Ingestion Carcinogenic Risk	Age-adjusted Dermal Carcinogenic Risk	Age-adjusted Inhalation Carcinogenic Risk	Total Carcinogenic Risk	Child Ingestion Hazard Quotient	Child Dermal Hazard Quotient	Adult Ingestion Hazard Quotient	Adult Dermal Hazard Quotient	Inhalation Hazard Quotient	Total Hazard Quotient - Child	Total Hazard Quotient - Adult
Volatile Organic Compounds															
Trichloroethene	79-01-6	0.27	U	Max	--	--	--	--	--	--	--	--	--	--	--
Semivolatile Organic Compounds															
1-Methylnaphthalene	90-12-0	0.32	J	Max	1.3E-08	5.3E-09	--	2E-08	0.000058	0.000020	0.0000055	0.0000030	--	0.00008	0.000008
2-Methylnaphthalene	91-57-6	0.29	J	Max	--	--	--	--	0.00093	0.00032	0.000087	0.000048	--	0.001	0.0001
Bis(2-chloroethyl)ether	111-44-4	0.24	J	Max	3.8E-07	--	4.7E-07	9E-07	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons															
BaP-equivalent ⁽⁴⁾	50-32-8	17		UCL	1.1E-04	4.2E-05	3.3E-07	2E-04	0.72	0.25	0.068	0.037	0.25	1	0.4
PCBs															
Aroclor-1254	11097-69-1	0.22	J	Max	6.3E-07	2.7E-07	3.8E-08	9E-07	0.14	0.053	0.013	0.0078	--	0.2	0.02
Aroclor-1260	11096-82-5	0.8		Max	2.3E-06	9.8E-07	8.8E-08	3E-06	--	--	--	--	--	--	--
Inorganics															
Antimony	7440-36-0	6.5		Max	--	--	--	--	0.21	--	0.019	--	--	0.2	0.02
Arsenic	7440-38-2	7.34		Max	1.6E-05	1.5E-06	8.9E-09	2E-05	0.31	0.025	0.029	0.0037	0.00037	0.3	0.03
Cobalt	7440-48-4	5.07		Max	--	--	1.3E-08	1E-08	0.22	--	0.020	--	0.00064	0.2	0.02
Manganese	7439-96-5	292	U	Max	--	--	--	--	--	--	--	--	--	--	--
Mercury	7439-97-6	4.06		Max	--	--	--	--	--	--	--	--	0.21	0.2	0.2
Vanadium	7440-62-2	47.8		Max	--	--	--	--	0.12	--	0.011	--	0.00036	0.1	0.01
Pathway Risk					1E-04	4E-05	1E-06	--	2	0.3	0.2	0.05	0.5	--	--
Total Risk								2E-04	Hazard Index						
														3	0.7

⁽¹⁾ COPC = Constituent of potential concern.
⁽²⁾ CAS = Chemical Abstracts Service number.
⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.
⁽⁴⁾ See Table G.2.4 for B(a)P-equivalent calculation.
-- Risk/hazard not calculated because toxicity value was not available.

Table G.2.28
TARGET ORGANS AND TOXIC CRITICAL EFFECTS FOR SEGREGATED HAZARD INDICES FOR SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 2
Parcel 83
Fort Monmouth, New Jersey

Constituent	Child Ingestion + Dermal Hazard Index (1)	Inhalation Hazard Index (1)	Ingestion + Dermal			Inhalation		
			Target Organ	Toxic Critical Effect	Source	Target Organ	Toxic Critical Effect	Source
Trichloroethene	--	--	Heart	Increased fetal cardiac malformations in Sprague-Dawley rats	IRIS	Thymus	Decreased thymus weight in female B6C3F1 mice (immunotoxicity)	IRIS
1-Methylnaphthalene	0.00008	--	Respiratory	Increased incidence of pulmonary alveolar proteinosis	ATSDR Final	--	--	--
2-Methylnaphthalene	0.001	--	Lungs	Pulmonary alveolar proteinosis	IRIS	--	--	--
Bis(2-chloroethyl)ether	--	--	--	--	--	--	--	--
Benzo(a)pyrene [B(a)P Equivalent Concentration]	1	0.3	Developmental	Neurobehavioral changes	IRIS	Developmental	Decreased embryo/fetal survival	IRIS
Aroclor-1254	0.1	--	Whole Body	Ocular exudate, inflamed and prominent Meibomian glands, distorted growth of finger and toe nails; decreased antibody (IgG and IgM) response to sheep erythrocytes	IRIS	--	--	--
Aroclor-1260	--	--	--	--	--	--	--	--
Antimony	0.2	--	Whole body	Longevity, blood glucose, and cholesterol	IRIS	--	--	--
Arsenic	0.3	0.0004	Cardiovascular and Dermal	Hyperpigmentation, keratosis and possible vascular complications	IRIS	--	--	--
Cobalt	0.2	0.0006	Thyroid	Decreased iodine uptake	PPRTV Current	Respiratory Tract; Lung	Irritation; Decreased function	PPRTV Current
Manganese	--	--	Nervous	CNS effects	IRIS	Nervous	Impairment of neurobehavioral function	IRIS
Mercury	--	0.2	--	--	--	Nervous	Hand tremor; increases in memory disturbances; slight subjective and objective evidence of autonomic dysfunction	IRIS
Vanadium	0.1	0.0004	Dermal	Decreased hair cystine	SURROGAT E. See Vanadium Pentoxide. MW contribution adjustment.	Respiratory	hyperplasia of alveolar and bronchiolar epithelium, degeneration and hyperplasia of epiglottis epithelium, and goblet cell hyperplasia in nasal respiratory epithelium	ATSDR Final

⁽¹⁾ See Table G.2.28 for hazard indices.

⁽²⁾ ATSDR - Agency for Toxic Substances and Disease Registry (<http://www.atsdr.cdc.gov/>)

IRIS - Integrated Risk Information System (<http://www.epa.gov/IRIS/>)

PPRTV - Provisional Peer Reviewed Toxicity Values for Superfund (<http://hhpprtv.ornl.gov/>)

Table G.2.29

NONCANCER HAZARDS SEPARATED BY TARGET ORGAN FOR SURFACE SOIL (0-2')

UU/UE RECEPTOR

EXPOSURE AREA 2

Parcel 83

Fort Monmouth, New Jersey

Target Organ	Constituent Groupings for Ingestion + Dermal Exposure Pathways	Ingestion + Dermal Hazard Index ⁽¹⁾	Constituent Groupings for Inhalation Exposure Pathways	Inhalation Hazard Index ⁽¹⁾	Summed Segregated Hazard Index ⁽²⁾
Cardiovascular system	Trichloroethene	--	N/A	N/A	0.3
	Arsenic	0.3			
Dermal	Arsenic	0.3	N/A	N/A	0.5
	Vanadium	0.1			
Develomental	BaP	1	BaP	0.3	1
Nervous	Manganese	--	Manganese	--	0.2
			Mercury	0.2	
Respiratory system	1-Methylnaphthalene	0.00008	Cobalt	0.0006	0.002
	2-Methylnaphthalene	0.001	Vanadium	0.0004	
Thymus	N/A	N/A	Trichloroethene	--	--
Thyroid	Cobalt	0.2	N/A	N/A	0.2
Whole Body	Aroclor-1254	0.1	N/A	N/A	0.3
	Antimony	0.2	N/A	N/A	

⁽¹⁾ See Table G.2.29.

⁽²⁾ Sum of the ingestion+dermal and inhalation hazard indices for the applicable target organ.

-- Hazard not calculated because analyte was not detected at the exposure area.

N/A - Not applicable. Does not have a toxicity value for the exposure pathway.

Table G.2.30
RISK AND HAZARD ESTIMATES -- INCIDENTAL INGESTION OF SURFACE SOIL (0-2")
UU/UE RECEPTOR
EXPOSURE AREA 3
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions				Equations
Receptor				UU/UE RECEPTOR
Parameter	Abbreviation	Value	Units	
COPC Concentration in Soil	C _s	chemical-specific	mg/kg	
Soil Ingestion Rate - adult	IRS _{adult}	100	mg/day	
Soil Ingestion Rate - child	IRS _{child}	200	mg/day	
Age-adjusted soil ingestion factor	IFS _{adj}	105	(mg-year)/(kg-day)	
Exposure Frequency	EF	350	days/year	
Exposure Duration - adult	ED _{adult}	20	years	
Exposure Duration - child	ED _{child}	6	years	
Conversion Factor-soil	CF _s	0.000001	kg/mg	
Averaging Time -- carcinogens	AT _c	25550	days	
Averaging Time -- noncarcinogens, child	AT _{nc} - child	2190	days	
Averaging Time -- noncarcinogens, adult	AT _{nc} - adult	7300	days	
Oral Slope Factor	SF _o	chemical-specific	(mg/kg-day) ⁻¹	
Body Weight - adult	BW _{adult}	80	kg	
Body Weight - child	BW _{child}	15	kg	
Fraction Ingested	FI	1	unitless	
Oral Reference Dose	RfD _o	chemical-specific	mg/kg-day	

Incidental ingestion of carcinogenic COPCs in soil for multiple age groups simultaneously:

$$Ingestion_{age-adj} = \frac{(C_s)(IFS_{adj})(EF)(CF_s)(FI)}{(AT_c)}$$

where:
$$IFS_{adj} = \frac{(ED_{child})(IRS_{child})}{(BW_{child})} + \frac{(ED_{adult})(IRS_{adult})}{(BW_{adult})}$$

Incidental ingestion of noncarcinogenic COPCs in soil for separate age groups:

$$Ingestion = \frac{(C_s)(IRS)(EF)(ED)(CF_s)(FI)}{(AT_{nc})(BW)}$$

Carcinogenic Risk:
$$Risk = (Ingestion)(SF_o)$$

Noncarcinogenic Hazard:
$$HQ = Ingestion/RfD_o$$

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	Carcinogenic Ingestion _{age-adj} (mg/kg-day)	Noncarcinogenic Ingestion - Child (mg/kg-day)	Noncarcinogenic Ingestion - Adult (mg/kg-day)	SFo ⁽⁴⁾ (mg/kg-day) ⁻¹	RfDo ⁽⁴⁾ (mg/kg-day)	Cancer Risk	% of Total	Hazard Quotient - Child	% of Total	Hazard Quotient - Adult	% of Total	
Volatile Organic Compounds															
Trichloroethene	79-01-6	0.3	U	Max	-- ⁽⁶⁾	--	--	--	--	--	--	--	--	--	
Semivolatile Organic Compounds															
1-Methylnaphthalene	90-12-0	0.036		Max	5.2E-08	0.00000046	0.000000043	2.9E-02	7.0E-02	1.5E-09	0.0022%	0.0000066	0.00040%	0.00000062	0.00040%
2-Methylnaphthalene	91-57-6	0.86	J	Max	--	0.000011	0.0000010	--	4.0E-03	--	0.0027	0.17%	0.00026	0.17%	
Bis(2-chloroethyl)ether	111-44-4	1.2	U	Max	--	--	--	--	--	--	--	--	--	--	
Polycyclic Aromatic Hydrocarbons															
BaP-equivalent ⁽⁵⁾	50-32-8	5.1		UCL	3.4E-05 ⁽⁶⁾	0.000065	0.0000061	1.0E+00	3.0E-04	3.4E-05	49%	0.22	13%	0.020	13%
PCBs															
Aroclor-1260	11096-82-5	0.0042	U	Max	--	--	--	--	--	--	--	--	--	--	
Inorganics															
Antimony	7440-36-0	0.543	U	Max	--	--	--	--	--	--	--	--	--	--	
Arsenic	7440-38-2	16		Max	2.3E-05	0.00020	0.000019	1.5E+00	3.0E-04	3.5E-05	51%	0.68	41%	0.064	41%
Cobalt	7440-48-4	10.1		Max	--	0.00013	0.000012	--	3.0E-04	--	0.43	26%	0.040	26%	
Manganese	7439-96-5	266	U	Max	--	--	--	--	--	--	--	--	--	--	
Mercury	7439-97-6	0.119	U	Max	--	--	--	--	--	--	--	--	--	--	
Vanadium	7440-62-2	123		Max	--	0.0016	0.00015	--	5.0E-03	--	0.31	19%	0.029	19%	
Pathway Sums:									Cancer Risk		Hazard Index		Hazard Index		
									7E-05	100%	2	100%	0.2	100%	

⁽¹⁾ COPC = Constituent of potential concern.
⁽²⁾ CAS = Chemical Abstracts Service number.
⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.
⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.
⁽⁵⁾ See Table G.2.4 for B(a)P-equivalent calculation.
⁽⁶⁾ See Table G.2.32 for mutagenic mode of action ingestion intake calculation and risk calculation.
-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.31
MUTAGENIC MODE OF ACTION – INCIDENTAL INGESTION OF SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 3
Parcel 83
Fort Monmouth, New Jersey

Risk Equation

$$Ingestion = \frac{C_s \times \left(\frac{((ED_{0-2})(IRS_{child})(10))}{BW_{child}} + \frac{((ED_{2-6})(IRS_{child})(3))}{BW_{child}} + \frac{((ED_{6-16})(IRS_{adult})(3))}{BW_{adult}} + \frac{((ED_{16-30})(IRS_{adult})(1))}{BW_{adult}} \right) \times EF \times CF_s}{AT_c}$$

Mutagenic Risk: $Risk = (Ingestion)(SF_o)$

Exposure Assumptions			
Receptor UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units
COPC Concentration in Soil (C _s)	C _s	chemical-specific	mg/kg
Soil Ingestion Rate - adult	IRS _{adult}	100	mg/day
Soil Ingestion Rate - child	IRS _{child}	200	mg/day
Exposure Frequency	EF	350	days/year
Exposure Duration, 0 to 2 years of age	ED ₀₋₂	2	years
Exposure Duration, 2 to 6 years of age	ED ₂₋₆	4	years
Exposure Duration, 6 to 16 years of age	ED ₆₋₁₆	10	years
Exposure Duration, 16 to 30 years of age	ED ₁₆₋₃₀	14	years
Conversion Factor-soil	CF _s	0.000001	kg/mg
Averaging Time – carcinogens	AT _c	25550	days
Oral Slope Factor	SF _o	chemical-specific	(mg/kg-day) ⁻¹
Body Weight - adult	BW _{adult}	80	kg
Body Weight - child	BW _{child}	15	kg

COPC ⁽¹⁾	CAS Number ⁽²⁾	Cs ⁽³⁾ (mg/kg)	Carcinogenic Ingestion (mg/kg-day)	SFo ⁽⁴⁾ (mg/kg-day) ⁻¹	Cancer Risk
Trichloroethene	79-01-6	0.3	2.0E-06	4.6E-02	9.1E-08
BaP-equivalent ⁽⁵⁾	50-32-8	5.1	3.4E-05	1.0E+00	3.4E-05

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.

⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁵⁾ See Table G.2.4 for B(a)P-equivalent calculation.

Table G.2.32
RISK AND HAZARD ESTIMATES -- DERMAL CONTACT WITH SURFACE SOIL (0-2")
UU/UE RECEPTOR
EXPOSURE AREA 3
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions			
Receptor	UU/UE RECEPTOR		
Parameter	Abbreviation	Value	Units
COPC Concentration in Soil	C_s	chemical-specific	mg/kg
Exposure Frequency	EF	350	days/year
Exposure Duration - adult	ED _{adult}	20	years
Exposure Duration - child	ED _{child}	6	years
Event Frequency	EV	1	events/day
Exposed Skin Surface Area - adult	SA _{adult}	6032	cm ²
Exposed Skin Surface Area - child	SA _{child}	2690	cm ²
Age-adjusted dermal contact factor	SFS _{adj}	321	(mg-year)/(kg-event)
Adherence Factor - adult	AF _{adult}	0.07	mg/cm ²
Adherence Factor - child	AF _{child}	0.2	mg/cm ²
Dermal Absorption Factor	ABS _d	chemical-specific	unitless
Averaging Time – carcinogens	AT _c	25550	days
Averaging Time – noncarcinogens, child	AT _{nc} - child	2190	days
Averaging Time – noncarcinogens, adult	AT _{nc} - adult	7300	days
Oral Slope Factor Adjusted for GI Absorption	SF _d	chemical-specific	(mg/kg-day) ⁻¹
Body Weight - adult	BW _{adult}	80	kg
Body Weight - child	BW _{child}	15	kg
Oral Reference Dose Adjusted for GI Absorption	RD _d	chemical-specific	mg/kg-day
Conversion Factor-soil	CF _s	0.000001	kg/mg
Fraction of contaminant absorbed in gastrointestinal tract	GIABS	chemical-specific	unitless
Dermal Absorbed Dose	DAD	chemical-specific	mg/kg-day
Absorbed dose per event	DA _{event}	chemical-specific	mg/cm ² -event

Dermal absorbed dose for carcinogenic COPCs in soil for multiple age groups simultaneously:

$$DAD = \frac{(C_s)(SFS_{adj})(ABS_d)(EF)(EV)(CF)}{(AT)}$$

$$\text{where: } SFS_{adj} = \frac{(ED_{child})(AF_{child})(SA_{child})}{(BW_{child})} + \frac{(ED_{adult})(AF_{adult})(SA_{adult})}{(BW_{adult})}$$

Dermal absorbed dose of noncarcinogenic COPCs in soil for separate age groups:

$$DAD = \frac{(DA_{event})(EF)(ED)(EV)(SA)}{(BW)(AT)}$$

where: $DA_{event} = (C_S)(CF_S)(AF)(ABS_d)$

Carcinogenic Risk: $Risk = (DAD)(SF_d)$

$$\text{where: } SF_d = SF_o / GIABS$$

Noncarcinogenic Hazard: $HQ = DAD / Rf_d$

where: $RfD_d = (RfD_o)(GIABS)$

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	ABS _d ⁽⁴⁾ (unitless)	SF _d ⁽⁴⁾ (mg/kg-day) ⁻¹	RfD _d ⁽⁴⁾ (mg/kg-day)	Carcinogenic DAD (mg/kg-day)	Noncarcinogenic DAD - Child (mg/kg-day)	Noncarcinogenic DAD - Adult (mg/kg-day)	Cancer Risk	% of Total	Hazard Quotient - Child	% of Total	Hazard Quotient - Adult	% of Total
Volatile Organic Compounds															
Trichloroethene	79-01-6	0.3	U	Max	--	4.6E-02	5.0E-04	-- ⁽⁶⁾	--	--	--	--	--	--	--
Semivolatile Organic Compounds															
1-Methylnaphthalene	90-12-0	0.036		Max	0.13	2.9E-02	7.0E-02	2.1E-08	1.6E-07	2.4E-08	6.0E-10	0.0038%	0.0000023	0.0017%	0.00000034
2-Methylnaphthalene	91-57-6	0.86	J	Max	0.13	--	4.0E-03	--	3.8E-06	5.7E-07	--	--	0.00096	0.73%	0.00014
Bis(2-chloroethyl)ether	111-44-4	1.2	U	Max	--	1.1E+00	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons															
BaP-equivalent ⁽⁵⁾	50-32-8	5.1		UCL	0.13	1.0E+00	3.0E-04	1.3E-05 ⁽⁶⁾	2.3E-05	3.4E-06	1.3E-05	80%	0.076	58%	0.011
PCBs															
Aroclor-1260	11096-82-5	0.0042	U	Max	0.14	2.0E+00	--	--	--	--	--	--	--	--	--
Inorganics															
Antimony	7440-36-0	0.543	U	Max	--	--	6.0E-05	--	--	--	--	--	--	--	--
Arsenic	7440-38-2	16		Max	0.03	1.5E+00	3.0E-04	2.1E-06	1.7E-05	2.4E-06	3.2E-06	20%	0.055	42%	0.0081
Cobalt	7440-48-4	10.1		Max	--	--	3.0E-04	--	--	--	--	--	--	--	--
Manganese	7439-96-5	266	U	Max	--	--	1.4E-01	--	--	--	--	--	--	--	--
Mercury	7439-97-6	0.119	U	Max	--	--	--	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	123		Max	--	--	1.3E-04	--	--	--	--	--	--	--	--
										Cancer Risk	Hazard Index		Hazard Index		
Pathway Sums:										2E-05	100%	0.1	100%	0.02	100%

(1) COPC = Constituent of potential concern.
(2) CAS = Chemical Abstracts Service number.
(3) COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.
(4) Human Health Toxicity Values shown in Table G.2.11.
(5) See Table G.2.4 for B(a)P-equivalent calculation.
(6) See Table G.2.34 for mutagenic mode of action dermal contact calculation and risk calculation.
-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.33
MUTAGENIC MODE OF ACTION -- DERMAL CONTACT WITH SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 3
Parcel 83
Fort Monmouth, New Jersey

$$DAD = \frac{(C_s) \left(\frac{((ED_{0-2})(AF_{child})(SA_{child})(10))}{BW_{child}} + \frac{((ED_{2-6})(AF_{child})(SA_{child})(3))}{BW_{child}} + \frac{((ED_{6-16})(AF_{adult})(SA_{adult})(3))}{BW_{adult}} + \frac{((ED_{16-30})(AF_{adult})(SA_{adult})(1))}{BW_{adult}} \right) (ABS)(EF)(CF)}{AT_c}$$

Mutagenic Risk: $Risk = (DAD)(SF_d)$

Exposure Assumptions			
Receptor UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units
COPC Concentration in Soil	C _s	chemical-specific	mg/kg
Adherence Factor - adult	AF _{adult}	0.07	mg/cm2
Adherence Factor - child	AF _{child}	0.2	mg/cm2
Exposed Skin Surface Area - adult	SA _{adult}	6032	cm2
Exposed Skin Surface Area - child	SA _{child}	2690	cm2
Dermal Absorption Factor	ABS	chemical-specific	unitless
Exposure Frequency	EF	350	days/year
Exposure Duration, 0 to 2 years of age	ED ₀₋₂	2	years
Exposure Duration, 2 to 6 years of age	ED ₂₋₆	4	years
Exposure Duration, 6 to 16 years of age	ED ₆₋₁₆	10	years
Exposure Duration, 16 to 30 years of age	ED ₁₆₋₃₀	14	years
Conversion Factor-soil	CF _s	0.000001	kg/mg
Averaging Time -- carcinogens	AT _c	25550	days
Body Weight - adult	BW _{adult}	80	kg
Body Weight - child	BW _{child}	15	kg
Dermal Absorbed Dose	DAD	chemical-specific	mg/kg-day
Oral Slope Factor Adjusted for GI Absorption	SF _d	chemical-specific	(mg/kg-day) ⁻¹

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	ABS ⁽⁴⁾ (unitless)	Carcinogenic DAD (mg/kg-day)	SF _d (mg/kg-day) ⁻¹	Cancer Risk
Trichloroethene	79-01-6	0.3	--	--	4.6E-02	--
BaP-equivalent ⁽⁵⁾	50-32-8	5.1	1.3E-01	1.3E-05	1.0E+00	1.3E-05

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.

⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁵⁾ See Table G.2.4 for B(a)P-equivalent calculation.

Table G.2.34
RISK AND HAZARD ESTIMATES -- INHALATION OF VOLATILES/FUGITIVE DUST FROM SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 3
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions				Equations
Receptor	UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units	
COPC concentration in air (C _a)	C _a	chemical-specific	µg/m ³	
COPC concentration in surface soil (C _s)	C _s	chemical-specific	mg/kg	
Exposure Frequency	EF	350	days/year	
Exposure Duration - inhalation	ED _{inh}	26	years	
Exposure Time	ET	1	unitless	
Averaging Time – carcinogens	AT _c	25550	days	
Averaging Time - noncarcinogens, inhalation	AT _{nc - inh}	9490	days	
Inhalation Unit Risk	IUR	chemical-specific	(µg/m ³) ⁻¹	
Inhalation Reference Concentration	RfC	chemical-specific	mg/m ³	
Volatilization Factor	VF	chemical-specific	m ³ /kg	
Particulate emission factor ⁽¹⁾	PEF	1.27E+09	m ³ /kg	
Soil saturation	C _{sat}	chemical-specific	mg/kg	
Exposure concentration in air	EC(air)	chemical-specific	µg/m ³	

Exposure concentration in air for soil particulates and vapors emitted from soil for carcinogens and noncarcinogens:

$$EC(air) = \frac{(C_a)(ET)(EF)(ED_{inh})}{(AT)}$$

Where for inorganics, C_a calculated as:

$$C_a = (C_s) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{PEF} \right)$$

Where for organics with C_s ≤ C_{sat}, or if no C_{sat}, C_a calculated as:

$$C_a = (C_s) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{VF} + \frac{1}{PEF} \right)$$

Where for organics with C_s > C_{sat}, C_a calculated as:

$$C_a = \left[(C_s) \left(1000 \frac{\mu g}{mg} \right) \left(\frac{1}{PEF} \right) \right] + \left[(C_{sat}) \left(1000 \frac{\mu g}{mg} \right) \left(\frac{1}{VF} \right) \right]$$

$$Risk = [EC(air)](IUR)$$
$$HQ = \frac{EC(air)}{(RfC) \left(1,000 \frac{\mu g}{mg} \right)}$$

COPC ⁽²⁾	CAS Number ⁽³⁾	C _s ⁽⁴⁾ (mg/kg)	UCL or Max	C _{sat} ⁽⁵⁾ (mg/kg)	Is C _s ≤ C _{sat} ?	Volatilization Factor ⁽⁶⁾ (m ³ /kg)	C _a (µg/m ³)	Carcinogenic EC(air) (µg/m ³)	Noncarcinogenic EC(air) (µg/m ³)	IUR ⁽⁵⁾ (µg/m3) ⁻¹	RfC _i ⁽⁵⁾ (mg/m ³)	Cancer Risk	% of Total	Hazard Quotient	% of Total
Volatile Organic Compounds															
Trichloroethene	79-01-6	0.3 U	Max	--	--	3.1E+03	--	-- ⁽⁸⁾	--	--	--	--	--	--	--
Semivolatile Organic Compounds															
1-Methylnaphthalene	90-12-0	0.036	Max	3.9E+02	Yes	8.2E+04	4.4E-04	--	--	--	--	--	--	--	--
2-Methylnaphthalene	91-57-6	0.86 J	Max	--	--	8.1E+04	1.1E-02	--	--	--	--	--	--	--	--
Bis(2-chloroethyl)ether	111-44-4	1.2 U	Max	--	--	5.9E+04	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons															
BaP-equivalent ⁽⁵⁾	50-32-8	5.1	UCL	--	--	3.3E+07	1.6E-04	1.7E-04 ⁽⁸⁾	1.5E-04	6.0E-04	2.0E-06	9.9E-08	69%	0.076	96%
PCBs															
Aroclor-1260	11096-82-5	0.0042 U	Max	--	--	1.8E+06	--	--	--	--	--	--	--	--	--
Inorganics															
Antimony	7440-36-0	0.543 U	Max	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic	7440-38-2	16	Max	--	--	--	1.3E-05	4.5E-06	1.2E-05	4.3E-03	1.5E-05	1.9E-08	13%	0.00081	1.0%
Cobalt	7440-48-4	10.1	Max	--	--	--	8.0E-06	2.8E-06	7.6E-06	9.0E-03	6.0E-06	2.6E-08	18%	0.0013	1.6%
Manganese	7439-96-5	266 U	Max	--	--	--	--	--	--	--	--	--	--	--	--
Mercury	7439-97-6	0.119 U	Max	--	--	4.9E+04	--	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	123	Max	--	--	--	9.7E-05	--	9.3E-05	--	1.0E-04	--	--	0.00093	1.2%
Pathway Sums:												Cancer Risk 1E-07	100%	Hazard Index 0.079	100%

⁽¹⁾ PEF calculated as shown in Table G.2.9.

⁽²⁾ COPC = Constituent of potential concern.

⁽³⁾ CAS = Chemical Abstracts Service number.

⁽⁴⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.

⁽⁵⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁶⁾ See Table G.2.10 for VF calculation.

⁽⁷⁾ See Table G.2.4 for B(a)P-equivalent calculation.

⁽⁸⁾ See Table G.2.36 for mutagenic mode of action inhalation calculation and risk calculation.

-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.35
MUTAGENIC MODE OF ACTION -- INHALATION OF VOLATILES/FUGITIVE DUST FROM SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 3
Parcel 83
Fort Monmouth, New Jersey

Equations

$$EC(air) = \frac{(C_a)(ET)(EF)[((ED_{0-2})(10)) + ((ED_{2-6})(3)) + ((ED_{6-16})(3)) + ((ED_{6-30})(1))]}{AT_c}$$

where: $C_a = (C_s)(1,000 \mu g / mg) \left(\frac{1}{VF} + \frac{1}{PEF} \right)$

$$Mutagenic Risk_{inh} = [(EC(air))(IUR)]$$

Exposure Assumptions			
UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units
COPC in air	C _a	chemical-specific	μg/m ³
COPC Concentration in Soil	C _s	chemical-specific	mg/kg
Exposure Frequency	EF	350	days/year
Exposure Duration, 0 to 2 years of age	ED ₀₋₂	2	years
Exposure Duration, 2 to 6 years of age	ED ₂₋₆	4	years
Exposure Duration, 6 to 16 years of age	ED ₆₋₁₆	10	years
Exposure Duration, 16 to 30 years of age	ED ₁₆₋₃₀	14	years
Exposure Time	ET	1	unitless
Averaging Time – carcinogens	AT _c	25550	days
Inhalation Unit Risk	IUR	chemical-specific	(μg/m ³) ⁻¹
Volatilization Factor (VF)	VF	chemical-specific	m ³ /kg
Particulate emission factor (PEF) ⁽¹⁾	PEF	1.27E+09	m ³ /kg
Exposure concentration in air	EC(air)	chemical-specific	μg/m ³

COPC ⁽²⁾	CAS Number ⁽³⁾	C _s ⁽⁴⁾ (mg/kg)	Volatilization Factor ⁽⁵⁾ (m ³ /kg)	C _a (μg/m ³)	Carcinogenic EC(air) (μg/m ³)	IUR ⁽⁶⁾ (μg/m ³) ⁻¹	Cancer Risk
Trichloroethene	79-01-6	0.3	3.1E+03	9.7E-02	1.0E-01	4.1E-06	4.1E-07
BaP-equivalent ⁽⁷⁾	50-32-8	5.1	3.3E+07	1.6E-04	1.7E-04	6.0E-04	9.9E-08

⁽¹⁾ PEF calculated as shown in Table G.2.9.

⁽²⁾ COPC = Constituent of potential concern.

⁽³⁾ CAS = Chemical Abstracts Service number.

⁽⁴⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.

⁽⁵⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁶⁾ See Table G.2.10 for VF calculation.

⁽⁷⁾ See Table G.2.4 for B(a)P-equivalent calculation.

Table G.2.36

HUMAN HEALTH RISK EVALUATION SUMMARY FOR SURFACE SOIL (0-2')

UU/UE RECEPTOR

EXPOSURE AREA 3

Parcel 83

Fort Monmouth, New Jersey

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	Age -adjusted Ingestion Carcinogenic Risk	Age-adjusted Dermal Carcinogenic Risk	Age-adjusted Inhalation Carcinogenic Risk	Total Carcinogenic Risk	Child Ingestion Hazard Quotient	Child Dermal Hazard Quotient	Adult Ingestion Hazard Quotient	Adult Dermal Hazard Quotient	Inhalation Hazard Quotient	Total Hazard Quotient - Child	Total Hazard Quotient - Adult
Volatile Organic Compounds														
Trichloroethene	79-01-6	0.3	U	Max	--	--	--	--	--	--	--	--	--	--
Semivolatile Organic Compounds														
1-Methylnaphthalene	90-12-0	0.036	Max	1.5E-09	6.0E-10	--	2E-09	0.0000066	0.0000023	0.0000062	0.00000034	--	0.000009	0.000001
2-Methylnaphthalene	91-57-6	0.86	J	Max	--	--	--	0.0027	0.00096	0.00026	0.00014	--	0.004	0.0004
Bis(2-chloroethyl)ether	111-44-4	1.2	U	Max	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons														
BaP-equivalent ⁽⁴⁾	50-32-8	5.1	UCL	3.4E-05	1.3E-05	9.9E-08	5E-05	0.22	0.076	0.020	0.011	0.076	0.4	0.1
PCBs														
Aroclor-1260	11096-82-5	0.0042	U	Max	--	--	--	--	--	--	--	--	--	--
Inorganics														
Antimony	7440-36-0	0.543	U	Max	--	--	--	--	--	--	--	--	--	--
Arsenic	7440-38-2	16	Max	3.5E-05	3.2E-06	1.9E-08	4E-05	0.68	0.055	0.064	0.0081	0.00081	0.7	0.07
Cobalt	7440-48-4	10.1	Max	--	--	2.6E-08	3E-08	0.43	--	0.040	--	0.0013	0.4	0.04
Manganese	7439-96-5	266	U	Max	--	--	--	--	--	--	--	--	--	--
Mercury	7439-97-6	0.119	U	Max	--	--	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	123	Max	--	--	--	--	0.31	--	0.029	--	0.00093	0.3	0.03
Pathway Risk				7E-05	2E-05	1E-07	--	2	0.1	0.2	0.02	0.079	--	--
Total Risk							8E-05	Hazard Index						
								2						
								0.3						

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.

⁽⁴⁾ See Table G.2.4 for B(a)P-equivalent calculation.

-- Risk/hazard not calculated because toxicity value was not available.

Table G.2.37
TARGET ORGANS AND TOXIC CRITICAL EFFECTS FOR SEGREGATED HAZARD INDICES FOR SURFACE SOIL (0-2')
UU/UE RECEPTOR
EXPOSURE AREA 3
Parcel 83
Fort Monmouth, New Jersey

Constituent	Child Ingestion + Dermal Hazard Index (1)	Inhalation Hazard Index (1)	Ingestion + Dermal			Inhalation		
			Target Organ	Toxic Critical Effect	Source	Target Organ	Toxic Critical Effect	Source
Trichloroethene	--	--	Heart	Increased fetal cardiac malformations in Sprague-Dawley rats	IRIS	Thymus	Decreased thymus weight in female B6C3F1 mice (immunotoxicity)	IRIS
1-Methylnaphthalene	0.000009	--	Respiratory	Increased incidence of pulmonary alveolar proteinosis	ATSDR Final	--	--	--
2-Methylnaphthalene	0.004	--	Lungs	Pulmonary alveolar proteinosis	IRIS	--	--	--
Bis(2-chloroethyl)ether	--	--	--	--	--	--	--	--
Benzo(a)pyrene [B(a)P Equivalent Concentration]	0.3	0.08	Developmental	Neurobehavioral changes	IRIS	Developmental	Decreased embryo/fetal survival	IRIS
Aroclor-1260	--	--	--	--	--	--	--	--
Antimony	--	--	Whole body	Longevity, blood glucose, and cholesterol	IRIS	--	--	--
Arsenic	0.7	0.0008	Cardiovascular and Dermal	Hyperpigmentation, keratosis and possible vascular complications	IRIS	--	--	--
Cobalt	0.4	0.001	Thyroid	Decreased iodine uptake	PPRTV Current	Respiratory Tract; Lung	Irritation; Decreased function	PPRTV Current
Manganese	--	--	Nervous	CNS effects	IRIS	Nervous	Impairment of neurobehavioral function	IRIS
Mercury	--	--	--	--	--	Nervous	Hand tremor; increases in memory disturbances; slight subjective and objective evidence of autonomic dysfunction	IRIS
Vanadium	0.3	0.0009	Dermal	Decreased hair cystine	SURROGAT E. See Vanadium Pentoxide. MW contribution adjustment.	Respiratory	hyperplasia of alveolar and bronchiolar epithelium, degeneration and hyperplasia of epiglottis epithelium, and goblet cell hyperplasia in nasal respiratory epithelium	ATSDR Final

(1) See Table G.2.37 for hazard indices.

(2) ATSDR - Agency for Toxic Substances and Disease Registry (<http://www.atsdr.cdc.gov/>)

IRIS - Integrated Risk Information System (<http://www.epa.gov/IRIS/>)

PPRTV - Provisional Peer Reviewed Toxicity Values for Superfund (<http://hhpprtv.ornl.gov/>)

Table G.2.38

NONCANCER HAZARDS SEPARATED BY TARGET ORGAN FOR SURFACE SOIL (0-2')

UU/UE RECEPTOR

EXPOSURE AREA 3

Parcel 83

Fort Monmouth, New Jersey

Target Organ	Constituent Groupings for Ingestion + Dermal Exposure Pathways	Ingestion + Dermal Hazard Index ⁽¹⁾	Constituent Groupings for Inhalation Exposure Pathways	Inhalation Hazard Index ⁽¹⁾	Summed Segregated Hazard Index ⁽²⁾
Cardiovascular system	Trichloroethene	--	N/A	N/A	0.7
	Arsenic	0.7			
Dermal	Arsenic	0.7	N/A	N/A	1
	Vanadium	0.3			
Develomental	BaP	0.3	BaP	0.08	0.4
Nervous	Manganese	--	Manganese	--	--
			Mercury	--	
Respiratory system	1-Methylnaphthalene	0.000009	Cobalt	0.001	0.006
	2-Methylnaphthalene	0.004	Vanadium	0.0009	
Thymus	N/A	N/A	Trichloroethene	--	--
Thyroid	Cobalt	0.4	N/A	N/A	0.4
Whole Body	Antimony	--	N/A	N/A	N/A

⁽¹⁾ See Table G.2.38.

⁽²⁾ Sum of the ingestion+dermal and inhalation hazard indices for the applicable target organ.

-- Hazard not calculated because analyte was not detected at the exposure area.

N/A - Not applicable. Does not have a toxicity value for the exposure pathway.

Table G.2.39

RISK AND HAZARD ESTIMATES -- INCIDENTAL INGESTION OF SURFACE SOIL (0-2')

UTILITY WORKER

Parcel 83

Fort Monmouth, New Jersey

Exposure Assumptions				Equations							
UTILITY WORKER											
Parameter	Abbreviation	Value	Units								
COPC Concentration in Soil	C _s	chemical-specific	mg/kg								
Soil Ingestion Rate - adult	IRS _{adult}	330	mg/day								
Exposure Frequency	EF	30	days/year								
Exposure Duration - adult	ED _{adult}	1	years								
Conversion Factor-soil	CF _s	0.000001	kg/mg								
Averaging Time – carcinogens	AT _c	25550	days								
Averaging Time – noncarcinogens, adult	AT _{nc} - adult	365	days								
Oral Slope Factor	SF _o	chemical-specific	(mg/kg-day) ⁻¹								
Body Weight - adult	BW _{adult}	80	kg								
Oral Reference Dose	RfD _o	chemical-specific	mg/kg-day								
Fraction Ingested	FI	1	unitless								

Incidental ingestion of noncarcinogenic and carcinogenic COPCs in soil :

$$Ingestion = \frac{(C_s)(IRS_{adult})(EF)(ED_{adult})(CF_s)(FI)}{(AT)(BW_{adult})}$$

Carcinogenic Risk: $Risk = (Ingestion)(SF_o)$

Noncarcinogenic Hazard: $HQ = Ingestion / RfD_o$

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	Carcinogenic Ingestion (mg/kg-day)	Noncarcinogenic Ingestion - Adult (mg/kg-day)	SFo ⁽⁴⁾ (mg/kg-day) ⁻¹	RfDo ⁽⁴⁾ (mg/kg-day)	Cancer Risk	% of Total	Hazard Quotient Adult	% of Total	
Volatile Organic Compounds												
Trichloroethene	79-01-6	5.8	Max	2.8E-08	2.0E-06	4.6E-02	5.0E-04	1.3E-09	0.43%	0.0039	4.5%	
Semivolatile Organic Compounds												
1-Methylnaphthalene	90-12-0	0.32	J	Max	1.5E-09	1.1E-07	2.9E-02	7.0E-02	4.5E-11	0.015%	0.0000015	0.0018%
2-Methylnaphthalene	91-57-6	4.3	Max	--	1.5E-06	--	4.0E-03	--	--	0.00036	0.42%	
Bis(2-chloroethyl)ether	111-44-4	0.24	J	Max	1.2E-09	--	1.1E+00	--	1.3E-09	0.43%	--	--
Polycyclic Aromatic Hydrocarbons												
BaP-equivalent ⁽⁵⁾	50-32-8	18	Max	8.7E-08	6.1E-06	1.0E+00	3.0E-04	8.7E-08	29%	0.020	23%	
PCBs												
Aroclor-1254	11097-69-1	0.22	J	Max	1.1E-09	7.5E-08	2.0E+00	2.0E-05	2.1E-09	0.71%	0.0037	4.3%
Aroclor-1260	11096-82-5	0.8	Max	3.9E-09	--	2.0E+00	--	7.7E-09	2.6%	--	--	
Inorganics												
Antimony	7440-36-0	8.42	Max	--	2.9E-06	--	4.0E-04	--	--	0.0071	8.2%	
Arsenic	7440-38-2	27.6	Max	1.3E-07	9.4E-06	1.5E+00	3.0E-04	2.0E-07	67%	0.031	36%	
Cobalt	7440-48-4	10.1	Max	--	3.4E-06	--	3.0E-04	--	--	0.011	13%	
Manganese	7439-96-5	230	Max	--	7.8E-05	--	1.4E-01	--	--	0.00056	0.64%	
Mercury	7439-97-6	4.06	Max	--	--	--	--	--	--	--	--	
Vanadium	7440-62-2	123	Max	--	4.2E-05	--	5.0E-03	--	--	0.0083	10%	
Pathway Sums:								Cancer Risk		Hazard Index		
								3E-07	100%	0.09	100%	

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.

⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁵⁾ See Table G.2.4 for B(a)P-equivalent calculation.

-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.40
RISK AND HAZARD ESTIMATES -- DERMAL CONTACT WITH SURFACE SOIL (0-2')
UTILITY WORKER
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions			
Receptor	UTILITY WORKER		
Parameter	Abbreviation	Value	Units
COPC Concentration in Soil	C _s	chemical-specific	mg/kg
Exposure Frequency	EF	30	days/year
Exposure Duration - adult	ED _{adult}	1	years
Event Frequency	EV	1	events/day
Exposed Skin Surface Area - adult	SA _{adult}	3470	cm2
Adherence Factor - adult	AF _{adult}	0.2	mg/cm2
Dermal Absorption Factor	ABS	chemical-specific	unitless
Averaging Time – carcinogens	AT _c	25550	days
Averaging Time – noncarcinogens, adult			
	AT _{nc} - adult	365	days
Oral Slope Factor Adjusted for GI Absorption			
	SF _d	chemical-specific	(mg/kg-day) ⁻¹
Body Weight - adult	BW _{adult}	80	kg
Oral Reference Dose Adjusted for GI Absorption			
	RfD _d	chemical-specific	mg/kg-day
Conversion Factor-soil	CF _s	0.000001	kg/mg
Dermal Absorbed Dose	DAD	chemical-specific	mg/kg-day
Absorbed dose per event	DA _{event}	chemical-specific	mg/cm ² -event

Dermal absorbed dose of noncarcinogenic and carcinogenic COPCs in soil:

$$DAD=\frac{(DA_{event})(EF)(ED_{adult})(EV)(SA_{adult})}{(BW_{adult})(AT)}$$

where:
$$DA_{event}=(C_s)(AF_d)(ABS)(CF)$$

Carcinogenic Risk:

$$Risk=(DAD)(SF_d)$$
$$SF_d=SF_o/GIABS$$

Noncarcinogenic Hazard:

$$HQ=DAD/Rf_d$$
$$RfD_d=(RfD_o)(GIABS)$$

where:

COPC ⁽¹⁾	CAS Number ⁽²⁾	Exposure Point Concentration ⁽³⁾ (mg/kg)	UCL or Max	ABS ⁽⁴⁾ (unitless)	SF _d ⁽⁴⁾ (mg/kg-day) ⁻¹	RfD _d ⁽⁴⁾ (mg/kg-day)	DAevent (mg/cm ² -event)	Carcinogenic DAD (mg/kg-day)	Noncarcinogenic DAD (mg/kg-day)	Cancer Risk	% of Total	Hazard Quotient	% of Total	
Volatile Organic Compounds														
Trichloroethene	79-01-6	5.8	Max	--	4.6E-02	5.0E-04	--	--	--	--	--	--	--	
Semivolatile Organic Compounds														
1-Methylnaphthalene	90-12-0	0.32	J	Max	2.9E-02	7.0E-02	8.3E-09	4.2E-10	3.0E-08	1.2E-11	0.031%	0.00000042	0.0049%	
2-Methylnaphthalene	91-57-6	4.3	Max	0.13	--	4.0E-03	1.1E-07	5.7E-09	4.0E-07	--	--	0.00010	1.1%	
Bis(2-chloroethyl)ether	111-44-4	0.24	J	Max	--	1.1E+00	--	--	--	--	--	--	--	
Polycyclic Aromatic Hydrocarbons														
BaP-equivalent ⁽⁵⁾	50-32-8	18	Max	0.13	1.0E+00	3.0E-04	4.7E-07	2.4E-08	1.7E-06	2.4E-08	60%	0.0056	64%	
PCBs														
Aroclor-1254	11097-69-1	0.22	J	Max	0.14	2.0E+00	2.0E-05	6.2E-09	3.1E-10	2.2E-08	6.3E-10	1.6%	0.0011	13%
Aroclor-1260	11096-82-5	0.8	Max	0.14	2.0E+00	--	2.2E-08	1.1E-09	8.0E-08	2.3E-09	5.8%	--	--	
Inorganics														
Antimony	7440-36-0	8.42	Max	--	--	6.0E-05	--	--	--	--	--	--	--	
Arsenic	7440-38-2	27.6	Max	0.03	1.5E+00	3.0E-04	1.7E-07	8.4E-09	5.9E-07	1.3E-08	32%	0.0020	23%	
Cobalt	7440-48-4	10.1	Max	--	--	3.0E-04	--	--	--	--	--	--	--	
Manganese	7439-96-5	230	Max	--	--	1.4E-01	--	--	--	--	--	--	--	
Mercury	7439-97-6	4.06	Max	--	--	--	--	--	--	--	--	--	--	
Vanadium	7440-62-2	123	Max	--	--	1.3E-04	--	--	--	--	--	--	--	
										Cancer Risk		Hazard Index		
Pathway Sums:										4E-08	100%	0.009	100%	

⁽¹⁾ COPC = Constituent of potential concern.
⁽²⁾ CAS = Chemical Abstracts Service number.
⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.
⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.
⁽⁵⁾ See Table G.2.4 for B(a)P-equivalent calculation.
-- = value not calculated because analyte not detected, or because toxicity data not available.
NA = Not analyzed in any sample
J = Estimated concentration exceeds the method detection limit (MDL) and is less than the reporting limit (RL)

Parsons

June 2020

Table G.2.41
RISK AND HAZARD ESTIMATES -- INHALATION OF VOLATILES/FUGITIVE DUST FROM SURFACE SOIL (0-2')
UTILITY WORKER
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions				Equations
Receptor	UTILITY WORKER			
Parameter	Abbreviation	Value	Units	
COPC in air	C _a	chemical-specific	µg/m ³	
COPC in surface soil	C _s	chemical-specific	mg/kg	
Exposure Frequency	EF	30	days/year	
Exposure Duration - adult	ED _{adult}	1	years	
Exposure Time	ET	0.33	unitless	
Averaging Time – carcinogens	AT _c	25550	days	
Averaging Time – noncarcinogens, adult	AT _{nc} - adult	365	days	
Inhalation Unit Risk (IUR)	IUR	chemical-specific	(µg/m ³) ⁻¹	
Inhalation Reference Concentration (RfC)	RfC	chemical-specific	mg/m ³	
Volatilization Factor (VF)	VF	chemical-specific	m ³ /kg	
Particulate emission factor (PEF) ⁽¹⁾	PEF	1.27E+09	m ³ /kg	
Soil saturation	C _{sat}	chemical-specific	mg/kg	
Exposure concentration in air	EC(air)	chemical-specific	µg/m ³	

Exposure concentration in air for soil particulates and vapors emitted from soil for carcinogens and noncarcinogens:

$$EC\ (air)\ =\ \frac{(C_a)(ET)(EF)(ED)}{(AT)}$$

Where for inorganics, C_a calculated as:

$$C_a\ =\ (C_s)\left(1,000\ \frac{\mu g}{mg}\right)\left(\frac{1}{PEF}\right)$$

Where for organics with C_s ≤ C_{sat}, C_a calculated as:

$$C_a\ =\ (C_s)\left(1,000\frac{\mu g}{mg}\right)\left(\frac{1}{VF}+\frac{1}{PEF}\right)$$

Where for organics with C_s > C_{sat}, C_a calculated as:

$$C_a\ =\ \left[(C_s)\left(1,000\ \frac{\mu g}{mg}\right)\left(\frac{1}{PEF}\right)\right]+\left[(C_{sat})\left(1,000\ \frac{\mu g}{mg}\right)\left(\frac{1}{VF}\right)\right]$$

Carcinogenic Risk:

$$Risk_{inh} = [EC(air)](IUR)$$

Noncarcinogenic Hazard:

$$HQ_{inh} = \frac{EC(air)}{(RfC)\left(1,000\ \frac{\mu g}{mg}\right)}$$

COPC ⁽²⁾	CAS Number ⁽³⁾	C _s ⁽⁴⁾ (mg/kg)	UCL or Max	C _{sat} ⁽⁵⁾ (mg/kg)	Is C _s ≤ C _{sat} ?	Volatilization Factor ⁽⁶⁾ (m ³ /kg)	C _a (µg/m ³)	Carcinogenic EC(air) (µg/m ³)	Noncarcinogenic EC(air) (µg/m ³)	IUR ⁽⁵⁾ (µg/m ³) ⁻¹	RfC ₁ ⁽⁵⁾ (mg/m3)	Cancer Risk	% of Total	Hazard Quotient	% of Total
Volatile Organic Compounds															
Trichloroethene	79-01-6	5.8	Max	6.9E+02	Yes	3.1E+03	1.9E+00	7.3E-04	5.1E-02	4.1E-06	2.0E-03	3.0E-09	78%	0.025	65%
Semivolatile Organic Compounds															
1-Methylnaphthalene	90-12-0	0.32	J	3.9E+02	Yes	8.2E+04	3.9E-03	--	--	--	--	--	--	--	--
2-Methylnaphthalene	91-57-6	4.3	Max	--	Yes	8.1E+04	5.3E-02	--	--	--	--	--	--	--	--
Bis(2-chloroethyl)ether	111-44-4	0.24	J	5.1E+03	Yes	5.9E+04	4.0E-03	1.6E-06	--	3.3E-04	--	5.2E-10	13%	--	--
Polycyclic Aromatic Hydrocarbons															
BaP-equivalent ⁽⁷⁾	50-32-8	18	Max	--	Yes	3.3E+07	5.6E-04	2.2E-07	1.5E-05	6.0E-04	2.0E-06	1.3E-10	3.4%	0.0076	19%
PCBs															
Aroclor-1254	11097-69-1	0.22	J	--	Yes	1.2E+06	1.9E-04	7.2E-08	--	5.7E-04	--	4.1E-11	1.1%	--	--
Aroclor-1260	11096-82-5	0.8	Max	--	Yes	1.8E+06	4.4E-04	1.7E-07	--	5.7E-04	--	9.6E-11	2.5%	--	--
Inorganics															
Antimony	7440-36-0	8.42	Max	--	Yes	--	6.6E-06	--	--	--	--	--	--	--	--
Arsenic	7440-38-2	27.6	Max	--	Yes	--	2.2E-05	8.4E-09	5.9E-07	4.3E-03	1.5E-05	3.6E-11	0.95%	0.000039	0.10%
Cobalt	7440-48-4	10.1	Max	--	Yes	--	8.0E-06	3.1E-09	2.2E-07	9.0E-03	6.0E-06	2.8E-11	0.73%	0.000036	0.092%
Manganese	7439-96-5	230	Max	--	Yes	--	1.8E-04	--	4.9E-06	--	5.0E-05	--	--	0.00010	0.25%
Mercury	7439-97-6	4.06	Max	3.1E+00	No	4.9E+04	6.4E-02	--	1.7E-03	--	3.0E-04	--	--	0.0058	15%
Vanadium	7440-62-2	123	Max	--	Yes	--	9.7E-05	--	2.6E-06	--	1.0E-04	--	--	0.000026	0.067%
												Cancer Risk		Hazard Index	
Pathway Sums:												4E-09	100%	0.04	100%

⁽¹⁾ PEF calculated as shown in Table G.2.9.
⁽²⁾ COPC = Constituent of potential concern.
⁽³⁾ CAS = Chemical Abstracts Service number.
⁽⁴⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.
⁽⁵⁾ Human Health Toxicity Values shown in Table G.2.11.
⁽⁶⁾ See Table G.2.10 for VF calculation.
⁽⁷⁾ See Table G.2.4 for B(a)P-equivalent calculation.
-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.42
HUMAN HEALTH RISK EVALUATION SUMMARY FOR SURFACE SOIL (0-2')
UTILITY WORKER
Parcel 83
Fort Monmouth, New Jersey

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	Adult Only Ingestion Carcinogenic Risk	Adult Only Dermal Carcinogenic Risk	Adult Only Inhalation Carcinogenic Risk	Total Carcinogenic Risk	Adult Ingestion Hazard Quotient	Adult Dermal Hazard Quotient	Adult Inhalation Hazard Quotient	Total Hazard Quotient
Volatile Organic Compounds											
Trichloroethene	79-01-6	5.8	Max	1.3E-09	--	3.0E-09	4E-09	0.0039	--	0.025	0.03
Semivolatile Organic Compounds											
1-Methylnaphthalene	90-12-0	0.32	J Max	4.5E-11	1.2E-11	--	6E-11	0.0000015	0.00000042	--	0.000002
2-Methylnaphthalene	91-57-6	4.3	Max	--	--	--	--	0.00036	0.00010	--	0.0005
Bis(2-chloroethyl)ether	111-44-4	0.24	J Max	1.3E-09	--	5.2E-10	2E-09	--	--	--	--
Polycyclic Aromatic Hydrocarbons											
BaP-equivalent ⁽⁴⁾	50-32-8	18	Max	8.7E-08	2.4E-08	1.3E-10	1E-07	0.020	0.0056	0.0076	0.03
PCBs											
Aroclor-1254	11097-69-1	0.22	J Max	2.1E-09	6.3E-10	4.1E-11	3E-09	0.0037	0.0011	--	0.005
Aroclor-1260	11096-82-5	0.8	Max	7.7E-09	2.3E-09	9.6E-11	1E-08	--	--	--	--
Inorganics											
Antimony	7440-36-0	8.42	Max	--	--	--	--	0.0071	--	--	0.007
Arsenic	7440-38-2	27.6	Max	2.0E-07	1.3E-08	3.6E-11	2E-07	0.031	0.0020	0.000039	0.03
Cobalt	7440-48-4	10.1	Max	--	--	2.8E-11	3E-11	0.011	--	0.000036	0.01
Manganese	7439-96-5	230	Max	--	--	--	--	0.00056	--	0.00010	0.0007
Mercury	7439-97-6	4.06	Max	--	--	--	--	--	--	0.0058	0.006
Vanadium	7440-62-2	123	Max	--	--	--	--	0.0083	--	0.000026	0.008
Pathway Risk				3E-07	4E-08	4E-09	--	0.09	0.009	0.04	--
							Total Risk	3E-07			
									Hazard Index	0.1	

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.

⁽⁴⁾ See Table G.2.4 for B(a)P-equivalent calculation.

-- Risk/hazard not calculated because toxicity value was not available.

NA = Not analyzed in any sample

Table G.2.43
RISK AND HAZARD ESTIMATES -- INCIDENTAL INGESTION OF SURFACE SOIL (0-2')
OUTDOOR WORKER
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions					Equations						
Receptor											
OUTDOOR WORKER											
Parameter	Abbreviation	Value	Units								
COPC Concentration in Soil	C _s	chemical-specific	mg/kg		Incidental ingestion of noncarcinogenic and carcinogenic COPCs in soil:						
Soil Ingestion Rate - adult	IRS _{adult}	100	mg/day								
Exposure Frequency	EF	225	days/year								
Exposure Duration - adult	ED _{adult}	25	years		$Ingestion = \frac{(C_s)(IRS_{adult})(EF)(ED_{adult})(CF_s)(FI)}{(AT)(BW_{adult})}$						
Conversion Factor-soil	CF _s	0.000001	kg/mg								
Averaging Time -- carcinogens	AT _c	25550	days		Carcinogenic Risk: $Risk = (Ingestion)(SF_o)$						
Averaging Time -- noncarcinogens, adult	AT _{nc} - adult	9125	days								
Oral Slope Factor	SF _o	chemical-specific	(mg/kg-day) ⁻¹		Noncarcinogenic Hazard: $HQ = Ingestion/RfD_o$						
Body Weight - adult	BW _{adult}	80	kg								
Oral Reference Dose	RfD _o	chemical-specific	mg/kg-day								
Fraction Ingested	FI	1	unitless								

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	Carcinogenic Ingestion (mg/kg-day)	Noncarcinogenic Ingestion - Adult (mg/kg-day)	SF _o ⁽⁴⁾ (mg/kg-day) ⁻¹	RfD _o ⁽⁴⁾ (mg/kg-day)	Cancer Risk	% of Total	Hazard Quotient Adult	% of Total
Volatile Organic Compounds											
Trichloroethene	79-01-6	5.8	Max	1.6E-06	4.5E-06	4.6E-02	5.0E-04	7.3E-08	0.43%	0.0089	4.5%
Semivolatile Organic Compounds											
1-Methylnaphthalene	90-12-0	0.32	J Max	8.8E-08	2.5E-07	2.9E-02	7.0E-02	2.6E-09	0.015%	0.0000035	0.0018%
2-Methylnaphthalene	91-57-6	4.3	Max	--	3.3E-06	--	4.0E-03	--	--	0.00083	0.42%
Bis(2-chloroethyl)ether	111-44-4	0.24	J Max	6.6E-08	--	1.1E+00	--	7.3E-08	0.43%	--	--
Polycyclic Aromatic Hydrocarbons											
BaP-equivalent ⁽⁵⁾	50-32-8	18	Max	5.0E-06	1.4E-05	1.0E+00	3.0E-04	5.0E-06	29%	0.046	23%
PCBs											
Aroclor-1254	11097-69-1	0.22	J Max	6.1E-08	1.7E-07	2.0E+00	2.0E-05	1.2E-07	0.71%	0.0085	4.3%
Aroclor-1260	11096-82-5	0.8	Max	2.2E-07	--	2.0E+00	--	4.4E-07	2.6%	--	--
Inorganics											
Antimony	7440-36-0	8.42	Max	--	6.5E-06	--	4.0E-04	--	--	0.016	8.2%
Arsenic	7440-38-2	27.6	Max	7.6E-06	2.1E-05	1.5E+00	3.0E-04	1.1E-05	67%	0.071	36%
Cobalt	7440-48-4	10.1	Max	--	7.8E-06	--	3.0E-04	--	--	0.026	13%
Manganese	7439-96-5	230	Max	--	1.8E-04	--	1.4E-01	--	--	0.0013	0.64%
Mercury	7439-97-6	4.06	Max	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	123	Max	--	9.5E-05	--	5.0E-03	--	--	0.019	10%
Pathway Sums:								Cancer Risk		Hazard Index	
								2E-05	100%	0.2	100%

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.

⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁵⁾ See Table G.2.4 for B(a)P-equivalent calculation.

-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.44
RISK AND HAZARD ESTIMATES – DERMAL CONTACT WITH SURFACE SOIL (0-2')
OUTDOOR WORKER
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions				Equations
Receptor				
OUTDOOR WORKER				
Parameter	Abbreviation	Value	Units	
COPC Concentration in Soil	C _s	chemical-specific	mg/kg	
Exposure Frequency	EF	225	days/year	
Exposure Duration - adult	ED _{adult}	25	years	
Event Frequency	EV	1	events/day	
Exposed Skin Surface Area - adult	SA _{adult}	3470	cm ²	
Adherence Factor - adult	AF _{adult}	0.12	mg/cm ²	
Dermal Absorption Factor	ABS	chemical-specific	unitless	
Averaging Time – carcinogens	AT _c	25550	days	
Averaging Time – noncarcinogens, adult	AT _{nc} - adult	9125	days	
Oral Slope Factor Adjusted for GI Absorption	SF _d	chemical-specific	(mg/kg-day) ⁻¹	
Body Weight - adult	BW _{adult}	80	kg	
Oral Reference Dose Adjusted for GI Absorption	RfD _d	chemical-specific	mg/kg-day	
Conversion Factor-soil	CF _s	0.000001	kg/mg	
Dermal Absorbed Dose	DAD	chemical-specific	mg/kg-day	
Absorbed dose per event	DA _{event}	chemical-specific	mg/cm ² -event	

Dermal absorbed dose of noncarcinogenic and carcinogenic COPCs in soil:

$$DAD = \frac{(DA_{event})(EF)(ED_{adult})(EV)(SA_{adult})}{(BW_{adult})(AT)}$$

where: $DA_{event} = (C_s)(AF_a)(ABS)(CF)$

Carcinogenic Risk:

$$Risk = (DAD)(SF_d)$$

$$SF_d = SF_o / GIABS$$

Noncarcinogenic Hazard:

$$HQ = DAD / Rf_d$$

where: $RfD_d = (RfD_o)(GIABS)$

COPC ⁽¹⁾	CAS Number ⁽²⁾	Exposure Point Concentration ⁽³⁾ (mg/kg)	UCL or Max	ABS ⁽⁴⁾ (unitless)	SF _d ⁽⁴⁾ (mg/kg-day) ⁻¹	RfD _d ⁽⁴⁾ (mg/kg-day)	DA _{event} (mg/cm ² -event)	Carcinogenic DAD (mg/kg-day)	Noncarcinogenic DAD (mg/kg-day)	Cancer Risk	% of Total	Hazard Quotient	% of Total
Volatile Organic Compounds													
Trichloroethene	79-01-6	5.8	Max	--	4.6E-02	5.0E-04	--	--	--	--	--	--	--
Semivolatile Organic Compounds													
1-Methylnaphthalene	90-12-0	0.32	J	Max	0.13	2.9E-02	7.0E-02	5.0E-09	4.8E-08	1.3E-07	1.4E-09	0.031%	0.0000019
2-Methylnaphthalene	91-57-6	4.3	Max	0.13	--	4.0E-03	6.7E-08	6.4E-07	1.8E-06	--	--	0.00045	1.1%
Bis(2-chloroethyl)ether	111-44-4	0.24	J	Max	--	1.1E+00	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons													
BaP-equivalent ⁽⁵⁾	50-32-8	18	Max	0.13	1.0E+00	3.0E-04	2.8E-07	2.7E-06	7.5E-06	2.7E-06	60%	0.025	64%
PCBs													
Aroclor-1254	11097-69-1	0.22	J	Max	0.14	2.0E+00	2.0E-05	3.7E-09	3.5E-08	9.9E-08	7.1E-08	1.6%	0.0049
Aroclor-1260	11096-82-5	0.8	Max	0.14	2.0E+00	--	1.3E-08	1.3E-07	3.6E-07	2.6E-07	5.8%	--	--
Inorganics													
Antimony	7440-36-0	8.42	Max	--	--	6.0E-05	--	--	--	--	--	--	--
Arsenic	7440-38-2	27.6	Max	0.03	1.5E+00	3.0E-04	9.9E-08	9.5E-07	2.7E-06	1.4E-06	32%	0.0089	23%
Cobalt	7440-48-4	10.1	Max	--	--	3.0E-04	--	--	--	--	--	--	--
Manganese	7439-96-5	230	Max	--	--	1.4E-01	--	--	--	--	--	--	--
Mercury	7439-97-6	4.06	Max	--	--	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	123	Max	--	--	1.3E-04	--	--	--	--	--	--	--
Pathway Sums:										Cancer Risk		Hazard Index	
										4E-06	100%	0.04	100%

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.

⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁵⁾ See Table G.2.4 for B(a)P-equivalent calculation.

-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.45
RISK AND HAZARD ESTIMATES -- INHALATION OF VOLATILES/FUGITIVE DUST FROM SURFACE SOIL (0-2')
OUTDOOR WORKER
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions

Receptor

OUTDOOR WORKER

Parameter	Abbreviation	Value	Units
COPC in air	C _a	chemical-specific	µg/m ³
COPC in surface soil	C _s	chemical-specific	mg/kg
Exposure Frequency	EF	225	days/year
Exposure Duration - adult	ED _{adult}	25	years
Exposure Time	ET	0.33	unitless
Averaging Time – carcinogens	AT _c	25550	days

Averaging Time – noncarcinogens, adult	ATnc - adult	9125	days
Inhalation Unit Risk (IUR)	IUR	chemical-specific	(µg/m ³) ⁻¹
Inhalation Reference Concentration (RfC)	RfC	chemical-specific	mg/m ³
Volatilization Factor (VF)	VF	chemical-specific	m ³ /kg
Particulate emission factor (PEF) ⁽¹⁾	PEF	1.27E+09	m ³ /kg
Soil saturation	C _{sat}	chemical-specific	mg/kg
Exposure concentration in air	EC(air)	chemical-specific	µg/m ³

Equations

Exposure concentration in air for soil particulates and vapors emitted from soil for carcinogens and noncarcinogens:

$$EC\text{ (air)} = \frac{(C_a)(ET)(EF)(ED)}{(AT)}$$

Where for inorganics, C_a calculated as:

$$C_a = (C_s) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{PEF} \right)$$

Where for organics with C_s ≤ C_{sat}, C_a calculated as:

$$C_a = (C_s) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{VF} + \frac{1}{PEF} \right)$$

Where for organics with C_s > C_{sat}, C_a calculated as:

$$C_a = \left[(C_s) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{PEF} \right) \right] + \left[(C_{sat}) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{VF} \right) \right]$$

Carcinogenic Risk:

$$Risk_{inh} = [EC(air)](IUR)$$

Noncarcinogenic Hazard:

$$HQ_{inh} = \frac{EC(air)}{(RfC) \left(1,000 \frac{\mu g}{mg} \right)}$$

COPC ⁽²⁾	CAS Number ⁽³⁾	Exposure Point Concentration ⁽⁴⁾ (mg/kg)	UCL or Max	C _{sat} ⁽⁵⁾ (mg/kg)	Is EPC ≤ C _{sat} ? ⁽⁶⁾	Volatilization Factor ⁽⁶⁾ (m ³ /kg)	C _a (µg/m ³)	Carcinogenic EC(air) (µg/m ³)	Noncarcinogenic EC(air) (µg/m ³)	IUR ⁽⁵⁾ (µg/m ³) ⁻¹	RfC _i ⁽⁵⁾ (mg/m ³)	Cancer Risk	% of Total	Hazard Quotient	% of Total
Volatile Organic Compounds															
Trichloroethene	79-01-6	5.8	Max	6.9E+02	Yes	3.1E+03	1.9E+00	1.4E-01	3.8E-01	4.1E-06	2.0E-03	5.6E-07	78%	0.19	65%
Semivolatile Organic Compounds															
1-Methylnaphthalene	90-12-0	0.32	J	3.9E+02	Yes	8.2E+04	3.9E-03	--	--	--	--	--	--	--	--
2-Methylnaphthalene	91-57-6	4.3	Max	--	Yes	8.1E+04	5.3E-02	--	--	--	--	--	--	--	--
Bis(2-chloroethyl)ether	111-44-4	0.24	Max	5.1E+03	Yes	5.9E+04	4.0E-03	2.9E-04	--	3.3E-04	--	9.7E-08	13%	--	--
Polycyclic Aromatic Hydrocarbons															
BaP-equivalent ⁽⁷⁾	50-32-8	18	Max	--	Yes	3.3E+07	5.6E-04	4.1E-05	1.1E-04	6.0E-04	2.0E-06	2.4E-08	3.4%	0.057	19%
PCBs															
Aroclor-1254	11097-69-1	0.22	J	--	Yes	1.2E+06	1.9E-04	1.4E-05	--	5.7E-04	--	7.7E-09	1.1%	--	--
Aroclor-1260	11096-82-5	0.8	Max	--	Yes	1.8E+06	4.4E-04	3.2E-05	--	5.7E-04	--	1.8E-08	2.5%	--	--
Inorganics															
Antimony	7440-36-0	8.42	Max	--	Yes	--	6.6E-06	--	--	--	--	--	--	--	--
Arsenic	7440-38-2	27.6	Max	--	Yes	--	2.2E-05	1.6E-06	4.4E-06	4.3E-03	1.5E-05	6.8E-09	0.95%	0.00030	0.10%
Cobalt	7440-48-4	10.1	Max	--	Yes	--	8.0E-06	5.8E-07	1.6E-06	9.0E-03	6.0E-06	5.2E-09	0.73%	0.00027	0.092%
Manganese	7439-96-5	230	Max	--	Yes	--	1.8E-04	--	3.7E-05	--	5.0E-05	--	--	0.00074	0.25%
Mercury	7439-97-6	4.06	Max	3.1E+00	No	4.9E+04	6.4E-02	--	1.3E-02	--	3.0E-04	--	--	0.044	15%
Vanadium	7440-62-2	123	Max	--	Yes	--	9.7E-05	--	2.0E-05	--	1.0E-04	--	--	0.00020	0.067%
Pathway Sums:												Cancer Risk		Hazard Index	
												7E-07	100%	0.3	100%

(1) PEF calculated as shown in Table G.2.9.

(2) COPC = Constituent of potential concern.

(3) CAS = Chemical Abstracts Service number.

(4) COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.

(5) Human Health Toxicity Values shown in Table G.2.11.

(6) See Table G.2.10 for VF calculation.

(7) See Table G.2.4 for B(a)P-equivalent calculation.

-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.46

HUMAN HEALTH RISK EVALUATION SUMMARY FOR SURFACE SOIL (0-2')

OUTDOOR WORKER

Parcel 83

Fort Monmouth, New Jersey

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	Adult Only Ingestion Carcinogenic Risk	Adult Only Dermal Carcinogenic Risk	Adult Only Inhalation Carcinogenic Risk	Total Carcinogenic Risk	Adult Ingestion Hazard Quotient	Adult Dermal Hazard Quotient	Adult Inhalation Hazard Quotient	Total Hazard Quotient
Volatile Organic Compounds											
Trichloroethene	79-01-6	5.8	Max	7.3E-08	--	5.6E-07	6E-07	0.0089	--	0.19	0.2
Semivolatile Organic Compounds											
1-Methylnaphthalene	90-12-0	0.32	J	Max	2.6E-09	1.4E-09	--	0.0000035	0.0000019	--	0.000005
2-Methylnaphthalene	91-57-6	4.3	Max	--	--	--	--	0.00083	0.00045	--	0.001
Bis(2-chloroethyl)ether	111-44-4	0.24	J	Max	7.3E-08	--	9.7E-08	2E-07	--	--	--
Polycyclic Aromatic Hydrocarbons											
BaP-equivalent ⁽⁴⁾	50-32-8	18	Max	5.0E-06	2.7E-06	2.4E-08	8E-06	0.046	0.025	0.057	0.1
PCBs											
Aroclor-1254	11097-69-1	0.22	J	Max	1.2E-07	7.1E-08	7.7E-09	2E-07	0.0085	0.0049	--
Aroclor-1260	11096-82-5	0.8	Max	4.4E-07	2.6E-07	1.8E-08	7E-07	--	--	--	--
Inorganics											
Antimony	7440-36-0	8.42	Max	--	--	--	--	0.016	--	--	0.02
Arsenic	7440-38-2	27.6	Max	1.1E-05	1.4E-06	6.8E-09	1E-05	0.071	0.0089	0.00030	0.08
Cobalt	7440-48-4	10.1	Max	--	--	5.2E-09	5E-09	0.026	--	0.00027	0.03
Manganese	7439-96-5	230	Max	--	--	--	--	0.0013	--	0.00074	0.002
Mercury	7439-97-6	4.06	Max	--	--	--	--	--	--	0.044	0.04
Vanadium	7440-62-2	123	Max	--	--	--	--	0.019	--	0.00020	0.02
Pathway Risk				2E-05	4E-06	7E-07	--	0.2	0.04	0.3	--
Total Risk							2E-05	Hazard Index			
								0.5			

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.

⁽⁴⁾ See Table G.2.4 for B(a)P-equivalent calculation.

-- Risk/hazard not calculated because toxicity value was not available.

NA = Not analyzed in any sample

Table G.2.47
RISK AND HAZARD ESTIMATES – INCIDENTAL INGESTION OF SURFACE SOIL (0-2')
RECREATIONAL USER
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions				Equations
Receptor	RECREATIONAL USER			
Parameter	Abbreviation	Value	Units	
COPC Concentration in Soil	C _s	chemical-specific	mg/kg	
Soil Ingestion Rate - adult	IRS _{adult}	50	mg/day	
Soil Ingestion Rate - adolescent	IRS _{adl}	100	mg/day	
Age-adjusted soil ingestion factor	IFS _{adj}	31.5	(mg-year)/(kg-day)	
Exposure Frequency	EF	50	days/year	
Exposure Duration - adult	ED _{adult}	14	years	
Exposure Duration - adolescent	Ed _{adl}	10	years	
Conversion Factor-soil	CF _s	0.000001	kg/mg	
Averaging Time – carcinogens	AT _c	25550	days	
Averaging Time – noncarcinogens, adolescent	AT _{nc} - adl	3650	days	
Averaging Time – noncarcinogens, adult	AT _{nc} - adult	5110	days	
Oral Slope Factor	SF _o	chemical-specific	(mg/kg-day) ⁻¹	
Body Weight - adult	BW _{adult}	80	kg	
Body Weight - adolescent	Bw _{adl}	44	kg	
Fraction Ingested	FI	1	unitless	
Oral Reference Dose	RfD _o	chemical-specific	mg/kg-day	

Incidental ingestion of carcinogenic COPCs in soil for multiple age groups simultaneously:

$$Ingestion_{age-adj} = \frac{(C_s)(IFS_{adj})(EF)(CF_s)(FI)}{(AT_c)}$$

where:
$$IFS_{adj} = \frac{(ED_{adl})(IRS_{adl})}{(BW_{adl})} + \frac{(ED_{adult})(IRS_{adult})}{(BW_{adult})}$$

Incidental ingestion of noncarcinogenic COPCs in soil for separate age groups:

$$Ingestion = \frac{(C_s)(IRS)(EF)(ED)(CF_s)(FI)}{(AT_{nc})(BW)}$$

Carcinogenic Risk:
$$Risk = (Ingestion)(SF_o)$$

Noncarcinogenic Hazard:
$$HQ = Ingestion / RfD_o$$

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	Carcinogenic Ingestion _{age-adj} (mg/kg-day)	Noncarcinogenic Ingestion - Adolescent (mg/kg-day)	Noncarcinogenic Ingestion - Adult (mg/kg-day)	SF _o ⁽⁴⁾ (mg/kg-day) ⁻¹	RfDo ⁽⁴⁾ (mg/kg-day)	Cancer Risk	% of Total	Hazard Quotient - Adolescent	% of Total	Hazard Quotient - Adult	% of Total
Volatile Organic Compounds														
Trichloroethene	79-01-6	5.8	Max	8.7E-07 ⁽⁶⁾	0.0000018	0.00000050	4.6E-02	5.0E-04	4.0E-08	0.74%	0.0036	4.5%	0.0010	4.5%
Semivolatile Organic Compounds														
1-Methylnaphthalene	90-12-0	0.32	Max	2.0E-08	0.00000010	0.000000027	2.9E-02	7.0E-02	5.7E-10	0.011%	0.0000014	0.0018%	0.00000039	0.0018%
2-Methylnaphthalene	91-57-6	4.3	Max	--	0.0000013	0.00000037	--	4.0E-03	--	--	0.00033	0.42%	0.000092	0.42%
Bis(2-chloroethyl)ether	111-44-4	0.24	Max	1.5E-08	--	--	1.1E+00	--	1.6E-08	0.30%	--	--	--	--
Polycyclic Aromatic Hydrocarbons														
BaP-equivalent ⁽⁵⁾	50-32-8	18	Max	2.7E-06 ⁽⁶⁾	0.0000056	0.0000015	1.0E+00	3.0E-04	2.7E-06	50%	0.019	23%	0.0051	23%
PCBs														
Aroclor-1254	11097-69-1	0.22	Max	1.4E-08	0.00000068	0.000000019	2.0E+00	2.0E-05	2.7E-08	0.50%	0.0034	4.3%	0.00094	4.3%
Aroclor-1260	11096-82-5	0.8	Max	4.9E-08	--	--	2.0E+00	--	9.9E-08	1.8%	--	--	--	--
Inorganics														
Antimony	7440-36-0	8.42	Max	--	0.0000026	0.00000072	--	4.0E-04	--	--	0.0066	8.2%	0.0018	8.2%
Arsenic	7440-38-2	27.6	Max	1.7E-06	0.0000086	0.0000024	1.5E+00	3.0E-04	2.6E-06	47%	0.029	36%	0.0079	36%
Cobalt	7440-48-4	10.1	Max	--	0.0000031	0.00000086	--	3.0E-04	--	--	0.010	13%	0.0029	13%
Manganese	7439-96-5	230	Max	--	0.000072	0.000020	--	1.4E-01	--	--	0.00051	0.64%	0.00014	0.64%
Mercury	7439-97-6	4.06	Max	--	--	--	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	123	Max	--	0.000038	0.000011	--	5.0E-03	--	--	0.0077	10%	0.0021	10%
Pathway Sums:									Cancer Risk		Hazard Index		Hazard Index	
									5E-06	100%	0.08	100%	0.02	100%

⁽¹⁾ COPC = Constituent of potential concern.
⁽²⁾ CAS = Chemical Abstracts Service number.
⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.
⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.
⁽⁵⁾ See Table G.2.4 for B(a)P-equivalent calculation.
⁽⁶⁾ See Table G.2.56 for mutagenic mode of action ingestion intake calculation and risk calculation.
-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.48
MUTAGENIC MODE OF ACTION -- INCIDENTAL INGESTION OF SURFACE SOIL (0-2')
RECREATIONAL USER
Parcel 83
Fort Monmouth, New Jersey

Risk Equation

Incidental ingestion for multiple age groups simultaneously of mutagenic COPCs in soil for recreational user receptors:

$$Ingestion = \frac{C_s \times \left(\frac{((ED_{6-16})(IRS_{adl})(3))}{BW_{adl}} + \frac{((ED_{16-30})(IRS_{adult})(1))}{BW_{adult}} \right) \times EF \times CF_s}{AT_c}$$

Mutagenic Risk: $Risk = (Ingestion)(SF_o)$

Exposure Assumptions			
RECREATIONAL USER			
Parameter	Abbreviation	Value	Units
COPC Concentration in Soil (C_s)	C_s	chemical-specific	mg/kg
Soil Ingestion Rate - adult	IRS_{adult}	50	mg/day
Soil Ingestion Rate - adolescent	IRS_{adl}	100	mg/day
Exposure Frequency	EF	50	days/year
Exposure Duration, 6 to 16 years of age	ED_{6-16}	10	years
Exposure Duration, 16 to 30 years of age	ED_{16-30}	14	years
Conversion Factor-soil	CF_s	0.000001	kg/mg
Averaging Time – carcinogens	AT_c	25550	days
Oral Slope Factor	SF_o	chemical-specific	$(\text{mg/kg-day})^{-1}$
Body Weight - adult	BW_{adult}	80	kg
Body Weight - adolescent	BW_{adl}	44	kg

COPC ⁽¹⁾	CAS Number ⁽²⁾	C_s ⁽³⁾ (mg/kg)	Carcinogenic Ingestion (mg/kg-day)	SF_o ⁽⁴⁾ (mg/kg-day) ⁻¹	Cancer Risk
Trichloroethene	79-01-6	5.8	8.7E-07	4.6E-02	4.0E-08
BaP-equivalent ⁽⁵⁾	50-32-8	18.0	2.7E-06	1.0E+00	2.7E-06

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table F.2.5.

⁽⁴⁾ Human Health Toxicity Values shown in Table F.2.11.

⁽⁵⁾ See Table F.2.4 for B(a)P-equivalent calculation.

Table G.2.49
RISK AND HAZARD ESTIMATES -- DERMAL CONTACT WITH SURFACE SOIL (0-2')
RECREATIONAL USER
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions			
Receptor			
RECREATIONAL USER			
Parameter	Abbreviation	Value	Units
COPC Concentration in Soil	C _s	chemical-specific	mg/kg
Exposure Frequency	EF	50	days/year
Exposure Duration - adult	ED _{adult}	14	years
Exposure Duration - adolescent	ED _{adl}	10	years
Event Frequency	EV	1	events/day
Exposed Skin Surface Area - adult	SA _{adult}	3470	cm ²
Exposed Skin Surface Area - adolescent	SA _{adl}	2160	cm ²
Age-adjusted dermal contact factor	SFS _{adj}	74	(mg-year)/(kg-event)
Adherence Factor - adult	AF _{adult}	0.09	mg/cm ²
Adherence Factor - adolescent	AF _{adl}	0.04	mg/cm ²
Dermal Absorption Factor	ABS _d	chemical-specific	unitless
Averaging Time – carcinogens	AT _c	25550	days
Averaging Time – noncarcinogens, adolescent	AT _{nc} - adl	3650	days
Averaging Time – noncarcinogens, adult	AT _{nc} - adult	5110	days
Oral Slope Factor Adjusted for GI Absorption	SF _d	chemical-specific	(mg/kg-day) ⁻¹
Body Weight - adult	BW _{adult}	80	kg
Body Weight - adolescent	BW _{adl}	44	kg
Oral Reference Dose Adjusted for GI Absorption	RfD _d	chemical-specific	mg/kg-day
Conversion Factor-soil	CF _s	0.000001	kg/mg
Fraction of contaminant absorbed in gastrointestinal tract	GIABS	chemical-specific	unitless
Dermal Absorbed Dose	DAD	chemical-specific	mg/kg-day
Absorbed dose per event	DA _{event}	chemical-specific	mg/cm ² -event

Equations

Dermal absorbed dose for carcinogenic COPCs in soil for multiple age groups simultaneously:

$$DAD_{age-adj} = \frac{(C_s)(SFS_{adj})(ABS_d)(EF)(EV)(CF)}{(AT)}$$

where:

$$SFS_{adj} = \frac{(ED_{adl})(AF_{adl})(SA_{adl})}{(BW_{adl})} + \frac{(ED_{adult})(AF_{adult})(SA_{adult})}{(BW_{adult})}$$

Carcinogenic Risk: $Risk = (DAD)(SF_d)$

Dermal absorbed dose of noncarcinogenic COPCs in soil for separate age groups:

where: $SF_d = SF_o / GIABS$

$$DAD = \frac{(DA_{event})(EF)(ED)(EV)(SA)}{(BW)(AT)}$$

Noncarcinogenic Hazard: $HQ = DAD / Rf_d$

where:

$$DA_{event} = (C_s)(CF_s)(AF)(ABS_d)$$

where: $RfD_d = (RfD_o)(GIABS)$

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	ABS _d ⁽⁴⁾ (unitless)	SF _d ⁽⁴⁾ (mg/kg-day) ⁻¹	RfD _d ⁽⁴⁾ (mg/kg-day)	Carcinogenic DAD (mg/kg-day)	Noncarcinogenic DAD - Adolescent (mg/kg-day)	Noncarcinogenic DAD Adult (mg/kg-day)	Cancer Risk	% of Total	Hazard Quotient - Adolescent	% of Total	Hazard Quotient - Adult	% of Total
Volatile Organic Compounds															
Trichloroethene	79-01-6	5.8	Max	--	4.6E-02	5.0E-04	-- ⁽⁶⁾	--	--	--	--	--	--	--	--
Semivolatile Organic Compounds															
1-Methylnaphthalene	90-12-0	0.32	J	Max	0.13	2.9E-02	7.0E-02	6.0E-09	1.1E-08	2.2E-08	1.8E-10	0.024%	0.00000016	0.0049%	0.00000032
2-Methylnaphthalene	91-57-6	4.3		Max	0.13	--	4.0E-03	--	1.5E-07	3.0E-07	--	--	0.000038	1.1%	0.000075
Bis(2-chloroethyl)ether	111-44-4	0.24	J	Max	--	1.1E+00	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons															
BaP-equivalent ⁽⁵⁾	50-32-8	18		Max	0.13	1.0E+00	3.0E-04	5.2E-07 ⁽⁶⁾	6.3E-07	1.3E-06	5.2E-07	70%	0.0021	64%	0.0042
PCBs															
Aroclor-1254	11097-69-1	0.22	J	Max	0.14	2.0E+00	2.0E-05	4.5E-09	8.3E-09	1.6E-08	9.0E-09	1.2%	0.00041	13%	0.00082
Aroclor-1260	11096-82-5	0.8		Max	0.14	2.0E+00	--	1.6E-08	--	--	3.3E-08	4.4%	--	--	--
Inorganics															
Antimony	7440-36-0	8.42		Max	--	--	6.0E-05	--	--	--	--	--	--	--	--
Arsenic	7440-38-2	27.6		Max	0.03	1.5E+00	3.0E-04	1.2E-07	2.2E-07	4.4E-07	1.8E-07	24%	0.00074	23%	0.0015
Cobalt	7440-48-4	10.1		Max	--	--	3.0E-04	--	--	--	--	--	--	--	--
Manganese	7439-96-5	230		Max	--	--	1.4E-01	--	--	--	--	--	--	--	--
Mercury	7439-97-6	4.06		Max	--	--	--	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	123		Max	--	--	1.3E-04	--	--	--	--	--	--	--	--
Pathway Sums:										Cancer Risk		Hazard Index		Hazard Index	
										7E-07	100%	0.003	100%	0.007	100%

⁽¹⁾ COPC = Constituent of potential concern.
⁽²⁾ CAS = Chemical Abstracts Service number.
⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.
⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.
⁽⁵⁾ See Table G.2.4 for B(a)P-equivalent calculation.
⁽⁶⁾ See Table G.2.58 for mutagenic mode of action dermal contact calculation and risk calculation.
-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.50
MUTAGENIC MODE OF ACTION -- DERMAL CONTACT WITH SURFACE SOIL (0-2')
RECREATIONAL USER
Parcel 83
Fort Monmouth, New Jersey

Equations

$$DAD = \frac{(C_s) \left(\frac{((ED_{6-16})(AF_{adl})(SA_{adl})(3))}{BW_{adl}} + \frac{((ED_{16-30})(AF_{adult})(SA_{adult})(1))}{BW_{adult}} \right) (ABS)(EF)(CF)}{AT_c}$$

Mutagenic Risk: $Risk = (DAD)(SF_d)$

Exposure Assumptions			
RECREATIONAL USER			
Parameter	Abbreviation	Value	Units
COPC Concentration in Soil	C _s	chemical-specific	mg/kg
Adherence Factor - adult	AF _{adult}	0.09	mg/cm ²
Adherence Factor - adolescent	AF _{adl}	0.04	mg/cm ²
Exposed Skin Surface Area - adult	SA _{adult}	3470	cm ²
Exposed Skin Surface Area - adolescent	SA _{adl}	2160	cm ²
Dermal Absorption Factor	ABS	chemical-specific	unitless
Exposure Frequency	EF	50	days/year
Exposure Duration, 6 to 16 years of age	ED ₆₋₁₆	10	years
Exposure Duration, 16 to 30 years of age	ED ₁₆₋₃₀	14	years
Conversion Factor-soil	CF _s	0.000001	kg/mg
Averaging Time – carcinogens	AT _c	25550	days
Body Weight - adult	BW _{adult}	80	kg
Body Weight - adolescent	BW _{adl}	44	kg
Dermal Absorbed Dose	DAD	chemical-specific	mg/kg-day
Oral Slope Factor Adjusted for GI Absorption	SF _d	chemical-specific	(mg/kg-day) ⁻¹

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾	ABS ⁽⁴⁾ (unitless)	Carcinogenic DAD (mg/kg-day)	SF _d (mg/kg-day) ⁻¹	Cancer Risk
Trichloroethene	79-01-6	5.8	--	--	4.6E-02	--
BaP-equivalent ⁽⁵⁾	50-32-8	18.0	1.3E-01	5.2E-07	1.0E+00	5.2E-07

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table F.2.5.

⁽⁴⁾ Human Health Toxicity Values shown in Table F.2.11.

⁽⁵⁾ See Table F.2.4 for B(a)P-equivalent calculation.

Table G.2.51
RISK AND HAZARD ESTIMATES -- INHALATION OF VOLATILES/FUGITIVE DUST FROM SURFACE SOIL (0-2')
RECREATIONAL USER
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions		RECREATIONAL USER	
Receptor	Parameter	Abbreviation	Value Units
	COPC in air (C _a)	C _a	chemical-specific µg/m ³
	COPC in surface soil (C _s)	C _s	chemical-specific mg/kg
	Exposure Frequency	EF	50 days/year
	Exposure Duration - inhalation	ED _{inh}	24 years
	Exposure Time	ET	0.083 unitless
	Averaging Time – carcinogens	AT _c	25550 days
	Averaging Time - noncarcinogens, inhalation	AT _{nc - inh}	8760 days
	Inhalation Unit Risk (IUR)	IUR	chemical-specific (µg/m ³) ⁻¹
	Inhalation Reference Concentration (RfC)	RfC	chemical-specific mg/m ³
	Volatilization Factor (VF)	VF	chemical-specific m ³ /kg
	Particulate emission factor (PEF) ⁽¹⁾	PEF	1.27E+09 m ³ /kg
	Soil saturation	C _{sat}	chemical-specific mg/kg
	Exposure concentration in air	EC(air)	chemical-specific µg/m ³

Exposure concentration in air for soil particulates and vapors emitted from soil for carcinogens and noncarcinogens:

$$EC(air) = \frac{(C_a)(ET)(EF)(ED_{inh})}{(AT)}$$

Where for inorganics, C_a calculated as:

$$C_a = (C_S) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{PEF} \right)$$

Where for organics with $C_s \leq C_{sat}$, or if no C_{sat} , C_a calculated as:

$$C_a = (C_s) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{VF} + \frac{1}{PEF} \right)$$

Where for organics with $C_s > C_{sat}$, C_a calculated as:

$$C_a = \left[(C_s) \left(1000 \mu g / mg \right) \left(\frac{1}{PEF} \right) \right] + \left[(C_{sat}) \left(1000 \mu g / mg \right) \left(\frac{1}{VF} \right) \right]$$

$$Risk = [EC(air)](IUR)$$

$$HQ = \frac{EC(air)}{(RfC)\left(1,000 \frac{\mu g}{mg}\right)}$$

COPC ⁽²⁾	CAS Number ⁽³⁾	C _s ⁽⁴⁾ (mg/kg)	UCL or Max	C _{sat} ⁽⁵⁾ (mg/kg)	Is C _s ≤ C _{sat} ? ⁽⁵⁾	Volatilization Factor ⁽⁶⁾ (m ³ /kg)	C _a (µg/m ³)	Carcinogenic EC(air) (µg/m ³)	Noncarcinogenic EC(air) (µg/m ³)	IUR ⁽⁵⁾ (µg/m ³) ⁻¹	RfC _i ⁽⁵⁾ (mg/m ³)	Cancer Risk	% of Total	Hazard Quotient	% of Total
Volatile Organic Compounds															
Trichloroethene	79-01-6	5.8	Max	6.9E+02	Yes	3.1E+03	1.9E+00	1.3E-02 ⁽⁸⁾	2.1E-02	4.1E-06	2.0E-03	5.5E-08	85%	0.011	65%
Semivolatile Organic Compounds															
1-Methylnaphthalene	90-12-0	0.32	J	Max	3.9E+02	Yes	8.2E+04	3.9E-03	--	--	--	--	--	--	--
2-Methylnaphthalene	91-57-6	4.3	Max	--	--	--	8.1E+04	5.3E-02	--	--	--	--	--	--	--
Bis(2-chloroethyl)ether	111-44-4	0.24	J	Max	5.1E+03	Yes	5.9E+04	4.0E-03	--	3.3E-04	--	5.2E-09	8.0%	--	--
Polycyclic Aromatic Hydrocarbons															
BaP-equivalent ⁽⁷⁾	50-32-8	18	Max	--	--	3.3E+07	5.6E-04	4.0E-06 ⁽⁸⁾	6.4E-06	6.0E-04	2.0E-06	2.4E-09	3.7%	0.0032	19%
PCBs															
Aroclor-1254	11097-69-1	0.22	J	Max	--	--	1.2E+06	1.9E-04	7.3E-07	--	5.7E-04	4.1E-10	0.64%	--	--
Aroclor-1260	11096-82-5	0.8	Max	--	--	--	1.8E+06	4.4E-04	1.7E-06	--	5.7E-04	9.7E-10	1.5%	--	--
Inorganics															
Antimony	7440-36-0	8.42	Max	--	--	--	6.6E-06	--	--	--	--	--	--	--	--
Arsenic	7440-38-2	27.6	Max	--	--	--	2.2E-05	8.5E-08	2.5E-07	4.3E-03	1.5E-05	3.7E-10	0.56%	0.000017	0.10%
Cobalt	7440-48-4	10.1	Max	--	--	--	8.0E-06	3.1E-08	9.1E-08	9.0E-03	6.0E-06	2.8E-10	0.43%	0.000015	0.092%
Manganese	7439-96-5	230	Max	--	--	--	1.8E-04	--	2.1E-06	--	5.0E-05	--	--	0.000041	0.25%
Mercury	7439-97-6	4.06	Max	3.1E+00	No	4.9E+04	6.4E-02	--	7.3E-04	--	3.0E-04	--	--	0.0024	15%
Vanadium	7440-62-2	123	Max	--	--	--	9.7E-05	--	1.1E-06	--	1.0E-04	--	--	0.000011	0.067%
Pathway Sums:												Cancer Risk		Hazard Index	
												6.5E-08	100%	0.02	100%

- (1) PEF calculated as shown in Table G.2.9.
- (2) COPC = Constituent of potential concern.
- (3) CAS = Chemical Abstracts Service number.
- (4) COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.
- (5) Human Health Toxicity Values shown in Table G.2.11.
- (6) See Table G.2.10 for VF calculation.
- (7) See Table G.2.4 for B(a)P-equivalent calculation.
- (8) See Table G.2.60 for mutagenic mode of action inhalation calculation and risk calculation.

-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.52
MUTAGENIC MODE OF ACTION – INHALATION OF VOLATILES/FUGITIVE DUST FROM SURFACE SOIL (0-2')
RECREATIONAL USER
Parcel 83
Fort Monmouth, New Jersey

Equations

$$EC(air) = \frac{(C_a)(ET)(EF)[((ED_{6-16})(3)) + ((ED_{6-30})(1))]}{AT_c}$$

$$\text{where: } C_a = (C_s)(1,000 \mu g / mg) \left(\frac{1}{VF} + \frac{1}{PEF} \right)$$

$$Mutagenic Risk_{inh} = [(EC(air))(IUR)]$$

Exposure Assumptions			
Receptor	RECREATIONAL USER		
Parameter	Abbreviation	Value	Units
COPC in air	C _a	chemical-specific	μg/m ³
COPC Concentration in Soil	C _s	chemical-specific	mg/kg
Exposure Frequency	EF	50	days/year
Exposure Duration, 6 to 16 years of age	ED ₆₋₁₆	10	years
Exposure Duration, 16 to 30 years of age	ED ₁₆₋₃₀	14	years
Exposure Time	ET	0.083	unitless
Averaging Time – carcinogens	AT _c	25550	days
Inhalation Unit Risk	IUR	chemical-specific	(μg/m ³) ⁻¹
Volatilization Factor	VF	chemical-specific	m ³ /kg
Particulate emission factor ⁽¹⁾	PEF	1.27E+09	m ³ /kg
Exposure concentration in air	EC(air)	chemical-specific	μg/m ³

COPC ⁽²⁾	CAS Number ⁽³⁾	C _s ⁽⁴⁾ (mg/kg)	Volatilization Factor ⁽⁵⁾ (m ³ /kg)	C _a (μg/m ³)	Carcinogenic EC(air) (μg/m ³)	IUR ⁽⁶⁾ (μg/m ³) ⁻¹	Cancer Risk
Trichloroethene	79-01-6	5.8	3.1E+03	1.9E+00	1.3E-02	4.1E-06	5.5E-08
BaP-equivalent ⁽⁷⁾	50-32-8	18.0	3.3E+07	5.6E-04	4.0E-06	6.0E-04	2.4E-09

⁽¹⁾ PEF calculated as shown in Table G.2.9.

⁽²⁾ COPC = Constituent of potential concern.

⁽³⁾ CAS = Chemical Abstracts Service number.

⁽⁴⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.

⁽⁵⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁶⁾ See Table G.2.10 for VF calculation.

⁽⁷⁾ See Table G.2.4 for B(a)P-equivalent calculation.

Table G.2.53
HUMAN HEALTH RISK EVALUATION SUMMARY FOR SURFACE SOIL (0-2')
RECREATIONAL USER
Parcel 83
Fort Monmouth, New Jersey

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	Age -adjusted Ingestion Carcinogenic Risk	Age-adjusted Dermal Carcinogenic Risk	Age-adjusted Inhalation Carcinogenic Risk	Total Carcinogenic Risk	Adolescent Ingestion Hazard Quotient	Adolescent Dermal Hazard Quotient	Adult Ingestion Hazard Quotient	Adult Dermal Hazard Quotient	Inhalation Hazard Quotient	Total Hazard Quotient - Adolescent	Total Hazard Quotient - Adult
Volatile Organic Compounds														
Trichloroethene	79-01-6	5.8	Max	4.0E-08	--	5.5E-08	1E-07	0.0036	--	0.0010	--	0.011	0.01	0.01
Semivolatile Organic Compounds														
1-Methylnaphthalene	90-12-0	0.32	J	Max	5.7E-10	1.8E-10	--	7E-10	0.0000014	0.00000016	0.00000039	0.00000032	--	0.000002
2-Methylnaphthalene	91-57-6	4.3	Max	--	--	--	--	0.00033	0.000038	0.000092	0.000075	--	0.0004	0.0002
Bis(2-chloroethyl)ether	111-44-4	0.24	J	Max	1.6E-08	--	5.2E-09	2E-08	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons														
BaP-equivalent ⁽⁴⁾	50-32-8	18	Max	2.7E-06	5.2E-07	2.4E-09	3E-06	0.019	0.0021	0.0051	0.0042	0.0032	0.02	0.01
PCBs														
Aroclor-1254	11097-69-1	0.22	J	Max	2.7E-08	9.0E-09	4.1E-10	4E-08	0.0034	0.00041	0.00094	0.00082	--	0.004
Aroclor-1260	11096-82-5	0.8	Max	9.9E-08	3.3E-08	9.7E-10	1E-07	--	--	--	--	--	--	--
Inorganics														
Antimony	7440-36-0	8.42	Max	--	--	--	--	0.0066	--	0.0018	--	--	0.007	0.002
Arsenic	7440-38-2	27.6	Max	2.6E-06	1.8E-07	3.7E-10	3E-06	0.029	0.00074	0.0079	0.0015	0.000017	0.03	0.009
Cobalt	7440-48-4	10.1	Max	--	--	2.8E-10	3E-10	0.010	--	0.0029	--	0.000015	0.01	0.003
Manganese	7439-96-5	230	Max	--	--	--	--	0.00051	--	0.00014	--	0.000041	0.0006	0.0002
Mercury	7439-97-6	4.06	Max	--	--	--	--	--	--	--	--	0.0024	0.002	0.002
Vanadium	7440-62-2	123	Max	--	--	--	--	0.0077	--	0.0021	--	0.000011	0.008	0.002
Pathway Risk				5E-06	7E-07	6E-08	--	0.08	0.003	0.02	0.007	0.02	--	--
Total Risk								6E-06	Hazard Index					
									0.1					
									0.04					

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.6.

⁽⁴⁾ See Table G.2.4 for B(a)P-equivalent calculation.

-- Risk/hazard not calculated because toxicity value was not available.

Table G.2.54
RISK AND HAZARD ESTIMATES -- INCIDENTAL INGESTION OF COMBINED SURFACE AND SUBSURFACE SOIL (0-15')
UU/UE RECEPTOR
EXPOSURE AREA 1
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions				Equations
Receptor	UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units	
COPC Concentration in Soil	C _s	chemical-specific	mg/kg	
Soil Ingestion Rate - adult	IRS _{adult}	100	mg/day	
Soil Ingestion Rate - child	IRS _{child}	200	mg/day	
Age-adjusted soil ingestion factor	IFS _{adj}	105	(mg-year)/(kg-day)	
Exposure Frequency	EF	350	days/year	
Exposure Duration - adult	ED _{adult}	20	years	
Exposure Duration - child	ED _{child}	6	years	
Conversion Factor-soil	CF _s	0.000001	kg/mg	
Averaging Time -- carcinogens	AT _c	25550	days	
Averaging Time -- noncarcinogens, child	AT _{nc} - child	2190	days	
Averaging Time -- noncarcinogens, adult	AT _{nc} - adult	7300	days	
Oral Slope Factor	SF _o	chemical-specific	(mg/kg-day) ⁻¹	
Body Weight - adult	BW _{adult}	80	kg	
Body Weight - child	BW _{child}	15	kg	
Fraction Ingested	FI	1	unitless	
Oral Reference Dose	RfD _o	chemical-specific	mg/kg-day	

Incidental ingestion of carcinogenic COPCs in soil for multiple age groups simultaneously:

$$Ingestion_{age-adj} = \frac{(C_s)(IFS_{adj})(EF)(CF_s)(FI)}{(AT_c)}$$

where:

$$IFS_{adj} = \frac{(ED_{child})(IRS_{child})}{(BW_{child})} + \frac{(ED_{adult})(IRS_{adult})}{(BW_{adult})}$$

Incidental ingestion of noncarcinogenic COPCs in soil for separate age groups:

$$Ingestion = \frac{(C_s)(IRS)(EF)(ED)(CF_s)(FI)}{(AT_{nc})(BW)}$$

Carcinogenic Risk:

$$Risk = (Ingestion)(SF_o)$$

Noncarcinogenic Hazard:

$$HQ = Ingestion/RfD_o$$

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	Carcinogenic Ingestion _{age-adj} (mg/kg-day)	Noncarcinogenic Ingestion - Child (mg/kg-day)	Noncarcinogenic Ingestion - Adult (mg/kg-day)	SF _o ⁽⁴⁾ (mg/kg-day) ⁻¹	RfDo ⁽⁴⁾ (mg/kg-day)	Cancer Risk	% of Total	Hazard Quotient - Child	% of Total	Hazard Quotient - Adult	% of Total
Volatile Organic Compounds														
Trichloroethene	79-01-6	5.8	Max	3.8E-05 ⁽⁶⁾	0.000074	0.0000070	4.6E-02	5.0E-04	1.8E-06	4.0%	0.15	8.4%	0.014	8.4%
Semivolatile Organic Compounds														
1-Methylnaphthalene	90-12-0	31	Max	4.5E-05	0.00040	0.000037	2.9E-02	7.0E-02	1.3E-06	2.9%	0.0057	0.32%	0.00053	0.32%
2-Methylnaphthalene	91-57-6	53	Max	--	0.00068	0.000064	--	4.0E-03	--	--	0.17	9.5%	0.016	9.5%
Bis(2-chloroethyl)ether	111-44-4	1.2	Max	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons														
BaP-equivalent ⁽⁵⁾	50-32-8	1.8	UCL	1.2E-05 ⁽⁶⁾	0.000023	0.0000022	1.0E+00	3.0E-04	1.2E-05	27%	0.077	4.3%	0.0072	4.3%
PCBs														
Aroclor-1260	11096-82-5	0.2	Max	2.9E-07	--	--	2.0E+00	--	5.8E-07	1.3%	--	--	--	--
Inorganics														
Antimony	7440-36-0	8.42	Max	--	0.00011	0.000010	--	4.0E-04	--	--	0.27	15%	0.025	15%
Arsenic	7440-38-2	13.2	UCL	1.9E-05	0.00017	0.000016	1.5E+00	3.0E-04	2.8E-05	65%	0.56	32%	0.053	32%
Cobalt	7440-48-4	7.35	Max	--	0.000094	0.0000088	--	3.0E-04	--	--	0.31	18%	0.029	18%
Manganese	7439-96-5	230	Max	--	0.0029	0.00028	--	1.4E-01	--	--	0.021	1.2%	0.0020	1.2%
Mercury	7439-97-6	0.121	Max	--	--	--	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	81.8	Max	--	0.0010	0.000098	--	5.0E-03	--	--	0.21	12%	0.020	12%
Pathway Sums:									Cancer Risk		Hazard Index		Hazard Index	
									4E-05	100%	2	100%	0.2	100%

⁽¹⁾ COPC = Constituent of potential concern.
⁽²⁾ CAS = Chemical Abstracts Service number.
⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.
⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.
⁽⁵⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.
⁽⁶⁾ See Table G.2.63 for mutagenic mode of action ingestion intake calculation and risk calculation.
-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.55
MUTAGENIC MODE OF ACTION -- INCIDENTAL INGESTION OF COMBINED SURFACE AND SUBSURFACE SOIL (0-15')
UU/UE RECEPTOR
EXPOSURE AREA 1
Parcel 83
Fort Monmouth, New Jersey

$$\text{Ingestion} = \frac{C_s \times \left(\frac{((ED_{0-2})(IRS_{child})(10))}{BW_{child}} + \frac{((ED_{2-6})(IRS_{child})(3))}{BW_{child}} + \frac{((ED_{6-16})(IRS_{adult})(3))}{BW_{adult}} + \frac{((ED_{16-30})(IRS_{adult})(1))}{BW_{adult}} \right) \times EF \times CF_s}{AT_c}$$

Mutagenic Risk: $Risk = (Ingestion)(SF_o)$

Exposure Assumptions			
UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units
COPC Concentration in Soil (C_s)	C_s	chemical-specific	mg/kg
Soil Ingestion Rate - adult	IRS_{adult}	100	mg/day
Soil Ingestion Rate - child	IRS_{child}	200	mg/day
Exposure Frequency	EF	350	days/year
Exposure Duration, 0 to 2 years of age	ED_{0-2}	2	years
Exposure Duration, 2 to 6 years of age	ED_{2-6}	4	years
Exposure Duration, 6 to 16 years of age	ED_{6-16}	10	years
Exposure Duration, 16 to 30 years of age	ED_{16-30}	14	years
Conversion Factor-soil	CF_s	0.000001	kg/mg
Averaging Time – carcinogens	AT_c	25550	days
Oral Slope Factor	SF_o	chemical-specific	(mg/kg-day) ⁻¹
Body Weight - adult	BW_{adult}	80	kg
Body Weight - child	BW_{child}	15	kg

COPC ⁽¹⁾	CAS Number ⁽²⁾	C_s ⁽³⁾ (mg/kg)	Carcinogenic Ingestion (mg/kg-day)	SF_o ⁽⁴⁾ (mg/kg-day) ⁻¹	Cancer Risk
Trichloroethene	79-01-6	5.8	3.8E-05	4.6E-02	1.8E-06
BaP-equivalent ⁽⁵⁾	50-32-8	1.8	1.2E-05	1.0E+00	1.2E-05

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.

⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁵⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.

Table G.2.56
RISK AND HAZARD ESTIMATES -- DERMAL CONTACT WITH COMBINED SURFACE AND SUBSURFACE SOIL (0-15')
UU/UE RECEPTOR
EXPOSURE AREA 1
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions				Equations			
Receptor				UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units				
COPC Concentration in Soil	C _s	chemical-specific	mg/kg				
Exposure Frequency	EF	350	days/year				
Exposure Duration - adult	ED _{adult}	20	years				
Exposure Duration - child	ED _{child}	6	years				
Event Frequency	EV	1	events/day				
Exposed Skin Surface Area - adult	SA _{adult}	6032	cm ²				
Exposed Skin Surface Area - child	SA _{child}	2690	cm ²				
Age-adjusted dermal contact factor	SFS _{adj}	321	(mg-year)/(kg-event)				
Adherence Factor - adult	AF _{adult}	0.07	mg/cm ²				
Adherence Factor - child	AF _{child}	0.2	mg/cm ²				
Dermal Absorption Factor	ABS _d	chemical-specific	unitless				
Averaging Time -- carcinogens	AT _c	25550	days				
Averaging Time -- noncarcinogens, child	AT _{nc} - child	2190	days				
Averaging Time -- noncarcinogens, adult	AT _{nc} - adult	7300	days				
Oral Slope Factor Adjusted for GI Absorption	SF _d	chemical-specific	(mg/kg-day) ⁻¹				
Body Weight - adult	BW _{adult}	80	kg				
Body Weight - child	BW _{child}	15	kg				
Oral Reference Dose Adjusted for GI Absorption	RfD _d	chemical-specific	mg/kg-day				
Conversion Factor-soil	CF _s	0.000001	kg/mg				
Fraction of contaminantt absorbed in gastrointestinal tract	GIABS	chemical-specific	unitless				
Dermal Absorbed Dose	DAD	chemical-specific	mg/kg-day				
Absorbed dose per event	DA _{event}	chemical-specific	mg/cm ² -event				

Dermal absorbed dose for carcinogenic COPCs in soil for multiple age groups simultaneously:

$$DAD_{age-adj} = \frac{(C_s)(SFS_{adj})(ABS_d)(EF)(EV)(CF)}{(AT)}$$

where:

$$SFS_{adj} = \frac{(ED_{child})(AF_{child})(SA_{child})}{(BW_{child})} + \frac{(ED_{adult})(AF_{adult})(SA_{adult})}{(BW_{adult})}$$

Carcinogenic Risk:

$$Risk = (DAD)(SF_d)$$

Dermal absorbed dose of noncarcinogenic COPCs in soil for separate age groups:

where:

$$SF_d = SF_o / GIABS$$

Noncarcinogenic Hazard:

$$HQ = DAD / Rf_d$$

where:

$$DA_{event} = (C_S)(CF_S)(AF)(ABS_d)$$

where:

$$RfD_d = (RfD_o)(GIABS)$$

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	ABS _d ⁽⁴⁾ (unitless)	SF _d ⁽⁴⁾ (mg/kg-day) ⁻¹	RfD _d ⁽⁴⁾ (mg/kg-day)	Carcinogenic DAD (mg/kg-day)	Noncarcinogenic DAD - Child (mg/kg-day)	Noncarcinogenic DAD Adult (mg/kg-day)	Cancer Risk	% of Total	Hazard Quotient - Child	% of Total	Hazard Quotient - Adult	% of Total
Volatile Organic Compounds															
Trichloroethene	79-01-6	5.8	Max	--	4.6E-02	5.0E-04	-- ⁽⁶⁾	--	--	--	--	--	--	--	--
Semivolatile Organic Compounds															
1-Methylnaphthalene	90-12-0	31	Max	0.13	2.9E-02	7.0E-02	1.8E-05	1.4E-04	2.0E-05	5.1E-07	6.6%	0.0020	1.5%	0.00029	1.5%
2-Methylnaphthalene	91-57-6	53	Max	0.13	--	4.0E-03	--	2.4E-04	3.5E-05	--	--	0.059	44%	0.0087	44%
Bis(2-chloroethyl)ether	111-44-4	1.2	U	Max	--	1.1E+00	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons															
BaP-equivalent ⁽⁵⁾	50-32-8	1.8	UCL	0.13	1.0E+00	3.0E-04	4.4E-06 ⁽⁶⁾	8.0E-06	1.2E-06	4.4E-06	57%	0.027	20%	0.0039	20%
PCBs															
Aroclor-1260	11096-82-5	0.2	Max	0.14	2.0E+00	--	1.2E-07	--	--	2.5E-07	3.2%	--	--	--	--
Inorganics															
Antimony	7440-36-0	8.42	Max	--	--	6.0E-05	--	--	--	--	--	--	--	--	--
Arsenic	7440-38-2	13.2	UCL	0.03	1.5E+00	3.0E-04	1.7E-06	1.4E-05	2.0E-06	2.6E-06	33%	0.045	34%	0.0067	34%
Cobalt	7440-48-4	7.35	Max	--	--	3.0E-04	--	--	--	--	--	--	--	--	--
Manganese	7439-96-5	230	Max	--	--	1.4E-01	--	--	--	--	--	--	--	--	--
Mercury	7439-97-6	0.121	U	Max	--	--	--	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	81.8	Max	--	--	1.3E-04	--	--	--	--	--	--	--	--	--
Pathway Sums:										Cancer Risk		Hazard Index		Hazard Index	
										8E-06	100%	0.1	100%	0.02	100%

⁽¹⁾ COPC = Constituent of potential concern.
⁽²⁾ CAS = Chemical Abstracts Service number.
⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.
⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.
⁽⁵⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.
⁽⁶⁾ See Table G.2.65 for mutagenic mode of action dermal contact calculation and risk calculation.
-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.57
MUTAGENIC MODE OF ACTION -- DERMAL CONTACT WITH COMBINED SURFACE AND SUBSURFACE SOIL (0-15')
UU/UE RECEPTOR
EXPOSURE AREA 1
Parcel 83
Fort Monmouth, New Jersey

$$DAD = \frac{(C_s) \left(\frac{((ED_{0-2})(AF_{child})(SA_{child})(10))}{BW_{child}} + \frac{((ED_{2-6})(AF_{child})(SA_{child})(3))}{BW_{child}} + \frac{((ED_{6-16})(AF_{adult})(SA_{adult})(3))}{BW_{adult}} + \frac{((ED_{16-30})(AF_{adult})(SA_{adult})(1))}{BW_{adult}} \right) (ABS)(EF)(CF)}{AT_c}$$

Mutagenic Risk: $Risk = (DAD)(SF_d)$

Exposure Assumptions			
Receptor UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units
COPC Concentration in Soil	C _s	chemical-specific	mg/kg
Adherence Factor - adult	AF _{adult}	0.07	mg/cm2
Adherence Factor - child	AF _{child}	0.2	mg/cm2
Exposed Skin Surface Area - adult	SA _{adult}	6032	cm2
Exposed Skin Surface Area - child	SA _{child}	2690	cm2
Dermal Absorption Factor	ABS	chemical-specific	unitless
Exposure Frequency	EF	350	days/year
Exposure Duration, 0 to 2 years of age	ED ₀₋₂	2	years
Exposure Duration, 2 to 6 years of age	ED ₂₋₆	4	years
Exposure Duration, 6 to 16 years of age	ED ₆₋₁₆	10	years
Exposure Duration, 16 to 30 years of age	ED ₁₆₋₃₀	14	years
Conversion Factor-soil	CF _s	0.000001	kg/mg
Averaging Time -- carcinogens	AT _c	25550	days
Body Weight - adult	BW _{adult}	80	kg
Body Weight - child	BW _{child}	15	kg
Dermal Absorbed Dose	DAD	chemical-specific	mg/kg-day
Oral Slope Factor Adjusted for GI Absorption	SF _d	chemical-specific	(mg/kg-day) ⁻¹

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾	ABS ⁽⁴⁾ (unitless)	Carcinogenic DAD (mg/kg-day)	SF _d (mg/kg-day) ⁻¹	Cancer Risk
Trichloroethene	79-01-6	5.8	--	--	4.6E-02	--
BaP-equivalent ⁽⁵⁾	50-32-8	1.8	1.3E-01	4.4E-06	1.0E+00	4.4E-06

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.

⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁵⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.

Table G.2.58
RISK AND HAZARD ESTIMATES -- INHALATION OF VOLATILES/FUGITIVE DUST FROM COMBINED SURFACE AND SUBSURFACE SOIL (0-15')
UU/UE RECEPTOR
EXPOSURE AREA 1
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions				Equations
Receptor				
UU/UE RECEPTOR				
Parameter	Abbreviation	Value	Units	
COPC in air (C _a)	C _a	chemical-specific	µg/m ³	
COPC in surface soil (C _s)	C _s	chemical-specific	mg/kg	
Exposure Frequency	EF	350	days/year	
Exposure Duration - inhalation	ED _{inh}	26	years	
Exposure Time	ET	1	unitless	
Averaging Time – carcinogens	AT _c	25550	days	
Averaging Time - noncarcinogens, inhalation	AT _{nc - inh}	9490	days	
Inhalation Unit Risk (IUR)	IUR	chemical-specific	(µg/m ³) ⁻¹	
Inhalation Reference Concentration (RfC)	RfC	chemical-specific	mg/m ³	
Volatilization Factor (VF)	VF	chemical-specific	m ³ /kg	
Particulate emission factor (PEF) ⁽¹⁾	PEF	1.27E+09	m ³ /kg	
Soil saturation	C _{sat}	chemical-specific	mg/kg	
Exposure concentration in air	EC(air)	chemical-specific	µg/m ³	

Exposure concentration in air for soil particulates and vapors emitted from soil for carcinogens and noncarcinogens:

$$EC(air) = \frac{(C_a)(ET)(EF)(ED_{inh})}{(AT)}$$

Where for inorganics, C_a calculated as:

$$C_a = (C_s) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{PEF} \right)$$

Where for organics with C_s ≤ C_{sat}, or if no C_{sat} value, C_a calculated as:

$$C_a = (C_s) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{VF} + \frac{1}{PEF} \right)$$

Where for organics with C_s > C_{sat}, C_a calculated as:

$$C_a = \left[(C_s) \left(1000 \frac{\mu g}{mg} \right) \left(\frac{1}{PEF} \right) \right] + \left[(C_{sat}) \left(1000 \frac{\mu g}{mg} \right) \left(\frac{1}{VF} \right) \right]$$

$$Risk = [EC(air)](IUR)$$

$$HQ = \frac{EC(air)}{(RfC) \left(1,000 \frac{\mu g}{mg} \right)}$$

COPC ⁽²⁾	CAS Number ⁽³⁾	C _s ⁽⁴⁾ (mg/kg)	UCL or Max	C _{sat} ⁽⁵⁾ (mg/kg)	Is C _s ≤ C _{sat} ? ⁽⁵⁾	Volatilization Factor ⁽⁶⁾ (m ³ /kg)	C _a (µg/m ³)	Carcinogenic EC(air) (µg/m ³)	Noncarcinogenic EC(air) (µg/m ³)	IUR ⁽⁵⁾ (µg/m ³) ⁻¹	RfC _i ⁽⁵⁾ (mg/m ³)	Cancer Risk	% of Total	Hazard Quotient	% of Total
Volatile Organic Compounds															
Trichloroethene	79-01-6	5.8	Max	6.9E+02	Yes	3.1E+03	1.9E+00	2.0E+00 ⁽⁸⁾	1.8E+00	4.1E-06	2.0E-03	8.0E-06	99%	0.90	97%
Semivolatile Organic Compounds															
1-Methylnaphthalene	90-12-0	31	Max	3.9E+02	Yes	8.2E+04	3.8E-01	--	--	--	--	--	--	--	--
2-Methylnaphthalene	91-57-6	53	Max	--	--	8.1E+04	6.5E-01	--	--	--	--	--	--	--	--
Bis(2-chloroethyl)ether	111-44-4	1.2	Max	--	--	5.9E+04	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons															
BaP-equivalent ⁽⁷⁾	50-32-8	1.8	UCL	--	--	3.3E+07	5.6E-05	5.8E-05 ⁽⁸⁾	5.4E-05	6.0E-04	2.0E-06	3.5E-08	0.43%	0.027	2.9%
PCBs															
Aroclor-1260	11096-82-5	0.2	Max	--	--	1.8E+06	1.1E-04	3.9E-05	--	5.7E-04	--	2.2E-08	0.27%	--	--
Inorganics															
Antimony	7440-36-0	8.42	Max	--	--	--	6.6E-06	--	--	--	--	--	--	--	--
Arsenic	7440-38-2	13.2	UCL	--	--	--	1.0E-05	3.7E-06	1.0E-05	4.3E-03	1.5E-05	1.6E-08	0.20%	0.00067	0.071%
Cobalt	7440-48-4	7.35	Max	--	--	--	5.8E-06	2.1E-06	5.6E-06	9.0E-03	6.0E-06	1.9E-08	0.23%	0.00093	0.10%
Manganese	7439-96-5	230	Max	--	--	--	1.8E-04	--	1.7E-04	--	5.0E-05	--	--	0.0035	0.37%
Mercury	7439-97-6	0.121	Max	--	--	4.9E+04	--	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	81.8	Max	--	--	--	6.5E-05	--	6.2E-05	--	1.0E-04	--	--	0.00062	0.066%
Pathway Sums:												Cancer Risk		Hazard Index	
												8E-06	100%	0.9	100%

⁽¹⁾ PEF calculated as shown in Table G.2.9.
⁽²⁾ COPC = Constituent of potential concern.
⁽³⁾ CAS = Chemical Abstracts Service number.
⁽⁴⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.
⁽⁵⁾ Human Health Toxicity Values shown in Table G.2.11.
⁽⁶⁾ See Table G.2.10 for VF calculation.
⁽⁷⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.
⁽⁸⁾ See Table G.2.67 for mutagenic mode of action inhalation calculation and risk calculation.
-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.59
MUTAGENIC MODE OF ACTION – INHALATION OF VOLATILES/FUGITIVE DUST FROM COMBINED SURFACE AND SUBSURFACE SOIL (0-15')
UU/UE RECEPTOR
EXPOSURE AREA 1
Parcel 83
Fort Monmouth, New Jersey

Equations

$$EC(air) = \frac{(C_a)(ET)(EF)[((ED_{0-2})(10)) + ((ED_{2-6})(3)) + ((ED_{6-16})(3)) + ((ED_{16-30})(1))]}{AT_c}$$

where: $C_a = (C_s)(1,000 \mu g / mg) \left(\frac{1}{VF} + \frac{1}{PEF} \right)$

$$Mutagenic Risk_{inh} = [EC(air)](IUR)$$

Exposure Assumptions			
UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units
COPC in air	C _a	chemical-specific	μg/m ³
COPC Concentration in Soil	C _s	chemical-specific	mg/kg
Exposure Frequency	EF	350	days/year
Exposure Duration, 0 to 2 years of age	ED ₀₋₂	2	years
Exposure Duration, 2 to 6 years of age	ED ₂₋₆	4	years
Exposure Duration, 6 to 16 years of age	ED ₆₋₁₆	10	years
Exposure Duration, 16 to 30 years of age	ED ₁₆₋₃₀	14	years
Exposure Time	ET	1	unitless
Averaging Time – carcinogens	AT _c	25550	days
Inhalation Unit Risk	IUR	chemical-specific	(μg/m ³) ⁻¹
Volatilization Factor	VF	chemical-specific	m ³ /kg
Particulate emission factor ⁽¹⁾	PEF	1.27E+09	m ³ /kg
Exposure concentration in air	EC(air)	chemical-specific	μg/m ³

COPC ⁽²⁾	CAS Number ⁽³⁾	C _s ⁽⁴⁾ (mg/kg)	Volatilization Factor ⁽⁵⁾ (m ³ /kg)	C _a (μg/m ³)	Carcinogenic EC(air) (μg/m ³)	IUR ⁽⁶⁾ (μg/m ³) ⁻¹	Cancer Risk
Trichloroethene	79-01-6	5.8	3.1E+03	1.9E+00	2.0E+00	4.1E-06	8.0E-06
BaP-equivalent ⁽⁷⁾	50-32-8	1.8	3.3E+07	5.6E-05	5.8E-05	6.0E-04	3.5E-08

⁽¹⁾ PEF calculated as shown in Table G.2.9.

⁽²⁾ COPC = Constituent of potential concern.

⁽³⁾ CAS = Chemical Abstracts Service number.

⁽⁴⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.

⁽⁵⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁶⁾ See Table G.2.10 for VF calculation.

⁽⁷⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.

Table G.2.60
HUMAN HEALTH RISK EVALUATION SUMMARY FOR COMBINED SURFACE AND SUBSURFACE SOIL (0-15')
UU/UE RECEPTOR
EXPOSURE AREA 1
Parcel 83
Fort Monmouth, New Jersey

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	Age -adjusted Ingestion Carcinogenic Risk	Age-adjusted Dermal Carcinogenic Risk	Age-adjusted Inhalation Carcinogenic Risk	Total Carcinogenic Risk	Child Ingestion Hazard Quotient	Child Dermal Hazard Quotient	Adult Ingestion Hazard Quotient	Adult Dermal Hazard Quotient	Inhalation Hazard Quotient	Total Hazard Quotient - Child	Total Hazard Quotient - Adult
Volatile Organic Compounds														
Trichloroethene	79-01-6	5.8	Max	1.8E-06	--	8.0E-06	1E-05	0.15	--	0.014	--	0.90	1	0.9
Semivolatile Organic Compounds														
1-Methylnaphthalene	90-12-0	31	Max	1.3E-06	5.1E-07	--	2E-06	0.0057	0.0020	0.00053	0.00029	--	0.008	0.0008
2-Methylnaphthalene	91-57-6	53	Max	--	--	--	--	0.17	0.059	0.016	0.0087	--	0.2	0.02
Bis(2-chloroethyl)ether	111-44-4	1.2	U	Max	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons														
BaP-equivalent ⁽⁴⁾	50-32-8	1.8	UCL	1.2E-05	4.4E-06	3.5E-08	2E-05	0.077	0.027	0.0072	0.0039	0.027	0.1	0.04
PCBs														
Aroclor-1260	11096-82-5	0.2	Max	5.8E-07	2.5E-07	2.2E-08	8E-07	--	--	--	--	--	--	--
Inorganics														
Antimony	7440-36-0	8.42	Max	--	--	--	--	0.27	--	0.025	--	--	0.3	0.03
Arsenic	7440-38-2	13.2	UCL	2.8E-05	2.6E-06	1.6E-08	3E-05	0.56	0.045	0.053	0.0067	0.00067	0.6	0.06
Cobalt	7440-48-4	7.35	Max	--	--	1.9E-08	2E-08	0.31	--	0.029	--	0.00093	0.3	0.03
Manganese	7439-96-5	230	Max	--	--	--	--	0.021	--	0.0020	--	0.0035	0.02	0.01
Mercury	7439-97-6	0.121	U	Max	--	--	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	81.8	Max	--	--	--	--	0.21	--	0.020	--	0.00062	0.2	0.02
Pathway Risk				4E-05	8E-06	8E-06	--	2	0.1	0.2	0.02	0.9	--	--
Total Risk							6E-05	Hazard Index						
													3	1

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.

⁽⁴⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.

-- Risk/hazard not calculated because toxicity value was not available.

Table G.2.61

TARGET ORGANS AND TOXIC CRITICAL EFFECTS FOR SEGREGATED HAZARD INDICES FOR COMBINED SURFACE AND SUBSURFACE SOIL (0-15')

UU/UE RECEPTOR

EXPOSURE AREA 1

Parcel 83

Fort Monmouth, New Jersey

Constituent	Child Ingestion + Dermal Hazard Index (1)	Inhalation Hazard Index (1)	Ingestion + Dermal			Inhalation		
			Target Organ	Toxic Critical Effect	Source	Target Organ	Toxic Critical Effect	Source
Trichloroethene	0.1	0.9	Heart	Increased fetal cardiac malformations in Sprague-Dawley rats	IRIS	Thymus	Decreased thymus weight in female B6C3F1 mice (immunotoxicity)	IRIS
1-Methylnaphthalene	0.008	--	Respiratory	Increased incidence of pulmonary alveolar proteinosis	ATSDR Final	--	--	--
2-Methylnaphthalene	0.2	--	Lungs	Pulmonary alveolar proteinosis	IRIS	--	--	--
Bis(2-chloroethyl)ether	--	--	--	--	--	--	--	--
Benzo(a)pyrene [B(a)P Equivalent Concentration]	0.1	0.03	Developmental	Neurobehavioral changes	IRIS	Developmental	Decreased embryo/fetal survival	IRIS
Aroclor-1260	--	--	--	--	--	--	--	--
Antimony	0.3	--	Whole body	Longevity, blood glucose, and cholesterol	IRIS	--	--	--
Arsenic	0.6	0.0007	Cardiovascular and Dermal	Hyperpigmentation, keratosis and possible vascular complications	IRIS	--	--	--
Cobalt	0.3	0.0009	Thyroid	Decreased iodine uptake	PPRTV Current	Respiratory Tract; Lung	Irritation; Decreased function	PPRTV Current
Manganese	0.02	0.003	Nervous	CNS effects	IRIS	Nervous	Impairment of neurobehavioral function	IRIS
Mercury	--	--	--	--	--	Nervous	Hand tremor; increases in memory disturbances; slight subjective and objective evidence of autonomic dysfunction	IRIS
Vanadium	0.2	0.0006	Dermal	Decreased hair cystine	SURROGAT E. See Vanadium Pentoxide. MW contribution adjustment.	Respiratory	hyperplasia of alveolar and bronchiolar epithelium, degeneration and hyperplasia of epiglottis epithelium, and goblet cell hyperplasia in nasal respiratory epithelium	ATSDR Final

(1) See Table G.2.68 for hazard indices.

(2) ATSDR - Agency for Toxic Substances and Disease Registry (<http://www.atsdr.cdc.gov/>)

IRIS - Integrated Risk Information System (<http://www.epa.gov/IRIS/>)

PPRTV - Provisional Peer Reviewed Toxicity Values for Superfund (<http://hhpprtv.ornl.gov/>)

Table G.2.62

NONCANCER HAZARDS SEPARATED BY TARGET ORGAN FOR COMBINED SURFACE AND SUBSURFACE SOIL (0-15')

UU/UE RECEPTOR

EXPOSURE AREA 1

Parcel 83

Fort Monmouth, New Jersey

Target Organ	Constituent Groupings for Ingestion + Dermal Exposure Pathways	Ingestion + Dermal Hazard Index ⁽¹⁾	Constituent Groupings for Inhalation Exposure Pathways	Inhalation Hazard Index ⁽¹⁾	Summed Segregated Hazard Index ⁽²⁾
Cardiovascular system	Trichloroethene	0.1	N/A	N/A	0.8
	Arsenic	0.6			
Dermal	Arsenic	0.6	N/A	N/A	0.8
	Vanadium	0.2			
Develomental	BaP	0.1	BaP	0.03	0.1
Nervous	Manganese	0.02	Manganese	0.003	0.02
			Mercury	--	
Respiratory system	1-Methylnaphthalene	0.008	Cobalt	0.0009	0.2
	2-Methylnaphthalene	0.2	Vanadium	0.0006	
Thymus	N/A	N/A	Trichloroethene	0.9	0.9
Thyroid	Cobalt	0.3	N/A	N/A	0.3
Whole Body	Antimony	0.3	N/A	N/A	0.3

⁽¹⁾ See Table G.2.69.

⁽²⁾ Sum of the ingestion+dermal and inhalation hazard indices for the applicable target organ.

-- Hazard not calculated because analyte was not detected at the exposure area.

N/A - Not applicable. Does not have a toxicity value for the exposure pathway.

Table G.2.63
RISK AND HAZARD ESTIMATES -- INCIDENTAL INGESTION OF COMBINED SURFACE AND SUBSURFACE SOIL (0-15')
UU/UE RECEPTOR
EXPOSURE AREA 2
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions				Equations
Receptor	UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units	
COPC Concentration in Soil	C _s	chemical-specific	mg/kg	
Soil Ingestion Rate - adult	IRS _{adult}	100	mg/day	
Soil Ingestion Rate - child	IRS _{child}	200	mg/day	
Age-adjusted soil ingestion factor	IFS _{adj}	105	(mg-year)/(kg-day)	
Exposure Frequency	EF	350	days/year	
Exposure Duration - adult	ED _{adult}	20	years	
Exposure Duration - child	ED _{child}	6	years	
Conversion Factor-soil	CF _s	0.000001	kg/mg	
Averaging Time -- carcinogens	AT _c	25550	days	
Averaging Time -- noncarcinogens, child	AT _{nc} - child	2190	days	
Averaging Time -- noncarcinogens, adult	AT _{nc} - adult	7300	days	
Oral Slope Factor	SF _o	chemical-specific	(mg/kg-day) ⁻¹	
Body Weight - adult	BW _{adult}	80	kg	
Body Weight - child	BW _{child}	15	kg	
Fraction Ingested	FI	1	unitless	
Oral Reference Dose	RfD _o	chemical-specific	mg/kg-day	

Incidental ingestion of carcinogenic COPCs in soil for multiple age groups simultaneously:

$$Ingestion_{age-adj} = \frac{(C_s)(IFS_{adj})(EF)(CF_s)(FI)}{(AT_c)}$$

where:

$$IFS_{adj} = \frac{(ED_{child})(IRS_{child})}{(BW_{child})} + \frac{(ED_{adult})(IRS_{adult})}{(BW_{adult})}$$

Incidental ingestion of noncarcinogenic COPCs in soil for separate age groups:

$$Ingestion = \frac{(C_s)(IRS)(EF)(ED)(CF_s)(FI)}{(AT_{nc})(BW)}$$

Carcinogenic Risk:

$$Risk = (Ingestion)(SF_o)$$

Noncarcinogenic Hazard:

$$HQ = Ingestion/RfD_o$$

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	Carcinogenic Ingestion _{age-adj} (mg/kg-day)	Noncarcinogenic Ingestion - Child (mg/kg-day)	Noncarcinogenic Ingestion - Adult (mg/kg-day)	SFo ⁽⁴⁾ (mg/kg-day) ⁻¹	RfDo ⁽⁴⁾ (mg/kg-day)	Cancer Risk	% of Total	Hazard Quotient - Child	% of Total	Hazard Quotient - Adult	% of Total	
Volatile Organic Compounds															
Trichloroethene	79-01-6	0.38	U	Max	-- ⁽⁶⁾	--	--	--	--	--	--	--	--	--	
Semivolatile Organic Compounds															
1-Methylnaphthalene	90-12-0	0.32	J	Max	4.6E-07	0.0000041	0.00000038	2.9E-02	7.0E-02	1.3E-08	0.017%	0.000058	0.0036%	0.0000055	0.0036%
2-Methylnaphthalene	91-57-6	0.29	J	Max	--	0.0000037	0.00000035	--	4.0E-03	--	--	0.00093	0.057%	0.000087	0.057%
Bis(2-chloroethyl)ether	111-44-4	0.24	J	Max	3.5E-07	--	--	1.1E+00	--	3.8E-07	0.48%	--	--	--	--
Polycyclic Aromatic Hydrocarbons															
BaP-equivalent ⁽⁵⁾	50-32-8	7.9		UCL	5.2E-05 ⁽⁶⁾	0.00010	0.0000095	1.0E+00	3.0E-04	5.2E-05	66%	0.34	21%	0.032	21%
PCBs															
Aroclor-1254	11097-69-1	0.22	J	Max	3.2E-07	0.0000028	0.00000026	2.0E+00	2.0E-05	6.3E-07	0.80%	0.14	8.6%	0.013	8.6%
Aroclor-1260	11096-82-5	0.8		Max	1.2E-06	--	--	2.0E+00	--	2.3E-06	2.9%	--	--	--	--
Inorganics															
Antimony	7440-36-0	6.5		Max	--	0.000083	0.0000078	--	4.0E-04	--	--	0.21	13%	0.019	13%
Arsenic	7440-38-2	10.8		Max	1.6E-05	0.00014	0.000013	1.5E+00	3.0E-04	2.3E-05	30%	0.46	28%	0.043	28%
Cobalt	7440-48-4	5.07		Max	--	0.000065	0.0000061	--	3.0E-04	--	--	0.22	13%	0.020	13%
Manganese	7439-96-5	292	U	Max	--	--	--	--	--	--	--	--	--	--	--
Mercury	7439-97-6	4.06		Max	--	--	--	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	104		Max	--	0.0013	0.00012	--	5.0E-03	--	--	0.27	16%	0.025	16%
Pathway Sums:									Cancer Risk		Hazard Index		Hazard Index		
									8E-05	100%	2	100%	0.2	100%	

⁽¹⁾ COPC = Constituent of potential concern.
⁽²⁾ CAS = Chemical Abstracts Service number.
⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.
⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.
⁽⁵⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.
⁽⁶⁾ See Table G.2.72 for mutagenic mode of action ingestion intake calculation and risk calculation.
-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.64
MUTAGENIC MODE OF ACTION -- INCIDENTAL INGESTION OF COMBINED SURFACE AND SUBSURFACE SOIL (0-15')
UU/UE RECEPTOR
EXPOSURE AREA 2
Parcel 83
Fort Monmouth, New Jersey

$$\text{Ingestion} = \frac{C_s \times \left(\frac{(ED_{0-2})(IRS_{child})(10))}{BW_{child}} + \frac{(ED_{2-6})(IRS_{child})(3))}{BW_{child}} + \frac{(ED_{6-16})(IRS_{adult})(3))}{BW_{adult}} + \frac{(ED_{16-30})(IRS_{adult})(1))}{BW_{adult}} \right) \times EF \times CF_s}{AT_c}$$

Mutagenic Risk: $Risk = (Ingestion)(SF_o)$

Exposure Assumptions			
UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units
COPC Concentration in Soil (C_s)	C_s	chemical-specific	mg/kg
Soil Ingestion Rate - adult	IRS_{adult}	100	mg/day
Soil Ingestion Rate - child	IRS_{child}	200	mg/day
Exposure Frequency	EF	350	days/year
Exposure Duration, 0 to 2 years of age	ED_{0-2}	2	years
Exposure Duration, 2 to 6 years of age	ED_{2-6}	4	years
Exposure Duration, 6 to 16 years of age	ED_{6-16}	10	years
Exposure Duration, 16 to 30 years of age	ED_{16-30}	14	years
Conversion Factor-soil	CF_s	0.000001	kg/mg
Averaging Time – carcinogens	AT_c	25550	days
Oral Slope Factor	SF_o	chemical-specific	(mg/kg-day) ⁻¹
Body Weight - adult	BW_{adult}	80	kg
Body Weight - child	BW_{child}	15	kg

COPC ⁽¹⁾	CAS Number ⁽²⁾	C_s ⁽³⁾ (mg/kg)	Carcinogenic Ingestion (mg/kg-day)	SF_o ⁽⁴⁾ (mg/kg-day) ⁻¹	Cancer Risk
Trichloroethene	79-01-6	0.4	2.5E-06	4.6E-02	1.2E-07
BaP-equivalent ⁽⁵⁾	50-32-8	7.9	5.2E-05	1.0E+00	5.2E-05

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.

⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁵⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.

Table G.2.65
RISK AND HAZARD ESTIMATES -- DERMAL CONTACT WITH COMBINED SURFACE AND SUBSURFACE SOIL (0-15')
UU/UE RECEPTOR
EXPOSURE AREA 2
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions				Equations			
Receptor				UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units				
COPC Concentration in Soil	C _s	chemical-specific	mg/kg				
Exposure Frequency	EF	350	days/year				
Exposure Duration - adult	ED _{adult}	20	years				
Exposure Duration - child	ED _{child}	6	years				
Event Frequency	EV	1	events/day				
Exposed Skin Surface Area - adult	SA _{adult}	6032	cm ²				
Exposed Skin Surface Area - child	SA _{child}	2690	cm ²				
Age-adjusted dermal contact factor	SFS _{adj}	321	(mg-year)/(kg-event)				
Adherence Factor - adult	AF _{adult}	0.07	mg/cm ²				
Adherence Factor - child	AF _{child}	0.2	mg/cm ²				
Dermal Absorption Factor	ABS _d	chemical-specific	unitless				
Averaging Time -- carcinogens	AT _c	25550	days				
Averaging Time -- noncarcinogens, child	AT _{nc} - child	2190	days				
Averaging Time -- noncarcinogens, adult	AT _{nc} - adult	7300	days				
Oral Slope Factor Adjusted for GI Absorption				SF _d	chemical-specific	(mg/kg-day) ⁻¹	
Body Weight - adult				BW _{adult}	80	kg	
Body Weight - child				BW _{child}	15	kg	
Oral Reference Dose Adjusted for GI Absorption				RfD _d	chemical-specific	mg/kg-day	
Conversion Factor-soil				CF _s	0.000001	kg/mg	
Fraction of contaminantt absorbed in gastrointestinal tract				GIABS	chemical-specific	unitless	
Dermal Absorbed Dose				DAD	chemical-specific	mg/kg-day	
Absorbed dose per event				DA _{event}	chemical-specific	mg/cm ² -event	

Dermal absorbed dose for carcinogenic COPCs in soil for multiple age groups simultaneously:

$$DAD_{age-adj} = \frac{(C_s)(SFS_{adj})(ABS_d)(EF)(EV)(CF)}{(AT)}$$

where:

$$SFS_{adj} = \frac{(ED_{child})(AF_{child})(SA_{child})}{(BW_{child})} + \frac{(ED_{adult})(AF_{adult})(SA_{adult})}{(BW_{adult})}$$

Dermal absorbed dose of noncarcinogenic COPCs in soil for separate age groups:

$$DAD = \frac{(DA_{event})(EF)(ED)(EV)(SA)}{(BW)(AT)}$$

where:

$$DA_{event} = (C_S)(CF_S)(AF)(ABS_d)$$

Carcinogenic Risk: $Risk = (DAD)(SF_d)$

where: $SF_d = SF_o / GIABS$

Noncarcinogenic Hazard: $HQ = DAD / Rf_d$

where: $RfD_d = (RfD_o)(GIABS)$

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	ABS _d ⁽⁴⁾ (unitless)	SF _d ⁽⁴⁾ (mg/kg-day) ⁻¹	RfD _d ⁽⁴⁾ (mg/kg-day)	Carcinogenic DAD (mg/kg-day)	Noncarcinogenic DAD - Child (mg/kg-day)	Noncarcinogenic DAD Adult (mg/kg-day)	Cancer Risk	% of Total	Hazard Quotient - Child	% of Total	Hazard Quotient - Adult	% of Total
Volatile Organic Compounds															
Trichloroethene	79-01-6	0.38	U	Max	--	4.6E-02	5.0E-04	-- ⁽⁶⁾	--	--	--	--	--	--	--
Semivolatile Organic Compounds															
1-Methylnaphthalene	90-12-0	0.32	J	Max	0.13	2.9E-02	7.0E-02	1.8E-07	1.4E-06	2.1E-07	5.3E-09	0.023%	0.000020	0.010%	0.0000030
2-Methylnaphthalene	91-57-6	0.29	J	Max	0.13	--	4.0E-03	--	1.3E-06	1.9E-07	--	--	0.00032	0.16%	0.000048
Bis(2-chloroethyl)ether	111-44-4	0.24	J	Max	--	1.1E+00	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons															
BaP-equivalent ⁽⁵⁾	50-32-8	7.9		UCL	0.13	1.0E+00	3.0E-04	1.9E-05 ⁽⁶⁾	3.5E-05	5.2E-06	1.9E-05	85%	0.12	57%	0.017
PCBs															
Aroclor-1254	11097-69-1	0.22	J	Max	0.14	2.0E+00	2.0E-05	1.4E-07	1.1E-06	1.6E-07	2.7E-07	1.2%	0.053	25%	0.0078
Aroclor-1260	11096-82-5	0.8		Max	0.14	2.0E+00	--	4.9E-07	--	--	9.8E-07	4.3%	--	--	--
Inorganics															
Antimony	7440-36-0	6.5		Max	--	--	6.0E-05	--	--	--	--	--	--	--	--
Arsenic	7440-38-2	10.8		Max	0.03	1.5E+00	3.0E-04	1.4E-06	1.1E-05	1.6E-06	2.1E-06	9.4%	0.037	18%	0.0055
Cobalt	7440-48-4	5.07		Max	--	--	3.0E-04	--	--	--	--	--	--	--	--
Manganese	7439-96-5	292	U	Max	--	--	1.4E-01	--	--	--	--	--	--	--	--
Mercury	7439-97-6	4.06		Max	--	--	--	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	104		Max	--	--	1.3E-04	--	--	--	--	--	--	--	--
Pathway Sums:										Cancer Risk		Hazard Index		Hazard Index	
										2E-05	100%	0.2	100%	0.03	100%

⁽¹⁾ COPC = Constituent of potential concern.
⁽²⁾ CAS = Chemical Abstracts Service number.
⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.
⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.
⁽⁵⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.
⁽⁶⁾ See Table G.2.74 for mutagenic mode of action dermal contact calculation and risk calculation.
-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.66
MUTAGENIC MODE OF ACTION -- DERMAL CONTACT WITH COMBINED SURFACE AND SUBSURFACE SOIL (0-15')
UU/UE RECEPTOR
EXPOSURE AREA 2
Parcel 83
Fort Monmouth, New Jersey

$$DAD = \frac{(C_s) \left(\frac{((ED_{0-2})(AF_{child})(SA_{child})(10))}{BW_{child}} + \frac{((ED_{2-6})(AF_{child})(SA_{child})(3))}{BW_{child}} + \frac{((ED_{6-16})(AF_{adult})(SA_{adult})(3))}{BW_{adult}} + \frac{((ED_{16-30})(AF_{adult})(SA_{adult})(1))}{BW_{adult}} \right) (ABS)(EF)(CF)}{AT_c}$$

Mutagenic Risk: $Risk = (DAD)(SF_d)$

Exposure Assumptions			
Receptor UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units
COPC Concentration in Soil	C _s	chemical-specific	mg/kg
Adherence Factor - adult	AF _{adult}	0.07	mg/cm2
Adherence Factor - child	AF _{child}	0.2	mg/cm2
Exposed Skin Surface Area - adult	SA _{adult}	6032	cm2
Exposed Skin Surface Area - child	SA _{child}	2690	cm2
Dermal Absorption Factor	ABS	chemical-specific	unitless
Exposure Frequency	EF	350	days/year
Exposure Duration, 0 to 2 years of age	ED ₀₋₂	2	years
Exposure Duration, 2 to 6 years of age	ED ₂₋₆	4	years
Exposure Duration, 6 to 16 years of age	ED ₆₋₁₆	10	years
Exposure Duration, 16 to 30 years of age	ED ₁₆₋₃₀	14	years
Conversion Factor-soil	CF _s	0.000001	kg/mg
Averaging Time -- carcinogens	AT _c	25550	days
Body Weight - adult	BW _{adult}	80	kg
Body Weight - child	BW _{child}	15	kg
Dermal Absorbed Dose	DAD	chemical-specific	mg/kg-day
Oral Slope Factor Adjusted for GI Absorption	SF _d	chemical-specific	(mg/kg-day) ⁻¹

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾	ABS ⁽⁴⁾ (unitless)	Carcinogenic DAD (mg/kg-day)	SF _d (mg/kg-day) ⁻¹	Cancer Risk
Trichloroethene	79-01-6	0.4	--	--	4.6E-02	--
BaP-equivalent ⁽⁵⁾	50-32-8	7.9	1.3E-01	1.9E-05	1.0E+00	1.9E-05

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.

⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁵⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.

Table G.2.67
RISK AND HAZARD ESTIMATES -- INHALATION OF VOLATILES/FUGITIVE DUST FROM COMBINED SURFACE AND SUBSURFACE SOIL (0-15')
UU/UE RECEPTOR
EXPOSURE AREA 2
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions				Equations
Receptor				
UU/UE RECEPTOR				
Parameter	Abbreviation	Value	Units	
COPC in air (C _a)	C _a	chemical-specific	µg/m ³	
COPC in surface soil (C _s)	C _s	chemical-specific	mg/kg	
Exposure Frequency	EF	350	days/year	
Exposure Duration - inhalation	ED _{inh}	26	years	
Exposure Time	ET	1	unitless	
Averaging Time - carcinogens	AT _c	25550	days	
Averaging Time - noncarcinogens, inhalation	AT _{nc-inh}	9490	days	
Inhalation Unit Risk (IUR)	IUR	chemical-specific	(µg/m ³) ⁻¹	
Inhalation Reference Concentration (RfC)	RfC	chemical-specific	mg/m ³	
Volatilization Factor (VF)	VF	chemical-specific	m ³ /kg	
Particulate emission factor (PEF) ⁽¹⁾	PEF	1.27E+09	m ³ /kg	
Soil saturation	C _{sat}	chemical-specific	mg/kg	
Exposure concentration in air	EC(air)	chemical-specific	µg/m ³	

Exposure concentration in air for soil particulates and vapors emitted from soil for carcinogens and noncarcinogens:

$$EC(air) = \frac{(C_a)(ET)(EF)(ED_{inh})}{(AT)}$$

Where for inorganics, C_a calculated as:

$$C_a = (C_s) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{PEF} \right)$$

Where for organics with C_s ≤ C_{sat}, or if no C_{sat} value, C_a calculated as:

$$C_a = (C_s) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{VF} + \frac{1}{PEF} \right)$$

Where for organics with C_s > C_{sat}, C_a calculated as:

$$C_a = \left[(C_s) \left(1000 \frac{\mu g}{mg} \right) \left(\frac{1}{PEF} \right) \right] + \left[(C_{sat}) \left(1000 \frac{\mu g}{mg} \right) \left(\frac{1}{VF} \right) \right]$$

$$Risk = [EC(air)](IUR)$$

$$HQ = \frac{EC(air)}{(RfC) \left(1,000 \frac{\mu g}{mg} \right)}$$

COPC ⁽²⁾	CAS Number ⁽³⁾	C _s ⁽⁴⁾ (mg/kg)	UCL or Max	C _{sat} ⁽⁵⁾ (mg/kg)	Is C _s ≤ C _{sat} ? ⁽⁵⁾	Volatilization Factor ⁽⁶⁾ (m ³ /kg)	C _a (µg/m ³)	Carcinogenic EC(air) (µg/m ³)	Noncarcinogenic EC(air) (µg/m ³)	IUR ⁽⁵⁾ (µg/m ³) ⁻¹	RfC _i ⁽⁵⁾ (mg/m ³)	Cancer Risk	% of Total	Hazard Quotient	% of Total	
Volatile Organic Compounds																
Trichloroethene	79-01-6	0.38	U	Max	--	--	3.1E+03	--	-- ⁽⁸⁾	--	--	--	--	--	--	
Semivolatile Organic Compounds																
1-Methylnaphthalene	90-12-0	0.32	J	Max	3.9E+02	Yes	8.2E+04	3.9E-03	--	--	--	--	--	--	--	
2-Methylnaphthalene	91-57-6	0.29	J	Max	--	--	8.1E+04	3.6E-03	--	--	--	--	--	--	--	
Bis(2-chloroethyl)ether	111-44-4	0.24	J	Max	5.1E+03	Yes	5.9E+04	4.0E-03	1.4E-03	--	3.3E-04	4.7E-07	61%	--	--	
Polycyclic Aromatic Hydrocarbons																
BaP-equivalent ⁽⁷⁾	50-32-8	7.9		UCL	--	--	3.3E+07	2.5E-04	2.6E-04 ⁽⁸⁾	2.4E-04	6.0E-04	2.0E-06	1.5E-07	20%	0.12	36%
PCBs																
Aroclor-1254	11097-69-1	0.22	J	Max	--	--	1.2E+06	1.9E-04	6.7E-05	--	5.7E-04	--	3.8E-08	4.9%	--	--
Aroclor-1260	11096-82-5	0.8		Max	--	--	1.8E+06	4.4E-04	1.6E-04	--	5.7E-04	--	8.8E-08	11%	--	--
Inorganics																
Antimony	7440-36-0	6.5		Max	--	--	--	5.1E-06	--	--	--	--	--	--	--	--
Arsenic	7440-38-2	10.8		Max	--	--	--	8.5E-06	3.0E-06	8.2E-06	4.3E-03	1.5E-05	1.3E-08	1.7%	0.00055	0.17%
Cobalt	7440-48-4	5.07		Max	--	--	--	4.0E-06	1.4E-06	3.8E-06	9.0E-03	6.0E-06	1.3E-08	1.6%	0.00064	0.20%
Manganese	7439-96-5	292	U	Max	--	--	--	--	--	--	--	--	--	--	--	--
Mercury	7439-97-6	4.06		Max	3.1E+00	No	4.9E+04	6.4E-02	--	6.2E-02	3.0E-04	--	--	0.21	63%	
Vanadium	7440-62-2	104		Max	--	--	--	8.2E-05	--	7.9E-05	1.0E-04	--	--	0.00079	0.24%	
Pathway Sums:												Cancer Risk		Hazard Index		
												8E-07	100%	0.3	100%	

⁽¹⁾ PEF calculated as shown in Table G.2.9.
⁽²⁾ COPC = Constituent of potential concern.
⁽³⁾ CAS = Chemical Abstracts Service number.
⁽⁴⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.
⁽⁵⁾ Human Health Toxicity Values shown in Table G.2.11.
⁽⁶⁾ See Table G.2.10 for VF calculation.
⁽⁷⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.
⁽⁸⁾ See Table G.2.76 for mutagenic mode of action inhalation calculation and risk calculation.
-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.68
MUTAGENIC MODE OF ACTION – INHALATION OF VOLATILES/FUGITIVE DUST FROM COMBINED SURFACE AND SUBSURFACE SOIL (0-15')
UU/UE RECEPTOR
EXPOSURE AREA 2
Parcel 83
Fort Monmouth, New Jersey

Equations

$$EC(air) = \frac{(C_a)(ET)(EF)[((ED_{0-2})(10)) + ((ED_{2-6})(3)) + ((ED_{6-16})(3)) + ((ED_{16-30})(1))]}{AT_c}$$

where: $C_a = (C_s)(1,000 \mu g / mg) \left(\frac{1}{VF} + \frac{1}{PEF} \right)$

$$Mutagenic Risk_{inh} = [EC(air)](IUR)$$

Exposure Assumptions			
UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units
COPC in air	C _a	chemical-specific	μg/m ³
COPC Concentration in Soil	C _s	chemical-specific	mg/kg
Exposure Frequency	EF	350	days/year
Exposure Duration, 0 to 2 years of age	ED ₀₋₂	2	years
Exposure Duration, 2 to 6 years of age	ED ₂₋₆	4	years
Exposure Duration, 6 to 16 years of age	ED ₆₋₁₆	10	years
Exposure Duration, 16 to 30 years of age	ED ₁₆₋₃₀	14	years
Exposure Time	ET	1	unitless
Averaging Time – carcinogens	AT _c	25550	days
Inhalation Unit Risk	IUR	chemical-specific	(μg/m ³) ⁻¹
Volatilization Factor	VF	chemical-specific	m ³ /kg
Particulate emission factor ⁽¹⁾	PEF	1.27E+09	m ³ /kg
Exposure concentration in air	EC(air)	chemical-specific	μg/m ³

COPC ⁽²⁾	CAS Number ⁽³⁾	C _s ⁽⁴⁾ (mg/kg)	Volatilization Factor ⁽⁵⁾ (m ³ /kg)	C _a (μg/m ³)	Carcinogenic EC(air) (μg/m ³)	IUR ⁽⁶⁾ (μg/m ³) ⁻¹	Cancer Risk
Trichloroethene	79-01-6	0.4	3.1E+03	1.2E-01	1.3E-01	4.1E-06	5.3E-07
BaP-equivalent ⁽⁷⁾	50-32-8	7.9	3.3E+07	2.5E-04	2.6E-04	6.0E-04	1.5E-07

⁽¹⁾ PEF calculated as shown in Table G.2.9.

⁽²⁾ COPC = Constituent of potential concern.

⁽³⁾ CAS = Chemical Abstracts Service number.

⁽⁴⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.

⁽⁵⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁶⁾ See Table G.2.10 for VF calculation.

⁽⁷⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.

Table G.2.69

HUMAN HEALTH RISK EVALUATION SUMMARY FOR COMBINED SURFACE AND SUBSURFACE SOIL (0-15')

UU/UE RECEPTOR

EXPOSURE AREA 2

Parcel 83

Fort Monmouth, New Jersey

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	Age -adjusted Ingestion Carcinogenic Risk	Age-adjusted Dermal Carcinogenic Risk	Age-adjusted Inhalation Carcinogenic Risk	Total Carcinogenic Risk	Child Ingestion Hazard Quotient	Child Dermal Hazard Quotient	Adult Ingestion Hazard Quotient	Adult Dermal Hazard Quotient	Inhalation Hazard Quotient	Total Hazard Quotient - Child	Total Hazard Quotient - Adult
Volatile Organic Compounds														
Trichloroethene	79-01-6	0.38 U	Max	--	--	--	--	--	--	--	--	--	--	--
Semivolatile Organic Compounds														
1-Methylnaphthalene	90-12-0	0.32 J	Max	1.3E-08	5.3E-09	--	2E-08	0.000058	0.000020	0.0000055	0.0000030	--	0.00008	0.000008
2-Methylnaphthalene	91-57-6	0.29 J	Max	--	--	--	--	0.00093	0.00032	0.000087	0.000048	--	0.001	0.0001
Bis(2-chloroethyl)ether	111-44-4	0.24 J	Max	3.8E-07	--	4.7E-07	9E-07	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons														
BaP-equivalent ⁽⁴⁾	50-32-8	7.9	UCL	5.2E-05	1.9E-05	1.5E-07	7E-05	0.34	0.12	0.032	0.017	0.12	0.6	0.2
PCBs														
Aroclor-1254	11097-69-1	0.22 J	Max	6.3E-07	2.7E-07	3.8E-08	9E-07	0.14	0.053	0.013	0.0078	--	0.2	0.02
Aroclor-1260	11096-82-5	0.8	Max	2.3E-06	9.8E-07	8.8E-08	3E-06	--	--	--	--	--	--	--
Inorganics														
Antimony	7440-36-0	6.5	Max	--	--	--	--	0.21	--	0.019	--	--	0.2	0.02
Arsenic	7440-38-2	10.8	Max	2.3E-05	2.1E-06	1.3E-08	3E-05	0.46	0.037	0.043	0.0055	0.00055	0.5	0.05
Cobalt	7440-48-4	5.07	Max	--	--	1.3E-08	1E-08	0.22	--	0.020	--	0.00064	0.2	0.02
Manganese	7439-96-5	292 U	Max	--	--	--	--	--	--	--	--	--	--	--
Mercury	7439-97-6	4.06	Max	--	--	--	--	--	--	--	--	0.21	0.2	0.2
Vanadium	7440-62-2	104	Max	--	--	--	--	0.27	--	0.025	--	0.00079	0.3	0.03
Pathway Risk				8E-05	2E-05	8E-07	--	2	0.2	0.2	0.03	0.3	--	--
Total Risk							1E-04	Hazard Index						
								2						
								0.5						

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.

⁽⁴⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.

-- Risk/hazard not calculated because toxicity value was not available.

Table G.2.70

TARGET ORGANS AND TOXIC CRITICAL EFFECTS FOR SEGREGATED HAZARD INDICES FOR COMBINED SURFACE AND SUBSURFACE SOIL (0-15')

UU/UE RECEPTOR

EXPOSURE AREA 2

Parcel 83

Fort Monmouth, New Jersey

Constituent	Child Ingestion + Dermal Hazard Index (1)	Inhalation Hazard Index (1)	Ingestion + Dermal			Inhalation		
			Target Organ	Toxic Critical Effect	Source	Target Organ	Toxic Critical Effect	Source
Trichloroethene	--	--	Heart	Increased fetal cardiac malformations in Sprague-Dawley rats	IRIS	Thymus	Decreased thymus weight in female B6C3F1 mice (immunotoxicity)	IRIS
1-Methylnaphthalene	0.00008	--	Respiratory	Increased incidence of pulmonary alveolar proteinosis	ATSDR Final	--	--	--
2-Methylnaphthalene	0.001	--	Lungs	Pulmonary alveolar proteinosis	IRIS	--	--	--
Bis(2-chloroethyl)ether	--	--	--	--	--	--	--	--
Benzo(a)pyrene [B(a)P Equivalent Concentration]	0.5	0.1	Developmental	Neurobehavioral changes	IRIS	Developmental	Decreased embryo/fetal survival	IRIS
Aroclor-1254	0.1	--	Whole Body	Ocular exudate, inflamed and prominent Meibomian glands, distorted growth of finger and toe nails; decreased antibody (IgG and IgM) response to sheep erythrocytes	IRIS	--	--	--
Aroclor-1260	--	--	--	--	--	--	--	--
Antimony	0.2	--	Whole body	Longevity, blood glucose, and cholesterol	IRIS	--	--	--
Arsenic	0.5	0.0005	Cardiovascular and Dermal	Hyperpigmentation, keratosis and possible vascular complications	IRIS	--	--	--
Cobalt	0.2	0.0006	Thyroid	Decreased iodine uptake	PPRTV Current	Respiratory Tract; Lung	Irritation; Decreased function	PPRTV Current
Manganese	--	--	Nervous	CNS effects	IRIS	Nervous	Impairment of neurobehavioral function	IRIS
Mercury	--	0.2	--	--	--	Nervous	Hand tremor; increases in memory disturbances; slight subjective and objective evidence of autonomic dysfunction	IRIS
Vanadium	0.3	0.0008	Dermal	Decreased hair cystine	SURROGAT E. See Vanadium Pentoxide. MW contribution adjustment.	Respiratory	hyperplasia of alveolar and bronchiolar epithelium, degeneration and hyperplasia of epiglottis epithelium, and goblet cell hyperplasia in nasal respiratory epithelium	ATSDR Final

(1) See Table G.2.77 for hazard indices.

(2) ATSDR - Agency for Toxic Substances and Disease Registry (<http://www.atsdr.cdc.gov/>)

IRIS - Integrated Risk Information System (<http://www.epa.gov/IRIS/>)

PPRTV - Provisional Peer Reviewed Toxicity Values for Superfund (<http://hhpprtv.ornl.gov/>)

Table G.2.71

NONCANCER HAZARDS SEPARATED BY TARGET ORGAN FOR COMBINED SURFACE AND SUBSURFACE SOIL (0-15')

UU/UE RECEPTOR

EXPOSURE AREA 2

Parcel 83

Fort Monmouth, New Jersey

Target Organ	Constituent Groupings for Ingestion + Dermal Exposure Pathways	Ingestion + Dermal Hazard Index ⁽¹⁾	Constituent Groupings for Inhalation Exposure Pathways	Inhalation Hazard Index ⁽¹⁾	Summed Segregated Hazard Index ⁽²⁾
Cardiovascular system	Trichloroethene	--	N/A	N/A	0.5
	Arsenic	0.5			
Dermal	Arsenic	0.5	N/A	N/A	0.8
	Vanadium	0.3			
Develomental	BaP	0.5	BaP	0.1	0.6
Nervous	Manganese	--	Manganese	--	0.2
			Mercury	0.2	
Respiratory system	1-Methylnaphthalene	0.00008	Cobalt	0.0006	0.003
	2-Methylnaphthalene	0.001	Vanadium	0.0008	
Thymus	N/A	N/A	Trichloroethene	--	--
Thyroid	Cobalt	0.2	N/A	N/A	0.2
Whole Body	Aroclor-1254	0.1	N/A	N/A	0.3
	Antimony	0.2			

⁽¹⁾ See Table G.2.78.

⁽²⁾ Sum of the ingestion+dermal and inhalation hazard indices for the applicable target organ.

-- Hazard not calculated because analyte was not detected at the exposure area.

N/A - Not applicable. Does not have a toxicity value for the exposure pathway.

Table G.2.72
RISK AND HAZARD ESTIMATES -- INCIDENTAL INGESTION OF COMBINED SURFACE AND SUBSURFACE SOIL (0-15')
UU/UE RECEPTOR
EXPOSURE AREA 3
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions				Equations
Receptor				UU/UE RECEPTOR
Parameter	Abbreviation	Value	Units	
COPC Concentration in Soil	C _s	chemical-specific	mg/kg	
Soil Ingestion Rate - adult	IRS _{adult}	100	mg/day	
Soil Ingestion Rate - child	IRS _{child}	200	mg/day	
Age-adjusted soil ingestion factor	IFS _{adj}	105	(mg-year)/(kg-day)	
Exposure Frequency	EF	350	days/year	
Exposure Duration - adult	ED _{adult}	20	years	
Exposure Duration - child	ED _{child}	6	years	
Conversion Factor-soil	CF _s	0.000001	kg/mg	
Averaging Time -- carcinogens	AT _c	25550	days	
Averaging Time -- noncarcinogens, child	AT _{nc} - child	2190	days	
Averaging Time -- noncarcinogens, adult	AT _{nc} - adult	7300	days	
Oral Slope Factor	SF _o	chemical-specific	(mg/kg-day) ⁻¹	
Body Weight - adult	BW _{adult}	80	kg	
Body Weight - child	BW _{child}	15	kg	
Fraction Ingested	FI	1	unitless	
Oral Reference Dose	RfD _o	chemical-specific	mg/kg-day	

Incidental ingestion of carcinogenic COPCs in soil for multiple age groups simultaneously:

$$Ingestion_{age-adj} = \frac{(C_s)(IFS_{adj})(EF)(CF_s)(FI)}{(AT_c)}$$

where:
$$IFS_{adj} = \frac{(ED_{child})(IRS_{child})}{(BW_{child})} + \frac{(ED_{adult})(IRS_{adult})}{(BW_{adult})}$$

Incidental ingestion of noncarcinogenic COPCs in soil for separate age groups:

$$Ingestion = \frac{(C_s)(IRS)(EF)(ED)(CF_s)(FI)}{(AT_{nc})(BW)}$$

Carcinogenic Risk:
$$Risk = (Ingestion)(SF_o)$$

Noncarcinogenic Hazard:
$$HQ = Ingestion/RfD_o$$

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	Carcinogenic Ingestion _{age-adj} (mg/kg-day)	Noncarcinogenic Ingestion - Child (mg/kg-day)	Noncarcinogenic Ingestion - Adult (mg/kg-day)	SFo ⁽⁴⁾ (mg/kg-day) ⁻¹	RfDo ⁽⁴⁾ (mg/kg-day)	Cancer Risk	% of Total	Hazard Quotient - Child	% of Total	Hazard Quotient - Adult	% of Total	
Volatile Organic Compounds															
Trichloroethene	79-01-6	0.34	U	Max	-- ⁽⁶⁾	--	--	--	--	--	--	--	--	--	
Semivolatile Organic Compounds															
1-Methylnaphthalene	90-12-0	0.036		Max	5.2E-08	0.00000046	0.000000043	2.9E-02	7.0E-02	1.5E-09	0.0029%	0.0000066	0.00047%	0.00000062	0.00047%
2-Methylnaphthalene	91-57-6	0.86	J	Max	--	0.000011	0.0000010	--	4.0E-03	--	--	0.0027	0.20%	0.00026	0.20%
Bis(2-chloroethyl)ether	111-44-4	1.2	U	Max	--	--	--	--	--	--	--	--	--	--	
Polycyclic Aromatic Hydrocarbons															
BaP-equivalent ⁽⁵⁾	50-32-8	4.2		UCL	2.8E-05 ⁽⁶⁾	0.000054	0.0000050	1.0E+00	3.0E-04	2.8E-05	53%	0.18	13%	0.017	13%
PCBs															
Aroclor-1260	11096-82-5	0.0042	U	Max	--	--	--	--	--	--	--	--	--	--	
Inorganics															
Antimony	7440-36-0	0.543	U	Max	--	--	--	--	--	--	--	--	--	--	
Arsenic	7440-38-2	11.3		UCL	1.6E-05	0.00014	0.000014	1.5E+00	3.0E-04	2.4E-05	47%	0.48	34%	0.045	34%
Cobalt	7440-48-4	10.1		Max	--	0.00013	0.000012	--	3.0E-04	--	--	0.43	31%	0.040	31%
Manganese	7439-96-5	266	U	Max	--	--	--	--	--	--	--	--	--	--	
Mercury	7439-97-6	0.119	U	Max	--	--	--	--	--	--	--	--	--	--	
Vanadium	7440-62-2	123		Max	--	0.0016	0.00015	--	5.0E-03	--	--	0.31	22%	0.029	22%
Pathway Sums:									Cancer Risk		Hazard Index		Hazard Index		
									5E-05	100%	1	100%	0.1	100%	

⁽¹⁾ COPC = Constituent of potential concern.
⁽²⁾ CAS = Chemical Abstracts Service number.
⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.
⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.
⁽⁵⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.
⁽⁶⁾ See Table G.2.81 for mutagenic mode of action ingestion intake calculation and risk calculation.
-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.73
MUTAGENIC MODE OF ACTION -- INCIDENTAL INGESTION OF COMBINED SURFACE AND SUBSURFACE SOIL (0-15')
UU/UE RECEPTOR
EXPOSURE AREA 3
Parcel 83
Fort Monmouth, New Jersey

$$\text{Ingestion} = \frac{C_s \times \left(\frac{((ED_{0-2})(IRS_{child})(10))}{BW_{child}} + \frac{((ED_{2-6})(IRS_{child})(3))}{BW_{child}} + \frac{((ED_{6-16})(IRS_{adult})(3))}{BW_{adult}} + \frac{((ED_{16-30})(IRS_{adult})(1))}{BW_{adult}} \right) \times EF \times CF_s}{AT_c}$$

Mutagenic Risk: $Risk = (Ingestion)(SF_o)$

Exposure Assumptions			
UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units
COPC Concentration in Soil (C_s)	C_s	chemical-specific	mg/kg
Soil Ingestion Rate - adult	IRS_{adult}	100	mg/day
Soil Ingestion Rate - child	IRS_{child}	200	mg/day
Exposure Frequency	EF	350	days/year
Exposure Duration, 0 to 2 years of age	ED_{0-2}	2	years
Exposure Duration, 2 to 6 years of age	ED_{2-6}	4	years
Exposure Duration, 6 to 16 years of age	ED_{6-16}	10	years
Exposure Duration, 16 to 30 years of age	ED_{16-30}	14	years
Conversion Factor-soil	CF_s	0.000001	kg/mg
Averaging Time – carcinogens	AT_c	25550	days
Oral Slope Factor	SF_o	chemical-specific	(mg/kg-day) ⁻¹
Body Weight - adult	BW_{adult}	80	kg
Body Weight - child	BW_{child}	15	kg

COPC ⁽¹⁾	CAS Number ⁽²⁾	C_s ⁽³⁾ (mg/kg)	Carcinogenic Ingestion (mg/kg-day)	SF_o ⁽⁴⁾ (mg/kg-day) ⁻¹	Cancer Risk
Trichloroethene	79-01-6	0.3	2.2E-06	4.6E-02	1.0E-07
BaP-equivalent ⁽⁵⁾	50-32-8	4.2	2.8E-05	1.0E+00	2.8E-05

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.

⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁵⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.

Table G.2.74
RISK AND HAZARD ESTIMATES -- DERMAL CONTACT WITH COMBINED SURFACE AND SUBSURFACE SOIL (0-15')
UU/UE RECEPTOR
EXPOSURE AREA 3
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions				Equations			
Receptor				UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units				
COPC Concentration in Soil	C _s	chemical-specific	mg/kg				
Exposure Frequency	EF	350	days/year				
Exposure Duration - adult	ED _{adult}	20	years				
Exposure Duration - child	ED _{child}	6	years				
Event Frequency	EV	1	events/day				
Exposed Skin Surface Area - adult	SA _{adult}	6032	cm ²				
Exposed Skin Surface Area - child	SA _{child}	2690	cm ²				
Age-adjusted dermal contact factor	SFS _{adj}	321	(mg-year)/(kg-event)				
Adherence Factor - adult	AF _{adult}	0.07	mg/cm ²				
Adherence Factor - child	AF _{child}	0.2	mg/cm ²				
Dermal Absorption Factor	ABS _d	chemical-specific	unitless				
Averaging Time -- carcinogens	AT _c	25550	days				
Averaging Time -- noncarcinogens, child	AT _{nc} - child	2190	days				
Averaging Time -- noncarcinogens, adult	AT _{nc} - adult	7300	days				
Oral Slope Factor Adjusted for GI Absorption	SF _d	chemical-specific	(mg/kg-day) ⁻¹				
Body Weight - adult	BW _{adult}	80	kg				
Body Weight - child	BW _{child}	15	kg				
Oral Reference Dose Adjusted for GI Absorption	RfD _d	chemical-specific	mg/kg-day				
Conversion Factor-soil	CF _s	0.000001	kg/mg				
Fraction of contaminantt absorbed in gastrointestinal tract	GIABS	chemical-specific	unitless				
Dermal Absorbed Dose	DAD	chemical-specific	mg/kg-day				
Absorbed dose per event	DA _{event}	chemical-specific	mg/cm ² -event				

Dermal absorbed dose for carcinogenic COPCs in soil for multiple age groups simultaneously:

$$DAD_{age-adj} = \frac{(C_s)(SFS_{adj})(ABS_d)(EF)(EV)(CF)}{(AT)}$$

where:

$$SFS_{adj} = \frac{(ED_{child})(AF_{child})(SA_{child})}{(BW_{child})} + \frac{(ED_{adult})(AF_{adult})(SA_{adult})}{(BW_{adult})}$$

Carcinogenic Risk: $Risk = (DAD)(SF_d)$

Dermal absorbed dose of noncarcinogenic COPCs in soil for separate age groups:

where: $SF_d = SF_o / GIABS$

$$DAD = \frac{(DA_{event})(EF)(ED)(EV)(SA)}{(BW)(AT)}$$

Noncarcinogenic Hazard: $HQ = DAD / Rf_d$

where:

$$DA_{event} = (C_S)(CF_S)(AF)(ABS_d)$$

where: $RfD_d = (RfD_o)(GIABS)$

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	ABS _d ⁽⁴⁾ (unitless)	SF _d ⁽⁴⁾ (mg/kg-day) ⁻¹	RfD _d ⁽⁴⁾ (mg/kg-day)	Carcinogenic DAD (mg/kg-day)	Noncarcinogenic DAD - Child (mg/kg-day)	Noncarcinogenic DAD Adult (mg/kg-day)	Cancer Risk	% of Total	Hazard Quotient - Child	% of Total	Hazard Quotient - Adult	% of Total
Volatile Organic Compounds															
Trichloroethene	79-01-6	0.34	U	Max	--	4.6E-02	5.0E-04	-- ⁽⁶⁾	--	--	--	--	--	--	--
Semivolatile Organic Compounds															
1-Methylnaphthalene	90-12-0	0.036	Max	0.13	2.9E-02	7.0E-02	2.1E-08	1.6E-07	2.4E-08	6.0E-10	0.0047%	0.0000023	0.0022%	0.00000034	0.0022%
2-Methylnaphthalene	91-57-6	0.86	J	Max	0.13	--	4.0E-03	3.8E-06	5.7E-07	--	--	0.0010	0.94%	0.00014	0.94%
Bis(2-chloroethyl)ether	111-44-4	1.2	U	Max	--	1.1E+00	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons															
BaP-equivalent ⁽⁵⁾	50-32-8	4.2	UCL	0.13	1.0E+00	3.0E-04	1.0E-05 ⁽⁶⁾	1.9E-05	2.8E-06	1.0E-05	82%	0.063	61%	0.0092	61%
PCBs															
Aroclor-1260	11096-82-5	0.0042	U	Max	0.14	2.0E+00	--	--	--	--	--	--	--	--	--
Inorganics															
Antimony	7440-36-0	0.543	U	Max	--	--	6.0E-05	--	--	--	--	--	--	--	--
Arsenic	7440-38-2	11.3	UCL	0.03	1.5E+00	3.0E-04	1.5E-06	1.2E-05	1.7E-06	2.2E-06	18%	0.039	38%	0.0057	38%
Cobalt	7440-48-4	10.1	Max	--	--	3.0E-04	--	--	--	--	--	--	--	--	--
Manganese	7439-96-5	266	U	Max	--	--	1.4E-01	--	--	--	--	--	--	--	--
Mercury	7439-97-6	0.119	U	Max	--	--	--	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	123	Max	--	--	1.3E-04	--	--	--	--	--	--	--	--	--
										Cancer Risk		Hazard Index		Hazard Index	
Pathway Sums:										1E-05	100%	0.1	100%	0.02	100%

⁽¹⁾ COPC = Constituent of potential concern.
⁽²⁾ CAS = Chemical Abstracts Service number.
⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.
⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.
⁽⁵⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.
⁽⁶⁾ See Table G.2.83 for mutagenic mode of action dermal contact calculation and risk calculation.
-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.75
MUTAGENIC MODE OF ACTION -- DERMAL CONTACT WITH COMBINED SURFACE AND SUBSURFACE SOIL (0-15')
UU/UE RECEPTOR
EXPOSURE AREA 3
Parcel 83
Fort Monmouth, New Jersey

$$DAD = \frac{(C_s) \left(\frac{((ED_{0-2})(AF_{child})(SA_{child})(10))}{BW_{child}} + \frac{((ED_{2-6})(AF_{child})(SA_{child})(3))}{BW_{child}} + \frac{((ED_{6-16})(AF_{adult})(SA_{adult})(3))}{BW_{adult}} + \frac{((ED_{16-30})(AF_{adult})(SA_{adult})(1))}{BW_{adult}} \right) (ABS)(EF)(CF)}{AT_c}$$

Mutagenic Risk: $Risk = (DAD)(SF_d)$

Exposure Assumptions			
Receptor UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units
COPC Concentration in Soil	C _s	chemical-specific	mg/kg
Adherence Factor - adult	AF _{adult}	0.07	mg/cm2
Adherence Factor - child	AF _{child}	0.2	mg/cm2
Exposed Skin Surface Area - adult	SA _{adult}	6032	cm2
Exposed Skin Surface Area - child	SA _{child}	2690	cm2
Dermal Absorption Factor	ABS	chemical-specific	unitless
Exposure Frequency	EF	350	days/year
Exposure Duration, 0 to 2 years of age	ED ₀₋₂	2	years
Exposure Duration, 2 to 6 years of age	ED ₂₋₆	4	years
Exposure Duration, 6 to 16 years of age	ED ₆₋₁₆	10	years
Exposure Duration, 16 to 30 years of age	ED ₁₆₋₃₀	14	years
Conversion Factor-soil	CF _s	0.000001	kg/mg
Averaging Time – carcinogens	AT _c	25550	days
Body Weight - adult	BW _{adult}	80	kg
Body Weight - child	BW _{child}	15	kg
Dermal Absorbed Dose	DAD	chemical-specific	mg/kg-day
Oral Slope Factor Adjusted for GI Absorption	SF _d	chemical-specific	(mg/kg-day) ⁻¹

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾	ABS ⁽⁴⁾ (unitless)	Carcinogenic DAD (mg/kg-day)	SF _d (mg/kg-day) ⁻¹	Cancer Risk
Trichloroethene	79-01-6	0.3	--	--	4.6E-02	--
BaP-equivalent ⁽⁵⁾	50-32-8	4.2	1.3E-01	1.0E-05	1.0E+00	1.0E-05

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.

⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁵⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.

Table G.2.76
RISK AND HAZARD ESTIMATES -- INHALATION OF VOLATILES/FUGITIVE DUST FROM COMBINED SURFACE AND SUBSURFACE SOIL (0-15')
UU/UE RECEPTOR
EXPOSURE AREA 3
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions				Equations
Receptor				
UU/UE RECEPTOR				
Parameter	Abbreviation	Value	Units	
COPC in air (C _a)	C _a	chemical-specific	µg/m ³	
COPC in surface soil (C _s)	C _s	chemical-specific	mg/kg	
Exposure Frequency	EF	350	days/year	
Exposure Duration - inhalation	ED _{inh}	26	years	
Exposure Time	ET	1	unitless	
Averaging Time - carcinogens	AT _c	25550	days	
Averaging Time - noncarcinogens, inhalation	AT _{nc - inh}	9490	days	
Inhalation Unit Risk (IUR)	IUR	chemical-specific	(µg/m ³) ⁻¹	
Inhalation Reference Concentration (RfC)	RfC	chemical-specific	mg/m ³	
Volatilization Factor (VF)	VF	chemical-specific	m ³ /kg	
Particulate emission factor (PEF) ⁽¹⁾	PEF	1.27E+09	m ³ /kg	
Soil saturation	C _{sat}	chemical-specific	mg/kg	
Exposure concentration in air	EC(air)	chemical-specific	µg/m ³	

Exposure concentration in air for soil particulates and vapors emitted from soil for carcinogens and noncarcinogens:

$$EC(air) = \frac{(C_a)(ET)(EF)(ED_{inh})}{(AT)}$$

Where for inorganics, C_a calculated as:

$$C_a = (C_s) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{PEF} \right)$$

Where for organics with C_s ≤ C_{sat}, or if no C_{sat} value, C_a calculated as:

$$C_a = (C_s) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{VF} + \frac{1}{PEF} \right)$$

Where for organics with C_s > C_{sat}, C_a calculated as:

$$C_a = \left[(C_s) \left(1000 \frac{\mu g}{mg} \right) \left(\frac{1}{PEF} \right) \right] + \left[(C_{sat}) \left(1000 \frac{\mu g}{mg} \right) \left(\frac{1}{VF} \right) \right]$$

$$Risk = [EC(air)](IUR)$$

$$HQ = \frac{EC(air)}{(RfC) \left(1,000 \frac{\mu g}{mg} \right)}$$

COPC ⁽²⁾	CAS Number ⁽³⁾	C _s ⁽⁴⁾ (mg/kg)	UCL or Max	C _{sat} ⁽⁵⁾ (mg/kg)	Is C _s ≤ C _{sat} ? ⁽⁵⁾	Volatilization Factor ⁽⁶⁾ (m ³ /kg)	C _a (µg/m ³)	Carcinogenic EC(air) (µg/m ³)	Noncarcinogenic EC(air) (µg/m ³)	IUR ⁽⁵⁾ (µg/m ³) ⁻¹	RfC _i ⁽⁵⁾ (mg/m ³)	Cancer Risk	% of Total	Hazard Quotient	% of Total
Volatile Organic Compounds															
Trichloroethene	79-01-6	0.34	U	Max	--	--	3.1E+03	--	-- ⁽⁸⁾	--	--	--	--	--	--
Semivolatile Organic Compounds															
1-Methylnaphthalene	90-12-0	0.036	Max	3.9E+02	Yes	8.2E+04	4.4E-04	--	--	--	--	--	--	--	--
2-Methylnaphthalene	91-57-6	0.86	J	Max	--	--	8.1E+04	1.1E-02	--	--	--	--	--	--	--
Bis(2-chloroethyl)ether	111-44-4	1.2	U	Max	--	--	5.9E+04	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons															
BaP-equivalent ⁽⁷⁾	50-32-8	4.2	UCL	--	--	3.3E+07	1.3E-04	1.4E-04 ⁽⁸⁾	1.3E-04	6.0E-04	2.0E-06	8.2E-08	68%	0.063	96%
PCBs															
Aroclor-1260	11096-82-5	0.0042	U	Max	--	--	1.8E+06	--	--	--	--	--	--	--	--
Inorganics															
Antimony	7440-36-0	0.543	U	Max	--	--	--	--	--	--	--	--	--	--	--
Arsenic	7440-38-2	11.3	UCL	--	--	--	8.9E-06	3.2E-06	8.6E-06	4.3E-03	1.5E-05	1.4E-08	11%	0.00057	0.87%
Cobalt	7440-48-4	10.1	Max	--	--	--	8.0E-06	2.8E-06	7.6E-06	9.0E-03	6.0E-06	2.6E-08	21%	0.0013	1.9%
Manganese	7439-96-5	266	U	Max	--	--	--	--	--	--	--	--	--	--	--
Mercury	7439-97-6	0.119	U	Max	--	--	4.9E+04	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	123	Max	--	--	--	9.7E-05	--	9.3E-05	--	1.0E-04	--	--	0.00093	1.4%
Pathway Sums:												Cancer Risk		Hazard Index	
												1E-07	100%	0.1	100%

⁽¹⁾ PEF calculated as shown in Table G.2.9.
⁽²⁾ COPC = Constituent of potential concern.
⁽³⁾ CAS = Chemical Abstracts Service number.
⁽⁴⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.
⁽⁵⁾ Human Health Toxicity Values shown in Table G.2.11.
⁽⁶⁾ See Table G.2.10 for VF calculation.
⁽⁷⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.
⁽⁸⁾ See Table G.2.85 for mutagenic mode of action inhalation calculation and risk calculation.
-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.77
MUTAGENIC MODE OF ACTION – INHALATION OF VOLATILES/FUGITIVE DUST FROM COMBINED SURFACE AND SUBSURFACE SOIL (0-15')
UU/UE RECEPTOR
EXPOSURE AREA 3
Parcel 83
Fort Monmouth, New Jersey

Equations

$$EC(air) = \frac{(C_a)(ET)(EF)[((ED_{0-2})(10)) + ((ED_{2-6})(3)) + ((ED_{6-16})(3)) + ((ED_{16-30})(1))]}{AT_c}$$

where: $C_a = (C_s)(1,000 \mu g / mg) \left(\frac{1}{VF} + \frac{1}{PEF} \right)$

$$Mutagenic Risk_{inh} = [EC(air)](IUR)$$

Exposure Assumptions			
UU/UE RECEPTOR			
Parameter	Abbreviation	Value	Units
COPC in air	C _a	chemical-specific	μg/m ³
COPC Concentration in Soil	C _s	chemical-specific	mg/kg
Exposure Frequency	EF	350	days/year
Exposure Duration, 0 to 2 years of age	ED ₀₋₂	2	years
Exposure Duration, 2 to 6 years of age	ED ₂₋₆	4	years
Exposure Duration, 6 to 16 years of age	ED ₆₋₁₆	10	years
Exposure Duration, 16 to 30 years of age	ED ₁₆₋₃₀	14	years
Exposure Time	ET	1	unitless
Averaging Time – carcinogens	AT _c	25550	days
Inhalation Unit Risk	IUR	chemical-specific	(μg/m ³) ⁻¹
Volatilization Factor	VF	chemical-specific	m ³ /kg
Particulate emission factor ⁽¹⁾	PEF	1.27E+09	m ³ /kg
Exposure concentration in air	EC(air)	chemical-specific	μg/m ³

COPC ⁽²⁾	CAS Number ⁽³⁾	C _s ⁽⁴⁾ (mg/kg)	Volatilization Factor ⁽⁵⁾ (m ³ /kg)	C _a (μg/m ³)	Carcinogenic EC(air) (μg/m ³)	IUR ⁽⁶⁾ (μg/m ³) ⁻¹	Cancer Risk
Trichloroethene	79-01-6	0.3	3.1E+03	1.1E-01	1.1E-01	4.1E-06	4.7E-07
BaP-equivalent ⁽⁷⁾	50-32-8	4.2	3.3E+07	1.3E-04	1.4E-04	6.0E-04	8.2E-08

⁽¹⁾ PEF calculated as shown in Table G.2.9.

⁽²⁾ COPC = Constituent of potential concern.

⁽³⁾ CAS = Chemical Abstracts Service number.

⁽⁴⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.

⁽⁵⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁶⁾ See Table G.2.10 for VF calculation.

⁽⁷⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.

Table G.2.78

HUMAN HEALTH RISK EVALUATION SUMMARY FOR COMBINED SURFACE AND SUBSURFACE SOIL (0-15')

UU/UE RECEPTOR

EXPOSURE AREA 3

Parcel 83

Fort Monmouth, New Jersey

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	Age -adjusted Ingestion Carcinogenic Risk	Age-adjusted Dermal Carcinogenic Risk	Age-adjusted Inhalation Carcinogenic Risk	Total Carcinogenic Risk	Child Ingestion Hazard Quotient	Child Dermal Hazard Quotient	Adult Ingestion Hazard Quotient	Adult Dermal Hazard Quotient	Inhalation Hazard Quotient	Total Hazard Quotient - Child	Total Hazard Quotient - Adult
Volatile Organic Compounds														
Trichloroethene	79-01-6	0.34 U	Max	--	--	--	--	--	--	--	--	--	--	--
Semivolatile Organic Compounds														
1-Methylnaphthalene	90-12-0	0.036	Max	1.5E-09	6.0E-10	--	2E-09	0.0000066	0.0000023	0.0000062	0.0000034	--	0.000009	0.000001
2-Methylnaphthalene	91-57-6	0.86 J	Max	--	--	--	--	0.0027	0.0010	0.00026	0.00014	--	0.004	0.0004
Bis(2-chloroethyl)ether	111-44-4	1.2 U	Max	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons														
BaP-equivalent ⁽⁴⁾	50-32-8	4.2	UCL	2.8E-05	1.0E-05	8.2E-08	4E-05	0.18	0.063	0.017	0.0092	0.063	0.3	0.09
PCBs														
Aroclor-1260	11096-82-5	0.0042 U	Max	--	--	--	--	--	--	--	--	--	--	--
Inorganics														
Antimony	7440-36-0	0.543 U	Max	--	--	--	--	--	--	--	--	--	--	--
Arsenic	7440-38-2	11.3	UCL	2.4E-05	2.2E-06	1.4E-08	3E-05	0.48	0.039	0.045	0.0057	0.00057	0.5	0.05
Cobalt	7440-48-4	10.1	Max	--	--	2.6E-08	3E-08	0.43	--	0.040	--	0.0013	0.4	0.04
Manganese	7439-96-5	266 U	Max	--	--	--	--	--	--	--	--	--	--	--
Mercury	7439-97-6	0.119 U	Max	--	--	--	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	123	Max	--	--	--	--	0.31	--	0.029	--	0.00093	0.3	0.03
Pathway Risk				5E-05	1E-05	1E-07	--	1	0.1	0.1	0.02	0.07	--	--
Total Risk						6E-05	Hazard Index						2	0.2

Table G.2.79

TARGET ORGANS AND TOXIC CRITICAL EFFECTS FOR SEGREGATED HAZARD INDICES FOR COMBINED SURFACE AND SUBSURFACE SOIL (0-15')

UU/UE RECEPTOR

EXPOSURE AREA 3

Parcel 83

Fort Monmouth, New Jersey

Constituent	Child Ingestion + Dermal Hazard Index (1)	Inhalation Hazard Index (1)	Ingestion + Dermal			Inhalation		
			Target Organ	Toxic Critical Effect	Source	Target Organ	Toxic Critical Effect	Source
Trichloroethene	--	--	Heart	Increased fetal cardiac malformations in Sprague-Dawley rats	IRIS	Thymus	Decreased thymus weight in female B6C3F1 mice (immunotoxicity)	IRIS
1-Methylnaphthalene	0.000009	--	Respiratory	Increased incidence of pulmonary alveolar proteinosis	ATSDR Final	--	--	--
2-Methylnaphthalene	0.004	--	Lungs	Pulmonary alveolar proteinosis	IRIS	--	--	--
Bis(2-chloroethyl)ether	--	--	--	--	--	--	--	--
Benzo(a)pyrene [B(a)P Equivalent Concentration]	0.2	0.06	Developmental	Neurobehavioral changes	IRIS	Developmental	Decreased embryo/fetal survival	IRIS
Aroclor-1260	--	--	--	--	--	--	--	--
Antimony	--	--	Whole body	Longevity, blood glucose, and cholesterol	IRIS	--	--	--
Arsenic	0.5	0.0006	Cardiovascular and Dermal	Hyperpigmentation, keratosis and possible vascular complications	IRIS	--	--	--
Cobalt	0.4	0.001	Thyroid	Decreased iodine uptake	PPRTV Current	Respiratory Tract; Lung	Irritation; Decreased function	PPRTV Current
Manganese	--	--	Nervous	CNS effects	IRIS	Nervous	Impairment of neurobehavioral function	IRIS
Mercury	--	--	--	--	--	Nervous	Hand tremor; increases in memory disturbances; slight subjective and objective evidence of autonomic dysfunction	IRIS
Vanadium	0.3	0.0009	Dermal	Decreased hair cystine	SURROGAT E. See Vanadium Pentoxide. MW contribution adjustment.	Respiratory	hyperplasia of alveolar and bronchiolar epithelium, degeneration and hyperplasia of epiglottis epithelium, and goblet cell hyperplasia in nasal respiratory epithelium	ATSDR Final

(1) See Table G.2.86 for hazard indices.

(2) ATSDR - Agency for Toxic Substances and Disease Registry (<http://www.atsdr.cdc.gov/>)

IRIS - Integrated Risk Information System (<http://www.epa.gov/IRIS/>)

PPRTV - Provisional Peer Reviewed Toxicity Values for Superfund (<http://hhpprtv.ornl.gov/>)

Table G.2.80

NONCANCER HAZARDS SEPARATED BY TARGET ORGAN FOR COMBINED SURFACE AND SUBSURFACE SOIL (0-15')

UU/UE RECEPTOR

EXPOSURE AREA 3

Parcel 83

Fort Monmouth, New Jersey

Target Organ	Constituent Groupings for Ingestion + Dermal Exposure Pathways	Ingestion + Dermal Hazard Index ⁽¹⁾	Constituent Groupings for Inhalation Exposure Pathways	Inhalation Hazard Index ⁽¹⁾	Summed Segregated Hazard Index ⁽²⁾
Cardiovascular system	Trichloroethene	--	N/A	N/A	0.5
	Arsenic	0.5			
Dermal	Arsenic	0.5	N/A	N/A	0.8
	Vanadium	0.3			
Develomental	BaP	0.2	BaP	0.06	0.3
Nervous	Manganese	--	Manganese	--	--
			Mercury	--	
Respiratory system	1-Methylnaphthalene	0.000009	Cobalt	0.001	0.006
	2-Methylnaphthalene	0.004	Vanadium	0.0009	
Thymus	N/A	N/A	Trichloroethene	--	--
Thyroid	Cobalt	0.4	N/A	N/A	0.4
Whole Body	Antimony	--	N/A	N/A	--

⁽¹⁾ See Table G.2.87.

⁽²⁾ Sum of the ingestion+dermal and inhalation hazard indices for the applicable target organ.

-- Hazard not calculated because analyte was not detected at the exposure area.

N/A - Not applicable. Does not have a toxicity value for the exposure pathway.

Table G.2.81

RISK AND HAZARD ESTIMATES – INCIDENTAL INGESTION OF COMBINED SURFACE AND SUBSURFACE SOIL (0-15')

UTILITY WORKER

Parcel 83

Fort Monmouth, New Jersey

Exposure Assumptions				Equations							
UTILITY WORKER											
Parameter	Abbreviation	Value	Units								
COPC Concentration in Soil	C _s	chemical-specific	mg/kg	$Ingestion = \frac{(C_s)(IRS_{adult})(EF)(ED_{adult})(CF_s)(FI)}{(AT)(BW_{adult})}$							
Soil Ingestion Rate - adult	IRS _{adult}	330	mg/day								
Exposure Frequency	EF	30	days/year								
Exposure Duration - adult	ED _{adult}	1	years								
Conversion Factor-soil	CF _s	0.000001	kg/mg								
Averaging Time – carcinogens	AT _c	25550	days	$Risk = (Ingestion)(SF_o)$							
Averaging Time – noncarcinogens, adult	AT _{nc} - adult	365	days								
Oral Slope Factor	SF _o	chemical-specific	(mg/kg-day) ⁻¹	$HQ = Ingestion / RfD_o$							
Body Weight - adult	BW _{adult}	80	kg								
Oral Reference Dose	RfD _o	chemical-specific	mg/kg-day								
Fraction Ingested	FI	1	unitless								

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	Carcinogenic Ingestion (mg/kg-day)	Noncarcinogenic Ingestion - Adult (mg/kg-day)	SF _o ⁽⁴⁾ (mg/kg-day) ⁻¹	RfDo ⁽⁴⁾ (mg/kg-day)	Cancer Risk	% of Total	Hazard Quotient - Adult	% of Total
Volatile Organic Compounds											
Trichloroethene	79-01-6	5.8	Max	2.8E-08	2.0E-06	4.6E-02	5.00E-04	1.3E-09	0.42%	0.0039	4.3%
Semivolatile Organic Compounds											
1-Methylnaphthalene	90-12-0	31	Max	1.5E-07	1.1E-05	2.9E-02	7.00E-02	4.4E-09	1.4%	0.00015	0.16%
2-Methylnaphthalene	91-57-6	53	Max	--	1.8E-05	--	4.00E-03	--	--	0.0045	4.9%
Bis(2-chloroethyl)ether	111-44-4	0.24	J Max	1.2E-09	--	1.1E+00	--	1.3E-09	0.42%	--	--
Polycyclic Aromatic Hydrocarbons											
BaP-equivalent ⁽⁵⁾	50-32-8	18	Max	8.7E-08	6.1E-06	1.0E+00	3.00E-04	8.7E-08	29%	0.020	22%
PCBs											
Aroclor-1254	11097-69-1	0.22	J Max	1.1E-09	7.5E-08	2.0E+00	2.00E-05	2.1E-09	0.70%	0.0037	4.1%
Aroclor-1260	11096-82-5	0.8	Max	3.9E-09	--	2.0E+00	--	7.7E-09	2.5%	--	--
Inorganics											
Antimony	7440-36-0	8.42	Max	--	2.9E-06	--	4.00E-04	--	--	0.0071	7.8%
Arsenic	7440-38-2	27.6	Max	1.3E-07	9.4E-06	1.5E+00	3.00E-04	2.0E-07	66%	0.031	34%
Cobalt	7440-48-4	10.1	Max	--	3.4E-06	--	3.00E-04	--	--	0.011	12.5%
Manganese	7439-96-5	230	Max	--	7.8E-05	--	1.40E-01	--	--	0.00056	0.61%
Mercury	7439-97-6	4.06	Max	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	123	Max	--	4.2E-05	--	5.00E-03	--	--	0.0083	9.1%
Pathway Sums:								Cancer Risk		Hazard Index	
								3E-07	100%	0.1	100%

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.

⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.

⁽⁵⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.

-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.82
RISK AND HAZARD ESTIMATES -- DERMAL CONTACT WITH COMBINED SURFACE AND SUBSURFACE SOIL (0-15')
UTILITY WORKER
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions				Equations
UTILITY WORKER				
Receptor				
Parameter	Abbreviation	Value	Units	
COPC Concentration in Soil	C _s	chemical-specific	mg/kg	
Exposure Frequency	EF	30	days/year	
Exposure Duration - adult	ED _{adult}	1	years	
Event Frequency	EV	1	events/day	
Exposed Skin Surface Area - adult	SA _{adult}	3470	cm2	
Adherence Factor - adult	AF _{adult}	0.2	mg/cm2	
Dermal Absorption Factor	ABS	chemical-specific	unitless	
Averaging Time – carcinogens	AT _c	25550	days	
Averaging Time – noncarcinogens, adult				
	AT _{nc} - adult	365	days	
Oral Slope Factor Adjusted for GI Absorption				
	SF _d	chemical-specific	(mg/kg-day) ⁻¹	
Body Weight - adult	BW _{adult}	80	kg	
Oral Reference Dose Adjusted for GI Absorption				
	RfD _d	chemical-specific	mg/kg-day	
Conversion Factor-soil	CF _s	0.000001	kg/mg	
Dermal Absorbed Dose	DAD	chemical-specific	mg/kg-day	
Absorbed dose per event	DA _{event}	chemical-specific	mg/cm ² -event	

Dermal absorbed dose of noncarcinogenic and carcinogenic COPCs in soil:

$$DAD = \frac{(DA_{event})(EF)(ED_{adult})(EV)(SA_{adult})}{(BW_{adult})(AT)}$$

where:

$$DA_{event} = (C_s)(AF_a)(ABS)(CF)$$

Carcinogenic Risk:

$$Risk = (DAD)(SF_d)$$
$$SF_d = SF_o / GIABS$$

Noncarcinogenic Hazard:

$$HQ = DAD / Rf_d$$
$$RfD_d = (RfD_o)(GIABS)$$

where:

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	ABS ⁽⁴⁾ (unitless)	SF _d ⁽⁴⁾ (mg/kg-day) ⁻¹	RfD _d ⁽⁴⁾ (mg/kg-day)	DAevent (mg/cm ² -event)	Carcinogenic DAD (mg/kg-day)	Noncarcinogenic DAD (mg/kg-day)	Cancer Risk	% of Total	Hazard Quotient	% of Total
Volatile Organic Compounds													
Trichloroethene	79-01-6	5.8	Max	--	4.6E-02	5.0E-04	--	--	--	--	--	--	--
Semivolatile Organic Compounds													
1-Methylnaphthalene	90-12-0	31	Max	0.13	2.9E-02	7.0E-02	8.1E-07	4.1E-08	2.9E-06	1.2E-09	2.9%	0.000041	0.41%
2-Methylnaphthalene	91-57-6	53	Max	0.13	--	4.0E-03	1.4E-06	--	4.9E-06	--	--	0.0012	12%
Bis(2-chloroethyl)ether	111-44-4	0.24	J	Max	--	1.1E+00	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons													
BaP-equivalent ⁽⁵⁾	50-32-8	18	Max	0.13	1.0E+00	3.0E-04	4.7E-07	2.4E-08	1.7E-06	2.4E-08	59%	0.0056	56%
PCBs													
Aroclor-1254	11097-69-1	0.22	J	Max	0.14	2.0E+00	6.2E-09	3.1E-10	2.2E-08	6.3E-10	1.5%	0.0011	11%
Aroclor-1260	11096-82-5	0.8	Max	0.14	2.0E+00	--	2.2E-08	1.1E-09	--	2.3E-09	5.6%	--	--
Inorganics													
Antimony	7440-36-0	8.42	Max	--	--	6.0E-05	--	--	--	--	--	--	--
Arsenic	7440-38-2	27.6	Max	0.03	1.5E+00	3.0E-04	1.7E-07	8.4E-09	5.9E-07	1.3E-08	31%	0.0020	20%
Cobalt	7440-48-4	10.1	Max	--	--	3.0E-04	--	--	--	--	--	--	--
Manganese	7439-96-5	230	Max	--	--	1.4E-01	--	--	--	--	--	--	--
Mercury	7439-97-6	4.06	Max	--	--	--	--	--	--	--	--	--	--
Vanadium	7440-62-2	123	Max	--	--	1.3E-04	--	--	--	--	--	--	--
Pathway Sums:										Cancer Risk		Hazard Index	
										4E-08	100%	0.01	100%

⁽¹⁾ COPC = Constituent of potential concern.
⁽²⁾ CAS = Chemical Abstracts Service number.
⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.
⁽⁴⁾ Human Health Toxicity Values shown in Table G.2.11.
⁽⁵⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.
-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.83
RISK AND HAZARD ESTIMATES -- INHALATION OF VOLATILES/FUGITIVE DUST FROM COMBINED SURFACE AND SUBSURFACE SOIL (0-15')
UTILITY WORKER
Parcel 83
Fort Monmouth, New Jersey

Exposure Assumptions				Equations
Receptor UTILITY WORKER				
Parameter	Abbreviation	Value	Units	
COPC in air	C _a	chemical-specific	µg/m ³	
COPC in surface soil	C _s	chemical-specific	mg/kg	
Exposure Frequency	EF	30	days/year	
Exposure Duration - adult	ED _{adult}	1	years	
Exposure Time	ET	0.33	unitless	
Averaging Time – carcinogens	AT _c	25550	days	
Averaging Time – noncarcinogens, adult	AT _{nc} - adult	365	days	

Inhalation Unit Risk (IUR)	IUR	chemical-specific	(µg/m ³) ⁻¹
Inhalation Reference Concentration (RfC)	RfC	chemical-specific	mg/m ³
Volatilization Factor (VF)	VF	chemical-specific	m ³ /kg
Particulate emission factor (PEF) ⁽¹⁾	PEF	1.27E+09	m ³ /kg
Soil saturation	C _{sat}	chemical-specific	mg/kg
Exposure concentration in air	EC(air)	chemical-specific	µg/m ³

Exposure concentration in air for soil particulates and vapors emitted from soil for carcinogens and noncarcinogens:

$$EC\ (air) = \frac{(C_a)(ET)(EF)(ED)}{(AT)}$$

Where for inorganics, C_a calculated as:

$$C_a = (C_s) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{PEF} \right)$$

Where for organics with C_s ≤ C_{sat}, C_a calculated as:

$$C_a = (C_s) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{VF} + \frac{1}{PEF} \right)$$

Where for organics with C_s > C_{sat}, C_a calculated as:

$$C_a = \left[(C_s) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{PEF} \right) \right] + \left[(C_{sat}) \left(1,000 \frac{\mu g}{mg} \right) \left(\frac{1}{VF} \right) \right]$$

Carcinogenic Risk:
$$Risk_{inh} = [EC(air)](IUR)$$

Noncarcinogenic Hazard:
$$HQ_{inh} = \frac{EC(air)}{(RfC) \left(1,000 \frac{\mu g}{mg} \right)}$$

COPC ⁽²⁾	CAS Number ⁽³⁾	C _s ⁽⁴⁾ (mg/kg)	UCL or Max	C _{sat} ⁽⁵⁾ (mg/kg)	Is EPC ≤ C _{sat} ?	Volatilization Factor ⁽⁶⁾ (m ³ /kg)	C _a (µg/m ₃)	Carcinogenic EC(air) (µg/m ³)	Noncarcinogenic EC(air) (µg/m3)	IUR ⁽⁵⁾ (µg/m ³) ⁻¹	RfC _i ⁽⁵⁾ (mg/m ³)	Cancer Risk	% of Total	Hazard Quotient	% of Total
Volatile Organic Compounds															
Trichloroethene	79-01-6	5.8	Max	6.9E+02	Yes	3.1E+03	1.9E+00	7.3E-04	5.1E-02	4.1E-06	2.0E-03	3.0E-09	78%	0.025	65%
Semivolatile Organic Compounds															
1-Methylnaphthalene	90-12-0	31	Max	3.9E+02	Yes	8.2E+04	3.8E-01	--	--	--	--	--	--	--	--
2-Methylnaphthalene	91-57-6	53	Max	--	Yes	8.1E+04	6.5E-01	--	--	--	--	--	--	--	--
Bis(2-chloroethyl)ether	111-44-4	0.24	J	5.1E+03	Yes	5.9E+04	4.0E-03	1.6E-06	--	3.3E-04	--	5.2E-10	13%	--	--
Polycyclic Aromatic Hydrocarbons															
BaP-equivalent ⁽⁷⁾	50-32-8	18	Max	--	Yes	3.3E+07	5.6E-04	2.2E-07	1.5E-05	6.0E-04	2.0E-06	1.3E-10	3.4%	0.0076	19%
PCBs															
Aroclor-1254	11097-69-1	0.22	J	--	Yes	1.2E+06	1.9E-04	7.2E-08	--	5.7E-04	--	4.1E-11	1.1%	--	--
Aroclor-1260	11096-82-5	0.8	Max	--	Yes	1.8E+06	4.4E-04	1.7E-07	--	5.7E-04	--	9.6E-11	2.5%	--	--
Inorganics															
Antimony	7440-36-0	8.42	Max	--	Yes	--	6.6E-06	--	--	--	--	--	--	--	--
Arsenic	7440-38-2	27.6	Max	--	Yes	--	2.2E-05	8.4E-09	5.9E-07	4.3E-03	1.5E-05	3.6E-11	0.95%	0.000039	0.101%
Cobalt	7440-48-4	10.1	Max	--	Yes	--	8.0E-06	3.1E-09	2.2E-07	9.0E-03	6.0E-06	2.8E-11	0.73%	0.000036	0.092%
Manganese	7439-96-5	230	Max	--	Yes	--	1.8E-04	--	4.9E-06	--	5.0E-05	--	--	0.00010	0.25%
Mercury	7439-97-6	4.06	Max	3.1E+00	No	4.9E+04	6.4E-02	--	1.7E-03	--	3.0E-04	--	--	0.0058	15%
Vanadium	7440-62-2	123	Max	--	Yes	--	9.7E-05	--	2.6E-06	--	1.0E-04	--	--	0.000026	0.067%
Pathway Sums:												Cancer Risk	4E-09	100%	100%
														Hazard Index	

⁽¹⁾ PEF calculated as shown in Table G.2.9.
⁽²⁾ COPC = Constituent of potential concern.
⁽³⁾ CAS = Chemical Abstracts Service number.
⁽⁴⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.
⁽⁵⁾ Human Health Toxicity Values shown in Table G.2.11.
⁽⁶⁾ See Table G.2.10 for VF calculation.
⁽⁷⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.
-- = value not calculated because analyte not detected, or because toxicity data not available.

Table G.2.84
HUMAN HEALTH RISK EVALUATION SUMMARY FOR COMBINED SURFACE AND SUBSURFACE SOIL (0-15')
UTILITY WORKER
Parcel 83
Fort Monmouth, New Jersey

COPC ⁽¹⁾	CAS Number ⁽²⁾	C _s ⁽³⁾ (mg/kg)	UCL or Max	Adult Only Ingestion Carcinogenic Risk	Adult Only Dermal Carcinogenic Risk	Adult Only Inhalation Carcinogenic Risk	Total Carcinogenic Risk	Adult Ingestion Hazard Quotient	Adult Dermal Hazard Quotient	Adult Inhalation Hazard Quotient	Total Hazard Quotient
Volatile Organic Compounds											
Trichloroethene	79-01-6	5.8	Max	1.3E-09	--	3.0E-09	4E-09	0.0039	--	0.025	0.03
Semivolatile Organic Compounds											
1-Methylnaphthalene	90-12-0	31	Max	4.4E-09	1.2E-09	--	6E-09	0.00015	0.000041	--	0.0002
2-Methylnaphthalene	91-57-6	53	Max	--	--	--	--	0.0045	0.0012	--	0.006
Bis(2-chloroethyl)ether	111-44-4	0.24	J Max	1.3E-09	--	5.2E-10	2E-09	--	--	--	--
Polycyclic Aromatic Hydrocarbons											
BaP-equivalent ⁽⁴⁾	50-32-8	18	Max	8.7E-08	2.4E-08	1.3E-10	1E-07	0.020	0.0056	0.0076	0.03
PCBs											
Aroclor-1254	11097-69-1	0.22	J	2.1E-09	6.3E-10	4.1E-11	3E-09	0.0037	0.0011	--	0.005
Aroclor-1260	11096-82-5	0.8	Max	7.7E-09	2.3E-09	9.6E-11	1E-08	--	--	--	--
Inorganics											
Antimony	7440-36-0	8.42	Max	--	--	--	--	0.0071	--	--	0.007
Arsenic	7440-38-2	27.6	Max	2.0E-07	1.3E-08	3.6E-11	2E-07	0.031	0.0020	0.000039	0.03
Cobalt	7440-48-4	10.1	Max	--	--	2.8E-11	3E-11	0.011	--	0.000036	0.01
Manganese	7439-96-5	230	Max	--	--	--	--	0.00056	--	0.00010	0.0007
Mercury	7439-97-6	4.06	Max	--	--	--	--	--	--	0.0058	0.006
Vanadium	7440-62-2	123	Max	--	--	--	--	0.0083	--	0.000026	0.008
Pathway Risk				3E-07	4E-08	4E-09	--	0.1	0.01	0.04	--
							Total Risk	3E-07			
									Hazard Index	0.1	

⁽¹⁾ COPC = Constituent of potential concern.

⁽²⁾ CAS = Chemical Abstracts Service number.

⁽³⁾ COPC concentration in Soil (C_s) is the 95% UCL or the maximum detected concentration. See Table G.2.7.

⁽⁴⁾ See Tables G.2.4 and G.2.5 for B(a)P-equivalent calculation.

-- Risk/hazard not calculated because toxicity value was not available.

Table G.2.85
SUMMARY OF RISK AND HAZARD FOR SOIL
Parcel 83
Fort Monmouth, New Jersey

Receptor and Medium	Cancer Risk ⁽¹⁾	Hazard Index - child ⁽¹⁾		Hazard Index - adolescent ⁽¹⁾	Hazard Index - adult ⁽¹⁾	RI Conclusion
		Target Organ	Segregated Hazard Index			
UU/UE Receptor - Exposure Area 1						
Surface Soil (Incidental Ingestion, Dermal Contact, and Inhalation)	7E-05	Cardiovascular system	0.7	--	1	No unacceptable risks to human health from exposure to COPCs in surface soil.
		Dermal	1			
		Developmental	0.4			
		Respiratory system	0.006			
		Thyroid	0.4			
Combined Surface and Subsurface Soil (Incidental Ingestion, Dermal Contact, and Inhalation)	6E-05	Cardiovascular system	0.8	--	1	No unacceptable risks to human health from exposure to COPCs in combined surface and subsurface soil.
		Dermal	0.8			
		Developmental	0.1			
		Nervous	0.02			
		Respiratory system	0.2			
		Thymus	0.9			
		Thyroid	0.3			
		Whole Body	0.3			
UU/UE Receptor - Exposure Area 2						
Surface Soil (Incidental Ingestion, Dermal Contact, and Inhalation)	2E-04	Cardiovascular system	0.3	--	0.7	Unacceptable risks to human health from exposure to carcinogenic PAHs in surface soil as represented by the BaP-equivalent concentration. Therefore, a feasibility study is recommended to address carcinogenic PAHs in surface soil at Exposure Area 2
		Dermal	0.5			
		Developmental	1			
		Nervous	0.2			
		Respiratory system	0.002			
		Thyroid	0.2			
		Whole Body	0.3			
Combined Surface and Subsurface Soil (Incidental Ingestion, Dermal Contact, and Inhalation)	1E-04	Cardiovascular system	0.5	--	1	No unacceptable risks to human health from exposure to COPCs in combined surface and subsurface soil.
		Dermal	0.8			
		Developmental	0.6			
		Nervous	0.2			
		Respiratory system	0.003			
		Thyroid	0.2			
		Whole Body	0.3			

Table G.2.85
SUMMARY OF RISK AND HAZARD FOR SOIL
Parcel 83
Fort Monmouth, New Jersey

UU/UE Receptor - Exposure Area 3						
Surface Soil (Incidental Ingestion, Dermal Contact, and Inhalation)	8E-05	Cardiovascular system	0.7	--	0.3	No unacceptable risks to human health from exposure to COPCs in surface soil.
		Dermal	1			
		Developmental	0.4			
		Respiratory system	0.006			
		Thyroid	0.4			
Combined Surface and Subsurface Soil (Incidental Ingestion, Dermal Contact, and Inhalation)	6E-05	Cardiovascular system	0.5	--	0.2	No unacceptable risks to human health from exposure to COPCs in combined surface and subsurface soil.
		Dermal	0.8			
		Developmental	0.3			
		Respiratory system	0.006			
		Thyroid	0.4			
Utility Worker Receptor						
Surface Soil (Incidental Ingestion, Dermal Contact, and Inhalation)	3E-07	--	--	--	0.1	No unacceptable risks to human health from exposure to COPCs in surface soil.
Combined Surface and Subsurface Soil (Incidental Ingestion, Dermal Contact, and Inhalation)	3E-07	--	--	--	0.1	No unacceptable risks to human health from exposure to COPCs in combined surface and subsurface soil.
Outdoor Worker Receptor						
Surface Soil (Incidental Ingestion, Dermal Contact, and Inhalation)	2E-05	--	--	--	0.5	No unacceptable risks to human health from exposure to COPCs in surface soil.
Combined Surface and Subsurface Soil (Incidental Ingestion, Dermal Contact, and Inhalation)	--	--	--	--	--	--
Recreational User Receptor						
Surface Soil (Incidental Ingestion, Dermal Contact, and Inhalation)	6E-06			0.1	0.04	No unacceptable risks to human health from exposure to COPCs in surface soil.
Combined Surface and Subsurface Soil (Incidental Ingestion, Dermal Contact, and Inhalation)	--			--	--	--

⁽¹⁾ HI and Cancer Risks were calculated by summing across exposure routes for each receptor.

-- Not calculated because receptor or pathway not present.

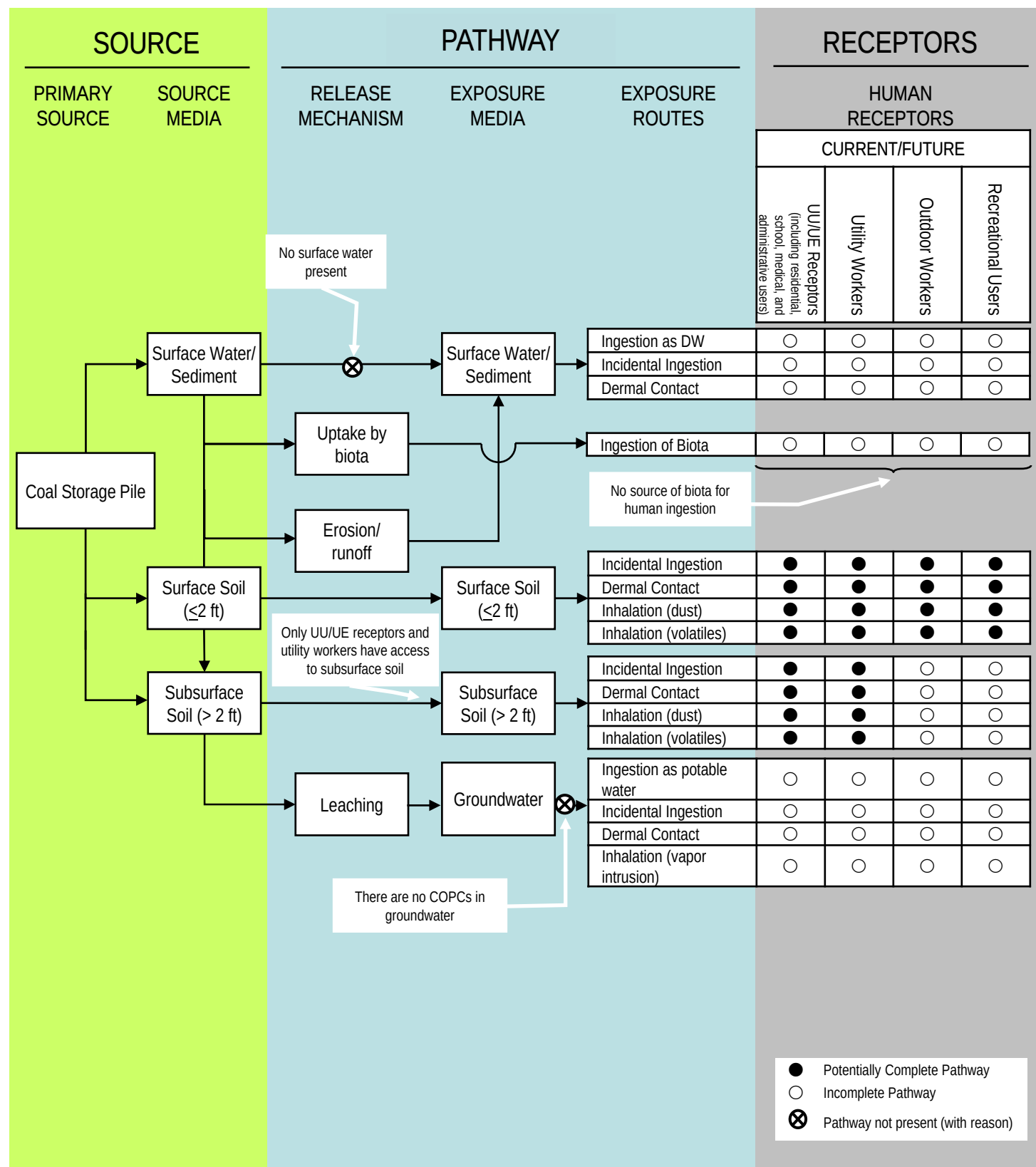
FIGURES

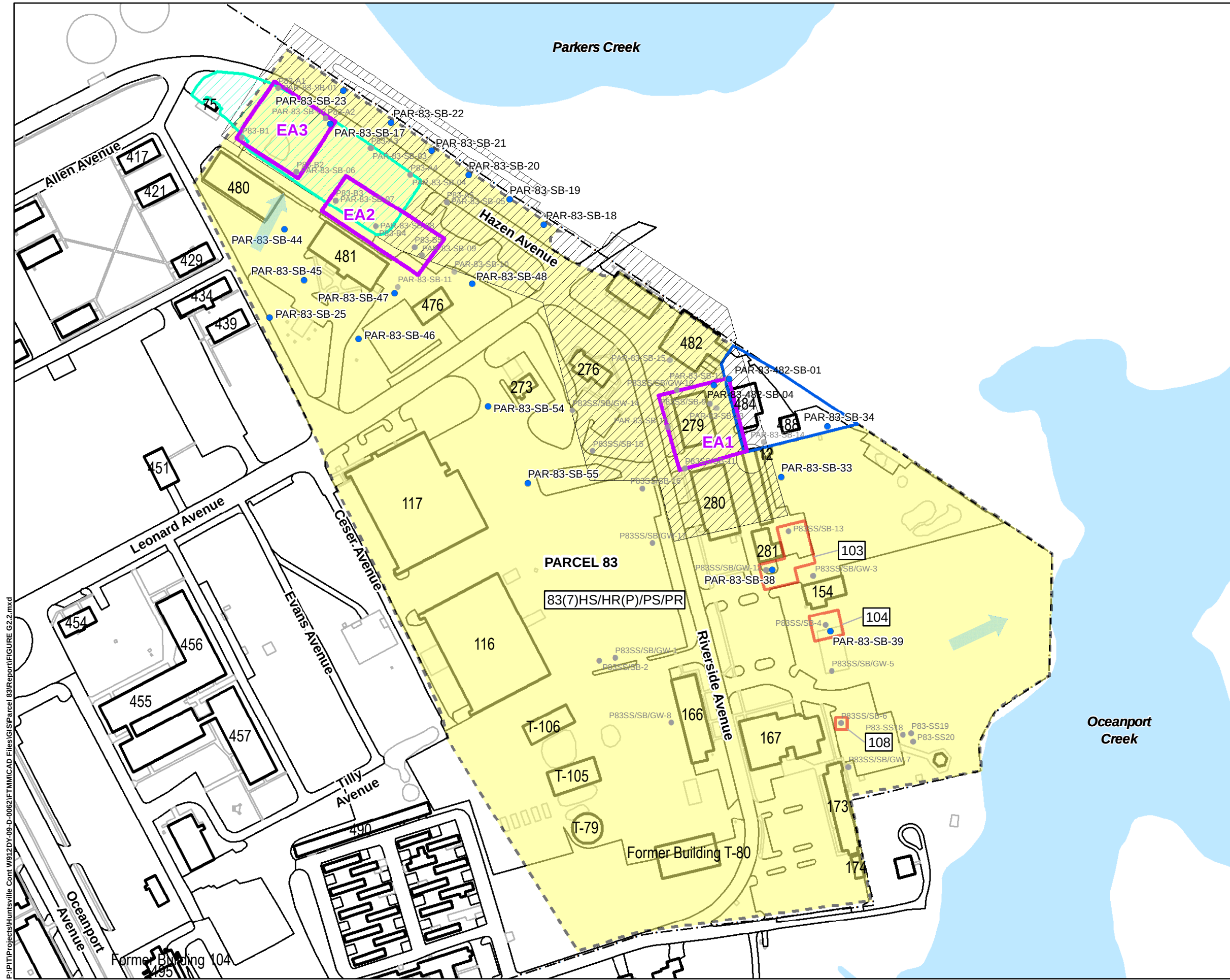
Figure G.2.1
CONCEPTUAL SITE MODEL DIAGRAM FOR PARCEL 83

Site Name: Fort Monmouth, New Jersey, Parcel 83 Former Industrial and Vehicle Related Activities and Parcels 103, 104, and 108 – PAHs in SI Samples

Completed By: Janelle Bartscherer - Parsons

Date Completed: July 11, 2019

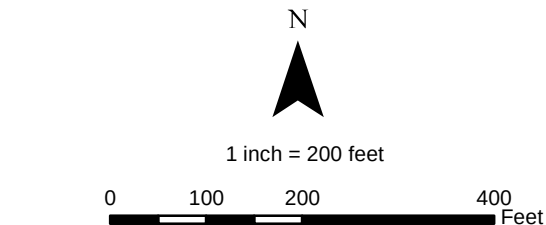




LEGEND:

- Surface/Subsurface Sample Location (2017)
- Historic Sample Locations (2007 and 2016)
- ▨ Former Coal Storage Area
- ▨ Parcel 83 Carve-Out (Approximate)
- ▨ Parcel 83 Boundary
- ▭ FTMM-57 Boundary
- ▭ Parcel 103, 104, and 108 Boundaries
- ▭ Exposure Areas
- ▭ Installation Boundary
- Surface Water Feature
- Generalized Groundwater Flow Direction

BRAC Parcel Label Definitions	
8(2)PS	HS – Hazardous Substance Storage
Contaminant Description	HR – Hazardous Substance Release
	PS – Petroleum Storage
	PR – Petroleum Release
	(P) – Possible Release or Disposal
Category Number	
Parcel Number	



Source: FTMM Supplied CAD; Shaw Environmental 2008.

PARSONS 401 Diamond Drive NW, Huntsville AL	Fort Monmouth New Jersey
PARCEL 83 EXPOSURE AREAS	
CREATED BY: RR	REVIEWED BY: AM
DATE: JUL. 2019	FIGURE NUMBER: FIGURE G.2.2
PROJECT NUMBER: 748810-01000	FILE: FIGURE G2.2.mxd

ATTACHMENT G.1

ProCUL Supporting Documentation

ProUCL Input

EA1SS BaP Equivalent	d_EA1SS BaP Equivalent	EA1SS Arsenic	d_EA1SS Arsenic	EA1MX 2-Methylnaphthalene	d_EA1MX 2-Methylnaphthalene	EA1 MX BaP Equivalent	d_EA1 MX BaP Equivalent	EA1MX Arsenic	d_EA1MX Arsenic	
0.017		1	27.6	1	1.1	0	0.88	1	27.6	1
0.3		1	27.1	1	4.3	1	0.063	1	27.1	1
2.5		0	8.96	1	1.2	0	2.5	0	8.96	1
2.5		1	5.2	1	0.0041	1	2.5	0	5.2	1
2.5		1	6.3	1	0.08	1	2.8	0	6.3	1
0.16		1	10.5	1	1	0	4.1	1	10.5	1
0.18		0	4.8	1	1.1	1	0.19	0	4.8	1
0.18		0	6.1	1	1.1	0	0.18	0	6.1	1
			9.8	1	1.2	0	0.18	1	6.09	1
					53	1	0.017	1	9.81	1
					0.0079	0	0.3	1	11.9	1
							2.5	0	9.5	1
							2.5	1	5.4	1
							2.5	1	8	1
							0.16	1	9.1	1
							0.18	0	11.4	1
							0.18	0	9.3	1
								9.8	1	1

EA2SS BaP Equivalent	d_EA2SS BaP Equivalent	EA2MX BaP Equivalent	d_EA2MX BaP Equivalent	EA3SS BaP Equivalent	d_EA3SS BaP Equivalent	EA3MX BaP Equivalent	d_EA3MX BaP Equivalent	EA3MX Arsenic	d_EA3MX Arsenic
18	1	0.02	1	0.12	1	0.02	1	16	1
0.019	1	0.018	1	0.027	1	0.095	1	3.59	1
2.4	1	0.014	1	2.1	1	0.84	1	4.87	1
0.19	1	0.018	1	0.25	1	0.014	1	10.8	1
1.2	1	2.8	0	0.014	1	0.17	1	4.63	1
2.1	1	2.6	1	11	1	1.4	1	2.77	1
1.7	1	2.8	0	7.2	1	2.5	1	13.4	1
2	1	18	1	2.3	0	2.7	1	7.93	1
		0.019	1	2.7	1	2.8	0		
		2.4	1			0.12	1		
		0.19	1			0.027	1		
		1.2	1			2.1	1		
		2.1	1			0.25	1		
		1.7	1			0.014	1		
		2	1			11	1		
						7.2	1		
						2.3	0		
						2.7	1		

ProUCL Output

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.17/12/2019 12:47:40 PM								
5	From File			ProUCL Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	EA1SS BaP Equivalent											
11												
12	General Statistics											
13	Total Number of Observations				8		Number of Distinct Observations				5	
14	Number of Detects				5		Number of Non-Detects				3	
15	Number of Distinct Detects				4		Number of Distinct Non-Detects				2	
16	Minimum Detect				0.017		Minimum Non-Detect				0.18	
17	Maximum Detect				2.5		Maximum Non-Detect				2.5	
18	Variance Detects				1.654		Percent Non-Detects				37.5%	
19	Mean Detects				1.095		SD Detects				1.286	
20	Median Detects				0.3		CV Detects				1.174	
21	Skewness Detects				0.581		Kurtosis Detects				-3.293	
22	Mean of Logged Detects				-1.056		SD of Logged Detects				2.093	
23												
24	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
25	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
26	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
27	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											
28												
29	Normal GOF Test on Detects Only											
30	Shapiro Wilk Test Statistic				0.741		Shapiro Wilk GOF Test					
31	5% Shapiro Wilk Critical Value				0.762		Detected Data Not Normal at 5% Significance Level					
32	Lilliefors Test Statistic				0.332		Lilliefors GOF Test					
33	5% Lilliefors Critical Value				0.343		Detected Data appear Normal at 5% Significance Level					
34	Detected Data appear Approximate Normal at 5% Significance Level											
35												
36	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
37	KM Mean				0.723		KM Standard Error of Mean				0.408	
38	KM SD				1.03		95% KM (BCA) UCL				N/A	
39	95% KM (t) UCL				1.496		95% KM (Percentile Bootstrap) UCL				N/A	
40	95% KM (z) UCL				1.394		95% KM Bootstrap t UCL				N/A	
41	90% KM Chebyshev UCL				1.948		95% KM Chebyshev UCL				2.502	
42	97.5% KM Chebyshev UCL				3.272		99% KM Chebyshev UCL				4.784	
43												
44	Gamma GOF Tests on Detected Observations Only											
45	A-D Test Statistic				0.407		Anderson-Darling GOF Test					
46	5% A-D Critical Value				0.709		Detected data appear Gamma Distributed at 5% Significance Level					
47	K-S Test Statistic				0.272		Kolmogorov-Smirnov GOF					
48	5% K-S Critical Value				0.371		Detected data appear Gamma Distributed at 5% Significance Level					
49	Detected data appear Gamma Distributed at 5% Significance Level											
50												

	A	B	C	D	E	F	G	H	I	J	K	L
51	Gamma Statistics on Detected Data Only											
52					k hat (MLE)	0.546					k star (bias corrected MLE)	0.352
53					Theta hat (MLE)	2.005					Theta star (bias corrected MLE)	3.113
54					nu hat (MLE)	5.464					nu star (bias corrected)	3.519
55					Mean (detects)	1.095						
56												
57	Gamma ROS Statistics using Imputed Non-Detects											
58	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
59	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
60	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
61	This is especially true when the sample size is small.											
62	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
63					Minimum	0.01					Mean	0.719
64					Maximum	2.5					Median	0.155
65					SD	1.103					CV	1.535
66					k hat (MLE)	0.455					k star (bias corrected MLE)	0.368
67					Theta hat (MLE)	1.579					Theta star (bias corrected MLE)	1.954
68					nu hat (MLE)	7.283					nu star (bias corrected)	5.885
69					Adjusted Level of Significance (β)	0.0195						
70					Approximate Chi Square Value (5.89, α)	1.582					Adjusted Chi Square Value (5.89, β)	1.085
71					95% Gamma Approximate UCL (use when $n \geq 50$)	2.674					95% Gamma Adjusted UCL (use when $n < 50$)	3.898
72												
73	Estimates of Gamma Parameters using KM Estimates											
74					Mean (KM)	0.723					SD (KM)	1.03
75					Variance (KM)	1.061					SE of Mean (KM)	0.408
76					k hat (KM)	0.493					k star (KM)	0.391
77					nu hat (KM)	7.886					nu star (KM)	6.262
78					theta hat (KM)	1.467					theta star (KM)	1.848
79					80% gamma percentile (KM)	1.164					90% gamma percentile (KM)	2.05
80					95% gamma percentile (KM)	3.027					99% gamma percentile (KM)	5.489
81												
82	Gamma Kaplan-Meier (KM) Statistics											
83					Approximate Chi Square Value (6.26, α)	1.775					Adjusted Chi Square Value (6.26, β)	1.238
84					95% Gamma Approximate KM-UCL (use when $n \geq 50$)	2.551					95% Gamma Adjusted KM-UCL (use when $n < 50$)	3.658
85												
86	Lognormal GOF Test on Detected Observations Only											
87					Shapiro Wilk Test Statistic	0.904					Shapiro Wilk GOF Test	
88					5% Shapiro Wilk Critical Value	0.762					Detected Data appear Lognormal at 5% Significance Level	
89					Lilliefors Test Statistic	0.227					Lilliefors GOF Test	
90					5% Lilliefors Critical Value	0.343					Detected Data appear Lognormal at 5% Significance Level	
91	Detected Data appear Lognormal at 5% Significance Level											
92												
93	Lognormal ROS Statistics Using Imputed Non-Detects											
94					Mean in Original Scale	0.709					Mean in Log Scale	-1.743
95					SD in Original Scale	1.109					SD in Log Scale	1.885
96					95% t UCL (assumes normality of ROS data)	1.452					95% Percentile Bootstrap UCL	1.32
97					95% BCA Bootstrap UCL	1.587					95% Bootstrap t UCL	7.772
98					95% H-UCL (Log ROS)	64.79						
99												

	A	B	C	D	E	F	G	H	I	J	K	L
100	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
101	KM Mean (logged)				-1.724	KM Geo Mean						0.178
102	KM SD (logged)				1.856	95% Critical H Value (KM-Log)						5.728
103	KM Standard Error of Mean (logged)				0.845	95% H-UCL (KM -Log)						55.52
104	KM SD (logged)				1.856	95% Critical H Value (KM-Log)						5.728
105	KM Standard Error of Mean (logged)				0.845							
106												
107	DL/2 Statistics											
108	DL/2 Normal				DL/2 Log-Transformed							
109	Mean in Original Scale				0.863	Mean in Log Scale						-1.234
110	SD in Original Scale				1.084	SD in Log Scale						1.795
111	95% t UCL (Assumes normality)				1.59	95% H-Stat UCL						63.3
112	DL/2 is not a recommended method, provided for comparisons and historical reasons											
113												
114	Nonparametric Distribution Free UCL Statistics											
115	Detected Data appear Approximate Normal Distributed at 5% Significance Level											
116												
117	Suggested UCL to Use											
118	95% KM (t) UCL				1.496							
119												
120	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
121	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
122												
123	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
124	Recommendations are based upon data size, data distribution, and skewness.											
125	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
126	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
127												
128												
129	EA1SS Arsenic											
130												
131	General Statistics											
132	Total Number of Observations				9	Number of Distinct Observations						9
133						Number of Missing Observations						0
134	Minimum				4.8	Mean						11.82
135	Maximum				27.6	Median						8.96
136	SD				9.033	Std. Error of Mean						3.011
137	Coefficient of Variation				0.764	Skewness						1.412
138												
139	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
140	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
141	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
142	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											
143												
144	Normal GOF Test											
145	Shapiro Wilk Test Statistic				0.723	Shapiro Wilk GOF Test						
146	5% Shapiro Wilk Critical Value				0.829	Data Not Normal at 5% Significance Level						
147	Lilliefors Test Statistic				0.336	Lilliefors GOF Test						
148	5% Lilliefors Critical Value				0.274	Data Not Normal at 5% Significance Level						
149	Data Not Normal at 5% Significance Level											
150												

	A	B	C	D	E	F	G	H	I	J	K	L
151	Assuming Normal Distribution											
152	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
153	95% Student's-t UCL					17.42	95% Adjusted-CLT UCL (Chen-1995)					18.28
154							95% Modified-t UCL (Johnson-1978)					17.65
155												
156	Gamma GOF Test											
157	A-D Test Statistic					0.801	Anderson-Darling Gamma GOF Test					
158	5% A-D Critical Value					0.728	Data Not Gamma Distributed at 5% Significance Level					
159	K-S Test Statistic					0.265	Kolmogorov-Smirnov Gamma GOF Test					
160	5% K-S Critical Value					0.282	Detected data appear Gamma Distributed at 5% Significance Level					
161	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
162												
163	Gamma Statistics											
164	k hat (MLE)					2.502	k star (bias corrected MLE)					1.742
165	Theta hat (MLE)					4.723	Theta star (bias corrected MLE)					6.783
166	nu hat (MLE)					45.04	nu star (bias corrected)					31.36
167	MLE Mean (bias corrected)					11.82	MLE Sd (bias corrected)					8.953
168							Approximate Chi Square Value (0.05)					19.56
169	Adjusted Level of Significance					0.0231	Adjusted Chi Square Value					17.63
170												
171	Assuming Gamma Distribution											
172	95% Approximate Gamma UCL (use when n>=50)					18.94	95% Adjusted Gamma UCL (use when n<50)					21.03
173												
174	Lognormal GOF Test											
175	Shapiro Wilk Test Statistic					0.853	Shapiro Wilk Lognormal GOF Test					
176	5% Shapiro Wilk Critical Value					0.829	Data appear Lognormal at 5% Significance Level					
177	Lilliefors Test Statistic					0.22	Lilliefors Lognormal GOF Test					
178	5% Lilliefors Critical Value					0.274	Data appear Lognormal at 5% Significance Level					
179	Data appear Lognormal at 5% Significance Level											
180												
181	Lognormal Statistics											
182	Minimum of Logged Data					1.569	Mean of logged Data					2.257
183	Maximum of Logged Data					3.318	SD of logged Data					0.656
184												
185	Assuming Lognormal Distribution											
186	95% H-UCL					21.37	90% Chebyshev (MVUE) UCL					19.25
187	95% Chebyshev (MVUE) UCL					22.76	97.5% Chebyshev (MVUE) UCL					27.61
188	99% Chebyshev (MVUE) UCL					37.16						
189												
190	Nonparametric Distribution Free UCL Statistics											
191	Data appear to follow a Discernible Distribution at 5% Significance Level											
192												
193	Nonparametric Distribution Free UCLs											
194	95% CLT UCL					16.77	95% Jackknife UCL					17.42
195	95% Standard Bootstrap UCL					16.52	95% Bootstrap-t UCL					29.88
196	95% Hall's Bootstrap UCL					52.28	95% Percentile Bootstrap UCL					16.73
197	95% BCA Bootstrap UCL					18.18						
198	90% Chebyshev(Mean, Sd) UCL					20.85	95% Chebyshev(Mean, Sd) UCL					24.94
199	97.5% Chebyshev(Mean, Sd) UCL					30.62	99% Chebyshev(Mean, Sd) UCL					41.78
200												

	A	B	C	D	E	F	G	H	I	J	K	L
201	Suggested UCL to Use											
202	95% Adjusted Gamma UCL					21.03						
203												
204	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
205	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
206												
207	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
208	Recommendations are based upon data size, data distribution, and skewness.											
209	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
210	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
211												
212	EA1MX 2-Methylnaphthalene											
213												
214	General Statistics											
215	Total Number of Observations					11	Number of Distinct Observations					8
216	Number of Detects					5	Number of Non-Detects					6
217	Number of Distinct Detects					5	Number of Distinct Non-Detects					4
218	Minimum Detect					0.0041	Minimum Non-Detect					0.0079
219	Maximum Detect					53	Maximum Non-Detect					1.2
220	Variance Detects					536.2	Percent Non-Detects					54.55%
221	Mean Detects					11.7	SD Detects					23.16
222	Median Detects					1.1	CV Detects					1.98
223	Skewness Detects					2.205	Kurtosis Detects					4.883
224	Mean of Logged Detects					-0.5	SD of Logged Detects					3.648
225												
226	Normal GOF Test on Detects Only											
227	Shapiro Wilk Test Statistic					0.612	Shapiro Wilk GOF Test					
228	5% Shapiro Wilk Critical Value					0.762	Detected Data Not Normal at 5% Significance Level					
229	Lilliefors Test Statistic					0.425	Lilliefors GOF Test					
230	5% Lilliefors Critical Value					0.343	Detected Data Not Normal at 5% Significance Level					
231	Detected Data Not Normal at 5% Significance Level											
232												
233	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
234	KM Mean					5.358	KM Standard Error of Mean					5.096
235	KM SD					15.12	95% KM (BCA) UCL					14.97
236	95% KM (t) UCL					14.59	95% KM (Percentile Bootstrap) UCL					14.85
237	95% KM (z) UCL					13.74	95% KM Bootstrap t UCL					162.5
238	90% KM Chebyshev UCL					20.65	95% KM Chebyshev UCL					27.57
239	97.5% KM Chebyshev UCL					37.18	99% KM Chebyshev UCL					56.06
240												
241	Gamma GOF Tests on Detected Observations Only											
242	A-D Test Statistic					0.239	Anderson-Darling GOF Test					
243	5% A-D Critical Value					0.761	Detected data appear Gamma Distributed at 5% Significance Level					
244	K-S Test Statistic					0.197	Kolmogorov-Smirnov GOF					
245	5% K-S Critical Value					0.385	Detected data appear Gamma Distributed at 5% Significance Level					
246	Detected data appear Gamma Distributed at 5% Significance Level											
247												
248	Gamma Statistics on Detected Data Only											
249	k hat (MLE)					0.241	k star (bias corrected MLE)					0.23
250	Theta hat (MLE)					48.45	Theta star (bias corrected MLE)					50.88
251	nu hat (MLE)					2.414	nu star (bias corrected)					2.299
252	Mean (detects)					11.7						

	A	B	C	D	E	F	G	H	I	J	K	L
253												
254	Gamma ROS Statistics using Imputed Non-Detects											
255	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
256	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
257	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
258	This is especially true when the sample size is small.											
259	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
260					Minimum	0.0041					Mean	5.322
261					Maximum	53					Median	0.01
262					SD	15.87					CV	2.981
263					k hat (MLE)	0.171					k star (bias corrected MLE)	0.185
264					Theta hat (MLE)	31.14					Theta star (bias corrected MLE)	28.78
265					nu hat (MLE)	3.76					nu star (bias corrected)	4.068
266					Adjusted Level of Significance (β)	0.0278						
267					Approximate Chi Square Value (4.07, α)	0.749					Adjusted Chi Square Value (4.07, β)	0.551
268					95% Gamma Approximate UCL (use when $n \geq 50$)	28.92					95% Gamma Adjusted UCL (use when $n < 50$)	39.27
269												
270	Estimates of Gamma Parameters using KM Estimates											
271					Mean (KM)	5.358					SD (KM)	15.12
272					Variance (KM)	228.5					SE of Mean (KM)	5.096
273					k hat (KM)	0.126					k star (KM)	0.152
274					nu hat (KM)	2.765					nu star (KM)	3.344
275					theta hat (KM)	42.64					theta star (KM)	35.25
276					80% gamma percentile (KM)	5.896					90% gamma percentile (KM)	15.92
277					95% gamma percentile (KM)	29.42					99% gamma percentile (KM)	68.48
278												
279	Gamma Kaplan-Meier (KM) Statistics											
280					Approximate Chi Square Value (3.34, α)	0.481					Adjusted Chi Square Value (3.34, β)	0.342
281					95% Gamma Approximate KM-UCL (use when $n \geq 50$)	37.23					95% Gamma Adjusted KM-UCL (use when $n < 50$)	52.38
282												
283	Lognormal GOF Test on Detected Observations Only											
284					Shapiro Wilk Test Statistic	0.988					Shapiro Wilk GOF Test	
285					5% Shapiro Wilk Critical Value	0.762					Detected Data appear Lognormal at 5% Significance Level	
286					Lilliefors Test Statistic	0.165					Lilliefors GOF Test	
287					5% Lilliefors Critical Value	0.343					Detected Data appear Lognormal at 5% Significance Level	
288	Detected Data appear Lognormal at 5% Significance Level											
289												
290	Lognormal ROS Statistics Using Imputed Non-Detects											
291					Mean in Original Scale	5.331					Mean in Log Scale	-2.689
292					SD in Original Scale	15.86					SD in Log Scale	3.279
293					95% t UCL (assumes normality of ROS data)	14					95% Percentile Bootstrap UCL	14.66
294					95% BCA Bootstrap UCL	19.77					95% Bootstrap t UCL	260.1
295					95% H-UCL (Log ROS)	68689						
296												
297	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
298					KM Mean (logged)	-2.656					KM Geo Mean	0.0703
299					KM SD (logged)	3.193					95% Critical H Value (KM-Log)	7.943
300					KM Standard Error of Mean (logged)	1.214					95% H-UCL (KM -Log)	34861
301					KM SD (logged)	3.193					95% Critical H Value (KM-Log)	7.943
302					KM Standard Error of Mean (logged)	1.214						
303												

	A	B	C	D	E	F	G	H	I	J	K	L
304	DL/2 Statistics											
305	DL/2 Normal					DL/2 Log-Transformed						
306	Mean in Original Scale					5.572	Mean in Log Scale					-0.995
307	SD in Original Scale					15.78	SD in Log Scale					2.756
308	95% t UCL (Assumes normality)					14.19	95% H-Stat UCL					6813
309	DL/2 is not a recommended method, provided for comparisons and historical reasons											
310												
311	Nonparametric Distribution Free UCL Statistics											
312	Detected Data appear Gamma Distributed at 5% Significance Level											
313												
314	Suggested UCL to Use											
315	95% KM Bootstrap t UCL					162.5	Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$)					52.38
316												
317	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
318	Recommendations are based upon data size, data distribution, and skewness.											
319	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
320	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
321												
322	EA1 MX BaP Equivalent											
323												
324	General Statistics											
325	Total Number of Observations					17	Number of Distinct Observations					10
326	Number of Detects					9	Number of Non-Detects					8
327	Number of Distinct Detects					8	Number of Distinct Non-Detects					4
328	Minimum Detect					0.017	Minimum Non-Detect					0.18
329	Maximum Detect					4.1	Maximum Non-Detect					2.8
330	Variance Detects					2.189	Percent Non-Detects					47.06%
331	Mean Detects					1.189	SD Detects					1.48
332	Median Detects					0.3	CV Detects					1.245
333	Skewness Detects					1.156	Kurtosis Detects					0.123
334	Mean of Logged Detects					-0.942	SD of Logged Detects					1.861
335												
336	Normal GOF Test on Detects Only											
337	Shapiro Wilk Test Statistic					0.791	Shapiro Wilk GOF Test					
338	5% Shapiro Wilk Critical Value					0.829	Detected Data Not Normal at 5% Significance Level					
339	Lilliefors Test Statistic					0.282	Lilliefors GOF Test					
340	5% Lilliefors Critical Value					0.274	Detected Data Not Normal at 5% Significance Level					
341	Detected Data Not Normal at 5% Significance Level											
342												
343	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
344	KM Mean					0.713	KM Standard Error of Mean					0.305
345	KM SD					1.159	95% KM (BCA) UCL					1.244
346	95% KM (t) UCL					1.245	95% KM (Percentile Bootstrap) UCL					1.238
347	95% KM (z) UCL					1.214	95% KM Bootstrap t UCL					1.514
348	90% KM Chebyshev UCL					1.628	95% KM Chebyshev UCL					2.042
349	97.5% KM Chebyshev UCL					2.617	99% KM Chebyshev UCL					3.747
350												

	A	B	C	D	E	F	G	H	I	J	K	L
351	Gamma GOF Tests on Detected Observations Only											
352	A-D Test Statistic					0.362	Anderson-Darling GOF Test					
353	5% A-D Critical Value					0.766	Detected data appear Gamma Distributed at 5% Significance Level					
354	K-S Test Statistic					0.198	Kolmogorov-Smirnov GOF					
355	5% K-S Critical Value					0.293	Detected data appear Gamma Distributed at 5% Significance Level					
356	Detected data appear Gamma Distributed at 5% Significance Level											
357												
358	Gamma Statistics on Detected Data Only											
359	k hat (MLE)					0.56	k star (bias corrected MLE)					0.447
360	Theta hat (MLE)					2.123	Theta star (bias corrected MLE)					2.657
361	nu hat (MLE)					10.08	nu star (bias corrected)					8.054
362	Mean (detects)					1.189						
363												
364	Gamma ROS Statistics using Imputed Non-Detects											
365	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
366	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
367	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
368	This is especially true when the sample size is small.											
369	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
370	Minimum					0.01	Mean					0.681
371	Maximum					4.1	Median					0.16
372	SD					1.19	CV					1.746
373	k hat (MLE)					0.4	k star (bias corrected MLE)					0.368
374	Theta hat (MLE)					1.705	Theta star (bias corrected MLE)					1.85
375	nu hat (MLE)					13.59	nu star (bias corrected)					12.52
376	Adjusted Level of Significance (β)					0.0346						
377	Approximate Chi Square Value (12.52, α)					5.572	Adjusted Chi Square Value (12.52, β)					5.094
378	95% Gamma Approximate UCL (use when $n \geq 50$)					1.531	95% Gamma Adjusted UCL (use when $n < 50$)					1.675
379												
380	Estimates of Gamma Parameters using KM Estimates											
381	Mean (KM)					0.713	SD (KM)					1.159
382	Variance (KM)					1.344	SE of Mean (KM)					0.305
383	k hat (KM)					0.378	k star (KM)					0.35
384	nu hat (KM)					12.85	nu star (KM)					11.91
385	theta hat (KM)					1.886	theta star (KM)					2.034
386	80% gamma percentile (KM)					1.129	90% gamma percentile (KM)					2.058
387	95% gamma percentile (KM)					3.098	99% gamma percentile (KM)					5.752
388												
389	Gamma Kaplan-Meier (KM) Statistics											
390	Approximate Chi Square Value (11.91, α)					5.169	Adjusted Chi Square Value (11.91, β)					4.711
391	95% Gamma Approximate KM-UCL (use when $n \geq 50$)					1.642	95% Gamma Adjusted KM-UCL (use when $n < 50$)					1.802
392												
393	Lognormal GOF Test on Detected Observations Only											
394	Shapiro Wilk Test Statistic					0.945	Shapiro Wilk GOF Test					
395	5% Shapiro Wilk Critical Value					0.829	Detected Data appear Lognormal at 5% Significance Level					
396	Lilliefors Test Statistic					0.174	Lilliefors GOF Test					
397	5% Lilliefors Critical Value					0.274	Detected Data appear Lognormal at 5% Significance Level					
398	Detected Data appear Lognormal at 5% Significance Level											
399												

	A	B	C	D	E	F	G	H	I	J	K	L
400	Lognormal ROS Statistics Using Imputed Non-Detects											
401	Mean in Original Scale					0.679	Mean in Log Scale					-1.693
402	SD in Original Scale					1.187	SD in Log Scale					1.648
403	95% t UCL (assumes normality of ROS data)					1.182	95% Percentile Bootstrap UCL					1.169
404	95% BCA Bootstrap UCL					1.318	95% Bootstrap t UCL					1.499
405	95% H-UCL (Log ROS)					3.34						
406												
407	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
408	KM Mean (logged)					-1.687	KM Geo Mean					0.185
409	KM SD (logged)					1.708	95% Critical H Value (KM-Log)					3.852
410	KM Standard Error of Mean (logged)					0.534	95% H-UCL (KM -Log)					4.116
411	KM SD (logged)					1.708	95% Critical H Value (KM-Log)					3.852
412	KM Standard Error of Mean (logged)					0.534						
413												
414	DL/2 Statistics											
415	DL/2 Normal						DL/2 Log-Transformed					
416	Mean in Original Scale					0.954	Mean in Log Scale					-1.003
417	SD in Original Scale					1.158	SD in Log Scale					1.616
418	95% t UCL (Assumes normality)					1.444	95% H-Stat UCL					6.009
419	DL/2 is not a recommended method, provided for comparisons and historical reasons											
420												
421	Nonparametric Distribution Free UCL Statistics											
422	Detected Data appear Gamma Distributed at 5% Significance Level											
423												
424	Suggested UCL to Use											
425	Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$)					1.802						
426												
427	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
428	Recommendations are based upon data size, data distribution, and skewness.											
429	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
430	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
431												
432												
433	EA1MX Arsenic											
434												
435	General Statistics											
436	Total Number of Observations					18	Number of Distinct Observations					18
437							Number of Missing Observations					0
438	Minimum					4.8	Mean					10.38
439	Maximum					27.6	Median					9.2
440	SD					6.542	Std. Error of Mean					1.542
441	Coefficient of Variation					0.63	Skewness					2.151
442												
443	Normal GOF Test											
444	Shapiro Wilk Test Statistic					0.683	Shapiro Wilk GOF Test					
445	5% Shapiro Wilk Critical Value					0.897	Data Not Normal at 5% Significance Level					
446	Lilliefors Test Statistic					0.297	Lilliefors GOF Test					
447	5% Lilliefors Critical Value					0.202	Data Not Normal at 5% Significance Level					
448	Data Not Normal at 5% Significance Level											
449												

	A	B	C	D	E	F	G	H	I	J	K	L
450	Assuming Normal Distribution											
451	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
452	95% Student's-t UCL					13.06	95% Adjusted-CLT UCL (Chen-1995)					13.75
453							95% Modified-t UCL (Johnson-1978)					13.19
454												
455	Gamma GOF Test											
456	A-D Test Statistic					1.204	Anderson-Darling Gamma GOF Test					
457	5% A-D Critical Value					0.743	Data Not Gamma Distributed at 5% Significance Level					
458	K-S Test Statistic					0.217	Kolmogorov-Smirnov Gamma GOF Test					
459	5% K-S Critical Value					0.205	Data Not Gamma Distributed at 5% Significance Level					
460	Data Not Gamma Distributed at 5% Significance Level											
461												
462	Gamma Statistics											
463	k hat (MLE)					3.982	k star (bias corrected MLE)					3.355
464	Theta hat (MLE)					2.607	Theta star (bias corrected MLE)					3.094
465	nu hat (MLE)					143.4	nu star (bias corrected)					120.8
466	MLE Mean (bias corrected)					10.38	MLE Sd (bias corrected)					5.667
467							Approximate Chi Square Value (0.05)					96.41
468	Adjusted Level of Significance					0.0357	Adjusted Chi Square Value					94.33
469												
470	Assuming Gamma Distribution											
471	95% Approximate Gamma UCL (use when n>=50))					13.01	95% Adjusted Gamma UCL (use when n<50)					13.29
472												
473	Lognormal GOF Test											
474	Shapiro Wilk Test Statistic					0.873	Shapiro Wilk Lognormal GOF Test					
475	5% Shapiro Wilk Critical Value					0.897	Data Not Lognormal at 5% Significance Level					
476	Lilliefors Test Statistic					0.181	Lilliefors Lognormal GOF Test					
477	5% Lilliefors Critical Value					0.202	Data appear Lognormal at 5% Significance Level					
478	Data appear Approximate Lognormal at 5% Significance Level											
479												
480	Lognormal Statistics											
481	Minimum of Logged Data					1.569	Mean of logged Data					2.209
482	Maximum of Logged Data					3.318	SD of logged Data					0.488
483												
484	Assuming Lognormal Distribution											
485	95% H-UCL					13.01	90% Chebyshev (MVUE) UCL					13.81
486	95% Chebyshev (MVUE) UCL					15.46	97.5% Chebyshev (MVUE) UCL					17.74
487	99% Chebyshev (MVUE) UCL					22.22						
488												
489	Nonparametric Distribution Free UCL Statistics											
490	Data appear to follow a Discernible Distribution at 5% Significance Level											
491												
492	Nonparametric Distribution Free UCLs											
493	95% CLT UCL					12.92	95% Jackknife UCL					13.06
494	95% Standard Bootstrap UCL					12.74	95% Bootstrap-t UCL					16.75
495	95% Hall's Bootstrap UCL					29.01	95% Percentile Bootstrap UCL					12.98
496	95% BCA Bootstrap UCL					13.71						
497	90% Chebyshev(Mean, Sd) UCL					15.01	95% Chebyshev(Mean, Sd) UCL					17.1
498	97.5% Chebyshev(Mean, Sd) UCL					20.01	99% Chebyshev(Mean, Sd) UCL					25.72
499												

	A	B	C	D	E	F	G	H	I	J	K	L
500	Suggested UCL to Use											
501	95% Student's-t UCL					13.06	or 95% Modified-t UCL					13.19
502	or 95% H-UCL					13.01						
503												
504	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
505	Recommendations are based upon data size, data distribution, and skewness.											
506	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
507	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
508												
509	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.											
510	H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.											
511	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.											
512	Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.											
513												
514												
515	EA2SS BaP Equivalent											
516												
517	General Statistics											
518	Total Number of Observations					8	Number of Distinct Observations					8
519							Number of Missing Observations					0
520	Minimum					0.019	Mean					3.451
521	Maximum					18	Median					1.85
522	SD					5.943	Std. Error of Mean					2.101
523	Coefficient of Variation					1.722	Skewness					2.705
524												
525	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
526	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
527	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
528	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											
529												
530	Normal GOF Test											
531	Shapiro Wilk Test Statistic					0.559	Shapiro Wilk GOF Test					
532	5% Shapiro Wilk Critical Value					0.818	Data Not Normal at 5% Significance Level					
533	Lilliefors Test Statistic					0.445	Lilliefors GOF Test					
534	5% Lilliefors Critical Value					0.283	Data Not Normal at 5% Significance Level					
535	Data Not Normal at 5% Significance Level											
536												
537	Assuming Normal Distribution											
538	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
539	95% Student's-t UCL					7.432	95% Adjusted-CLT UCL (Chen-1995)					9.054
540							95% Modified-t UCL (Johnson-1978)					7.767
541												
542	Gamma GOF Test											
543	A-D Test Statistic					0.533	Anderson-Darling Gamma GOF Test					
544	5% A-D Critical Value					0.761	Detected data appear Gamma Distributed at 5% Significance Level					
545	K-S Test Statistic					0.286	Kolmogorov-Smirnov Gamma GOF Test					
546	5% K-S Critical Value					0.309	Detected data appear Gamma Distributed at 5% Significance Level					
547	Detected data appear Gamma Distributed at 5% Significance Level											
548												

	A	B	C	D	E	F	G	H	I	J	K	L
549	Gamma Statistics											
550	k hat (MLE)					0.524	k star (bias corrected MLE)					0.411
551	Theta hat (MLE)					6.582	Theta star (bias corrected MLE)					8.396
552	nu hat (MLE)					8.39	nu star (bias corrected)					6.577
553	MLE Mean (bias corrected)					3.451	MLE Sd (bias corrected)					5.383
554							Approximate Chi Square Value (0.05)					1.941
555	Adjusted Level of Significance					0.0195	Adjusted Chi Square Value					1.371
556												
557	Assuming Gamma Distribution											
558	95% Approximate Gamma UCL (use when n>=50)					11.69	95% Adjusted Gamma UCL (use when n<50)					16.56
559												
560	Lognormal GOF Test											
561	Shapiro Wilk Test Statistic					0.884	Shapiro Wilk Lognormal GOF Test					
562	5% Shapiro Wilk Critical Value					0.818	Data appear Lognormal at 5% Significance Level					
563	Lilliefors Test Statistic					0.279	Lilliefors Lognormal GOF Test					
564	5% Lilliefors Critical Value					0.283	Data appear Lognormal at 5% Significance Level					
565	Data appear Lognormal at 5% Significance Level											
566												
567	Lognormal Statistics											
568	Minimum of Logged Data					-3.963	Mean of logged Data					0.0362
569	Maximum of Logged Data					2.89	SD of logged Data					2.033
570												
571	Assuming Lognormal Distribution											
572	95% H-UCL					978.9	90% Chebyshev (MVUE) UCL					14.95
573	95% Chebyshev (MVUE) UCL					19.51	97.5% Chebyshev (MVUE) UCL					25.83
574	99% Chebyshev (MVUE) UCL					38.27						
575												
576	Nonparametric Distribution Free UCL Statistics											
577	Data appear to follow a Discernible Distribution at 5% Significance Level											
578												
579	Nonparametric Distribution Free UCLs											
580	95% CLT UCL					6.907	95% Jackknife UCL					7.432
581	95% Standard Bootstrap UCL					6.693	95% Bootstrap-t UCL					21.19
582	95% Hall's Bootstrap UCL					26.68	95% Percentile Bootstrap UCL					7.48
583	95% BCA Bootstrap UCL					7.975						
584	90% Chebyshev(Mean, Sd) UCL					9.755	95% Chebyshev(Mean, Sd) UCL					12.61
585	97.5% Chebyshev(Mean, Sd) UCL					16.57	99% Chebyshev(Mean, Sd) UCL					24.36
586												
587	Suggested UCL to Use											
588	95% Adjusted Gamma UCL					16.56						
589												
590	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
591	Recommendations are based upon data size, data distribution, and skewness.											
592	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
593	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
594												

	A	B	C	D	E	F	G	H	I	J	K	L
595	EA2MX BaP Equivalent											
596												
597	General Statistics											
598	Total Number of Observations				15		Number of Distinct Observations				13	
599	Number of Detects				13		Number of Non-Detects				2	
600	Number of Distinct Detects				12		Number of Distinct Non-Detects				1	
601	Minimum Detect				0.014		Minimum Non-Detect				2.8	
602	Maximum Detect				18		Maximum Non-Detect				2.8	
603	Variance Detects				23.23		Percent Non-Detects				13.33%	
604	Mean Detects				2.329		SD Detects				4.82	
605	Median Detects				1.2		CV Detects				2.069	
606	Skewness Detects				3.32		Kurtosis Detects				11.52	
607	Mean of Logged Detects				-1.152		SD of Logged Detects				2.556	
608												
609	Normal GOF Test on Detects Only											
610	Shapiro Wilk Test Statistic				0.493		Shapiro Wilk GOF Test					
611	5% Shapiro Wilk Critical Value				0.866		Detected Data Not Normal at 5% Significance Level					
612	Lilliefors Test Statistic				0.401		Lilliefors GOF Test					
613	5% Lilliefors Critical Value				0.234		Detected Data Not Normal at 5% Significance Level					
614	Detected Data Not Normal at 5% Significance Level											
615												
616	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
617	KM Mean				2.155		KM Standard Error of Mean				1.174	
618	KM SD				4.35		95% KM (BCA) UCL				4.33	
619	95% KM (t) UCL				4.223		95% KM (Percentile Bootstrap) UCL				4.29	
620	95% KM (z) UCL				4.086		95% KM Bootstrap t UCL				8.424	
621	90% KM Chebyshev UCL				5.677		95% KM Chebyshev UCL				7.273	
622	97.5% KM Chebyshev UCL				9.488		99% KM Chebyshev UCL				13.84	
623												
624	Gamma GOF Tests on Detected Observations Only											
625	A-D Test Statistic				0.829		Anderson-Darling GOF Test					
626	5% A-D Critical Value				0.822		Detected Data Not Gamma Distributed at 5% Significance Level					
627	K-S Test Statistic				0.23		Kolmogorov-Smirnov GOF					
628	5% K-S Critical Value				0.255		Detected data appear Gamma Distributed at 5% Significance Level					
629	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
630												
631	Gamma Statistics on Detected Data Only											
632	k hat (MLE)				0.339		k star (bias corrected MLE)				0.312	
633	Theta hat (MLE)				6.88		Theta star (bias corrected MLE)				7.472	
634	nu hat (MLE)				8.802		nu star (bias corrected)				8.104	
635	Mean (detects)				2.329							
636												

	A	B	C	D	E	F	G	H	I	J	K	L
637	Gamma ROS Statistics using Imputed Non-Detects											
638	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
639	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
640	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
641	This is especially true when the sample size is small.											
642	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
643	Minimum				0.01	Mean				2.11		
644	Maximum				18	Median				1.2		
645	SD				4.507	CV				2.136		
646	k hat (MLE)				0.334	k star (bias corrected MLE)				0.311		
647	Theta hat (MLE)				6.324	Theta star (bias corrected MLE)				6.777		
648	nu hat (MLE)				10.01	nu star (bias corrected)				9.341		
649	Adjusted Level of Significance (β)				0.0324							
650	Approximate Chi Square Value (9.34, α)				3.534	Adjusted Chi Square Value (9.34, β)				3.107		
651	95% Gamma Approximate UCL (use when n>=50)				5.577	95% Gamma Adjusted UCL (use when n<50)				6.343		
652												
653	Estimates of Gamma Parameters using KM Estimates											
654	Mean (KM)				2.155	SD (KM)				4.35		
655	Variance (KM)				18.92	SE of Mean (KM)				1.174		
656	k hat (KM)				0.245	k star (KM)				0.241		
657	nu hat (KM)				7.363	nu star (KM)				7.223		
658	theta hat (KM)				8.781	theta star (KM)				8.95		
659	80% gamma percentile (KM)				3.087	90% gamma percentile (KM)				6.484		
660	95% gamma percentile (KM)				10.55	99% gamma percentile (KM)				21.42		
661												
662	Gamma Kaplan-Meier (KM) Statistics											
663	Approximate Chi Square Value (7.22, α)				2.294	Adjusted Chi Square Value (7.22, β)				1.967		
664	95% Gamma Approximate KM-UCL (use when n>=50)				6.786	95% Gamma Adjusted KM-UCL (use when n<50)				7.913		
665												
666	Lognormal GOF Test on Detected Observations Only											
667	Shapiro Wilk Test Statistic				0.836	Shapiro Wilk GOF Test						
668	5% Shapiro Wilk Critical Value				0.866	Detected Data Not Lognormal at 5% Significance Level						
669	Lilliefors Test Statistic				0.245	Lilliefors GOF Test						
670	5% Lilliefors Critical Value				0.234	Detected Data Not Lognormal at 5% Significance Level						
671	Detected Data Not Lognormal at 5% Significance Level											
672												
673	Lognormal ROS Statistics Using Imputed Non-Detects											
674	Mean in Original Scale				2.067	Mean in Log Scale				-1.195		
675	SD in Original Scale				4.517	SD in Log Scale				2.402		
676	95% t UCL (assumes normality of ROS data)				4.121	95% Percentile Bootstrap UCL				4.154		
677	95% BCA Bootstrap UCL				5.58	95% Bootstrap t UCL				9.462		
678	95% H-UCL (Log ROS)				168.8							
679												
680	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
681	KM Mean (logged)				-1.196	KM Geo Mean				0.302		
682	KM SD (logged)				2.432	95% Critical H Value (KM-Log)				5.42		
683	KM Standard Error of Mean (logged)				0.696	95% H-UCL (KM -Log)				197.2		
684	KM SD (logged)				2.432	95% Critical H Value (KM-Log)				5.42		
685	KM Standard Error of Mean (logged)				0.696							
686												

	A	B	C	D	E	F	G	H	I	J	K	L
687	DL/2 Statistics											
688	DL/2 Normal						DL/2 Log-Transformed					
689	Mean in Original Scale					2.205	Mean in Log Scale					-0.953
690	SD in Original Scale					4.474	SD in Log Scale					2.424
691	95% t UCL (Assumes normality)					4.24	95% H-Stat UCL					241
692	DL/2 is not a recommended method, provided for comparisons and historical reasons											
693												
694	Nonparametric Distribution Free UCL Statistics											
695	Detected Data appear Approximate Gamma Distributed at 5% Significance Level											
696												
697	Suggested UCL to Use											
698	Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$)					7.913						
699												
700	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
701	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
702												
703	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
704	Recommendations are based upon data size, data distribution, and skewness.											
705	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
706	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
707												
708	EA3SS BaP Equivalent											
709												
710	General Statistics											
711	Total Number of Observations					9	Number of Distinct Observations					9
712	Number of Detects					8	Number of Non-Detects					1
713	Number of Distinct Detects					8	Number of Distinct Non-Detects					1
714	Minimum Detect					0.014	Minimum Non-Detect					2.3
715	Maximum Detect					11	Maximum Non-Detect					2.3
716	Variance Detects					16.59	Percent Non-Detects					11.11%
717	Mean Detects					2.926	SD Detects					4.073
718	Median Detects					1.175	CV Detects					1.392
719	Skewness Detects					1.448	Kurtosis Detects					1.13
720	Mean of Logged Detects					-0.66	SD of Logged Detects					2.546
721												
722	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
723	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
724	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
725	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											
726												
727	Normal GOF Test on Detects Only											
728	Shapiro Wilk Test Statistic					0.773	Shapiro Wilk GOF Test					
729	5% Shapiro Wilk Critical Value					0.818	Detected Data Not Normal at 5% Significance Level					
730	Lilliefors Test Statistic					0.272	Lilliefors GOF Test					
731	5% Lilliefors Critical Value					0.283	Detected Data appear Normal at 5% Significance Level					
732	Detected Data appear Approximate Normal at 5% Significance Level											
733												

	A	B	C	D	E	F	G	H	I	J	K	L
734	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
735	KM Mean					2.657	KM Standard Error of Mean					1.316
736	KM SD					3.681	95% KM (BCA) UCL					5.121
737	95% KM (t) UCL					5.104	95% KM (Percentile Bootstrap) UCL					4.895
738	95% KM (z) UCL					4.822	95% KM Bootstrap t UCL					9.316
739	90% KM Chebyshev UCL					6.605	95% KM Chebyshev UCL					8.393
740	97.5% KM Chebyshev UCL					10.88	99% KM Chebyshev UCL					15.75
741												
742	Gamma GOF Tests on Detected Observations Only											
743	A-D Test Statistic					0.313	Anderson-Darling GOF Test					
744	5% A-D Critical Value					0.783	Detected data appear Gamma Distributed at 5% Significance Level					
745	K-S Test Statistic					0.198	Kolmogorov-Smirnov GOF					
746	5% K-S Critical Value					0.314	Detected data appear Gamma Distributed at 5% Significance Level					
747	Detected data appear Gamma Distributed at 5% Significance Level											
748												
749	Gamma Statistics on Detected Data Only											
750	k hat (MLE)					0.382	k star (bias corrected MLE)					0.322
751	Theta hat (MLE)					7.654	Theta star (bias corrected MLE)					9.08
752	nu hat (MLE)					6.117	nu star (bias corrected)					5.157
753	Mean (detects)					2.926						
754												
755	Gamma ROS Statistics using Imputed Non-Detects											
756	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
757	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
758	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
759	This is especially true when the sample size is small.											
760	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
761	Minimum					0.014	Mean					2.618
762	Maximum					11	Median					0.25
763	SD					3.92	CV					1.497
764	k hat (MLE)					0.378	k star (bias corrected MLE)					0.326
765	Theta hat (MLE)					6.927	Theta star (bias corrected MLE)					8.03
766	nu hat (MLE)					6.804	nu star (bias corrected)					5.87
767	Adjusted Level of Significance (β)					0.0231						
768	Approximate Chi Square Value (5.87, α)					1.574	Adjusted Chi Square Value (5.87, β)					1.153
769	95% Gamma Approximate UCL (use when n>=50)					9.767	95% Gamma Adjusted UCL (use when n<50)					13.33
770												
771	Estimates of Gamma Parameters using KM Estimates											
772	Mean (KM)					2.657	SD (KM)					3.681
773	Variance (KM)					13.55	SE of Mean (KM)					1.316
774	k hat (KM)					0.521	k star (KM)					0.421
775	nu hat (KM)					9.376	nu star (KM)					7.584
776	theta hat (KM)					5.101	theta star (KM)					6.306
777	80% gamma percentile (KM)					4.312	90% gamma percentile (KM)					7.435
778	95% gamma percentile (KM)					10.84	99% gamma percentile (KM)					19.36
779												
780	Gamma Kaplan-Meier (KM) Statistics											
781	Approximate Chi Square Value (7.58, α)					2.497	Adjusted Chi Square Value (7.58, β)					1.926
782	95% Gamma Approximate KM-UCL (use when n>=50)					8.071	95% Gamma Adjusted KM-UCL (use when n<50)					10.46
783												

	A	B	C	D	E	F	G	H	I	J	K	L
784	Lognormal GOF Test on Detected Observations Only											
785	Shapiro Wilk Test Statistic					0.921	Shapiro Wilk GOF Test					
786	5% Shapiro Wilk Critical Value					0.818	Detected Data appear Lognormal at 5% Significance Level					
787	Lilliefors Test Statistic					0.209	Lilliefors GOF Test					
788	5% Lilliefors Critical Value					0.283	Detected Data appear Lognormal at 5% Significance Level					
789	Detected Data appear Lognormal at 5% Significance Level											
790												
791	Lognormal ROS Statistics Using Imputed Non-Detects											
792	Mean in Original Scale					2.615	Mean in Log Scale					-0.817
793	SD in Original Scale					3.922	SD in Log Scale					2.428
794	95% t UCL (assumes normality of ROS data)					5.046	95% Percentile Bootstrap UCL					4.856
795	95% BCA Bootstrap UCL					5.525	95% Bootstrap t UCL					9.242
796	95% H-UCL (Log ROS)					2961						
797												
798	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
799	KM Mean (logged)					-0.823	KM Geo Mean					0.439
800	KM SD (logged)					2.367	95% Critical H Value (KM-Log)					6.669
801	KM Standard Error of Mean (logged)					0.874	95% H-UCL (KM -Log)					1917
802	KM SD (logged)					2.367	95% Critical H Value (KM-Log)					6.669
803	KM Standard Error of Mean (logged)					0.874						
804												
805	DL/2 Statistics											
806	DL/2 Normal					DL/2 Log-Transformed						
807	Mean in Original Scale					2.729	Mean in Log Scale					-0.571
808	SD in Original Scale					3.855	SD in Log Scale					2.397
809	95% t UCL (Assumes normality)					5.119	95% H-Stat UCL					3037
810	DL/2 is not a recommended method, provided for comparisons and historical reasons											
811												
812	Nonparametric Distribution Free UCL Statistics											
813	Detected Data appear Approximate Normal Distributed at 5% Significance Level											
814												
815	Suggested UCL to Use											
816	95% KM (t) UCL					5.104						
817												
818	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
819	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
820												
821	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
822	Recommendations are based upon data size, data distribution, and skewness.											
823	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
824	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
825												

	A	B	C	D	E	F	G	H	I	J	K	L
826	EA3MX BaP Equivalent											
827												
828	General Statistics											
829	Total Number of Observations				18	Number of Distinct Observations				16		
830	Number of Detects				16	Number of Non-Detects				2		
831	Number of Distinct Detects				14	Number of Distinct Non-Detects				2		
832	Minimum Detect				0.014	Minimum Non-Detect				2.3		
833	Maximum Detect				11	Maximum Non-Detect				2.8		
834	Variance Detects				9.348	Percent Non-Detects				11.11%		
835	Mean Detects				1.947	SD Detects				3.057		
836	Median Detects				0.545	CV Detects				1.57		
837	Skewness Detects				2.226	Kurtosis Detects				4.931		
838	Mean of Logged Detects				-0.97	SD of Logged Detects				2.28		
839												
840	Normal GOF Test on Detects Only											
841	Shapiro Wilk Test Statistic				0.677	Shapiro Wilk GOF Test						
842	5% Shapiro Wilk Critical Value				0.887	Detected Data Not Normal at 5% Significance Level						
843	Lilliefors Test Statistic				0.278	Lilliefors GOF Test						
844	5% Lilliefors Critical Value				0.213	Detected Data Not Normal at 5% Significance Level						
845	Detected Data Not Normal at 5% Significance Level											
846												
847	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
848	KM Mean				1.806	KM Standard Error of Mean				0.694		
849	KM SD				2.836	95% KM (BCA) UCL				2.957		
850	95% KM (t) UCL				3.014	95% KM (Percentile Bootstrap) UCL				2.958		
851	95% KM (z) UCL				2.948	95% KM Bootstrap t UCL				4.263		
852	90% KM Chebyshev UCL				3.889	95% KM Chebyshev UCL				4.833		
853	97.5% KM Chebyshev UCL				6.142	99% KM Chebyshev UCL				8.715		
854												
855	Gamma GOF Tests on Detected Observations Only											
856	A-D Test Statistic				0.461	Anderson-Darling GOF Test						
857	5% A-D Critical Value				0.817	Detected data appear Gamma Distributed at 5% Significance Level						
858	K-S Test Statistic				0.163	Kolmogorov-Smirnov GOF						
859	5% K-S Critical Value				0.23	Detected data appear Gamma Distributed at 5% Significance Level						
860	Detected data appear Gamma Distributed at 5% Significance Level											
861												
862	Gamma Statistics on Detected Data Only											
863	k hat (MLE)				0.402	k star (bias corrected MLE)				0.368		
864	Theta hat (MLE)				4.844	Theta star (bias corrected MLE)				5.287		
865	nu hat (MLE)				12.86	nu star (bias corrected)				11.78		
866	Mean (detects)				1.947							
867												

	A	B	C	D	E	F	G	H	I	J	K	L
868	Gamma ROS Statistics using Imputed Non-Detects											
869	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
870	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
871	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
872	This is especially true when the sample size is small.											
873	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
874	Minimum				0.014		Mean				1.757	
875	Maximum				11		Median				0.308	
876	SD				2.925		CV				1.665	
877	k hat (MLE)				0.408		k star (bias corrected MLE)				0.377	
878	Theta hat (MLE)				4.301		Theta star (bias corrected MLE)				4.654	
879	nu hat (MLE)				14.71		nu star (bias corrected)				13.59	
880	Adjusted Level of Significance (β)				0.0357							
881	Approximate Chi Square Value (13.59, α)				6.29		Adjusted Chi Square Value (13.59, β)				5.819	
882	95% Gamma Approximate UCL (use when n>=50)				3.795		95% Gamma Adjusted UCL (use when n<50)				4.103	
883												
884	Estimates of Gamma Parameters using KM Estimates											
885	Mean (KM)				1.806		SD (KM)				2.836	
886	Variance (KM)				8.041		SE of Mean (KM)				0.694	
887	k hat (KM)				0.406		k star (KM)				0.375	
888	nu hat (KM)				14.6		nu star (KM)				13.5	
889	theta hat (KM)				4.453		theta star (KM)				4.816	
890	80% gamma percentile (KM)				2.89		90% gamma percentile (KM)				5.157	
891	95% gamma percentile (KM)				7.671		99% gamma percentile (KM)				14.04	
892												
893	Gamma Kaplan-Meier (KM) Statistics											
894	Approximate Chi Square Value (13.50, α)				6.23		Adjusted Chi Square Value (13.50, β)				5.76	
895	95% Gamma Approximate KM-UCL (use when n>=50)				3.913		95% Gamma Adjusted KM-UCL (use when n<50)				4.231	
896												
897	Lognormal GOF Test on Detected Observations Only											
898	Shapiro Wilk Test Statistic				0.918		Shapiro Wilk GOF Test					
899	5% Shapiro Wilk Critical Value				0.887		Detected Data appear Lognormal at 5% Significance Level					
900	Lilliefors Test Statistic				0.154		Lilliefors GOF Test					
901	5% Lilliefors Critical Value				0.213		Detected Data appear Lognormal at 5% Significance Level					
902	Detected Data appear Lognormal at 5% Significance Level											
903												
904	Lognormal ROS Statistics Using Imputed Non-Detects											
905	Mean in Original Scale				1.752		Mean in Log Scale				-1.051	
906	SD in Original Scale				2.928		SD in Log Scale				2.157	
907	95% t UCL (assumes normality of ROS data)				2.952		95% Percentile Bootstrap UCL				2.985	
908	95% BCA Bootstrap UCL				3.214		95% Bootstrap t UCL				4.468	
909	95% H-UCL (Log ROS)				39.72							
910												
911	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
912	KM Mean (logged)				-1.058		KM Geo Mean				0.347	
913	KM SD (logged)				2.189		95% Critical H Value (KM-Log)				4.658	
914	KM Standard Error of Mean (logged)				0.557		95% H-UCL (KM -Log)				45.19	
915	KM SD (logged)				2.189		95% Critical H Value (KM-Log)				4.658	
916	KM Standard Error of Mean (logged)				0.557							
917												

	A	B	C	D	E	F	G	H	I	J	K	L
918	DL/2 Statistics											
919	DL/2 Normal					DL/2 Log-Transformed						
920	Mean in Original Scale					1.872	Mean in Log Scale					-0.835
921	SD in Original Scale					2.88	SD in Log Scale					2.178
922	95% t UCL (Assumes normality)					3.053	95% H-Stat UCL					53.77
923	DL/2 is not a recommended method, provided for comparisons and historical reasons											
924												
925	Nonparametric Distribution Free UCL Statistics											
926	Detected Data appear Gamma Distributed at 5% Significance Level											
927												
928	Suggested UCL to Use											
929	Adjusted KM-UCL (use when $k \leq 1$ and $15 < n < 50$ but $k \leq 1$)					4.231						
930												
931	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
932	Recommendations are based upon data size, data distribution, and skewness.											
933	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
934	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
935												
936												
937	EA3MX Arsenic											
938												
939	General Statistics											
940	Total Number of Observations					8	Number of Distinct Observations					8
941							Number of Missing Observations					0
942	Minimum					2.77	Mean					7.999
943	Maximum					16	Median					6.4
944	SD					4.913	Std. Error of Mean					1.737
945	Coefficient of Variation					0.614	Skewness					0.633
946												
947	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
948	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
949	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
950	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											
951												
952	Normal GOF Test											
953	Shapiro Wilk Test Statistic					0.904	Shapiro Wilk GOF Test					
954	5% Shapiro Wilk Critical Value					0.818	Data appear Normal at 5% Significance Level					
955	Lilliefors Test Statistic					0.238	Lilliefors GOF Test					
956	5% Lilliefors Critical Value					0.283	Data appear Normal at 5% Significance Level					
957	Data appear Normal at 5% Significance Level											
958												
959	Assuming Normal Distribution											
960	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
961	95% Student's-t UCL					11.29	95% Adjusted-CLT UCL (Chen-1995)					11.27
962							95% Modified-t UCL (Johnson-1978)					11.35
963												
964	Gamma GOF Test											
965	A-D Test Statistic					0.316	Anderson-Darling Gamma GOF Test					
966	5% A-D Critical Value					0.721	Detected data appear Gamma Distributed at 5% Significance Level					
967	K-S Test Statistic					0.224	Kolmogorov-Smirnov Gamma GOF Test					
968	5% K-S Critical Value					0.296	Detected data appear Gamma Distributed at 5% Significance Level					
969	Detected data appear Gamma Distributed at 5% Significance Level											

	A	B	C	D	E	F	G	H	I	J	K	L
970												
971	Gamma Statistics											
972	k hat (MLE)					3.006	k star (bias corrected MLE)					1.962
973	Theta hat (MLE)					2.661	Theta star (bias corrected MLE)					4.076
974	nu hat (MLE)					48.1	nu star (bias corrected)					31.4
975	MLE Mean (bias corrected)					7.999	MLE Sd (bias corrected)					5.71
976							Approximate Chi Square Value (0.05)					19.59
977	Adjusted Level of Significance					0.0195	Adjusted Chi Square Value					17.27
978												
979	Assuming Gamma Distribution											
980	95% Approximate Gamma UCL (use when n>=50))					12.82	95% Adjusted Gamma UCL (use when n<50)					14.54
981												
982	Lognormal GOF Test											
983	Shapiro Wilk Test Statistic					0.942	Shapiro Wilk Lognormal GOF Test					
984	5% Shapiro Wilk Critical Value					0.818	Data appear Lognormal at 5% Significance Level					
985	Lilliefors Test Statistic					0.191	Lilliefors Lognormal GOF Test					
986	5% Lilliefors Critical Value					0.283	Data appear Lognormal at 5% Significance Level					
987	Data appear Lognormal at 5% Significance Level											
988												
989	Lognormal Statistics											
990	Minimum of Logged Data					1.019	Mean of logged Data					1.904
991	Maximum of Logged Data					2.773	SD of logged Data					0.644
992												
993	Assuming Lognormal Distribution											
994	95% H-UCL					15.62	90% Chebyshev (MVUE) UCL					13.57
995	95% Chebyshev (MVUE) UCL					16.09	97.5% Chebyshev (MVUE) UCL					19.58
996	99% Chebyshev (MVUE) UCL					26.45						
997												
998	Nonparametric Distribution Free UCL Statistics											
999	Data appear to follow a Discernible Distribution at 5% Significance Level											
1000												
1001	Nonparametric Distribution Free UCLs											
1002	95% CLT UCL					10.86	95% Jackknife UCL					11.29
1003	95% Standard Bootstrap UCL					10.71	95% Bootstrap-t UCL					12.21
1004	95% Hall's Bootstrap UCL					11.02	95% Percentile Bootstrap UCL					10.65
1005	95% BCA Bootstrap UCL					11.04						
1006	90% Chebyshev(Mean, Sd) UCL					13.21	95% Chebyshev(Mean, Sd) UCL					15.57
1007	97.5% Chebyshev(Mean, Sd) UCL					18.85	99% Chebyshev(Mean, Sd) UCL					25.28
1008												
1009	Suggested UCL to Use											
1010	95% Student's-t UCL					11.29						
1011												
1012	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1013	Recommendations are based upon data size, data distribution, and skewness.											
1014	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1015	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1016												

ATTACHMENT G.2

IEUBK Output

Exposure Area 1 Surface Soil

EA1 SS.txt
LEAD MODEL FOR WINDOWS Version 1.1

```
=====
Model Version: 1.1 Build11
User Name:
Date:
Site Name:
Operable Unit:
Run Mode: Research
=====
```

***** Air *****

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m ³ /day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m ³)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

***** Diet *****

Age	Diet Intake(µg/day)
.5-1	2.260
1-2	1.960
2-3	2.130
3-4	2.040
4-5	1.950
5-6	2.050
6-7	2.220

***** Drinking Water *****

Water Consumption:

Age	Water (L/day)
-----	---------------

.5-1	0.200
------	-------

EA1 SS.txt

1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.000 µg Pb/L

***** Soil & Dust *****

Multiple Source Analysis Used

Average multiple source concentration: 243.100 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700

Outdoor airborne lead to indoor household dust lead concentration: 100.000

Use alternate indoor dust Pb sources? No

Age	Soil (µg Pb/g)	House Dust (µg Pb/g)
.5-1	333.000	243.100
1-2	333.000	243.100
2-3	333.000	243.100
3-4	333.000	243.100
4-5	333.000	243.100
5-6	333.000	243.100
6-7	333.000	243.100

***** Alternate Intake *****

Age	Alternate (µg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

***** Maternal Contribution: Infant Model *****

Maternal Blood Concentration: 1.000 µg Pb/dL

CALCULATED BLOOD LEAD AND LEAD UPTAKES:

Year	Air (µg/day)	EA1 SS.txt Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
.5-1	0.021	1.031	0.000	0.365
1-2	0.034	0.881	0.000	0.899
2-3	0.062	0.971	0.000	0.948
3-4	0.067	0.942	0.000	0.978
4-5	0.067	0.923	0.000	1.041
5-6	0.093	0.979	0.000	1.108
6-7	0.093	1.066	0.000	1.133
Year	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)	
.5-1	6.598	8.015	4.3	
1-2	10.319	12.132	5.0	
2-3	10.466	12.446	4.6	
3-4	10.601	12.587	4.4	
4-5	8.052	10.082	3.6	
5-6	7.314	9.495	3.0	
6-7	6.942	9.234	2.7	

Exposure Area 1
Combined Surface and Subsurface Soil

EA1 MX.txt
LEAD MODEL FOR WINDOWS Version 1.1

```
=====
Model Version: 1.1 Build11
User Name:
Date:
Site Name:
Operable Unit:
Run Mode: Research
=====
```

***** Air *****

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m ³ /day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m ³)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

***** Diet *****

Age	Diet Intake(µg/day)
.5-1	2.260
1-2	1.960
2-3	2.130
3-4	2.040
4-5	1.950
5-6	2.050
6-7	2.220

***** Drinking Water *****

Water Consumption:

Age	Water (L/day)
.5-1	0.200

EA1 MX.txt

1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.000 µg Pb/L

***** Soil & Dust *****

Multiple Source Analysis Used

Average multiple source concentration: 112.200 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700

Outdoor airborne lead to indoor household dust lead concentration: 100.000

Use alternate indoor dust Pb sources? No

Age	Soil (µg Pb/g)	House Dust (µg Pb/g)
.5-1	146.000	112.200
1-2	146.000	112.200
2-3	146.000	112.200
3-4	146.000	112.200
4-5	146.000	112.200
5-6	146.000	112.200
6-7	146.000	112.200

***** Alternate Intake *****

Age	Alternate (µg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

***** Maternal Contribution: Infant Model *****

Maternal Blood Concentration: 1.000 µg Pb/dL

CALCULATED BLOOD LEAD AND LEAD UPTAKES:

Year	Air (µg/day)	EA1 MX.txt Diet (µg/day)	Alternate (µg/day)	Water (µg/day)

.5-1	0.021	1.073	0.000	0.380
1-2	0.034	0.924	0.000	0.943
2-3	0.062	1.012	0.000	0.988
3-4	0.067	0.976	0.000	1.014
4-5	0.067	0.945	0.000	1.066
5-6	0.093	0.998	0.000	1.130
6-7	0.093	1.084	0.000	1.152
Year	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)	

.5-1	3.086	4.560	2.5	
1-2	4.865	6.766	2.8	
2-3	4.902	6.964	2.6	
3-4	4.938	6.996	2.5	
4-5	3.705	5.783	2.1	
5-6	3.350	5.571	1.8	
6-7	3.172	5.501	1.6	

Exposure Area 2 Surface Soil

EA2 SS.txt
LEAD MODEL FOR WINDOWS Version 1.1

```
=====
Model Version: 1.1 Build11
User Name:
Date:
Site Name:
Operable Unit:
Run Mode: Research
=====
```

***** Air *****

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m ³ /day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m ³)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

***** Diet *****

Age	Diet Intake(µg/day)
.5-1	2.260
1-2	1.960
2-3	2.130
3-4	2.040
4-5	1.950
5-6	2.050
6-7	2.220

***** Drinking Water *****

Water Consumption:
Age Water (L/day)

.5-1	0.200
------	-------

EA2 SS.txt

1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.000 µg Pb/L

***** Soil & Dust *****

Multiple Source Analysis Used

Average multiple source concentration: 208.800 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700

Outdoor airborne lead to indoor household dust lead concentration: 100.000

Use alternate indoor dust Pb sources? No

Age	Soil (µg Pb/g)	House Dust (µg Pb/g)
.5-1	284.000	208.800
1-2	284.000	208.800
2-3	284.000	208.800
3-4	284.000	208.800
4-5	284.000	208.800
5-6	284.000	208.800
6-7	284.000	208.800

***** Alternate Intake *****

Age	Alternate (µg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

***** Maternal Contribution: Infant Model *****

Maternal Blood Concentration: 1.000 µg Pb/dL

CALCULATED BLOOD LEAD AND LEAD UPTAKES:

Year	Air (µg/day)	EA2 SS.txt Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
.5-1	0.021	1.042	0.000	0.369
1-2	0.034	0.891	0.000	0.910
2-3	0.062	0.981	0.000	0.958
3-4	0.067	0.950	0.000	0.988
4-5	0.067	0.929	0.000	1.048
5-6	0.093	0.984	0.000	1.114
6-7	0.093	1.070	0.000	1.138
Year	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)	
.5-1	5.704	7.135	3.9	
1-2	8.938	10.774	4.4	
2-3	9.051	11.052	4.1	
3-4	9.156	11.160	3.9	
4-5	6.932	8.975	3.2	
5-6	6.290	8.481	2.7	
6-7	5.966	8.268	2.4	

Exposure Area 2
Combined Surface and Subsurface Soil

EA2 MX.txt
LEAD MODEL FOR WINDOWS Version 1.1

```
=====
Model Version: 1.1 Build11
User Name:
Date:
Site Name:
Operable Unit:
Run Mode: Research
=====
```

***** Air *****

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m ³ /day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m ³)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

***** Diet *****

Age	Diet Intake(µg/day)
.5-1	2.260
1-2	1.960
2-3	2.130
3-4	2.040
4-5	1.950
5-6	2.050
6-7	2.220

***** Drinking Water *****

Water Consumption:

Age	Water (L/day)
-----	---------------

.5-1	0.200
------	-------

EA2 MX.txt

1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.000 µg Pb/L

***** Soil & Dust *****

Multiple Source Analysis Used

Average multiple source concentration: 100.300 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700

Outdoor airborne lead to indoor household dust lead concentration: 100.000

Use alternate indoor dust Pb sources? No

Age	Soil (µg Pb/g)	House Dust (µg Pb/g)
.5-1	129.000	100.300
1-2	129.000	100.300
2-3	129.000	100.300
3-4	129.000	100.300
4-5	129.000	100.300
5-6	129.000	100.300
6-7	129.000	100.300

***** Alternate Intake *****

Age	Alternate (µg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

***** Maternal Contribution: Infant Model *****

Maternal Blood Concentration: 1.000 µg Pb/dL

CALCULATED BLOOD LEAD AND LEAD UPTAKES:

Year	Air (µg/day)	EA2 MX.txt Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
.5-1	0.021	1.077	0.000	0.381
1-2	0.034	0.928	0.000	0.947
2-3	0.062	1.016	0.000	0.992
3-4	0.067	0.979	0.000	1.018
4-5	0.067	0.947	0.000	1.069
5-6	0.093	1.000	0.000	1.132
6-7	0.093	1.085	0.000	1.154
Year	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)	
.5-1	2.752	4.232	2.3	
1-2	4.342	6.252	2.6	
2-3	4.373	6.443	2.4	
3-4	4.403	6.467	2.3	
4-5	3.299	5.382	1.9	
5-6	2.982	5.207	1.7	
6-7	2.823	5.155	1.5	

Exposure Area 3 Surface Soil

EA3 SS.txt
LEAD MODEL FOR WINDOWS Version 1.1

```
=====
Model Version: 1.1 Build11
User Name:
Date:
Site Name:
Operable Unit:
Run Mode: Research
=====
```

***** Air *****

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m ³ /day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m ³)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

***** Diet *****

Age	Diet Intake(µg/day)
.5-1	2.260
1-2	1.960
2-3	2.130
3-4	2.040
4-5	1.950
5-6	2.050
6-7	2.220

***** Drinking Water *****

Water Consumption:

Age	Water (L/day)
.5-1	0.200

EA3 SS.txt

1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.000 µg Pb/L

***** Soil & Dust *****

Multiple Source Analysis Used

Average multiple source concentration: 35.900 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700

Outdoor airborne lead to indoor household dust lead concentration: 100.000

Use alternate indoor dust Pb sources? No

Age	Soil (µg Pb/g)	House Dust (µg Pb/g)
.5-1	37.000	35.900
1-2	37.000	35.900
2-3	37.000	35.900
3-4	37.000	35.900
4-5	37.000	35.900
5-6	37.000	35.900
6-7	37.000	35.900

***** Alternate Intake *****

Age	Alternate (µg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

***** Maternal Contribution: Infant Model *****

Maternal Blood Concentration: 1.000 µg Pb/dL

CALCULATED BLOOD LEAD AND LEAD UPTAKES:

Year	Air (µg/day)	EA3 SS.txt Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
.5-1	0.021	1.100	0.000	0.389
1-2	0.034	0.952	0.000	0.971
2-3	0.062	1.038	0.000	1.014
3-4	0.067	0.998	0.000	1.037
4-5	0.067	0.959	0.000	1.082
5-6	0.093	1.010	0.000	1.143
6-7	0.093	1.095	0.000	1.164
Year	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)	
.5-1	0.903	2.414	1.3	
1-2	1.432	3.389	1.4	
2-3	1.437	3.550	1.3	
3-4	1.442	3.544	1.3	
4-5	1.074	3.180	1.1	
5-6	0.968	3.214	1.0	
6-7	0.915	3.267	0.9	

Exposure Area 3
Combined Surface and Subsurface Soil

EA3 MX.txt
LEAD MODEL FOR WINDOWS Version 1.1

```
=====
Model Version: 1.1 Build11
User Name:
Date:
Site Name:
Operable Unit:
Run Mode: Research
=====
```

***** Air *****

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m ³ /day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m ³)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

***** Diet *****

Age	Diet Intake(µg/day)
.5-1	2.260
1-2	1.960
2-3	2.130
3-4	2.040
4-5	1.950
5-6	2.050
6-7	2.220

***** Drinking Water *****

Water Consumption:

Age	Water (L/day)
-----	---------------

.5-1	0.200
------	-------

EA3 MX.txt

1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.000 µg Pb/L

***** Soil & Dust *****

Multiple Source Analysis Used

Average multiple source concentration: 24.700 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700

Outdoor airborne lead to indoor household dust lead concentration: 100.000

Use alternate indoor dust Pb sources? No

Age	Soil (µg Pb/g)	House Dust (µg Pb/g)
.5-1	21.000	24.700
1-2	21.000	24.700
2-3	21.000	24.700
3-4	21.000	24.700
4-5	21.000	24.700
5-6	21.000	24.700
6-7	21.000	24.700

***** Alternate Intake *****

Age	Alternate (µg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

***** Maternal Contribution: Infant Model *****

Maternal Blood Concentration: 1.000 µg Pb/dL

CALCULATED BLOOD LEAD AND LEAD UPTAKES:

Year	Air (µg/day)	EA3 MX.txt Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
.5-1	0.021	1.104	0.000	0.391
1-2	0.034	0.956	0.000	0.976
2-3	0.062	1.042	0.000	1.017
3-4	0.067	1.001	0.000	1.040
4-5	0.067	0.961	0.000	1.084
5-6	0.093	1.011	0.000	1.145
6-7	0.093	1.096	0.000	1.165
Year	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)	
.5-1	0.574	2.090	1.2	
1-2	0.910	2.876	1.2	
2-3	0.913	3.034	1.1	
3-4	0.916	3.024	1.1	
4-5	0.681	2.792	1.0	
5-6	0.614	2.863	0.9	
6-7	0.580	2.935	0.8	

APPENDIX H

Remedial Alternative Cost Estimates

APPENDIX H
FEASIBILITY STUDY COST ESTIMATES
PARCEL 83
FORT MONMOUTH, NEW JERSEY

Table of Contents

H.1	Remedial Alternatives Cost Summary
H.2	Alternative 2 - Land Use Controls: Cost Breakdown
H.3	Alternative 2 - Land Use Controls: Present Value
H.4	Alternative 3 - Capping Cost Breakdown
H.5	Alternative 3 - Capping Present Value
H.6	Alternative 3 - Detailed Capital Cost Breakdown for Asphalt Cap
H.7	Alternative 4 - Detailed Capital Cost Breakdown for Source Removal

TABLE H.1
REMEDIAL ALTERNATIVES COST SUMMARY
PARCEL 83
FORT MONMOUTH, NEW JERSEY

Remedial Alternative	Description	Capital Cost	Annual Operations and Maintenance Cost ^{a/}	Periodic Cost ^{a/}	Non-Discounted Constant Dollar Cost ^{b/}	TPV at 1.9% Discount Rate ^{c/}
1	No Action	\$0	\$0	\$0	\$0	\$0
2	Land Use Controls (LUCs) - 30 year duration	\$51,000	\$16,000	\$31,000	\$723,000	\$558,000
3	Containment via Capping with Alternative 2 - 30 year duration	\$2,335,000	\$16,000	\$75,000	\$3,664,000	\$3,335,000
4	Source Removal via Direct Excavation and Backfill - 2 year duration	\$5,396,000	\$0	\$0	\$5,396,000	\$5,396,000

Notes

^{a/} Highest annual and periodic costs for remedial alternatives shown. Periodic costs may be less during a specific year.

^{b/} Non-discounted constant dollar cost provided to show impact of discount rate on total present value (TPV).

^{c/} TPV cost estimates are considered accurate to within -30% to +50% of actual costs. Time frames vary among alternatives and are based on the time required to achieve remedial action objectives (RAOs).

Other Notes/Assumptions

- Design and construction contingencies have been added to capital and O&M costs based on USEPA (2000) and professional judgment. USEPA. 2000. *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study*. USEPA 540-R-00-002. July.

Source

Discount Rate 1.90%

TABLE H.2
ALTERNATIVE 2 LAND USE CONTROLS
COST BREAKDOWN
PARCEL 83
FORT MONMOUTH, NEW JERSEY

Item		Units	Unit Cost	Extended
Capital				
Declaration of Environmental Restriction (DER)/Deed Notice	1	Lump Sum	\$ 18,000	\$ 18,000
Flood Hazard Area Control Act Rules Permit preparation and filing	1	Lump Sum	\$ 3,000	\$ 3,000
Coastal Area Facility Review Act permit preparation and filing	1	Lump Sum	\$ 3,000	\$ 3,000
Land survey for Deed Notice	1	Lump Sum	\$ 7,000	\$ 7,000
LUC Implementation Plan	1	Lump Sum	\$ 10,000	\$ 10,000
Contingency	25%			\$ 10,250
			<i>Capital Total</i>	\$ 51,250
Annual Costs				
Inspect & monitor LUCs to ensure restricted use of, or access	1	each	\$ 2,500	\$ 2,500
Reporting & long-term management	1	each	\$ 10,000	\$ 10,000
Contingency	25%			\$ 3,100
			<i>Periodic Costs Total</i>	\$ 15,600
Periodic Costs (every 5 years)				
Update/verify CEA and Deed Notice, inspect ECs	1	each	\$ 5,000	\$ 5,000
Five-Year Review and Reporting	1	each	\$ 20,000	\$ 20,000
Contingency	25%			\$ 6,300
			<i>Periodic Costs Total</i>	\$ 31,300

Assumptions:

LUCs have a duration of 30 years

TABLE H.3
ALTERNATIVE 2 LAND USE CONTROLS
PRESENT VALUE
PARCEL 83
FORT MONMOUTH, NEW JERSEY

Year	Capital Cost (\$)	Annual O&M (\$) (LUCs)	Periodic Costs (\$)	Total Cost	Discount Factor at 1.9%	Present Value at 1.9%
Annual Cost for Remedial Alternatives - Anticipated 30-Year Duration						
0	\$ 51,300	\$ 15,600	\$ -	\$ 66,900	1.000	\$ 66,900
1	\$ -	\$ 15,600	\$ -	\$ 15,600	0.981	\$ 15,310
2	\$ -	\$ 15,600	\$ -	\$ 15,600	0.963	\$ 15,024
3	\$ -	\$ 15,600	\$ -	\$ 15,600	0.945	\$ 14,744
4	\$ -	\$ 15,600	\$ -	\$ 15,600	0.927	\$ 14,469
5	\$ -	\$ 15,600	\$ 31,300	\$ 46,900	0.910	\$ 42,688
6	\$ -	\$ 15,600	\$ -	\$ 15,600	0.893	\$ 13,935
7	\$ -	\$ 15,600	\$ -	\$ 15,600	0.877	\$ 13,675
8	\$ -	\$ 15,600	\$ -	\$ 15,600	0.860	\$ 13,420
9	\$ -	\$ 15,600	\$ -	\$ 15,600	0.844	\$ 13,170
10	\$ -	\$ 15,600	\$ 31,300	\$ 46,900	0.828	\$ 38,854
11	\$ -	\$ 15,600	\$ -	\$ 15,600	0.813	\$ 12,683
12	\$ -	\$ 15,600	\$ -	\$ 15,600	0.798	\$ 12,447
13	\$ -	\$ 15,600	\$ -	\$ 15,600	0.783	\$ 12,215
14	\$ -	\$ 15,600	\$ -	\$ 15,600	0.768	\$ 11,987
15	\$ -	\$ 15,600	\$ 31,300	\$ 46,900	0.754	\$ 35,364
16	\$ -	\$ 15,600	\$ -	\$ 15,600	0.740	\$ 11,544
17	\$ -	\$ 15,600	\$ -	\$ 15,600	0.726	\$ 11,329
18	\$ -	\$ 15,600	\$ -	\$ 15,600	0.713	\$ 11,118
19	\$ -	\$ 15,600	\$ -	\$ 15,600	0.699	\$ 10,910
20	\$ -	\$ 15,600	\$ 31,300	\$ 46,900	0.686	\$ 32,188
21	\$ -	\$ 15,600	\$ -	\$ 15,600	0.674	\$ 10,507
22	\$ -	\$ 15,600	\$ -	\$ 15,600	0.661	\$ 10,311
23	\$ -	\$ 15,600	\$ -	\$ 15,600	0.649	\$ 10,119
24	\$ -	\$ 15,600	\$ -	\$ 15,600	0.637	\$ 9,930
25	\$ -	\$ 15,600	\$ 31,300	\$ 46,900	0.625	\$ 29,297
26	\$ -	\$ 15,600	\$ -	\$ 15,600	0.613	\$ 9,564
27	\$ -	\$ 15,600	\$ -	\$ 15,600	0.602	\$ 9,385
28	\$ -	\$ 15,600	\$ -	\$ 15,600	0.590	\$ 9,210
29	\$ -	\$ 15,600	\$ -	\$ 15,600	0.579	\$ 9,039
30	\$ -	\$ 15,600	\$ 31,300	\$ 46,900	0.569	\$ 26,666
TOTALS	\$ 51,300	\$ 483,600	\$ 187,800	\$ 722,700		\$ 558,100

TABLE H.4
ALTERNATIVE 3 CAPPING
COST BREAKDOWN
PARCEL 83
FORT MONMOUTH, NEW JERSEY

Item		Units	Unit Cost	Extended
Capital				
LUCs capital cost	1	Lump Sum	\$ 51,300	\$ 51,300
Planning, Oversight, Scheduling, Meetings, Scope Preparation, Documents	1	Lump Sum	\$ 119,900	\$ 119,900
Demolition, earthwork, paving, waste management	1	Lump Sum	\$ 2,127,800	\$ 2,127,800
Reporting	1	Lump Sum	\$ 36,100	\$ 36,100
Note: 25% Contingency rolled into unit cost				
Capital Total				\$ 2,335,100
Annual Costs				
Inspect & monitor LUCs to ensure restricted use of, or access	1	each	\$ 2,500	\$ 2,500
Reporting & long-term management	1	each	\$ 10,000	\$ 10,000
Contingency	25%			\$ 3,100
Annual Costs Total				\$ 15,600
Periodic Costs (every 2 years)				
Cap maintenance	1	each	\$ 35,000	\$ 35,000
Contingency	25%			\$ 8,800
2-Year Periodic Costs Total				\$ 43,800
Periodic Costs (every 5 years)				
Update/verify CEA and Deed Notice, inspect ECs	1	each	\$ 5,000	\$ 5,000
Five-Year Review and Reporting	1	each	\$ 20,000	\$ 20,000
Contingency	25%			\$ 6,300
5-Year Periodic Costs Total				\$ 31,300

Assumptions:

LUCs have a duration of 30 years

TABLE H.5
ALTERNATIVE 3 CAPPING
PRESENT VALUE
PARCEL 83
FORT MONMOUTH, NEW JERSEY

Year	Capital Cost (\$)	Annual O&M (\$) (LUCs)	Periodic Costs (\$)	Total Cost	Discount Factor at 1.9%	Present Value at 1.9%
Annual Cost for Remedial Alternatives - Anticipated 30-Year Duration						
0	\$ 2,335,100	\$ 15,600	\$ -	\$ 2,350,700	1.000	\$ 2,350,700
1	\$ -	\$ 15,600	\$ -	\$ 15,600	0.981	\$ 15,310
2	\$ -	\$ 15,600	\$ 43,800	\$ 59,400	0.963	\$ 57,206
3	\$ -	\$ 15,600	\$ -	\$ 15,600	0.945	\$ 14,744
4	\$ -	\$ 15,600	\$ 43,800	\$ 59,400	0.927	\$ 55,093
5	\$ -	\$ 15,600	\$ 31,300	\$ 46,900	0.910	\$ 42,688
6	\$ -	\$ 15,600	\$ 43,800	\$ 59,400	0.893	\$ 53,057
7	\$ -	\$ 15,600	\$ -	\$ 15,600	0.877	\$ 13,675
8	\$ -	\$ 15,600	\$ 43,800	\$ 59,400	0.860	\$ 51,097
9	\$ -	\$ 15,600	\$ -	\$ 15,600	0.844	\$ 13,170
10	\$ -	\$ 15,600	\$ 75,100	\$ 90,700	0.828	\$ 75,140
11	\$ -	\$ 15,600	\$ -	\$ 15,600	0.813	\$ 12,683
12	\$ -	\$ 15,600	\$ 43,800	\$ 59,400	0.798	\$ 47,392
13	\$ -	\$ 15,600	\$ -	\$ 15,600	0.783	\$ 12,215
14	\$ -	\$ 15,600	\$ 43,800	\$ 59,400	0.768	\$ 45,641
15	\$ -	\$ 15,600	\$ 31,300	\$ 46,900	0.754	\$ 35,364
16	\$ -	\$ 15,600	\$ 43,800	\$ 59,400	0.740	\$ 43,955
17	\$ -	\$ 15,600	\$ -	\$ 15,600	0.726	\$ 11,329
18	\$ -	\$ 15,600	\$ 43,800	\$ 59,400	0.713	\$ 42,331
19	\$ -	\$ 15,600	\$ -	\$ 15,600	0.699	\$ 10,910
20	\$ -	\$ 15,600	\$ 75,100	\$ 90,700	0.686	\$ 62,248
21	\$ -	\$ 15,600	\$ -	\$ 15,600	0.674	\$ 10,507
22	\$ -	\$ 15,600	\$ 43,800	\$ 59,400	0.661	\$ 39,261
23	\$ -	\$ 15,600	\$ -	\$ 15,600	0.649	\$ 10,119
24	\$ -	\$ 15,600	\$ 43,800	\$ 59,400	0.637	\$ 37,810
25	\$ -	\$ 15,600	\$ 31,300	\$ 46,900	0.625	\$ 29,297
26	\$ -	\$ 15,600	\$ 43,800	\$ 59,400	0.613	\$ 36,414
27	\$ -	\$ 15,600	\$ -	\$ 15,600	0.602	\$ 9,385
28	\$ -	\$ 15,600	\$ 43,800	\$ 59,400	0.590	\$ 35,068
29	\$ -	\$ 15,600	\$ -	\$ 15,600	0.579	\$ 9,039
30	\$ -	\$ 15,600	\$ 75,100	\$ 90,700	0.569	\$ 51,569
TOTALS	\$ 2,335,100	\$ 483,600	\$ 844,800	\$ 3,663,500		\$ 3,334,500

TABLE H.6
ALTERNATIVE 3 DETAILED CAPITAL COST BREAKDOWN FOR ASPHALT CAP
FEASIBILITY STUDY COST SUMMARY PARCEL 83 FORT MONMOUTH, NEW JERSEY

[illegible]

TABLE H.7
ALTERNATIVE 4 DETAILED CAPITAL COST BREAKDOWN FOR SOURCE REMOVAL
FEASIBILITY STUDY COST SUMMARY PARCEL 83 FORT MONMOUTH, NEW JERSEY

Professional Category	Labor					Subcontractors					Number of Events	Total Capital Cost
	Senior Level	Mid Level	Junior Level	Total	Total	Sub	Quantity	Units	Unit Rate	Total		
Approximate Billing Rate (\$/hr)	\$130	\$100	\$75	Hours	Labor	Hours				Subs		
Planning, Direction, Oversight, Scheduling, Meetings, Scope Preparation, and Planning Documents												
Planning, Direction, and Oversight	10	12	16	38	\$ 3,700						1	\$ 3,700
Schedule Preparation, Implementation, and Meetings	12	6	6	24	\$ 2,610						1	\$ 2,610
Scope Preparation/Permitting	10	320	200	40	\$ 48,300						1	\$ 48,300
Flood Hazard Area Control Act Rules Permit preparation and filing							1	lump sum	\$ 3,000	\$ 3,000	1	\$ 3,000
Coastal Area Facility Review Act permit preparation and filing							1	lump sum	\$ 3,000	\$ 3,000	1	\$ 3,000
Remedial Action Work Plan/UFP-QAPP/APP/SSHP/QASP	12	100	120	232	\$ 20,560						1	\$ 20,560
Finalize RAWP and Submitt to Regulators	6	80	160	246	\$ 20,780						1	\$ 20,780
Subtotal	50	518	502	1,070	\$ 95,950							\$ 101,950
Excavation and Offsite Disposal												
Mobilization/Set-up/Demobilization	4	6	20	30	\$ 2,620		1	lump sum	\$ 10,000	\$ 10,000	1	\$ 12,620
Utility Clearance		8	20	28	\$ 2,300		2	day	\$ 2,000	\$ 4,000	1	\$ 6,300
Surveying (pre excavation)		8	20	28	\$ 2,300		1	day	\$ 2,500	\$ 2,500	1	\$ 4,800
Perimeter Air Monitoring and Dust Control							1	lump sum	\$ 3,000	\$ 3,000	1	\$ 3,000
Excavation & Disposal												
excavation/segregation/stockpiling	20	80	160	260	\$ 22,600		30000	ton	\$ 32	\$ 960,000	1	\$ 982,600
sorting/loading		20	40	60	\$ 5,000		1	lump sum	\$ 5,000	\$ 5,000	1	\$ 10,000
transport & disposal of excavated non-hazardous		8	16	24	\$ 2,000		30000	ton	\$ 90	\$ 2,700,000	1	\$ 2,702,000
waste characterization/profiling/tracking	4	8	8	20	\$ 1,920						1	\$ 1,920
Confirmation Sampling												
sample collection	4	8	24	36	\$ 3,120						1	\$ 3,120
Data Management		4	24	28	\$ 2,200						1	\$ 2,200
excavation (bottom and sidewalls) confirmation soil sampling							109	sample	\$ 200	\$ 21,800	1	\$ 21,800
soil stockpile waste characterization suite							5	sample	\$ 600	\$ 3,000	1	\$ 3,000
Backfill												
oversight of backfill operations	4	10	40	54	\$ 4,520						1	\$ 4,520
soil fill import (transport, placement, testing)	2	4	8	14	\$ 1,260		30000	ton	\$ 50	\$ 1,500,000	1	\$ 1,501,260
import material sampling suite							5	sample	\$ 450	\$ 2,250		
Geotechnical Services		4	8	12	\$ 1,000		1	lump sum	\$ 5,000	\$ 5,000	1	\$ 6,000
Subtotal	38	168	388	594	\$ 50,840					\$ 5,216,550		\$ 5,265,140
Reporting												
Draft Report Preparation on Excavation	40	60	88	200	\$ 17,800						1	\$ 17,800
Incorporate Comments from FTMM and USACE	12	20	32	60	\$ 5,960						1	\$ 5,960
Finalize Report and Submitt to Regulators	10	20	24	40	\$ 5,100						1	\$ 5,100
Subtotal	62	100	144	306	\$ 28,860							\$ 28,860
Alternative 4 Excavation Subtotal												\$ 5,306,620
Contingency (25%)												\$ 1,326,655
Alternative 4 Excavation Total	150	786	1,034	1,970	\$ 175,650					\$ 5,216,550		\$ 5,395,950